



KY

**WILDLIFE
ACTION
PLAN**

SEPTEMBER 1, 2023

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KENTUCKY'S STATE WILDLIFE ACTION PLAN

Kentucky Department of Fish and Wildlife Resources,

#1 Sportsman's Lane, Frankfort, Kentucky 40601.

fw.ky.gov/WAP/Pages/Default.aspx (September 2023).



COMMISSIONER'S FOREWORD

As its name suggests, Kentucky's State Wildlife Action Plan is not meant to sit on a shelf and collect dust.

It's intended to be used as a roadmap.

State Wildlife Action Plans strive to keep common species common - before a species is listed or emergency room measures are needed – because once a species is imperiled, recovery becomes more expensive, takes longer, and the odds of success diminish.

The many collaborators on this latest revision to Kentucky's Plan went to work to reimagine what it needed to include, how it should look and function.

Teams of subject-matter experts and representatives from government and non-government organizations identified more than 500 Species of Greatest Conservation Need, including insects and globally rare plant species, and more than 2,000 actions that could help those species.

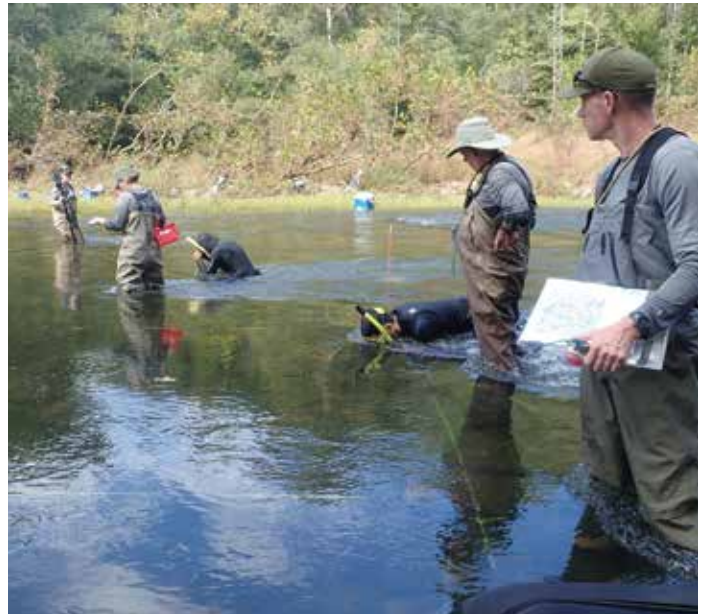
This astounding team effort has produced a revised plan that is more user-friendly and provides a framework for collaboration by Kentucky's state conservation partners and citizens – utilizing their respective missions, passions and areas of expertise.

There is something in it for every Kentuckian.

We are entrusted to be good stewards of the resources in a place that we are blessed to call home. While we can make a difference as individuals to conserve, protect and enhance our abundance of natural resources, this State Wildlife Action Plan shows us that conservation success in the Commonwealth is possible by combining our efforts and working together.



Rich Storm
Commissioner, Kentucky Department of Fish
and Wildlife Resources



EXECUTIVE SUMMARY

Kentucky's State Wildlife Action Plan (SWAP, also referred to as the 'Plan') was developed to identify and conserve Kentucky's Species of Greatest Conservation Need (SGCN) and to comply with the requirements of the Congressionally authorized State and Tribal Wildlife Grants Program. This document represents a proactive plan for sustaining the diversity of species and habitats found in Kentucky. The Kentucky Department of Fish and Wildlife Resources (KDFWR) acted as the lead agency in this effort, but the finished product is the result of efforts and expertise provided by many additional partners. This is not KDFWR's plan, but rather an overarching initiative for collaborative conservation efforts among Kentucky's federal, state and local agencies, educational institutions, business groups, consultants, energy industries, environmental consultants, non-governmental organizations, conservation groups, and citizens- all committed to working on behalf of our state's SGCN.

This Plan largely addresses species that have not traditionally had a dedicated funding source. Historically, the authority and responsibility for species management has been vested with the states. For decades, state fish and wildlife agencies have worked, in partnership with the U.S. Fish and Wildlife Service (USFWS) under the Federal Aid in Wildlife Restoration Act and the Federal Aid in Sport Fish Restoration Act to conserve and properly manage game species. Separate funding sources have also been established for species listed as Federally Threatened or Endangered. However, a reliable funding mechanism has not been established to adequately address other non-game species. This plan is a judicious effort to address the future of these species.

A total of 527 Species of Greatest Conservation Need were identified for Kentucky, representing species from 9 taxonomic groups: Amphibians, Birds, Crustaceans, Fishes and Lampreys, Freshwater Mussels and Snails, Insects and Springtails, Mammals, Plants, and Reptiles. Additionally, we identified groups of Data deficient species for which further information is needed. For each SGCN, we mapped ranges and known locations and identified key habitats on which they depend. We identified primary threats affecting SGCN and proposed specific conservation actions to address those threats. Measures to monitor the status of SGCN and their habitats were developed along with survey, research, and management needs to drive ongoing efforts and shape future plans. We delineated eleven Conservation Opportunity Areas (COAs) that

represent some of the best regions of the state to continue or initiate conservation objectives. Just as importantly, we proposed the framework for a system to monitor the overall effectiveness of this Plan.

We purposefully structured this Plan around the Eight Required Elements for SWAPs but did so in a way to convey information clearly and efficiently so that we could accommodate a variety of users. A Guide to the Eight to the Elements has been developed to aid reviewers and other users in locating each element. There is much to learn about Kentucky's fish and wildlife species and their habitats, and we intend to adapt our approach as new information becomes available through the implementation of this plan. We recognize our current efforts represent a starting point for conservation, not a conclusion.



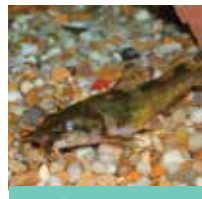
Amphibians



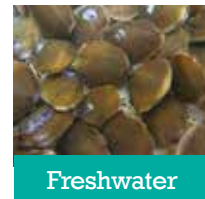
Birds



Crustaceans



Fishes and
Lampreys



Freshwater
Mussels and
Snails



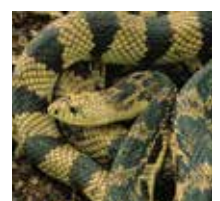
Insects and
Springtails



Mammals



Plants



Reptiles

INVITATION TO KENTUCKIANS

Kentucky's State Wildlife Action Plan serves as a toolkit containing unparalleled resources for conserving Kentucky's imperiled animals and plants - the Species of Greatest Conservation Need. The plan also represents an invitation for you to join this vital effort to restore and sustain species that call the Bluegrass State their home.

Every year, millions of people actively engage in some type of recreation directly involving fish and wildlife in Kentucky. We enjoy viewing the native fauna and flora of our beautiful state. We want to know that these creatures will be here for future generations to enjoy as well.

Moreover, wild animals are public resources. Practically speaking, this means we all share in the numerous benefits wild animals provide, and we likewise share the responsibility to conserve them. Our native plants and animals are truly vital components of the "common wealth" of Kentucky.

Our shared love for nature presents us with a tremendous opportunity. We can pull in the same direction to help ensure that none of the diverse and important species highlighted in this plan are ever lost to extinction.

The task may seem daunting, even overwhelming. Can one person, family, group or community make a difference across the vast Kentucky landscape, which spans some 25 million acres? After all, relatively few of us are professional biologists, botanists, researchers or public policy makers. Only a small percentage of us own land or water sizeable enough to protect even a single species. The answer, fortunately, is a resounding 'Yes!'

The actions outlined in this plan summarize what is necessary to help stabilize and recover Kentucky's species of greatest conservation need - all 527 of them. With such a large task at hand, the agencies, partners and organizations involved in building this plan must work together in meaningful and impactful ways.

Our communities, too, can play a role in the success of this Wildlife Action Plan. What might this look like?

- Homeowners can convert swaths or blocks of their lawns to native, nectar-producing plants and milkweed to benefit Monarch butterflies and other at-risk pollinators.
- Landowners with more acreage can receive free technical assistance from their local Kentucky Fish and Wildlife private lands biologist to develop a wildlife conservation plan. This can open the door to funding opportunities through conservation incentive programs.

- Clubs and conservation organizations can volunteer for projects to help species in need of conservation. This could include biological surveys, habitat improvements, invasive plant removal and clean ups of natural areas.
- Schools and businesses can learn how to better manage their grounds, water resources and other features on their property to benefit wildlife.

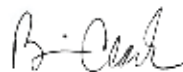
Finally, we can support this effort financially.

- Join the Kentucky Wild program. Proceeds help restore wildlife that don't currently have ample dedicated funding.
- Select the nongame check-off box on your state income tax return.
- Purchase a nature license plate to support the Heritage Land Conservation Fund to permanently protect more land in the state.
- Donate to a specific project being conducted by a state agency or nonprofit group that is aimed at helping one of our imperiled species.

Whatever your circumstances, geography or interest with regard to Species of Greatest Conservation Need in Kentucky, please accept our invitation to be a part of the effort to invest in Kentucky's rich natural resources to help restore these species.

Alone, none of us has the capacity to do all that is needed to turn things around for these cherished wild animals and plants. But united, we can.

Thank you for your investment in 'our "common wealth" of nature!



Brian Clark
Deputy Commissioner, Kentucky Department of Fish and Wildlife Resources

CHAPTER 1: INTRODUCTION

Changes to Kentucky's Landscape

The State Wildlife Action Plan – Changes in the Kentucky Landscape Over the Decades

Famed Kentucky pioneer Daniel Boone finally viewed the “levels of Kentucky” on June 7, 1769, from what is now Pilot Knob State Nature Preserve in Powell County and set up camp nearby.

Author John Filson related what Boone saw in his book *The Discovery, Settlement and Present State of Kentucke*: “the buffalo are more frequent than I have ever seen cattle in the settlements, browsing on the leaves of cane, or cropping the herbage on those extensive plains, fearless because ignorant of man. Sometimes we saw hundreds in a drove, and the numbers about the salt springs were amazing.”

In 1775, Daniel Boone and other pioneers began the settlement at Fort Boonesboro, Kentucky along the south bank of Kentucky River, under the auspices of Judge Richard Henderson and the Transylvania Company. When Boone's party first arrived that spring, the area around the fort abounded in elk, deer, bison and wild turkey. Within a month of their arrival, wanton slaughter and human activity drove away most of the game from the area. Judge Richard Henderson of the Transylvania Company wrote: “We found it very difficult at first to stop great waste in killing meat. Some would kill three, four, five or half a dozen buffalo and not take a half horse load from them all. For want of a little obligatory law, our game as soon as we got here was driven off very much.”

The settlers at Boonesboro held a convention for the adoption of laws for the new colony. One of the nine acts passed by this rudimentary legislature was for the preservation of game.

The American bison were so numerous in early Kentucky some considered them pests. Other early settlers forsook farming to hunt bison.

The seasonal migrations of bison dictated pioneer settlement patterns. They instinctually knew the easiest path over steep terrain. Their migration trails provided early explorers the easiest places to ford streams. Their crossing spots on major rivers provided naturally graded landings for the flatboats of early pioneers and the steamboats of a later generation.

One of the most notable was at Yellowbanks on the Ohio River, where vast herds of bison crossed while migrating from their summer range in the southern Illinois grasslands to their wintering areas near the salt springs around what is now Nashville, Tennessee.

Yellowbanks eventually became the city of

Owensboro, Kentucky.

The first explorers to enter Kentucky used bison and Native American paths to navigate the wilderness. The road system that later developed in the Inner Bluegrass Region often used the trails carved by bison migration. A bison trail led from McConnell Springs in what is now Fayette County to the great bison crossing at Leestown along the Kentucky River in Franklin County.

U.S. 421 now roughly follows this ancient trail. The city of Lexington grew up around McConnell Springs and Kentucky's capital city, Frankfort, arose around Leestown.

The influx of settlers from 1780 through 1800 from the actions of Boone and others transformed the Kentucky landscape. The pattern established at Boonesboro of indiscriminate wanton slaughter of bison continued, nearly all were gone from the Inner Bluegrass Region by 1800.

The Barrens, the grassland in south-central Kentucky rich with herds of bison, held the last of them in Kentucky. The last confirmed reports of bison were a small herd going down the Green River in Hart County in 1820.



The migration routes of the American Bison became early transportation corridors for pioneers settling Kentucky. Many modern highways, especially in central Kentucky, still roughly follow old bison paths. Photo: Adobe Stock

Bison maintained the natural meadows and canebrakes, but as settlers cleaned them out, cattle imported from the East, replaced them. Cattle quickly devoured the cane and natural grass lands, opening up new areas for their replacement by the grass most associated with Kentucky: bluegrass.

Native to Eurasia, *Poa Pratensis*, Kentucky Bluegrass, came to the Eastern seaboard in 1625. French traders brought bluegrass down to the Ohio and Mississippi river valleys. It grew so quickly and extensively that Native Americans derisively called it “foot grass.” The plant had already invaded the meadows of the Bluegrass Region by

the time Daniel Boone glimpsed them.

The destruction of the native canebrakes and replacement by bluegrass fostered livestock production that rivaled anywhere in the early United States. Cattle and sheep could now overwinter by feeding on bluegrass. Purebred cattle entered Kentucky in 1785 and launched Kentucky's still strong cattle industry. Kentucky became known for excellent short horn cattle.

Some attribute bluegrass as the vehicle for the uptake of the calcium and phosphorus in the soil of the Inner Bluegrass Region, spurring strong bone growth and muscle development in thoroughbred racehorses.

The famed naturalist Aldo Leopold said Kentucky was an ecological accident between humans and the land: "It is time now to ponder the fact that cane lands (of Kentucky), when subjected to the particular mixture of forces represented by the cow, plow, fire and axe of the pioneer, became bluegrass. What if the plant succession inherent in this dark and bloody ground had, under the impact of these forces, given us some worthless sedge, shrub or weed? Would Boone and Kenton have held out? Would there have been any overflow into Ohio, Indiana, Illinois and Missouri? Any Louisiana Purchase? Any transcontinental new states? Any Civil War?"

Row crops also made their way over the Appalachian mountains. The Virginia legislature in 1776 created the Corn Patch and Cabin Rights Act, which anyone who by Jan. 1, 1778, erected a cabin and planted a patch of corn could establish a claim to 400 acres. This act helped sew corn into the fabric of early Kentucky.

Some of the immigrants who came through the Cumberland Gap or down the Ohio River into what would become Kentucky brought with them knowledge of distilling. They adapted their whiskey recipes to include corn.

These pioneer farmer-distillers such as Jacob Beam in what is now Washington County, Stephen Ritchie on Cox's Creek in Nelson County, Elijah and Oscar Pepper in what is now Woodford County and Jacob Spears in Bourbon County. Spear's stone 1790 distillery still stands on Clay-Kiser Road in Bourbon County.

The bourbon produced by these farmer-distillers proved popular and Kentucky bourbon whiskey soon gained a reputation for quality. This popularity increased after the arrival of James Crow into Woodford County; he went to work for Oscar Pepper at his large stone distillery along Glenss Creek in the 1830s. This distillery is now known as the Woodford Reserve Distillery.

Crow, a chemist, used scientific principles to test the mash for sweetness and acidity and was a stickler for a thorough cleaning of all distilling equipment after each batch. This kept unwanted bacteria, molds or other contaminants from impacting the flavor of the finished product.

Crow also perfected the sour mash process, using some of the previous mash to encourage good fermentation for the next batch, prevent the growth of bad

bacteria and provide consistency from batch to batch. This process is similar to using a starter for sourdough bread. Early Kentucky distillers also knew to age their bourbon in charred white oak barrels to impart color, improve the taste and greatly mellow the bourbon.



Warehouse A at Jim Beam's Old Grand Dad plant along Elkhorn Creek in Frankfort, Kentucky is the oldest rickhouse in the Jim Beam family of distilleries. Photo: Lee McClellan



These are barrels of Jim Beam bourbon asleep in the wood in Warehouse A. The barrels at the top and bottom of Warehouse A will become Jim Beam White Label 4-Year-Old bourbon. The barrels in the middle of Warehouse A will eventually become Knob Creek bourbon. Photo: Lee McClellan

They developed the Old Crow brand of bourbon and became one of the most popular brands in the United States. The demand for Kentucky bourbon rose dramatically. This placed pressure on the Kentucky legislature to make "improvements" to the rivers in Kentucky to aid travel, particularly the Kentucky and Green rivers. The distillers along with farmers wanting to ship tobacco, hogs and other commodities needed access to markets.

Shipping bourbon and the other products downriver to markets in Louisville or all the way to New Orleans proved

easier and more profitable than moving product over the Appalachian Mountains to the east.

The first “improvements” on Kentucky rivers involved removing snags from the riverbed, eliminating important cover and nursery habitat for fish. The first five locks and dams on Kentucky River went up between 1836 and 1842, completing slack water navigation to Frankfort. The first locks and dams on the Green River began construction in 1834 in a process that would end with the completion of Lock and Dam #6 near Brownsville in 1906.

The arrival of the first steamboats on the Kentucky River in 1816 and at Bowling Green in 1828 was the main catalyst for creating slack water navigation. Major barriers to steamboat navigation on Green River were the Long Falls at Calhoun and the Big Falls at Rochester, a natural rock dam formed by Green River’s confluence with Mud River.

Calhoun became the site of the Lock and Dam 2, the first one built on Green River in 1834 while Rochester became the site for Lock and Dam 3. They built Lock and Dam 1 on Barren River by 1836, allowing for steamboat traffic to reach Bowling Green at any time of year and the city grew in importance as a result.

Steamboat shipping gave farmers who grew hemp and tobacco access to profitable markets. As the Deep South cotton belt expanded, it spurred demand for hemp rope and bagging to wrap cotton bales. Hemp grew exceptionally well in the Kentucky climate and as the steamboat industry expanded, so did the need for rope and caulking made from Kentucky hemp.

The steamboat also brought Kentucky tobacco to consumers, and it proved popular. Water transportation allowed for large hogheads of tobacco to quickly reach market, something extremely difficult to accomplish by traveling overland using animal power and carts. Kentucky’s tobacco production increased to eventually become the largest cash crop in the state.

The establishment of profitable crops and entrenchment of farming dramatically changed the Kentucky landscape. By the 1850s, more than 80 percent of the Bluegrass Region in central Kentucky was in farms with 59 percent of this under cultivation. The forests disappeared as central Kentucky was primarily forested in pioneer days, but only 5 to 6 percent remained by 1910.

The construction of locks and dams brought profits to distillers and gave farmers markets to sell their crops but brought the complete obliteration of the rivers natural processes and animal habitats. The impact on mussel fauna was staggering.

Even the largest streams in Kentucky were relatively shallow in their natural condition. The Ohio River had an average low water depth of just three feet and had numerous shallow shoals and riffles, which made great mussel habitats. The inundation of these riverine habitats by lock and dam construction made mussel species accustomed to shallow shoal habitats were now too deep. Silt covered many mussel



Workers removed Lock and Dam 5 on Green River in the summer of 2022. The removal of Locks and Dams 5 and 6 frees 73 miles of formerly impounded water on the Green River. Photo: Eric Cummins

beds after locks and dams eliminated these river’s ability to flush silt from their stream bottoms.

The barriers to fish migration greatly impacted mussel reproduction, as certain mussel species need particular fish species to serve as host fish for part of the mussel reproduction cycle. This fragmentation resulted in mussel species isolated from their host fish and caused extinctions, primarily those mussel species dependent on migrating fish such as sauger. Many mussel species today are teetering on the brink of extinction from these same forces.

It boggles the mind to consider the Green River remains one of the most biologically diverse rivers in the United States. It is home to 150 species of fish and 70 mussel species (including 19 federally listed and one endemic species). The Green River had six locks and dams including the 8,200-acre Green River Lake. Despite these impacts, the river continues to maintain a diverse aquatic fauna.

Dam construction began nearly as soon as pioneers established homesteads near streams. They built stone dams to harness the power of water to turn grinding stones in grist mills that turn corn into meal and wheat into flour. By 1840, 1,300 of these mills existed in the Bluegrass Region.

Grist mill dam construction did change the hydrology of the streams and impacted fish migration, but these early social centers for pioneers were extremely small scale compared to the lock and dam systems constructed on the larger rivers. A paddler on the shallow, rock bottomed streams of Kentucky will encounter the remains of these old grist mills. Often the former rock dam now lies in the streambed, providing current breaks for smallmouth bass.

Kentucky agriculture became entrenched in livestock production and the raising of hemp, corn and tobacco before the Civil War. The war ripped all of it asunder.

Large swaths of Kentucky were nearly stripped of its

livestock, agricultural surplus and wealth.

By the end of war, Kentucky was fractured, ravaged, impoverished and vulnerable. Large scale change was to come from the forces of capital from outside the state, who wanted the profits from exploiting Kentucky's virgin forests and untapped mineral holdings.

The Civil War left citizens of both sides of the conflict thirsty and demand for Kentucky bourbon increased. The expansion of the railroads during and immediately after the Civil War allowed for much easier ways of shipping great quantities of Kentucky bourbon over great distances to a rapidly growing country.

These forces prompted some Kentucky distillers, such as David M. Beam, grandson of early distiller Jacob Beam and father of James B. "Jim" Beam, to move locations to take advantage of the railroads. They also changed the name of their flagship bourbon from Old Jake Beam Sour Mash to Old Tub. David Beam moved the Beam brands to just north of Bardstown along a newly constructed railroad line in 1850s. From this new location, they could ship Old Tub to anywhere in the country.

It became the most popular bourbon in Kentucky during the Civil War and as the country expanded, so did the market for Old Tub. It became one of the first national brands and further enhanced the reputation of Kentucky bourbon for smoothness and quality. When people in the newly settled regions of the nation asked for the "good Kentucky bourbon," they were likely asking for Old Tub.

As the demand for bourbon grew, so did the need for barrels. This increased the need for white oak as barrels made from this species are much preferred for bourbon storage. This increase in demand also piggy backed on the great expansion of railroads and the need for railroad ties. It takes up to 3,000 ties to lay just one mile of track. Oaks, often white oaks, make good railroad ties.

This placed pressure on white oaks stands in Kentucky. Stands of white oak in the Knobs region near the bourbon distilleries in Nelson and Marion counties came under intense pressure. As railroads tapped the eastern Kentucky mountains, those white oaks stands felt the pressure as well. This is an ongoing process as the so-called "bourbon boom" over the last couple of decades placed new stresses on white oak stocks under pressure since the Civil War.

White oak acorns make one of the most important food sources in Kentucky forests. Removing white oak stands allows increase of red maple, a much less desirable species for wildlife. Red maple impacts the ability of white oak to reproduce, crowding out young white oak trees that don't grow as quickly as red maple.

The opening of railroads into the eastern Kentucky mountains transformed the region. Large scale capital came into the region after the Civil War and companies such as the Cincinnati and Green River Railway, the Cincinnati and Southern Railroad and the Louisville and

Nashville expanded their lines from 1870 through the 1920s. This prompted construction of smaller feeder lines to probe more isolated regions and quickly remove the valuable timber.

Cincinnati businessman Eugene Zimmerman bought 13,000 acres of timberlands in Casey County and built the Cincinnati and Green River Railway in 1884. This created a timber boom town at Yosemite in northeast Casey County, the location of the sawmills for his Green River Lumber Company. It took less than a decade to clean out his holdings of timber, he began to liquidate his cut over lands in 1891.

Two Cincinnati businessmen, Fred Mowbray and Edward Robinson, purchased 15,000 acres in Breathitt, Knott and Perry counties and from 1909 to 1922, they removed the timber from this region along the North Fork of the Kentucky River. They sold the processed lumber to the Singer Sewing Machine Company for wooden cabinets for their machines. In 1923, Robinson donated 14,800 acres to the University of Kentucky for a research forest that now bears his name.

The Bond-Foley Lumber Company built the largest double band sawmill in Kentucky to process the timber on their 24,000 acres in Jackson County.

The Dana Lumber Company, the Swan Day Lumber Company and other smaller companies such as the Union City Lumber Company removed the timber from what is now the Red River Gorge National Geological Area. Michigan began to exhaust their timber resources in the 1850s and businessmen from that state began to look at Appalachia for timber.

The Union City Lumber Company of Union City, Michigan in 1898 purchased the Red River Valley Railroad to move logs from their holdings along Big Amos Creek and the East Fork of Indian Creek in Menifee County. Some of the trees they cut were 6 to 7 feet in diameter. Hikers and trout anglers along the East Fork of Indian



The expansion of the bourbon industry after the Civil War placed pressure on white oak stands in Kentucky. White oak is preferred for making bourbon barrels.

Photo: Steve Bonney

Creek in the Red River Gorge National Geological Area can easily discern the narrow-gauge railroad bed that brought those massive trees to market.

In recent years, many agencies conducted an extensive stream restoration on East Fork of Indian Creek to help the stream heal from the ravages of deforestation and channel alteration.

Another Michigan businessman, Justus S. Stearns bought massive holdings on the Cumberland Plateau in southeastern Kentucky and northeastern Tennessee, eventually reaching nearly 200 square miles. His massive operation, the Stearns Coal and Lumber Company, eventually employed 2,200 people and prompted the formation of Kentucky's last county, McCreary, in 1912. It remains the only county in Kentucky without an incorporated city.

The Stearns lands in Kentucky are now primarily part of the 100,000-acre Big South Fork National River and Recreation Area and the Daniel Boone National Forest.

Within 60 years of 1870, 99.5 percent of Appalachia's forests were removed. In addition to white oak, the loss of trees prized for their wood such as cherry, walnut, hickory and other oaks meant fewer food items for wildlife. This in combination with the loss of the American chestnut due to the chestnut blight places our current forests in Kentucky in a compromised state.

The first record of coal production in Kentucky was in 1828, when workers mined 328 tons. The expansion of railroads into the isolated sections of eastern Kentucky brought millions of board feet of lumber to market, but also spurred the development of coalfields.

Well financed companies, often from the northeastern United States, moved into the region to exploit the mineral resources. The discovery of the Elkhorn seams of coal in extreme eastern and southeastern Kentucky spurred much coal mining. Coals from these seams are of a quality high enough to use for the making of high-grade steel.

In 1917, the U.S. Steel Corporation's subsidiary, U.S. Coal and Coke Company, built Lynch, the largest coal camp in the world, to mine the 19,000 acres the company acquired in Harlan County, along the Virginia border.

The industrial complex included the largest coal tippie in the world. On Feb. 17, 1923, miners at Lynch set the world record for coal production in a nine-hour shift with 12,820 tons mined, filling 256 railcars.

The Kentenia Corporation, a land company that leased coal and timberlands, came to control 100 square miles of land in Harlan and Bell counties. A young Franklin Delano Roosevelt, just out of Harvard, traveled to the region in 1909 to help his uncle, Warren Delano, Vice-President of Kentenia and a director of the Louisville and Nashville Railroad.

In letters that future wife Eleanor published, young Franklin learned to spit tobacco juice on hot pot-bellied stoves to make it sizzle, like the locals he witnessed. He

described the majesty of riding along the Martin's Fork of Cumberland River as "the most beautiful country we have seen yet."

The forces unleashed after his visit would obliterate from the Earth the culture young Franklin encountered and the landscapes he saw.

Coal mining also transformed the Western Coalfield Region in the decades after World War II by strip mining the relatively shallow seams of coal. Big Hog, at the time the world's largest shovel, uncovered 80 million tons of coal in two decades. It was immortalized in John Prine's classic song "Paradise."

Postal records show small crossroads communities



Strip mining for coal produced great profits for coal companies, but left a complicated environmental legacy in both the Eastern and Western Kentucky coalfields.

Photo: Dave Baker

along the Pond River in Muhlenberg County disappeared in the 1950s from displacement to strip mine coal. They also altered other towns to get at the coal underneath. Although much of this region is now in the Peabody Wildlife Management Area and is Kentucky's best quail hunting place, the land remains transformed and denuded.

Both underground and surface mines can seriously degrade stream ecosystems. Coal mining exposes iron sulfide and when mixed with water and oxygen produces sulfuric acid and dissolved iron that leach into streams. This acid mine drainage often impacts streams for decades after reclamation and can eliminate many forms of aquatic life.

Coal mining is implicated in mussel declines throughout the coal producing regions of Kentucky. The Little South Fork of Cumberland River along the Wayne - McCreary County border, once held the most intact mussel populations in the Cumberland River watershed. Acid mine drainage and oil extraction caused a decline of 83 percent in species richness, from 29 historically known species to five in recent surveys of the river.

Another major disruptor to Kentucky's natural resources was the construction of major flood control and hydropower reservoirs. Beginning with Herrington Lake, one the first reservoirs built for electrical generation in the early 1920s and concluding with the completion of Yatesville Lake on Blaine Creek in Lawrence County in the early 1990s, 19 major reservoirs changed Kentucky waterways forever.

Large dams change the fish populations from the dominance of stream species such as rock and smallmouth bass to species that prefer flat water such as largemouth bass, crappie and bluegill.

The most devastating impact of large dams is on mussel populations. Mussels adapted to shallow, flowing rivers can't survive being at the bottom of deep reservoirs. Silt covers mussel beds and the tailwaters downstream of large dams impede natural flow regimens, reducing mussel species richness.

Sources say the most destructive large dam for mussels was the completion of Wolf Creek Dam in the early 1950s, forming Lake Cumberland. This dam eliminated the last populations of the forkshell mussel, it is also a major contributor to the extinction of the acornshell mussel. Wolf Creek Dam also is responsible for the imperilment of a dozen more mussel species.

The Little River, a large chunk of which is now part of Lake Barkley, is another example of the impact of dams on mussel populations. Historically, Little River held 28 species of mussels, but in recent surveys the river only contains five species, a loss of 82 percent.

Signs of light are on the horizon. In recent years, Lock and Dam 5 and 6 on Green River have been removed, returning free flowing conditions to 73 miles of the river. Workers removed Lock and Dam 1 on Barren River in the summer of 2022, the river now flows free from Barren River Lake dam for 80 miles to its confluence with Green River.

Workers removed the dangerous, obsolete low head dam on Elkhorn Creek at the Jim Beam facility in Frankfort in 2021. This will improve fish populations and flow conditions downstream on Kentucky's most historic smallmouth bass stream.

Resource managers try to learn from the past and make the best decisions going forward to improve ecosystem health, therefore benefitting fish and wildlife resources.

Although hard to see at times, the future is bright for resource management as we move forward and learn from the mistakes of the past.

Kentucky's State Wildlife Action Plan (SWAP)

State fish and wildlife management agencies are tasked with managing all wildlife species within their borders. For decades, state fish and wildlife agencies



Central Kentucky's Herrington Lake is one the first large reservoirs created for electric power generation in the upper South. Large dams such as this heavily impact the fish and mussel fauna in river systems in which they are built. Photo: KDFWR

have worked, in partnership with the U. S. Fish and Wildlife Service (USFWS) under the Federal Aid in Wildlife Restoration Act and the Federal Aid in Sport Fish Restoration Act to conserve and properly manage game species. Funding for these programs is generated from license sales and excise taxes on hunting and fishing supplies, ammo, boat fuel and registrations. These revenues have provide critical funding for fish and wildlife conservation and have brought about major conservation victories for species like deer, turkey, and elk. Given the nature of these funding sources, conservation focus has understandably focused primarily on game species with a few notable exceptions like the bald eagle and peregrine falcon.

Separate funding sources for threatened and endangered species are available from the Cooperative Endangered Species Conservation Fund (Section 6 of the Endangered Species Act) and provide grants to States and Territories to participate in a wide array of voluntary conservation projects for listed, candidate, and at-risk species. These monies support management, research, monitoring and outreach projects that have direct conservation benefits for listed species, recently de-listed species, and candidate species that reside within that State. However, a reliable funding mechanism has not been established to adequately address other non-game species.

In 2001, the State Wildlife and the Tribal Wildlife Grant (STWG) Program was established to provide conservation opportunity for many species not covered in existing funding sources. STWG was designed to

implement conservation actions aimed at preventing new federal listings of threatened and endangered species, recovering those species already listed, and maintaining healthy populations of fish and wildlife before they are in crisis. It is intended to develop and implement programs that benefit wildlife and their habitats; specifically, species and habitats of greatest conservation concern need (SGCN).

To receive funding through STWG, Kentucky maintains a State Wildlife Action Plan (SWAP), herein also referred to as the “Plan”. This plan identifies species and habitats in greatest conservation need, identifies significant threats to these species, and outlines actions needed for species protection and recovery. Developed collaboratively with state species experts, scientists, universities, conservation groups and land managers, the SWAP is a road map to maintain the health and diversity of all of Kentucky’s fish and wildlife resources. It identifies species in greatest conservation need (SGCN) and outlines approaches to direct limited financial resources where they are most effective. Kentucky’s SWAP is reviewed every 10 years to reflect the most current survey, research, and management needs. The Plan does not involve hunting, fishing, or trapping regulations.

This document represents a comprehensive review and second revision of Kentucky’s original Plan, updated and submitted to USFWS for approval in September 2023. Developed to comply with the requirements of the congressionally authorized STWG Program, it represents a proactive strategy for sustaining the diversity of species and habitats found in Kentucky on behalf of its citizens.

Highlights of Plan Accomplishments (2005-2023)

Since enactment of Kentucky’s State Wildlife Action Plan in 2005, STWG funding has helped support a variety of conservation activities to benefit Kentucky SGCN. Kentucky’s SWAP has guided and informed strategic habitat acquisition, cooperative habitat restoration projects, species reintroductions, defined service areas for stream and wetland mitigation, and informed research and status assessments. State conservation partners have used Kentucky’s SWAP to leverage grant monies to fund activities that benefit Kentucky SGCN. The examples below provide a sampling of projects and activities implemented through Kentucky’s SWAP.

Land Acquisition

Licking River tract at Clay WMA

Public lands like refuges, forests, WMAs, parks, and nature preserves provide places for people to enjoy resource-based recreation. Acquiring and managing

lands for conservation is multi-faceted, and may involve protecting, restoring, or enhancing existing habitats. Securing land and water habitats, especially in unique areas or in connectivity with existing public lands, is a high priority for many conservation partners. Clay WMA spans nearly 9000 acres in portions of three Kentucky counties. Primarily forested, this steep to rolling upland area along the Licking River provides excellent opportunities for hunting, fishing, hiking, and wildlife watching. In 2014, the Gray and Bailey Tracts at Clay WMA were purchased to protect a stretch of the Licking River harboring eastern hellbender salamander and several species of SGCN freshwater mussels including the fanshell, longsolid, round hickorynut, sheepsnose, and snuffbox. Since acquisition, staff from Kentucky Center for Mollusk Conservation (CMC) and conservation partners within and outside Kentucky have propagated and/or translocated an additional 7 species of mussel (catspaw, clubshell, northern riffleshell, pink mucket, rayed bean, rabbitsfoot, and rough pigtoe) making this stretch of the Licking River one of the richest locations in the state. Protecting important habitats like this not only provide strongholds for rare species, but also improve the quality of downstream habitats.



This stretch of the Licking River was purchased to protect high quality habitat for freshwater mussel species and eastern hellbender. Photo: KDFWR



In addition to harboring rare species, this location has since been a release site for several species of freshwater mussels including the snuffbox. Photo: KDFWR

Data Management

Databasing and Geo-referencing fish collections from Kentucky

Through a partnership with Southern Illinois University Carbondale, all Kentucky fish collections housed at the university fluid vertebrate collection were digitized and georeferenced. This effort resulted in over 45,000 digitized records, vastly expanding the number of fish distribution records in KFWIS. Because these records are vouchered (tied to an actual museum specimen) and most of identifications verified, they serve as the foundation for review and verification of additional records submitted to KFWIS. It also includes most records depicted in the maps published in the Distributional Atlas of Kentucky Fishes which we now have georeferenced and in database form.



Museum research in action. David Eisenhour examining fish specimens to verify species distribution records in Kentucky. Photos: KDFWR

Site Protection

Identifying and protecting hibernation roosts for endangered bats

Kentucky's Mammoth Cave may be famous as the longest cave system in the world, but Kentucky has hundreds of caves, sinkholes and rock shelters that provide important habitat for many subterranean species, including bats. While not all bats use caves, many species use caves for hibernation, maternity sites, and temporary roosts during migration. Bats are very sensitive to disturbance, and unfortunately, some caves have been exploited for mineral resources, recreation, and tourism. Cave gates, like this one, are used in certain situations to restrict human access and provide protection for SGCN bat species. In a partnership among USFWS, Daniel Boone National Forest, Kentucky Natural Lands Trust and Kentucky Wild, this iron gate was installed in 2022 to protect the second largest maternity colony of Virginia Big-eared bats known in Kentucky.



This cave in Daniel Boone National Forest was recently gated to protect a newly discovered maternity colony. Photos: KDFWR

Site Management

Fish barrier removal in the Licking River watershed

Dams and other barriers alter natural water flow, block movement of fishes, and turn free flowing streams into lakes and pools. These changes impact survivorship of many native mussels and fishes. Due to its proximity to the Licking River and the presence of several threatened, endangered, and species of greatest conservation need, the conversion of this culverted stream crossing to a bridge was a high priority project. Removal of this barrier allows fish and mussel species to travel further upstream into West Creek, particularly during the spring when higher flows are more common. This access is particularly important as most critical species spawn during the spring. Additional access should significantly increase survival of young and offer adults more access to ideal spawning conditions.



In a partnership with Harrison County Fiscal Court, a new bridge crossing was constructed across West Creek. This improvement allows fish and mussel passage into the upstream reaches of West Creek. Photo: KDFWR

Habitat Enhancement and Restoration

Grassland management and restoration

Whether on large scale public lands projects or through technical assistance programs with private landowners, restoration and management of native grasslands is considered among the top objectives to benefit many grassland SGCN. Habitat management practices like native warm season grass conversions, removal of invasive species, and maintenance of some idle grassland areas can result in improved use of habitat for many SGCN that rely on high quality grasslands during breeding, wintering, and/or migration. Prescribed fire is one of the most cost effective and dynamic tools employed for managing wildlife habitat. Some of its most significant benefits include reducing invasion of trees and shrubs, removing excess leaf litter that inhibits vegetative growth and wildlife use, releasing seed for germination, reducing hazardous fuels, and controlling disease.



Prescribed fire is one of many management tools used to create and maintain high quality grassland habitat in Kentucky. Photo: John Brunjes

Surveys and Monitoring

Inventory and long-term Monitoring of Herpetofauna at National Parks

Long term monitoring is an important tool for detecting changes in species abundance. One area selected for intensive field study has hosted an extensive, long-term herpetofauna monitoring project since 2002. On site, there are 252 tin coverboards, two tin stacks, 75 pieces of OSB, and 50 pieces of plywood which are checked 10-12 times each year. There are also 5 vernal ponds and one permanent pond regularly visited. The OSB boards have proven reliable sites to find salamanders, lizards, and small snakes, and have been repeatedly used as egg-laying sites for lizards and snakes. Since surveys began, much of the open habitats are filling in from natural succession. These habitat changes have resulted in a noticeable shift in herpetofauna present. Targeted searches for many SGCN reptiles including the Six-lined Racerunner, Coal Skink, Western Slender Glass Lizard, Scarletsnake, Cornsnake, Scarlet Kingsnake, Northern Pinesnake, Southeastern Crowned Snake, Timber Rattlesnake, and Eastern Mud Turtle indicate that several of these species are in decline.



Since 2002, partners from KDFWR, and the Kentucky Herpetological Society annually survey over 250 tin coverboards for a variety of SGCN lizards and snakes. Photo: John MacGregor

Status Assessments

Conservation Status of Big Sandy Crayfish and Mountain midget crayfish

Via collaboration with crayfish researchers, conservation statuses for the Big Sandy Crayfish and Mountain Midget Crayfish were conducted throughout the species ranges in eastern Kentucky. Data compiled as a part of this study demonstrated that both species warranted elevated conservation statuses as a result of their limited distribution and likely population declines. This work also provided



Taxonomic research is ongoing for the Mountain midget crayfish. Photo: Zac Loughman

baseline data which led to the taxonomic revision of both species and ultimately to the Big Sandy Crayfish being listed as Threatened under the federal Endangered Species Act. Further research into the taxonomy of the Mountain Midget Crayfish, and the closely related Spiny Scale Crayfish, in Kentucky is currently being conducted by KDFWR.

Research

Effects of native grassland restoration on raptor habitat use and prey abundance

Grassland habitat is declining at a rapid pace, making grassland birds one of the most imperiled group of vertebrates. SGCN raptors like the northern harrier and short-eared owl rely on small mammal prey during breeding, migration, and wintering seasons. They are known to use grasslands on reclaimed strip-mined lands in Kentucky. Research at Peabody WMA investigated the relationships among raptor habitat use, small mammal abundance and vegetation structure where native grass restoration and other management activities were ongoing. Comparing relationships such as these among different grassland management approaches help inform decision-making on how to best invest limited funds to benefit grassland species.

Captive Propagation and Reintroduction

Development of *In-vitro* techniques at Kentucky's Center for Mollusk Conservation

Kentucky's Center for Mollusk Conservation (CMC) is a world-renowned freshwater mollusk propagation facility. With a goal to preclude species listings and help recover and restore imperiled aquatic species, CMC staff have worked for over 20 years on over 70 species of freshwater mussels, 75 species of fishes, and 12 species of snails. Notably, CMC has developed new techniques to raise mussels and other freshwater mollusks *in vitro*, which precludes the need for a fish host. Pioneering this technique has given researchers the opportunity to rear thousands of rare and endangered species. As a result, large scale releases of freshwater mussels into historic streams are now possible not only in Kentucky but also in surrounding states.

Disease Surveillance

Southeastern Cooperative Disease Monitoring for White nose syndrome

White-nose syndrome (WNS) is a devastating disease impacting many bat species in North America. Caused by a white fungus that often grows on the muzzle and wings, it has caused unprecedented mortality in some



Short-eared owls require broad expanses of open land with low vegetation and high prey densities.
Photo: Mark Salsman



Culture systems used to rear juvenile freshwater mussels. Photo: KDFWR



Infected little brown bats.

Diseases such as white nose syndrome in bats can have significant impacts on wildlife health and may event result in widespread mortality.
Photo: Terry Derting/Murray State University

hibernating bat species. WNS was first documented in Kentucky in April 2011 and is now found in caves across the state. It is believed to be responsible for significant local population declines for some SGCN species such as little brown bats, tricolored bats, northern long-eared bats, and Indiana bats. As a result, some of these species are now candidates for listing under the Endangered Species Act. Continued surveillance for this WNS in Kentucky is ongoing and plays a critical role in the protection and management of Kentucky bat species.

Inventory to Fill Gaps

Barn Owl Inventory

Surveys and monitoring are important tools to maintain current information for many SGCN species, and to fill data gaps for species with little current information available. The barn owl was included as a Species of Greatest Conservation Need in Kentucky's first State Wildlife Action Plan as very little was known about its population status in Kentucky. A statewide count began in 2010 and nest boxes were placed at several locations on WMAs. In addition, outreach to private landowners was initiated and resulted in several new nesting and roosting locations. By 2016, surveys confirmed 76 confirmed Barn Owl nest locations and 18 non-breeding sites. This inventory suggested that despite an abundance of suitable habitat, the species is scarce and more work is needed. Intensive surveys and banding now occur every three years, and biologists collect dead barn owls to screen for diseases and contaminants that could be affecting their populations. Monitoring, nest box installations, and banding will continue as time and funding permit until the nesting population demonstrates growth and stability.

SWAPs compile and prioritize specific conservation actions needed for SGCN statewide and serve as a resource for the many conservation partners available and willing to implement actions within their purview and expertise. These activities and projects help inform wildlife professionals to direct limited financial resources to where they can be most effective. As these examples demonstrate, the quality of work done with extremely limited resources underlies the need to continue a relentless pursuit of dedicated, long-term funding for SWAPs nationwide.

2023 Comprehensive Review and Revision

Congress requires that each state comprehensively review their SWAP at least every 10 years to incorporate new information and changing conditions. The plan revision process is outward-looking to capture the full scope of the issues involved and is built upon comprehensive assessments that describe the ecological as well as the social elements of the planning area and is grounded in science.

Kentucky Barn Owl Project



HAVE YOU SEEN ME?

The Barn Owl is a rare species in Kentucky. The KY Dept. of Fish and Wildlife Resources would like to learn more about nesting Barn Owls, but we need your help. Please report Barn Owl nests to:

Kate Heyden
1-800-858-1549 x 4475
kathryn.heyden@ky.gov



Very little was known about barn owls in Kentucky until statewide counts began in 2010. Despite an abundance of suitable habitat, the species is scarce.

Photo: KDFWR

Kentucky's first plan was written in 2005 and first revised in 2013, and a second revision is due in 2023.

The second revision is due earlier than most other states with deadlines of 2025. Ahead of the 2025 cycle, there has been a great deal of new guidance produced, which we have considered and incorporated as possible during this revision. Any new best practices or guidance emerging too late to incorporate will be considered during the next revision. Should an emerging issue arise in between comprehensive review periods it will be addressed using processes outlined by USFWS.

As a first step of the revision, an Advisory Team was established to provide oversight, direction, and decision-making throughout the process. At the first meeting, the Advisory Team developed a foundational goal:

To produce a concise and action-focused SWAP that aligns diverse conservation partners around a shared purpose to conserve Kentucky's native species and the habitats on which they depend.

In conjunction with this core vision, the Advisory Team adopted several guiding principles for decision making during the second comprehensive review and revision of Kentucky's SWAP:

Guiding Principle #1

Refine Kentucky's Plan to be more accessible, understandable, and relevant to broader constituencies.

Guiding Principle #2

Increase consistency and alignment with SWAPs from other states by implementing standardized and repeatable processes.

Guiding Principle #3

Ensure that Kentucky's Plan is developed and implemented collaboratively and in partnership with a diverse set of partners.

Guiding Principle #4

Focus Plan development so that action implementation can be tracked efficiently within our agency, as well as externally with conservation partners.

Early in the revision process, technical teams were convened for nine taxa groups: Amphibians, Birds, Crustaceans, Fishes and Lampreys, Freshwater Mussels and Snails, Insects and Springtails, Mammals, Plants, and Reptiles. Team members represented specialists from a variety of disciplines, including academia, state and federal agencies, non-governmental organizations, and knowledgeable citizens.

Rather than a formal 'partner team', our approach was to include representatives from other state and federal natural resource management agencies, academic institutions, conservation groups, and non-affiliated individuals throughout the revision process. Partners were members of technical teams, plan development, COA delineation, scientific review, and advisors on special topics such as climate change and wildlife disease. New relationships forged during state, regional, and national professional meetings also provided valuable assistance during plan development, especially with respect to potential development of an online conservation dashboard.

Kentucky's Advisory Team reviewed the original 2005 plan and 2013 first revision to identify changes and updates needed for each required plan element and sought input from colleagues that were familiar with the pros and cons of the existing plan. Using resources provided in Best Practices for State Wildlife Action Plans: Voluntary Guidance to States for Revision and Implementation, the Advisory Team compiled the following needs and/or objectives (*) for each of the Eight required Elements:

Element One

Information on the distribution and abundance of species of wildlife, including low and declining populations as the State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the State's wildlife.

- Update and standardize taxonomy for consistency.
- Develop a repeatable, standardized process to select SGCN.
- Identify category to consider data deficient species as SGCN.
- Consider addition of other species groups, including aquatic snails, insects, and plants as possible with available data.
- Refine approach/definitions for prioritizing SGCN.

Element Two

Descriptions of locations and relative condition of key habitats and community types essential to conservation of species identified in Element One.

- In addition to habitat guilds, recognize natural community types in association with SGCN habitats.
- Refine approach for describing habitats used by aquatic SGCN.
- Use habitat models to represent location of preferred habitats for SGCN.
- Spatially depict areas that offer the best opportunities for SGCN conservation as Conservation Opportunity Areas (COAs).

Element Three

Descriptions of problems which may adversely affect species identified in Element One or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats.

- Adopt threat classification categories outlined by Salafsky et al. (2008).
- Identify priority research and survey needs for each SGCN.

Element Four

Descriptions of conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions.

- Adopt conservation classification categories as outlined by Salafsky et al. (2008).
- Develop a prioritization process to address conservation actions.

Element Five

Proposed plans for monitoring species identified in Element One and their habitats, for monitoring the effectiveness of the conservation actions proposed in Element Four, and for adapting these conservation actions to respond appropriately to new information or changing conditions.

- Summarize existing monitoring programs across taxa groups to identify gaps.
- Identify opportunities for additional monitoring should funding become available.

- Consider approach to tracking SWAP actions implemented by conservation partners.

Element Six

Descriptions of procedures to review the strategy at intervals not to exceed ten years.

Element Seven

Plans for coordinating the development, implementation, review, and revision of the plan with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the State or administer programs that significantly affect the conservation of identified species and habitats.

- Develop a more action-focused plan, including sections to appeal to a broader collection of users, present specific actions by taxa and species, and spatially where possible.

Element Eight

Broad public participation in the development and implementation of the conservation strategy.

- Develop SGCN profile pages and plan implementation goals so that actions are readily understood by a variety of users.

After consideration of the above needs, the Advisory Team pursued a drastically different format for the Plan. Because significant changes to layout were not made with the first revision in 2013, the entire plan was restructured. This revision included ambitious and intentional data collection that would allow for meaningful comparisons across taxa, ease of use by a variety of parties, alignment with regional initiatives, and the production of a final product that would lend itself to creation of a searchable product dashboard. With such a significant restructuring, a tabular representation of changes was not plausible. Instead, APX 1.1 provides the chapter locations and page numbers for the Eight Required elements as presented in this Plan.

KDFWR's Advisory Team met regularly during each phase of plan development. State partners were regularly consulted to review plan content, answer questions, and incorporate necessary changes. The draft revision was then made available for public comment during late summer 2023 through KDFWR's agency website, which included an online platform for users to submit feedback. Public notice regarding the open comment period was given through press release and social media channels. Comments obtained during this period were compiled and reviewed by appropriate technical staff and final changes were incorporated to the draft plan. In September of 2023, Kentucky's Plan was submitted to the USFWS for review and approval.

Moving forward with an approved Kentucky SWAP, we have identified several long-term goals:

- Maintain regular meetings of SWAP Advisory Team. Establish a regular schedule to meet with internal agency staff and external partners to develop a process to better track Plan accomplishments.
- Continue process towards a more accessible Plan. Explore feasibility of a dashboard format that enables users to generate customized, spatial information to meet their specific needs.
- Use performance-based monitoring identified within the Plan to incorporate information from new research and monitoring to adapt conservation actions as necessary.
- Continue to consider regional initiatives in conservation planning. As a member of two different AFWA regions, we must balance initiatives and Plan-related guidance most relevant to Kentucky.

It is our desire that with this revision, Kentucky's Plan will better serve as a guiding document for state conservation efforts and that Kentucky's many federal and agencies, local governments, educational institutions, private entities and conservation groups, and citizens will see themselves as critical partners in its implementation.

Kentucky will begin the third comprehensive review and revision process by early 2031 for completion no later than September 2033.

Partnerships for Plan Development and Implementation

Resource professionals experience a complex and ever-changing information landscape. This Plan seeks to provide a framework to engage both traditional and new resource partners who are invested in conserving Kentucky's native wildlife.

Sustainability of ecological systems is not and cannot be the sole responsibility of any single agency, organization, or landowner. Ecological systems transcend public and private land ownerships and they do not recognize or conform to geopolitical boundaries. What happens ecologically on one parcel of land will invariably affect what is possible on adjacent lands. Since much of Kentucky's total land area is in private ownership, efforts to sustain Kentucky's biodiversity must involve, gain acceptance of, and increase the stewardship capacity of private landowners.

Federal agencies are the largest land holders in Kentucky. Coordination with other federal and state

landowners is essential to developing integrated strategies and for adapting these strategies to changed conditions over time. As threats facing SGCN continue to escalate, there is a need to build upon traditional partnerships built on trust and success but also to look at opportunities with new partner groups with the desire and power to shape policy, land use and public engagement.

Traditional SWAP partners for Kentucky include state and federal agencies such as the Office of Kentucky Nature Preserves (OKNP), USDA Natural Resources Conservation Service (NRCS), USDA Forest Service (USFS), US Army Corps of Engineers (USCOE), US Fish and Wildlife Service (USFWS), Kentucky Division of Forestry (KDF) and Kentucky State Parks (KSP) and non-governmental partners including educational institutions from public and private university and colleges, The Nature Conservancy (TNC), the Kentucky Chapter of The Wildlife Society (TWS), and Kentucky Prescribed Fire Council (KPFC), among many others. Local government bodies have also embraced collaboration opportunities.

Exciting new collaborations are underway with local and state land trust groups such as the Kentucky Land Trust Coalition (KLTC), Kentucky Natural Lands Trust (KNLT), Bluegrass Land Trust Alliance (BLTA) among others. We recognize that these groups can move strategically to secure properties via fee simple acquisition or conservation easement and are critical in identifying and securing additional funding opportunities. With increased awareness of actions related to outreach and education in this Plan, they can also be a voice to policy makers and the public to stress the importance and timeliness of conservation and management actions.

Society is demanding new and innovative ways to power our homes and lives. Communication and cooperation with state and local land use planners has not been utilized effectively in the past. Outreach to Area Development Districts (ADDs), city planners, the Kentucky Transportation Cabinet (KTC) and other policy makers regarding actions presented in this Plan is a priority for expanding a non-traditional partnership. Through these conversations, we hope to prioritize and implement actions at a scale that would result in avoidance of many sensitive biological areas, reduction of pollutants, and preservation of corridors and connectivity for animal and plant movement. There will be times when impacts to SGCN populations and habitat are unavoidable. In these circumstances, maintaining a dialog that will allow for the implementation of minimization measures, SGCN population response monitoring, and utilization of adaptive management will allow for all parties to refine management techniques in the future.

With this revision, it was our intent to develop and structure a plan that would engage a varied group of

Kentucky's conservation community. Partners played an essential role during the revision process and development of the 2023 Kentucky Plan. Partners agencies collaborated as members of the SWAP Advisory Team, Technical Teams, data management, Conservation Opportunity Area development, and plan review (Apxs 1.2 and 1.3). This foundational involvement paves the way for the more critical stage of SWAP implementation. With hundreds of SGCN, thousands of threats and actions, and even more research, monitoring and management needs- there is room for these and additional partners to join forces in the coming years.

To focus implementation efforts over the next ten years, this plan outlines specific priorities and Conservation Opportunity Areas (COAs) that identify some of the best opportunities for focused and manageable impact. The only way to reach these goals is to rely on the collaborative efforts and expertise of Kentucky's varied conservation partners.

Effective implementation will require full involvement of our conservation partners, taxonomic experts, and the public.

Tools within this plan have application for:

- Conservation Planning
- Best Management Practices
- Outreach and Education Initiatives
- Data Management
- New and Existing Species and Habitat Monitoring
- Collaborative Research Projects
- Filling data gaps
- Creative Funding opportunities

To further engage traditional and new partner groups and to refine approaches to action implementation, our approach was to schedule focused meetings with key partner groups after technical teams identified actions and needs for Kentucky's 527 SGCN. By focusing on specific actions that were most applicable to that partner, we sought to build upon current collaborations, identify gaps in communication and ways to improve reporting of Plan use, and brainstorm opportunities for future collaboration. These targeted meetings provided a forum for early Plan feedback and conservation goal refinement but started conversations about engagement and implementation opportunities. For many partners the priority was on expanding existing relationships and resources, but for many it was to establish better communication or get conversations started. Common take-away from these

meetings included the need for improved communication in the form of annual meetings among sister agencies (broadly and regarding Plan implementation), expanded data sharing initiatives, and need for a development of a searchable and real-time Plan conservation dashboard for wider partner engagement.

A few notable examples include:

Kentucky Division of Water (KDOW)- Continue sharing of species information but expand communication to include results of watershed level health to help inform habitat monitoring for aquatic SGCN. Resume regular annual or bi-annual meetings.

Daniel Boone National Forest- Continued coordination between biologists and managers along with incorporations of SGCN and identified conservation actions into future Forest Plans.

Kentucky Department of Transportation (KDOT)- Begin collaboration to incorporate tools created in The Plan with planning of future transportation projects. Identify ways to implement conservation actions into future transportation projects (pollinator plots, wildlife crossings, etc.). Utilize Transportation staff and biologists to assist in SGCN monitoring (wildlife crossings, bridge use by bat SGCN, etc.).

NRCS- Continue to leverage NRCS funding to implement identified conservation actions. Utilize tools created in The Plan to better focus on-the-ground actions, goals, and objectives. Continue collaboration between agency biologists and resource managers in focus resources in Conservation Opportunity Areas.

Louisville Zoo expansion of a new partnership to include information and outreach for pollinator SGCN, including habitat demonstration sites in all 120 counties; outreach on native species through development of the Zoo's Kentucky Trails exhibit and highlights of SGCN; native species recovery and captive breeding of eastern hellbender.

With new emphasis on identifying specific threats and actions, as well as categorizing species with data deficiencies, it is evident that this Plan can serve as a clear companion to professionals in many disciplines whose work touches the far reaches of the Commonwealth. An overarching goal is not to provide a list of tasks to complete over the upcoming decade, but to spark a genesis of new collaborations and reinvigorated existing partnerships that can address the complex pressures and needs identified for Kentucky SGCN.

Public Engagement

Fish and Wildlife agencies have traditionally been excellent at engaging a traditional constituency of hunters and anglers but have often fallen short of engaging citizens interested solely in non-consumptive activities such as wildlife watching.



Kentucky Wild members help tag endangered freshwater mussels for release. Photo: KDFWR

Recognizing a need to better engage with this group of citizens, KDFWR launched a new initiative called Kentucky Wild during the summer of 2018. Kentucky Wild provides a new partnership opportunity for Kentuckians interested in supporting conservation efforts for animals like songbirds, birds of prey, frogs, salamanders, butterflies and bats- species not hunted or fished and including many SGCN. Kentucky Wild built a way for members to financially contribute directly to the work KDFWR biologists and staff are doing for some of our most imperiled species. Much like a hunting/ fishing license helps fund efforts aimed at increasing opportunity and quality of pursuing game species, Kentucky Wild members help fund habitat improvement projects, purchase field gear and equipment, and contribute to research and monitoring efforts. The response to Kentucky Wild was overwhelming, joining over 10,000 members to date from across Kentucky's 120 counties and all 50 states, Canada, England, and the Caribbean nations. Kentucky Wild resonates among Kentucky's traditional constituency of hunters and anglers as well as those interested primarily in other pursuits such as hiking, camping, birdwatching, gardening, and wildlife watching.

In conjunction with the success of the Kentucky Wild program, Recovering America's Wildlife Act (RAWA) has and continues to provide a unique opportunity to highlight the connection of the Plan to the need for a secure, long-term funding source for SGCN. Developing and maintaining awareness of the existence and need for the Plan is an ongoing process.

Ahead of the comprehensive review period, the Plan landing page of KDFWR's website was restructured to make Plan components more accessible. The website was updated to inform users of the second revision. Inquiries pertaining to SWAP were addressed by the SWAP Coordinator, Wildlife Diversity Program

Manager, and/or relevant technical expert(s). In addition, highlights of SGCN conservation efforts were promoted through agency communications, the Kentucky Wild website and member events, social media channels, newsletters, and agency events. Specific notice of the 2023 revision was shared through KDFWR's Kentucky Afield magazine, Kentucky Wild communications and outreach, during presentations at national, regional, and state level professional meetings and conveyed among various channels by state conservation partners. This latter conduit was particularly beneficial throughout engagement regarding RAWA. Throughout that process, 'SWAP awareness' and the significance and connection of the Plan to long-term funding were consistently promoted to partners and the public.

To optimize outreach efforts, KDFWR's Communications Team was enlisted to promote the SWAP public comment period. The SWAP webpage was structured to receive, collect, and archive comments on the draft SWAP during the official public comment period. A public review draft of KY SWAP was posted on the KDFWR website from August 15 - September 15, 2023, and was announced through agency press release (343 outlets) and social media (727,400 followers), agency podcast (2000 listens), Kentucky Afield Magazine (25,000 subscribers) and notification through Kentucky Wild social media and newsletters (9,985 subscribers). In addition, partners were encouraged to share information about the public comment period through their communications channels.

Online feedback was reviewed weekly during the public comment period, sorted according to category or topic, and shared with the appropriate experts on the SWAP teams for response. All comments and recommended responses from technical teams were then shared with the SWAP Advisory Team and incorporated as needed prior to submission to USFWS. While not presented formally in this plan, final responses as approved by SWAP Advisory Team including and relevant actions for each are recorded in the 2023 SWAP database.

Analytics for the SWAP Open Comments indicate that the page was viewed 559 times. There were 82 submitted comments. Overall, the respondents were supportive of the SWAP, with the primary constructive criticism pertaining to the length of the document. Though the SGCN and COA portions of the plan are searchable from our website, this feedback validates our goals to move toward a fully web-based interface that provides a searchable platform for users. As we move towards this capability, we intend to create SWAP summary documents to outline specific portions of the plan as well as pages directed at specific user groups (private landowners, environmental consultants, academic institutions, area development districts, etc.). Additional comments that

were not related directly to the SWAP were shared with the appropriate agency program.

Public engagement and participation during the review process is important and underscores our larger goal of public involvement with plan implementation. By developing an interesting, informative, and user-friendly plan our hope is that it will ultimately be utilized by a wide range of Kentuckians.

During the public comment period, feedback captured through agency website was reviewed, considered, and incorporated as needed prior to submission to USFWS. Comments were sorted according to category or topic, then evaluated by the appropriate experts on the SWAP team. While not presented formally in this plan, all comments received were considered by the SWAP Advisory Team with notes and relevant actions recorded in the 2023 SWAP database.

While public engagement and participation during the review process is important, our larger focus was directed towards public involvement with plan implementation. This focus drove plan development and presentation as it was a primary goal to craft a plan that would be interesting, informative, and ultimately utilized by a wide range of Kentuckians.

Sources

Association of Fish and Wildlife Agencies (2012). Best Practices for State Wildlife Action Plans. Voluntary Guidance to States for Revision and Implementation.

Salafsky et al.'s (2008) A Standard Lexicon for Biodiversity Conservation: Unified Classifications of Threats and Actions.

APX 1.1 Location and Guide to the Eight Required Elements

The second revision to Kentucky's State Wildlife Action Plan (Plan) represents a significant change from the Plan's original layout. While still addressing the eight Congressionally required elements, the overall format of this revision is drastically different from the original Plan.

To aid in evaluation, this section presents a guide to locating relevant portions of the Plan that address each element and sub-element. There is a section for each of the eight elements below with a corresponding table to identify the locations where each is addressed in the 2023 Plan. The Plan is designed to work most efficiently online as hyperlinks automatically open the appendices or sections referenced. In the paper document we have included page numbers in place of hyperlinks.

Element 1

Information on the distribution and abundance of species of wildlife, including low and declining populations as the state deems appropriate, that are indicative of the diversity and health of the state's wildlife.

Chapter	Sub-Element(s) Addressed	Page Number (s)
Chapter 1: Introduction	a	32-33
Chapter 2: Overview of Kentucky		
Chapter 3: Kentucky's SGCN	a, b, c, d, e	58-1186
Chapter 4: SGCN Distribution and Habitats	a, b	1189-1194; 1208-1256
Chapter 5: Threats to Kentucky's SGCN		
Chapter 6: Monitoring		
Chapter 7: Conservation Actions for Kentucky's SGCN		

Element 2

Descriptions of locations and relative condition of key habitats and community types essential to conservation of species identified in Element 1.

Sub-elements:

2a. The Plan provides a reasonable explanation for the level of detail provided; if insufficient, the Plan

Chapter	Sub-Element(s) Addressed	Page Number (s)
Chapter 1: Introduction		
Chapter 2: Overview of Kentucky	a, b	35-51; 53, 56
Chapter 3: Kentucky's SGCN	a, b	70-1172
Chapter 4: SGCN Distribution and Habitats	a, b	1187-1257
Chapter 5: Threats to Kentucky's SGCN		
Chapter 6: Monitoring	a, b	1347-1349
Chapter 7: Conservation Actions for Kentucky's SGCN	b	1457-1459; 1461-1495; 1631

Sub-elements:

- 1a.** The Plan indicates sources of information (e.g., literature, data bases, agencies, individuals) on wildlife abundance and distribution consulted during the planning process.
- 1b.** The Plan includes information about both abundance and distribution for species in all major groups to the extent that data are available. There are plans for acquiring information about species for which adequate abundance and/or distribution information is unavailable.
- 1c.** The Plan identifies low and declining populations to the extent data are available.
- 1d.** All major groups of wildlife have been considered or an explanation is provided as to why they were not. The state may indicate whether these groups are to be included in a future Plan revision.
- 1e.** The Plan describes the process used to select the species in greatest need of conservation. The quantity of information in the Plan is determined by the state with input from its partners, based on what is available to the state.

identifies the types of future actions that will be taken to obtain the information.

- 2b.** Key habitats and their relative conditions are described in enough detail such that the state can determine where (i.e., in which regions, watersheds, or landscapes within the state) and what conservation actions need to take place.

Element 3

Descriptions of problems which may adversely affect species identified in Element 1 or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats.

Sub-elements:

- 3a.** The Plan indicates sources of information (e.g., literature, databases, agencies or individuals) used to determine the problems or threats.
- 3b.** The threats/problems are described in sufficient detail to develop focused conservation actions.

- 3c.** The Plan considers threats/problems, regardless of their origins (local, state, regional, national, and international), where relevant to the state's species and habitats.
- 3d.** If available information is insufficient to describe threats/problems, research and survey efforts are identified to obtain needed information.
- 3e.** The priority research and survey needs, and resulting products, are described sufficiently to allow for the development of research and survey projects after the Plan is approved.

Chapter	Sub-Element(s) Addressed	Page Number (s)
Chapter 1: Introduction	a	32-33; 67; 123; 292; 399; 559-561; 763; 920; 989; 1120
Chapter 2: Overview of Kentucky		
Chapter 3: Kentucky's SGCN	a, b, c, d	70-1172
Chapter 4: SGCN Distribution and Habitats		
Chapter 5: Threats to Kentucky's SGCN	a, b, c	1258-1261; 1264-1342
Chapter 6: Monitoring	d, e	1361-1451
Chapter 7: Conservation Actions for Kentucky's SGCN		

Element 4

Descriptions of conservation actions determined to be necessary to conserve the identified species and habitats and priorities for implementing such actions.

Sub-elements:

- 4a.** The Plan identifies how conservation actions address identified threats to species of greatest conservation need and their habitats.
- 4b.** The Plan describes conservation actions sufficiently to guide implementation of those actions through the development and execution of specific projects and programs.
- 4c.** The Plan links conservation actions to objectives and

indicators that will facilitate monitoring and performance measurement of those conservation actions.

- 4d.** The Plan describes conservation actions (where relevant to the state's species and habitats) that could be addressed by federal agencies or regional, national or international partners and shared with other states.
- 4e.** If available information is insufficient to describe needed conservation actions, the Plan identifies research or survey needs for obtaining information to develop specific conservation actions.
- 4f.** The Plan identifies the relative priority of conservation actions.

Chapter	Sub-Element(s) Addressed	Page Number (s)
Chapter 1: Introduction		
Chapter 2: Overview of Kentucky		
Chapter 3: Kentucky's SGCN	a, b, c, d, e	70-1172
Chapter 4: SGCN Distribution and Habitats		
Chapter 5: Threats to Kentucky's SGCN		
Chapter 6: Monitoring	b, c, e	1361-1451
Chapter 7: Conservation Actions for Kentucky's SGCN	a, b, c, d, f	1452-1458; 1496-1630

Element 5

Proposed plans for monitoring species identified in Element 1 and their habitats, for monitoring the effectiveness of the conservation actions proposed in the Element 4, and for adapting these conservation actions to respond appropriately to new information or changing conditions.

Sub-elements:

- 5a.** The Plan describes plans for monitoring species identified in Element 1, and their habitats.
- 5b.** The Plan describes how the outcomes of the conservation actions will be monitored.
- 5c.** If monitoring is not identified for a species or species group, the Strategy explains why it is not appropriate, necessary or possible.

- 5d.** Monitoring is to be accomplished at one of several levels including individual species, guilds, or natural communities.
- 5e.** The monitoring utilizes or builds on existing monitoring and survey systems or explains how information will be obtained to determine the effectiveness of conservation actions.
- 5f.** The monitoring considers the appropriate geographic scale to evaluate the status of species or species groups and the effectiveness of conservation actions.
- 5g.** The Plan is adaptive in that it allows for evaluating conservation actions and implementing new actions accordingly.

Chapter	Sub-Element(s) Addressed	Page Number (s)
Chapter 1: Introduction		
Chapter 2: Overview of Kentucky		
Chapter 3: Kentucky's SGCN	a	70-1172
Chapter 4: SGCN Distribution and Habitats		
Chapter 5: Threats to Kentucky's SGCN		
Chapter 6: Monitoring	a, b, c, d, e, f, g	1347-1451
Chapter 7: Conservation Actions for Kentucky's SGCN		

Element 6

Descriptions of procedures to review the Plan at intervals not to exceed ten years.

Sub-elements:

- 6a.** The State describes the process that will be used to review the Strategy within the next ten years.

Chapter	Sub-Element(s) Addressed	Page Number (s)
Chapter 1: Introduction	a	22-26
Chapter 2: Overview of Kentucky		
Chapter 3: Kentucky's SGCN		
Chapter 4: SGCN Distribution and Habitats		
Chapter 5: Threats to Kentucky's SGCN		
Chapter 6: Monitoring		
Chapter 7: Conservation Actions for Kentucky's SGCN	a	1456-1457

Element 7

Plans for coordinating, to the extent feasible, the development, implementation, review, and revision of the Plan with federal, state, and local agencies, and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats.

Sub-elements:

- 7a.** The state describes the extent of its coordination with and efforts to involve federal, state and local agencies, and Indian tribes in the development of its Plan.
- 7b.** The state describes its continued coordination with these agencies and tribes in the implementation, review and revision of its Plan.

Chapter	Sub-Element(s) Addressed	Page Number (s)
Chapter 1: Introduction	a, b	22-26; 32-33
Chapter 2: Overview of Kentucky		
Chapter 3: Kentucky's SGCN	a, b	1173
Chapter 4: SGCN Distribution and Habitats		
Chapter 5: Threats to Kentucky's SGCN		
Chapter 6: Monitoring	a, b	1347-1360
Chapter 7: Conservation Actions for Kentucky's SGCN	a, b	1461-1495

Element 8

Provisions to ensure public participation in the development, revision, and implementation of projects and programs.

Sub-elements:

- 8a.** The state describes the extent of its efforts to involve the public in the development of its Plan.
- 8b.** The state describes its continued public involvement in the implementation and revision of its Plan.

Chapter	Sub-Element(s) Addressed	Page Number (s)
Chapter 1: Introduction	a, b	11; 26-27
Chapter 2: Overview of Kentucky		
Chapter 3: Kentucky's SGCN		
Chapter 4: SGCN Distribution and Habitats		
Chapter 5: Threats to Kentucky's SGCN		
Chapter 6: Monitoring	b	1349-1360
Chapter 7: Conservation Actions for Kentucky's SGCN	b	1461-1495

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Ap^x 1.3 Commonly used Acronyms

ADD	Area Development District	NALCP	North American Landbird Conservation Plan
ABC	American Bird Conservancy	NAWCP	North American Waterfowl Conservation Plan
AFWA	Association of Fish and Wildlife Agencies	NBCI	Northern Bobwhite Conservation Initiative
APSU	Austin Peay State University	NGO	Nongovernment Organization
BLTA	Bluegrass Land Trust Alliance	NPS	National Park Service
COA	Conservation Opportunity Area	NRCS	Natural Resource Conservation Service
DBNF	Daniel Boone National Forest	NRRA	National River and Recreation Area
EKPC	Eastern Kentucky Power Cooperative	NWR	National Wildlife Refuge
EKU	Eastern Kentucky University	OKNP	Office of Kentucky Nature Preserves
ESA	Endangered Species Act	PIF	Partners in Flight
FSA	Farm Service Agency	RAWA	Recovering America's Wildlife Act
FILO	Fees In Lieu of Program	SECAS	Southeast Conservation Adaptation Strategy
GIS	Geographic Information Systems	SGCN	Species of Greatest Conservation Need
GRank	Global Rank	SKVI	Shaker Village of Pleasant Hill
KDFWR	Kentucky Department of Fish and Wildlife Resources	SNA	State Natural Area
KDOT	Kentucky Department of Transportation	SNP	State Nature Preserve
KDC	Kentucky Division of Conservation	SRank	State Rank
KDF	Kentucky Division of Forestry	STWG	State and Tribal Wildlife Grants Program
KDOW	Kentucky Division of Water	SWAP	State Wildlife Action Plan
KFB	Kentucky Farm Bureau	TNC	The Nature Conservancy
KFWIS	Kentucky Fish and Wildlife Information System	TWS	The Wildlife Society
KLTC	Kentucky Land Trust Coalition	USACE	United States Army Corps of Engineers
KNLT	Kentucky Natural Lands Trust	USDA	United States Department of Agriculture
KNPS	Kentucky Native Plant Society	USFWS	United States Fish and Wildlife Service
KOS	Kentucky Ornithological Society	USFS	United States Forest Service
KPFC	Kentucky Prescribed Fire Council	USGS	United States Geological Survey
KSP	Kentucky State Parks	USSCP	United States Shorebird Conservation Plan
KTC	Kentucky Transportation Cabinet	UK	University of Kentucky
KWWA	Kentucky Waterways Alliance	UL	University of Louisville
KU	Kentucky Utilities	WKU	Western Kentucky University
LBL	Land Between the Lakes	WMA	Wildlife Management Area
LGE	Louisville Gas and Electric		
MCNP	Mammoth Cave National Park		
MLI	Midwest Landscape Initiative		
NABCI	North American Bird Conservation Initiative		

CHAPTER 2: OVERVIEW OF KENTUCKY

Kentucky's Ecoregions

Kentucky's landscapes are among the most varied in the eastern United States, ranging from striking mountains to gently rolling lowlands to flat plains, interspersed with knobs and caves. Though landcover has changed significantly with European settlement (Apx 2.1), this landscape holds a great wealth of biodiversity.

Areas where ecosystems and environmental resources are generally similar are often referred to as ecoregions. In previous versions of Kentucky's SWAP, Level III and Level IV ecoregions formed the basis for our spatial assessment of terrestrial SGCN and their habitats. These widely-accepted designations were developed by the Environmental Protection Agency (EPA) in collaboration with other state and federal agencies and provides a common framework for research, assessment, and monitoring of ecosystems across political boundaries. From a management perspective, using standardized ecoregions is especially helpful to inform conservation activities among partner agencies and nongovernmental organizations that are responsible for different types of resources within the same geographic areas.

Ecoregions are described at several hierarchical levels based on general similarity in the type, quality, and quantity of environmental resources, including geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. Level I is the coarsest level and divides North America into 15 ecological regions; Level II further divides the continent into 52 regions. At Level III, the continental United States contains 104 ecoregions. Level IV is a further subdivision of Level III ecoregions.

In Kentucky, ecological and biological diversity is very strongly related to regional physiographic, geologic, land use, and soil characteristics. Kentucky contains 7 Level III ecoregions and 25 Level IV ecoregions; all but four Level IV ecoregions continue into ecologically similar parts of adjacent states. The finer scale of the Level IV ecoregion boundaries are informative for coordinating efforts across political and administrative boundaries and provide a good representative of the ecologic and biologic diversity in Kentucky. We felt that 15 categories was perhaps too specific for our needs. During this revision, we opted to combine some Level IV ecoregions together and assess terrestrial SGCN using 9 ecoregion groupings (Apx. 2.2). The following is an overview of each Ecoregion grouping, with the Level 4 ecoregions in parenthesis and further details provided below.

Cumberland Mountains (Ecoregion 69e)

The Cumberland Mountains are the region with the highest mountains in Kentucky. The state's only occurrences of the globally rare Cumberland Highlands Forest occur here on Black Mountain and along Pine Mountain, the longest forested corridor in Kentucky. This region's rugged terrain and location at Kentucky's eastern edge make it home to numerous regionally rare species, especially on Pine Mountain and Cumberland/Stone Mountain which have not experienced the heavy logging and mining that otherwise dominated the region. The Cumberland Mountain region also supports several unique and rare communities found nowhere else in the state, such as the Appalachian calcareous forest on the north face of Pine Mountain, pitch pine barrens on dry slopes of Pine Mountain's south face, and Appalachian seeps and bogs.



The steep hills and ridges of the Cumberland Mountains are heavily forested and provide a variety of habitats of native plants and animals. Photo: Tara Littlefield, OKNP

69e. The mostly forested Cumberland Mountain Thrust Block contains high, steep ridges, hills, coves, narrow valleys, and the Pine Mountain Overthrust Fault. Maximum elevation is greater than elsewhere in Kentucky. Forests are usually more mesophytic than in the Dissected Appalachian Plateau (69d) but forest composition is highly variable and controlled by aspect, slope position, past usage, and degree of topographic shading. Components of the bird, amphibian, small mammal, and plant assemblages are also distinct from Ecoregion 69d. The Cumberland Mountain Thrust Block (69e) is mostly underlain by Pennsylvanian shale, siltstone, sandstone, conglomerate, and coal. Sedimentation from coal mines, coal washing, and logging as well as acidic mine drainage have decreased the biological integrity and productivity of surface waters. Small streams are common and have high gradients, waterfalls, many riffles, few pools, and cobble or boulder substrates. Nutrient and alkalinity levels are lower, thermal regimes are cooler, and fish populations are less diverse than in Ecoregion 69d..

Cumberland Plateau (Ecoregions 68a, 69d, 70b, 70f, 70h)

The Cumberland Plateau is a high sandstone plateau dissected by stream erosion, forming erosional mountains characterized by steep hills and narrow stream valleys. While outcrops are common, it lacks the massive cliffs as well as broader ridges of the Escarpment and accordingly does not support as many different plant communities as the Escarpment. Depending on slope and aspect, most of the surface is covered by xeric, Appalachian sub-xeric and Appalachian mesophytic forest. Due to a long history of intense logging and large-scale surface mining in this region, few intact larger forest tracts remain, but it is the most extensively forested part of Kentucky.



The steep mountains of the Cumberland Plateau are the most extensively forested part of Kentucky.
Photo: Tara Littlefield, OKNP

68a. The Cumberland Plateau is composed of low hills, ridges, rolling uplands, and valleys. It is underlain by flat-lying, Pennsylvanian sandstone, shale, siltstone, conglomerate, and coal; Mississippian carbonates are absent in contrast to the nearby Plateau Escarpment (68c), Northern Forested Plateau Escarpment (70g), and Eastern Highland Rim (71g). Ecoregion 68a is mostly forested. Forest composition is highly variable. Logging, coal mining, and livestock grazing are common and limited cropland occurs on broader ridge tops and in valleys. Cleared land, as a percentage of the total, is greater than in more rugged Ecoregions 68c and 69d but less than in Ecoregion 70f. Streams have moderate to low gradients and have broader floodplains and more riparian wetlands than in the Plateau Escarpment (68c). Acidic drainage and sedimentation from coal mining have decreased the biological productivity of many streams. As a result of sedimentation, streams are generally more turbid than in Ecoregion 68c.

69d. Dissected Appalachian Plateau is composed of narrow ridges, deep coves, and narrow valleys and is mostly forested. Cool, high gradient streams with cobble and boulder substrates and extensive riffles are common. Ecoregion 69d is more rugged, more extensively forested, and has higher stream gradients than the Cumberland Plateau (68a) and the Ohio/Kentucky Carboniferous Plateau (70f). Forest composition is controlled by aspect, slope position, degree of topographic shading, and past usage and, thus, is highly variable. Ecoregion 69d is underlain by flat-lying Pennsylvanian shale, siltstone, sandstone, and coal. Surface and underground coal mining, logging, and both gas and oil production are common and have degraded surface waters. Acidic drainage and sedimentation from coal mines have decreased the biological productivity of many streams and, in some reaches, all but the most tolerant aquatic biota have been eliminated. However, gradual improvement in the control of acidic mine drainage is occurring. Nutrient levels in streams are very low and are a reflection of the ecoregion's low population density, limited agriculture, and non-carbonate rocks.

70b. Monongahela Transition Zone is differentiated from other ecoregions by its clayey regolith, erosion-prone soils, land slips, and rough, broken terrain. Steep, clayey slopes can be unstable when saturated and, as a result, streams can be more turbid than elsewhere in Ecoregion 70. Vandalia and Upshur soils are common and are easily erodible after disturbance. They have developed from Pennsylvanian clay shale, siltstone, and sandstone of the Monongahela and Conemaugh formations which are not widely exposed in other parts of Kentucky. Mixed deciduous– evergreen forests dominate steeper hills and ridges, pastureland is found on gentler slopes, and some cropland occurs in valleys. Streams have cobble, gravel, and sand substrates and moderate gradients.

70f. The hilly Ohio/Kentucky Carboniferous Plateau is

a mosaic of woodland, pastureland, and cropland. Mixed deciduous–evergreen forests characterized by oaks and pines occur. Ecoregion 70f is lower and less rugged than adjacent portions of the Dissected Appalachian Plateau (69d) and Northern Forested Plateau Escarpment (70g). Characteristically, cleared land, as a percentage of the total, is greater than in Ecoregions 69d, 70g, and 70h. Valleys are less meandering, contain higher gradient streams, and have fewer wetlands than Ecoregion 68a. They lack the karst of Ecoregions 68c, 70g, and 70h. Streams are cool and have sand or boulder substrates. Fish and mussel assemblages are unlike the Cumberlandian fauna of Ecoregion 68a. Fish, macroinvertebrate, and diatom diversity is high in good quality streams. However, water quality in many stream reaches has been degraded by underground and surface coal mining, logging, agriculture, and oil production.

70h. The Carter Hills is composed of hills, ridges, and narrow valleys. It is covered with mixed deciduous forests containing successional cedar and pine. Resistant Pennsylvanian sandstone and conglomerate cap the ridges and Mississippian limestone is exposed in some valleys. Limestone is thicker than in Ecoregion 70g and is associated with karst topography; karst is more extensive than in Ecoregion 70g. Ecoregion 70h is physiographically and lithologically unlike Ecoregion 70d and is higher and more rugged than adjacent portions of Ecoregions 70f and 71d. In addition, cliffs are lower and fewer in number than in Ecoregion 70g. Most stream segments have upland characteristics including moderate to high gradients, rock substrate, extensive riffles, and low waterfalls. Important land uses include logging, clay mining, recreation, and livestock farming

Plateau Escarpment (Ecoregions 68c, 70g)

The Plateau Escarpment is the highly dissected edge of the Cumberland Plateau. It is characterized by narrow ravines often bordered by massive sandstone cliffs that dissect rolling uplands of thin acidic soils. Ridges are typically covered with xeric acidic or Appalachian sub-xeric forest. Historically, fire-dependent pine savannahs occurred here, and acidic headwater seeps can still be found on especially the broader uplands. Dry ridges also support sandstone glades and outcrops. Ravines contain Appalachian mesophytic and hemlock mixed forest, and cliffs harbor rare herbaceous communities such in rock houses containing a few narrow endemics. Several of the major stream corridors in this region are protected as wild rivers and contain flood-scoured prairies with numerous globally rare endemic species.

68c. The Plateau Escarpment contains narrow ridges, cliffs, and gorges. It is more rugged, dissected, and forested and has higher average stream gradients than Ecoregions 68a and 71g. Uplands are underlain by Pennsylvanian



The Plateau Escarpment is characterized by deep river gorges surrounded by sandstone ridges, outcrops and forests. Photo: Tara Littlefield

strata including cliff-forming sandstone and coal. Lower slopes and western valleys are usually underlain by Mississippian carbonates that are absent from Ecoregions 68a and 70f. Some of the highest quality streams in Kentucky occur here and have high gradients, riffles, pools, and boulder or bedrock substrates. They are home to many rare or endangered fishes and mussels and certain segments have been designated as Kentucky Wild Rivers. Other streams have cut down to Mississippian limestone and have wider valleys, lower gradients, warmer thermal regimes, higher nutrient and alkalinity levels, and a higher number of fish and mussel species. Logging and coal mining occur. Acidic drainage and sedimentation from coal mining have lowered the biological productivity of many stream reaches.

70g. The hills and ridges of the Northern Forested Plateau Escarpment are very rugged and highly dissected. Cliffs, narrow valleys, and ravines are common and characteristic. Thick, resistant Pennsylvanian quartzose sandstone caps the ridges and Mississippian limestone, shale, and siltstone are exposed on lower slopes and in valleys. Karst is not extensive but does occur. Ecoregion 70g is physiographically and lithologically unlike Ecoregion 70d and is higher and more rugged than adjacent portions of Ecoregions 70f and 71d. In addition, cliffs are more

numerous and higher than in Ecoregion 70h. Streams are cool and typically have moderate to high gradients, rock bottoms, and low amounts of turbidity. Fish assemblages are diverse but lack the endemic Cumberlandian species of Ecoregion 68c. Mixed oak and oak–pine forests are common and bottomland hardwood forests grow along streams. Logging and recreation are important land uses and dwellings are found on valley sides and on bottomlands. There is less agriculture and cleared land than in Ecoregion 70f.

Bluegrass (Ecoregions 71d, 71k)

The Bluegrass Region is a rolling plain of limestone and dolomite that has some of the most alkaline soils in Kentucky. The rich calcareous uplands of the Bluegrass were among the first to be converted to agriculture, and data on pre-settlement vegetation, especially native grasslands, are incomplete. Steep stream and river valleys still contain extensive forests and woodlands, notably along the Licking River, Salt River, and Kentucky River. The Kentucky River Palisades harbor a dense concentration of rare species, especially globally-rare plants, scattered throughout the extensive forests and cliffs of the ecological corridor. Though few and far between, this region contains grasslands like the dolomite glades near Louisville, the remnant bison traces of Blue Licks, and the Bluegrass cat prairies of Lewis County, all of which harbor globally rare species. Virtually all terrestrial ecosystems in the Bluegrass are highly threatened by invasive species, most notably the bush honeysuckles.



The Kentucky River winds through Kentucky's Bluegrass Region. Photo: Marc Evans OKNP

71d. The rolling to hilly Outer Bluegrass contains sinkholes, springs, entrenched rivers, and intermittent and perennial streams. Local relief is variable but is usually less than in the geomorphically distinct Knobs–Norman Upland (71c). Discontinuous glacial outwash and leached, pre-Wisconsinan till deposits occur in the north from Louisville to Covington. Glacial deposits do not occur elsewhere in Kentucky. Ecoregion 71d is mostly underlain by Upper Ordovician limestone and shale. Natural soil fertility is higher than in the shale-dominated Hills of the Bluegrass (71k). Today, pastureland and cropland are widespread and dissected areas are wooded. At the time of settlement, open savanna woodlands were found on most uplands. On less fertile, more acidic soils derived from Silurian dolomite, white oak stands occurred and had barren openings. Cane grew along streams and was especially common in the east. Distinct vegetation grew in areas underlain by glacial drift (see summary table). Upland streams have moderate to high gradients and cobble, boulder, or bedrock substrates. Mean stream density is greater than in Ecoregion 71l but less than in Ecoregion 71k. Mean summer stream temperatures are much warmer than in Ecoregions 71b, 71c, and 71e. Concentrations of suspended sediment and nutrients can be high.

71k. The mostly forested Hills of the Bluegrass is underlain by Upper Ordovician calcareous shale, siltstone, and limestone. It is lithologically unlike the Knobs–Norman Upland (71c), Outer Bluegrass (71d), and Inner Bluegrass (71l). Upland soils are fairly high in phosphorus, potassium, and lime but are not as naturally fertile as Ecoregions 71d and 71l; they support young, mixed forests rich in white oak, hickory, and cedar. The Hills of the Bluegrass (71k) has steeper terrain, droughtier soils, lower soil fertility, higher drainage density, and is more erosion-prone than Ecoregions 71d and 71l. As a result, less than ten percent of Ecoregion 71k is suited to row crop agriculture and the rest is wooded, pastureland, or hayland. Stream nutrient levels are generally lower than in Ecoregions 71d and 71l. Upland streams are often intermittent and have cobble, boulder, or bedrock substrates. Gradients are steeper than in Ecoregion 71l. Fish and macroinvertebrate assemblages are similar to Ecoregions 71d and 71l but have elements that are distinct from Ecoregion 71c.

71l. The nearly level to rolling Inner Bluegrass is a weakly dissected agricultural plain containing extensive karst, intermittent streams, and expanding urban-suburban areas that originally developed near major springs. Deep, forested gorges also occur along the Kentucky and Dix rivers. The Inner Bluegrass (71l) is characteristically underlain by Middle Ordovician Lexington Limestone and is lithologically distinct from the rest of Ecoregion 71. Very fertile Alfisols and Mollisols have developed from the residuum of underlying phosphatic limestone; natural soil fertility is greater than in Ecoregion 71k. The original open woodlands, savannas, and swamp forests have been largely replaced by agriculture and urban-suburban-

industrial areas. However, deciduous forests containing eastern redcedar still occur in ravines, along the Kentucky River, and near streams. Thoroughbred horse farms, cattle grazing, tobacco, alfalfa, and hay farming are common land uses. Some upland streams are very warm and have seasonally variable flows but others, fed by major springs, are colder and have plentiful perennial flow. In either case, they have moderate to low gradients, cobble or bedrock substrates, and fish assemblages that are similar to the Outer Bluegrass (71d) and the Hills of the Bluegrass (71k). Higher gradient streams draining into the Kentucky River gorge have macroinvertebrate and fish assemblages that are more typical of the Knobs–Norman Upland (71c) than the rest of Ecoregion 71l. Agriculture contributes sediment, nutrients, pesticides, and pathogens to surface water; algal blooms and low concentrations of dissolved oxygen occur especially where the riparian tree canopy has been removed. Wastewater discharge and runoff downstream of urban areas release trace metals into some streams. Package waste treatment plants for small residential subdivisions often discharge into dry valleys, produce effluent-dominated streams, and have a high failure rate. The Kentucky River has some of the highest nitrite plus nitrate and phosphate concentrations in Kentucky. It has been impounded by a series of locks and dams, causing the number of pool-inhabiting fish to increase at the expense of upland habitat species.

Knobs (Ecoregions 70d, 71c)

The Knobs is a narrow hilly band around the Bluegrass Region. Forests of various moisture levels dominate this region. This region is home to two globally rare natural communities, shale or siltstone woodlands and limestone slope glades. Unique calcareous examples of the former can be found in the eastern Knobs region, while a dense concentration of limestone slope glades is found in the western Knobs.



The Knobs is a distinct ecoregion of isolated cone shaped hills and ridge systems with intervening valley flats that partially encircles the Bluegrass Region. Photo: Tara Littlefield, OKNP

70d. Knobs–Lower Scioto Dissected Plateau contains rounded hills and ridges, narrow valleys with high gradient streams, and a few wide, locally swampy, bottoms underlain by weak shales. Cliffs occur especially in the south. High amounts of topographic and geologic variation are typical and create substantial ecological diversity. Ecoregion 70d is underlain by a mixture of Pennsylvanian-age through Silurian-age sedimentary rocks that is absent from the rest of Ecoregion 70. Ecoregion 70d is geographically adjacent and ecologically connected to the Western Allegheny Plateau (70) and, as such, is not a part of the Interior Plateau (71). Uplands knobs are forested and oak and oak–pine forests predominate. Broad valleys are mostly covered by bottomland forests but some are used for livestock or general farming. Elevation, local relief, and forest density are much greater than in Ecoregions 71d, 71k, and 71l. Nutrient and ionic concentrations in streams are lower than in Ecoregions 71d and 71l. No coal mining or related stream acidity problems occur.

71c. The Knobs–Norman Upland is underlain by Pennsylvanian-age through Silurian-age sedimentary rocks. Its rounded hills and ridges are mostly forested and divide the Bluegrass (Ecoregions 71d, 71k, and 71l) from the rest of the Interior Plateau (71). Inceptisols and Ultisols occur on slopes and support mixed deciduous forests. Narrow, high gradient valleys are also common. In addition, a few wide, locally swampy valley floors occur and are used for livestock farming, general farming, and woodland. Ecoregion 71c is characterized by large amounts of geological, topographical, and ecological diversity. Overall, however, physiography, soils, lithology, and land use are distinct from the limestone- and Alfisol-dominated agricultural plains of Ecoregions 71b, 71d, 71e, and 71l. The density of perennial upland streams is far greater than on nearby limestone plains. Nutrient and ionic concentrations are much lower in streams that originate in Ecoregion 71d than outside it in heavily populated, agricultural ecoregions underlain by limestone. Fish and macroinvertebrate diversity is in between that of the Bluegrass (Ecoregions 71d, 71k, and 71l) and that of Ecoregions 71b, 71g, and 70g.

Interior Plateau (Ecoregions 71a, 71b, 71e, 71f, 71g, 71h)

The Interior Plateau is a karst plain with some sandstone peppered by depression ponds and dissected by few streams. Grassland types are numerous in the region which was once covered by extensive prairie, but is now highly agricultural with few larger prairie patches remaining. Hilly areas are mostly forested but still harbor dry grassland communities such as limestone slope glades and cedar barrens. Scattered occurrences of fragipan soils in the southeastern portion of this region contain unique wetlands, including a xero-hydric meadow that is one of the rarest grasslands in Kentucky. Stream

valleys are often too rugged for agriculture and provide important corridors for a mix of mesic forests and xeric bluff woodlands. Depression wetlands are numerous and variable, ranging from seasonally inundated ponds to lakes to flatwoods and even large swamps. River corridors of this region also support some rare communities, such as flood-scoured limestone river prairies.



Parts of the interior plateau consist of flat limestone plains with sinkholes, cave and few surface streams.
Photo: Gary Berdeaux

71a. Crawford–Mammoth Cave Uplands is higher and more rugged than neighboring Ecoregions 71b and 71e. Sandstone cliffs, dissected shale valleys, and less dissected limestone valleys with well developed karst occur. Resistant Mississippian sandstone forms the uplands and cavernous Mississippian limestones are often basal; Pennsylvanian carboniferous sedimentary rocks are absent in contrast to Ecoregions 72c and 72h. In valleys underlain by thick cavernous limestone, stream density is low and sinkholes, caverns, subterranean drainage, and springs are common. Elsewhere, surface drainage is significant and streams have higher gradients than in Ecoregions 71b and 71e. Upland streams are rocky, cool and clear. Rivers are all through-Appendix 1.11 Continued. flowing, meandering, and deeply incised into bedrock. Fish assemblages vary among river systems. A mixture of forests, pastureland, and cropland occur; farming is more widespread than in the Caseyville Hills (72h) but not nearly as extensive as in Ecoregions 71b or 71e.

71b. The rolling Mitchell Plain (71b) is underlain by Mississippian limestones and is characterized by well developed karst, low relief, and extensive agriculture. Sinkholes, ponds, springs, sinkhole wetlands, subterranean drainage, and dry valleys occur. Stream

incision is typically limited except along master streams. Drainage density is lower than in Ecoregions 71a and 71c but higher than in Ecoregion 71e. Mean elevation, relief, and stream gradient are lower than in the lithologically distinct Ecoregions 71a, 71c, and 71g. Potential natural vegetation is a mosaic of bluestem prairie and oak–hickory forest. Today, cropland and pastureland is extensive, mixed oak forests are found on steep slopes, and pin oak, swamp white oak, and sweetgum grow in poorly drained areas. Sinkhole wetlands are common. Water quality has been degraded by municipal effluent, agricultural discharge, and bank erosion following riparian forest removal. However, nutrient concentrations are not typically as high as in Ecoregion 71e.

71e. The weakly dissected Western Pennyroyal Karst Plain is underlain by Middle Mississippian limestones and is extensively farmed; it is both physiographically and lithologically distinct from surrounding ecoregions. Sinkholes, ponds, springs, sinking streams, and dry valleys occur. Underground drainage is well developed, stream density is low, and soils are quick to dry. Most upland streams have limited discharge or are intermittent or ephemeral; they become laden with suspended sediment after heavy rains. Deeper, more intense dissection occurs near incised master streams which are fed by cool, nitrate-rich groundwater. Fish assemblages vary among river systems. Potential natural vegetation is mapped as a mosaic of bluestem prairie and oak–hickory forest. Barrens (i.e. bluestem prairies) were once more widespread than elsewhere in Kentucky. Today, extensive tobacco, livestock, corn, soybean, and small grain farming occurs.

71f. Western Highland Rim is a hilly area that is bisected by the Tennessee River and the Cumberland River valleys. Ecoregion 71f is much more wooded and rugged than the nearby agricultural plains of Ecoregions 71e and 74b. It is underlain by Mississippian limestone and shales and, in the west, by Cretaceous-Paleocene shale, siltstone, and sandstone. Ridges and hills are often capped by cherty gravels and veneered by thin loess. Karst valleys underlain by limestone also occur. Ecoregion 71f is lithologically distinct from Ecoregions 71a, 71e, 72h, and 74b. Potential natural vegetation is oak–hickory forest; it lacks the barrens (i.e. bluestem prairies) of Ecoregions 71e and 74b. Upland soils tend to be cherty, droughty, low in fertility, and are mostly covered by mixed oak forests. Some agriculture occurs on flatter interfluvies and in valleys. Recreation is an important land use in the Land-Between-the-Lakes area. Streams are cool and clear. They have moderate gradients and gravel and sand substrates. Stream alkalinity and hardness vary from east to west but are usually greater than in Ecoregion 74. Fish assemblages vary among river systems.

71g. Eastern Highland Rim is a diverse ecoregion with undulating plains, hills, and karst. Near the Cumberland River, steep bluffs, springs, cascades, and wide bottomlands occur. The degree of dissection is

variable. Overall, nearly level terrain is more extensive than in Ecoregion 71f and stream density is greater than in the lower, less rugged Ecoregion 71e. Ecoregion 71g is mostly underlain by Mississippian limestone, chert, shale, siltstone, and sandstone; it is lithologically distinct from the Pennsylvanian carboniferous sedimentary rocks of Ecoregions 68, 69, and 70. Potential natural vegetation is mapped as oak–hickory forest but, in ravines near the Cumberland Plateau (68a), forests are mixed mesophytic in character. Today, white oak dominates upland forests and bottomland trees grow along streams. Streams are nutrient-rich and moderate in gradient. Riffle substrates are composed of cobble, gravel, or bedrock. Fish, macroinvertebrate, and mussel biodiversity is greater than in the Bluegrass (Ecoregions 71d, 71k, and 71l).

71h. Outer Nashville Basin in Kentucky contains untillable steep ridges and bluffs and cultivated terraces and floodplains along the meandering, downcutting Cumberland River. Springs occur in bluffs and feed waterfalls. Soluble limestone, dolomite, and weak shales of Mississippian-age through Ordovician-age are typically exposed. Potential natural vegetation is oak–hickory forest and, in moister areas, mixed mesophytic forest. Today, forests, pastures, and hay, tobacco, corn, soybean, and small grain farming occur. Cumberland River tributaries are productive, nutrient-rich, and mostly moderate in gradient. Macroinvertebrate communities more closely resemble those of the Bluegrass (Ecoregions 71d, 71k, and 71l) than the adjacent Eastern Highland Rim (71g). However, fish assemblages are Cumberlandian and are similar to those of Ecoregion 71g. Flow on the Cumberland River in Ecoregion 71h is dam-controlled; cold reservoir discharge has eliminated nearly all native fish and mussel fauna downstream to the Tennessee border.

Interior River Valley and Hills (Ecoregions 72a, 72c, 72h)

The Interior River Valley and Hills region is a dissected sandstone plateau with limestone often exposed on lower slopes giving rise to a wide variety of natural communities. Most uplands have been converted to agriculture, but remaining forests are interspersed with depression wetlands, sandstone glades and woodlands. Sandstone ravines may feature disjunct Appalachian species in mesic forests along with numerous cliffs and rockhouses. Limestone uplands harbor limestone slope glades and woodlands and slopes along stream valleys usually contain mesic forests. Historically extensive wetlands on the floodplains of the numerous rivers in this region have either been drained or mined, but some larger wetlands similar to those of the Mississippi River Alluvial and Loess Plain remain.



Portions of the Interior River Valley and Hills contain sandstone bluffs and habitats similar to communities of the plateau escarpment. Photo: Devin Rodgers

72a. The Wabash–Ohio Bottomlands is composed of nearly level, poorly-drained floodplains and undulating terraces. Wetlands, ponds, abandoned channels, oxbow lakes, and low ridges occur. Potential natural vegetation is mapped as southern floodplain forest. Ecoregion 72a is lower, more poorly-drained, and has a different natural vegetation than other parts of Ecoregion 72. Today, some woodlands remain but livestock, alfalfa, corn, soybean, and wheat farming is extensive. Land use is affected by seasonally high water tables and localized flooding. Low gradient streams with silt or sand bottoms occur and are inhabited by Ohio River-type fish fauna. Channelization and drainage ditches are common.

72c. Green River–Southern Wabash Lowlands is dominated by agriculture and coal mining. Wide, poorly-drained, low gradient valleys filled with alluvial and lacustrine deposits are extensive and low hills mantled with loess occur. Ecoregion 72c is largely underlain by Pennsylvanian carboniferous sedimentary rocks of the Sturgis and Carbondale formations that are not exposed in the higher, more rugged, and more wooded Ecoregion 72h. Bottomland forests were once common and oak–hickory forests grew on the better-drained upland sites. Today, some forests and wetlands remain but cropland, pastureland, and both underground and surface coal mining are now extensive. Siltation from mining and agriculture has increased flooding and prompted remedial channelization projects. Channelized streams lack riparian forests and have very warm water, high turbidity, and limited concentrations of dissolved oxygen. Acid coal mine runoff has decreased biological productivity in streams; many tributaries have low numbers of fish and fish species

while others are entirely devoid of fish. Macroinvertebrate and fish communities are similar to those in Ecoregion 72a but are less diverse than in the upland streams of Ecoregion 72h.

72h. Caseyville Hills is dominated by forests and pastureland and is mantled by thin loess. Valleys are narrower and are much less extensive than in Ecoregion 72c but are wider, deeper, and more numerous than in Ecoregion 71a. Ecoregion 72h is underlain by Pennsylvanian sandstones, siltstones, shales, and coal of the Tradewater and Caseyville formations and Mississippian Chesterian limestones, sandstones, siltstones, and shales. These formations are absent from the lower, less rugged, and less wooded Ecoregions 72a and 72c. Limestone is much less common than in the Interior Plateau (71). Potential natural vegetation is oak–hickory forest and forests remain common. Today, livestock and hay farming, logging, oil production, and coal mining are the dominant land uses. However, coal mining is less extensive than in Ecoregion 72c. Upland perennial streams are cooler and have higher gradients, rockier substrates, better water quality, more diverse habitats, and more productive fish and macroinvertebrate communities than Ecoregion 72c.

Mississippi Alluvial Plain (Ecoregion 73a)

Mostly a flat, broad alluvial plain with river terraces, swales, and levees providing the main elements of relief. Soils are typically finer-textured and more poorly-drained than the upland soils of Ecoregion 74. However, better-drained loamy, silty, and sandy soils also occur. Winters are mild and summers are hot. Bottomland forests dominated by water-tolerant oaks and swamp forests of tupelo and bald cypress were once common. Grasslands occurred on well-drained sandy sites. Much of the natural vegetation has been cleared and drained for cultivation. Streams are extremely low in gradient and have sandy to muddy substrates. Fish assemblages, with the exception of a few rare and sporadically occurring species, are similar to those in the lowland streams in Ecoregion 74.

73a. The Holocene Meander Belts contains floodplains, low terraces, levees, abandoned channels, oxbow lakes, wetlands, and bayous. Soils are derived from deep Quaternary alluvium and are naturally fertile. They support a potential natural vegetation of southern floodplain forest that is distinct from the oak–hickory forest of nearby upland ecoregions. Aquatic communities are largely lentic in nature and Mississippian-type biotic assemblages occur. Undrained areas are subject to seasonal flooding. Elsewhere, drainage canals and field drains are common. Extensive wetland drainage and bottomland forest clearance has occurred in Ecoregion 73a. Today, the ecoregion is dominated by soybean, corn, small grain, and livestock farming. Only



Bottomland forests, swamps and oxbow lakes are characteristic communities of the nearly level, poorly drained lowlands found within the Mississippi floodplain region. Photo: John Brunjes

limited areas of bottomland forests and swamps still occur. The remaining bottomland forests are dominated by water-tolerant oaks, maples, sweetgum, sugarberry, sycamore, American elm, and pecan. The remaining swamps contain many southern species that are near their northern distributional limits including bald cypress and tupelo. Water and marsh birds are abundant.

Mississippi Valley Loess Plains (Ecoregions 74a, 74b)

Ecoregion 74 in far western Kentucky consists of irregular plains, gently rolling hills, and, near the Mississippi River, bluffs. It is characteristically covered by thick loess and alluvium and is underlain by unconsolidated coastal plain sediments that are susceptible to rapid erosion. Ecoregion 74 is lithologically distinct from the consolidated bedrock of the Interior Plateau (71) and the Interior River Valleys and Hills (72). Ecoregion 74 has less relief than Ecoregions 71 and 72. Elevations and relief are much lower than in the Appalachian Mountains (i.e. Ecoregions 68, 69, and 70). Potential natural vegetation is oak–hickory forest and is unlike the southern floodplain forest of the Mississippi Alluvial Plain (73). Forested wetlands were once extensive but have been replaced by extensive cropland and pastureland. Streams typically have low gradients and

gravelly to sandy bottoms. Stream alkalinity and hardness levels are lower than in Ecoregion 71. Fish assemblages, with the exception of several locally endemic species, are similar to those of Ecoregions 72 and 73. Virtually all of the major stream systems have been channelized to some degree. Small patches of prairie still occur on roadsides and utility right of ways, but forests dominate the few remaining natural areas and are usually restricted to hilly terrain unsuitable for agriculture. The Jackson Purchase prairie is virtually extinct.



The Mississippi Valley Loess Plains is characterized by cypress and tupelo swamps, such as Obion Creek.
Photo: Marc Evans

74a. The highly dissected Bluff Hills is a narrow belt of rugged terrain that is mantled by thick loess and underlain by unconsolidated coastal plain sediments. The Bluff Hills (74a) ecoregion is highly susceptible to landslides and erosion if disturbed. Ecoregion 74a is higher and more rugged than adjacent ecoregions. Steep hills, bluffs, winding ridges, and narrow valleys occur and have a mosaic of macroenvironments. Drier uplands are covered in oak–hickory forest and mixed oak forests. Mesic slopes have closed forests that are dominated by sugar maple, bitternut hickory, yellow-poplar, and beech. Aquatic habitats and fish assemblages are more typical of uplands than of nearby Ecoregions 73a and 74b. Intermittent and ephemeral streams are common and have silty or sandy bottoms. Higher gradient stream reaches with gravel substrates also occur.

74b. The Loess Plains is a productive agricultural area that is composed of gently rolling uplands, broad bottomlands, and terraces. It is mantled by thick loess and alluvium and is underlain by weak, unconsolidated

coastal plain sediments. Ecoregion 74b is lithologically distinct from higher, more easterly ecoregions. Potential natural vegetation is a mosaic of oak–hickory forest and bluestem prairie and is unlike the southern floodplain forest of Ecoregions 72a and 73a. Grasslands and forested wetlands were once widespread here and in the Western Pennyroyal Karst Plain (71e). Most of the original vegetation has now been replaced by cropland. Extensive corn, soybean, wheat, hay, tobacco, livestock, and poultry farming occurs. Agricultural runoff has degraded surface water quality. High turbidity and siltation are common in the streams and rivers of Ecoregion 74b. Many channelized streams occur.

Sources:

U.S. Environmental Protection Agency. Level III ecoregions of the continental United States (revision of Omernik, 1987). 2002. Corvallis, Oregon, USEPA–National Health and Environmental Effects Research Laboratory. Notes: Map M-1, various scales.

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Kentucky's Watersheds

Kentucky has an abundance of surface and groundwater resources, with over 90,000 miles of surface streams, over 229,000 acres of lakes and reservoirs, and extensive underground stream systems. These waters provide a diverse array of habitats that support a wide variety of aquatic organisms. Ten major drainage systems are included within the state: Mississippi River and minor tributaries, Ohio River and minor tributaries, Tennessee River system, Cumberland River system, Tradewater River system, Green River system, Salt River system, Kentucky River system, Licking River system, and Big Sandy River system (Apx 2.3). Most streams in Kentucky ultimately drain into the Ohio River. The Ohio River basin encompasses the Tennessee, Cumberland, Tradewater, Green, Salt, Licking, and Big Sandy River systems. The only exceptions are minor direct tributaries of Mississippi River in the far western portion of the state.

Mississippi River and Minor Tributaries

The Mississippi River forms Kentucky's western border, from the Ohio River confluence in Ballard County downstream for approximately 157 kilometers (98 miles) to the Tennessee border. This section is part of the lower Mississippi River, draining the Mississippi Alluvial Plain of the Mississippi Embayment physiographic province. The river adjacent to Kentucky is not impounded and the floodplain contains lowland habitats including meander cut-offs, backwater sloughs, side channels, and oxbow lakes. The principal direct tributaries of the

Mississippi River are Mayfield Creek, Obion Creek, and Bayou de Chien, all of which lie on the Coastal Plain of extreme western Kentucky. Other tributaries include Running Slough and Terrapin Creek, which drain south into Reelfoot Lake and the Obion River, respectively, in Tennessee. Most of these are lowland streams that historically were highly sinuous and associated with extensive riparian wetlands and bottomland hardwood riparian forests. They have since been channelized and straightened to a large extent and many of the wetlands have been drained and converted to agricultural fields. Terrapin Creek in southern Graves County has spring-fed wetlands along its floodplain. The headwater reaches of Terrapin Creek and some other streams in the area are somewhat more upland in character with flowing sections over shifting gravel substrates. The aquatic fauna of the Mississippi River and its tributaries includes a mixture of large river and lowland species, many of which are distributed beyond the boundaries of Kentucky. Terrapin Creek has Kentucky's most unusual fish fauna, with seven species found nowhere else in the state and several others with limited ranges.



Mississippi River in Carlisle County. Photo: Matt Thomas



Terrapin Creek in Graves County, Obion River drainage.
Photo: Matt Thomas

Ohio River and Minor Tributaries

The Ohio River forms the entire northern border of Kentucky for a distance of about 1,069 km (664 mi), from the mouth of the Big Sandy River in the east (upstream) to its confluence with the Mississippi River in the west (downstream). It receives all the major rivers of the state and many small direct tributaries. From east to west, the Ohio River flows through three major physiographic provinces: the Appalachian Plateaus, Interior Low Plateaus, and Coastal Plain. The upper and middle sections of the river situated within the Appalachian Plateaus and Interior Low Plateaus are narrower, bordered by high wooded hills or bluffs, have few islands, and a relatively narrow floodplain with little wetland development. The lower section of the river, from the Shawnee Hills section of the Interior Low Plateaus to the Coastal Plain, the river and its floodplain broadens considerably, hills are lower, islands are more frequent, and oxbow lakes, wetlands, and other floodplain shallow aquatic habitats are more common. The entire river is impounded by a series of navigation dams (nine in Kentucky), that maintain a minimum depth of 3 m (10 ft) in the channel at low flow. This has eliminated most of the shallow shoal habitat, with gravel and sand bars existing in some places, including the shorelines immediately downstream of dams. Minor tributaries of the Ohio River in Kentucky include Kinniconick Creek, Tygarts Creek, and Little Sandy River, as well as numerous smaller streams that flow directly into the Ohio River along the entire northern border of the state. Despite impoundment and a history of water pollution, the Ohio River continues to support a large and diverse aquatic fauna. Large river species are dominant in the mainstem, which also enter the lower reaches of tributaries. Species characteristic of upland streams inhabit Kinniconick Creek, Tygarts Creek, and Little Sandy River, which lie within the Appalachian Plateaus physiographic province. Lowland species become more prevalent with distance downstream, particularly from the Shawnee Hills section of the Interior Low Plateaus to the Coastal Plain.



Ohio River, Lewis County. Photo: Matt Thomas



Kinniconick Creek in Lewis County, an upland Ohio River tributary. Photo: Matt Thomas



Tennessee River below Kentucky Dam, Livingston County. Photo: Matt Thomas

Tennessee River Drainage

In Kentucky, the Tennessee River drainage is limited to parts of the Highland Rim section of the Interior Low Plateaus and the Eastern Gulf Coastal Plain section of the Mississippi Embayment. The river enters Kentucky from Tennessee at the southwestern corner of Calloway County and flows north-northwest for 79 km (49 mi) to its confluence with the lower Ohio River in McCracken County. The Kentucky portion of the Tennessee River is a large river with habitats similar to the lower Ohio River including a broad floodplain with wetland features. About 64 km (41 mi) of the river is impounded by Kentucky Dam forming a large reservoir (Kentucky Lake), which is relatively shallow and partially riverine in character. The lowermost 32 km (22 mi) section below Kentucky Dam is more riverine in character but is influenced by impoundment on the Ohio River by Olmstedt Lock and Dam. Major tributaries, including Blood River and Jonathan Creek, are embayed by Kentucky Lake. The only major unimpounded tributary is Clarks River, which joins the Tennessee River near its mouth. Most tributary streams have upland features in their headwaters, becoming more lowland in their middle and lower reaches. Streams draining into Kentucky Lake are isolated by lacustrine conditions at their mouths. The Clarks River is the largest tributary to the Kentucky Portion of the Tennessee River drainage. It has upland features in the middle and headwater reaches, with broad floodplains and numerous meander cut-offs, overflow pools, and spring-fed wetlands in the lower portion of the system. Many streams have been channelized and wetlands cleared and drained for agriculture. The riverine portion of the Tennessee River in Kentucky supports a large river aquatic fauna like that of the Lower Ohio River. Kentucky Lake supports some riverine species, but also contains lentic species that have adapted to impoundment. The Clarks River supports a diverse mixture of lowland species and small to medium-sized stream species.

Cumberland River Drainage

The Cumberland River originates in the Cumberland Mountains of southeastern Kentucky, flows west and north over Cumberland Falls, and bends through southcentral Kentucky before entering into Tennessee. The river re-enters the western part of the state where it parallels the Tennessee River and flows north to its confluence with the Ohio River. Because of its large size and division by physiographic and political boundaries, the Cumberland River drainage is divided into upper, middle, and lower sections. The aquatic habitats and faunas of the river and its tributaries differ substantially among the different sections.

The lower Cumberland River drainage includes the portion in western Kentucky paralleling the Tennessee River and the Red River system. From the Kentucky-Tennessee border in Trigg County, the river flows northwestward 121 km (75 mi) and joins the Ohio River at Smithland, Livingston County. Over half of the river's length in Kentucky is impounded by Barkley Dam to form Lake Barkley, which is relatively shallow and partially riverine in character. The lowermost 49 km (30 mi) section below Barkley Dam is more riverine but is influenced by Olmstedt Lock and Dam on the Ohio River. Most of the lower Cumberland River drainage is within the Highland Rim section of the Interior Low Plateaus province, with extreme headwater portions of some tributaries in the Shawnee Hills section. Two major tributaries of the lower Cumberland River in Kentucky are Little River, which drains into Lake Barkley from the east, and Red River, which has portions in Kentucky and Tennessee and enters the Cumberland River near Clarksville, Tennessee. Streams and rivers in the lower Cumberland River basin are generally upland in character and often have springs and karst features. Direct tributaries to Lake Barkley are embayed in their lower reaches forming a lacustrine environment. Tributaries entering the river below Barkley Dam are

upland in their headwaters are upland with rocky riffles and pools but become lowland in character as they enter the floodplain of the Cumberland River. Land use within the watershed is predominantly row-crop agriculture. The riverine section of the lower Cumberland River supports a large river aquatic fauna similar to the Tennessee and Ohio rivers. Lake Barkley supports some riverine species, but also contains lentic species that have adapted to impoundment. The Little and Red rivers support diverse faunas composed of small to medium-sized upland stream species.



Blue Spring resurgence pool in Trigg County, lower Cumberland River drainage. Photo: Matt Thomas



Red River in Logan County, a major tributary of the Lower Cumberland River. Photo: Matt Thomas

The Middle Cumberland River drainage includes the portion of the watershed from Cumberland Falls downstream to the Tennessee border. The river and its tributaries from Cumberland Falls downstream about 72 km (45 mi) lies mostly within the Cumberland Plateau and Pottsville Escarpment. Major tributaries within this section are the Rockcastle and Laurel rivers and the upper section of the Big South Fork Cumberland River. Streams and rivers of the Cumberland Plateau and Pottsville Escarpment lie within deep gorges, have high

gradients with low waterfalls, large boulders, fast riffles, and deep holes. The river and its tributaries from Buck Creek downstream lie mostly within the Highland Rim section of the Interior Lows physiographic province. Major tributaries in this section include Marrowbone, Crocus, Indian, Beaver, Fishing, Pitman, and Buck creeks, and the lower Big South Fork. In addition, a small portion the Wolf River system, part of the Obey River that joins the Cumberland River in Tennessee, lies within Kentucky. Streams and rivers in this section are upland in nature with alternating riffles and pools, incised meanders, narrow floodplains, and rocky substrates. The middle Cumberland River drainage has been transformed considerably by Wolf Creek Dam, which impounded the river to form Lake Cumberland. The reservoir inundated about 163 km (101 mi) of the river from the dam to about 6 km (3.7 mi) downstream of Cumberland Falls, including lower reaches of tributaries upstream to Laurel River. Laurel River is impounded above its confluence with the Cumberland River to form Laurel River Lake. The region is highly scenic and contains some of the most pristine waters remaining in the state. Four stream and river segments are designated Kentucky Wild Rivers including parts of the Rockcastle River, Little South Fork, Rock Creek, and Big South Fork. The middle Cumberland River drainage supports a diverse upland fauna with numerous endemic species.



Cumberland Falls in Whitley County, the boundary of middle and upper Cumberland River drainage. Photo: Matt Thomas



Rockcastle River in Pulaski County, middle Cumberland River drainage. Photo: Matt Thomas

The upper Cumberland River drainage includes the watershed from its headwaters downstream to Cumberland Falls. The mainstem of the Cumberland River is formed by the confluence of the Poor Fork, Clover Fork, and Martins fork in Harlan County, and flows southwest along the southern base of Pine Mountain. The headwater portion of the watershed drains the Cumberland Mountains section of the Appalachian Plateaus province. As the river flows westward it cuts through Pine Mountain to enter the Cumberland Plateau section, then across the Plateau to Cumberland Falls. Cumberland Falls represents a natural barrier separating the fauna of the upper and middle Cumberland River drainage. Streams in the Cumberland Mountains section are high gradient with coarse cobble and boulder substrates with limited pool development. In the Cumberland Plateau section, streams have lower gradients with long pools and shorter riffles and substrates composed of more fine sediment. Much of the upper Cumberland watershed is forested, but has a history of coal mining, oil and gas exploration, and silviculture, which have degraded water quality. Because Cumberland Falls serves as a dispersal barrier, the aquatic fauna of the upper Cumberland River drainage is depauperate with fewer native species represented.



Upper Cumberland River in Whitley County, above Cumberland Falls. Photo: Matt Thomas

Tradewater River Drainage

The Tradewater River is an Ohio River tributary that lies between the lower Green River to the east and the lower Cumberland River to the west. It originates in Christian County and flows northwest for about 234 km (134 mi) to its confluence with the Ohio River in Union County. The drainage is entirely within the Shawnee Hills section of the Interior Low Plateaus physiographic province. The river is a medium-sized lowland stream throughout much of its length and has some of the largest wetlands remaining in Kentucky. The upper portion of the watershed has streams that are upland in

nature. Aquatic habitats and water quality throughout the drainage have been severely degraded by coal mining, which has in turn reduced the aquatic fauna. What remains is a mixture of lowland and small to medium-sized stream species, with some large river species appearing in the lower section of the river.



The Tradewater River is a typical gentle rolling river with an abundance of woody debris, braided channels, riffles, runs and deeper pools.

Photo: KDFWR

Green River Drainage

The Green River drainage encompasses a greater percentage of Kentucky's land area than any other watershed in the state. It is contained almost entirely in Kentucky except for a small portion of the headwaters of the Barren River in northcentral Tennessee. The Green River originates in Lincoln County and flows westward for 610 km (379 mi) to its confluence with the Ohio River in Henderson County. Because the river flows through and drains a diverse landscape, the aquatic habitats and fauna differ substantially between the lower and upper parts of the watershed.

The lower Green River drainage extends from the mouth of the Barren River downstream to the confluence with the Ohio River. This portion of the drainage lies mostly within the Shawnee Hills section of the Interior Lows physiographic province except for the headwaters of the Rough River, which lie on the Highland Rim. Major tributaries of the lower Green River include Panther Creek, and Pond, Rough, and Mud rivers. The lower Green River is a large river with habitats similar to the Tennessee, lower Cumberland, and Ohio rivers. This section is impounded by four navigation dams, which have altered the natural flow and largely eliminated shallow shoal habitats. The only large impoundment in

the lower Green River drainage is Rough River Lake, which inundates about 30 km (18 mi) of the Rough River and portions of several tributaries. Many tributaries have been channelized and a large portion of the watershed has been affected by coal mining and oil drilling. Streams in the lower drainage are mostly lowland in character with wetlands, sloughs, and oxbow lakes commonly occurring along the wide floodplains; however, the upper reaches of tributaries (e.g., Pond, Mud, and Rough rivers) have upland characteristics including higher gradients with gravel riffles. The aquatic fauna is a mixture of lowland species and small to medium-sized stream species. The lower Green River mainstem is dominated by large river species.



Green River in Butler County. Photo: Matt Thomas

The upper Green River drainage extends from the headwaters downstream to and including the Barren River and its tributaries. In addition to the Barren River, major tributaries of the upper Green River include Nolin River, Little Barren River, Big Pitman Creek, and Russell Creek. Major tributaries of the Barren River are the Gasper River and Drakes Creek. The upper Green River drainage lies mostly within the Highland Rim section of the Interior Low Plateaus physiographic province, but lower sections of the Green, Barren, and Nolin rivers are in the Shawnee Hills section. The upper Green River and Barren River are medium-sized to large streams, both of which are impounded by navigation dams. The two dams on the Green River in this section and one on the Barren River were recently removed, which will restore free-flowing conditions and shallow riverine habitat to many miles of river upstream of these structures. The Green, Barren, and Nolin rivers are also impounded by large flood control dams to form Green River Lake, Barren River Lake, and Nolin Lake. These

reservoirs inundate large portions of these rivers and lower reaches of tributaries and alter natural flow and temperature conditions of the rivers downstream of the dams. Sources of pollution are diverse and varied, but agricultural run-off, municipal and domestic wastes, oil drilling are main contributors. In contrast to the lower Green River drainage, streams in the upper drainage are upland in character and flow over sand, gravel, and bedrock substrates. The aquatic faunal assemblages in the mainstem Green River and lower Barren River are a mixture of medium-sized to large stream species, and tributaries support headwater to small and medium-sized upland stream species.

Salt River Drainage

The Salt River drainage drains into the Ohio River in northcentral Kentucky and is bordered by the Green River drainage to the west and south, and the Kentucky River drainage to the east. The watershed is highly dendritic and lies entirely within the Bluegrass section of the Interior Low Plateaus physiographic province. The three major branches, Salt River and Floyds Fork, Beech Fork, and Rolling Fork, are roughly equal in size. The upper Salt River is impounded to form Taylorsville Lake, which is the only major reservoir in the drainage. Agriculture is the dominant land use throughout the drainage, which is the principal source of nutrient enrichment and sedimentation in streams. Municipal and industrial effluents are also sources of water pollution. Streams within the drainage are classified as upland with moderate gradient, well-developed riffles and shoals, and rocky substrates. Some larger streams flow through wide floodplains, have relatively low gradients, and are generally shallow, warm, and productive. These features impart a somewhat lowland character to streams in some areas. Large river habitat is limited to the lower Salt and Rolling Fork rivers, which are influenced by backwaters from Cannelton Lock and Dam on the Ohio River. The aquatic fauna is composed of mostly small to medium-sized stream species, but large river species occur in the lower reaches of the Salt and Rolling Fork rivers. Some species characteristic of lowland habitats in western Kentucky occur in low-gradient areas and wide floodplains.



Chaplin River in Washington County, Salt River drainage. Photo: Matt Thomas

Kentucky River Drainage

The Kentucky River drainage originates on the northern side of Pine Mountain in southeastern Kentucky and flows northwest to join the Ohio River in Carroll County. The mainstem of the Kentucky River begins at the confluence of the North Fork, Middle Fork, and South Fork in Lee County, and flows 411 km (255 mi) to its mouth. In addition to the three forks, major tributaries of the Kentucky River from its mouth upstream include Eagle Creek, Elkhorn Creek, Dix River, and Red River. The upper portion of the drainage, which includes the three forks and the Red River system, lies within the Cumberland Plateau section of the Appalachian Plateaus physiographic province. A section of the North Fork Red River is designated a Kentucky Wild River due to its scenic beauty and exceptional water quality. The lower portion of the drainage, including Eagle Creek, Elkhorn Creek, and Dix River lies within the Bluegrass section of the Interior Lows Plateau physiographic province. Streams within upper portion of the drainage on the Cumberland Plateau are upland, with relatively high gradients, low productivity, and sand, gravel, and cobble substrates. Streams draining the Bluegrass section are of lower gradient and higher productivity with substrates of bedrock and patches of gravel, sand, and silt. The Kentucky River mainstem below the three forks is impounded by a series of 14 navigation dams, which have eliminated most shallow shoal habitats. Three major flood control reservoirs exist within the drainage: Buckhorn Lake (Middle Fork Kentucky River), Herrington Lake (Dix River), and Carr Fork Lake (Carr Fork-North Fork Kentucky River). Shorter reaches of some other streams are impounded by low-head dams (e.g., mill dams). The upper portion of the drainage on the Cumberland Plateau is largely forested, but coal mining, silviculture, and oil and gas extraction have resulted in habitat and water quality degradation. In the Bluegrass, land use in the lower portion of the drainage is a mixture of agriculture and urban development, which has resulted in degraded water quality from domestic, municipal, and agricultural effluents. The aquatic fauna of the Kentucky River mainstem below the forks is riverine, but also has tolerant lentic species that have adapted to impoundment. Tributaries throughout the drainage contain small to medium-sized upland stream species, with lowland species appearing more frequently in the lower portion of the drainage approaching the Ohio River.



Kentucky River, Mercer County. Photo: Matt Thomas

Licking River Drainage

The Licking River originates in Magoffin County in eastern Kentucky and flows northwest 496 km (308 mi) to join the Ohio River in Kenton County. Major tributaries of the Licking River from its mouth upstream include South Fork and North Fork Licking rivers, and Fleming, Fox, Slate, and Triplett creeks. The upper half of the drainage lies mainly on the Unglaciaded Allegheny Plateau section of the Appalachian Plateaus, and the remaining lower portion lies within the Bluegrass section of the Interior Plateaus physiographic province. The Licking River is impounded by a single large reservoir, Cave Run Lake, which is located near the boundary of the Unglaciaded Allegheny Plateau and the Bluegrass. Cave Run Lake inundates 61 km (38 mi) of the mainstem and lower reaches of several tributaries. Streams in the upper portion the drainage on the Unglaciaded Allegheny Plateau are characterized as upland, having moderate to high gradients, well-developed riffles and shoals, rocky substrates, and relatively narrow floodplains. In the lower part of the drainage in the Bluegrass, streams have lower gradients, are more productive, and have substrates of bedrock with patches of gravel, sand, and silt. The watershed upstream of Cave Run Lake has been impacted by coal mining, oil and gas extraction, and pollution from municipal and domestic sources. Downstream of Cave Run Lake, much of the lower portion of the drainage has been impacted by sedimentation and pollution from agricultural activity. The aquatic fauna of the tributaries in the Licking River drainage is composed of small to medium-sized upland stream species. Lowland and large river species appear in the lower mainstem Licking River and tributaries, similar to the Kentucky and Salt river drainages.



Licking River, Pendleton County. Photo: Matt Thomas

Big Sandy River Drainage

The Big Sandy River drainage includes portions of eastern Kentucky, West Virginia, and Virginia. The drainage is comprised of the Big Sandy River and its two major tributaries, Levisa Fork and Tug Fork. The Levisa Fork originates in Virginia and is joined by the Russell Fork, which also originates in Virginia. The Tug Fork originates in West Virginia and flows north forming approximately 145 km (90 mi) of the Kentucky-West Virginia border. It joins the Levisa Fork to form the Big Sandy River in Lawrence County, where it continues along the state line for approximately 40 km (25 mi) before joining the Ohio River between Boyd County, Kentucky, and Wayne County, West Virginia. In addition to the Levisa and Tug Forks, major tributaries in Kentucky include Blaine, Johns, and Beaver creeks, and Russell Fork. In Virginia, the headwaters of the Levisa Fork arise in the Cumberland Mountains section of the Appalachian Plateaus physiographic province, but most of the drainage in Kentucky lies within the Unglaciated Allegheny Plateau section. All streams in the drainage are upland, having moderate to steep gradients, well-developed riffles and shoals, rocky substrates and narrow, poorly developed floodplains. Four major reservoirs exist in the Kentucky portion of the drainage: Yatesville Lake (Blaine Creek), Patinsville Lake (Paint Creek), Dewey Lake (Johns Creek), and Fishtrap Lake (Levisa Fork). Coal mining, oil and gas extraction, poor silviculture practices, and domestic and municipal pollution have severely degraded water quality throughout the drainage. The current aquatic fauna is a remnant of what occurred there historically. The Big Sandy River and lower Levisa fork has medium to large-sized stream and riverine species. Smaller tributaries have species typical of small to medium-sized upland streams.

Faunal Composition by Drainage

Impoundments have altered many of Kentucky's watersheds (Apix 2.4). Despite these impacts, Kentucky harbors some of the most biodiverse river systems in the nation. In addition, our state has significant recovery potential to restore natural systems by removing defunct lock and dams. The major drainages of Kentucky and the total number of native, endemic, and species of greatest conservation need for fishes, mussels, and crayfishes are presented in the table below. Principal factors influencing aquatic species diversity among Kentucky's drainages are drainage area, habitat diversity, and geological history. A positive relationship exists between the size of a drainage and number of species present. The Cumberland and Green river drainages are the largest in the state and have the most diverse faunas. In contrast, smaller drainages such as the Salt and Tradewater have among the fewest species, regardless of their geographic position.



Elkhorn Creek in Pike County, Big Sandy River drainage. Photo: Matt Thomas



Russell Fork canyon, Breaks Interstate Park (Pike County) on the KY/VA state line. Photo: Matt Thomas

Variety of habitats also influences species diversity. For example, the combination of upland and lowland habitats in the Green River drainage greatly enhances its species diversity. The influence of geological history is exemplified by the upper Cumberland River, where a major waterfall (Cumberland Falls) has resulted in a strikingly depauperate fauna when compared to the remainder of the drainage. The Cumberland River drainage supports the state's most diverse and unique fauna due to its large drainage area, habitat diversity, and complex history. It contains the highest number of native and endemic species of fish, mussels, and crayfish than any other major drainage in the state. The Green River drainage is second to the Cumberland in total native species and endemics, except for crayfishes, which have slightly higher numbers in the Ohio River and minor tributaries. Number of

species of greatest conservation need (SGCN) generally coincides with number of native species and endemics. The Cumberland and Green river drainages and the Ohio River and minor tributaries contain the highest number of mussel and crayfish SGCN. The Mississippi River and minor tributaries ranks highest for fish SGCN,

followed by the Cumberland and Green. The Green River drainage includes the top “hot spot” watersheds for imperiled fish and mussel taxa, based on numbers of species receiving Endangered Species Act Protection, are candidates for federal listing, or state-listed as endangered, threatened, or of special concern by the Office of Kentucky Nature Preserves.

Major Drainage	Watershed Area in KY (km ²)	Fishes (native species/ endemics/ SGCN)	Mussels (native species/ endemics ^a /SGCN)	Crayfishes (native species/ endemics ^b /SGCN)
Mississippi River and minor tributaries	2,978	129 / 1 / 40	29 / 0 / 10	11 / 0 / 7
Ohio River and minor tributaries	101,554	139 / 0 / 26	76 / 0 / 37	29 / 3 / 18
Tennessee River	2,590	130 / 2 / 24	58 / 0 / 26	11 / 1 / 5
Cumberland River	18,700	175 / 19 / 36	88 / 6 / 50	33 / 4 / 19
Tradewater River	2,442	74 / 0 / 6	31 / 0 / 8	6 / 0 / 3
Green River	23,906	155 / 8 / 32	73 / 1 / 36	26 / 2 / 15
Salt River	7,560	95 / 0 / 9	58 / 0 / 26	8 / 0 / 5
Kentucky River	18,042	124 / 2 / 18	60 / 0 / 27	21 / 4 / 13
Licking River	9,601	109 / 0 / 14	56 / 0 / 25	10 / 0 / 5
Big Sandy River	5,916	96 / 0 / 9	29 / 0 / 7	10 / 2 / 5

^a approximately 30 species of mussels are endemic to the Cumberlandian region, which includes the Cumberland and Tennessee River basins.

^b two species of crayfish endemic to Kentucky each occupy a small area but occur in two major drainages and are not included.

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Climate

Kentucky's location in the southeast interior U.S. produces a moderate climate often being classified as humid and temperate. The state's weather systems are associated with cyclic movement of the jet stream. Winter and spring weather are dominated by low pressure, including both cold and warm fronts, bringing cloudy, cool, and sometimes wet days. In winter, an occasional high pressure system dips southward from Canada bringing cold, clear and dry conditions to the state and region. The jet stream moves northward in summer and fall and the state is dominated by high-pressure. Clockwise airflow around this high-pressure system results in warm, humid summers as air flows up the Mississippi and Ohio Valleys from the south. The prevalent wind direction is from the south-southwest with typically light surface winds.

Temperatures in Kentucky are normally at the lowest in January and highest in July. Latitude and elevation influence mean annual temperatures in the state. The highest temperatures usually occur in extreme western Kentucky at the lower elevations. The lowest temperatures occur along the upland Ohio and West Virginia borders. Thirty-year averages of mean annual temperatures throughout Kentucky vary with a maximum of 60°F for Gilbertsville in the west and a minimum of 53°F for Ashland in the east. Extremely cold or hot temperatures are rare. The growing season follows a similar pattern to temperature patterns geographically, extending from 155-170 days in eastern and northern regions to more than 200 days in western and southern portions of the state.

Kentucky receives about 46 inches of precipitation annually. Although precipitation is distributed fairly evenly throughout the year, most of the state experiences a spring maximum and fall minimum. The annual distribution of precipitation is typically in phase with the temperature fluctuations during the summer months. The precipitation maximum normally occurs in the same month as the temperature maximum, often in July. Western Kentucky, however, exhibits a March precipitation maximum. Eastern Kentucky shows a July precipitation maximum with a strong secondary peak in March. October is usually the driest month in the state. Kentucky receives about twelve inches of snowfall annually, but most winter precipitation falls as rain, drizzle, or sleet. Ice storms occasionally cause major ecological disturbance in Kentucky.

Land Ownership, Population, and Economy

The boundary of Kentucky encompasses roughly 39,491.61 square miles or 25.859 million acres. This area can be further segmented into 120 counties, 81 urban

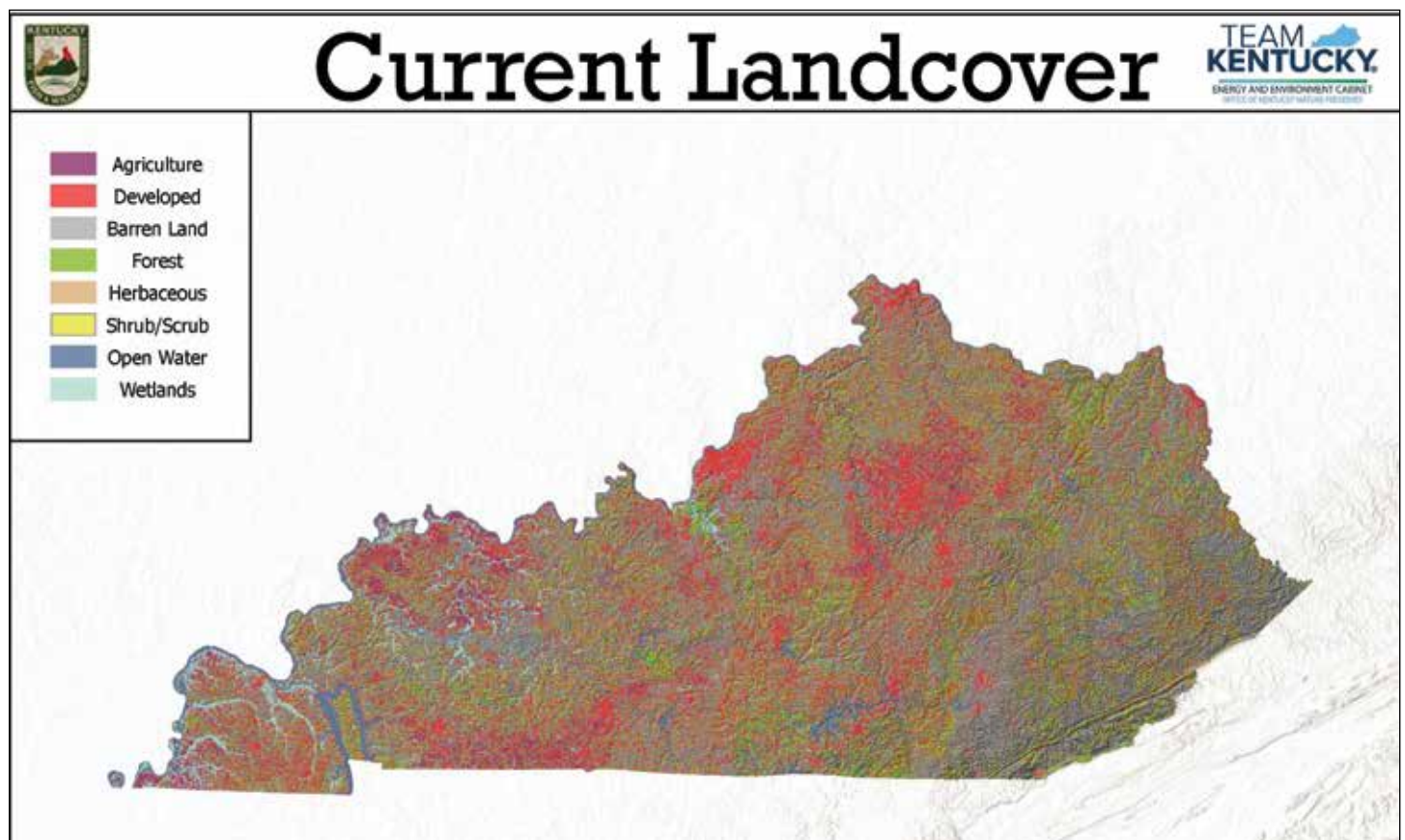
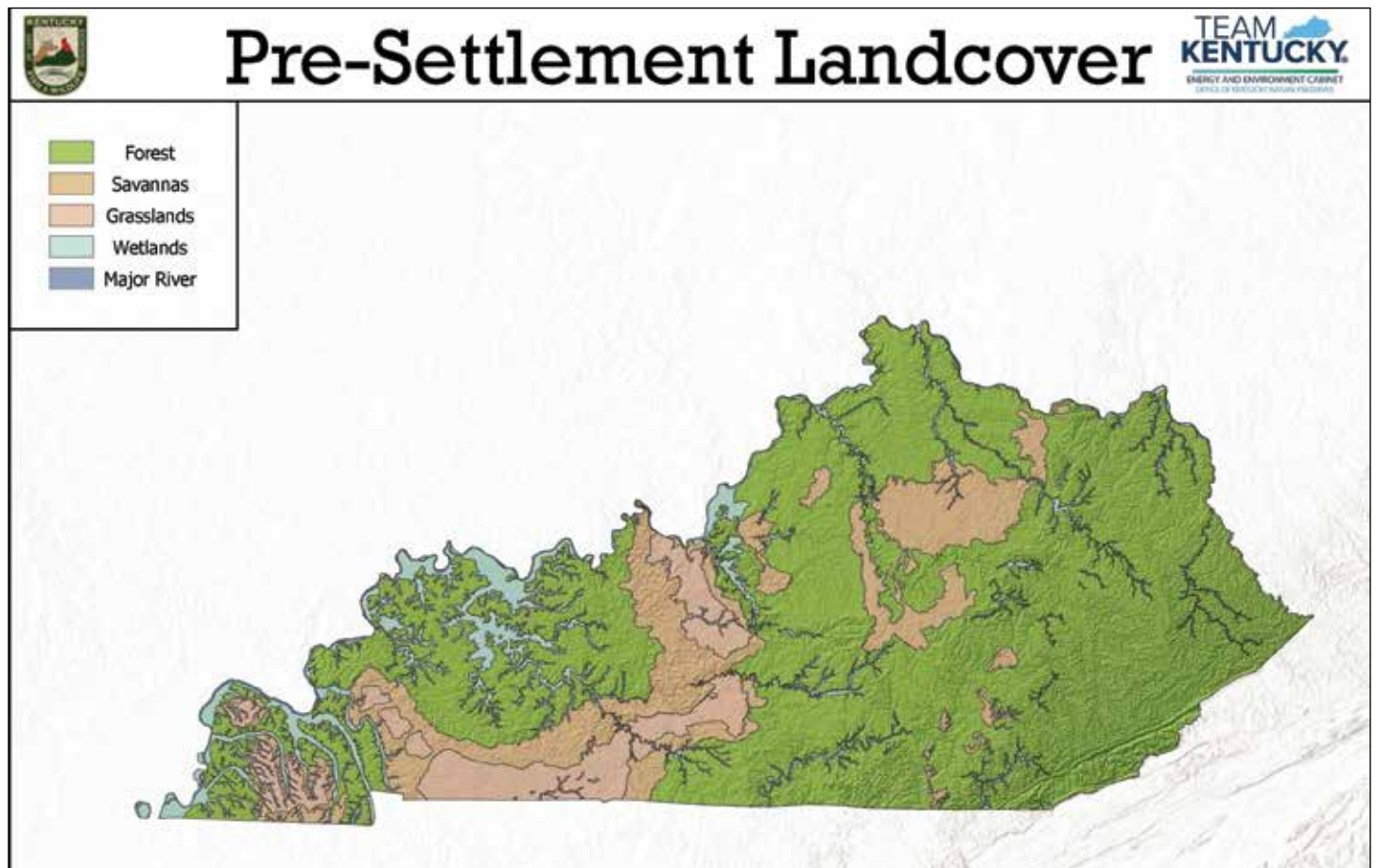
areas and 422 incorporated cities.

As of the 2020 U.S. Census, Kentucky's total population was 4,505,836, an increase of 166,469 (3.8%) since 2010. Compared to the United States as a whole (7.4% increase from 2010-2020), Kentucky's population is growing at a significantly slower pace. Total housing units in Kentucky was estimated at 1,994,323 in 2020 (an increase of 3.5% since 2010). Statewide population density in 2020 was 114.1 people per square mile (an increase of 3.82% from 2010). Four counties (Jefferson, Fayette, Kenton, and Campbell) have population densities greater than 500 people per square mile while roughly half of Kentucky counties have a population density below 60 people per square mile.

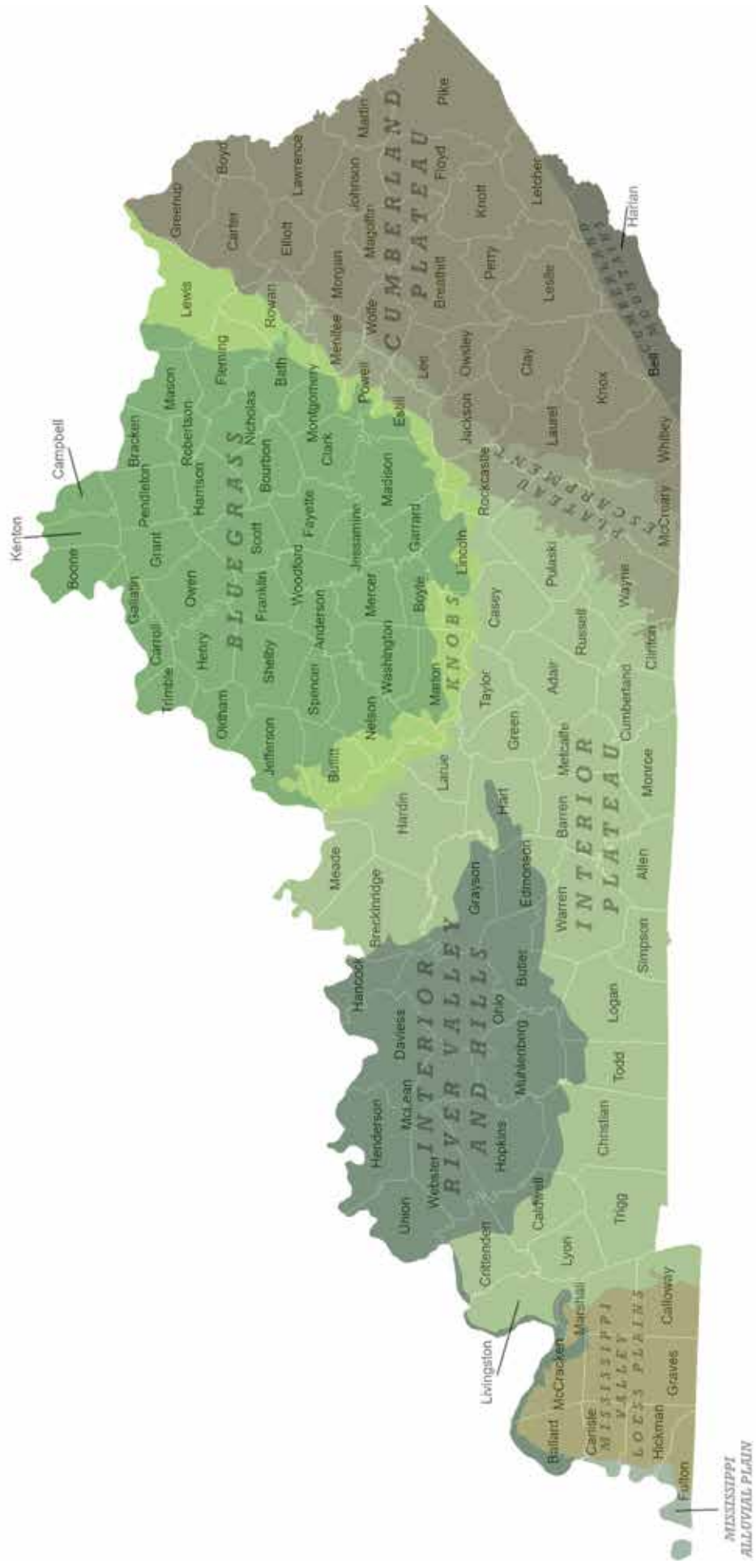
Public ownership of land between federal, state, or local governments total 1,219,942 acres. While these publicly owned lands represent potential areas for managing native flora and fauna, biodiversity is not the driving factor for managing most of these areas. According to analyses conducted by the Southeast Conservation Adaptation Strategy (SECAS), land area managed for biodiversity in Kentucky is roughly 1.4% (382,260 acres) of the State. Another 4.3% (1,108,797 acres) is managed land for multiple usages included mining, logging, and off-highway vehicle use. An additional 3.2% (821,271 acres) is publicly owned but has no known mandate for biodiversity management or protection.

Kentucky's economy is driven by a diverse blend of income producing ventures ranging from resource extraction, service and retail, manufacturing, and agriculture. Natural resource extraction (drilling, mining, and logging) is distributed statewide. Coal mining is restricted to the eastern third of Kentucky and portions of western Kentucky, while mining for limestone is common in central Kentucky. Large sand and gravel mining operations are often associated with floodplains of major rivers, while small-scale local mining occurs as wet-mining of sand and gravel directly from smaller creeks throughout the eastern two-thirds of the State. Manufacturing is spread statewide but is typically tied to areas with already established means of transporting goods via road, rail, or river. Urban centers serve as hubs for the highest concentrations of service and retail.

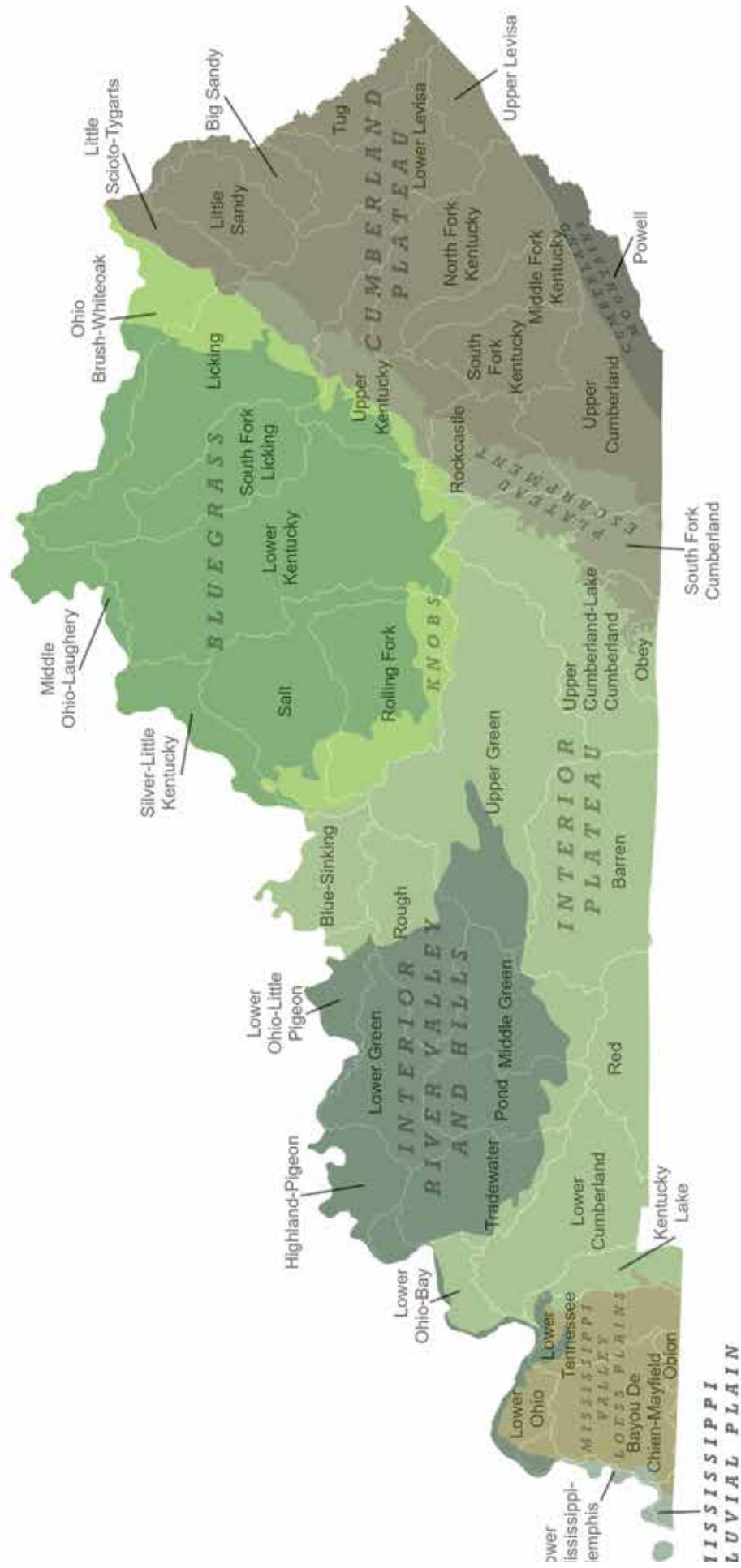
Urbanization models created by SECAS and reported in their Southeast Conservation Blueprint Summary for Kentucky indicate that roughly 8.2% (2,127,630 acres) of Kentucky is in an urban setting as of 2019. This is expected to increase by roughly 20,000 acres per decade over the next 100 years. The densest areas of urbanization are modeled to radiate outward from existing urban areas (including Louisville, Lexington, Northern Kentucky, and Bowling Green) with the most likely areas for urbanization occurring along transportation routes connecting existing urban areas.



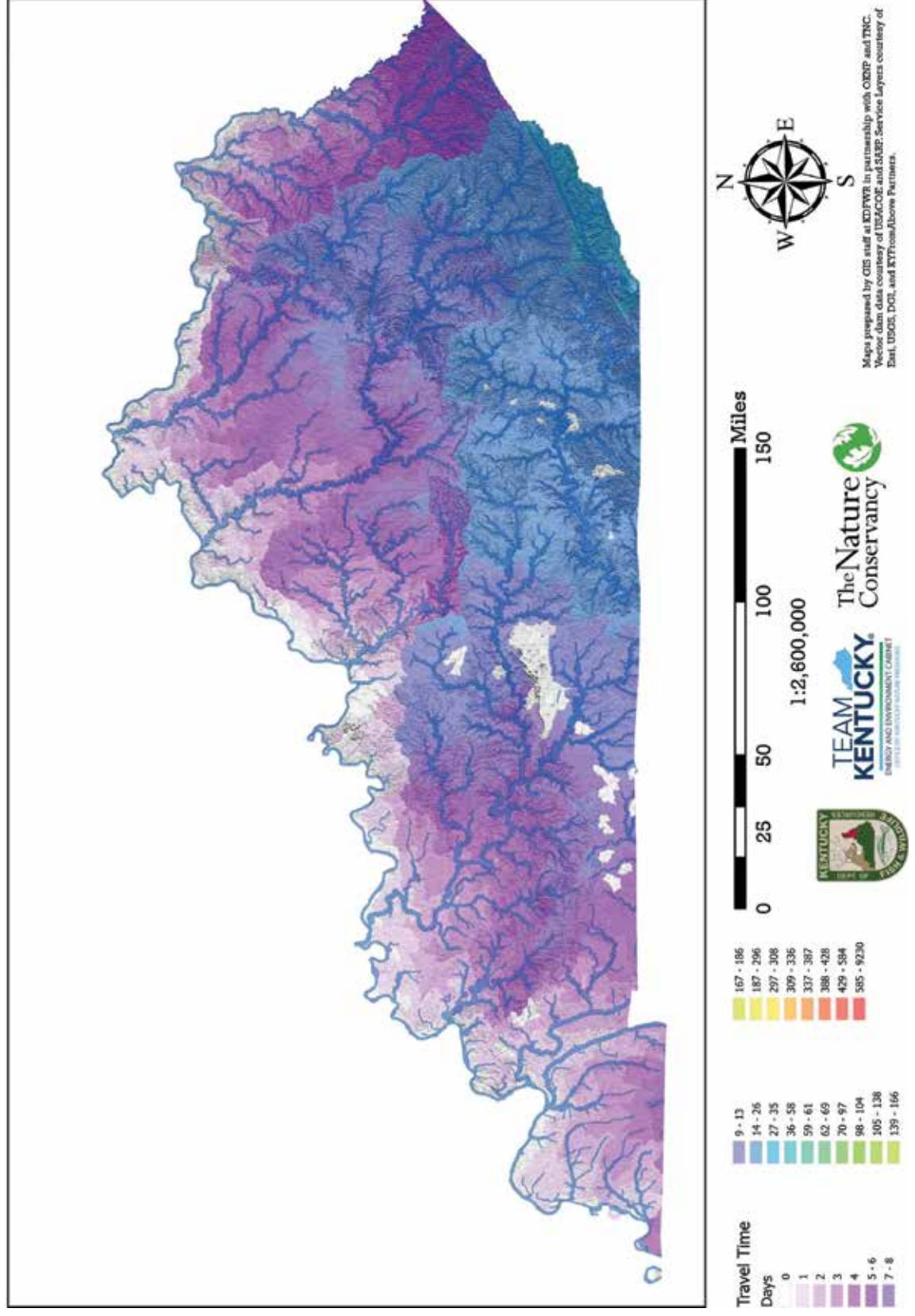
Physiographic Regions



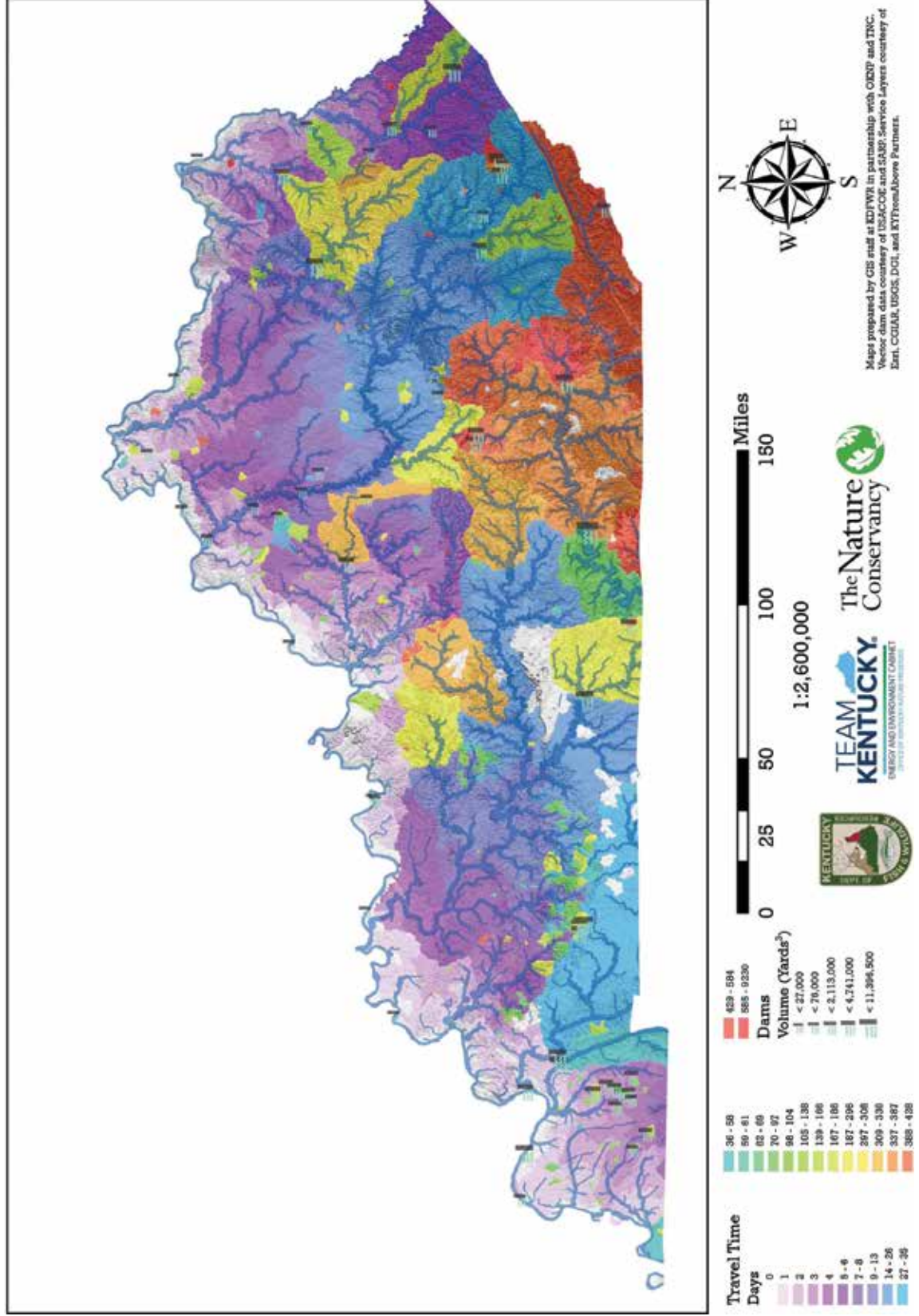
Watersheds



Travel Time without Impoundments



Travel Time with Impoundments



CHAPTER 3: SPECIES OF GREATEST CONSERVATION NEED

Data Sources

Data for decision making and mapping products were derived from both KDFWR's "KyObs" species observation database, as well as Kentucky's Natural Heritage Database maintained by both organization's GIS programs. Observation records and species ranges underwent a thorough review process to ensure quality and accuracy under supervision of data stewards and expert biologists/botanists for each respective taxonomic group. Species were split into two groups based on habitat preferences, terrestrial or aquatic, and data products were generated accordingly.

The KYObs species database includes over 1,567,215 reported observations of native and non-native species. OKNP's natural heritage database contains 24,248 species and rare community site specific records. Data have been reported from a variety of sources including biologists from multiple state and federal agencies, university researchers, consultants, citizens, museum specimens, and scientific publications. The data are typically not associated with monitoring projects included in Kentucky's SWAP and are not equally stratified across all taxonomic groups evaluated as a part of this revision. Instead, the data reflect the familiarity associated with species identification within a taxonomic group, the interests of the research community, and the necessity for data collection as required for regulatory purposes. For example, familiarity and broad research interest have resulted in more records of birds in the KYObs database than any other taxonomic group. The abundance of bat and freshwater mussel data in KYObs is a result of federal protection afforded to some of these species via the Endangered Species Act (ESA). Listing under the ESA has led to thousands of sampling events

(typically to determine absence/presence and assess project impacts) being reported under state issued scientific collection permits.

Conversely, insect data within KYObs is severely limited. Data for Kentucky's arachnid, millipede, terrestrial and aquatic snails and flatworm fauna are also extremely limited. OKNP lists 87 insects and 27 terrestrial snails as state endangered, threatened, or special concern. An additional 19 cave obligate invertebrates, such as millipedes, mites, harvestmans, pseudoscorpions, and planarians are also listed as endangered, threatened or special concern. OKNP tracks populations of all of these rare invertebrates in the Kentucky Natural Heritage Database and this data formed the basis for assessing Kentucky's invertebrates to be included in Kentucky's SWAP.

While data on mammal observations is the third most abundantly reported, terrestrial small mammal data is significantly lacking. This dearth of available data is a result of a lack of funding to encourage research, regulatory requirement for surveys, and/or no requirement to report some data under existing scientific collection permit statutes. As a result, many taxonomic groups (especially aquatic and terrestrial invertebrates) could not be evaluated as a part of this revision because of our currently incomplete knowledge of the native fauna to Kentucky. For other taxonomic groups, enough data existed to allow for a nearly complete list of fauna to be generated. But evaluation beyond that to determine the status of many species in Kentucky was precluded.

Reported observations by taxonomic rank is provided below.

Colloquial Name	Class	Records	Included in SGCN Evaluation?
Birds	Aves	777,077	Yes
Ray-finned Fishes	Actinopterygii	330,475	Yes
Mammals	Mammalia	148,967	Yes
Amphibians	Amphibia	130,757	Yes
Freshwater Mussels	Bivalvia	83,812	Yes
Snakes and Lizards	Reptilia	62,855	Yes
Turtles	Chelonia	17,194	Yes
Crustaceans	Malacostraca	7,791	In Part
Snails	Gastropoda	3,009	In Part

Colloquial Name	Class	Records	Included in SGCN Evaluation?
Lampreys	Petromyzontida	1,634	Yes
Insects	Insecta	366	In Part
Spiders	Arachnida	63	No
Millipedes	Diplopoda	9	No
Springtails	Collembola	5	No
Seed Shrimp	Ostracoda	2	No
Flatworms	Turbellaria	2	No

Approach to SGCN Selection

The 2013 version of KY's SWAP identified 301 Species of Greatest Conservation Need (SGCN), with considerations restricted to terrestrial vertebrates, fishes, lampreys, crayfishes, and bivalves. During the 2023 revision, changes were made to standardize the original selection process and to revisit additional taxa groups that could be considered with the data sources available. Some notable additions to the 2023 SGCN list include 76 insect and springtail species, 62 globally rare plant species, and 129 data deficient SGCN.

Plant SGCN

The addition of Plant SGCN is one of the most significant changes adopted during this revision and reflects the important role that plants have in the conservation of biodiversity. Plants form the foundation of most life on Earth: they form the basis of the ecosystem food chain, regulate our climate, purify our water and air, mitigate erosion, and enrich the soil when they decompose. Plants are also an essential resource for human sustenance, well-being, and culture, providing food, medicine, shelter, and clothing, and have aesthetic and spiritual significance. Native plants provide homes and food for important pollinators, insects, birds, and many other animals. As plants and animals are explicitly linked through their associated natural communities, managing the habitats for SGCN plants also improves habitat for SGCN animals.

Data Deficient SGCN (DD SGCN)

A new category of SGCN was added during this revision to address concerns surrounding data deficiency. We assigned DD SGCN status to species considered very likely to qualify as SGCN, but for which we lack enough reliable or recent information on distribution, life history, and/or habitat requirements to make informed assessments about conservation status. Having this category allows for actions to fill data gaps and better inform future status decisions.

SGCN Selection Process

Teams evaluated all Kentucky amphibians, birds, crayfishes, fishes, freshwater mollusks, reptiles, and

mammals known to occur regularly (not vagrants) for any part of its life cycle. When baseline data was lacking, technical teams chose to focus on species currently tracked by KDFWR or OKNP. Any special cases for consideration among these taxa groups are further addressed in taxa overviews.

Best Practices for State Wildlife Action Plans recommends a well-defined, clear and repeatable process for determining. We developed a flowchart process for teams to evaluate species within the state using the same criteria. Using this tool, each species evaluated was determined to fall in one of three categories: SGCN, NOT SGCN, or Data Deficient SGCN. A presentation of the overall process is pictured in Figure 3.1, with a written description of each decision point presented below.

Insect SGCN were selected using the same flowchart process, but the team only evaluated insect and springtail species for which sufficient data was available. DD SGCN status was not used for this taxa group.

Kentucky's Plant SGCN represent globally rare species. They were selected with a slightly different process, presented in Appendix 3.1. DD SGCN status was not used for this taxa group.

Further information on G rank and S rank, as defined by NatureServe, are provided in Appendix 3.2.

Node 1: Species is native to KY

Native refers to an extant, historically present, breeding or migratory species, regularly occurring within its native range in Kentucky without direct human assistance. Exotic or introduced species do not qualify as SGCN.

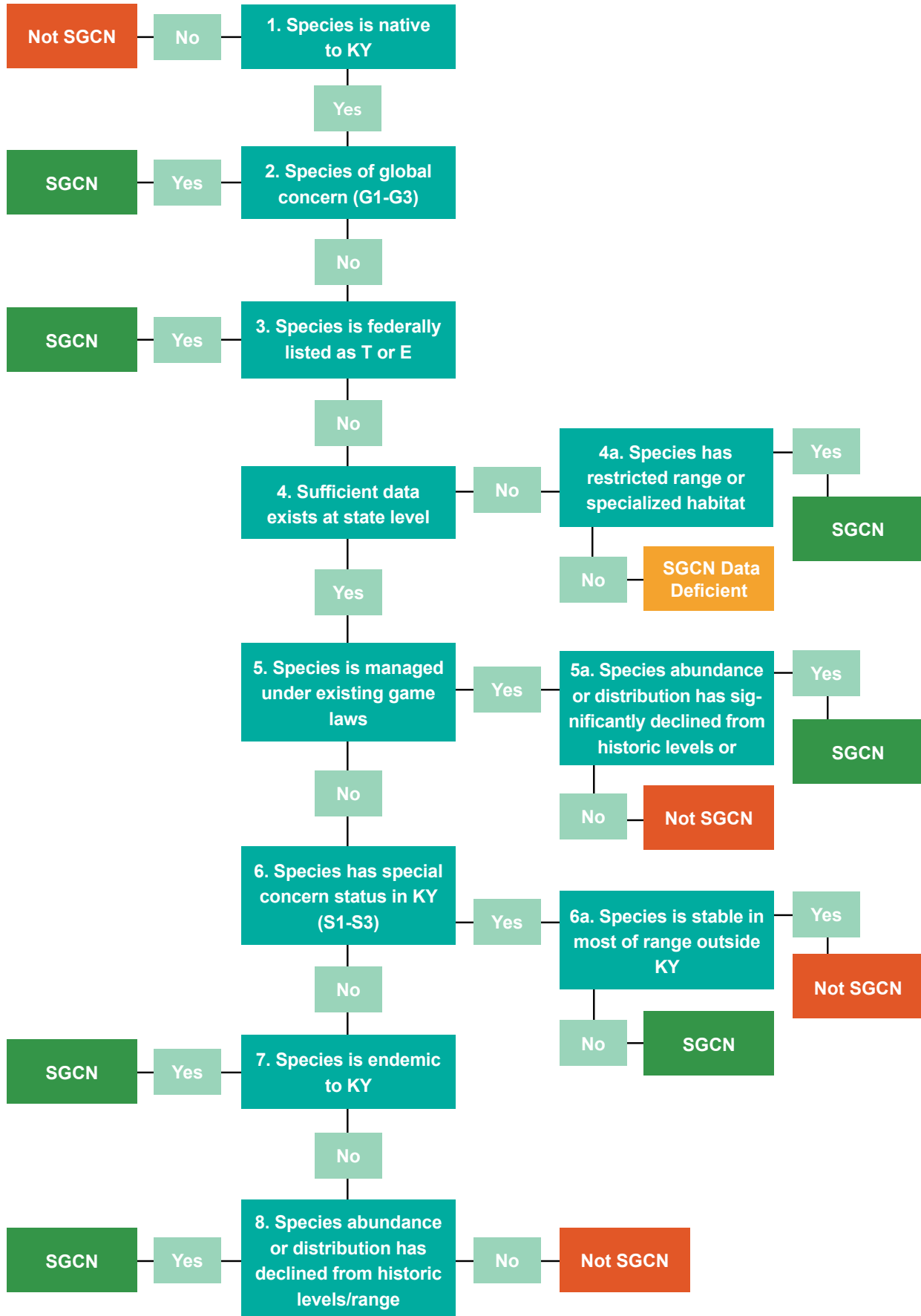
Node 2: Species is of Global Concern

As evaluated by NatureServe, the species is considered vulnerable to critically imperiled at the global scale. Includes G1, G2, G3, G1G2, G1G3, G2G3, and G3G4 status categories.

Node 3: Species is Federally listed

Federally listed means the species is receiving, or deemed eligible to receive, federal protection under the Endangered Species Act of 1973, as amended. This includes endangered, threatened, candidate species or

Figure 3.1 SGCN Selection Flowchart



proposed fish, amphibian, reptile, terrestrial and aquatic invertebrate, bird or mammal species known to occur in Kentucky during any stage of its life cycle.

Node 4: Sufficient State-Level Data

Describes sufficiency of species abundance and/or distribution data as determined by the team.

Node 5: Species is managed under existing game laws

Game laws for this node pertain to harvest, and do not address species collected for falconry, scientific purposes, etc. Teams also considered if species abundance or distribution for game species have significantly declined from historic levels or range.

Node 6: Species has special concern status in KY (S1-S3)

As evaluated by NatureServe, the species is considered vulnerable to critically imperiled at the subnational (state) scale. Includes S1, S2, S3, S1S2, S1S3, S2S3, and S3S4 status categories.

Node 7: Endemism

All Kentucky endemics qualify as SGCN.

Node 8: Historic vs Current abundance and distribution

Teams considered if species abundance and/or distribution had declined significantly compared with historic information.

Though this flowchart process was an improved and efficient way to evaluate hundreds of native species, there were a couple exceptions that needed further consideration (i.e., where a G rank or S rank was in question, or new state information was available). If technical experts questioned the calculated SGCN status, we created a process to override the calculated SGCN status and assign a different Final SGCN status. For these rare exceptions, the change was documented in the SWAP SGCN Selection database along with comments to validate the decision. A table summarizing the number of species evaluated and SGCN status by taxa is presented below.

Taxa	# SGCN	# DD SGCN	Not SGCN	# Species Evaluated
Amphibians	12	13	34	59
Birds	81	1	308	390
Crustaceans	22	28	43	94
Fishes and Lampreys	66	11	197	274
Freshwater Mussels and Snails	55	44	99	198
Insects and Springtails	76			76
Mammals	18	13	49	80
Reptiles	6	19	34	59
Plants	62			2207

SGCN Prioritization

Kentucky's SWAP is intended to develop and implement management, research and habitat restoration efforts for SGCN. Ideally, these efforts will result in recovery for species currently listed as threatened or endangered under the Endangered Species Act and preclude the need for future listings.

In developing methods to prioritize SGCN and then their associated conservation actions, we were mindful of the risks associated with conflating species imperilment with management priority. With limited funding, we know our efforts must be intentional and consider a variety of other factors, including the chance of action success. For instance, a SGCN at greatest risk of extinction/extirpation may require enormous financial expenditures over a long period of time with little chance of recovery, while a less-imperiled species could be recovered with only modest spending and effort.

Priority designations are useful in determining which species are at greatest risk but should not necessarily receive the bulk of funding or actions. During this revision, priority designations helped inform decision making in prioritizing conservation actions. These scores should be

interpreted with caution and not be used synonymously with importance. With a multitude of conservation partners representing diverse missions and responsibilities, it is our hope that all SGCN would receive attention through future partnerships and collaborative funding efforts.

To prioritize Kentucky's SGCN, we pursued an approach that would balance several considerations including global rarity, and Kentucky's conservation responsibility, species residency in the state, risk of extinction/extirpation, and the current availability of funding sources. Each category was subdivided into three point levels with which each SGCN was assessed:

Ranking Criterion 1 – Global Rank

State Natural Heritage Inventory partner OKNP utilizes NatureServe ranking procedures to characterize global conservation status. These conservation status ranks convey vulnerability for a species based on a scale of G1 through G5 with G1 the highest degree of imperilment and G5 the most secure (Appendix 3.2).

3 points - Global Heritage Rank of G1 or G2

2 points - Global Heritage Rank of G3 or G4

1 point - Global Heritage Rank of G5

Ranking Criterion 2 – Percent of SGCN population/ range within Kentucky

We utilized NatureServe Explorer to inform regional information regarding species range. An SGCN receives a higher score within this category if it is endemic or nearly endemic to Kentucky. SGCN receive a lower score if Kentucky is on the periphery of its range.

3 points - Kentucky represents >25% of the species' range or population

2 points - Kentucky represents 5-25% of the species range or population

1 point - Kentucky represents <5% of the species range or population

Ranking Criterion 3 – Length of annual residency in Kentucky

SGCN that are year-round residents and/or present during the breeding season receive a higher score within this category as they are present in all or vital parts of their life cycle.

3 points - SGCN is a year-round resident in Kentucky and/or is present during its breeding season

2 points - SGCN does not breed in Kentucky but is present as a wintering species.

1 point - SGCN is an annual migrant through Kentucky, present for only brief periods each year

Ranking Criterion 4 – Risk of extinction and extirpation

3 points - Without conservation action, SGCN is likely to disappear from Kentucky within the next 10 years

2 points - Without conservation action, SGCN is likely to have significant decline within Kentucky over the next 10 years

1 point - SGCN appears to have a relatively stable population trend and geographic range, and would likely experience only slight declines within the next 10 years without conservation action

Ranking Criterion 5 – Availability of alternate conservation funding sources

Some SGCN qualify to receive other funding sources.

This criterion assigns higher scores to species without such alternate sources of conservation funding.

3 points - SGCN is not eligible for funding through traditional Federal Aid in Sport Fish and Wildlife Restoration Programs (Dingle-Johnson, or Pittman-Robertson, Section 6 of the Endangered Species Act.)

2 points - SGCN is listed as federally endangered or threatened and eligible for management funding under Section 6 of the Endangered Species Act

1 point - SGCN is eligible for traditional management funding as a sport fish, game bird or game mammal

After assigning and adding scores in each of the above 5 categories, a combined score was derived that corresponded to one of three categories:

HIGHEST PRIORITY SGCN

Combined score of 13-15 points

HIGH PRIORITY SGCN

Combined score of 11-12 points

MODERATE PRIORITY SGCN

Combined score of 10 or less points

DD SGCN and Plant SGCN were not prioritized through this process. For the 129 DD SGCN, there was insufficient information to assess many of the needed criteria, and teams agreed that conservation efforts for DD SGCN species collectively would focus on filling data gaps regarding abundance and distribution. Similarly, all 62 Plant SGCN are globally rare species that would score similarly with this process, so we opted to also keep them as a stand-alone group.

A breakdown of Kentucky's 527 species as prioritized into groups is presented in Figure 3.2. Priority scores for individual species by taxa are available in Appendix 3.3.

SGCN Profile Pages

A summary of the most pertinent information for each of Kentucky's SGCN is provided in the following Profile Pages. Pages are presented alphabetically by taxa, with individual species alphabetized by scientific name. Each profile page is a species overview which includes a photo, current range map, habitat associations, threats and conservation actions identified for the species, as well as a list of survey, research, and management needs. Even for SGCN that are well-documented in Kentucky, the need to 'collect baseline species information' is ongoing. To maintain the adaptive nature of SWAP, it is essential to continue activities that capture range shifts, changes in species distribution, and overall population trends.

A brief description of each profile page component is provided below. Chapter locations in parentheses indicate where users may find more detailed information on the approach and methodology for each section.

Conservation Profile

SWAP Priority Group (Chapter 3) and current conservation status including G rank, S rank, Federal and IUCN Red Listing Status as determined in OKNP Biotics database. Additional comments regarding inclusion as SGCN may be provided in this section.

Conservation Goal

Determined by the taxa specialists, this section summarizes the overarching conservation goal(s) for the species over the next decade.

Habitat Associations (Chapter 4)

Terrestrial Species: Occurrence by physiographic regions, habitat guild associations, and general habitat requirements.

Aquatic Species: Current HUC 8 Watersheds, Stream Type, general habitat requirements.

Threats (Chapter 5, Appendix 5.2a-i)

List of standardized categories for primary threats known to be impacting the species. Threats were not identified for DD SGCN.

Actions (Chapter 7, Appendix 7a-i)

List of standardized categories for the actions necessary to address threats impacting the species. Icon(s) beside each action correspond to the threat category addressed by implementing the desired conservation action. Actions were not identified for DD SGCN.

Needs (Chapter 6, Appendix 6a – 6i)


Survey, Research, and Management efforts identified for this species. This section is particularly significant for DD SGCN for which specific threats and actions were not identified.

Range Map (Chapter 3)


Current and/or historic range within Kentucky. See taxa overviews for specific notes and criteria used to generate ranges.


Threat Categories

 Residential and Commercial Development

 Agriculture and Aquaculture


 Energy Production and Mining


 Transportation and Service Corridors


 Biological resource use


 Human Intrusions and Disturbance

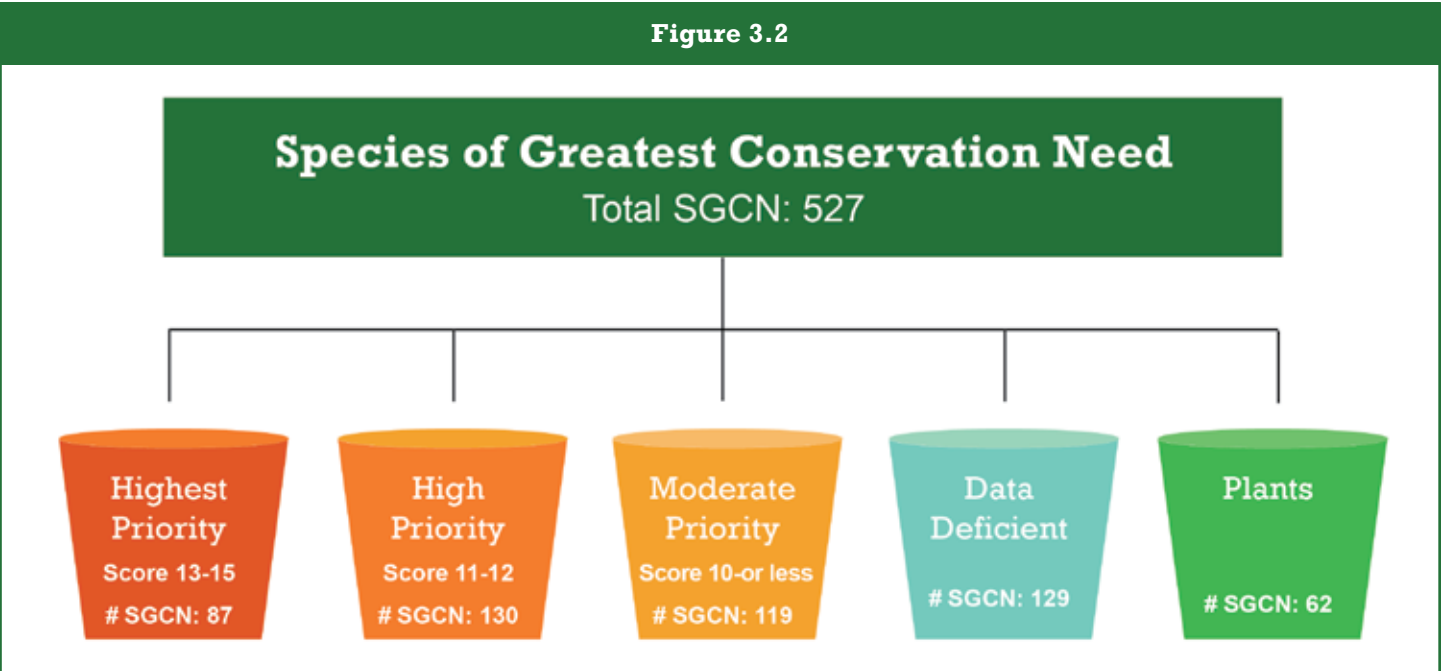
 Natural System Modifications

 Invasive and Other Problematic Species and Genes

 Pollution

 Geological Events

 Climate Change and Severe Weather



AMPHIBIANS

Introduction

The amphibian fauna of Kentucky includes 58 species of anurans and salamanders. All are native, none are known or thought to have been extirpated, and no modern taxa are extinct. No federally listed amphibians are known from Kentucky. The state has no endemic amphibians although several species (Streamside Salamander, Black Mountain Salamander, Cumberland Plateau Salamander) are more common and widely distributed in Kentucky than in any other state.

Kentucky's anurans (order Anura) consist of 23 species of frogs and toads in 5 families and represent about 21% of the 109 described anuran species in the U.S. The 35 salamanders (Order Caudata) include members of 7 families representing about 18% of the 198 described salamander species known from the U.S.

Field surveys and taxonomic research since the early 2000's have added 3 species to Kentucky's known amphibian fauna. A small population of Plains Leopard Frogs was discovered in Fulton County during project fieldwork, Blanchard's Cricket Frog was documented from Carroll County during a rangewide molecular study of the cricket frog complex, and the Western Chorus Frog was documented from numerous counties in central and western Kentucky from a molecular study of the trilling chorus frog complex.

Kentucky's initial SWAP was completed in 2005 and recognized 22 native amphibians (8 anurans and 14 salamanders) as Species of Greatest Conservation Need (SGCN). That list included 11 amphibians then recognized as Endangered, Threatened, or Special Concern by KSNPC as well as 11 species determined by KDFWR to have conservation concerns. During the 2013 SWAP revision, 1 salamander and 1 frog were dropped from the KDFWR list after conservation concerns had been addressed by targeted field survey work, while 2 frogs and 2 salamanders were added for a total of 24 SGCN amphibians.

Much has been learned about Kentucky's amphibian fauna during the past two decades. When the 2005 Plan was written the available baseline information consisted of detailed distributional data for the 11 amphibians monitored by KSNPC, county-level distribution maps for all amphibians, and a database populated by museum specimen records and biologists' field note information that had been compiled by biologists at East Kentucky Power Cooperative in support of a to-be-completed Kentucky herp book. Since that time the State Herpetologist has worked closely with the KFWIS staff to compile and review a large set of amphibian records covering all amphibian taxa from

across the state. At the present time the total number of reviewed and reasonable or verified point records for both SGCN and non-SGCN amphibians is as follows:

Group	Total reviewed records	Total reviewed SGCN records
Anurans (frogs & toads)	63,645	4,830
Salamanders	45,848	11,837

The species list for the 2023 SWAP includes 25 amphibian SGCN chosen by a team of professional biologists knowledgeable about Kentucky's herpetofauna (Herp Team). The updated list includes 9 amphibian species currently recognized by the Office of Kentucky Nature Preserves (OKNP) as endangered (3), threatened (1), or of special concern (5) along with 13 additional species that do not appear on the OKNP list but are known or believed to have undergone serious range reductions and/or population declines in Kentucky and/or nearby states. The new list also contains 3 additional taxa (including the Unisexual Ambystoma, an all-female form of hybrid origin which lies outside the current definition of a species) that can only be identified using molecular techniques and have been documented from very few specific Kentucky locations. For these, further study is needed to determine where they



Though not a true endemic, the Streamside Salamander is more common in Kentucky than anywhere else within its range. Photo: John MacGregor

occur and what level of protection – if any – is warranted. Altogether, 13 of Kentucky's 25 SGCN amphibians have been designated as "Data Deficient" because we simply don't have enough information on their distribution, abundance, life history, and/or habitat requirements to be

able to make informed assessments of their conservation status. The 17 SGCN salamanders listed in the 2023 SWAP represent 47% of Kentucky's caudate fauna, and the 8 SGCN anurans comprise 35% of Kentucky's frogs and toads.

The Herp Team recommended dropping 3 previously listed amphibians from the 2013 SWAP list, and 4 new species were added. Green Treefrogs were dropped because they have gradually expanded their range in Kentucky for the past decade or more, while Wood Frogs and Four-toed Salamanders were dropped because have been monitored regularly since 2005 and there is no evidence of any reduction in range or numbers in Kentucky. The Midland Mud Salamander was added because it has become increasingly rare and had vanished from several counties over the past 2 decades, and Blanchard's Cricket Frog, Mississippi Slimy Salamander, and the Unisexual Ambystoma were added because essentially nothing is known about their true conservation status in Kentucky and molecular techniques are needed to distinguish them from other species.

Kentucky distributions for each SGCN amphibian are shown on the accompanying range maps. For some species both historic and current records have been combined, but for others we have defined current and historic ranges based on observation dates coupled with occurrence data. For most such species the designated historic range is the area from which all observations or collections were made prior to 2003, but for a few well-monitored but rapidly declining species the historic range can even include counties with no records since 2010. All range maps are based on carefully reviewed species observations maintained within KFWIS, a comprehensive data set that includes all available records for Kentucky vertebrates, crayfishes, and mussels. Data sources primarily include published records, museum and university collections, agency collections, scientific and educational collecting permit reports submitted by researchers and consultants, and observations documented by biologists working for government agencies, academic institutions, and consulting firms.

The 17 SGCN salamanders occupy a wide variety of habitats across Kentucky. Five species are completely terrestrial, lay their eggs on land, and live in forested habitats; 3 others are totally aquatic at all life stages; and the remaining 9 are terrestrial to semiaquatic as adults but have aquatic larvae. All 8 SGCN anurans lay their eggs in water and are aquatic as larvae and become terrestrial, arboreal, or even fossorial as adults.

Kentucky has no endemic amphibians although several SGCN taxa (Streamside Salamander, Black Mountain Salamander, and Cumberland Plateau Salamander) are more common here than anywhere else within their respective ranges. Kentucky's SGCN amphibians as a group are widely and somewhat evenly distributed across the state but when looked at individually

most species tend to have limited ranges. The Mississippi Alluvial Plain, our smallest physiographic region and restricted to portions of only 3 counties, harbors just 6 SGCN amphibians but is the only area within the state with Plains Leopard Frogs. The Bluegrass Region, a much larger area that includes all or part of 42 counties, has only 9 SGCN amphibians but 2 of these (Northern Red-backed Salamander and Unisexual Ambystoma) have been found nowhere else in Kentucky and 2 others (Northern Leopard Frog, Streamside Salamander) are more widely distributed in the Bluegrass than in any other region. The Cumberland Mountains, Cumberland Plateau, and Plateau Escarpment in eastern Kentucky collectively harbor 13 kinds of SGCN amphibians and encompass all (or nearly all) of the Kentucky ranges of 5 SGCN salamanders (Green Salamander, Allegheny Mountain Dusky Salamander, Black Mountain Salamander, Cumberland Plateau Salamander, and Yellow-spotted Woodland Salamander). The Interior Plateau, which stretches from Rockcastle County in the east to the hills bordering Kentucky Lake in Marshall and Calloway counties, includes parts of the ranges of 16 SGCN amphibians but only 1 of these (Barking Treefrog) is restricted to that region. SGCN amphibians that occur within 6 or more physiographic regions include the Streamside Salamander, Eastern Hellbender, Northern Dusky Salamander, Midland Mud Salamander, and Eastern Spadefoot.

SGCN amphibians on the periphery of their ranges with very limited distributions in Kentucky include the Gray Treefrog, Plains Leopard Frog, Three-toed Amphiuma, Three-lined Salamander, Northern Red-backed Salamander, Yellow-spotted Woodland Salamander, and possibly Blanchard's Cricket Frog and Unisexual Ambystoma. Some of these (like the Gray Treefrog) are



The Midland Mud Salamander is widespread, but increasingly uncommon. It is difficult to survey for and may already be extirpated in much of its Kentucky range. Collecting baseline species information is a priority for this and other Data Deficient SGCN.

Photo: John MacGregor

quite common where they occur and seem well adapted to human-caused changes in the landscape, but others are more specific in their habitat requirements and may be quite vulnerable to extirpation from Kentucky.

Threat Categories

Threat categories to SGCN amphibians identified by the taxa team include Invasive and other Problematic Species and Genes, Agriculture and Aquaculture, Energy Production and Mining, Residential and Commercial Development, Biological Resource Use, Human Intrusion and Disturbance, Transportation and Service Corridors, Pollution, Natural System Modifications, and Climate Change and Severe Weather. Some specific threats identified within these categories are amphibian disease agents such as chytrid fungus and ranavirus, conversion of suitable upland or wetland habitat to cropland and pasture, logging and wood harvesting, surface mining (essentially mountaintop removal mining), impacts to headwater streams related to oil and gas drilling, certain agricultural practices, residential and commercial development, and road mortality. These threats generally occur statewide but are more pervasive in some regions than others.

Conservation Actions

Conservation actions recommended by the Herp Team to counteract identified threats to SGCN amphibians include Law and Policy, Land/Water Management, Land/Water Protection, Education and Awareness, and External Capacity Building. The habitats favored by Kentucky's 25 SGCN amphibians can include anything from permanent bald cypress swamps to headwater streams, seeps, springs, or caves to grasslands, mature forests, boulder talus slopes, or crevices along shaded cliff lines and it follows that the effective implementation of conservation actions will require the formation of partnerships and alliances with a variety of state and federal agencies, nonprofits, universities, businesses, and communities and should also include incorporating the needs of local SGCN reptile species into local development plans.

For Data Deficient SGCN amphibians there is a strong need to develop and implement field survey protocols that will allow us to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky as well as to assess taxonomic status and determine population trends.

Specific conservation needs common across the SGCN amphibian spectrum are listed below:

Develop a way to utilize KFWIS to effectively track SWAP survey and monitoring activities carried out by agency and university personnel and contractors to include areas surveyed, techniques used, voucher photos or recordings made, survey dates and times, survey

personnel, SWAP results both positive and negative, and other herp species encountered during surveys.

Develop a way to consistently obtain SGCN observations from other land management agencies including the National Park Service (Mammoth Cave NP, Big South Fork NRR, Cumberland Gap NHP, Abraham Lincoln's Boyhood Home at Knob Creek), US Fish & Wildlife Service (Frankfort Field Office personnel, Clarks River NWR), US Forest Service (Daniel Boone National Forest, Land Between The Lakes National Recreation Area), Department of Defense (Fort Knox, Fort Campbell), Office of Kentucky Nature Preserves, and Kentucky Department of Parks along with places like Bernheim Forest, Robinson Forest (UK), Lilley Cornett Woods (EKU), Maywoods (EKU), Boone County Parks, TNC, KNLT, etc.

Develop a SWAP-funded nongame herp work/job component for all Wildlife Division field staff (including Wildlife Management area personnel) along with biologists and educators from the KDFWR Fisheries and Conservation Education Divisions that would include performing basic herpetological inventory work and SGCN monitoring on all state-owned and state-managed lands as well as looking at the effects of management activities on local populations of amphibians and reptiles.



Biologists measure a male hellbender collected from an eastern Kentucky stream. As part of ongoing research, partners work together to collect eggs, rear young in captivity, and restock historically occupied streams. Photo: John MacGregor

Work with KFWIS staff to ensure that all museum and university collections holding amphibian and reptile specimens from Kentucky – and especially those located within the state – are aware of the value of maintaining updated specimen catalogs and periodically sending electronic data to KFWIS. This is extremely important because KDFWR is the one state agency charged with

managing Kentucky's wildlife resources for its citizens and a major part of this includes keeping track of occurrence records for all wildlife.

Continue to solicit amphibian and reptile photos from the public for identification, and develop a way to catalog, store, and retrieve SGCN voucher photos and/or recordings.

Develop a way to sort, review, evaluate, and obtain accurate locality data for SGCN amphibian and reptile observations posted on citizen science natural history apps such as iNaturalist and HerpMapper.

Investigate the further use of eDNA to detect the presence of both aquatic and terrestrial SGCN.

Develop and employ specific management techniques (breeding pond construction for frogs and salamanders, prescribed burning and other forestry practices, wetland protection and restoration, grassland and open land management, etc.) for SWAP amphibians.

Work to require consideration of SGCN amphibians and reptiles in environmental assessments for projects tied to the use of state or federal funding.

Work toward the establishment of a Kentucky natural history museum.

Work toward the designation of a regulation-backed state list of endangered and threatened species.



Voice surveys along local roads are one way biologists monitor use of known breeding sites and document new sites for many Amphibian SGCN, like this Barking Tree frog. Photo: John MacGregor

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Northern Leopard Frog Recovery on Kentucky River Wildlife Management Area in Owen County, Kentucky

Prior to the Kentucky River WMA Herpetological Inventory, Northern Leopard Frogs (*Lithobates pipiens*) had been documented by only 2 observations in Owen County.

During a 2003 herpetological survey of several of our Wildlife Management Areas (WMAs), a small population of Northern Leopard Frogs was discovered in Browns Bottom on Kentucky River WMA. About 7 males were calling from a pair of grassy water-filled drainage ditches in an agricultural field on a floodplain terrace near the Kentucky River. The site was revisited a few days later and 2 egg masses were discovered in shallow water. Healthy tadpoles were also observed later in the spring.

The following year, males were heard calling and egg masses and small tadpoles were observed. Unfortunately, a short time later the ditches were completely dry and all of the tadpoles were dead. Calling males and eggs were documented later that season, but dry conditions again prevailed, and the ditches were totally dry by early June.

In 2005, Kentucky River WMA personnel used a small bulldozer to create three shallow vernal pools along the ditch channels that would hold water throughout the spring and early summer and create better breeding conditions for the Northern Leopard Frogs. The new pools were used as breeding sites the following spring and contained egg masses and tadpoles during 11 of the next 13 years. Transforming young and metamorphs were documented during the first 2 weeks of June in 2006, 2008, 2009, 2014, 2016, and 2017 and were likely produced most other years; however, a lack of timely rainfall caused the new pools to go dry in 2007 and 2015 and all tadpoles for those years were lost. In comparison, the original drainage



Adult northern leopard frog in grassy drainage ditch.
Photo: John MacGregor



Northern leopard frog egg mass. Photo:
John MacGregor



Northern leopard frog drainage ditch and breeding scrape on KY River WMA, one year after construction.
Photo: John MacGregor

ditches went dry in at least 6 of these years (2007, 2010, 2011, 2014, 2015, and 2018) causing 100% Northern Leopard Frog tadpole mortality.

In late summer 2013, WMA personnel built 2 larger shallow ponds in the same general area that were designed to hold water during all but the driest months. The upper pond, created by damming another old drainage channel, turned out to be a bit more permanent than planned but had at least 1 calling male Northern Leopard Frog and egg masses. The lower pond, created by putting a low berm around a low spot in a field, mimics a natural seasonal wetland – it goes dry by late fall each year and has had Northern Leopard Frog egg masses and/or tadpoles during 4 of the first 5 years.

Other amphibian species that have bred successfully in these constructed vernal pools and shallow ponds include Jefferson Salamanders (*Ambystoma jeffersonianum*), Spotted Salamanders (*Ambystoma maculatum*), Eastern Newts (*Notophthalmus viridescens*), American toads (*Anaxyrus americanus*), Cope's Gray Treefrogs (*Hyla chrysoscelis*), Spring Peepers (*Pseudacris crucifer*), Green Frogs (*Lithobates clamitans*), and Pickerel Frogs (*Lithobates palustris*).



Northern leopard frog transforming in breeding scrape. Photo: John MacGregor

AMPHIBIAN PROFILE PAGES

Photo: John MacGregor



BLANCHARD'S CRICKET FROG

(*Acris blanchardi*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S5

Federal Status: N/A

IUCN Red List: N/A

Blanchard's Cricket Frog is poorly documented in Kentucky, known from only one confirmed location. The known population and habitat appear stable in Kentucky, though there are some population declines in northern states. Molecular analyses are needed to better determine range limits of *Acris blanchardi* vs. *Acris crepitans*.

Conservation Goal

Support molecular work to determine actual range. Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.






Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs

Guilds: Forested Wetland, Mesic Forest, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar

Sometimes occurs in pastures, glades, and other open habitats as well as in forested areas.

Threats

-  Annual and Perennial Nontimber Crops
-  Commercial and Industrial Areas
-  Housing and Urban Areas
-  Pathogens and Microbes
-  Residential and Commercial Development

Conservation Actions

Unknown

Needs

Survey: Disease surveillance

Survey: Distribution and abundance

Management: Amend transportation regs to minimize disease transmission.

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Protect and restore natural stream channels, bayous, swamps, and wetlands

Management: Protect wetland habitat

Management: Provide patches of open habitat adjacent to wetlands

Management: Restore and create upland breeding habitat

Management: Restore and/or create wetland habitat

Management: Restore degraded wetland habitats

Range Map

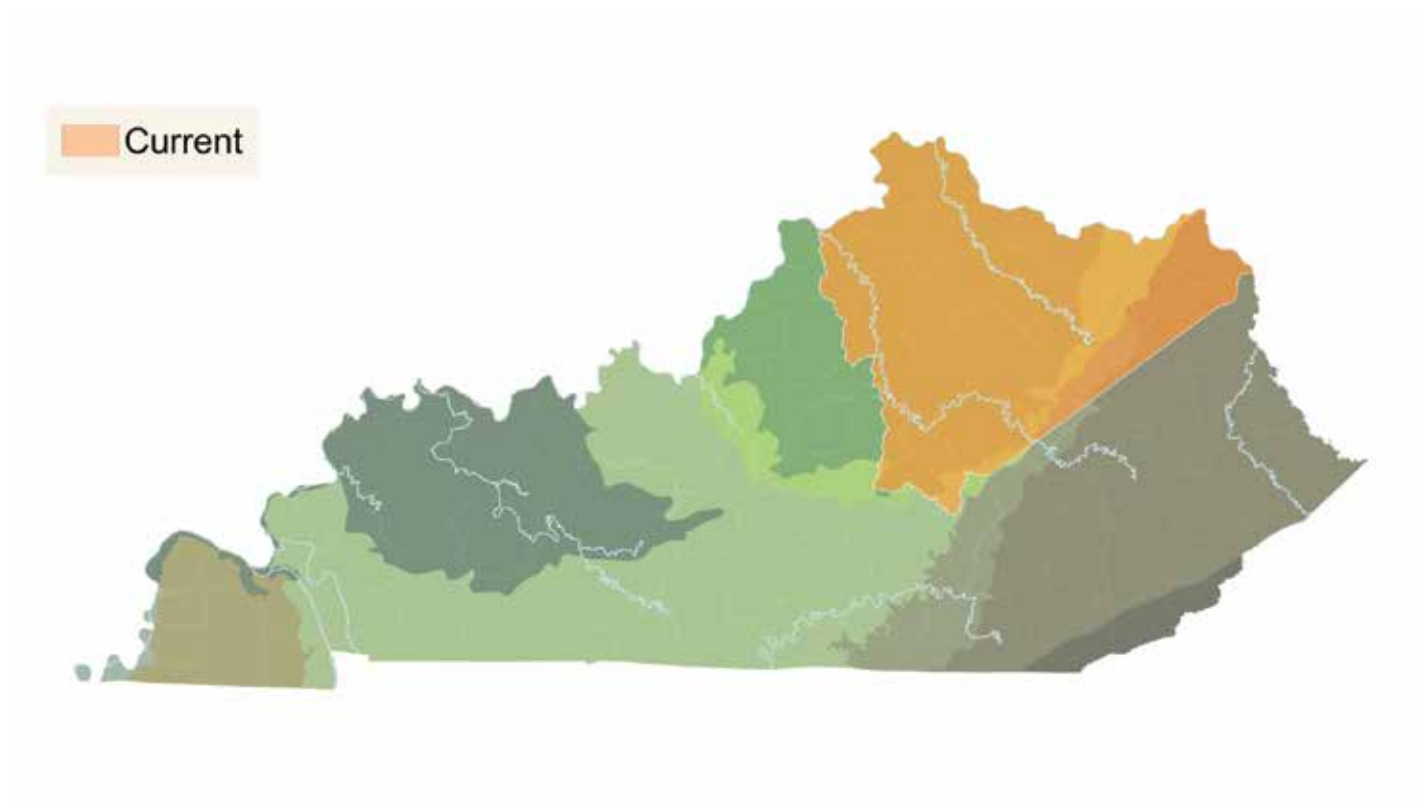


Photo: John MacGregor



STREAMSIDE SALAMANDER

(*Ambystoma barbouri*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S5

Federal Status: Not Listed

IUCN Red List: NT - Near threatened

Nearly endemic, as Kentucky comprises over 50% of the total range for the Streamside Salamander. Overall, populations in Kentucky appear stable.

Conservation Goal






Conduct surveys near Streamside and Small-mouthed Salamander contact zones to determine degree the interdigitation and/or potential hybridization. Monitor breeding activity on at least 5 WMA's or other public lands.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau

Guilds: Forested Wetland, Grassland/Savannah, Mesic Forest, Xeric Forest, Lake/Pond, River/Streams, Agriculture, Suburban, Scrub-Shrub/Early Successional Forest

Threats

-  Annual and Perennial Nontimber Crops
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Pathogens and Microbes
-  Roads and Railroads

Conservation Actions

- Awareness and Communications 
- External Capacity Building  
- Habitat and Natural Process Restoration 
- Policies and Regulations 
- Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Develop disease response plan

Management: Disease reporting portal

Terrestrial as adults, live mostly underground in mammal burrows and may also use coarse woody debris for cover. Breeding sites include headwater streams, ditches, small ponds, vernal pools and forested wetlands.

Range Map

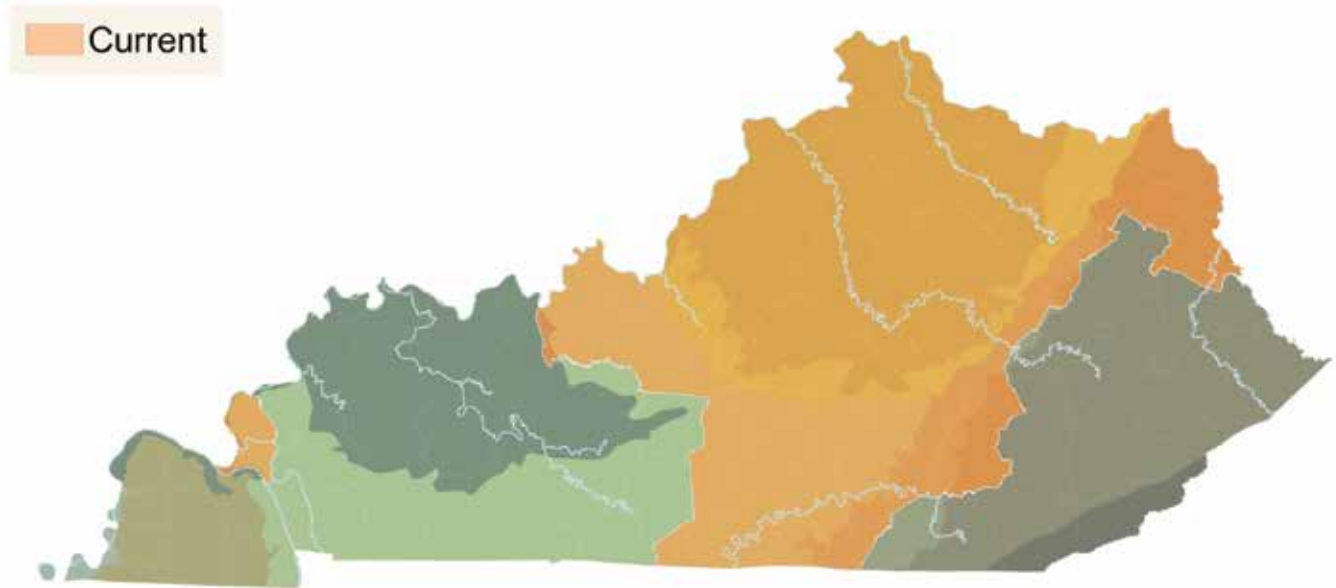


Photo: John MacGregor



UNISEXUAL AMBYSTOMA

(*Ambystoma JJJL*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: GNA

S Rank: SNA

Federal Status: N/A

IUCN Red List: N/A

Unisexual Ambystoma is difficult to identify in the field. There are very few populations known in the state, and Kentucky is on the southern portion of the species range. This species may be relatively stable outside of Kentucky, but more research is needed.

Conservation Goal

Support molecular work to determine actual range. Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Forested Wetland, Mesic Forest, Xeric Forest, Lake/Pond, Suburban, Scrub-Shrub/Early Successional Forest

Terrestrial as adults, live mostly underground in mammal burrows and may also use coarse woody debris for cover. Breeding sites include small ponds, vernal pools and forested wetlands.

Threats

- 🚫 Pathogens and Microbes
- 🏠 Residential and Commercial Development

Conservation Actions

Unknown

Needs

Survey: Additional surveys

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Amphibian crossing structures

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Protect existing forested areas

Management: Protect woodland breeding ponds

Management: Restore and maintain sites with good forest cover

Management: Restore and/or create woodland breeding ponds

Range Map

Current

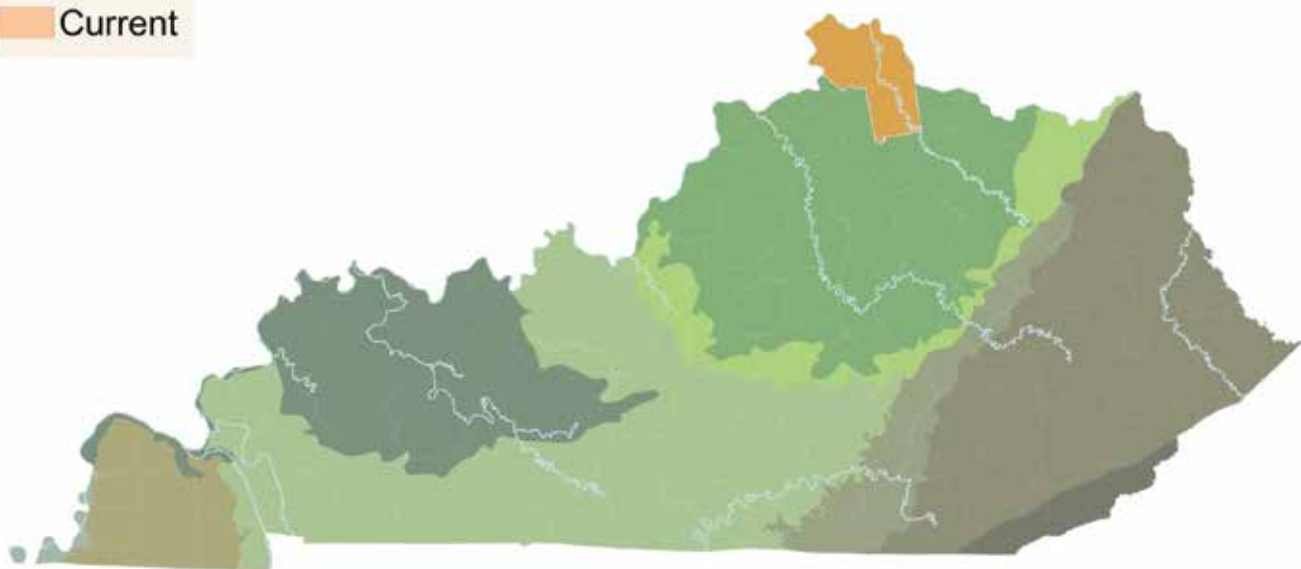


Photo: John MacGregor



MOLE SALAMANDER

(*Ambystoma talpoideum*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor breeding activity at 5 sites on public lands.
Create 25 upland woodland breeding ponds on
WMAs in western Kentucky.





Habitat Associations

Physiographic Regions: Interior Plateau, Interior
River Valley And Hills, Mississippi Alluvial Plain,
Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest, Xeric
Forest, Open Wetland, Lake/Pond, Scrub-
Shrub/Early Successional Forest

Terrestrial as adults, live mostly underground in
mammal burrows and may also use coarse woody
debris for cover. Breeding sites include small ponds,
vernal pools and forested wetlands.

Threats

-  Annual and Perennial Nontimber Crops
-  Pathogens and Microbes
-  Renewable Energy
-  Roads and Railroads

Conservation Actions

- Awareness and Communications 
- External Capacity Building  
- Habitat and Natural Process Restoration 
- Policies and Regulations 
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Research: Assessment of how timber removal impacts
habitat use and movement

Management: Develop disease response plan

Management: Disease reporting portal

Range Map

Current

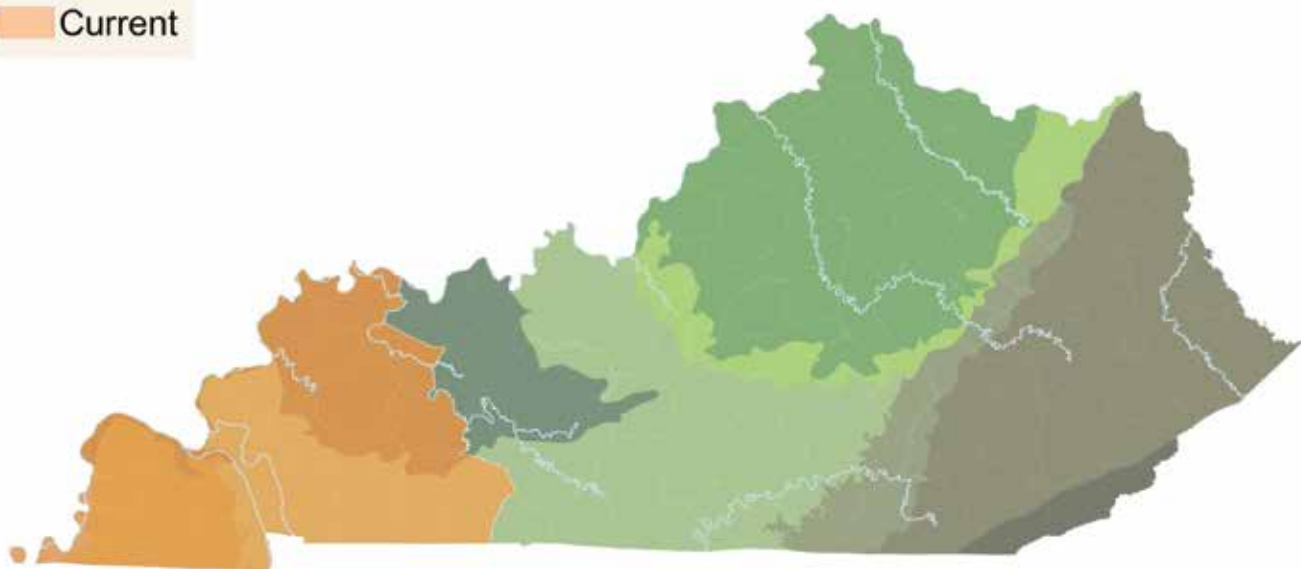


Photo: John MacGregor



THREE-TOED AMPHIUMA

(*Amphiuma tridactylum*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Three-toed Amphiuma are difficult to survey for and its distribution is very poorly known.

Conservation Goal

Support development of eDNA protocols to determine presence. Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.




Habitat Associations

Physiographic Regions: Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Stream Type: Warm-Low Gradient-Stream, Other

Adult and larvae are aquatic and live in burrows or beneath submerged logs or masses of vegetation in sloughs, large pools, and forested wetlands with mud bottoms.

Threats

-  Annual and Perennial Nontimber Crops
-  Industrial and Military Effluents
-  Pathogens and Microbes

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Protect existing wetland habitats

Management: Restore degraded wetland habitats

Range Map

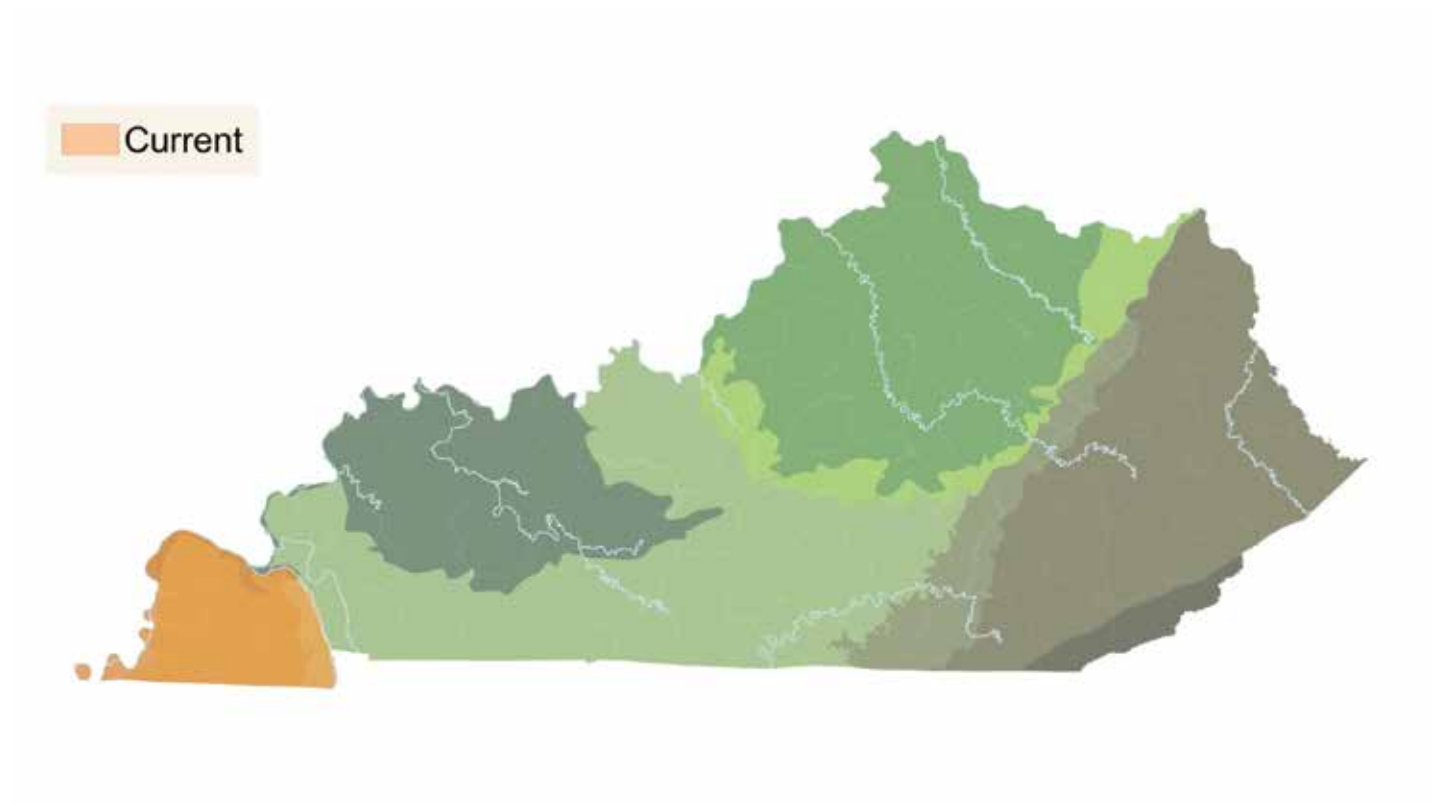




Photo: John MacGregor

GREEN SALAMANDER

(*Aneides aeneus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3G4

S Rank: S3S4

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Survey cliff line habitat for new occurrences with emphasis on public lands. Establish walking transects to monitor 10 selected populations during late July-October when eggs or hatchlings are likely to be present.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs, Interior Plateau, Interior River Valley And Hills

Guilds: Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

Found primarily in rock crevices on acidic substrates (sandstone, shale), though occasionally found in limestone habitats. May also use loose bark, tree cavities, split trees, and deeply furrowed bark.

Threats

- Logging and Wood Harvesting
- Mining and Quarrying
- Pathogens and Microbes
- Recreational Activities
- Utility and Service Lines

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Education and Awareness
- External Capacity Building
- Habitat and Natural Process Restoration
- Policies and Regulations
- Resource and Habitat Protection

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Develop disease response plan

Management: Disease reporting portal

Range Map

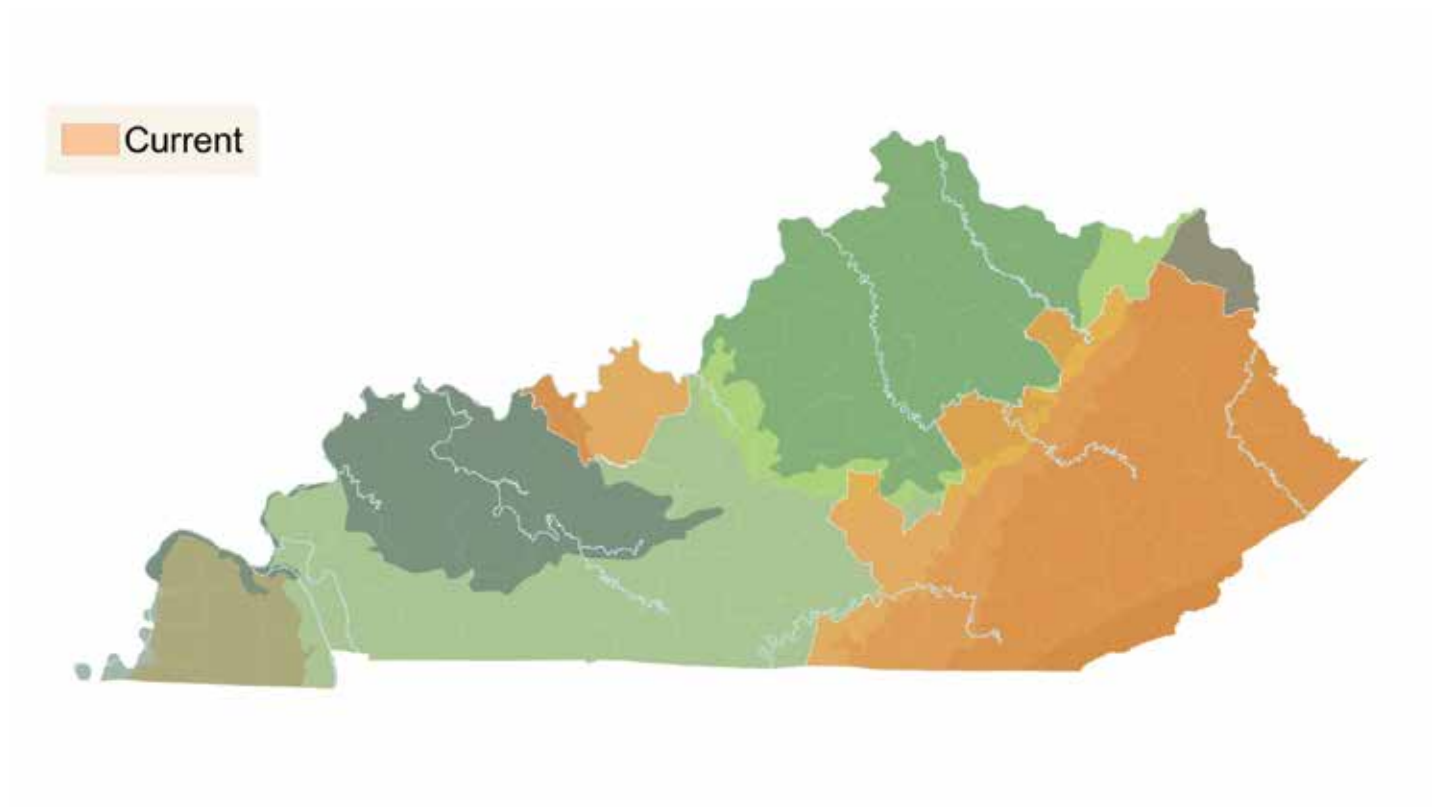


Photo: John MacGregor



EASTERN HELLBENDER

(*Cryptobranchus alleganiensis
alleganiensis*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G3T2

S Rank: S2S3

Federal Status: N/A

IUCN Red List: N/A





Conservation Goal

Continue to request photos documenting Hellbender sightings from the public in the annual fishing guide. Support development and use of eDNA protocols to determine presence and conduct or support follow-up surveys to document occurrences. Continue working with partners at Purdue University to collect eggs, rear young in captivity, and restock historically occupied streams. Support molecular research to determine Hellbender genetic distinctness among major Kentucky watersheds. Work with KDFWR Stream Group to incorporate Hellbender habitat into stream restoration sites as appropriate.

Habitat Associations

Current Watersheds: Barren, Big Sandy, Blue-Sinking, Licking, Little Sandy, Little Scioto-Tygarts, Lower Kentucky, Lower Levisa, Middle Fork Kentucky, Middle Ohio-Laughery, Obey, Ohio Brush-Whiteoak, Powell, Raccoon-Symmes, Rockcastle, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Tug, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky, Upper Levisa

Threats

-  Agriculture and Aquaculture
-  Mining and Quarrying
-  Pathogens and Microbes
-  Recreational Activities

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications  
- Habitat and Natural Process Restoration  
- Policies and Regulations 
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Dam removal

Management: Develop disease response plan

Management: Disease reporting portal

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Cool-Confined-Large River

Found in rivers and large-medium sized perennial cool streams with sand, gravel, or rock substrates. Uses submerged boulders and/or rock ledges for retreats and nesting. Needs streams with good to excellent water quality, cool water temperatures, low silt/sediment loads, and swift-moderate current.

Range Map

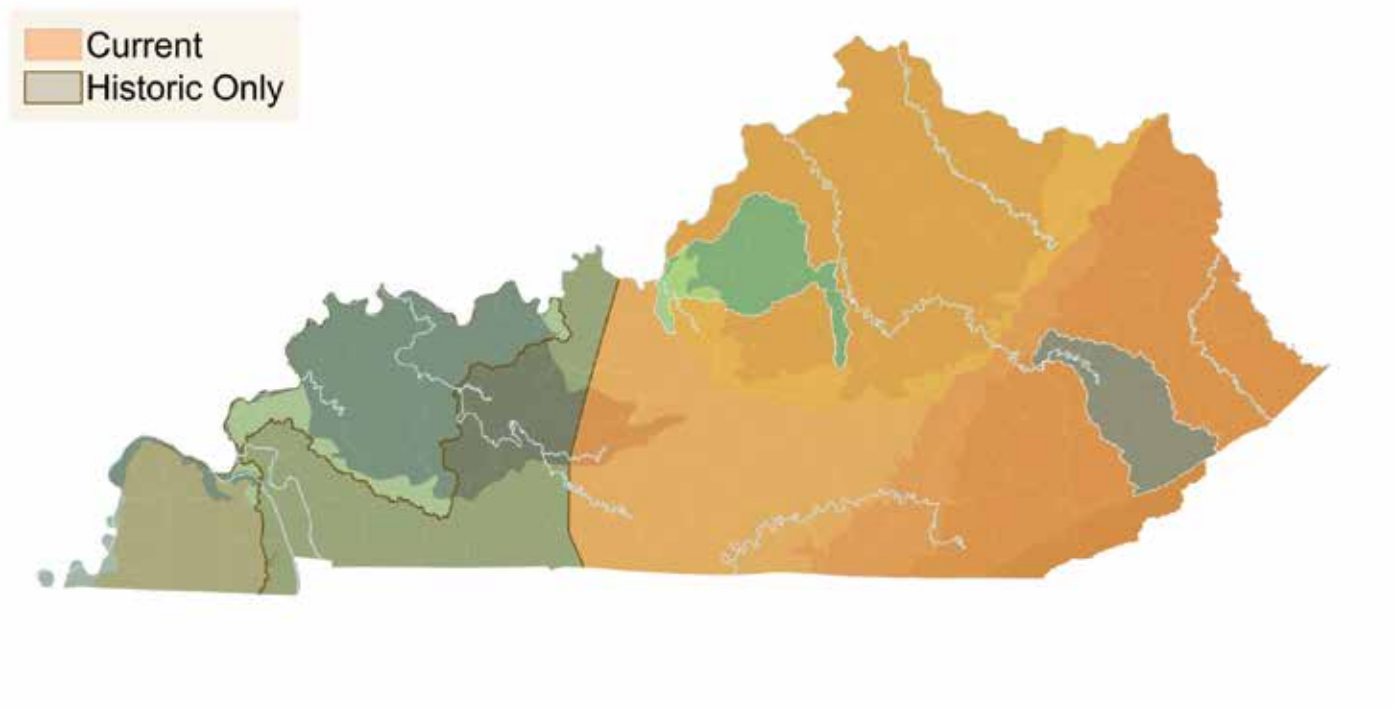


Photo: John MacGregor



SPOTTED DUSKY SALAMANDER

(Desmognathus conanti)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Acquire or otherwise protect the Type Locality near old US 60 ca 2.1 miles SW of Smithland in Livingston County. Develop and implement repeatable field survey and monitor 5 populations. Develop recommendations for forested buffers along small streams to protect adult and larval habitat.





Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest, Xeric Forest, River/Streams

Adults are semiaquatic and live in, along, and near springs, seeps, and small streams located in wooded areas. Some live in damp burrows in or close to stream channels and others spend much of their time hiding beneath rocks, woody debris, and other detritus. Larvae are aquatic and live in small creeks, seeps, and springs.

Threats

-  Annual and Perennial Nontimber Crops
-  Logging and Wood Harvesting
-  Pathogens and Microbes
-  Roads and Railroads

Conservation Actions

- Awareness and Communications 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Policies and Regulations 
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Develop disease response plan

Management: Disease reporting portal

Range Map

Current

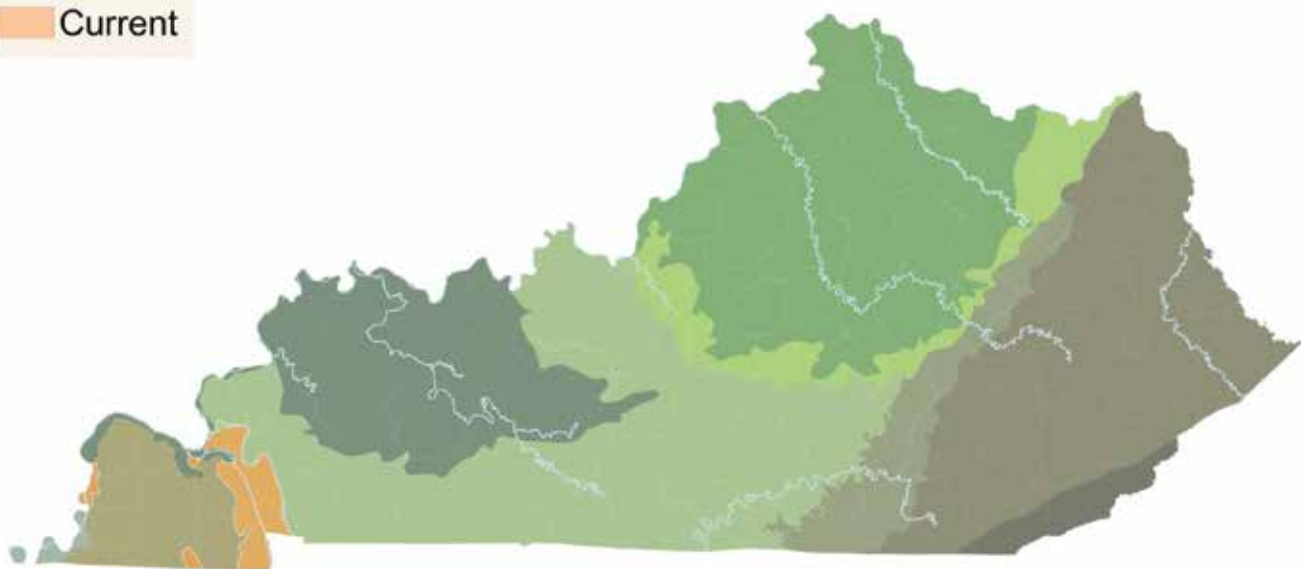


Photo: John MacGregor



NORTHERN DUSKY SALAMANDER

(*Desmognathus fuscus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Though much of the Northern Dusky Salamander's population is relatively stable, there are documented declines at Mammoth Cave, Rowan County and other local areas. Strip mining activities have degraded habitat quality in part of its range. *Desmognathus* species in general appear sensitive to stream pollution and sedimentation.

Conservation Goal

Identify and investigate local and regional population declines/extirpations at 20 historic sites. Establish repeatable survey routes along 10 streams across the range in Kentucky and conduct timed searches at least 3 times in each. Develop recommendations for forested buffers along small streams to protect adult and larval habitat.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills

Threats

- Air-borne Pollutants
- Housing and Urban Areas
- Logging and Wood Harvesting
- Mining and Quarrying
- Pathogens and Microbes
- Recreational Activities

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Education and Awareness
- External Capacity Building
- Habitat and Natural Process Restoration
- Policies and Regulations
- Resource and Habitat Protection

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Develop disease response plan

Management: Disease reporting portal

Guilds: Cave/Karst, Cliff/Rockshelter, Forested Wetland, Mesic Forest, Xeric Forest, River/Streams, Floodplain/Sandbar, Suburban, Scrub-Shrub/Early Successional Forest

Uses streams, springs, seeps, and other wet areas in a variety of habitats.

Range Map

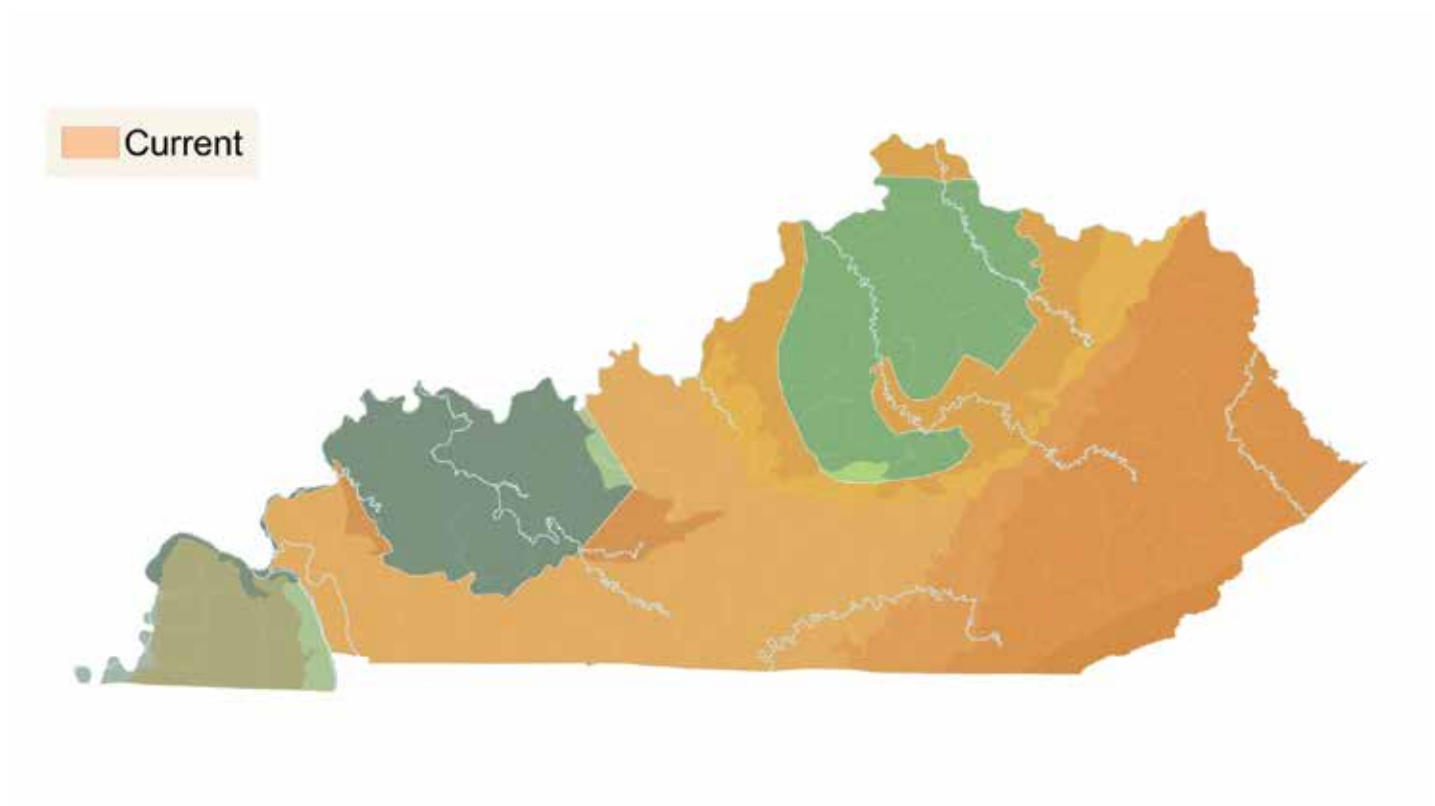


Photo: John MacGregor



ALLEGHENY MOUNTAIN DUSKY SALAMANDER

(*Desmognathus ochrophaeus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S5

Federal Status: N/A

IUCN Red List: LC - Least concern

The Allegheny Mountain Dusky Salamander has a limited distribution in Kentucky and is apparently absent from the Carter and McCreary County sites where it occurred 20 years ago. Population declines are possibly linked to strip mining. *Desmognathus* species in general appear sensitive to stream pollution and sedimentation.

Conservation Goal





Develop repeatable field survey and monitoring techniques. Monitor 5 sites including at least 2 at higher elevations on Black Mountain. Develop recommendations for forested buffers along small streams, seeps, and dripping rock outcrops to protect habitat.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment

Guilds: Cliff/Rockshelter, Mesic Forest, River/Streams, Scrub-Shrub/Early Successional Forest

Threats

-  Logging and Wood Harvesting
-  Mining and Quarrying
-  Pathogens and Microbes
-  Recreational Activities

Conservation Actions

- Awareness and Communications  
- Education and Awareness 
- Habitat and Natural Process Restoration  
- Policies and Regulations  
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Develop disease response plan

Management: Disease reporting portal

Mostly associated with wet rock faces, mucky and mossy seeps, and the margins of mountain streams.
Also occurs out in the woods and beside road ruts and shallow roadside ditches.

Range Map

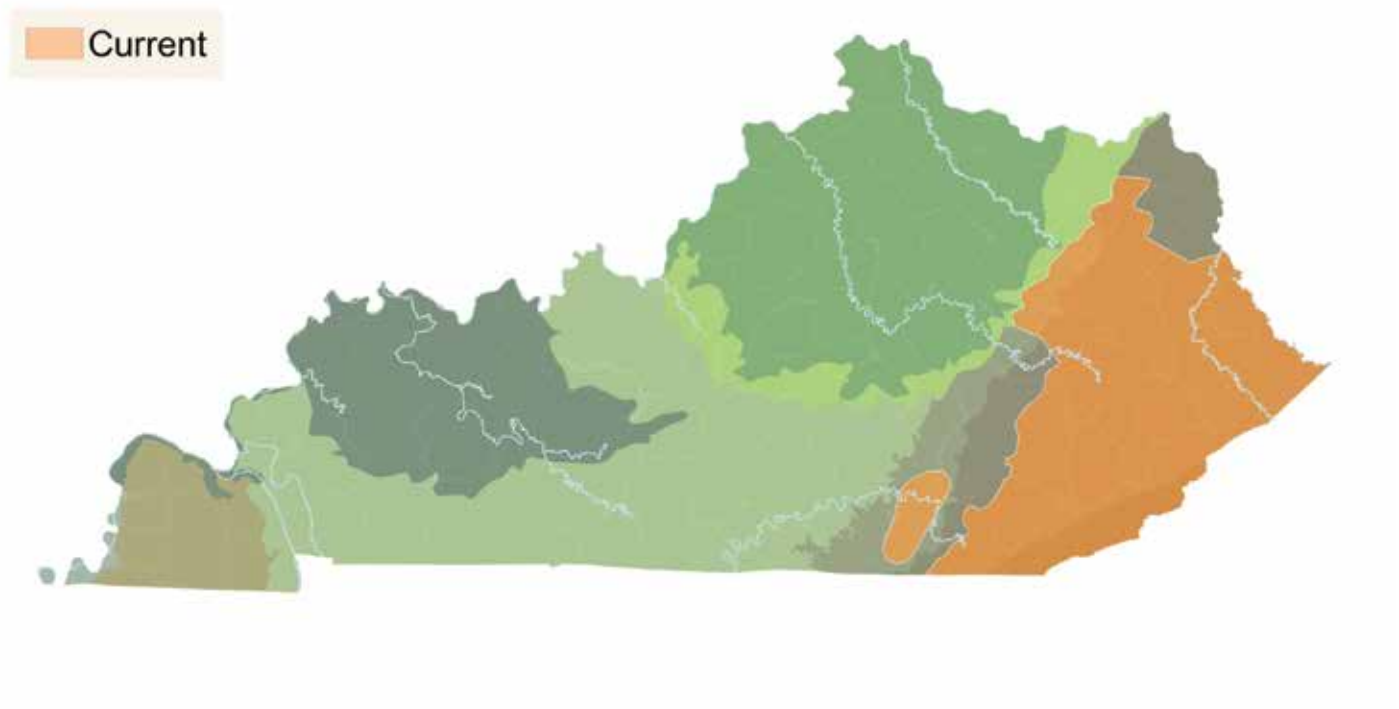


Photo: John MacGregor



BLACK MOUNTAIN SALAMANDER

(*Desmognathus welteri*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Population declines and/or reduced distributions for Black Mountain Salamanders are based on pre- and post-2000 data. It is possibly extirpated from portions of its Kentucky range. *Desmognathus* species in general are sensitive to stream pollution and sedimentation.

Conservation Goal





Support studies of salamander recovery along streams impacted by mining, oil and gas development, and timber harvest in the Cumberland Mountains. Develop recommendations for forested buffers along high gradient streams to protect salamander adult and larval habitat. Develop and implement field survey techniques to monitor 10 populations including the purported Type Locality at "Welteri Branch" along KY 160 on Black Mountain.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs, Interior Plateau

Guilds: Cave/Karst, Cliff/Rockshelter, Mesic Forest, River/Streams

Threats

-  Logging and Wood Harvesting
-  Mining and Quarrying
-  Pathogens and Microbes
-  Recreational Activities

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Identify and restore cave, spring, and seep habitats

Management: Protect cave, spring, and seep areas

Management: Protect existing forested areas

Management: Raise awareness of the importance and diversity of amphibians in Kentucky


Management: Raise awareness of the recreational impacts to amphibian habitat from off-trail ATV use

Sometimes in small cool streams associated with cave entrances and cliffs (waterfalls).

Management: Restore and maintain sites with good forest cover

Management: Work with regulatory agencies and private partners to minimize the impacts of surface mining and other forms of mineral extraction

Range Map

 Current

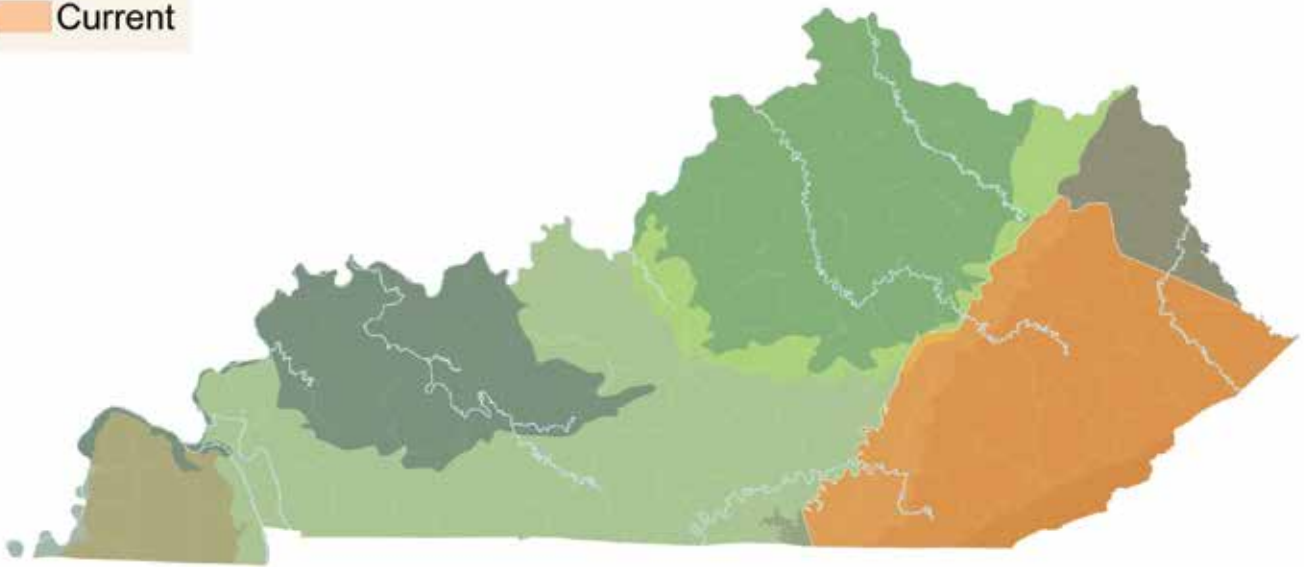


Photo: John MacGregor



THREE-LINED SALAMANDER

(*Eurycea guttolineata*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Support research to investigate the extent of hybridization with Long-tailed Salamanders in the Blood River drainage. Monitor continued occurrence in Blood River bottoms at Kentucky Lake WMA (Calloway Co) and Terrapin Creek State Nature Preserve (Graves Co). Develop recommendations for forested buffers along springs, small streams, and wetlands to protect adult and larval habitat.





Habitat Associations

Physiographic Regions: Interior Plateau, Mississippi Valley Loess Plain







Guilds: Forested Wetland, Mesic Forest, River/Streams, Floodplain/Sandbar, Scrub-Shrub/Early Successional Forest

Adults live in and under drift piles, fallen or decaying logs and other woody debris, and trash and also occupy crayfish burrows and similar retreats. Larvae are aquatic and mostly occur in springs, seeps, and small spring-fed creeks in bottomland and floodplain forests.

Threats

-  Annual and Perennial Nontimber Crops
-  Logging and Wood Harvesting
-  Pathogens and Microbes
-  Roads and Railroads

Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration  
- Policies and Regulations 
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Develop disease response plan

Management: Disease reporting portal

Range Map

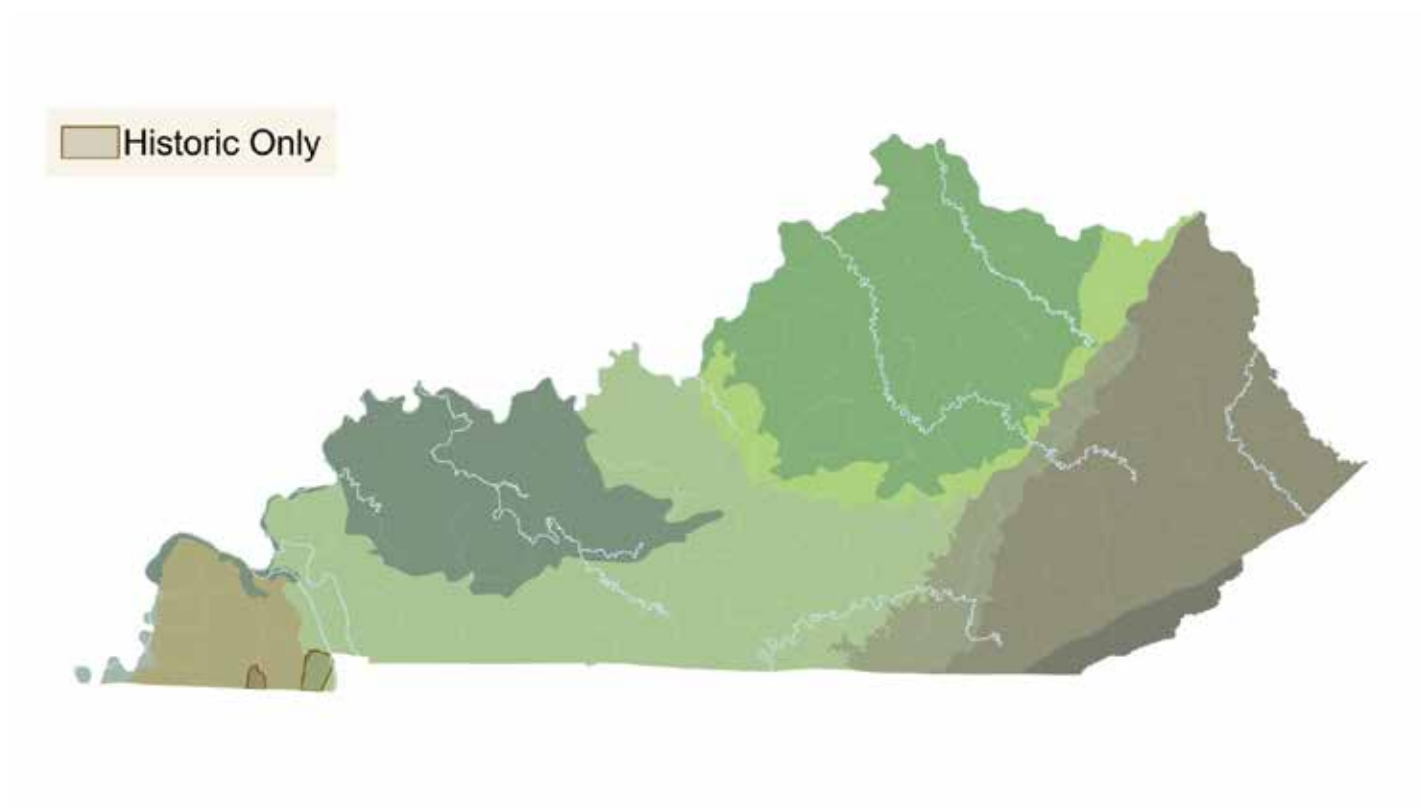


Photo: John MacGregor



BIRD-VOICED TREEFROG

(*Hyla avivoca*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S3S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor evening choruses on Clear Creek (Hopkins Co), Cypress Creek (Marshall Co), and Obion WMA (Hickman Co) annually. Identify and document Bird-voiced/Cope's Gray Treefrog hybrids. Support land acquisition/wetland restoration adjacent to known populations. Conduct voice surveys along local roads from late April-July to monitor continued use of known breeding sites and document new sites.

Habitat Associations





Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland, Lake/Pond



Arboreal; occur on living or dead trees, shrubs, and/or emergent vegetation located in and near forested wetlands. Breeding takes place in forested wetlands and adjacent open wetlands or ponds; the eggs are laid in water and the tadpoles are aquatic.

The tadpoles are relatively poor swimmers and are most often found amongst emergent vegetation in shallow water.

Threats

-  Annual and Perennial Nontimber Crops
-  Logging and Wood Harvesting
-  Mining and Quarrying
-  Pathogens and Microbes

Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration  
- Policies and Regulations 
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Develop disease response plan

Management: Disease reporting portal

Range Map

Current

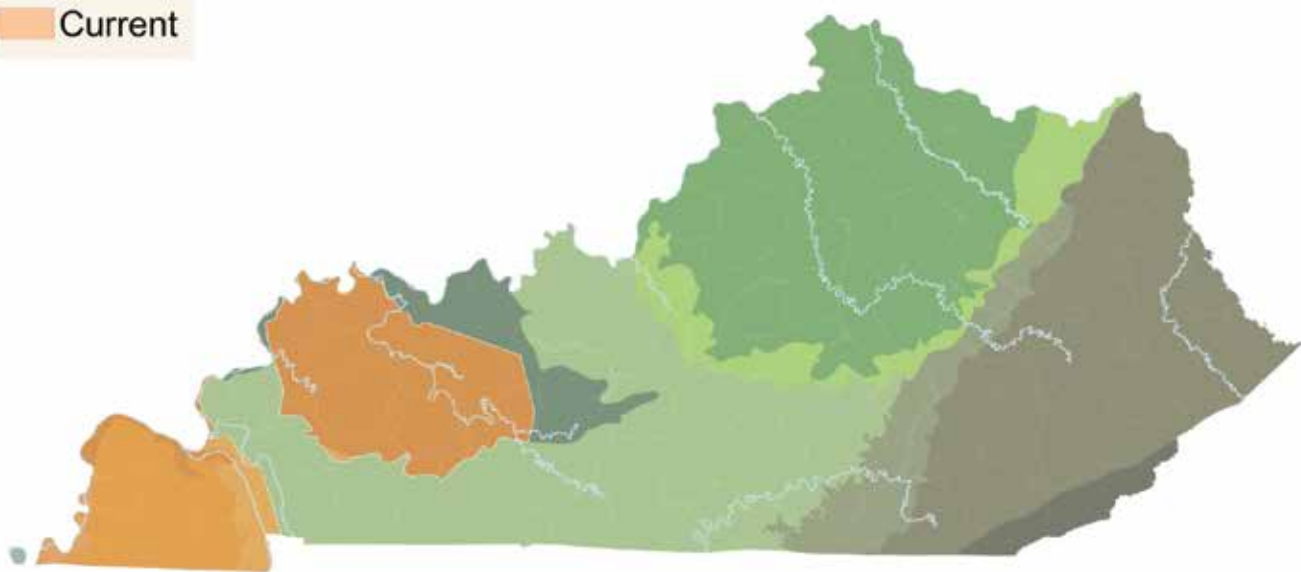


Photo: John MacGregor



BARKING TREEFROG

(*Hyla gratiosa*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S3S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Support research to determine habitat requirements of adults when they are away from the breeding ponds. Conduct voice surveys along local roads from mid-May-July to monitor use of known breeding sites and document new sites. Work with Private Lands Biologists to encourage landowners to conserve and protect at least 25 breeding ponds across species range.




Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Grassland/Savannah, Open Wetland, Lake/Pond, Agriculture

Barking Treefrogs are likely terrestrial to somewhat arboreal. All known breeding sites in Kentucky have been seasonal to semi-permanent ponds and open wetlands surrounded mostly to entirely by open fields, pasture, and/or cropland. Eggs are laid in water and the tadpoles are aquatic.

Threats

-  Annual and Perennial Nontimber Crops
-  Pathogens and Microbes
-  Residential and Commercial Development

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Protect warm season grasslands and special open habitats

Management: Protect wetland habitat

Management: Restore and create upland breeding habitat

Management: Restore and manage warm season grasslands and special open habitats

Management: Restore and/or create wetland habitat

Range Map

Current

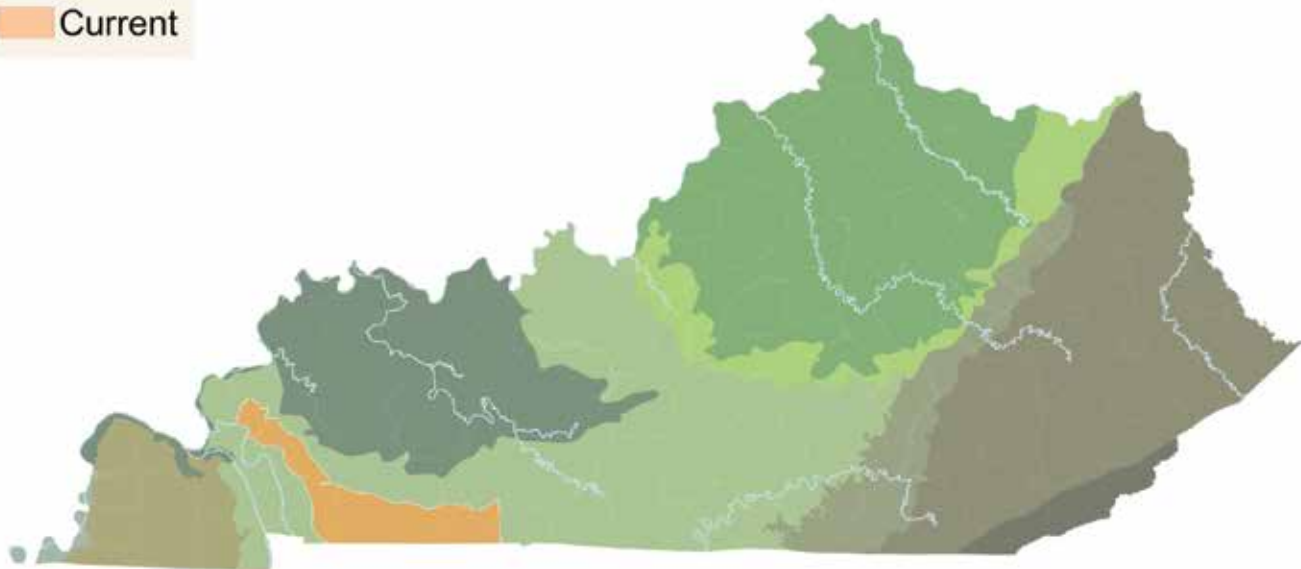


Photo: John MacGregor



GRAY TREEFROG

(*Hyla versicolor*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S2S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Conduct voice surveys along local roads from late April-July to monitor continued use of breeding sites and document new sites. Create 5 new upland breeding ponds on South Shore WMA.




Habitat Associations

Physiographic Regions: Cumberland Plateau, Interior Plateau

Guilds: Forested Wetland, Mesic Forest, Xeric Forest, Open Wetland, Lake/Pond, Agriculture, Suburban, Scrub-Shrub/Early Successional Forest

Arboreal to somewhat terrestrial. Live in a variety of habitats ranging from forested wetlands and xeric to mesic forests to cutover woods, fencerows and edges, thickets, and old fields. Breeding sites include ponds, open and forested wetlands, ditches, and even water-filled tire ruts.

Threats

-  Annual and Perennial Nontimber Crops
-  Pathogens and Microbes
-  Residential and Commercial Development

Conservation Actions

- Awareness and Communications 
- External Capacity Building 
- Habitat and Natural Process Restoration  
- Policies and Regulations 
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Develop disease response plan

Management: Disease reporting portal

Range Map

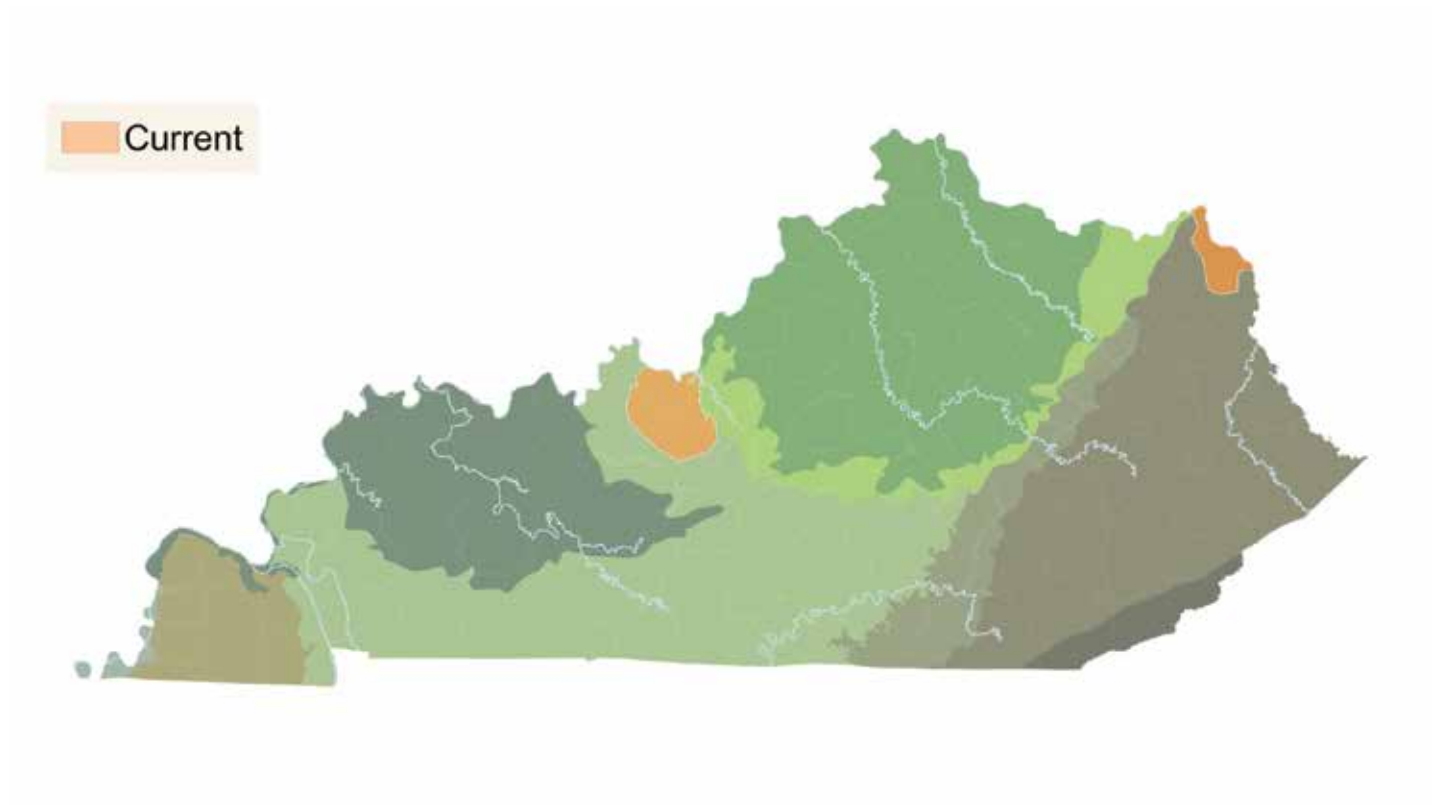




Photo: John MacGregor

NORTHERN CRAWFISH FROG

(*Lithobates areolatus circulosus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4T4

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Northern Crawfish Frogs are apparently extirpated from much of its Kentucky range.

Conservation Goal





Monitor reproductive success at 15 breeding sites (including 11 constructed or rehabilitated ponds and wetlands) on West Kentucky WMA. Provide Crawfish Frog BMP information to state and federal agency biologists within Kentucky range. Conduct and support voice surveys within historic range. Work with land managers to establish populations on public land using a combination of egg and tadpole translocation and head starting – this will likely include acquiring crawdad-infested farmland adjacent to existing WMAs and building at least 10 new breeding ponds.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Lake/Pond, Agriculture

Threats

-  Annual and Perennial Nontimber Crops
-  Other Ecosystem Modifications
-  Pathogens and Microbes
-  Roads and Railroads

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Protect warm season grasslands and special open habitats

Management: Provide patches of open habitat adjacent to wetlands

Management: Restore and create upland breeding habitat

Management: Restore and manage warm season grasslands and special open habitats

Adults and juveniles live in crayfish burrows situated in a variety of open upland habitats including cropland, pasture, hayfields, and grasslands. Breeding ponds are shallow, support emergent vegetation, and become dry to nearly dry in late summer and fall. Eggs and tadpoles are aquatic.

Range Map

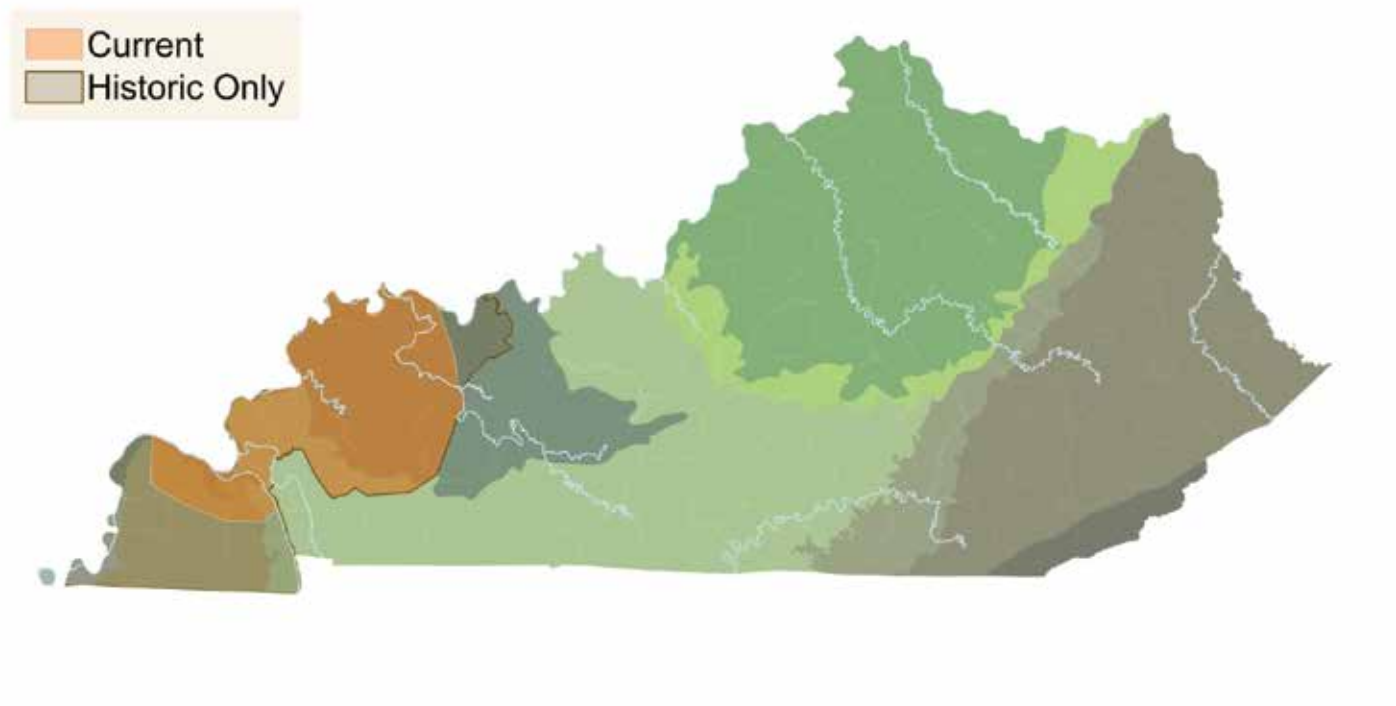


Photo: John MacGregor



PLAINS LEOPARD FROG

(*Lithobates blairi*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs. Investigate extent of hybridization with Southern Leopard Frogs in Lower Hickman Bottoms. Catch and identify Leopard Frogs in bottomland forest between the Sutton Road levee and Mississippi River. Search for new populations in Upper Hickman Bottoms and northward along the Mississippi River.





Habitat Associations

Physiographic Regions: Mississippi Alluvial Plain

Guilds: Forested Wetland, Grassland/Savannah, Open Wetland, Lake/Pond, Agriculture

Adults use open, agriculture-dominated habitats (cropland, pasture, and hayfields) and likely grasslands should be suitable as well. Known breeding sites include a mix of open and forested wetland and several seasonally flooded fields. Eggs and tadpoles are aquatic.

Threats

-  Annual and Perennial Nontimber Crops
-  Pathogens and Microbes
-  Problematic Native Species
-  Residential and Commercial Development

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Protect warm season grasslands and special open habitats

Management: Protect wetland habitat

Management: Provide patches of open habitat adjacent to wetlands

Management: Restore and create upland breeding habitat

Management: Restore and manage warm season grasslands and special open habitats

Management: Restore and/or create wetland habitat

Range Map

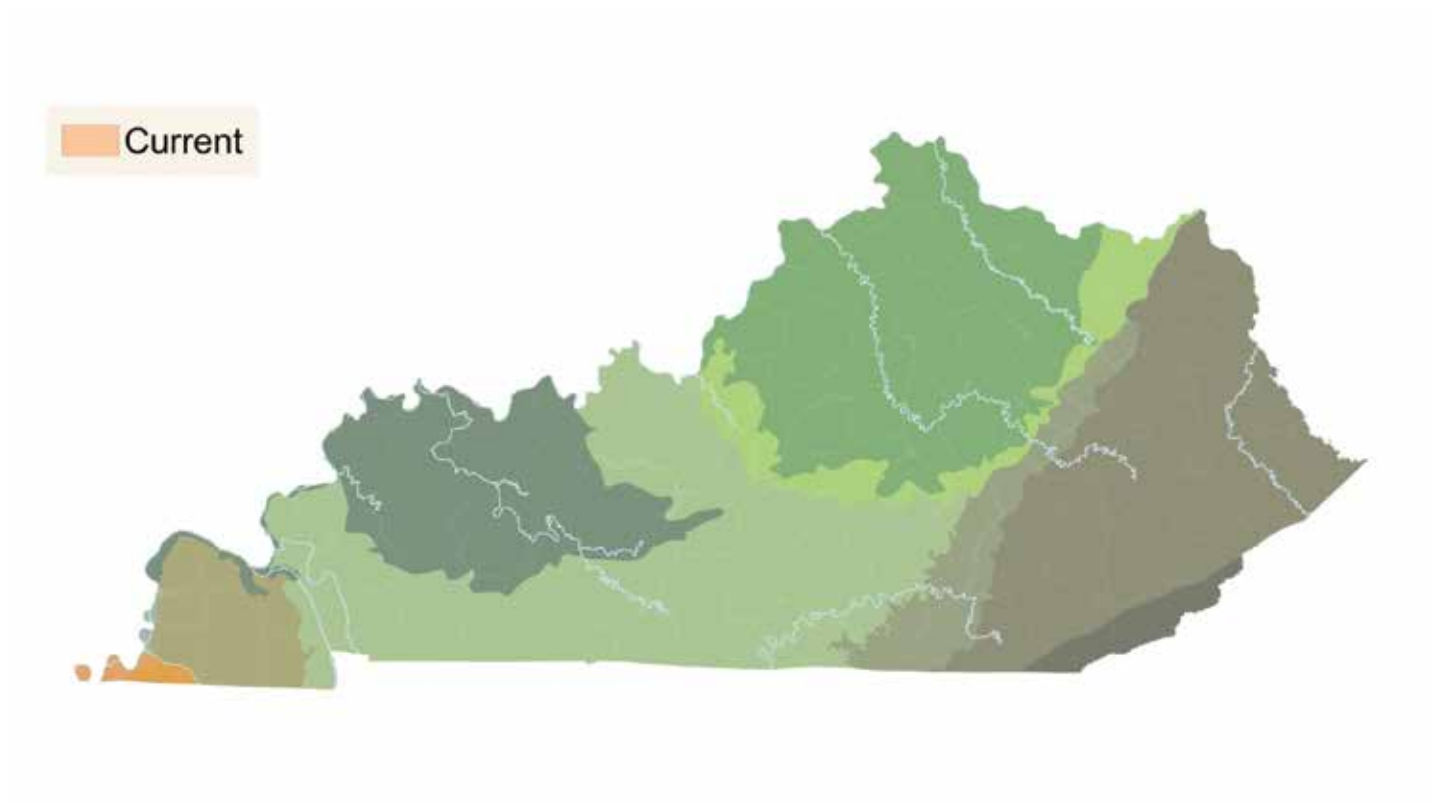




Photo: John MacGregor

NORTHERN LEOPARD FROG

(*Lithobates pipiens*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Northern Leopard Frogs are apparently extirpated from much of its Kentucky range. The species may be difficult to distinguish from Southern Leopard Frog.

Conservation Goal

Support molecular work to determine actual range (some populations are not distinguishable from Southern Leopard Frog except by voice). Conduct surveys to find/document new sites. Monitor tadpoles/metamorphs at South Shore WMA (Greenup Co) and Kentucky River WMA (Owen Co). Build 25 new breeding ponds on WMAs in the Bluegrass Region.




Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs

Guilds: Open Wetland, Lake/Pond, River/Streams, Agriculture

Adults use natural or man-made open wetlands or ponds in various ag-dominated habitats (fencerows, borders, pastures, hayfields)= as breeding sites. Some have been seen taking refuge beneath

Threats

-  Annual and Perennial Nontimber Crops
-  Pathogens and Microbes
-  Residential and Commercial Development

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Protect warm season grasslands and special open habitats.

Management: Protect wetland habitat

Management: Provide patches of open habitat adjacent to wetlands

Management: Restore and create upland breeding habitat

Management: Restore and manage warm season grasslands and special open habitats

Management: Restore and/or create wetland habitat

masses of dead leaves in streams and some may overwinter there. These frogs are rarely seen in forested areas. Eggs and tadpoles are aquatic.

Range Map

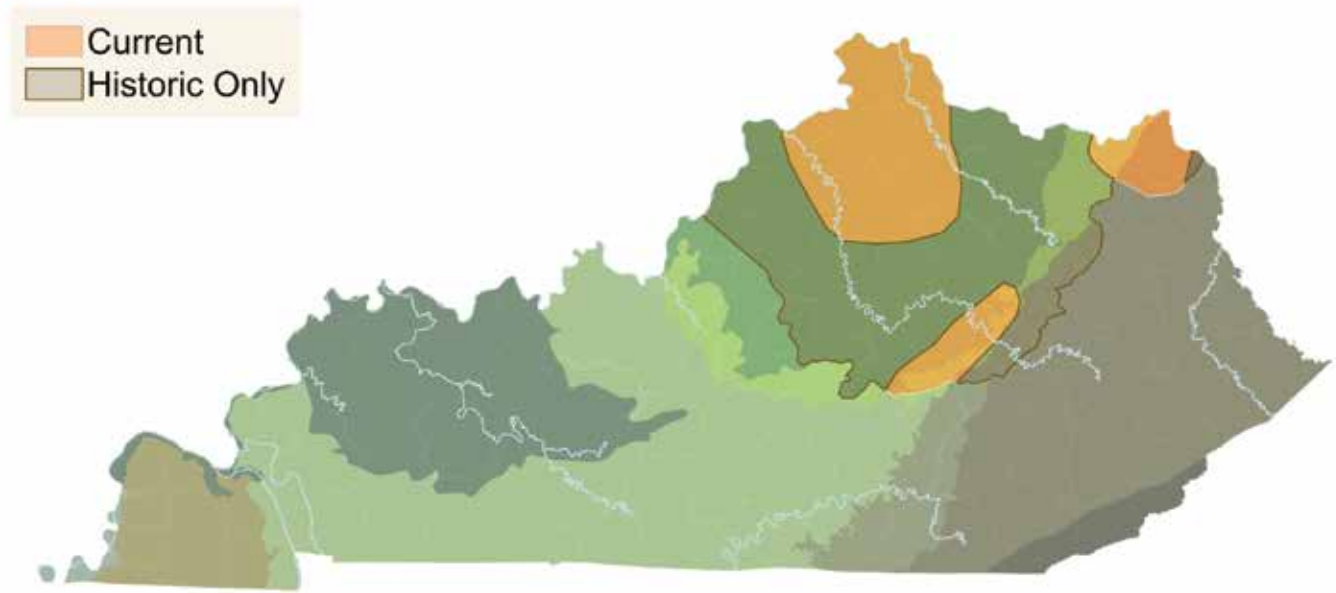


Photo: John MacGregor



EASTERN RED-BACKED SALAMANDER

(*Plethodon cinereus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S2S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Protect the isolated and genetically unique population that occurs on the steep north-facing slopes on Eagle Hill in northern Owen County (Note: this population could be seriously impacted or even eliminated if the decision were ever made to reconstruct US 127 at or near its present location). Monitor numbers annually at 5 sites including Adair WMA and Boone County Cliffs (Boone Co) and Eagle Hill (Owen Co).







Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Mesic Forest, Xeric Forest, Suburban, Scrub-Shrub/Early Successional Forest

Occurs mostly in mesic woodlands but is sometimes found in xeric woodlands and even suburban yards and is able to persist in cutover woods. Apparently dependent upon suitable underground retreats including burrows made by earthworms, cicada nymphs, ants, etc. Eggs are laid on land and there is no aquatic larval stage.

Threats

-  Climate Change and Severe Weather
-  Invasive Non-native/Alien species
-  Mining and Quarrying
-  Pathogens and Microbes
-  Residential and Commercial Development
-  Roads and Railroads

Conservation Actions

- Awareness and Communications 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Policies and Regulations 
- Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Develop disease response plan

Management: Disease reporting portal

Range Map

Historic Only

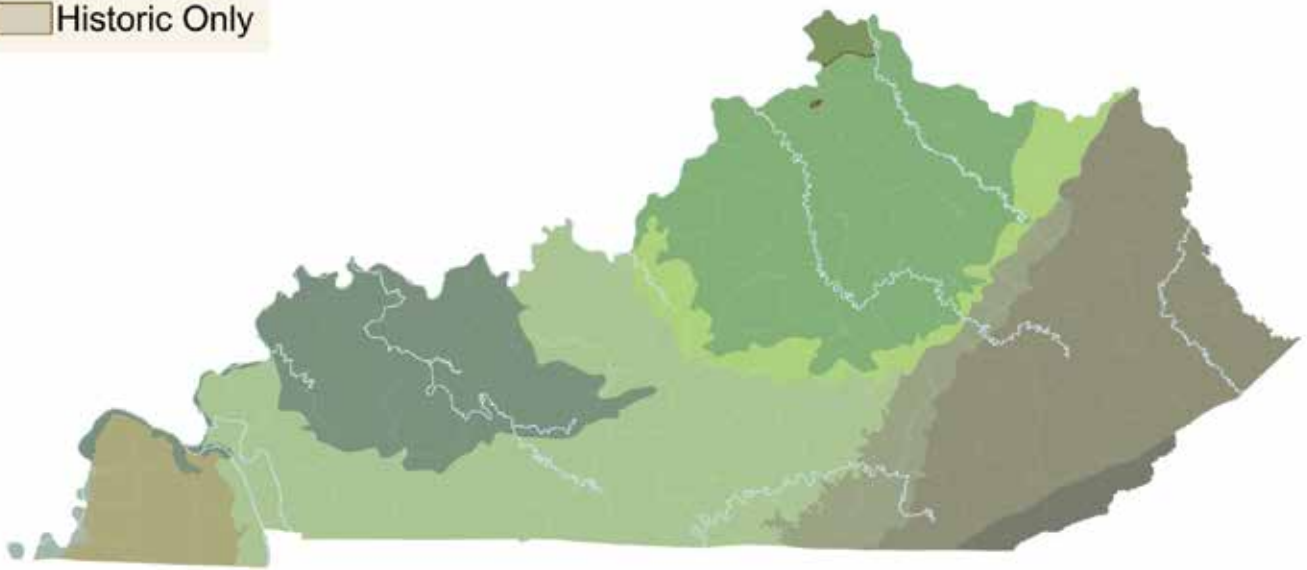


Photo: John MacGregor



CUMBERLAND PLATEAU SALAMANDER

(*Plethodon kentucki*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

The Cumberland Plateau Salamander is nearly endemic, as 60% of the species range lies within Kentucky. There are fewer records and known locations/sites observed in the past 20 years. This species has 5 clades rangewide, 4 of which occur in Kentucky. Research indicates that this could be a species complex, and more work is needed.





Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs. Support molecular work to determine whether the four genetically distinct populations that occur in Kentucky are worthy of recognition at the species level and work out exact distributions of each population. Establish evening walking transects and coverboard sites to monitor salamander numbers on Pine Mountain WMA in Letcher Co, at high elevations on Black Mountain in Harlan Co, and on Pine Mountain or Log Mountain in Bell Co.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs

Threats

-  Logging and Wood Harvesting
-  Mining and Quarrying
-  Pathogens and Microbes
-  Recreational Activities

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Communicate impacts of fire to amphibian populations and habitats

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Protect existing forested areas

Management: Raise awareness of the importance and diversity of amphibians in Kentucky

Management: Restore and maintain sites with good forest cover

Guilds: Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

Occurs mostly in mesic woodlands, sometimes xeric woodlands and is able to persist in cutover woods. Apparently dependent upon suitable underground retreats including rock crevices, caves, small mammal burrows and runways, etc. and can sometimes be found beneath rocks, logs, and other forest floor debris.

Management: Restrict ATV traffic to approved trails and hardened stream crossings

Management: Work with regulatory agencies and private partners to minimize the impacts of surface mining and other forms of mineral extraction

Range Map

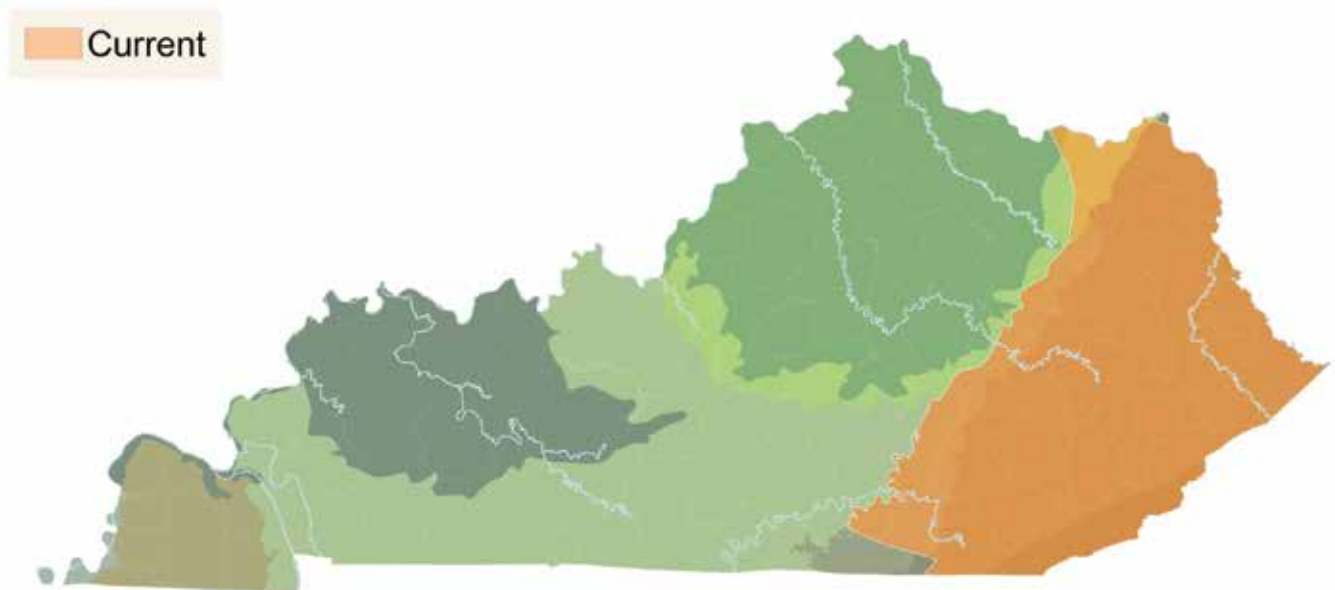


Photo: John MacGregor



MISSISSIPPI SLIMY SALAMANDER

(*Plethodon mississippi*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S5

Federal Status: N/A

IUCN Red List: N/A

The range of the Mississippi Slimy Salamander is limited to Purchase Region. There are few records confirmed with DNA, but range limits between *Plethodon mississippi* and *Plethodon glutinosus* need to be better defined. There is no data indicating population declines, but habitat loss has occurred due to deforestation.

Conservation Goal

Support molecular work to determine actual range. Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and determine conservation status and habitat needs.



Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest, Xeric Forest, Suburban

Livdds in a variety of upland and bottomland forest types. Most occupy burrows on the forest floor, especially on wooded slopes, or reside in small

Threats

-  Annual and Perennial Nontimber Crops
-  Pathogens and Microbes

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Protect existing forested areas

Management: Restore and maintain sites with good forest cover

mammal runways and tunnels; some also live under leaf litter and woody debris or in decaying logs or even damp rock crevices.

Range Map

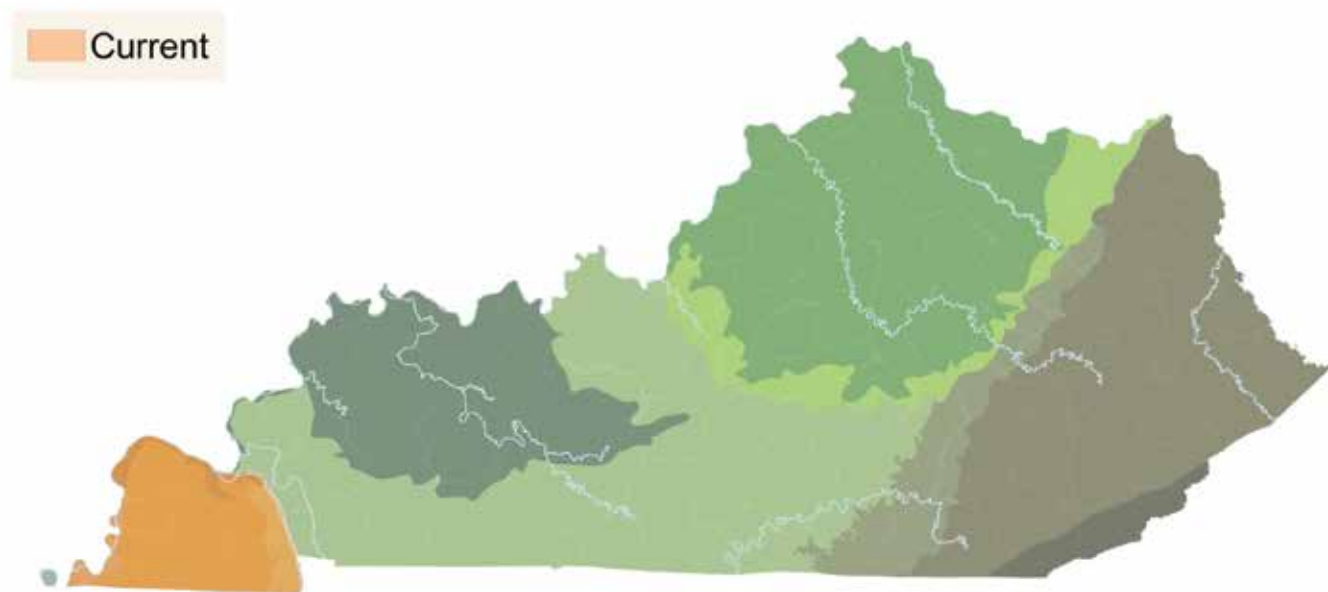


Photo: John MacGregor



YELLOW-SPOTTED WOODLAND SALAMANDER

(*Plethodon pauleyi*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: GNR

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

The Yellow-spotted Woodland Salamander is difficult to survey for and its distribution very poorly known.

Conservation Goal

Develop and support and/or implement field survey protocols to collect data on distribution, life history, and habitat needs. Survey at least 5 new potential sites each year. Monitor specific populations at Lilley Cornett Woods and the Franks Creek site (both in Letcher Co).





Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau

Guilds: Cliff/Rockshelter, Mesic Forest, Xeric Forest

Occurs mostly in mesic woodlands, but sometimes xeric woodlands. Apparently dependent upon suitable underground retreats including rock crevices, small mammal burrows and runways, etc. but can sometimes be found beneath rocks, logs, and other forest floor debris; one of our best sites is an old roadcut.

Threats

-  Logging and Wood Harvesting
-  Mining and Quarrying
-  Pathogens and Microbes
-  Recreational Activities

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Communicate impacts of fire to amphibian populations and habitats

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Protect existing forested areas

Management: Raise awareness of the recreational impacts to amphibian habitat from off-trail ATV use

Management: Restore and maintain sites with good forest cover

Management: Work with regulatory agencies and private partners to minimize the impacts of surface mining and other forms of mineral extraction

Range Map

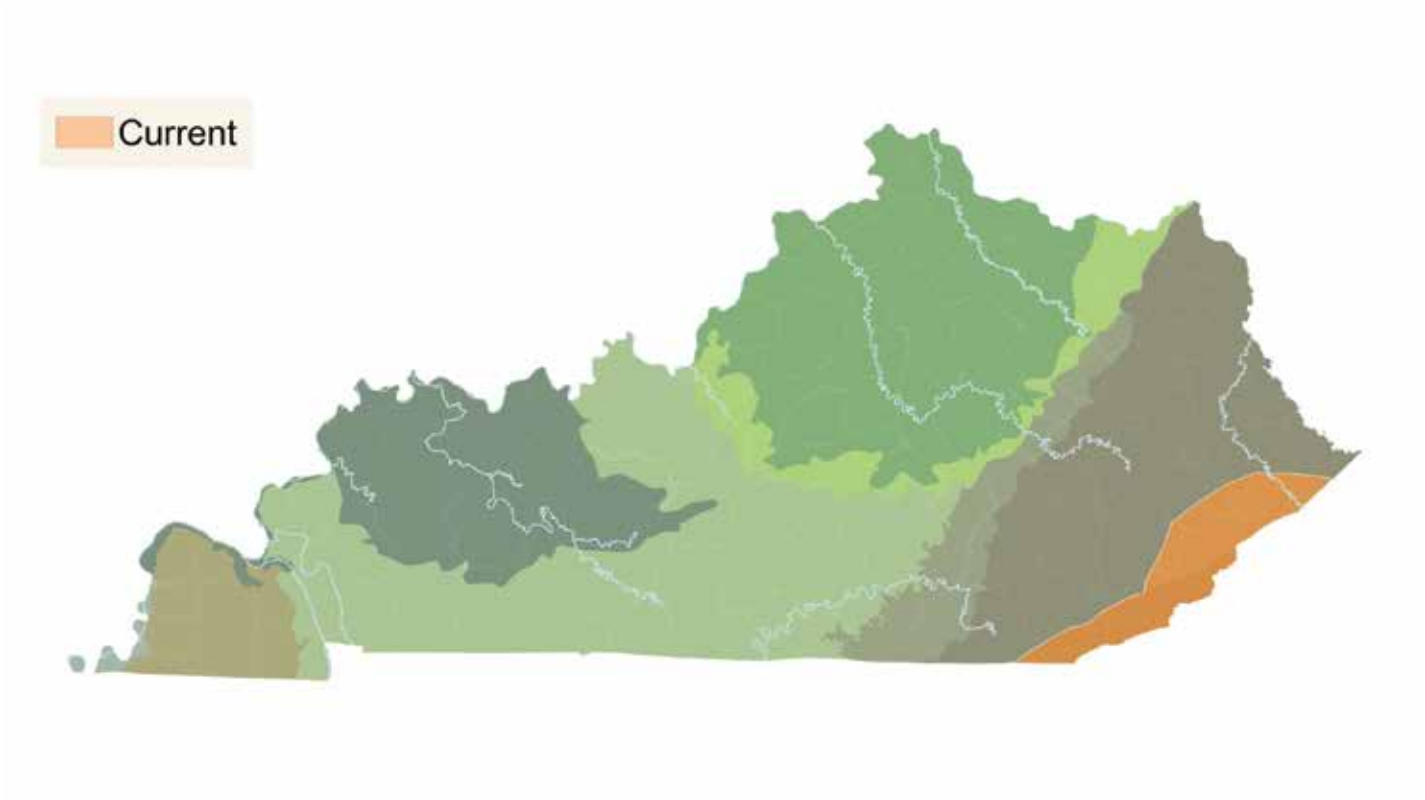


Photo: John MacGregor



MIDLAND MUD SALAMANDER

(Pseudotriton montanus diastictus)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5T5

S Rank: S3?

Federal Status: N/A

IUCN Red List: N/A

The Midland Mud Salamander is difficult to survey for and it may already be extirpated in much of its Kentucky range.

Conservation Goal

Support development and use of eDNA protocols to determine presence and conduct follow-up surveys to document occurrences. Develop recommendations for forested buffers along springs, small streams, and wetlands to protect adult and larval habitat.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills

Guilds: Cave/Karst, Forested Wetland, Grassland/Savannah, Mesic Forest, Xeric Forest, Lake/Pond, River/Streams, Suburban, Scrub-Shrub/Early Successional Forest

Adults are semiaquatic to terrestrial; some are found in caves, springs, seeps, mucky areas, dripping rock ledges, and other wet places along streams; others can be found under rocks along or near stream

Threats

- Agricultural and Forestry Effluents
- Logging and Wood Harvesting
- Mining and Quarrying
- Pathogens and Microbes
- Recreational Activities

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Identify and restore cave, spring, and seep habitats

Management: Protect cave, spring, and seep areas

Management: Protect existing forested areas

Management: Raise awareness of the recreational impacts to amphibian habitat from off-trail ATV use

Management: Restore and maintain sites with good forest cover

channels. They also live beneath logs and other debris in bottomland or upland forest well away from water; many use or live in burrows (including those of burrowing crayfish). Larvae are aquatic and occur in springs, seeps, cave streams, spring-fed creeks, and small streams.

Management: Work with regulatory agencies and private partners to minimize the impacts of surface mining and other forms of mineral extraction

Range Map

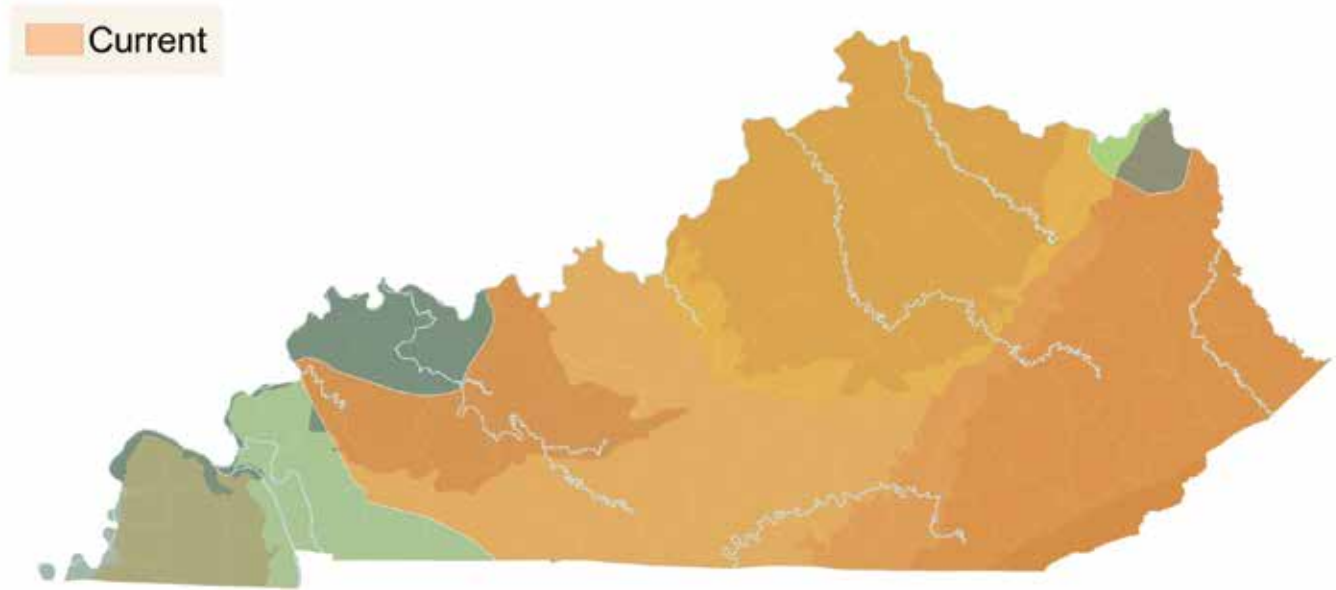


Photo: John MacGregor



EASTERN SPADEFOOT

(*Scaphiopus holbrookii*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S5

Federal Status: N/A

IUCN Red List: LC - Least concern

Eastern Spadefoot populations are difficult to monitor due to variable breeding success and inconsistent recruitment. It is an explosive breeder that often appears, calls, mates, lays eggs, and disappears within a period of 24 hours or less. It can breed just about any time of year, but local or regional populations can go for years without breeding in the absence of proper conditions. Larval development is rapid and the species can go from eggs to froglets in as little as 30 days making it difficult to monitor during the larval stage. Breeding often takes place in temporary pools and flooded fields that may go dry after just a few days and wipe out the entire local breeding effort.

Conservation Goal

Monitor tadpoles (mostly 2-3 weeks after local storm events from May through August) in specific breeding sites on DBNF and MCNP. Build 25 new vernal pool breeding sites on WMAs within known range across Kentucky.

Habitat Associations

Threats

- ☀ Climate Change and Severe Weather
- 🦠 Pathogens and Microbes
- 🦎 Problematic Native Species
- 🏠 Residential and Commercial Development

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Disease surveillance

Management: Amend transportation regs to minimize disease transmission.

Management: Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Management: Develop disease response plan

Management: Develop education and outreach materials to inform the public of disease issues and minimization measures.

Management: Disease reporting portal

Management: Prescribed fire management

Management: Protect existing forested areas

Management: Protect warm season grasslands and special open habitats

Management: Protect woodland breeding ponds

Management: Restore and create upland breeding habitat

Management: Restore and maintain sites with good forest cover

Management: Restore and manage warm season grasslands and special open habitats

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Mesic Forest, Xeric Forest, Lake/Pond, Agriculture, Scrub-Shrub/Early Successional Forest

Adults are burrowers and spend much of their time underground. Habitat above the ground is variable; the main habitat requirements include a mix of well-drained loose or sandy soils for burrowing and low spots where temporary breeding ponds or pools can form during periods of heavy rain. Eggs are laid in water and the tadpoles are aquatic.

Management: Restore and/or create woodland breeding ponds

Range Map

Current

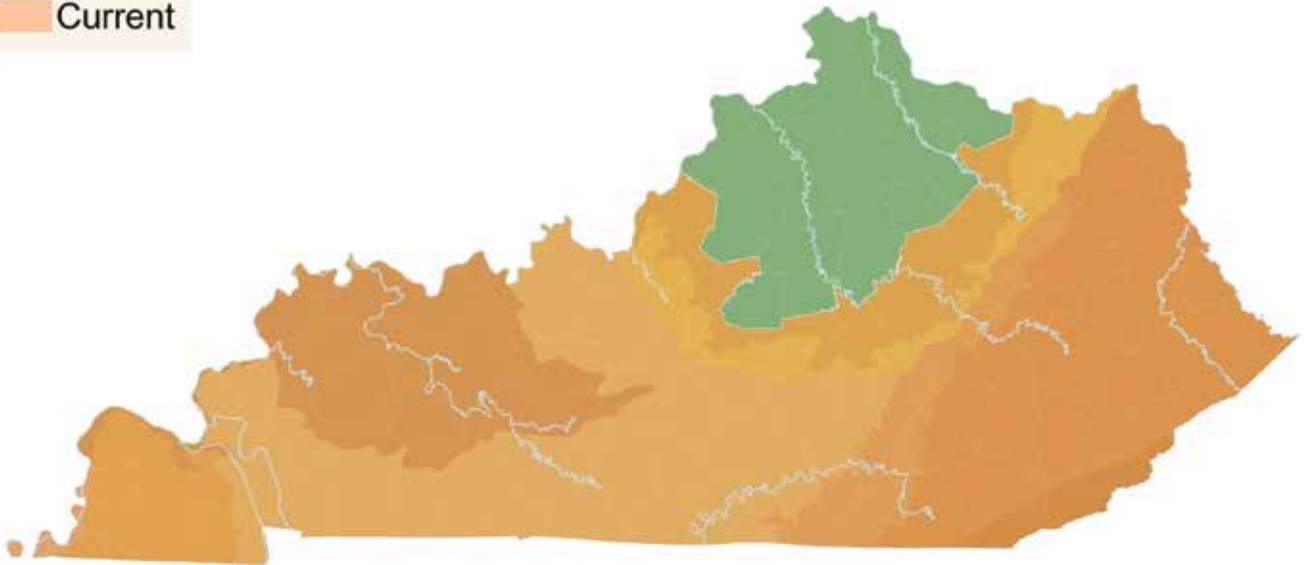


Photo: John MacGregor



LESSER SIREN

(*Siren intermedia*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S3?

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Support development and use of eDNA protocols to determine presence and conduct follow-up surveys to document occurrences using traps, partly submerged coverboards, or other methods.




Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Highland-Pigeon, Kentucky Lake, Lower Cumberland, Lower Green, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Obion, Pond, Rough, Tradewater

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Unconfined-Medium River, Other

Found in ponds, sloughs, ditches, forested and open wetlands, sluggish streams, and backwaters. Adults and larvae are aquatic but may travel short distances over land during wet weather. Adults are able to burrow into mud or enter crayfish burrows and aestivate in ponds and wetlands that go dry for part of the year.

Threats

-  Annual and Perennial Nontimber Crops
-  Mining and Quarrying
-  Pathogens and Microbes

Conservation Actions

-  Awareness and Communications
-  Habitat and Natural Process Restoration
-  Policies and Regulations
-  Resource and Habitat Protection

Needs

Survey: Collect baseline species information

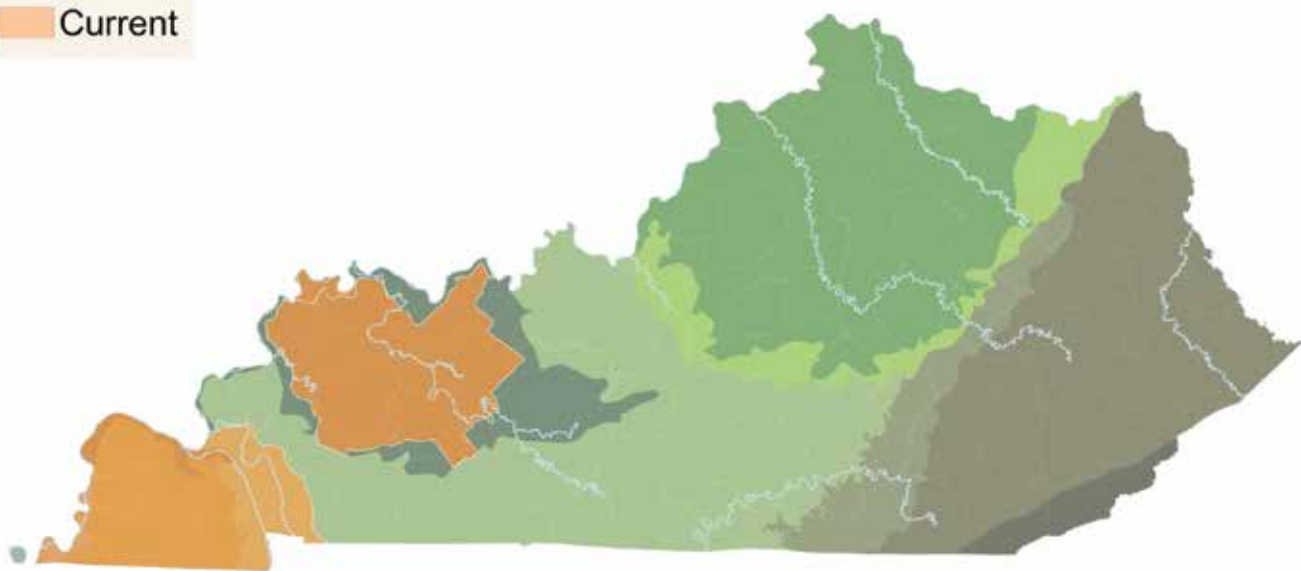
Survey: Disease surveillance

Management: Develop disease response plan

Management: Disease reporting portal

Range Map

Current



BIRDS

Introduction

Kentucky is an ecologically diverse state that transitions from alluvial and coastal plain soils, to a northern hardwood forest landscape and to the mountains of the Cumberland Plateau. Kentucky is rich in upland forest, high elevation forest, floodplain forest, grassland, riverine and marsh habitats. Because of this diversity, Kentucky falls within four Bird Conservation Regions (BCR) under the North American Bird Conservation Initiative (NABCI). These include the following: the Central Hardwoods, which includes much of the state; the Appalachian Mountains, which includes the Cumberland Mountains and Plateau; the Mississippi Alluvial Valley, which covers a small portion of the Jackson Purchase along the Mississippi River; and the East Gulf Coastal Plain, which covers most of the Jackson Purchase west of Land Between the Lakes. Joint Ventures corresponding to each BCR guide much of the discussion, research and implementation of conservation actions for birds within each region.

Over 375 species of birds have been recorded in Kentucky, and of these, about 150 species regularly breed in the state. Taxonomically, these species can be categorized as landbirds, waterbirds, shorebirds and waterfowl. Continental or rangewide bird conservation plans have been created to cover suites of species and include the Partners in Flight's (PIF) Landbird Conservation Plan, the United States Shorebird Conservation Plan, the North American Waterbird Conservation Plan and the North American Waterfowl Management Plan. Where possible, Kentucky's bird portion of the SWAP follows recommendations highlighted under these continental plans.

Selection of SGCN

There were 82 avian species selected for inclusion as SGCN in this revision by the bird taxa team. Species listed as SGCN (by suite) include 46 landbird species, 7 waterfowl species, 13 waterbird/marshbird species and 16 shorebird species.

In general, efforts were made in this revision to focus the SGCN list on species for which Kentucky holds a significant stewardship responsibility and that have showed declines in the past 50 years. Thus, when species qualified for inclusion based on state rank, we then checked for regularity of occurrence by consulting the Annotated Checklist of the Birds of Kentucky (Palmer-Ball 2019). Species were generally excluded from the SGCN list if they were described as "extremely rare, vagrant, visitant, extirpated or accidental" during the season (winter, breeding and transient) for which

they had a qualifying state rank (S1-S3). Two exceptions were made in this regard for recently extirpated species: Bewick's wren and red-cockaded woodpecker. Both of these species had nesting populations in Kentucky within the last 30 years and were maintained as SGCN in order to look for feasible opportunities to manage for the species in Kentucky

82 avian species were selected for inclusion as SGCN in this revision by the bird taxa team.

in the future. Game birds were included as SGCN, only if recent Kentucky data showed declines.

For species that didn't meet other inclusion criteria, short or long term declines were assessed using the following data sources: the USGS Breeding Bird Survey, the Audubon Christmas Bird Count, KDFWR survey data and the 2016 Partner's in Flight Landbird Conservation Plan. In general, the species included on the list due to recent declines showed a decline of 50% or more over the past 40-50 years. As a result of this evaluation, we added some common birds in steep decline to the SGCN list including, Green Heron, Yellow-billed Cuckoo, Cape May Warbler, Blackpoll Warbler, Field Sparrow and Eastern Meadowlark.

Using the same process, several species were removed from the SGCN list during this revision. Mississippi kite, rose-breasted grosbeak, brown creeper, lark sparrow and dark-eyed junco were removed due to relatively stable rangewide population levels. Greater prairie chicken was removed due to longterm extirpation and little hope of restoring habitat for this species in the state. Swallow-tailed kite and vesper sparrow were removed due to extreme rarity.

The Cornell Lab of Ornithology has recently produced



Several common birds in steep decline were added as SGCN in this revision. Species added included those species present in Kentucky during migration only, such as the Cape May Warbler.
Photo: Mark Lowry

several products which will prove useful in future SWAP revisions for SGCN designation, especially in regards to stewardship responsibility. However, these products were released after our SGCN selection process was already complete for this SWAP version.

Identification of Threats

Several threats were included for numerous species including habitat loss and fragmentation within Kentucky (especially for grassland and forested/open wetland birds), habitat loss on the winter grounds (including Central and South America), the effects of invasive plants on habitat structure, collisions with communications towers and windows, predation by feral cats, the effects of climate change and the effects of pesticides and other contaminants on bird health and prey abundance.

Emerging threats that were not included during this revision due to limited information or presence in Kentucky included threats due to wind and solar energy development. Lack of inclusion of these threats doesn't preclude their future research and consideration, and it's likely these will be included in the next SWAP revision.

Research and Survey Needs

While many SGCN require further research to determine reasons for decline or best management practices for habitat improvement, a few research or survey needs were common amongst several species.

Kentucky's first BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of all breeding birds and (if they are repeated) how this is changing over time. KDFWR is interested in completing a second BBA. Changes in distribution documented through the second breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues for many species. The effort would also help to identify important areas for some species which may not already be obvious and develop conservation strategies in those areas. Collecting a new dataset using modern methods eBird (ebird.org/home) also sets the stage for long-term monitoring for all of Kentucky's breeding birds.

In order for conservation efforts to be successful for migratory species, the full life cycle must be considered. Much is still unknown about migratory movements, winter areas and non-breeding season survival for many species and thus this a recurring research need for migratory SGCN in this SWAP. Satellite telemetry tags are now available for a range in size of birds, but still not available for the smallest songbirds. Automated radio telemetry allows researchers to track small species over large distances via the Motus network (motus.org/). Data collected through this research

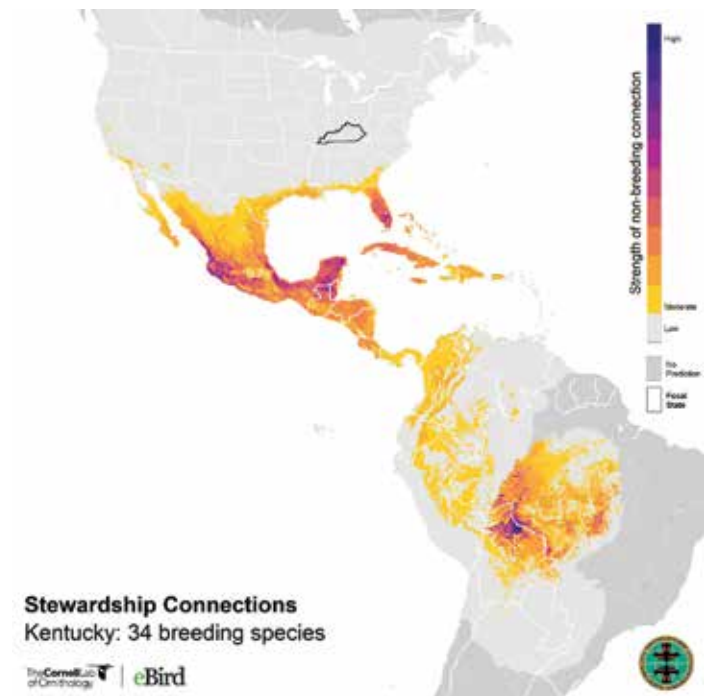
will fuel full life cycle conservation for migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.

The availability of new technologies is constantly changing the way we monitor bird populations and the use of Automated Recording Units (ARUs) in proposed breeding season research was mentioned for several SGCN. As methods advance, use of ARU technology may become more commonplace for monitoring species during migration as well.

Other recurring research needs included research on the effects of climate change, emerging diseases and pesticide use on bird populations. As appropriate, we will work with multi-state working groups, flyways and joint ventures on large scale research projects to address these topics.

Conservation Actions

Several conservation actions aimed at increasing habitat availability were included for numerous species, including the acquisition and protection of habitat and improved habitat management on public lands. In order to increase habitat availability on private lands, conservation actions were proposed including incentivizing habitat creation and management, educating private landowners on habitat needs and partnering with trade organizations and industry. Supporting broad initiatives that encourage overall ecosystem integrity were seldom included as conservation



Conservation efforts on the winter grounds can be directed using targeted information from research for a particular species or using combined range information for many species as shown in the above map produced by the Cornell Lab of Ornithology using eBird data, ebird.org/science/status-and-trends.

actions specific to a certain species, though we recognize their importance to bird habitat and will support them as appropriate (e.g. forest health and water quality initiatives).

Additional conservation actions were also included for several species which will focus more so on policy, public education, partnership or implementation of voluntary industry-related guidelines. These included actions related to reducing anthropogenic sources of mortality due to window and tower collisions, powerline electrocutions, feral cats, pesticides and other contaminants.

In order to consider the full life cycle of SGCN, conservation actions for neotropical migrants included funding conservation efforts on the winter grounds in Central and South America. Conservation efforts, funded and coordinated through Southern Wings, on migratory stopover sites and the nonbreeding grounds, work to curb threats to neotropical migrant species. This is achieved through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.

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Golden-winged Warbler Research and Management

Golden-winged warblers are small, vibrantly colored songbirds that breed in southeastern Kentucky, and winter in Central America and northern South America. They are named for the bright yellow patches on their wings, which contrast sharply with their slate gray backs and heads. Unfortunately, these birds are declining rapidly due to habitat loss, hybridization with blue-winged warblers, and other threats, making conservation efforts essential to their survival. As a result, golden-winged warblers are the focus of intensive research and conservation initiatives aimed at protecting their habitats, understanding their life history, and ensuring their continued existence in Kentucky.

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has participated in multiple research projects to better understand Kentucky's population of golden-winged warblers. KDFWR has conducted Golden-winged Warbler Atlas Project surveys since 2003. This survey was conceived to identify important populations of golden-winged warblers, measure population trends, and determine the range of acceptable habitats for the species. These surveys continue to take place yearly in Bell, Harlan, McCreary, Pike, and Whitley counties.

KDFWR has also deployed radio tags on golden-winged warblers to better understand the species' migratory routes, survival, and site fidelity. These tags are registered with the Motus network, so any tagged birds that comes into proximity of a Motus station will automatically be detected. This allows for KDFWR to learn more about the migratory routes and wintering grounds



Golden-winged Warbler tagged with a radio transmitter. Photo: Michael Patton

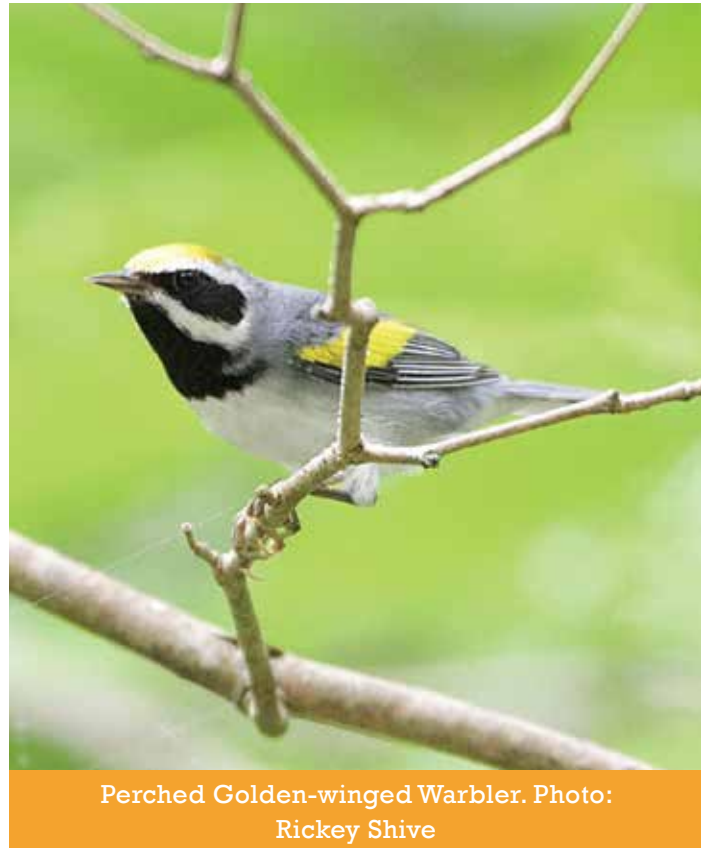


Perched Golden-winged Warbler. Photo: Greg Walker

that Kentucky's population of golden-winged warblers use and aid in conservation efforts in these areas.

These projects have allowed KDFWR to identify the areas of southeastern Kentucky that golden-winged warblers inhabit. Based on this information, the department is able to target areas with specific management practices to create habitat for the species. In 2022, 1,240 acres of land were burned with prescribed fire and an additional 2,000 acres experienced some other type of habitat management, such as foliar spraying of herbicide, in Kentucky's Appalachian region. A portion of this management took place in areas that were formerly inhabited by golden-winged warblers but are now devoid of the species due to habitat succession. The hope of this targeted management is for golden-winged warblers to return to the areas they formerly occupied.

To continue to conserve the golden-winged warbler, a multi-pronged approach is necessary. The continuation of research and monitoring projects, and habitat management to create and maintain early successional habitat are vital to this species' continued existence in the state of Kentucky. With sustained and coordinated conservation efforts, we can ensure the long-term survival of this unique and valuable species.



Perched Golden-winged Warbler. Photo:
Rickey Shive

BIRD PROFILE PAGES



Photo: John Collins



SHARP-SHINNED HAWK

(*Accipiter striatus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3B,S4N

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

- 🏠 Housing and Urban Areas
- 🪚 Logging and Wood Harvesting

Conservation Actions

- 🏠 Awareness and Communications
- 🪚 Habitat and Natural Process Restoration

Needs

Survey: Collect baseline species information

Conservation Goal

Improve habitat quality and availability on public lands.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Mesic Forest, Xeric Forest, Suburban

This species requires large tracts of mature forest with an evergreen component for nesting habitat. Natural stands of hemlock and pine, as well as introduced pine plantings provide nesting habitat. Winter occurrence is statewide in a wider variety of forested habitats (habitat generalist).

Range Map

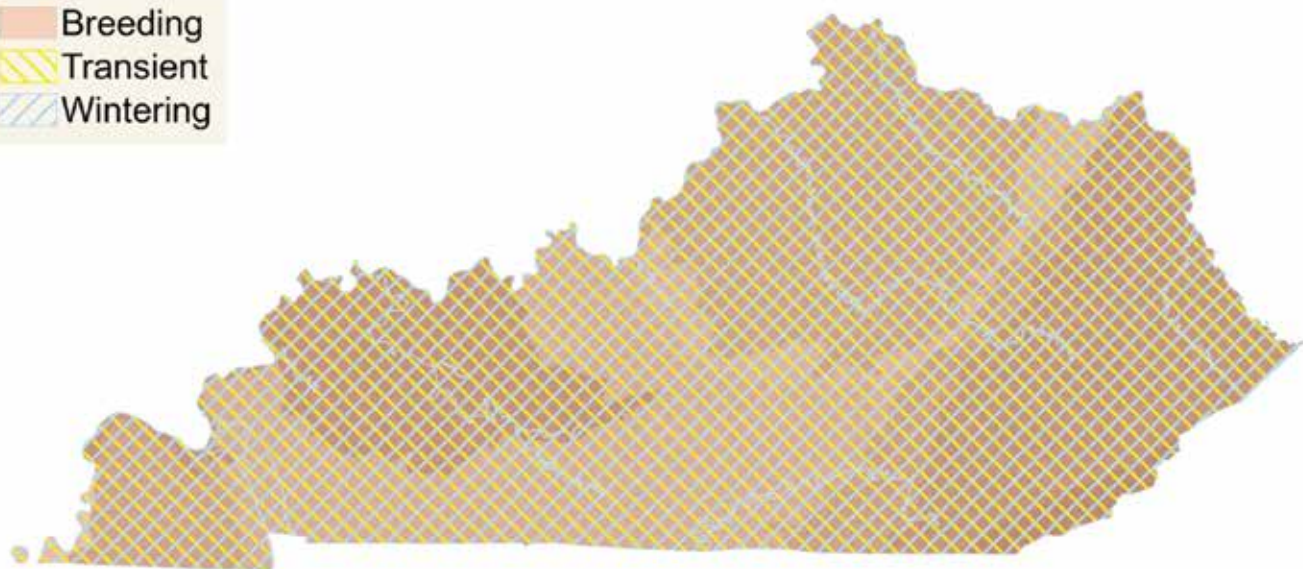







Photo: Jeff Sole



SPOTTED SANDPIPER

(*Actitis macularia*)

Threats

-  Agricultural and Forestry Effluents
-  Annual and Perennial Nontimber Crops
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications 
- Conservation Finance 
- Conservation Payments  
- External Capacity Building  
- Resource and Habitat Protection   
- Site/Area Management 
- Training 

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands. Fund conservation efforts on the wintering grounds.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar

This species uses shallow aquatic habitats including margins of streams and farm ponds and shores, mudflats and bars of larger lakes and rivers.

Range Map

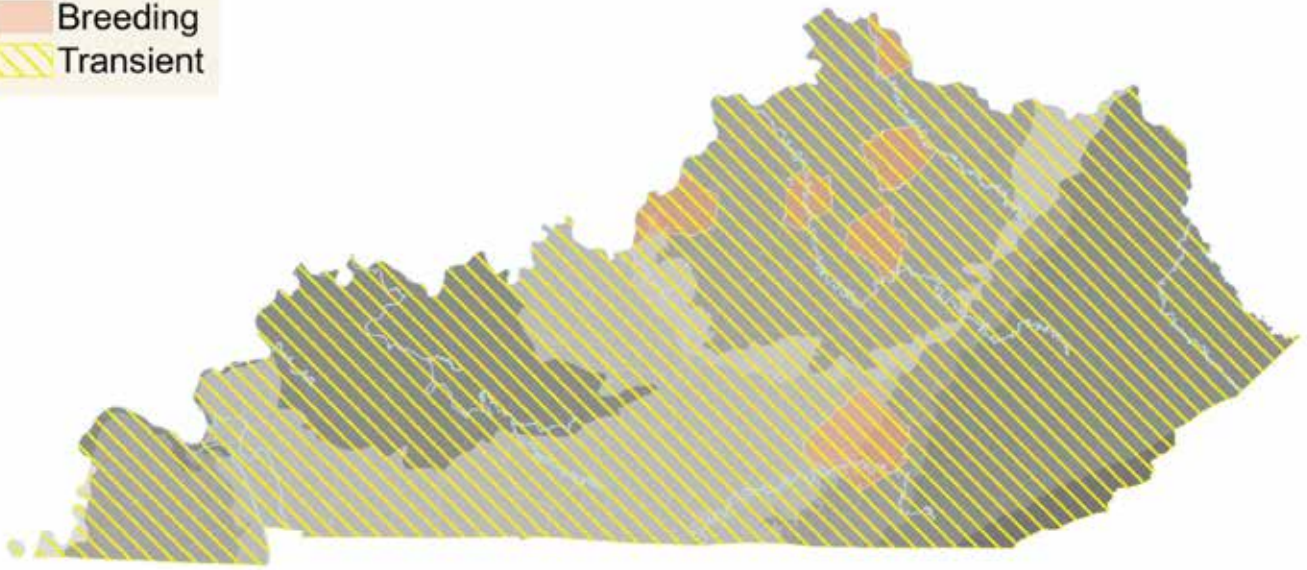





Photo: Mark Lowry



GRASSHOPPER SPARROW

(*Ammodramus savannarum*)

Threats

-  Annual and Perennial Nontimber Crops
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications  
- Conservation Payments 
- Education and Awareness 
- External Capacity Building 
- Resource and Habitat Protection 
- Training 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Analyze Data from Kentucky Quail Focal Areas Surveys

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S4B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve grassland habitat quality and availability on public and private lands. Conduct or support research on the effects of pesticide and fungicide use on bird populations.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River

Valley And Hills, Mississippi Alluvial Plain, Mississippi
Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture

This species occurs in grasslands that are dominated by relatively sparse or short vegetation, no scrub cover and often with some bare ground.

Consequently, they are most numerous in lightly grazed pastures, restored native grasslands with lower, more sparse vegetation, hayfields, reclaimed surface mines, and to a lesser extent fallow row-crop fields where grassy vegetation is beginning to recolonize.

Range Map

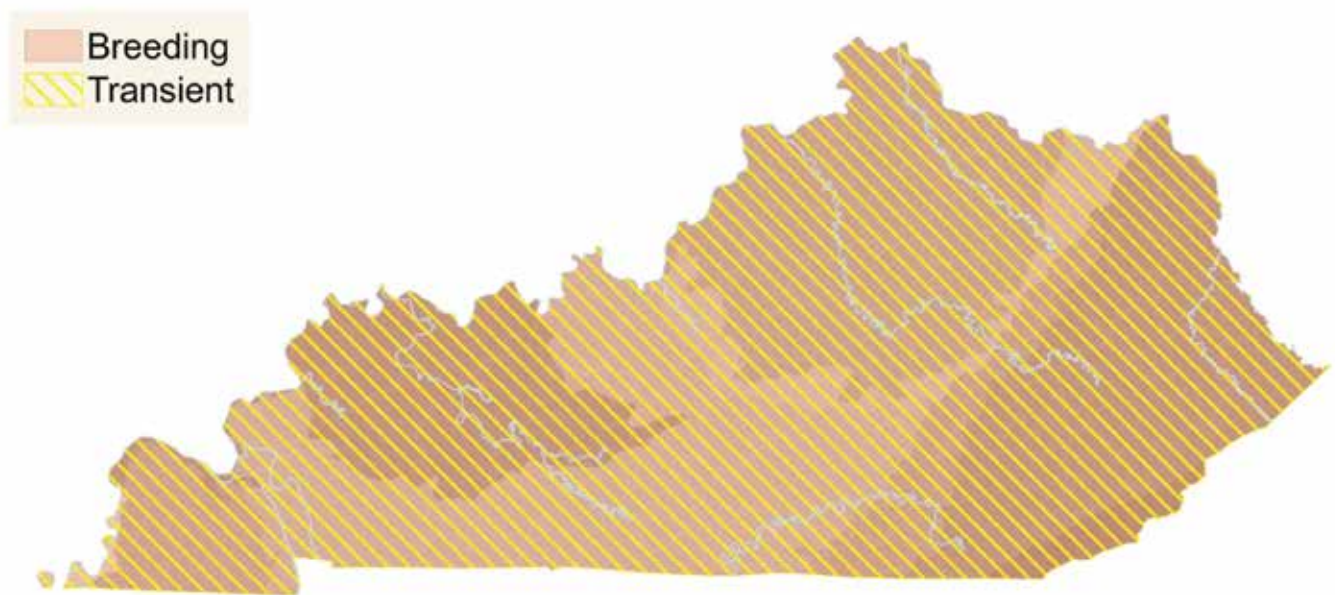
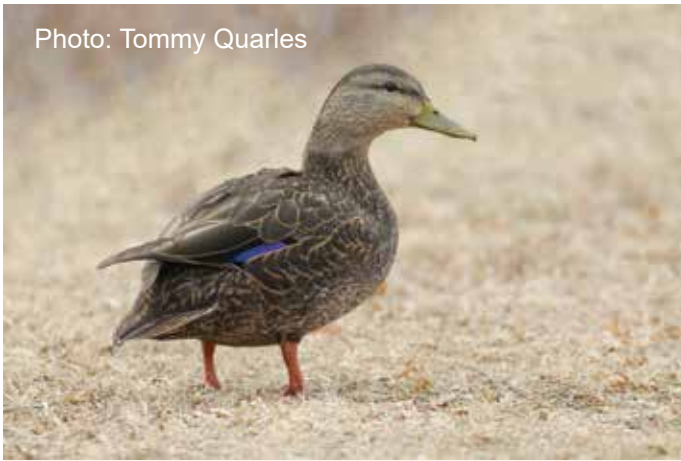


Photo: Tommy Quarles



AMERICAN BLACK DUCK

(*Anas rubripes*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S4N

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Continue to monitor for current and emerging disease-related threats. Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.





Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain



Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

This species primarily uses forested wetlands, buttonbush sloughs, flooded bottomland hardwoods, and beaver ponds. It will also use shallow water wetlands and flooded fields, and loaf on larger bodies of water.

Threats

-  Housing and Urban Areas
-  Pathogens and Microbes
-  Pollution
-  Problematic Native Species

Conservation Actions

- Education and Awareness 
- External Capacity Building 

Needs

Survey: Collect baseline species information

Research: Monitor the effects of Highly Pathogenic Avian Influenzas and other diseases on bird populations

Range Map

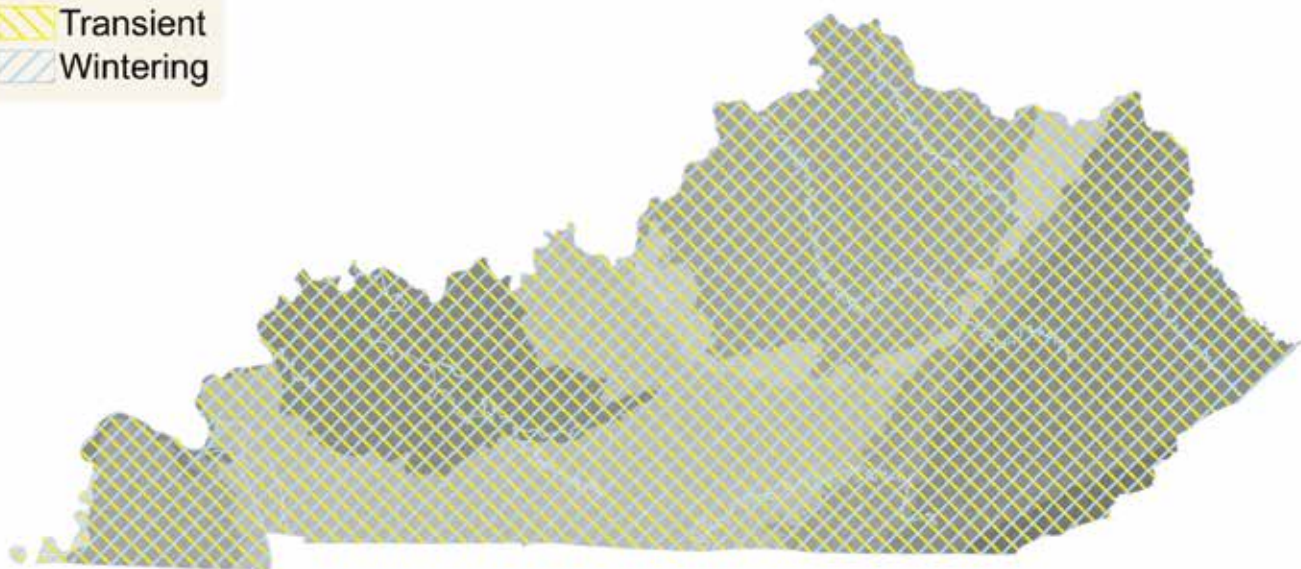


Photo: DJ McNeil



CHUCK-WILL'S-WIDOW

(*Antrostomus carolinensis*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S4S5B

Federal Status: N/A

IUCN Red List: NT - Near threatened

According to the North American Breeding Bird Survey, Chuck-will's-widow numbers declined by about 2.3% per year between 1966 and 2015, resulting in a cumulative decline of 69% rangewide. Cornell Lab of Ornithology lists this species as a common bird in steep decline. Kentucky survey data shows the species is no longer found in some areas where it had been during Kentucky's most recent Breeding Bird Atlas.

Conservation Goal





Improve woodland habitat quality and availability on public lands. Fund conservation efforts on the wintering grounds. Conduct research on life history, vital rates and beneficial habitat management actions for nightjars.

Habitat Associations







Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

Threats

-  Agricultural and Forestry Effluents
-  Fire and Fire Suppression
-  Invasive Non-native/Alien species
-  Other Ecosystem Modifications

Conservation Actions

- Awareness and Communications 
- Conservation Finance 
- Habitat and Natural Process Restoration 
- Policies and Regulations 
- Resource and Habitat Protection 
- Training 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Survey: Continue Kentucky nightjar survey

Research: Conduct or support research on the effects of pesticide use on bird populations

Research: Conduct research on life history, vital rates and beneficial habitat management actions for nightjars

Research: Support and Fund Expansion of the Motus Network in Kentucky

This species is found in areas with scattered tracts of forest, open woodlands, and forest edges and is usually absent in extensively forested areas. They are found more commonly in drier forests with an open mid and understory, especially in oak and hickory forests with scattered cedars or introduced pines.

Range Map

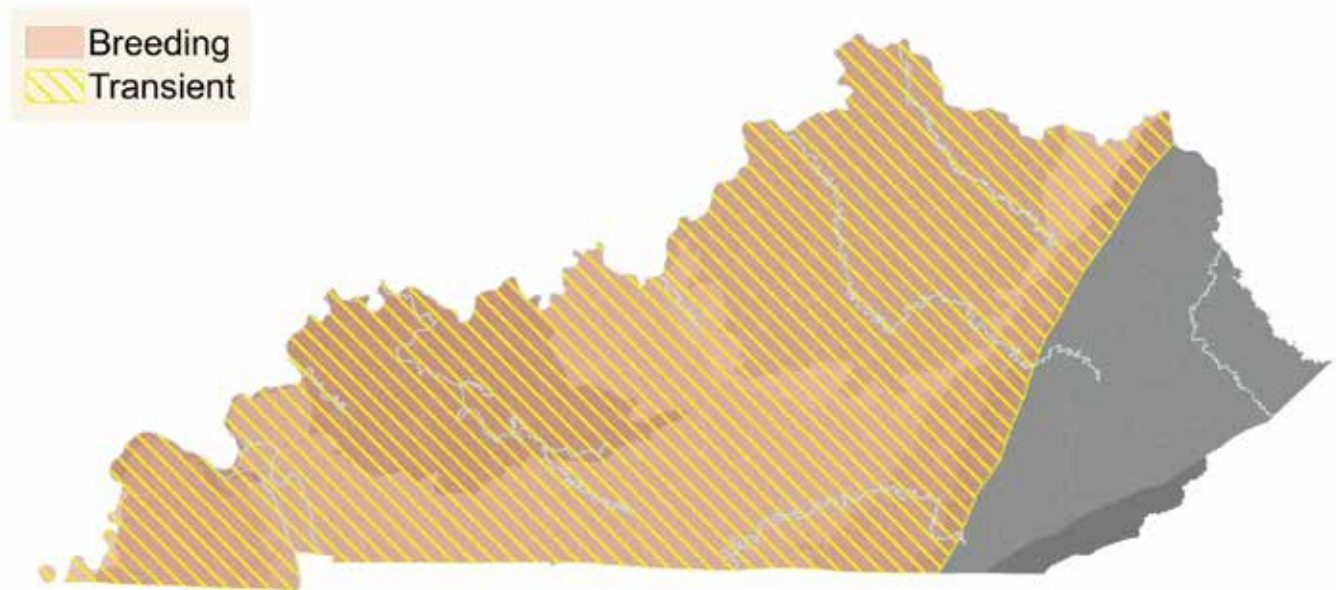




Photo: Debra

WHIP-POOR-WILL

(*Antrostomus vociferus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S5B

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Improve woodland habitat quality and availability on public and private lands. Fund conservation efforts on the wintering grounds. Conduct research on life history, vital rates and beneficial habitat management actions for nightjars.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Mesic Forest, Xeric Forest

This species occurs in woodlands and forests and is most abundant in areas of unfragmented forest, though a variety of stages of succession are needed within. Forest openings, logged areas, farm fields and forest edges are used for foraging. This species nests on the ground in dry upland forest or woodland, often choosing a site near to a forest edge.

Threats

- Agricultural and Forestry Effluents
- Invasive Non-native/Alien species
- Other Ecosystem Modifications

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Finance
- Conservation Payments
- Education and Awareness
- Habitat and Natural Process Restoration
- Invasive/Problematic Species Control
- Policies and Regulations
- Resource and Habitat Protection
- Training

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Survey: Continue Kentucky nightjar survey

Research: Conduct or support research on the effects of pesticide use on bird populations

Research: Conduct research on life history, vital rates and beneficial habitat management actions for nightjars

Research: Support and Fund Expansion of the Motus Network in Kentucky

Range Map

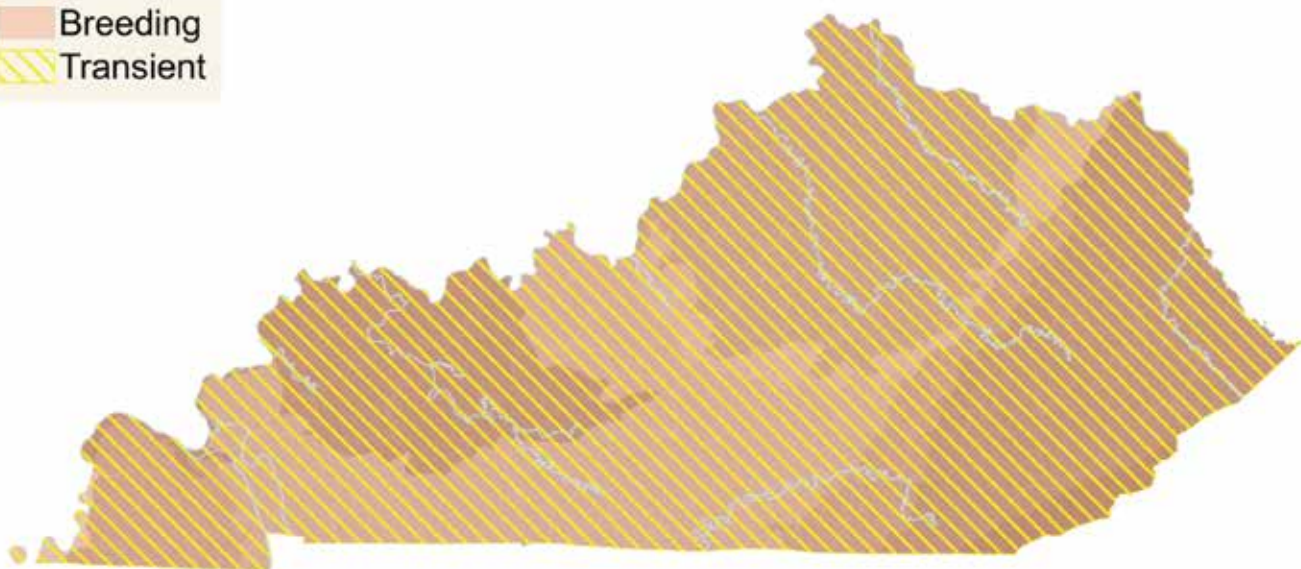


Photo: Hunter Wells



GREAT EGRET

(*Ardea alba*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S2B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Improve habitat quality and availability on public lands.







Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain





Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar

This species nests primarily in floodplain forests and bottomland hardwood forests, but will also nest and feed in association with reservoir habitat. They forage in a wide variety of wetland habitats, including marshes, swamps, streams, rivers, ponds, lakes, impoundments, ditches, and fish-rearing ponds.

Threats

-  Annual and Perennial Nontimber Crops
-  Logging and Wood Harvesting
-  Pollution
-  Problematic Native Species
-  Recreational Activities
-  Residential and Commercial Development

Conservation Actions

- Education and Awareness 
- External Capacity Building  
- Site/Area Protection 

Needs

Survey: Collect baseline species information

Range Map

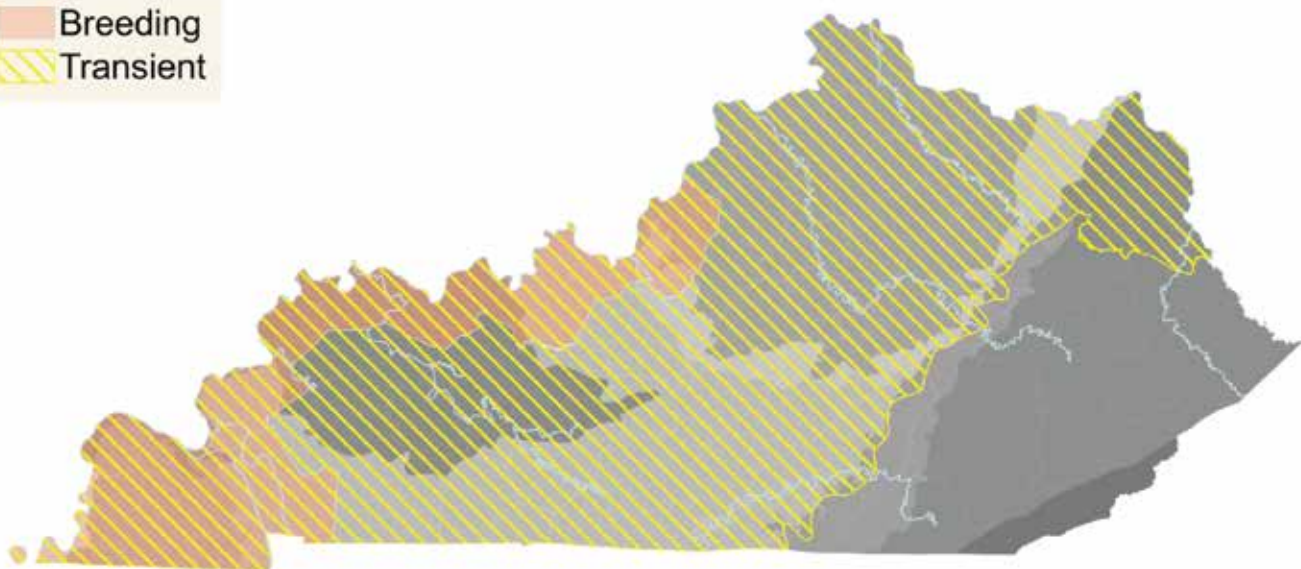






Photo: Ellis Laudermilk



SHORT-EARED OWL

(*Asio flammeus*)

Threats

-  Agricultural and Forestry Effluents
-  Climate Change and Severe Weather
-  Livestock Farming and Ranching
-  Residential and Commercial Development

Conservation Actions

- Awareness and Communications 
- Conservation Payments 
- External Capacity Building  
- Resource and Habitat Protection 
- Site/Area Management  
- Training  

Needs

Survey: Statewide Winter Survey

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1B,S2N

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve grassland habitat quality and availability on public and private lands. Reduce mortality caused by secondary rodenticide exposure.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture

This species is found most often in hayfields, pastures and reclaimed surface mines. Broad expanses of open land with low vegetation and high prey densities are required for foraging. Winter communal roost sites occur in habitat similar to foraging and are likely important.

Range Map

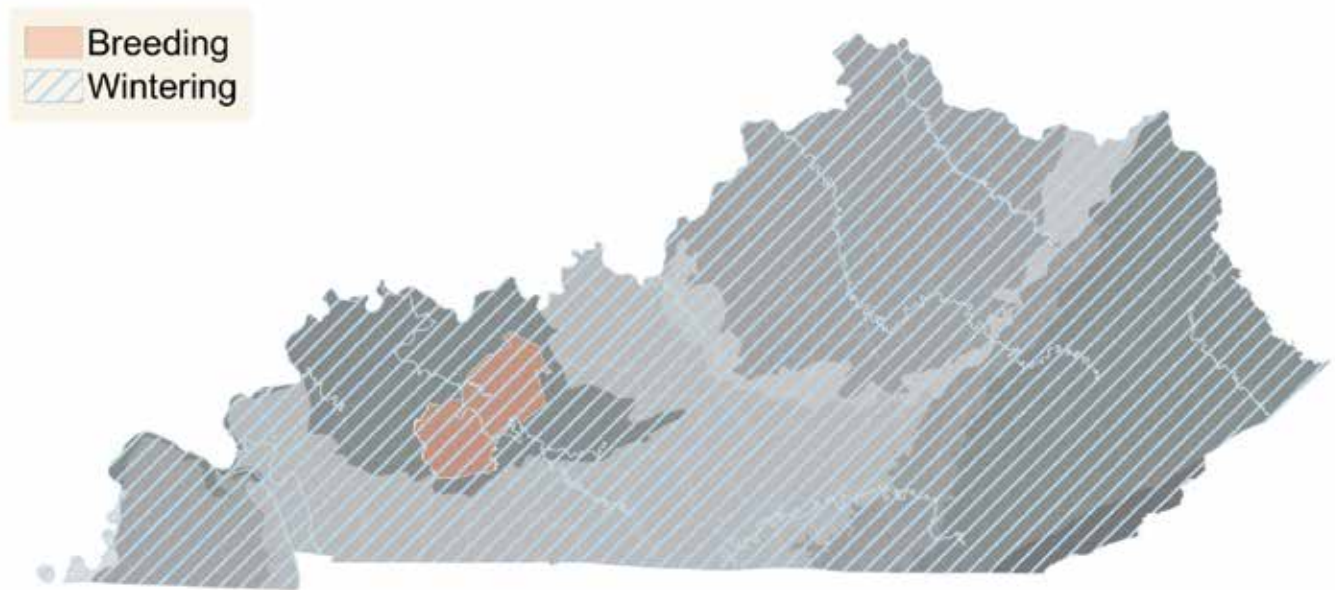


Photo: Rex Graham



LONG-EARED OWL

(*Asio otus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1B, S1S2N

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Improve habitat quality and availability on public lands.



Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior River Valley And Hills



Guilds: Grassland/Savannah, Scrub-Shrub/Early Successional Forest

This species is known to roost in evergreen trees during the day, in areas near to open habitats, including grassland, hayfield, pasture and reclaimed mineland.

Threats

-  Agricultural and Forestry Effluents
-  Logging and Wood Harvesting

Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration 

Needs

Survey: Collect baseline species information

Range Map

 Wintering

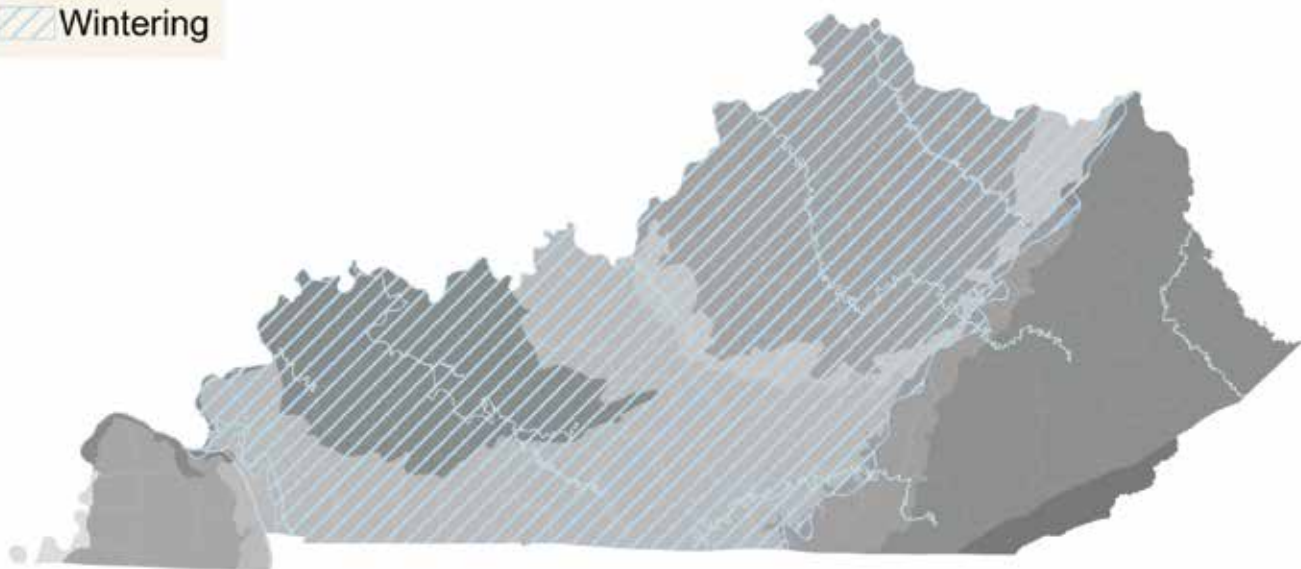


Photo: Rickey Shive



LESSER SCAUP

(*Aythya affinis*)

Conservation Profile

Priority Group: Moderate

KNP Info



G Rank: G5

S Rank: S4N

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Pathogens and Microbes
-  Pollution

Conservation Actions

Education and Awareness 

Needs

Survey: Collect baseline species information

Research: Monitor the effects of Highly Pathogenic Avian Influenzas and other diseases on bird populations

Conservation Goal

Continue to monitor for current and emerging disease-related threats. Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Lake/Pond, River/Streams

This species uses large lakes and rivers that remain ice-free during the winter.

Range Map

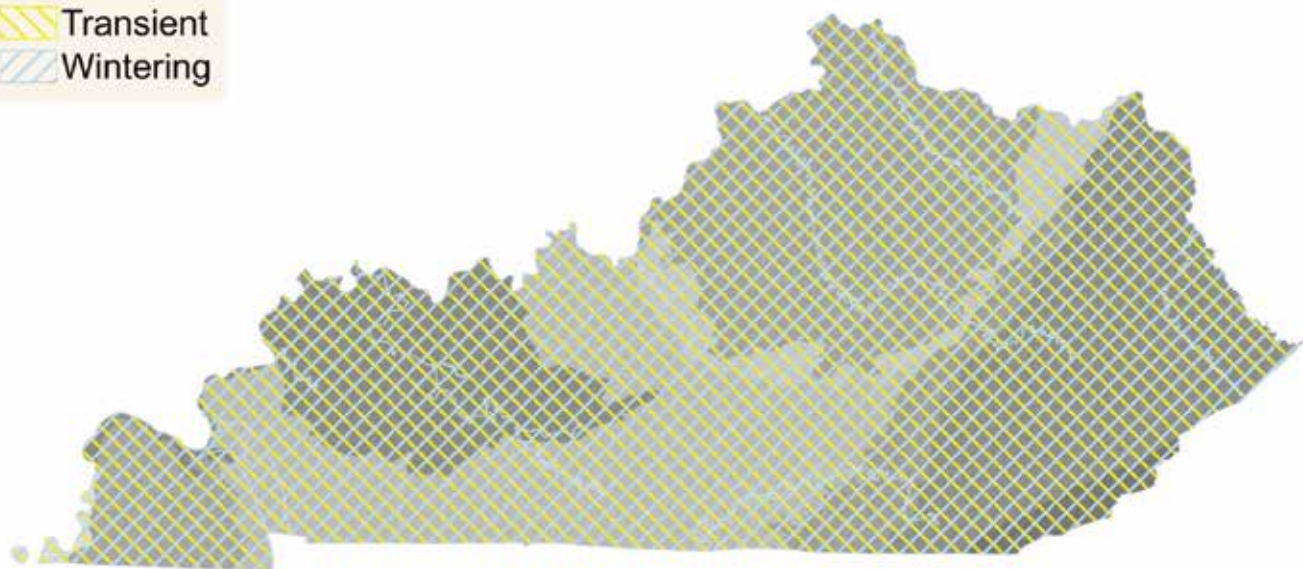


Photo: Jeff Sole



GREATER SCAUP

(*Aythya marila*)

Conservation Profile

Priority Group: Moderate

KNP Info



G Rank: G5

S Rank: S2S3N


Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Pathogens and Microbes
-  Pollution

Conservation Actions

Education and Awareness 

Needs

Survey: Collect baseline species information

Research: Monitor the effects of Highly Pathogenic Avian Influenzas and other diseases on bird populations

Conservation Goal

Continue to monitor for current and emerging disease-related threats. Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Lake/Pond, River/Streams

This species uses large lakes and rivers that remain ice-free during the winter.

Range Map

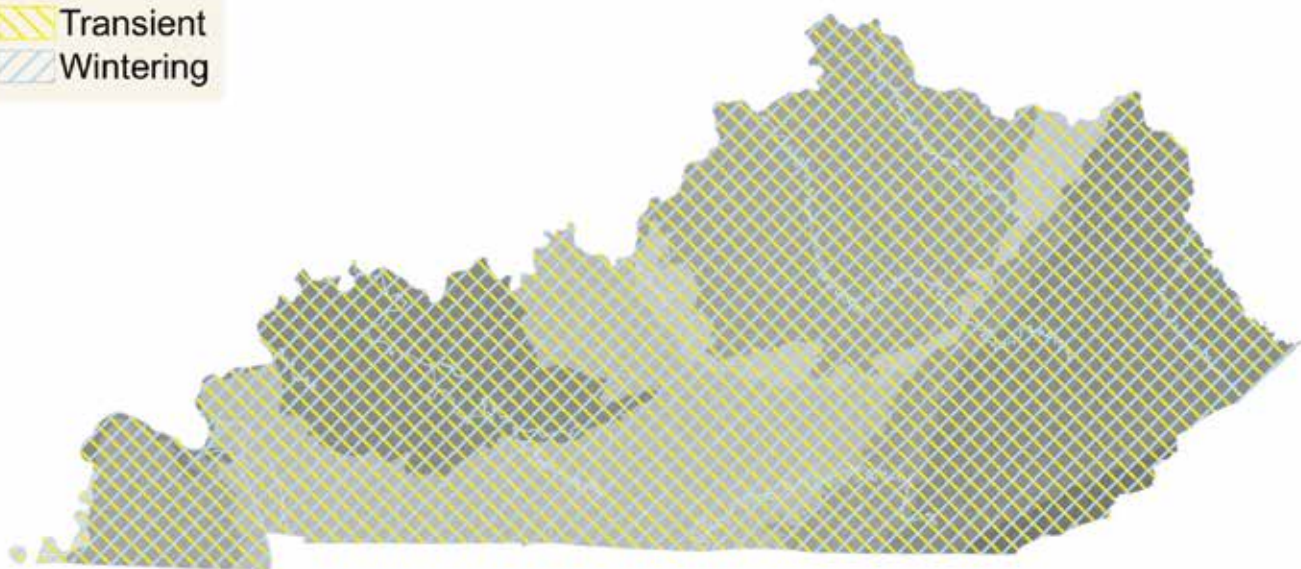




Photo: Don Pelly



UPLAND SANDPIPER

(*Bartramia longicauda*)

Threats

-  Agriculture and Aquaculture
-  Annual and Perennial Nontimber Crops

Conservation Actions

Conservation Finance 

Needs

Survey: Collect baseline species information

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SHB

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Fund conservation efforts on the wintering grounds.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Floodplain/Sandbar, Agriculture

This species uses cultivated fields, mowed hayfields, and pastures for migratory stopovers. Occasionally observed on mudflats and shorelines. Short vegetation seems to be preferred.

Range Map

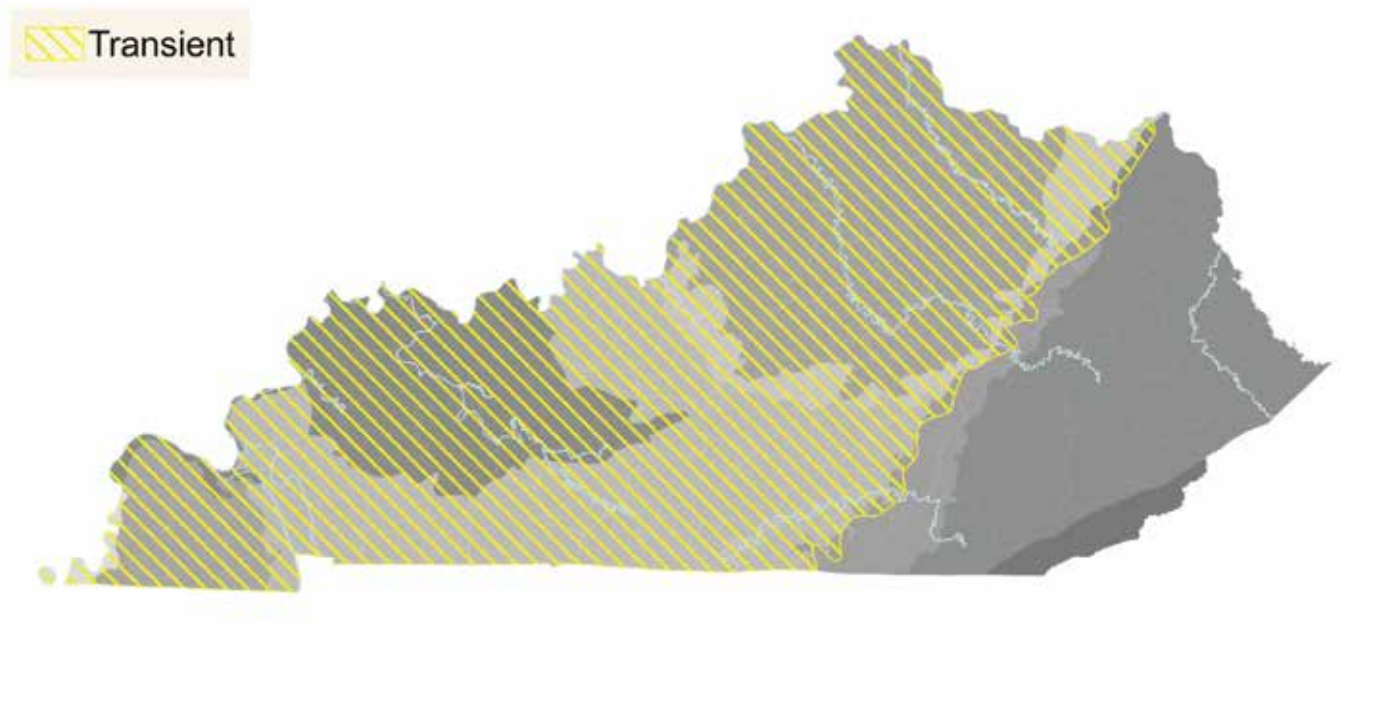


Photo: Joe Lacefield



RUFFED GROUSE

(*Bonasa umbellus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5




S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Abundance and population status for Ruffed Grouse vary considerably by region, with declining trends in eastern and southern portions of its range. In the eastern U.S., ruffed grouse abundance indices (e.g., Christmas Bird Count, USGS Breeding Bird Survey, state Breeding Bird Atlas projects, state grouse hunter-cooperator surveys) have declined 71% in the Southeast since 1989. In Kentucky, the spring drumming survey index declined 77% between 1996 and 2016, while the fall-winter hunter-cooperator survey index declined 71% between 2000-2019. Ruffed grouse population trends mirror those of young forest habitat availability. In Kentucky's ruffed grouse range, Forest Inventory Analysis data from the U.S. Forest Service indicate a 64% decline in young forest between 1975-2015.

Threats

-  Habitat Shifting and Alteration
-  Other Ecosystem Modifications
-  Pathogens and Microbes

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications 
- Conservation Payments 
- Education and Awareness 
- Habitat and Natural Process Restoration 
- Resource and Habitat Protection 

Needs

Survey: Monitor grouse population response to habitat improvement using Automated Recording Units

Research: Expand LiDAR analysis across grouse range in eastern Kentucky

Research: Research on vital rates and habitat use

Conservation Goal

Improve habitat quality and availability on public and private lands. Implement research on habitat use and ruffed grouse response to management.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs

Guilds: Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

Grouse occur only in predominately forested landscapes and are abundant only where early-successional, open-canopy forest is plentiful within a mosaic of older forest. They also utilize forests with rhododendron and mountain laurel, or shrubby mineland with dense autumn olive. Young forest stands (<15 years old) created by timber harvest, weather events, fire, mine reclamation, and old-field reversion provide ideal forest structure. Grouse rely on young forest for both cover and food, although they venture into mature forest to forage on hard and soft mast, ferns, and forbs.

Range Map

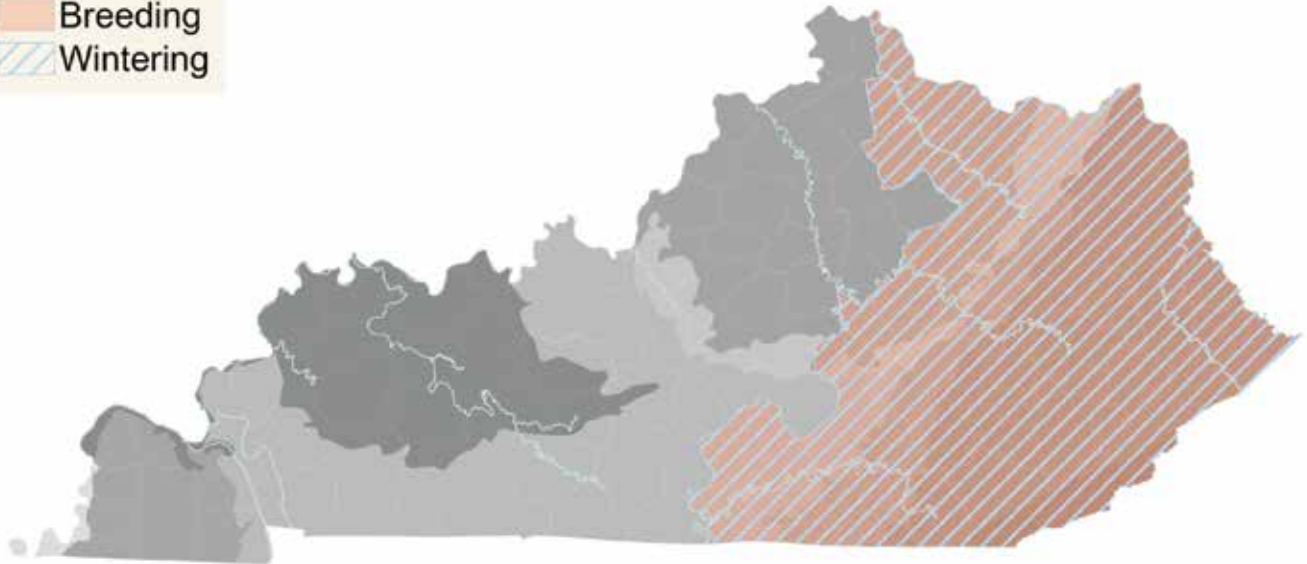


Photo: Lee Payne



AMERICAN BITTERN

(*Botaurus lentiginosus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SHB

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond

This species is found in freshwater wetlands with tall, dense emergent vegetation and patches of open water. It will also use lake and pond edges with cattails and sedges or wet areas in native grasslands adjacent to wetlands for stop over habitat.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Housing and Urban Areas
- Invasive Non-native/Alien species

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Payments
- External Capacity Building
- Habitat and Natural Process Restoration
- Invasive/Problematic Species Control
- Policies and Regulations
- Resource and Habitat Protection
- Training

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Range Map

 Transient



Photo: Jeff Sole



GREEN HERON

(*Butorides virescens*)

Conservation Profile

Priority Group: Moderate

KNP Info



G Rank: G5

S Rank: S4S5B





Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Livestock Farming and Ranching
-  Residential and Commercial Development

Conservation Actions

- Awareness and Communications 
- Conservation Payments  
- External Capacity Building 

Needs

Survey: Collect baseline species information

Conservation Goal

Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Improve habitat quality and availability on private lands.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Suburban

A generalist, this species can be found in riparian zones along creeks and streams, marshes, human-made ditches, canals, ponds, lake edges, open floodplains, backwater oxbow ponds, sloughs, mudflats, and ponds in parks and neighborhoods.

Range Map

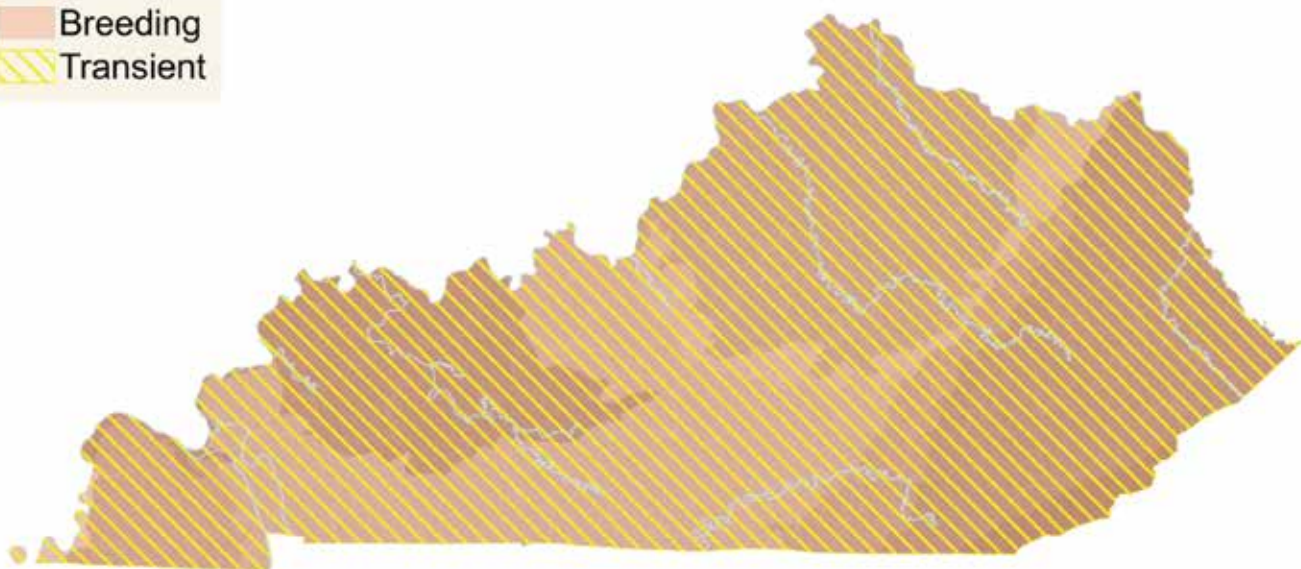


Photo: Hunter Wells



SANDERLING

(*Calidris alba*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain

Guilds: Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

During migration, habitat consists of flooded agricultural fields, margins of ponds, streams, and reservoirs.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Climate Change and Severe Weather
- Dams and Water Management/Use
- Hunting and Collecting Terrestrial Animals
- Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Payments
- External Capacity Building
- Resource and Habitat Protection
- Site/Area Management
- Training

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

Research: Support and Fund Expansion of the Motus Network in Kentucky

Range Map

 Transient

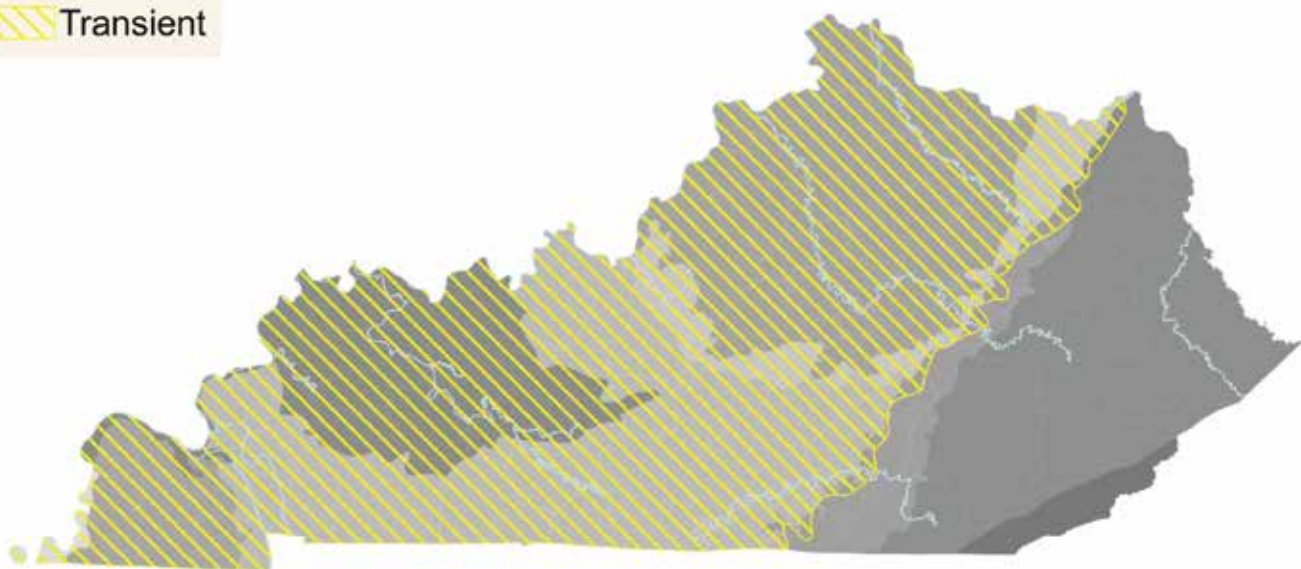


Photo: Rickey Shive



DUNLIN

(*Calidris alpina*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

Dunlin numbers are suspected to be in decline.

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands.





Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

This species uses shallow aquatic habitats including margins of streams and farm ponds and shores, mudflats and bars of larger lakes and rivers. Flooded agricultural fields are also used.

Threats

-  Annual and Perennial Nontimber Crops
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications 
- Conservation Payments  
- External Capacity Building  
- Resource and Habitat Protection   
- Site/Area Management 
- Training 

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

Research: Support and Fund Expansion of the Motus Network in Kentucky

Range Map

 Transient

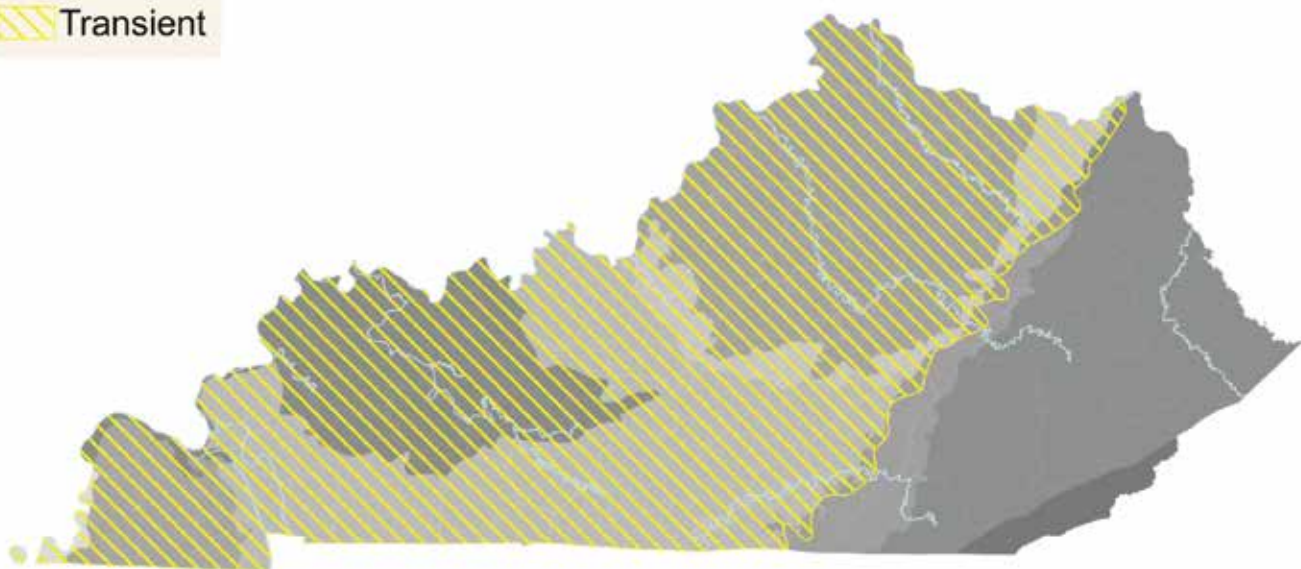


Photo: Jeff Sole



STILT SANDPIPER

(*Calidris himantopus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

Stilt Sandpiper populations may be declining, but the extent of the decline is unknown. Populations present in northern Canada were carefully studied from the 1960s to the present, and have apparently suffered from a proliferation of nesting Snow Geese, which degrade Stilt Sandpiper nesting habitat. The density of breeding pairs in that study declined by almost 90% over a 30-year period.

Conservation Goal






Improve shorebird habitat quality and availability on public and private lands. Fund conservation efforts on the wintering grounds.

Habitat Associations

Physiographic Regions: Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

Threats

-  Agricultural and Forestry Effluents
-  Annual and Perennial Nontimber Crops
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Hunting and Collecting Terrestrial Animals

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications 
- Conservation Finance 
- Conservation Payments  
- External Capacity Building 
- Resource and Habitat Protection  
- Site/Area Management 
- Training 

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

This species uses shallow aquatic habitats including margins of streams and farm ponds and shores, mudflats and bars of larger lakes and rivers. Flooded agricultural fields are also used.

Range Map

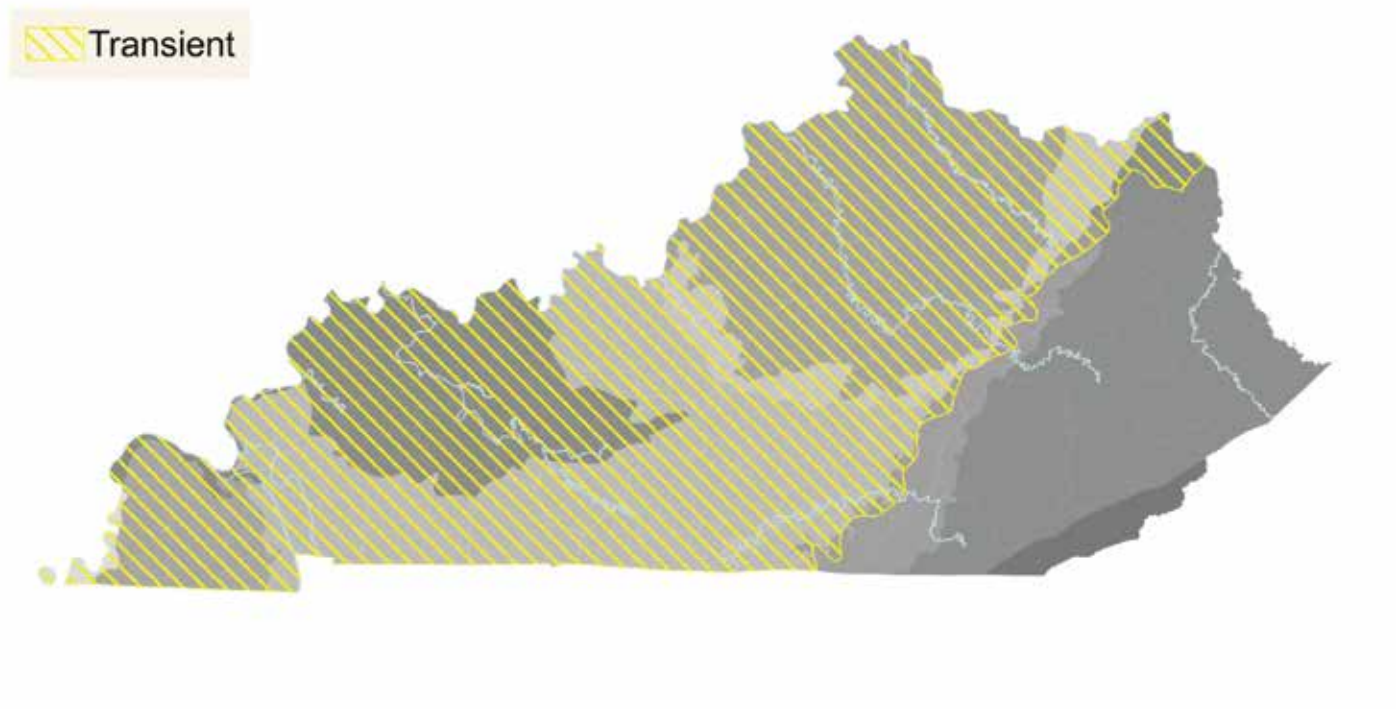


Photo: Rickey Shive



SEMIPALMATED SANDPIPER

(*Calidris pusilla*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands. Fund conservation efforts on the wintering grounds.







Habitat Associations

Physiographic Regions: Cumberland Plateau, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

This species uses shallow aquatic habitats including margins of streams and farm ponds and shores, mudflats, flooded agricultural fields and bars of larger lakes and rivers.

Threats

-  Agricultural and Forestry Effluents
-  Annual and Perennial Nontimber Crops
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Hunting and Collecting Terrestrial Animals
-  Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications 
- Conservation Finance 
- Conservation Payments  
- External Capacity Building  
- Resource and Habitat Protection   
- Site/Area Management  
- Training 

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

Research: Support and Fund Expansion of the Motus Network in Kentucky

Range Map

 Transient

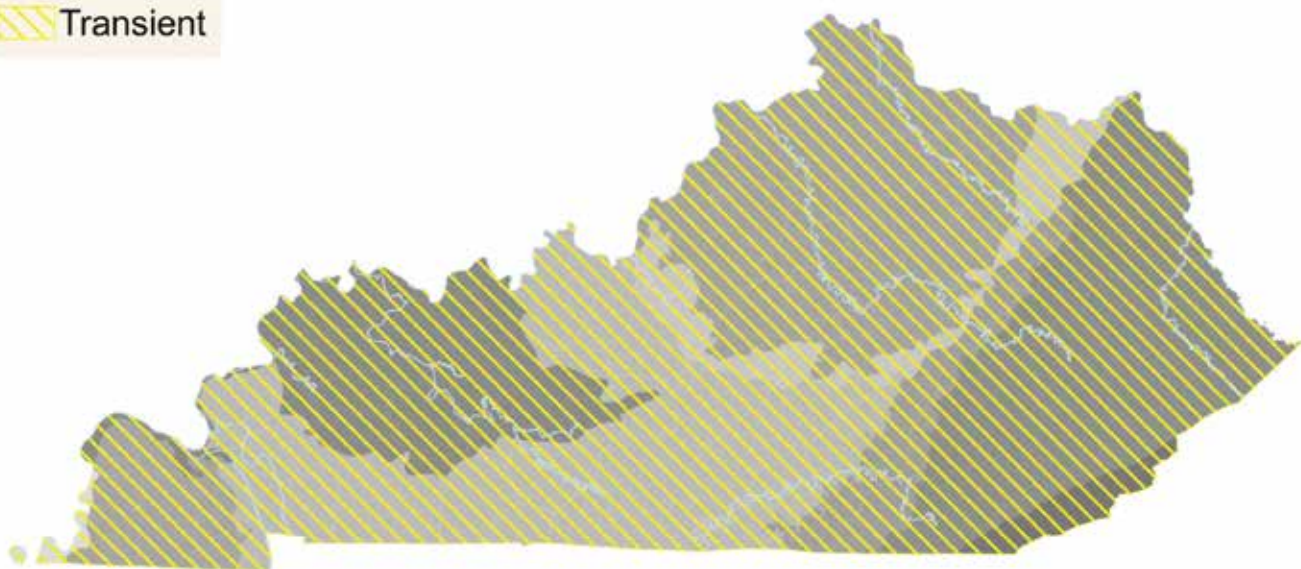


Photo: Jeff Sole



BUFF-BREASTED SANDPIPER

(*Calidris subruficollis*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4

S Rank: SNA

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

This species uses shallow aquatic habitats including margins of streams and shores, flooded agricultural fields, mudflats and bars of larger lakes and rivers. Short grassy fields may also be used.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Climate Change and Severe Weather
- Dams and Water Management/Use
- Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Payments
- External Capacity Building
- Resource and Habitat Protection
- Site/Area Management
- Training

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

Range Map

 Transient

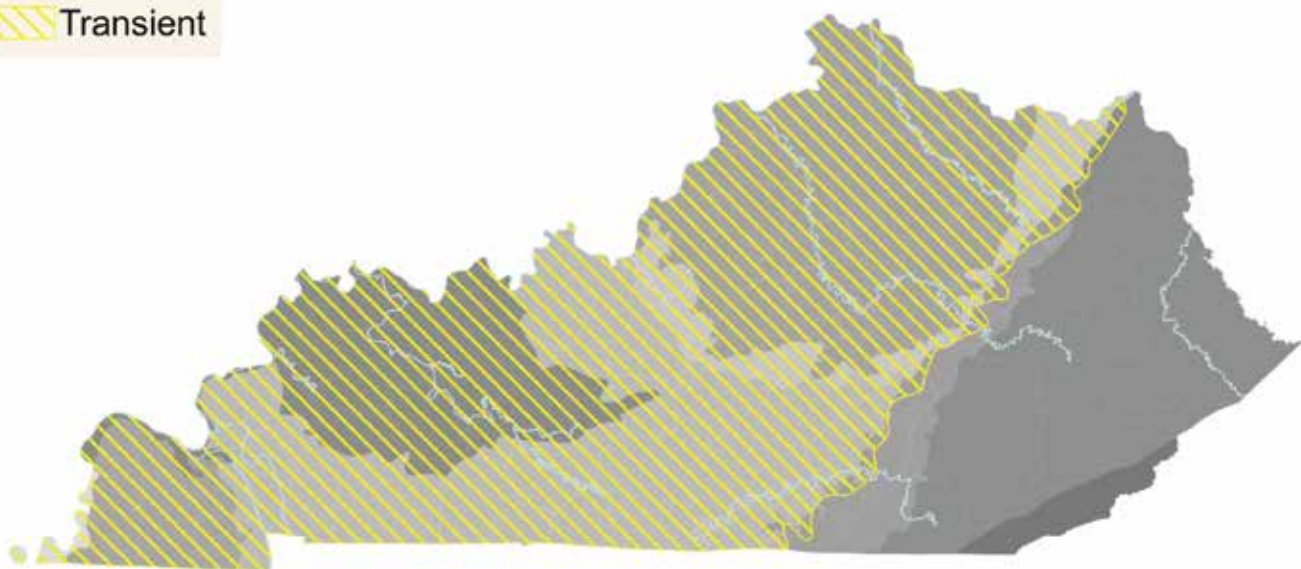


Photo: Rickey Shive



CANADA WARBLER

(*Cardellina canadensis*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Protect high quality nesting habitat and create stopover habitat throughout the state. Fund conservation efforts on the wintering grounds. Reduce the frequency of mortality events caused by collisions.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

This species nests in the higher elevations of the Cumberland Mountains in mesic forests with a dense understory of rhododendron or younger, cut-over forest. Migratory stop over habitat occurs statewide in a variety of forested and shrubby habitats.

Threats

- Invasive Non-native/Alien species
- Other Ecosystem Modifications
- Residential and Commercial Development
- Utility and Service Lines

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Finance
- Conservation Payments
- External Capacity Building
- Invasive/Problematic Species Control
- Resource and Habitat Protection

Needs

Survey: Collect baseline species information

Management: Collaborate with partners to create tower strike incidental take permit

Range Map

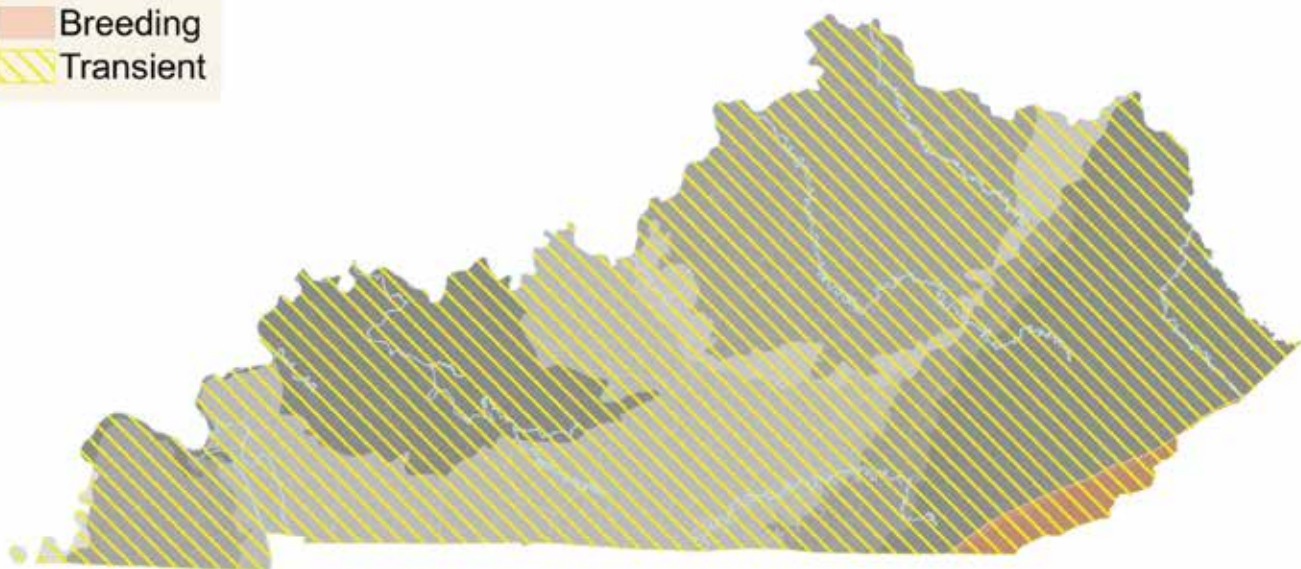








Photo: Mark Lowry



HENSLOW'S SPARROW

(*Centronyx henslowii*)

Threats

-  Agriculture and Aquaculture
-  Fire and Fire Suppression
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Other Ecosystem Modifications
-  Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development  
- Awareness and Communications  
- Conservation Finance 
- Conservation Payments  
- Education and Awareness 
- External Capacity Building 
- Resource and Habitat Protection 
- Training 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Analyze Data from Kentucky Quail Focal Areas Surveys

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Research: Support and Fund the Southern Grassland Bird Collaborative

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S3B

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Improve grassland habitat quality and availability on public and private lands. Conduct or support research on the effects of pesticide and fungicide use on bird populations.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture

This species nests in open habitats dominated by thick, grassy vegetation, including reclaimed surface mines, restored native grasslands, fallow fields, pastures, hayfields and other unmowed grassy habitats. The species favors areas that have not been disturbed for a year or two and have accumulated a layer of dead plant material at the base of the current year's growth.

Range Map

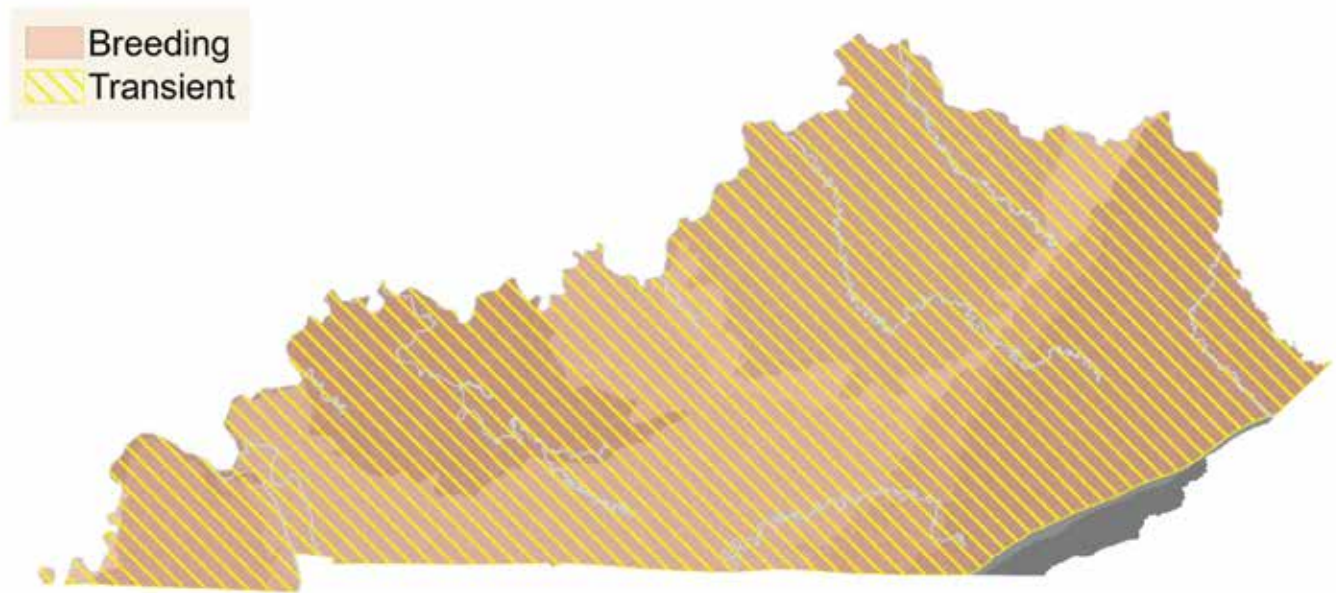


Photo: Rickey Shive



PIPING PLOVER

(*Charadrius melodus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G3

S Rank: SNA

Federal Status: Threatened

IUCN Red List: NT - Near threatened

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain

Guilds: Lake/Pond, River/Streams, Floodplain/Sandbar

This species uses shallow water wetlands, flooded agricultural fields, and shoreline, mudflat, and sandbar habitat of lakes and rivers.

Threats

- Climate Change and Severe Weather
- Dams and Water Management/Use
- Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Payments
- External Capacity Building
- Resource and Habitat Protection
- Site/Area Management
- Training

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

Research: Support and Fund Expansion of the Motus Network in Kentucky

Range Map

 Transient

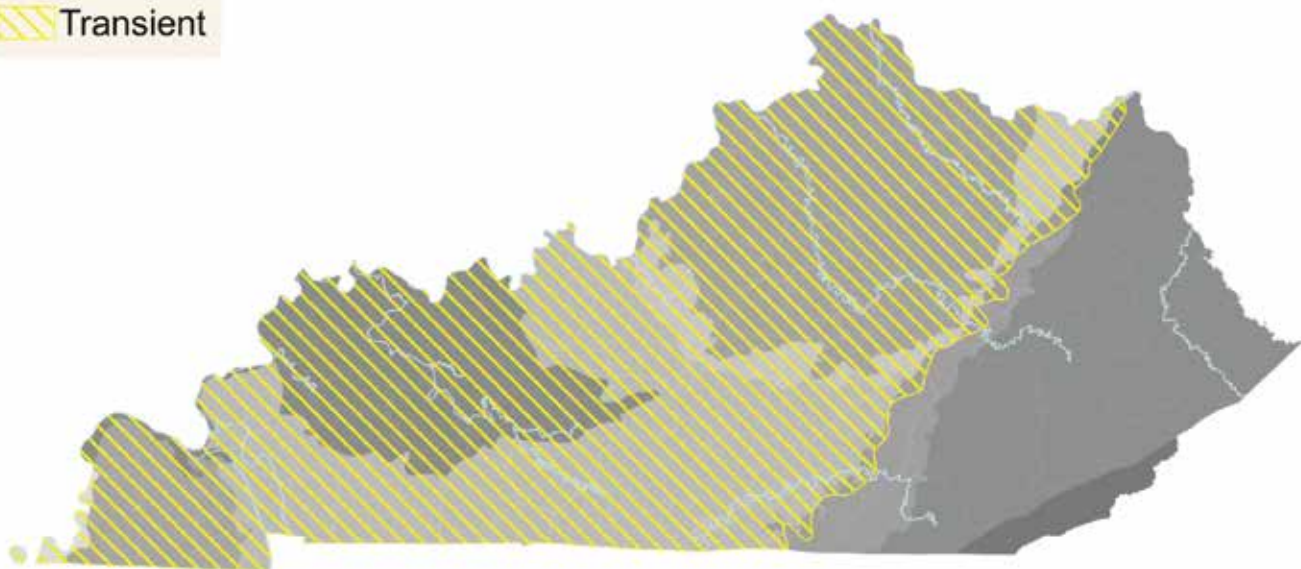


Photo: Rickey Shive



BLACK TERN

(*Chlidonias niger*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4G5

S Rank: SXB,S4N

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats



Pollution



Residential and Commercial Development

Conservation Actions

External Capacity Building

Needs

Survey: Collect baseline species information

Research: Support and Fund Expansion of the Motus Network in Kentucky

Conservation Goal

Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain

Guilds: Lake/Pond, River/Streams, Floodplain/Sandbar

During migration, this species frequents large lakes and rivers.

Range Map

 Transient



Photo: Mark Salsman



NORTHERN HARRIER

(*Circus hudsonius*)

Conservation Profile

Priority Group: Moderate

KNP Info




G Rank: G5

S Rank: S1S2B,S4N





Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Climate Change and Severe Weather
-  Fire and Fire Suppression
-  Livestock Farming and Ranching

Conservation Actions

- Land/Water Management 
- Resource and Habitat Protection  
- Site/Area Management 

Needs

Survey: Collect baseline species information

Conservation Goal

Acquire and protect high quality suitable habitat.
Improve habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Open Wetland, Agriculture

The species uses a wide variety of grassland, hayfield/pasture, reclaimed mineland, agricultural and marsh habitats during migration and winter. Nesting occurs on reclaimed mines while in the early stages of succession (grassland).

Range Map

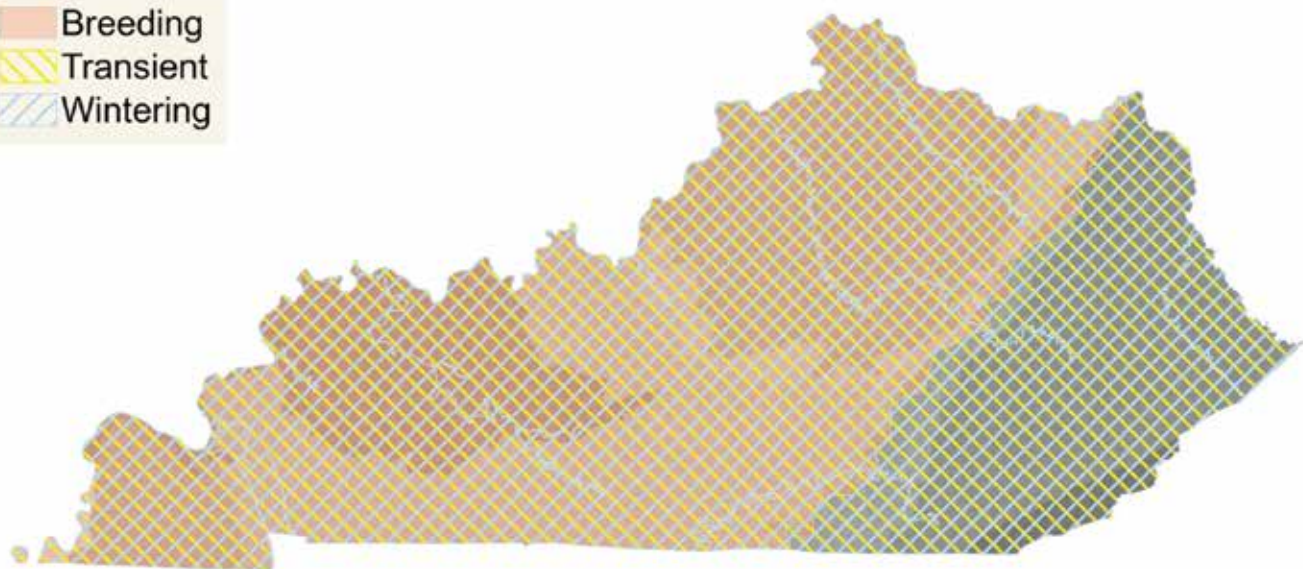


Photo: Jeff Sole



SEDGE WREN

(*Cistothorus stellaris*)

Conservation Profile

Priority Group: Moderate

KNP Info



G Rank: G5

S Rank: S3B

Federal Status: N/A

IUCN Red List: N/A

Threats

-  Annual and Perennial Nontimber Crops
-  Livestock Farming and Ranching

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications 
- External Capacity Building 
- Site/Area Management 
- Training 

Needs

Survey: Collect baseline species information

Conservation Goal

Improve grassland habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Open Wetland, Agriculture

This species is found in hayfields, overgrown pastures, and fallow fields and seems to prefer moist situations with an abundance of thick, herbaceous cover.

Range Map

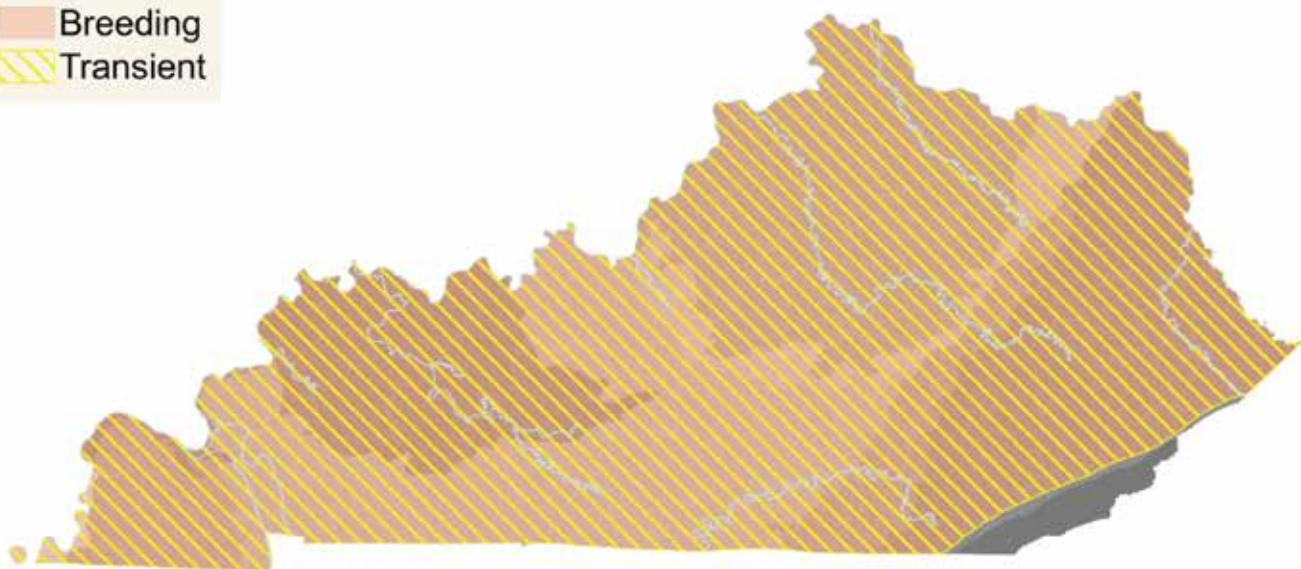







Photo: Mark Lowry






YELLOW-BILLED CUCKOO

(*Coccyzus americanus*)

Threats

-  Agriculture and Aquaculture
-  Habitat Shifting and Alteration
-  Residential and Commercial Development
-  Roads and Railroads
-  Utility and Service Lines

Conservation Actions

- Awareness and Communications  
- Conservation Payments 

Needs

Survey: Collect baseline species information

Research: Conduct research to identify causes of decline

Management: Work with partners to develop incidental take permits for tower strikes

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S5B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Conduct research to evaluate causes of decline.
Reduce frequency of collision caused mortality events.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

This species uses deciduous forest with a well developed midstory or early successional forest/shrubland for nesting habitat. It may use a variety of habitats during migration.

Range Map

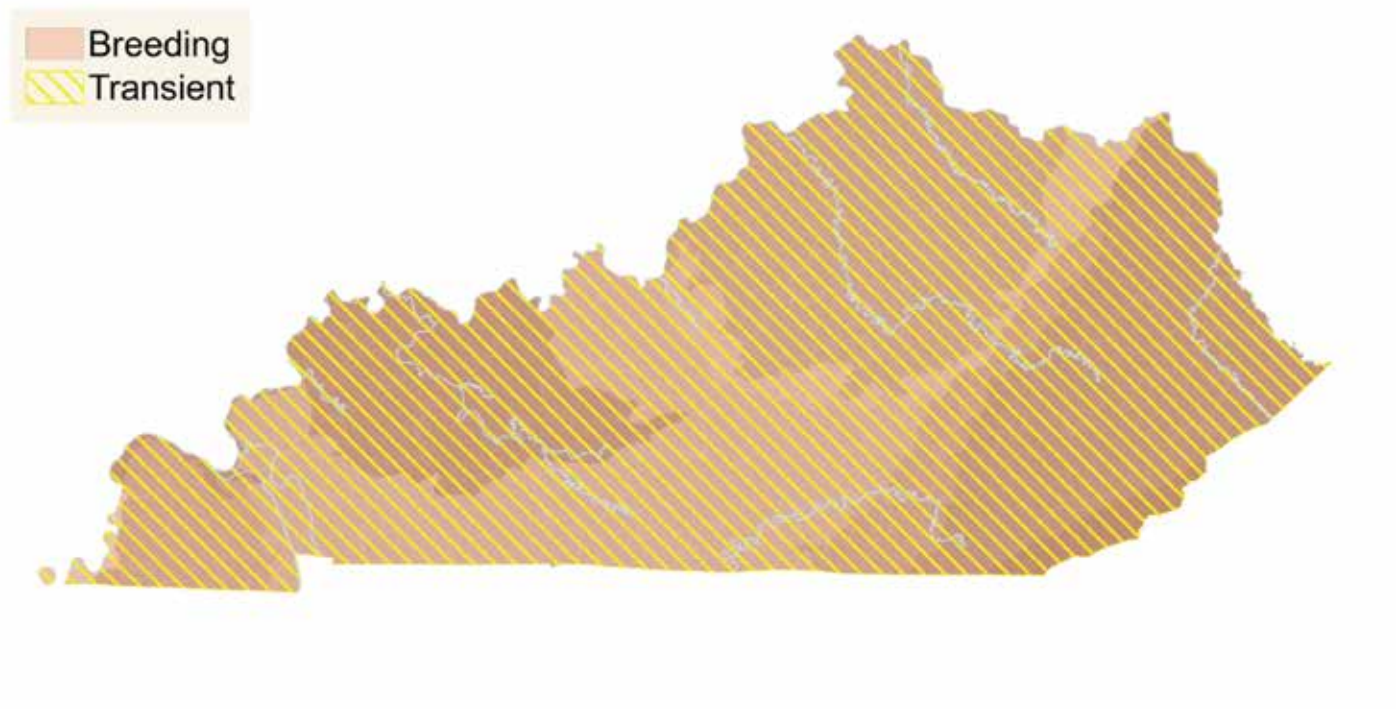


Photo: Mark Lowry



NORTHERN BOBWHITE

(*Colinus virginianus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4G5

S Rank: S4

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Improve grassland and shrubland habitat quality and availability on public and private lands. Monitor response to management at the landscape scale.






Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture, Scrub-Shrub/Early Successional Forest

This species uses grasslands, reclaimed surface mines, and open woodland/savannah with a well-developed herbaceous understory. Northern bobwhite can also be numerous in rural farmland that has a good supply of fencerows, brushy borders, and other patches of dense cover. Bare ground is an important habitat component, as well as shrub cover and/or woody edges.

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Temperature Extremes

Conservation Actions

- Alliance and Partnership Development   
- Awareness and Communications 
- Conservation Payments 
- Education and Awareness   
- Resource and Habitat Protection 
- Training  

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Survey: Monitor response at the landscape scale

Research: Analyze data from Kentucky Quail Focal Areas Surveys

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Research: Create a better understanding of landowner adoption of conservation practices

Research: Research on the carbon storage and sequestration potential of grasslands

Research: Support and fund the Southern Grassland Bird Collaborative

Range Map

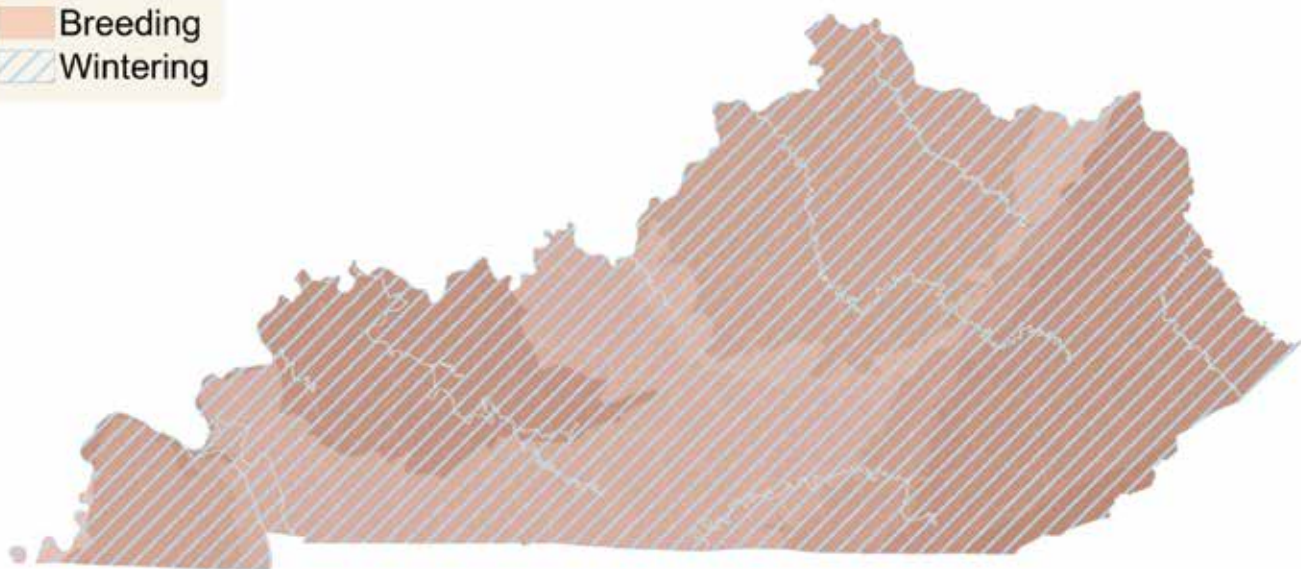


Photo: Tommy Quarles



COMMON RAVEN

(*Corvus corax*)

Conservation Profile

Priority Group: Moderate

KNP Info




G Rank: G5

S Rank: S1S2


Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Hunting and Collecting Terrestrial Animals
-  Pathogens and Microbes
-  Roads and Railroads

Conservation Actions

Alliance and Partnership Development 

Needs

Survey: Collect baseline species information

Conservation Goal

Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Avoid disturbance and destruction of known nest sites.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Interior Plateau

Guilds: Cliff/Rockshelter, Mesic Forest, Xeric Forest

This species primarily uses remote areas in eastern Kentucky where they can be found nesting on clifflines and exposed rock outcrops. In recent years, ravens have been documented nesting on manmade structures at a few sites in eastern Kentucky.

Range Map

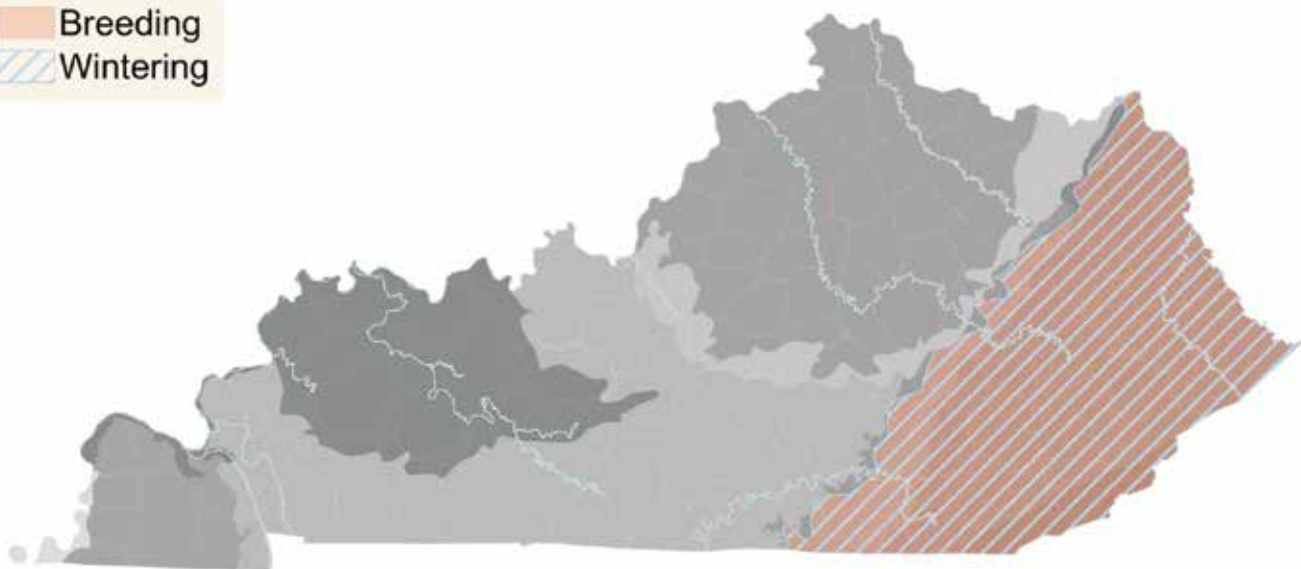


Photo: Jeff Sole



TRUMPETER SWAN

(*Cygnus buccinator*)

Conservation Profile

Priority Group: Moderate

KNP Info




G Rank: G4

S Rank: SNA



Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Invasive Non-native/Alien species
-  Pathogens and Microbes
-  Pollution

Conservation Actions

- Education and Awareness 
- Policies and Regulations 

Needs

Survey: Collect baseline species information

Research: Monitor the effects of Highly Pathogenic Avian Influenzas and other diseases on bird populations

Conservation Goal

Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Continue to monitor for current and emerging disease-related threats. Evaluate methods to reduce instances of lead poisoning.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar

This species that uses shallow water wetlands with submerged vegetation as well as larger lakes, rivers, reservoirs and ponds.

Range Map

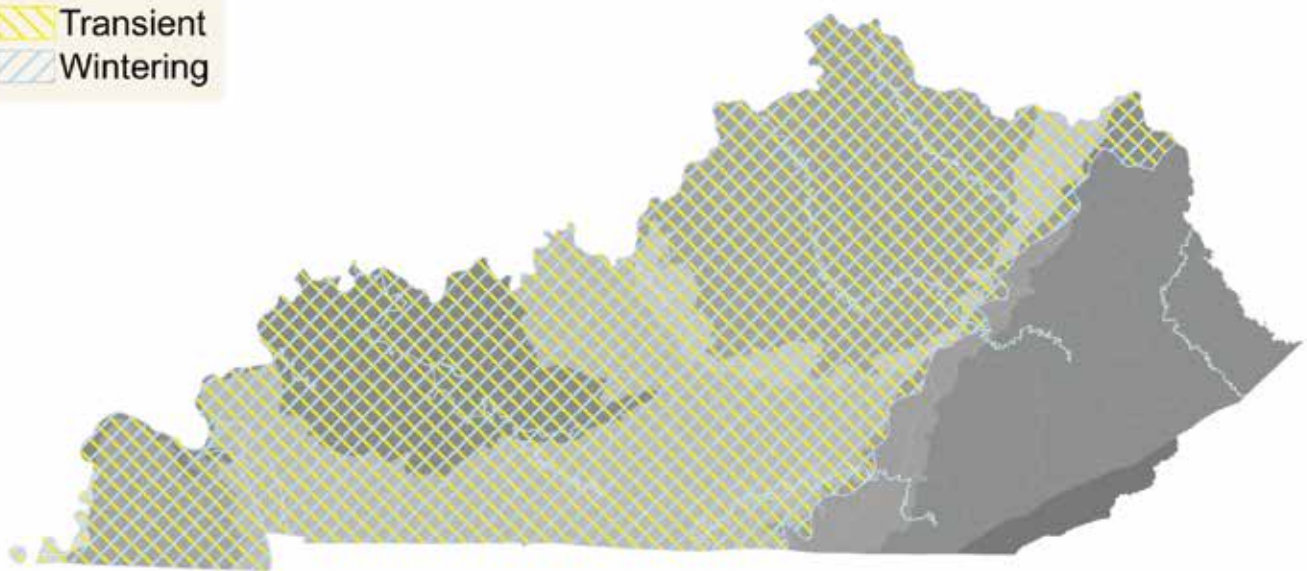





Photo: Mark Lowry



BOBOLINK

(*Dolichonyx oryzivorus*)

Threats

-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Other Ecosystem Modifications

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications  
- Conservation Finance 
- Conservation Payments 
- Resource and Habitat Protection 
- Training 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S2S3B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve grassland habitat quality and availability on public and private lands. Conduct or support research on the effects of pesticide and fungicide use on bird populations. Fund conservation efforts on the wintering grounds.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture

This species nests in a variety of grassy habitats including hayfields, pastures, and other infrequently mowed fields of grasses and forbs. Very open situations seem to be favored.

Range Map

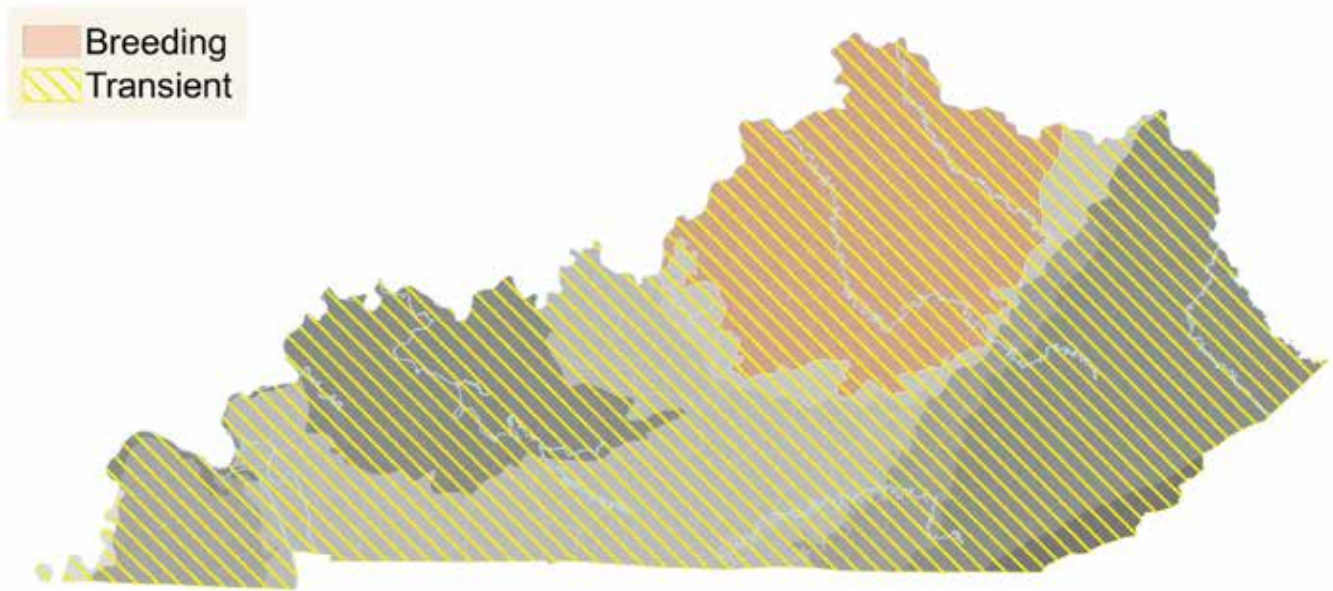


Photo: Tommy Quarles



RED-COCKADED WOODPECKER

(*Dryobates borealis*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G3

S Rank: SX

Federal Status: Endangered

IUCN Red List: NT - Near threatened

Threats

 Natural System Modifications

Conservation Actions

Habitat and Natural Process Restoration 

Needs

Survey: Collect baseline species information

Conservation Goal

Coordinate with state and federal biologists and foresters to look for opportunities for open pine habitat restoration within the historic range of this species.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment

Guilds: Mesic Forest, Xeric Forest

This once resident species inhabited open, mature pine habitats including shortleaf, pitch, and Virginia pines usually 80+ years old. Such mature pine or mixed pine-hardwood forest habitat is currently in poor condition due to damage by the southern pine bark beetle in 2000.

Range Map

 Historic Only

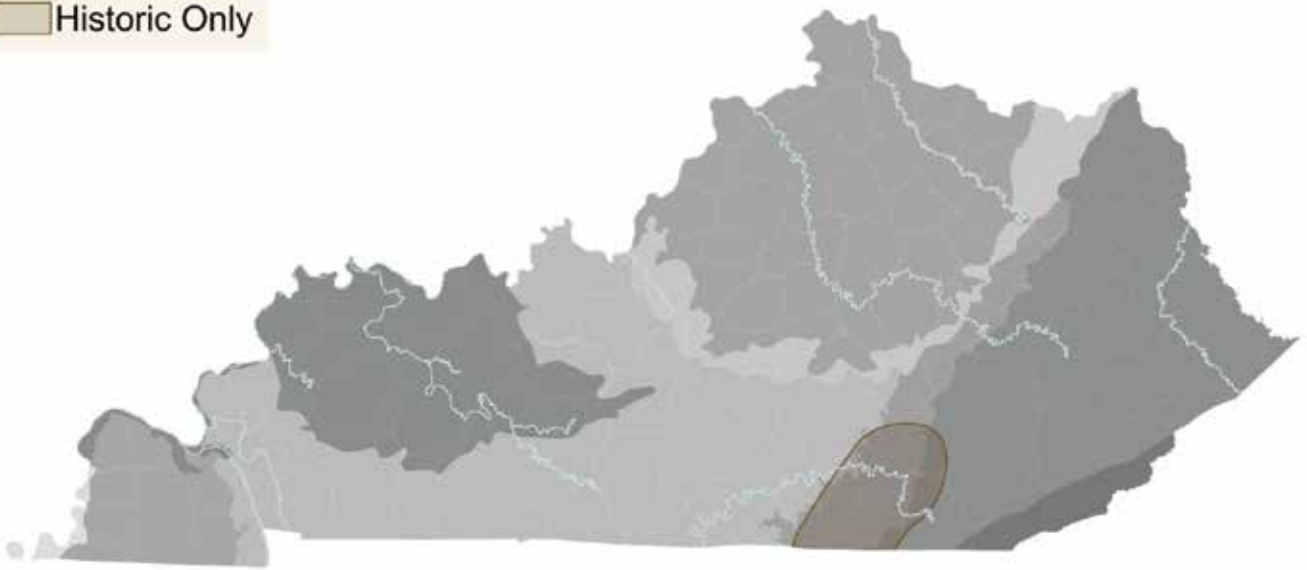


Photo: Rickey Shive



LEAST FLYCATCHER

(*Empidonax minimus*)

Conservation Profile

Priority Group: Moderate

KNP Info




G Rank: G5

S Rank: S1B





Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Fire and Fire Suppression
-  Other Ecosystem Modifications
-  Residential and Commercial Development

Conservation Actions

- Awareness and Communications 
- Conservation Finance 
- Conservation Payments 
- External Capacity Building 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Conservation Goal

Fund conservation efforts on the wintering grounds.
Reduce frequency of collision caused mortality events.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Scrub-Shrub/Early Successional Forest

During the nesting season, this species uses early successional forest, open woodland, brushy areas, thinned woodland, deciduous scrub, and forest edge at Black Mountain. The species occurs during migration statewide in similar habitats.

Range Map

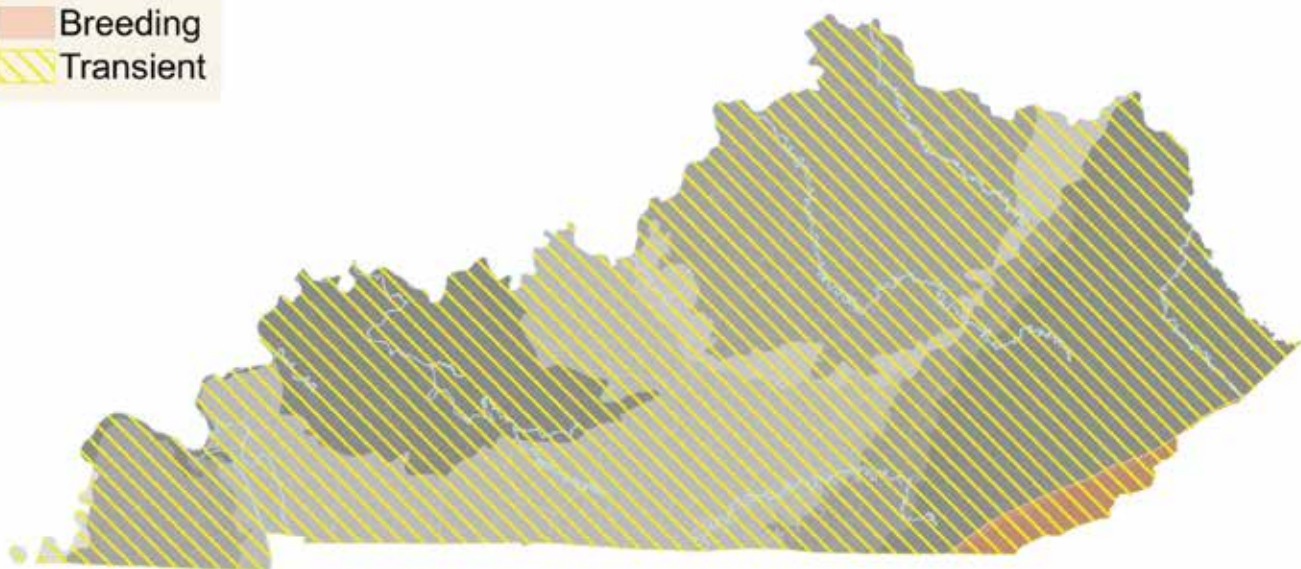


Photo: Mark Lowry



WILLOW FLYCATCHER

(*Empidonax traillii*)

Threats

- Invasive Non-native/Alien species
- Livestock Farming and Ranching
- Other Ecosystem Modifications
- Residential and Commercial Development

Conservation Actions

- Awareness and Communications
- Conservation Finance
- Conservation Payments
- External Capacity Building
- Site/Area Management
- Training

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3S4B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve shrubland habitat quality and availability on public and private lands. Fund conservation efforts on the wintering grounds. Reduce frequency of collision caused mortality events.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Open Wetland, Lake/Pond, River/Streams, Scrub-Shrub/Early Successional Forest

This species occurs in a variety of early successional habitats including patches of young trees along open stream corridors or in marshy areas, and sometimes in drier areas, such as in old fields regenerating from past agricultural use.

Range Map

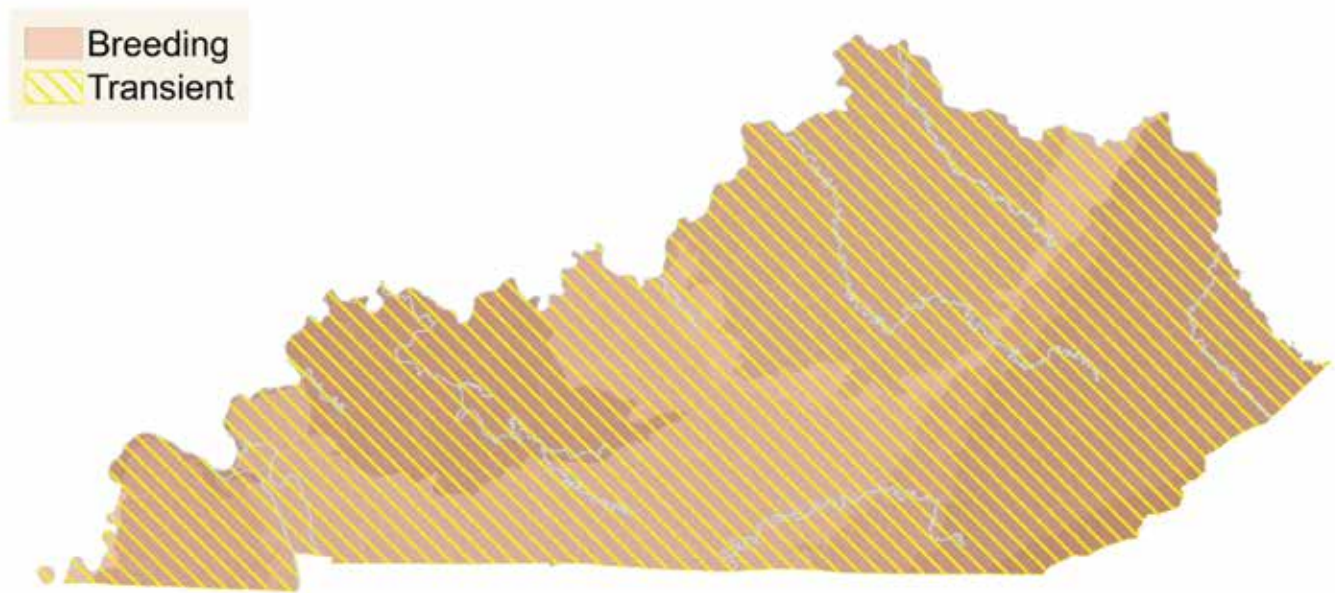


Photo: Gerhard Hofmann



© G.Hofmann & C. Mettke-Hofmann

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4

S Rank: S3S4N

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Protect and improve quality habitat in bottomland hardwood and riparian forests. Reduce the frequency of mortality events caused by collisions.




Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

RUSTY BLACKBIRD

(*Euphagus carolinus*)

Threats

-  Annual and Perennial Nontimber Crops
-  Pollution
-  Utility and Service Lines

Conservation Actions

- Awareness and Communications 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Research: Conduct or support research on the effects of pesticides and other contaminants on bird populations

Research: Conduct research to identify causes of decline

Research: Support and Fund Expansion of the Motus Network in Kentucky

Management: Collaborate with partners to create tower strike incidental take permit

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

This winter species is usually encountered in swampy woods, stream and pond margins, feedlots, agricultural fields and a variety of other habitats, as long as puddled water is present. Rusty blackbirds are more numerous in the western portion of the state, but can also be found in central and eastern Kentucky. This species eats a lot of aquatic invertebrates, but small-seeded acorns (e.g. water oak) and pecans are also important winter food sources and seeds and berries may be an important food source during fall migration.

Range Map



Photo: Thom Barnell



PEREGRINE FALCON

(*Falco peregrinus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4

S Rank: S1B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Continue to monitor for current and emerging disease-related threats. Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.




Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain





Guilds: Cliff/Rockshelter, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture, Urban, Suburban

The species nests at selected locations in the state, the majority of which are near the Ohio and Kentucky Rivers. The historic habitat of this species included cliffs along the Cumberland Mountains and Cumberland Plateau, and bluffs along the Kentucky and Ohio Rivers. Current nesting habitat includes bridges, smokestacks at powerplants, and tall buildings, as well as natural and manmade cliffs. Many nests are in nest boxes managed by the

Threats

-  Pathogens and Microbes
-  Pollution
-  Work and Other Activities

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications 
- Education and Awareness 
- Policies and Regulations 

Needs

Survey: Collect baseline species information

Research: Monitor for the effects of Highly Pathogenic Avian Flu and other diseases

Research: Monitor for the effects of the disease Trichomoniasis on nestling survival

department. Migrants are observed statewide in urban areas, as well as in areas with abundant shorebirds and waterfowl.

Range Map

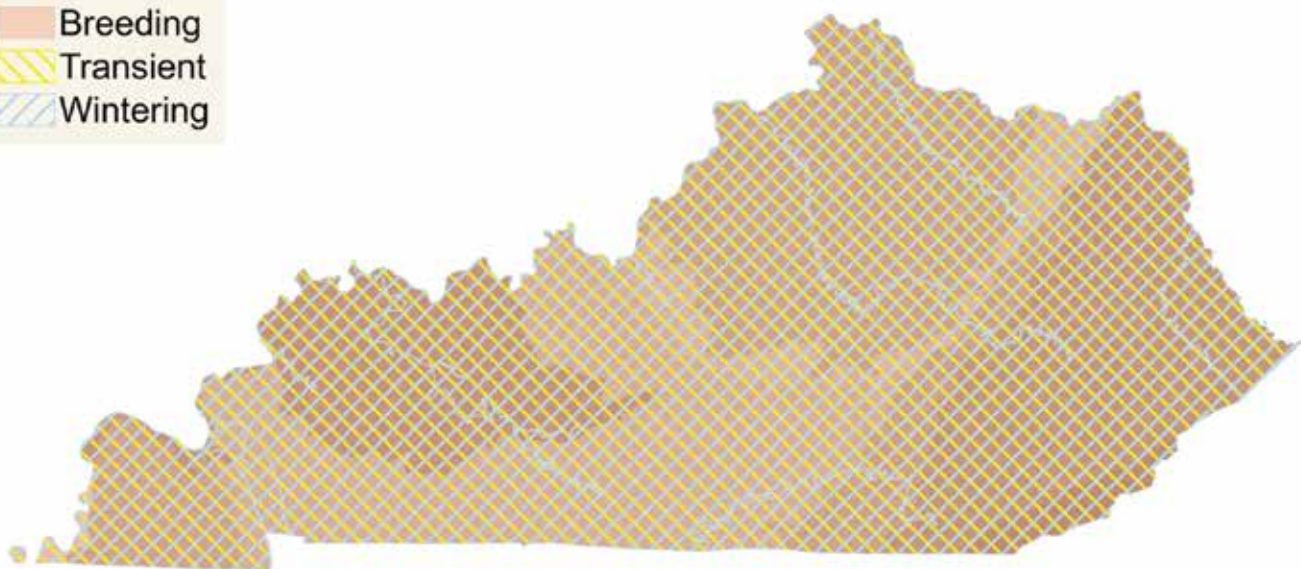


Photo: Mark Salsman



AMERICAN KESTREL

(*Falco sparverius*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S5B, S5N

Federal Status: N/A

IUCN Red List: LC - Least concern

American Kestrels show a declining trend (-0.3) in Kentucky Breeding Bird Survey data over past 4 decades. The species is gaining conservation concern region wide.

Conservation Goal




Improve habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture, Urban, Suburban

Threats

-  Agricultural and Forestry Effluents
-  Livestock Farming and Ranching
-  Other Ecosystem Modifications

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications 
- Conservation Payments 
- Habitat and Natural Process Restoration 
- Policies and Regulations 
- Resource and Habitat Protection 
- Training 

Needs

Survey: Collect baseline species information

Research: Conduct research to identify causes of decline

Research: Monitor for exposure to pesticides, rodenticides and other contaminants

This species inhabits rural farmland, native grasslands and altered habitats such as suburban areas, city parks, golf courses, industrial parks, and reclaimed surface mines. This species requires cavities for nesting.

Range Map

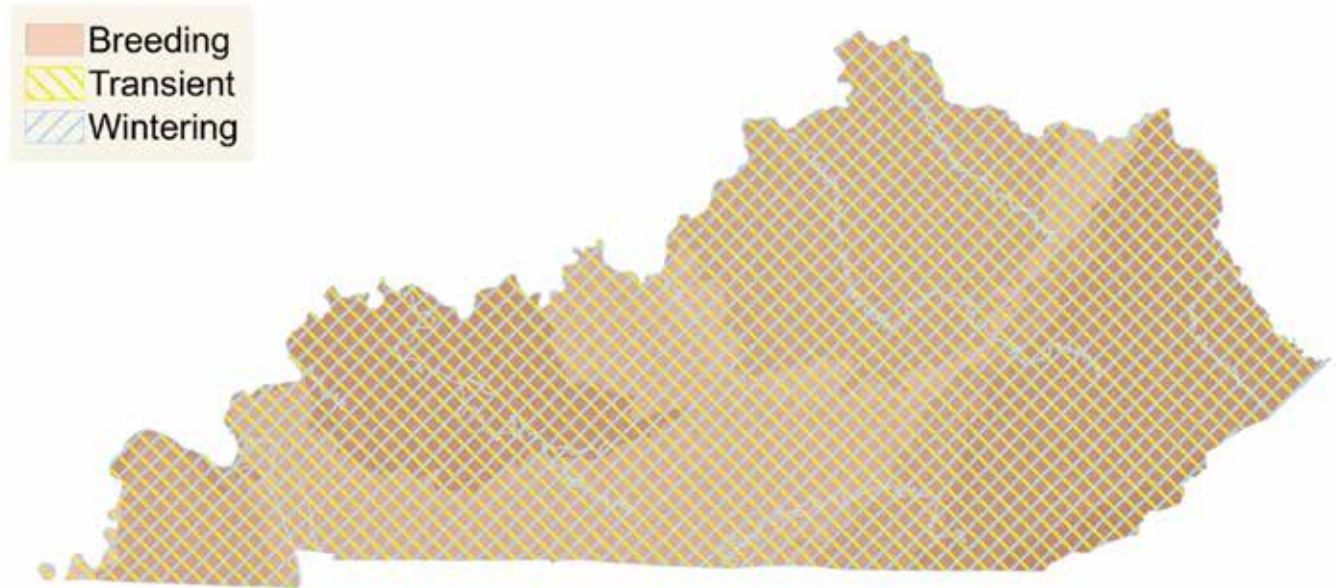


Photo: Jeff Sole



WILSON'S SNIPE

(*Gallinago delicata*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3S4N

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands.




Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland, Lake/Pond, Floodplain/Sandbar, Agriculture, Suburban

This species is found in marshes, swamps, wet lawns, wet agricultural fields and pastures, and marshy edges of streams and ditches.

Threats

-  Annual and Perennial Nontimber Crops
-  Dams and Water Management/Use
-  Pollution

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications 
- Conservation Payments  
- External Capacity Building  
- Resource and Habitat Protection  
- Site/Area Management 
- Training 

Needs

Survey: Collect baseline species information

Range Map

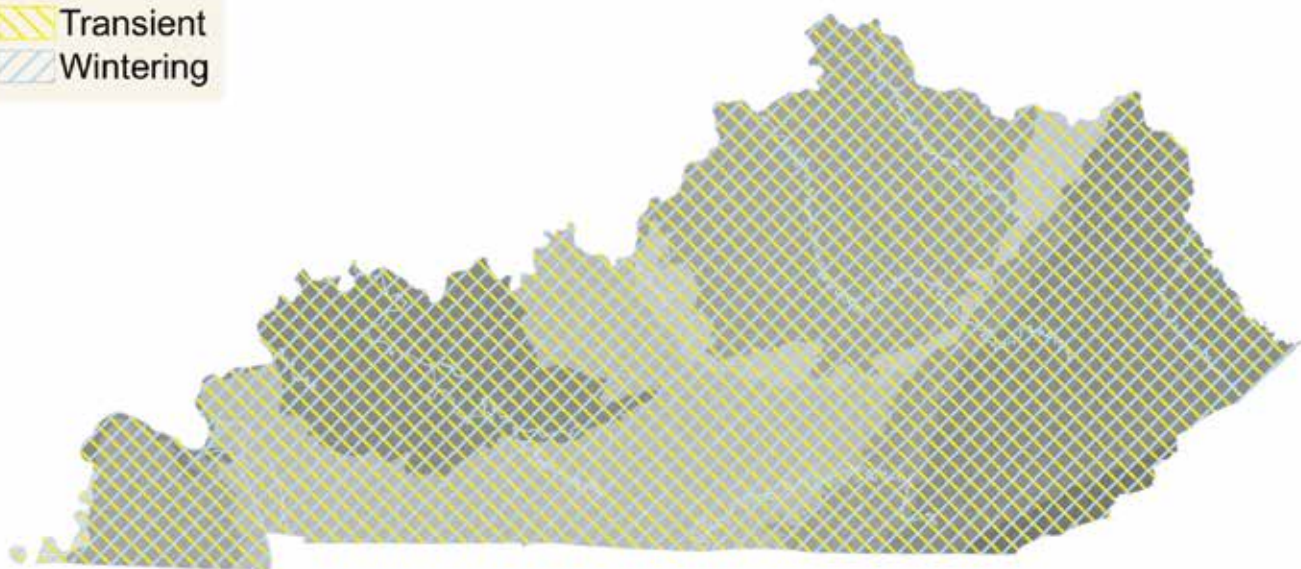



Photo: Jeff Sole



COMMON GALLINULE

(*Gallinula galeata*)

Threats

 Annual and Perennial Nontimber Crops

Conservation Actions

Unknown

Needs

Survey: Survey for occurrence

Management: Acquisition and protection of habitat

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S1S2B

Federal Status: N/A

IUCN Red List: LC - Least concern

Data is lacking, but there are breeding records from Common Gallinules in Kentucky. More research is needed for this species.

Conservation Goal

Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Improve wetland habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland

This species typically inhabits marshes and the marshy borders of lakes and ponds, fish hatchery ponds, and other types of shallow-water impoundments where cattails and other emergent aquatic vegetation thrive.

Range Map

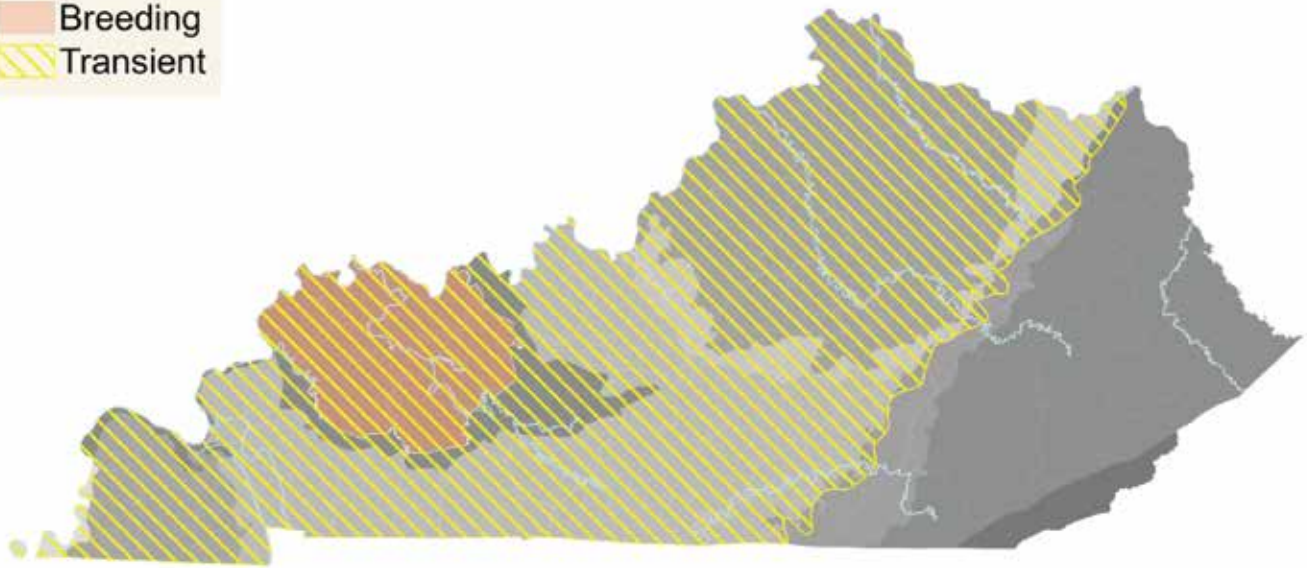


Photo: Mark Lowry



KENTUCKY WARBLER

(*Geothlypis formosa*)

Threats

- 🌿 Other Ecosystem Modifications
- 🏠 Residential and Commercial Development
- 🔌 Utility and Service Lines

Conservation Actions

- Awareness and Communications 🏠 🔌
- Conservation Finance 🌿
- Conservation Payments 🏠
- Education and Awareness 🌿
- External Capacity Building 🌿
- Habitat and Natural Process Restoration 🌿
- Invasive/Problematic Species Control 🌿
- Resource and Habitat Protection 🌿
- Training 🌿

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Management: Collaborate with partners to create tower strike incidental take permit

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S5B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve habitat quality and availability on public and private lands. Fund conservation efforts on the wintering grounds. Reduce the frequency of mortality events caused by collisions.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest, Xeric Forest, Floodplain/Sandbar

This species nests in forests with a moderate to dense shrub layer. The species occurs predominantly in deciduous forest, but mixed forest types with pines or hemlocks are also used. The Kentucky Warbler also occurs regularly in bottomland forests along major river floodplains.

Range Map



Photo: Jeff Sole



© JDSole Photo

WHOOPING CRANE

(*Grus americana*)

Conservation Profile

Priority Group: Moderate

KNP Info




G Rank: G1

S Rank: SNA



Federal Status: N/A

IUCN Red List: EN - Endangered

Threats

-  Hunting and Collecting Terrestrial Animals
-  Pollution
-  Utility and Service Lines

Conservation Actions

- Awareness and Communications 
- Training 

Needs

Survey: Collect baseline species information

Conservation Goal

Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Reduce mortality events caused by powerline electrocution and illegal hunting.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Open Wetland, Floodplain/Sandbar, Agriculture

This species uses managed wetlands on refuge and wildlife areas, flooded agricultural river bottoms, and harvested agricultural fields.

Range Map

 Transient

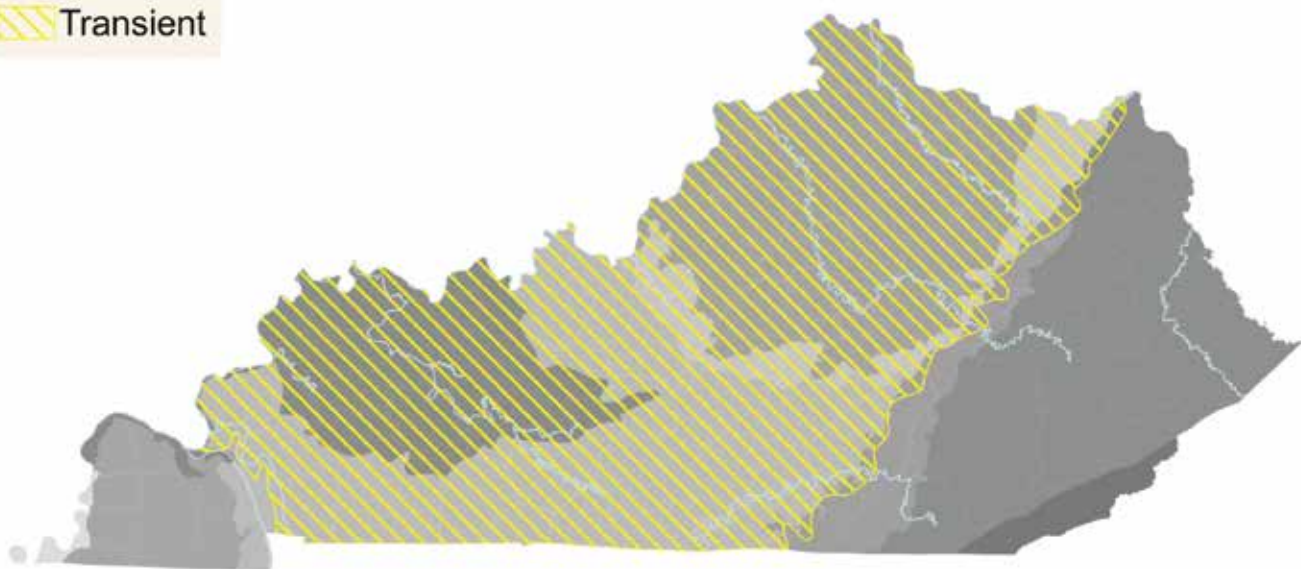
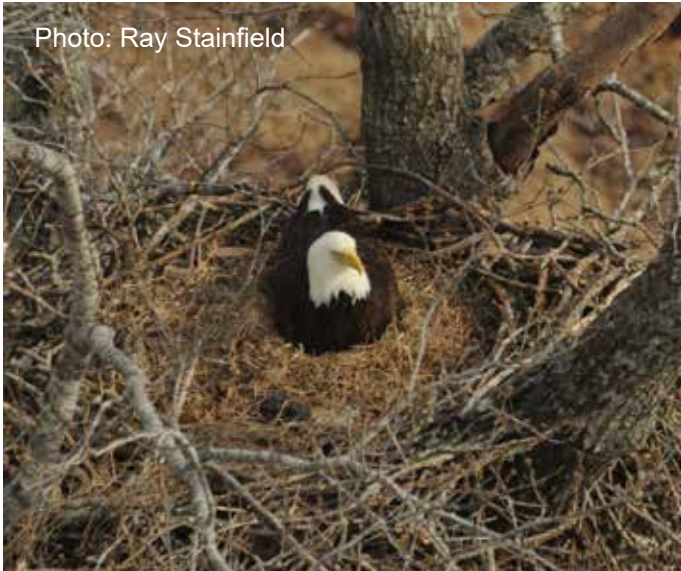


Photo: Ray Stainfield



BALD EAGLE

(*Haliaeetus leucocephalus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3B,S3S4N

Federal Status: Delisted

IUCN Red List: LC - Least concern

Conservation Goal

Continue to monitor for current and emerging disease-related threats. Acquire and protect high quality suitable habitat. Evaluate methods to reduce instances of lead poisoning and fishing line entanglement.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar

Forested areas, with mature trees near lakes and rivers, particularly within 2000m – 3000m of the shore are important for nesting sites. Areas near coves and source waters, where lakes are narrower and floodplains near rivers that create woody

Threats

- Climate Change and Severe Weather
- Hunting and Collecting Terrestrial Animals
- Logging and Wood Harvesting
- Pathogens and Microbes
- Pollution
- Recreational Activities
- Utility and Service Lines

Conservation Actions

- Awareness and Communications
- Education and Awareness
- Policies and Regulations
- Resource and Habitat Protection

Needs

Survey: Collect baseline species information

Survey: Monitor for the effects of Highly Pathogenic Avian Flu

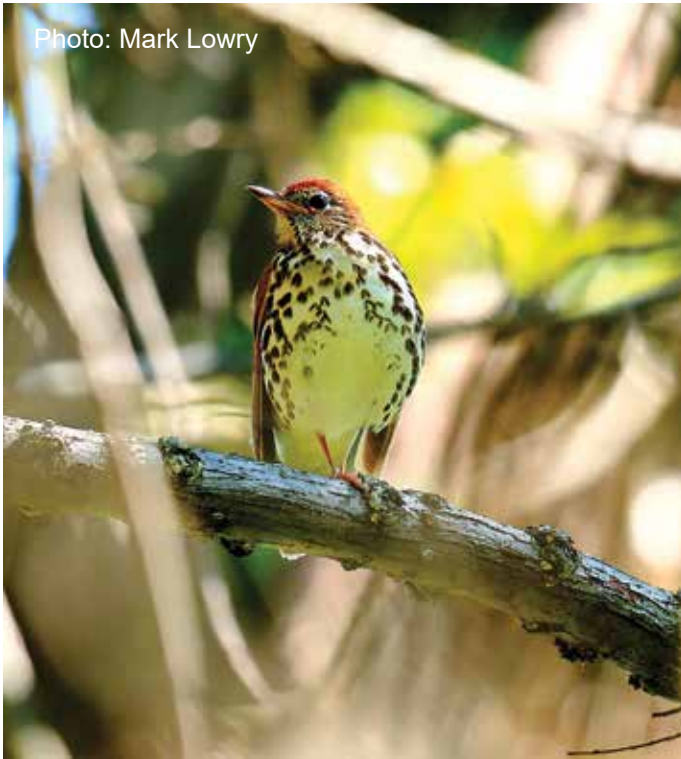
Research: Surveillance for disease and contaminant threats

wetlands are often used for nesting. Areas near large dams, rivers with sandbars and abundant waterfowl are important for immature bald eagles.

Range Map



Photo: Mark Lowry



WOOD THRUSH

(*Hylocichla mustelina*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S5B

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Improve forest habitat quality and availability on public and private lands. Reduce the frequency of mortality events caused by collisions and feral cats.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Mesic Forest, Xeric Forest

This species is found in most mesic and subxeric forest types with a well-developed shrub and midstory layer. The species also occurs in drier deciduous and mixed forests of ridges and slopes, as

Threats

- Invasive Non-native/Alien species
- Logging and Wood Harvesting
- Other Ecosystem Modifications
- Residential and Commercial Development
- Utility and Service Lines

Conservation Actions

- Awareness and Communications
- Conservation Finance
- Conservation Payments
- Education and Awareness
- External Capacity Building
- Habitat and Natural Process Restoration
- Resource and Habitat Protection
- Training

Needs

Survey: Collect baseline species information

Research: Support and Fund Expansion of the Motus Network in Kentucky

Management: Collaborate with partners to create tower strike incidental take permit

long as the understory is not too open. Wood Thrushes are most common in areas of extensive forest, but they tolerate slight fragmentation.

Range Map

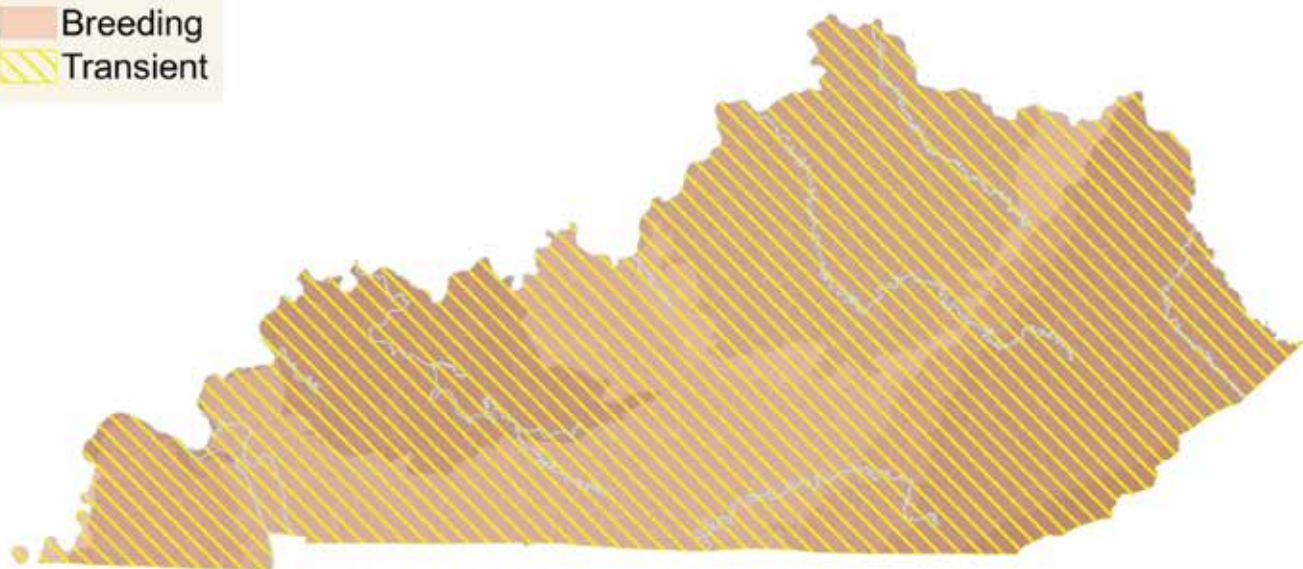


Photo: Jeff Sole



LEAST BITTERN

(*Ixobrychus exilis*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4G5

S Rank: S1S2B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond

This species uses dense, emergent marshes with patches of open water, dominated by herbaceous aquatic vegetation such as cattails, bulrushes, sedges and phragmites. Least bitterns will also use lake and pond edges with cattails and sedges for stop over habitat.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Housing and Urban Areas

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Payments
- External Capacity Building
- Habitat and Natural Process Restoration
- Policies and Regulations
- Resource and Habitat Protection
- Training

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Range Map

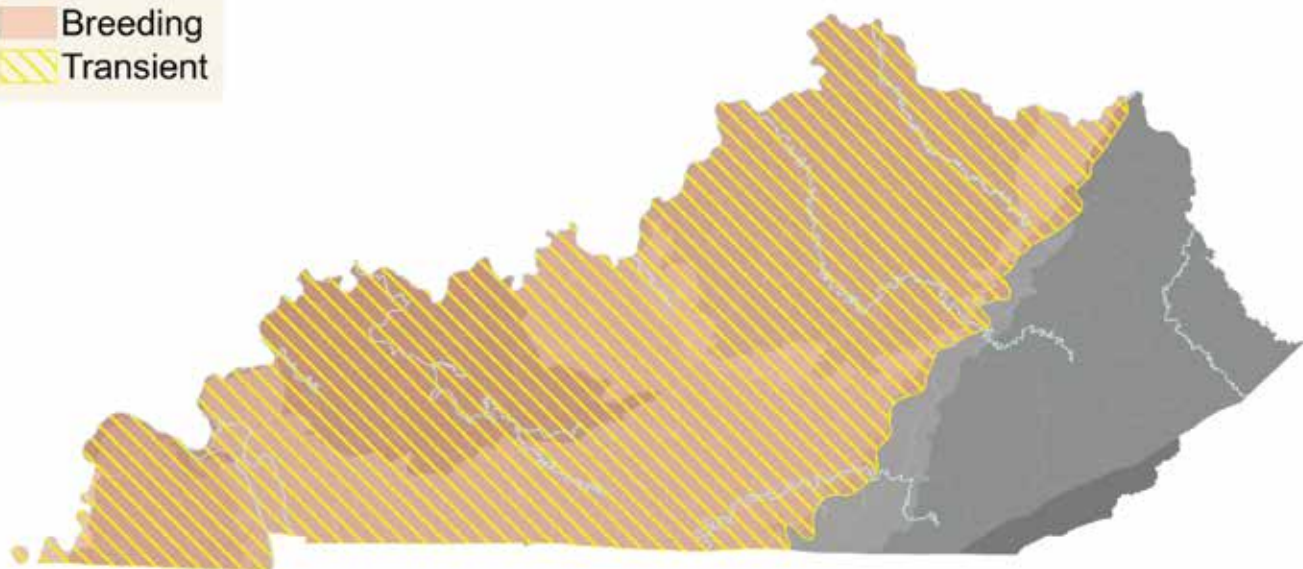


Photo: Mark Salsman



LOGGERHEAD SHRIKE

(*Lanius ludovicianus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S3S4B,S4N

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Continue monitoring loggerhead shrike populations. Conduct or support research on the effects of pesticide and fungicide use on bird populations. Improve grassland and shrubland habitat quality and availability on public lands.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture

The species prefers open land with short vegetation. Shrikes are often found in pastures with fence rows, old orchards, mowed roadsides, agricultural fields, and riparian areas. Nesting usually occurs in isolated trees or isolated large shrubs. Thorny shrubs or barbed wire are required for impaling prey.

Threats

- Agricultural and Forestry Effluents
- Climate Change and Severe Weather
- Invasive Non-native/Alien species
- Livestock Farming and Ranching
- Roads and Railroads

Conservation Actions

- Awareness and Communications
- Policies and Regulations

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Research: Conduct research to identify causes of decline

Research: Loggerhead Shrike Monitoring

Range Map

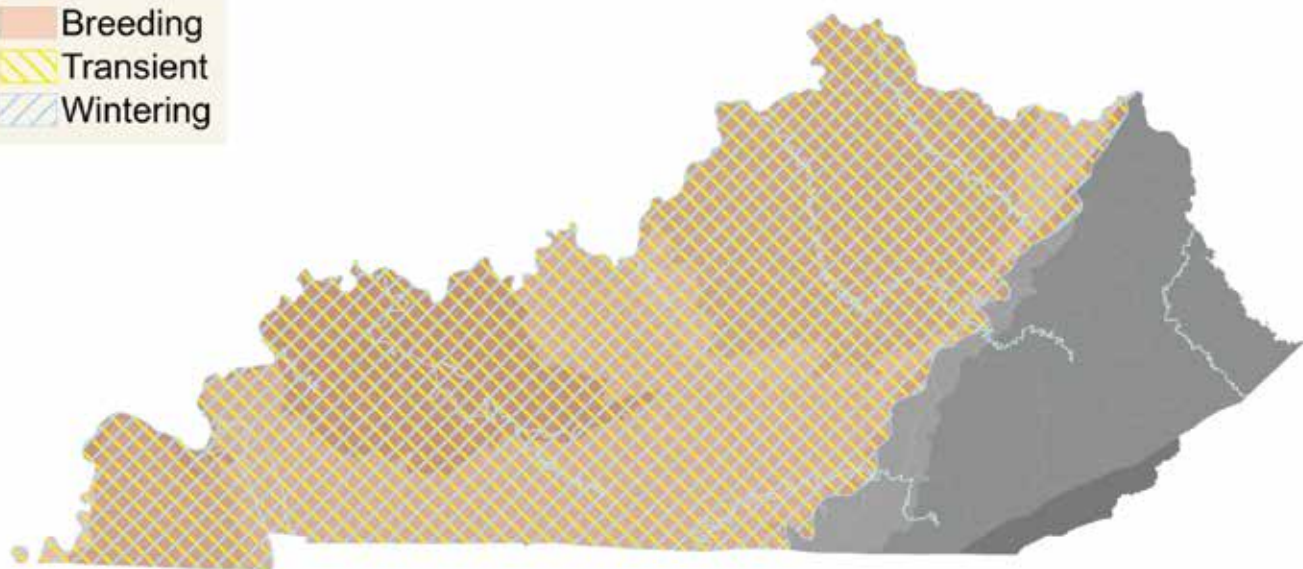


Photo: Jeff Sole



SHORT-BILLED DOWITCHER

(*Limnodromus griseus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

According to estimates by Partners in Flight, Short-billed Dowitcher populations declined between 15% and 50% from 1970 to 2015.

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

This species uses shallow aquatic habitats including margins of streams and farm ponds and shores, mudflats and bars of larger lakes and rivers. Flooded agricultural fields are also used.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Climate Change and Severe Weather
- Dams and Water Management/Use
- Hunting and Collecting Terrestrial Animals

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Payments
- External Capacity Building
- Resource and Habitat Protection
- Site/Area Management
- Training

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

Research: Support and Fund Expansion of the Motus Network in Kentucky

Range Map

 Transient

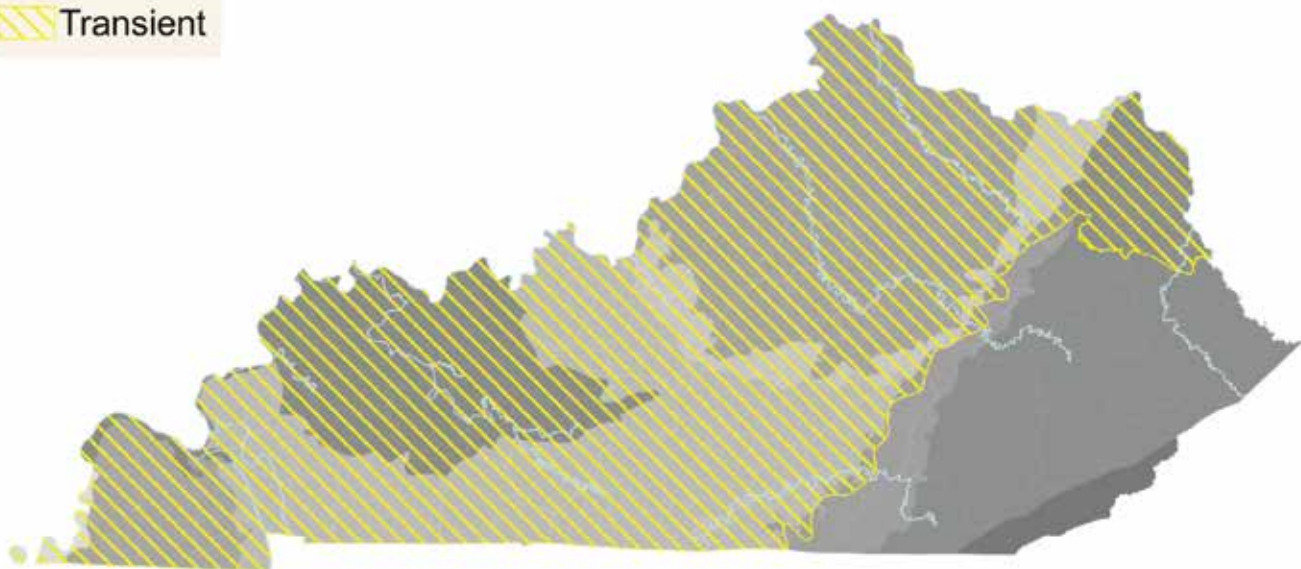


Photo: Gayle Pille



SWAINSON'S WARBLER

(*Limnothlypis swainsonii*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S3S4B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Conduct and support management that promotes maintenance and expansion of dense understory habitats. Fund conservation efforts on the wintering grounds. Reduce the frequency of mortality events caused by collisions.





Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Interior Plateau, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest

This species uses mesic forests with a dense understory. In western and south-central Kentucky, the species is typically found in floodplain forests with an abundance of giant cane or young trees in wet bottomlands, regenerating after logging. In southeastern Kentucky, the species is most often encountered where a dense understory of rhododendron is present or regenerating forest where the understory is thick.

Threats

-  Logging and Wood Harvesting
-  Other Ecosystem Modifications
-  Residential and Commercial Development
-  Utility and Service Lines

Conservation Actions

- Alliance and Partnership Development  
- Awareness and Communications  
- Conservation Finance 
- Conservation Payments 
- External Capacity Building  
- Habitat and Natural Process Restoration  
- Resource and Habitat Protection 
- Training  

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Conduct or support research on changes in habitat abundance and distribution

Management: Collaborate with partners to create tower strike incidental take permit

Range Map

Breeding

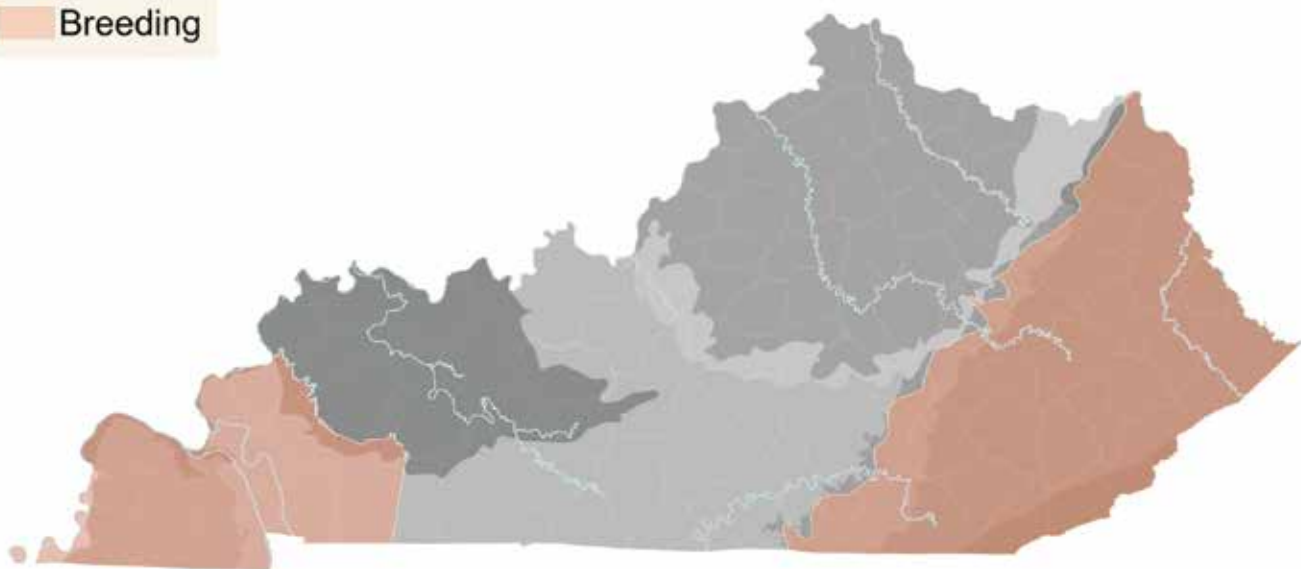


Photo: Jeff Sole



HOODED MERGANSER

(*Lophodytes cucullatus*)

Conservation Profile

Priority Group: Moderate

KNP Info



G Rank: G5

S Rank: S2B,S3S4N

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Annual and Perennial Nontimber Crops
-  Pollution

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Monitor the effects of Highly Pathogenic Avian Influenzas and other diseases on bird populations

Conservation Goal

Continue to monitor for current and emerging disease-related threats. Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar

This species nests in low numbers near shallow water sloughs and ponds of floodplain forests with cavity trees. Non-breeding birds will use a variety of wetland habitats, including reservoirs, marshes, sloughs, ponds, rivers, lakes and seasonally flooded forests.

Range Map

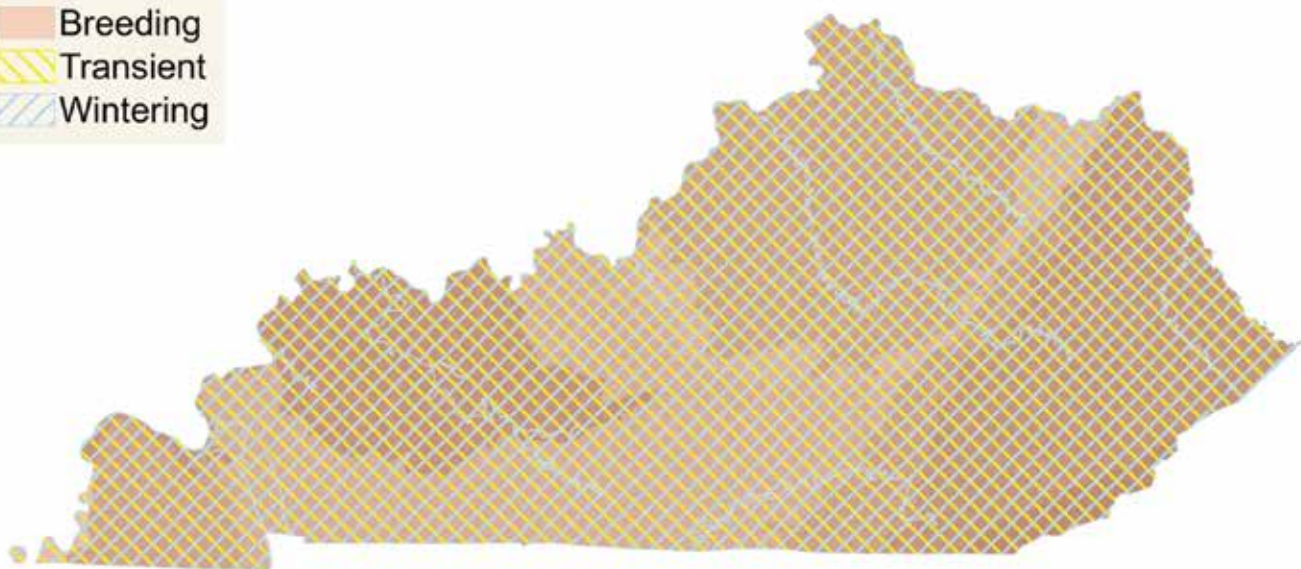


Photo: Mark Lowry



RED-HEADED WOODPECKER

(Melanerpes erythrocephalus)

Threats


 Natural System Modifications

Conservation Actions

Alliance and Partnership Development 

Education and Awareness 

Habitat and Natural Process Restoration 

Training 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S4B,S4N

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve habitat quality and availability on public lands.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Grassland/Savannah, Xeric Forest, Agriculture

This species is found in a great variety of habitats, but they occur most frequently in semi-open areas with some large trees. The species inhabits bottomland forests, swamps, and the margins of floodplain sloughs, rural farmland with scattered trees or small woodlots, and parkland, riparian corridors, and the margins of reservoirs. Wherever they breed, dead (or partially dead) trees for nest cavities are required.

Range Map

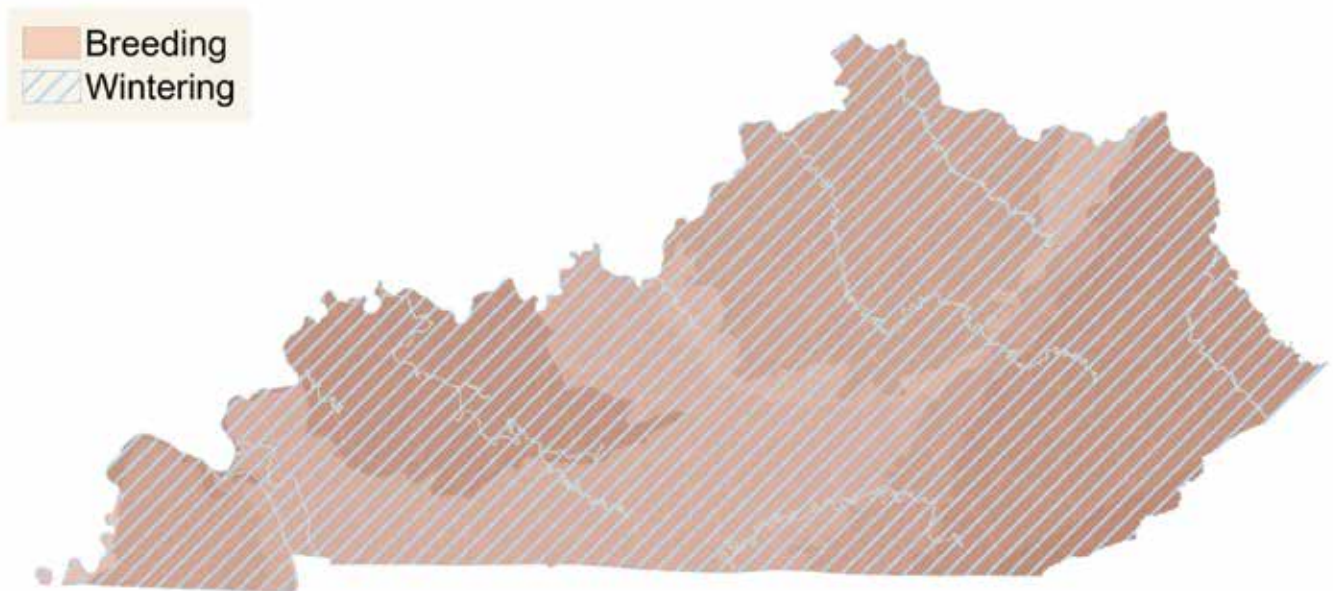


Photo: Jeff Sole



YELLOW-CROWNED NIGHT-HERON

(*Nyctanassa violacea*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S2B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve habitat quality and availability on public and private lands. Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar

This species uses bottomland forests, bald cypress swamps, shallow creeks, rivers, ponds, lakes, and swamps, and occasionally on lawns, plowed fields, and other upland sites.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Logging and Wood Harvesting
- Recreational Activities
- Residential and Commercial Development

Conservation Actions

- Education and Awareness
- External Capacity Building
- Site/Area Protection

Needs

Survey: Collect baseline species information

Range Map

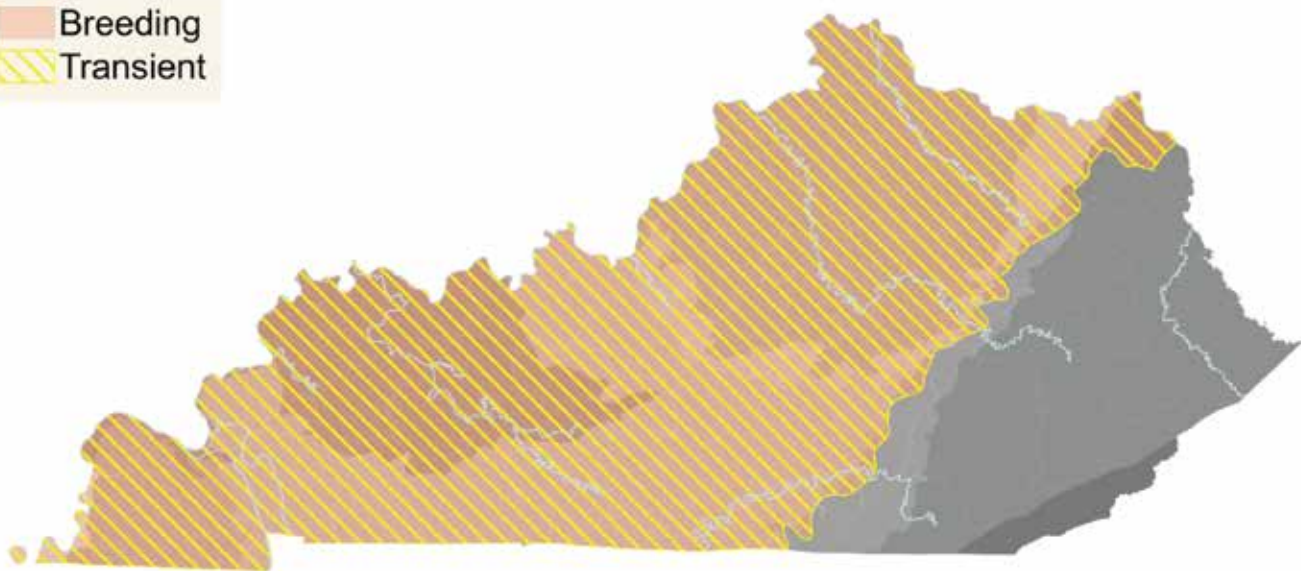


Photo: Jeff Sole



BLACK-CROWNED NIGHT-HERON

(*Nycticorax nycticorax*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1S2B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve habitat quality and availability on public and private lands. Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Suburban

This species uses reservoir habitat, fish hatcheries and larger lakes and rivers and occasionally shallow water wetlands. They require aquatic habitat for foraging and terrestrial vegetation for cover.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Hunting and Collecting Terrestrial Animals
- Logging and Wood Harvesting
- Recreational Activities
- Residential and Commercial Development

Conservation Actions

- Education and Awareness
- External Capacity Building
- Site/Area Protection

Needs

Survey: Collect baseline species information

Research: Support and fund expansion of the Motus network in Kentucky

Range Map

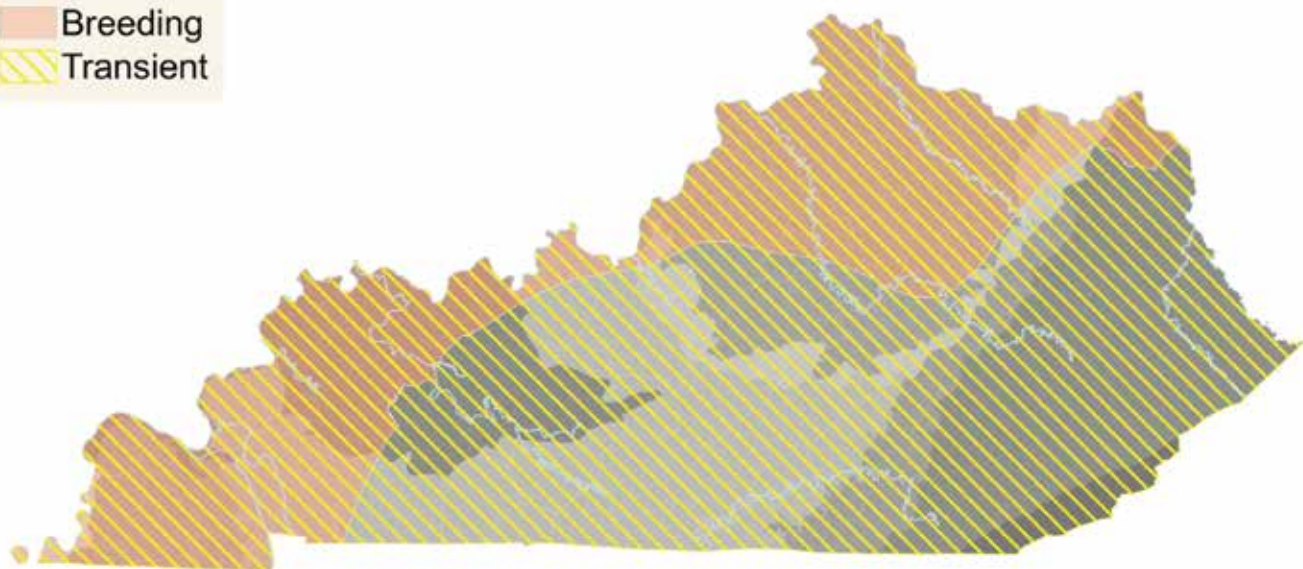


Photo: David Roemer



OSPREY

(*Pandion haliaetus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3S4B

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

- Garbage and Solid Waste
- Pollution
- Storms and Flooding
- Utility and Service Lines

Conservation Actions

- Awareness and Communications
- Policies and Regulations

Needs

Survey: Collect baseline species information

Conservation Goal

Evaluate methods to reduce instances of lead poisoning and fishing line entanglement. Collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Suburban

Ospreys historically nested in trees near or over water. While some Ospreys continue to use natural nest sites, many have adapted to nesting on manmade structures. During the 2017 Kentucky survey, 80% of osprey nests were found on manmade structures, statewide. Lake Barkley supports a large proportion of the nesting population, but nesting can occur statewide.

Range Map

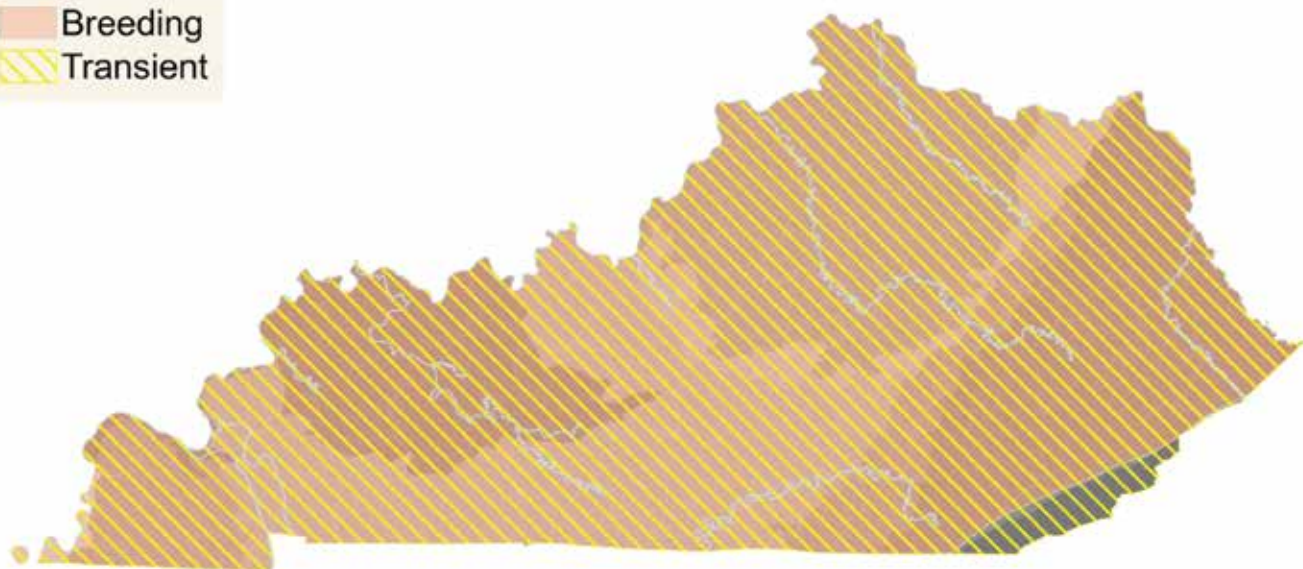







Photo: Mark Lowry



LOUISIANA WATERTHRUSH

(*Parkesia motacilla*)

Threats

-  Annual and Perennial Nontimber Crops
-  Mining and Quarrying
-  Other Ecosystem Modifications
-  Residential and Commercial Development
-  Utility and Service Lines

Conservation Actions

- Awareness and Communications  
- Conservation Finance 
- Conservation Payments 
- Education and Awareness 
- Resource and Habitat Protection  

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Management: Collaborate with partners to create tower strike incidental take permit

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S5B

Federal Status: N/A

IUCN Red List: LC - Least concern

Declines have been reported through the Breeding Bird Survey in about half of the states within the range of the Louisiana Waterthrush. Kentucky has a high stewardship responsibility for this bird which is a good indicator of water quality.

Conservation Goal

Acquire high quality suitable habitat under public ownership or protect via permanent easements to offset habitat fragmentation and loss on private lands. Fund conservation efforts on the wintering grounds. Reduce the frequency of mortality events caused by collisions.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest, River/Streams, Floodplain/Sandbar

This species is usually encountered along streams, slow-moving creeks or swampy areas. The Louisiana Waterthrush may also occur in woodlands along stream drainages that are dry for most of the year. They generally do not use streams for nesting unless there is a tract of forest along at least one side.

Range Map

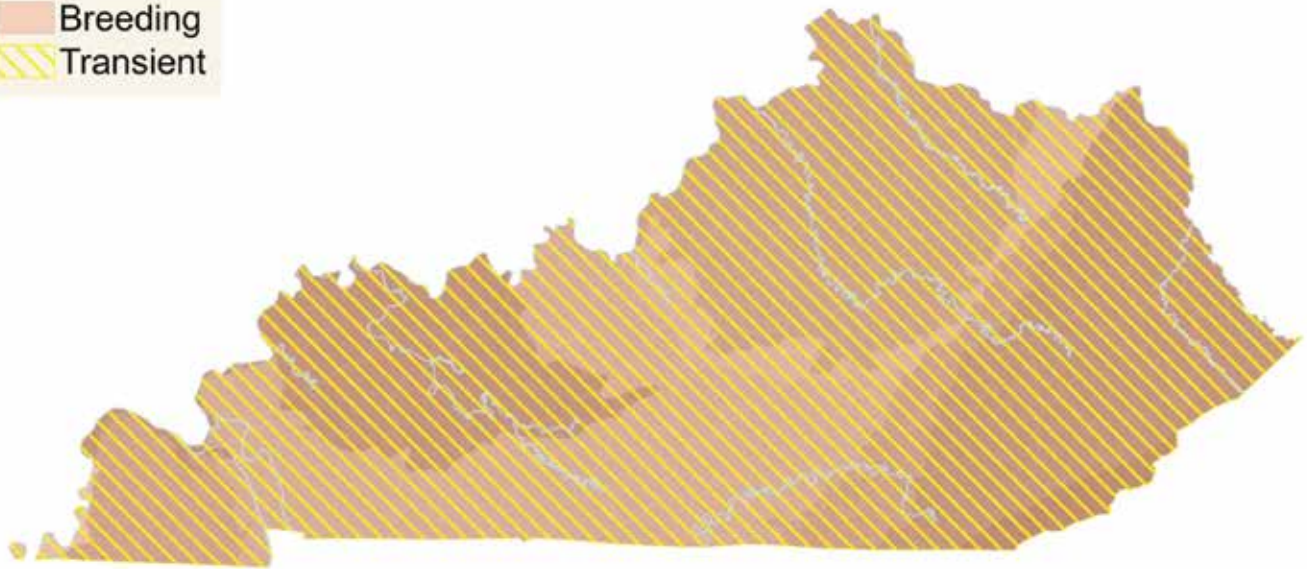





Photo: Mark Lowry









SAVANNAH SPARROW

(*Passerculus sandwichensis*)

Threats

-  Agricultural and Forestry Effluents
-  Livestock Farming and Ranching
-  Problematic Native Species

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications  
- Conservation Payments 
- Policies and Regulations 
- Training 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S2S3B,S2S3N

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve grassland habitat quality and availability on public and private lands. Evaluate potential policy changes in pesticide and fungicide use at state wildlife management areas.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture

This species is found most frequently during the breeding season in hayfields, pastures, and other grassy habitats where the vegetation is not especially tall or thick. In winter, the species is more numerous and found statewide in weedy, grassy areas and grain stubble fields with dense ground cover.

Range Map

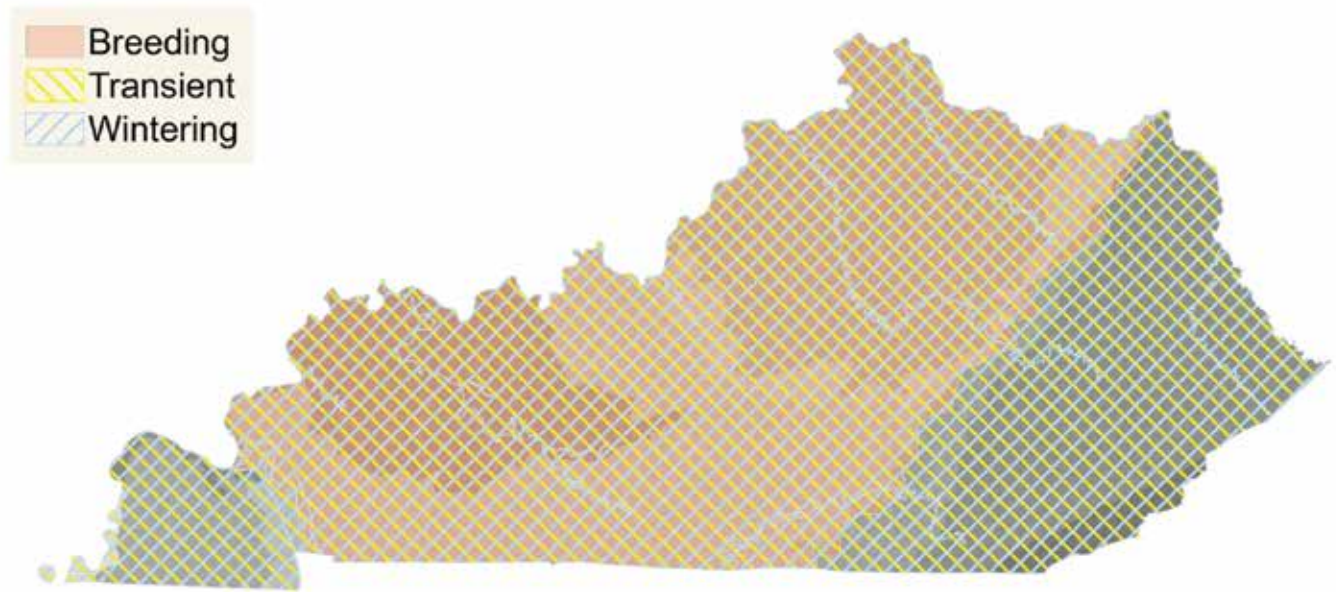


Photo: Tommy Quarles



BACHMAN'S SPARROW

(*Peucaea aestivalis*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G3

S Rank: S1B

Federal Status: N/A

IUCN Red List: NT - Near threatened

Threats



Annual and Perennial Nontimber Crops



Fire and Fire Suppression

Conservation Actions

Site/Area Protection 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Conservation Goal

Acquire or protect high quality habitat in order to reduce fragmentation.


Habitat Associations

Physiographic Regions: Interior Plateau, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Xeric Forest

The species is a habitat specialist and in Kentucky, the combination of conditions that may provide nesting habitat include: (not always) a hillside, some bare ground, some native grasses and forbs, patches of blackberry, and scattered small trees. Although the presence of pines is not essential, red cedars and other evergreens are frequently associated with such habitats.

Range Map

 Breeding

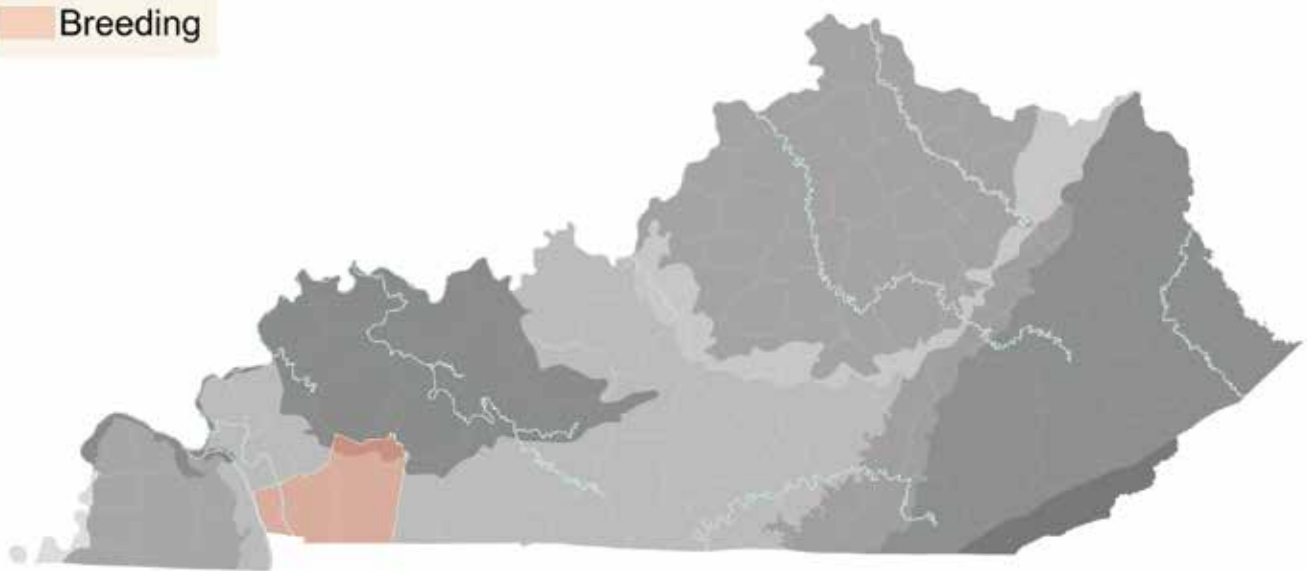


Photo: Rickey Shive



WILSON'S PHALAROPE

(*Phalaropus tricolor*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve habitat quality and availability on public lands.





Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

This species uses shallow aquatic habitats including margins of streams and farm ponds and shores, mudflats and bars of larger lakes and rivers. Flooded agricultural fields are also used.

Threats

-  Agricultural and Forestry Effluents
-  Annual and Perennial Nontimber Crops
-  Dams and Water Management/Use
-  Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development 
- External Capacity Building  
- Resource and Habitat Protection   
- Site/Area Management 
- Training 

Needs

Survey: Collect baseline species information

Range Map

 Transient

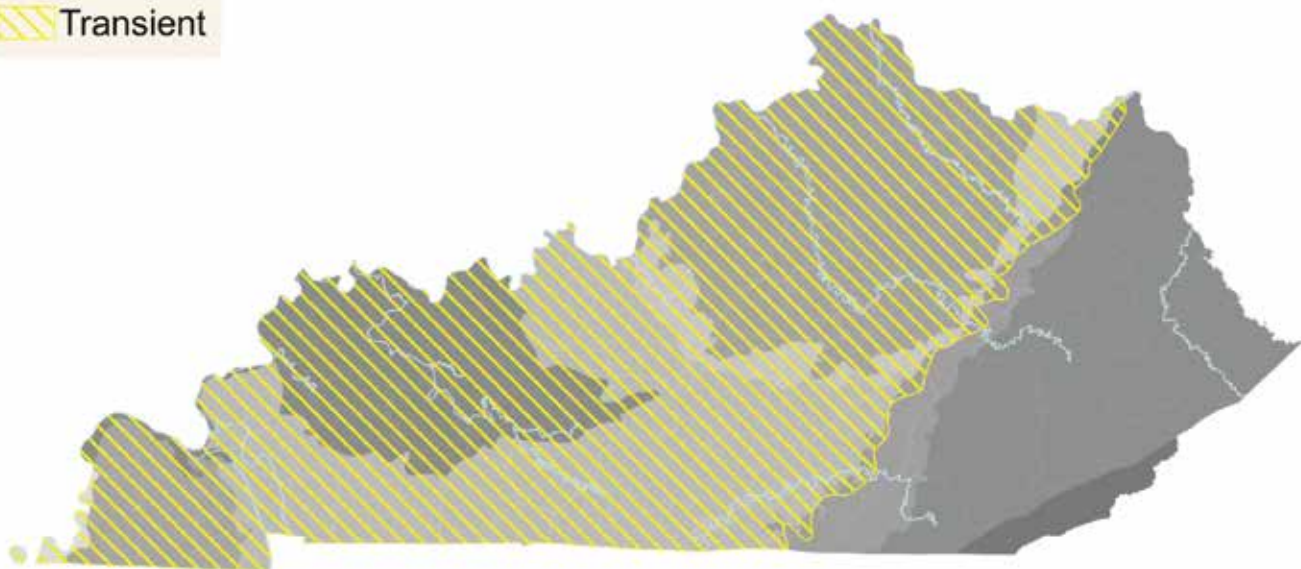
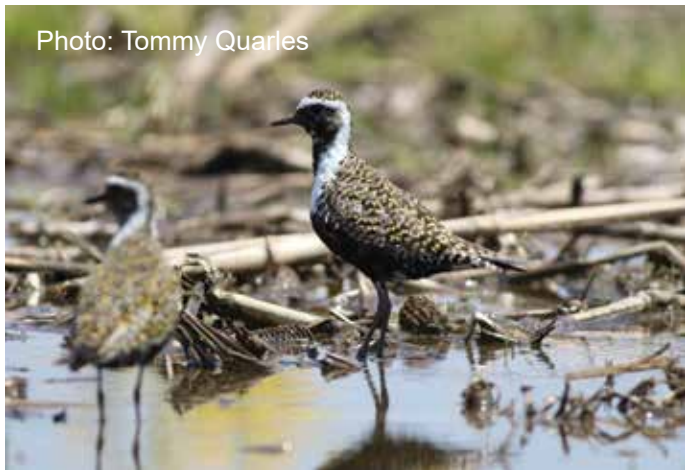


Photo: Tommy Quarles



AMERICAN GOLDEN-PLOVER

(*Pluvialis dominica*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

American Golden-plover numbers appear to be in decline.

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands. Fund conservation efforts on the wintering grounds.







Habitat Associations

Physiographic Regions: Cumberland Plateau, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Lake/Pond, Floodplain/Sandbar, Agriculture

This species uses shallow water wetlands, flooded agricultural fields, and shoreline, mudflat, and sandbar habitat of lakes and rivers. This species may also use the following habitats during migration: pastures, tilled farmland, untilled harvested fields, and burned fields.

Threats

-  Agricultural and Forestry Effluents
-  Annual and Perennial Nontimber Crops
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Housing and Urban Areas
-  Hunting and Collecting Terrestrial Animals

Conservation Actions

- Awareness and Communications 
- Conservation Finance 
- Conservation Payments  
- External Capacity Building  
- Resource and Habitat Protection   
- Training 

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

Range Map

 Transient

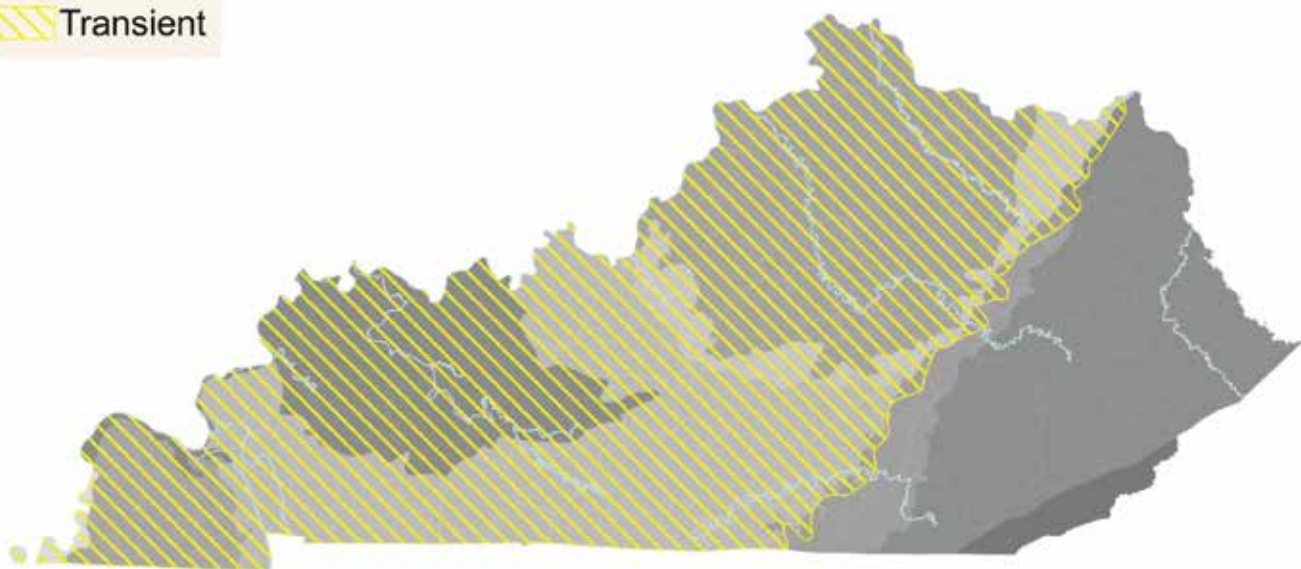


Photo: Jeff Sole



BLACK-BELLIED PLOVER

(*Pluvialis squatarola*)

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Climate Change and Severe Weather
- Dams and Water Management/Use
- Housing and Urban Areas
- Hunting and Collecting Terrestrial Animals

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Finance
- Conservation Payments
- External Capacity Building
- Resource and Habitat Protection
- Site/Area Management
- Training

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

Research: Support and Fund Expansion of the Motus Network in Kentucky

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands. Fund conservation efforts on the wintering grounds.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain

Guilds: Lake/Pond, Floodplain/Sandbar, Agriculture

This species uses shallow water wetlands, flooded agricultural fields, and shoreline, mudflat, and sandbar habitat of lakes and rivers.

Range Map

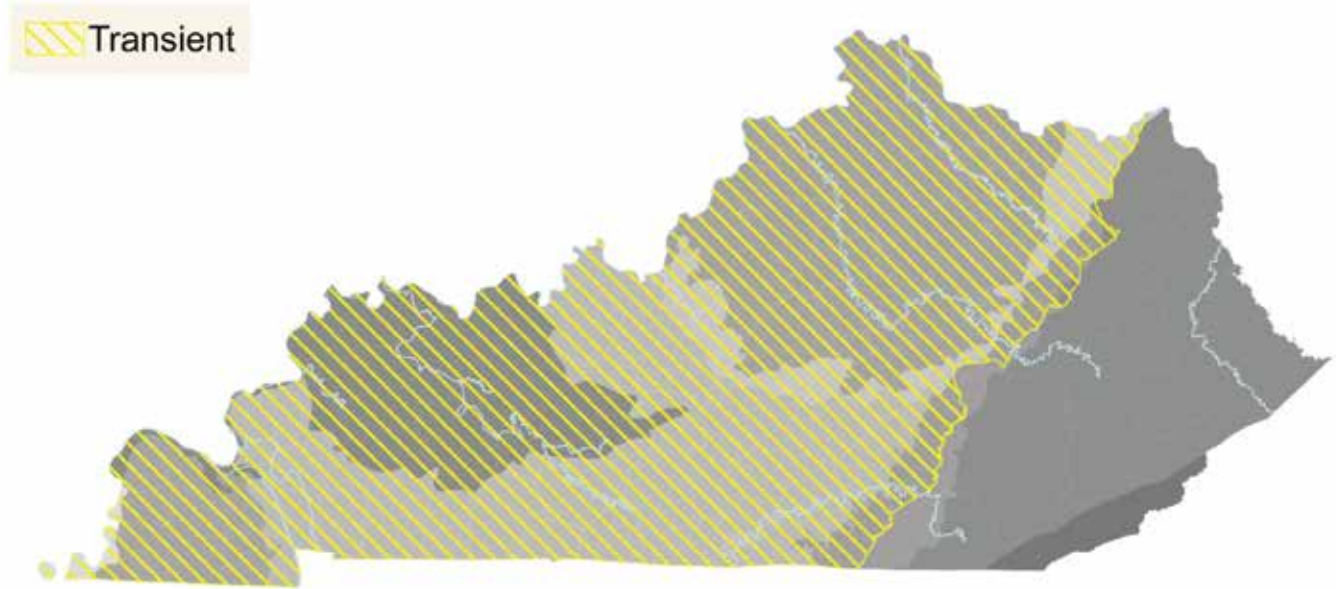
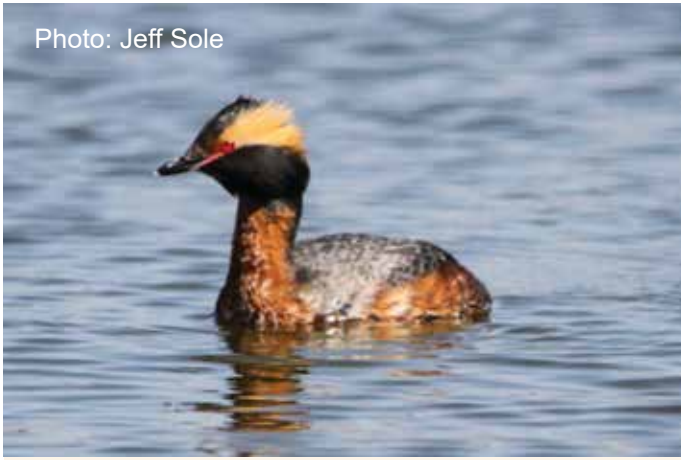


Photo: Jeff Sole



HORNED GREBE

(*Podiceps auritus*)

Conservation Profile

Priority Group: Moderate

KNP Info





G Rank: G5

S Rank: SNA




Federal Status: N/A

IUCN Red List: VU - Vulnerable

Threats

-  Agricultural and Forestry Effluents
-  Annual and Perennial Nontimber Crops
-  Industrial and Military Effluents
-  Recreational Activities

Conservation Actions

- Education and Awareness 
- External Capacity Building  

Needs

Survey: Collect baseline species information

Research: Monitor the effects of Highly Pathological Avian Influenzas and other diseases on bird populations

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Continue to monitor for current and emerging disease-related threats.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain

Guilds: Lake/Pond, River/Streams

This species may appear during migration on larger bodies of water, including rivers, if large enough for landing and take-off.

Range Map

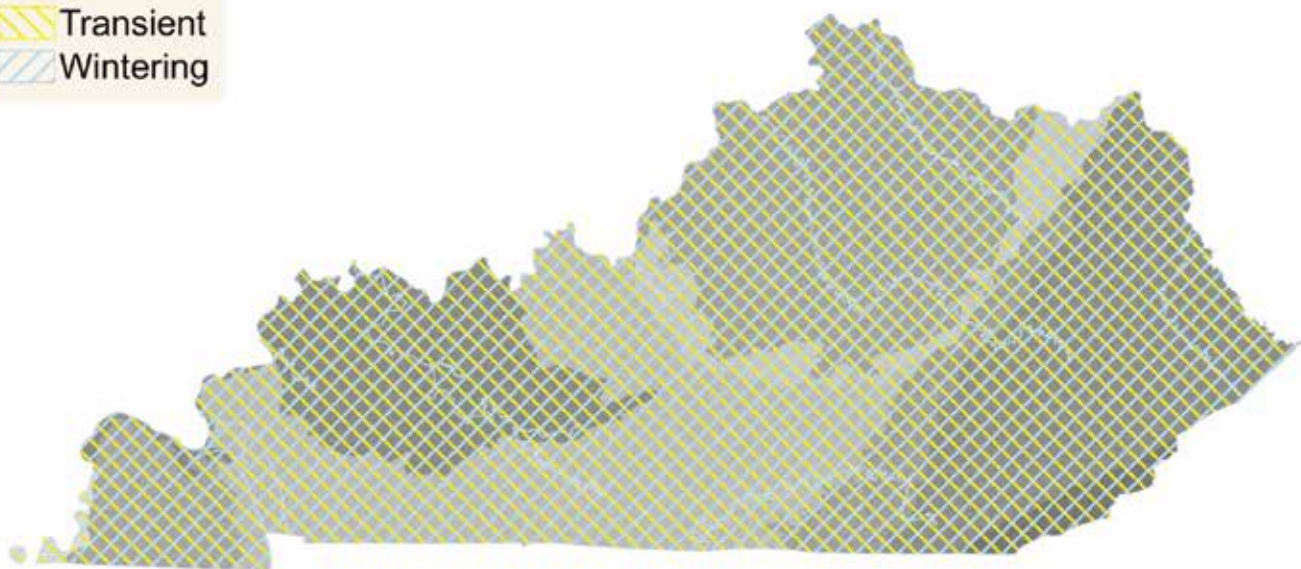


Photo: Rickey Shive



PIED-BILLED GREBE

(*Podilymbus podiceps*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1B, S4N

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Continue to monitor for current and emerging disease-related threats.





Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain





Guilds: Open Wetland, Lake/Pond, River/Streams

This species nests in marshy, shallow water habitats with an abundance of submerged vegetation. Nesting territories are usually associated with dense stands of emergent vegetation or aquatic vegetation close to surface for nest construction, and nearby open water, for foraging. This species is a winter habitat generalist.

Threats

-  Agricultural and Forestry Effluents
-  Annual and Perennial Nontimber Crops
-  Industrial and Military Effluents
-  Recreational Activities

Conservation Actions

- Education and Awareness 
- External Capacity Building  
- Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Research: Monitor the effects of Highly Pathological Avian Influenzas and other diseases on bird populations

Range Map

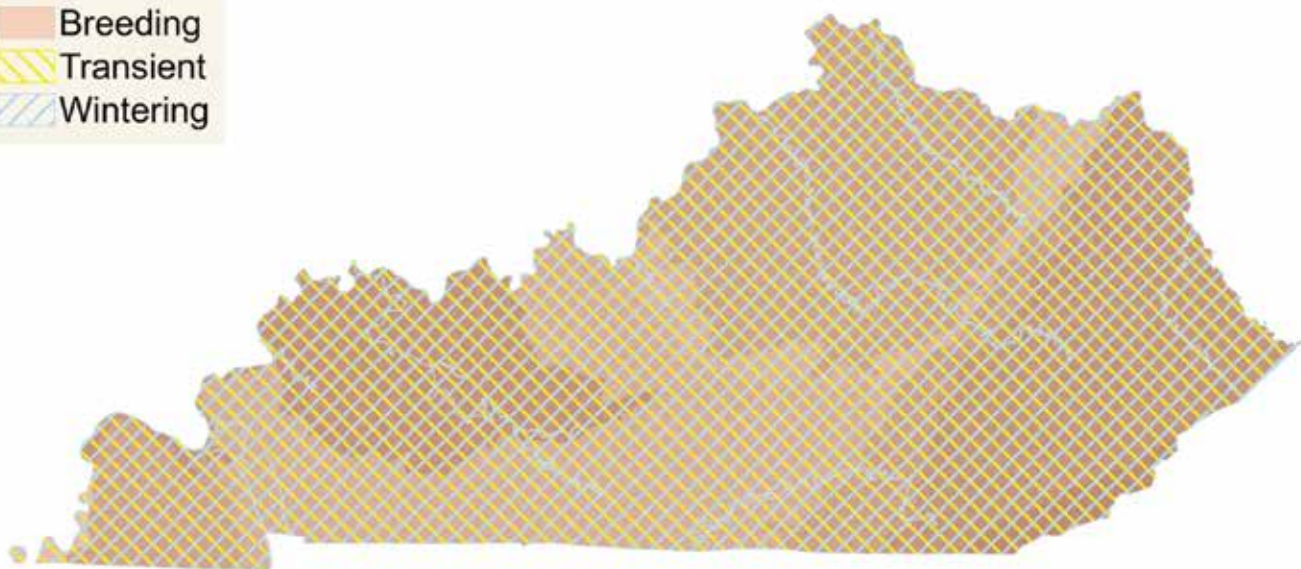




Photo: Jeff Sale

SORA

(*Porzana carolina*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve wetland habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Open Wetland

This species is found in wetlands with shallow and intermediate water depths (0–46 cm deep), dominated by robust or fine-leaved emergent vegetation, especially cattails, sedges, phragmites, and bulrushes.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Invasive Non-native/Alien species
- Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Payments
- External Capacity Building
- Policies and Regulations
- Resource and Habitat Protection
- Site/Area Management
- Training

Needs

Survey: Collect baseline species information

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Research: Support and Fund Expansion of the Motus Network in Kentucky

Range Map

 Transient

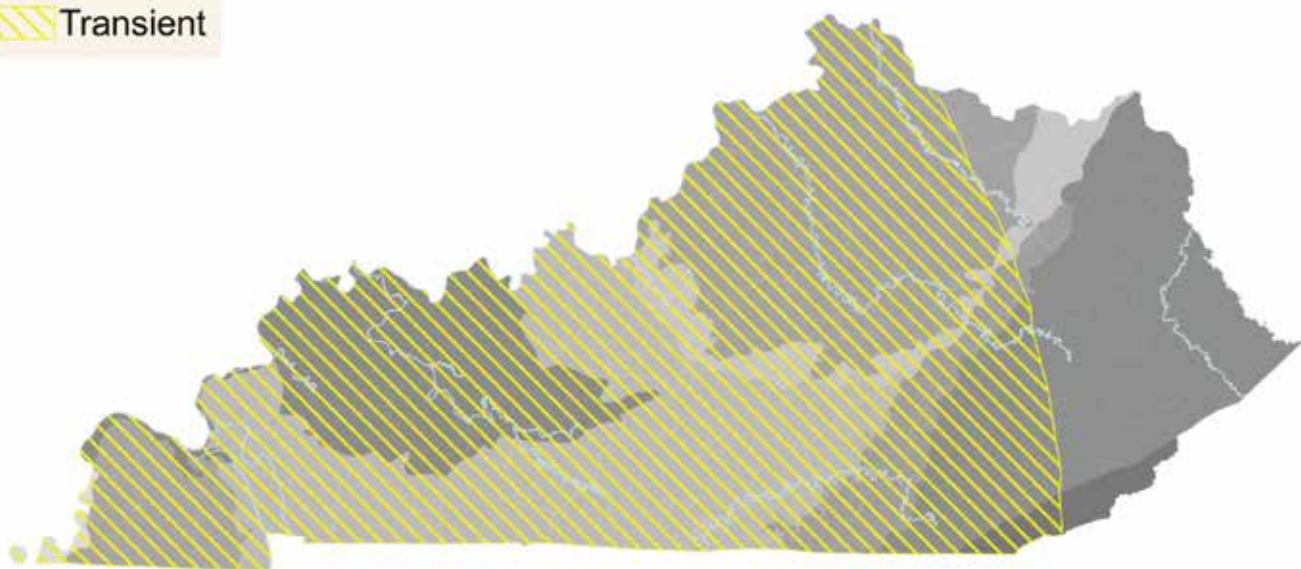
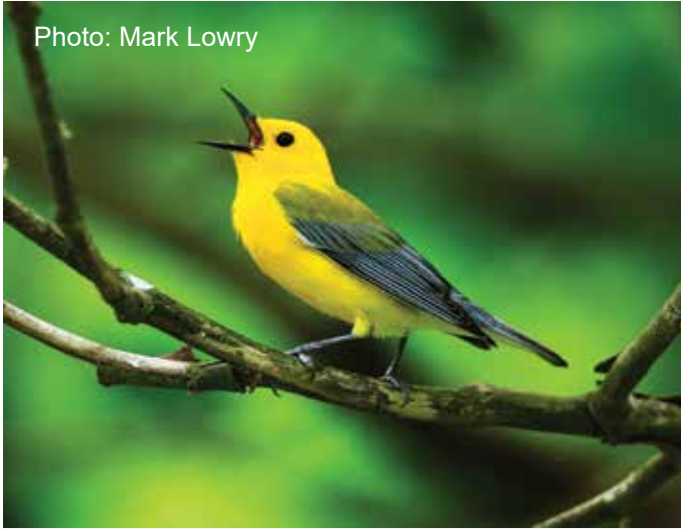


Photo: Mark Lowry



PROTHONOTARY WARBLER

(*Protonotaria citrea*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S5B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Protect high quality habitat and provide artificial nesting structures where appropriate. Fund conservation efforts on the wintering grounds. Reduce the frequency of mortality events caused by collisions.







Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain







Guilds: Forested Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar

Nesting habitat for this species includes large bodies of standing or slow-moving water, seasonally flooded bottomland hardwood forest, bald cypress swamps, and larger rivers or lakes. Cavity sites are necessary for nesting and this species will use natural and artificial cavities.

Threats

-  Annual and Perennial Nontimber Crops
-  Invasive and Other Problematic Species and Genes
-  Other Ecosystem Modifications
-  Residential and Commercial Development
-  Storms and Flooding
-  Utility and Service Lines

Conservation Actions

- Awareness and Communications  
- Conservation Finance 
- Conservation Payments 
- External Capacity Building 
- Resource and Habitat Protection 
- Species Management 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Support and Fund Expansion of the Motus Network in Kentucky

Management: Collaborate with partners to create tower strike incidental take permit

Range Map

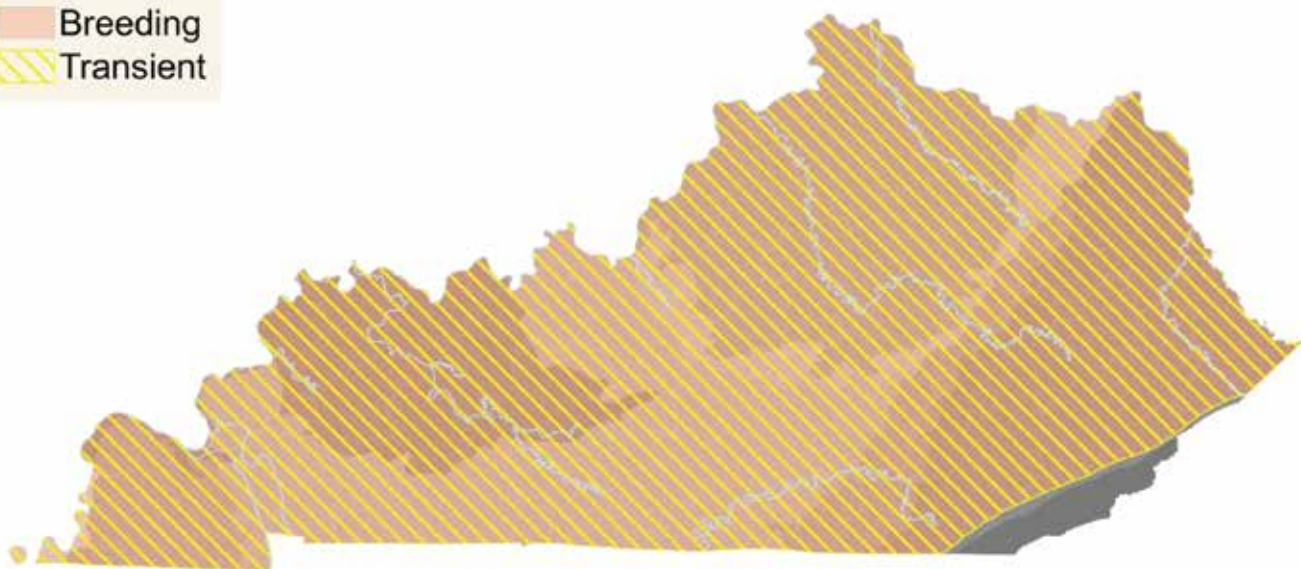


Photo: Jeff Sole



KING RAIL

(*Rallus elegans*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4

S Rank: S1B

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Improve wetland habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain

Guilds: Open Wetland

This species habitats include marshes, and early successional stages of marsh-shrub swamp. Favored habitat is typically dominated by a thick growth of herbaceous emergent vegetation such as cattails, bulrushes, sedges, and phragmites.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Invasive Non-native/Alien species
- Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Payments
- External Capacity Building
- Resource and Habitat Protection
- Training

Needs

Survey: Collect baseline species information

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Range Map

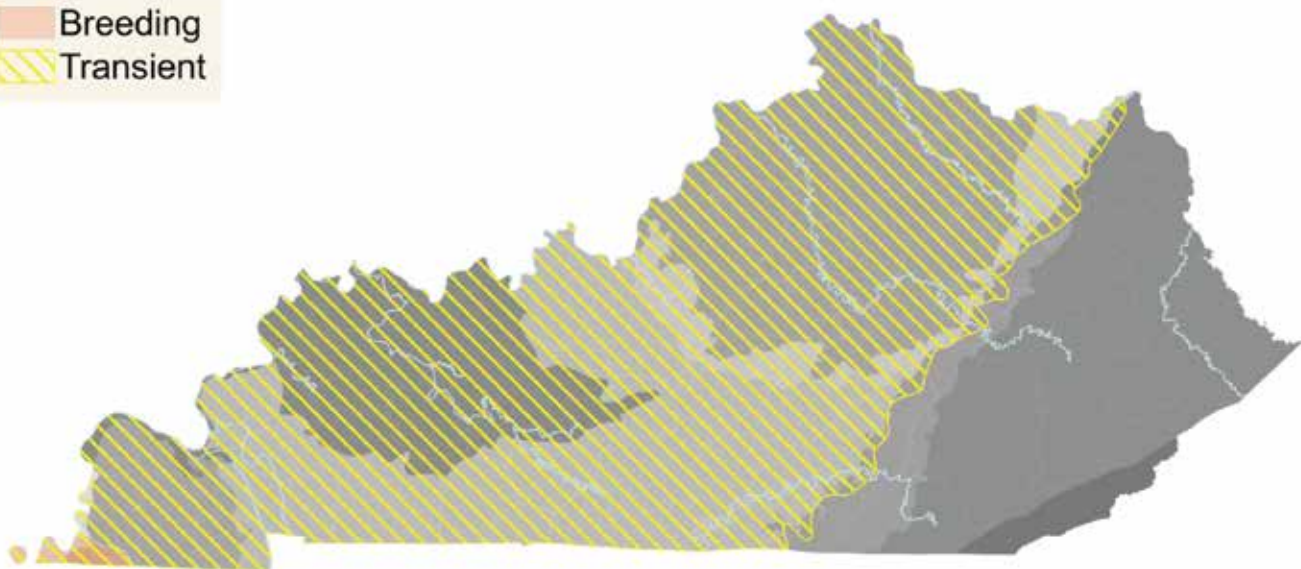


Photo: Tommy Quarles



VIRGINIA RAIL

(*Rallus limicola*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1B

Federal Status: N/A

IUCN Red List: LC - Least concern

Virginia Rails are regular breeders in Kentucky.

Conservation Goal

Improve wetland habitat quality and availability on public and private lands.





Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain

Guilds: Grassland/Savannah, Open Wetland

This species needs freshwater wetlands with stands of robust emergent vegetation (e.g. cattails, bulrush, phragmites). It also uses wet grasslands during migration. It prefers shallow and intermediate water depths (0–15 cm) with muddy, unstable substrates for foraging.

Threats

-  Agricultural and Forestry Effluents
-  Annual and Perennial Nontimber Crops
-  Housing and Urban Areas
-  Invasive Non-native/Alien species

Conservation Actions

- Alliance and Partnership Development    
- Awareness and Communications  
- Conservation Payments  
- External Capacity Building 
- Resource and Habitat Protection  
- Training  

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Research: Support and fund expansion of the Motus network in Kentucky

Range Map

 Transient

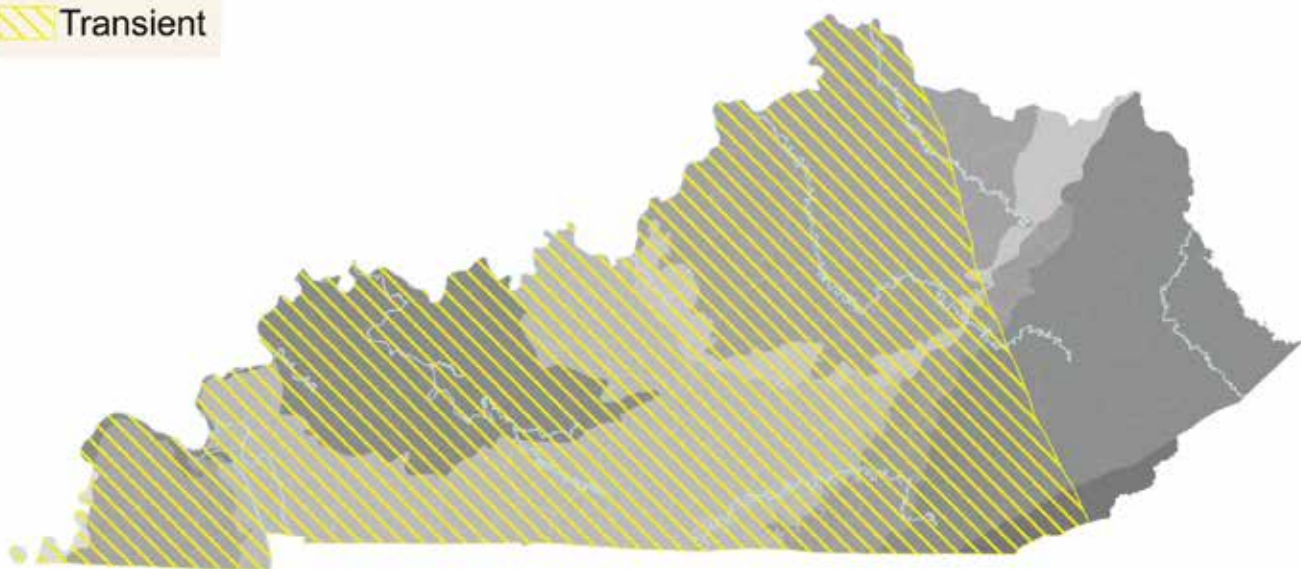


Photo: Tommy Quarles



BANK SWALLOW

(*Riparia riparia*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Conduct or support research on the effects of pesticide use on aerial insectivores. Fund conservation efforts on the winter grounds.




Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain



Guilds: River/Streams, Floodplain/Sandbar

This species is a colonial nester and uses natural riverbanks, gravel pits and sand pits for nest burrows. Key habitat locations are likely to include the banks of Mississippi, Ohio and other large rivers.

Threats

-  Agricultural and Forestry Effluents
-  Other Ecosystem Modifications
-  Shipping Lanes

Conservation Actions

- Conservation Finance 
- Policies and Regulations 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Conduct or support research on the effects of pesticide use on aerial insectivores

Range Map

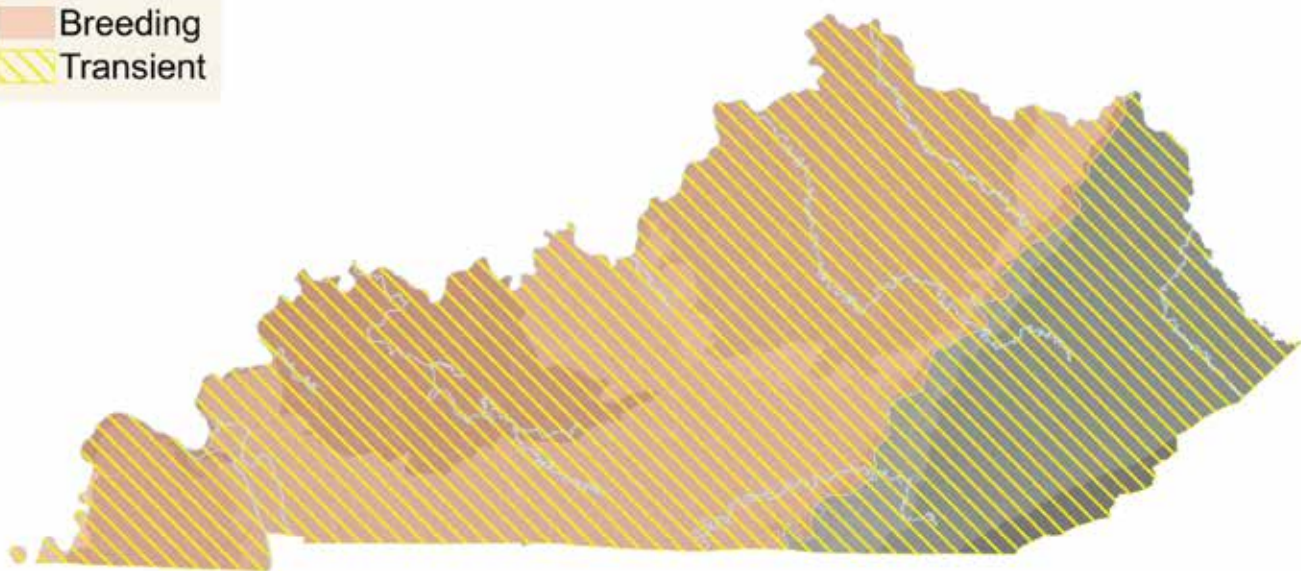


Photo: Hunter Wells



AMERICAN WOODCOCK

(*Scolopax minor*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S4S5B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve habitat quality and availability on public lands.




Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain



Guilds: Grassland/Savannah, Floodplain/Sandbar, Agriculture, Suburban, Scrub-Shrub/Early Successional Forest

This species nests in young, shrubby, deciduous forests, old fields, and mixed forest-agricultural-urban areas. They display in forest openings and fields in the springtime and often use clearings for roosting in the summer. During the migration and the nesting season, wet native grass fields are often used.

Threats

-  Agricultural and Forestry Effluents
-  Annual and Perennial Nontimber Crops
-  Other Ecosystem Modifications

Conservation Actions

- Education and Awareness 
- Policies and Regulations 

Needs

Survey: Collect baseline species information

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Research: Support and Fund Expansion of the Motus Network in Kentucky

Range Map

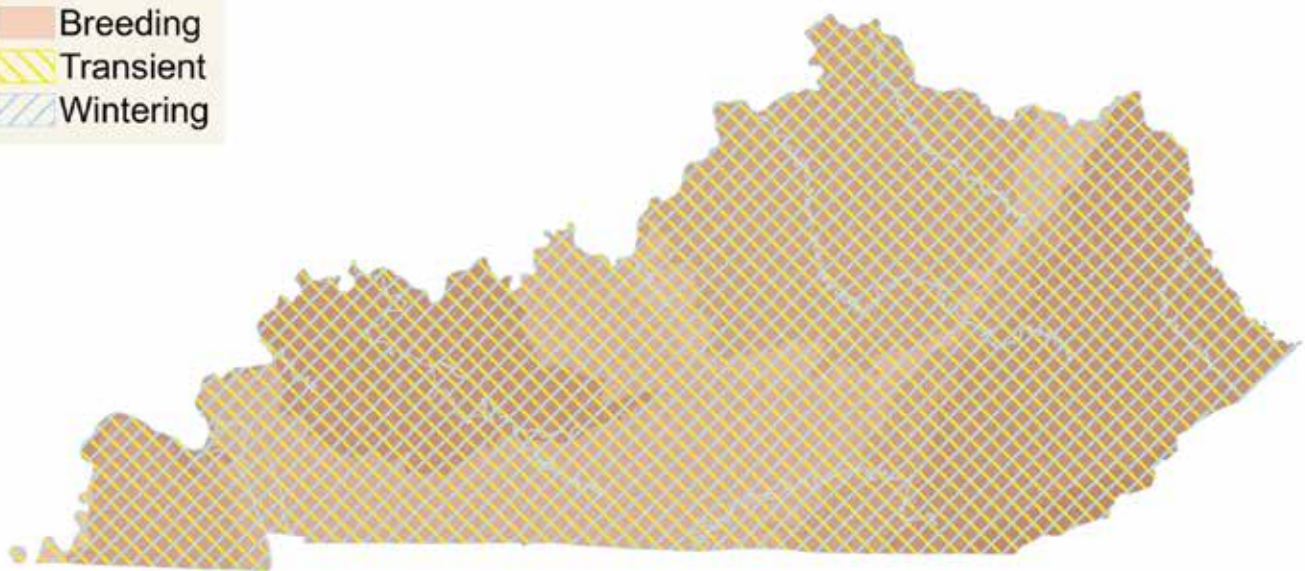


Photo: Jeff Sole



CERULEAN WARBLER

(*Setophaga cerulea*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S4B

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Increase the amount of diverse forest structure throughout the state. Fund conservation efforts on the wintering grounds. Reduce the frequency of mortality events caused by collisions.




Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest, Xeric Forest

This species uses mature deciduous forests in extensively forested areas and is often associated with small canopy gaps such as along ridges, river corridors, and roads. Ice storm, tornado and other weather damage can also create suitable canopy gaps, as well as logging/thinning. Cerulean Warblers tend to use white oak, cucumber magnolia, bitternut

Threats

-  Other Ecosystem Modifications
-  Residential and Commercial Development
-  Utility and Service Lines

Conservation Actions

- Awareness and Communications   
- Conservation Finance 
- Conservation Payments  
- Education and Awareness 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Invasive/Problematic Species Control 
- Training 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Support and Fund Expansion of the Motus Network in Kentucky

Management: Collaborate with partners to create tower strike incidental take permit

hickory, and sugar maple for nesting and foraging, typically avoiding red oak and red maple. Grapevines provide a favored source of nest material.

Range Map



Photo: Mark Lowry



PRAIRIE WARBLER

(*Setophaga discolor*)

Threats

- Other Ecosystem Modifications
- Residential and Commercial Development
- Utility and Service Lines

Conservation Actions

- Awareness and Communications
- Conservation Finance
- Conservation Payments
- External Capacity Building
- Habitat and Natural Process Restoration
- Training

Needs

Survey: Collect baseline species information

Management: Collaborate with partners to create tower strike incidental take permit

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S5B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve shrubland habitat quality and availability on public and private lands. Reduce the frequency of mortality events caused by collisions. Fund conservation efforts on the winter grounds.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Xeric Forest, Scrub-Shrub/Early Successional Forest

This species inhabits a variety of semi-open habitats, including reverting agricultural fields and pastures, regenerating forest clear-cuts and reclaimed strip mines. This species requires an early successional component, though it can be found in mature open woodlands. Although the species can be found in deciduous vegetation, it occurs most frequently in mixed community types where pines or red cedars are present.

Range Map

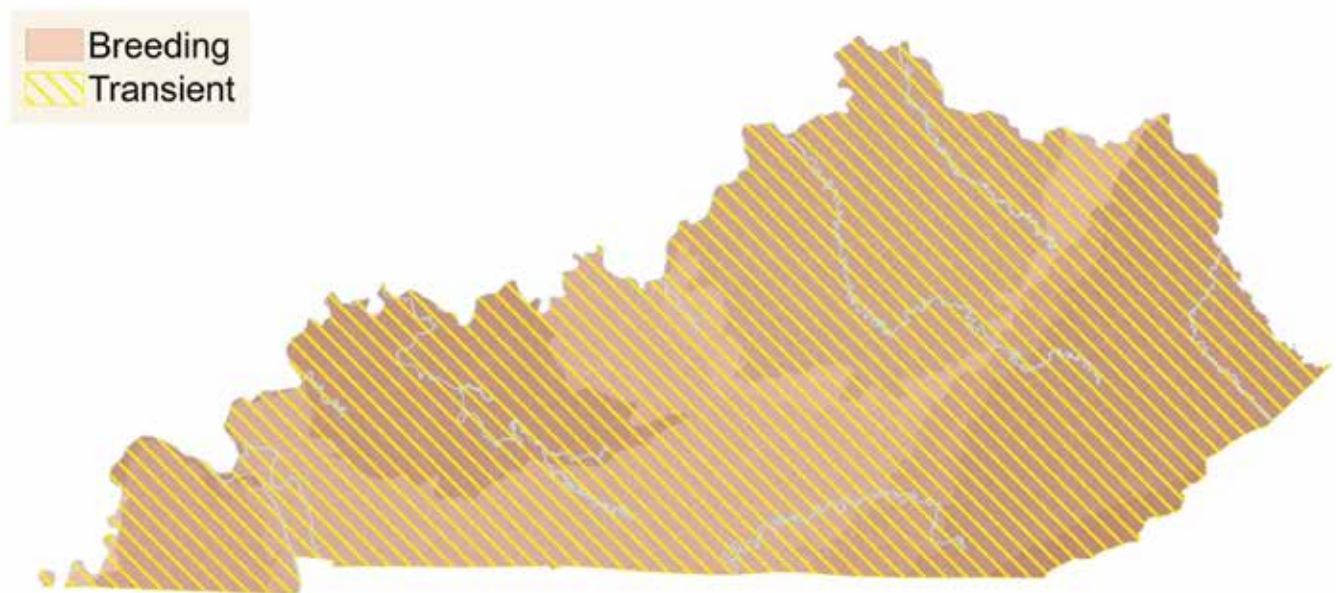


Photo: Mark Lowry



BLACKPOLL WARBLER

(*Setophaga striata*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: NT - Near threatened

North American Breeding Bird Survey records suggest an extreme decline of nearly 5% per year for Blackpoll warblers from 1966–2015, resulting in a cumulative decline of 92% during that time period. According to Partners in Flight, they are a common species in steep decline.

Conservation Goal




Increase the availability and quality of stopover habitat statewide. Fund conservation efforts on the wintering grounds. Reduce the frequency of mortality events caused by collisions.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain

Guilds: Mesic Forest, Xeric Forest, Suburban, Scrub-Shrub/Early Successional Forest

Threats

-  Other Ecosystem Modifications
-  Residential and Commercial Development
-  Utility and Service Lines

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications  
- Conservation Finance 
- Conservation Payments 
- External Capacity Building 

Needs

Survey: Collect baseline species information

Research: Support and Fund Expansion of the Motus Network in Kentucky

Management: Collaborate with partners to create tower strike incidental take permit

This migrant species is found statewide during the migration seasons in a variety of forested or shrubby habitats including mature evergreen and deciduous forest, woodlands, forest edges, scrubby thickets, parks and yards.

Range Map

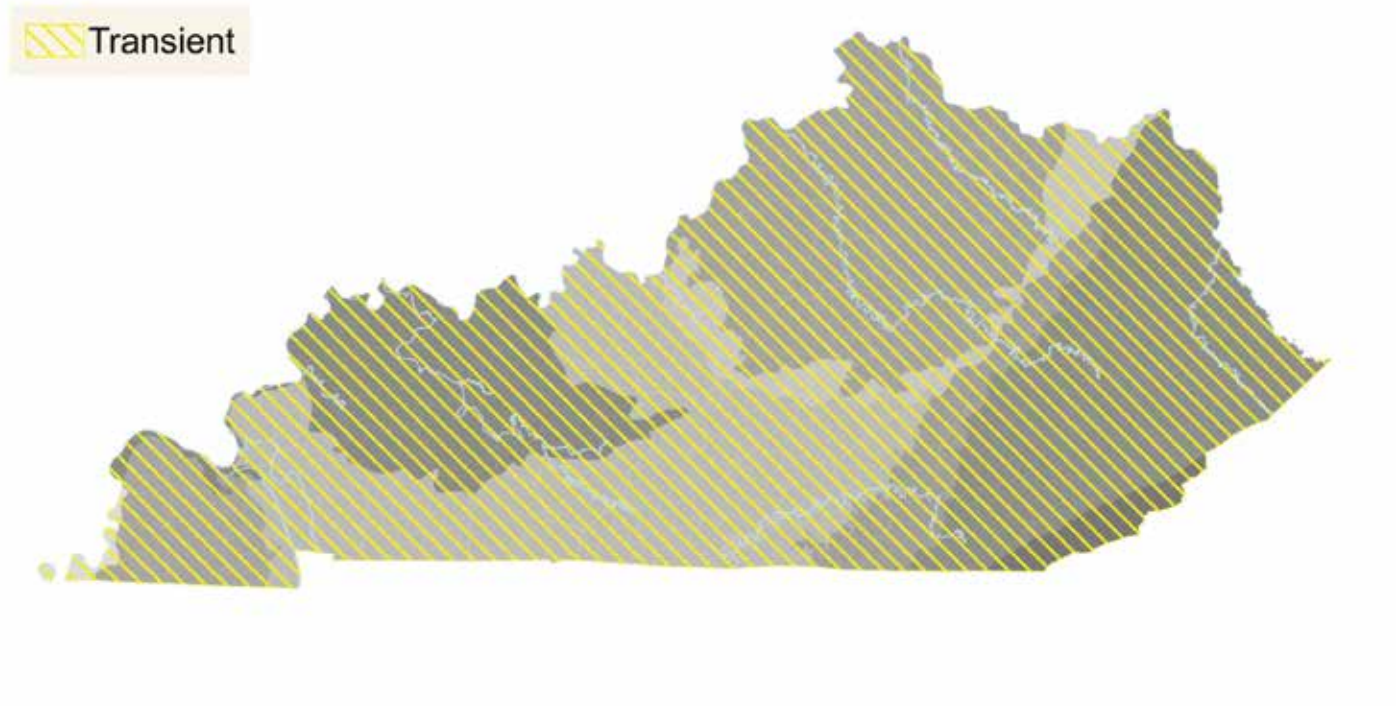





Photo: Mark Lowry









CAPE MAY WARBLER

(*Setophaga tigrina*)

Threats

-  Other Ecosystem Modifications
-  Residential and Commercial Development
-  Utility and Service Lines

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications  
- Conservation Finance 
- Conservation Payments 
- External Capacity Building 

Needs

Survey: Collect baseline species information

Research: Support and Fund Expansion of the Motus Network in Kentucky

Management: Collaborate with partners to create tower strike incidental take permit

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

According to the North American Breeding Bird Survey, Cape May Warbler populations declined by an estimated 2.5% per year from 1966 to 2015, resulting in a cumulative decline of 70% over that period. They are listed as a common bird in steep decline by Partners in Flight.

Conservation Goal

Increase the availability and quality of stopover habitat statewide. Fund conservation efforts on the wintering grounds. Reduce the frequency of mortality events caused by collisions.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills

Guilds: Mesic Forest, Xeric Forest, Suburban, Scrub-Shrub/Early Successional Forest

This migrant species is found in a variety of forested or shrubby habitats including mature forest and woodlands, forest edges, parks and yards. They are often observed in spruce and pine trees during migration.

Range Map



Photo: Mark Lowry



BLACK-THROATED GREEN WARBLER

(*Setophaga virens*)

Threats

- Invasive Non-native/Alien species
- Other Ecosystem Modifications
- Residential and Commercial Development
- Utility and Service Lines

Conservation Actions

- Awareness and Communications
- Conservation Finance
- Conservation Payments
- Invasive/Problematic Species Control

Needs

Survey: Collect baseline species information

Research: Hemlock Woolly Adelgid Research

Management: Collaborate with partners to create tower strike incidental take permit

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S4B

Federal Status: N/A

IUCN Red List: LC - Least concern

Declines for Black-throated Green Warblers have been documented over the past decade due to the Hemlock Woolly Adelgid.

Conservation Goal

Support the continued treatment of Eastern Hemlocks to control Hemlock Woolly Adelgid. Reduce the frequency of mortality events caused by collisions.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River

Valley And Hills, Mississippi Alluvial Plain, Mississippi
Valley Loess Plain

Guilds: Mesic Forest, Xeric Forest

This species is often found nesting in association with hemlock stands, although they are also found occasionally in deciduous or mixed pine hardwood forests. A variety of woodland and forest habitats are used during migration.

Range Map

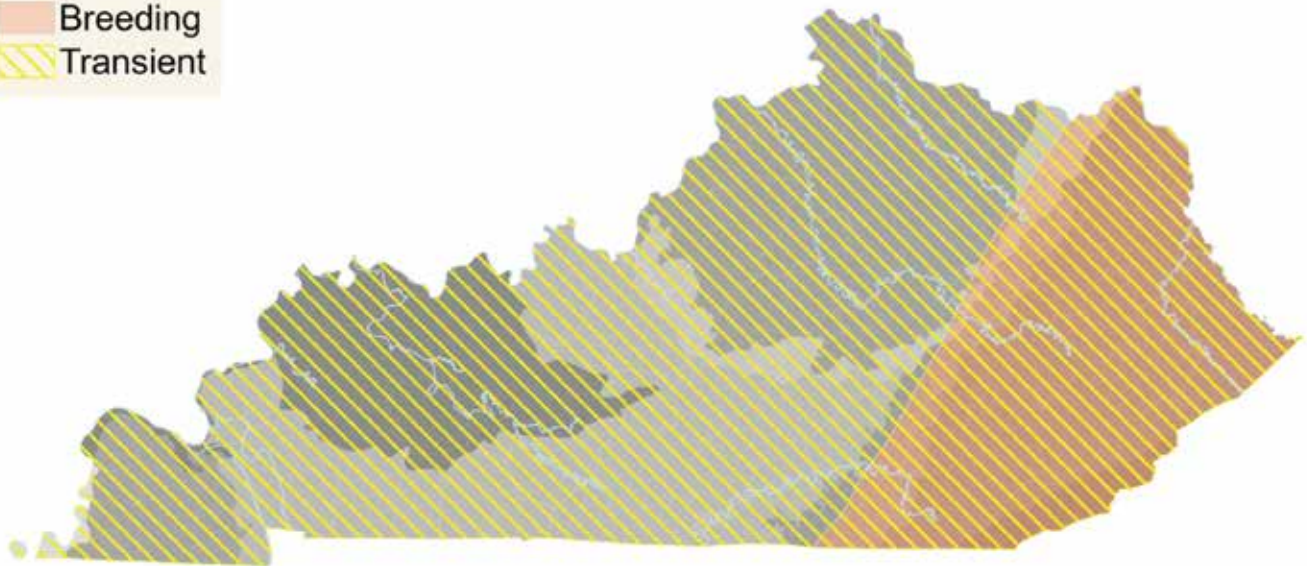








Photo: Mark Lowry



DICKCISSEL

(*Spiza americana*)

Threats

-  Agricultural and Forestry Effluents
-  Hunting and Collecting Terrestrial Animals
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Other Ecosystem Modifications
-  Utility and Service Lines

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications   
- Conservation Finance 
- Conservation Payments 
- Education and Awareness 
- Policies and Regulations 
- Resource and Habitat Protection 
- Training 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Analyze Data from Kentucky Quail Focal Areas Surveys

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Management: Collaborate with partners to create tower strike incidental take permit

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S4S5B

Federal Status: N/A

IUCN Red List: LC - Least concern

Kentucky Breeding Bird Survey data shows a decline in Dickcissels since 1966. Partners in Flight estimates a 14% decline for this species.

Conservation Goal

Improve grassland habitat quality and availability on public and private lands. Fund conservation efforts on the wintering grounds. Reduce the frequency of mortality events caused by collisions.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi

Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture

Dickcissels inhabit open habitats such as rural farmland, reclaimed strip mines, the unmowed margins of airports, restored native grasslands and other grassy fields such as lightly grazed pastures, hayfields, fallow agricultural fields, and even fencerows and roadsides. Agricultural fields with an abundance of forbs, such as fields of clover and alfalfa, as well as well as fields of small grains (especially wheat) may be used by this species.

Range Map

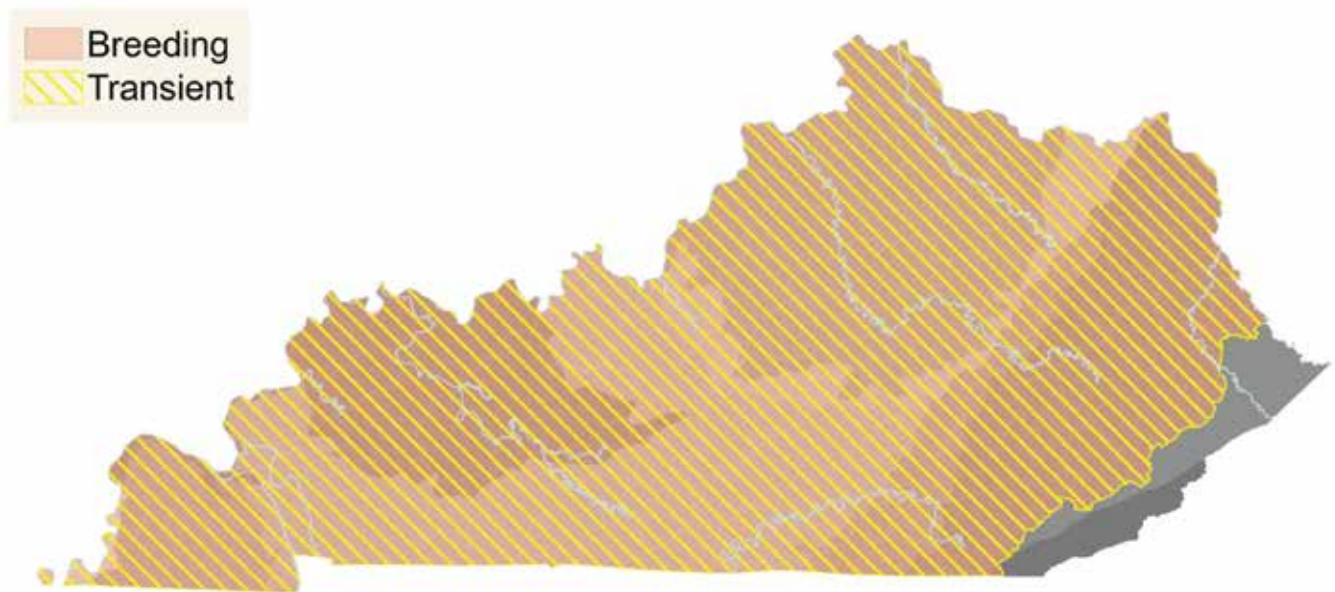


Photo: Mark Lowry



FIELD SPARROW

(*Spizella pusilla*)

Threats

- Invasive Non-native/Alien species
- Livestock Farming and Ranching
- Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Payments
- External Capacity Building
- Resource and Habitat Protection
- Training

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S5B,S5N

Federal Status: N/A

IUCN Red List: LC - Least concern

Needs

Survey: Collect baseline species information

Research: Analyze Data from Kentucky Quail Focal Areas Surveys

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Research: Support and Fund Expansion of the Motus Network in Kentucky

Conservation Goal

Improve grassland habitat quality and availability on public and private lands.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture, Scrub-Shrub/Early Successional Forest

This species uses open habitats, such as idle agricultural fields and pastures, fencerows, road and forest edges, and openings in wooded areas. Perch availability is important within grassy habitat.

Range Map

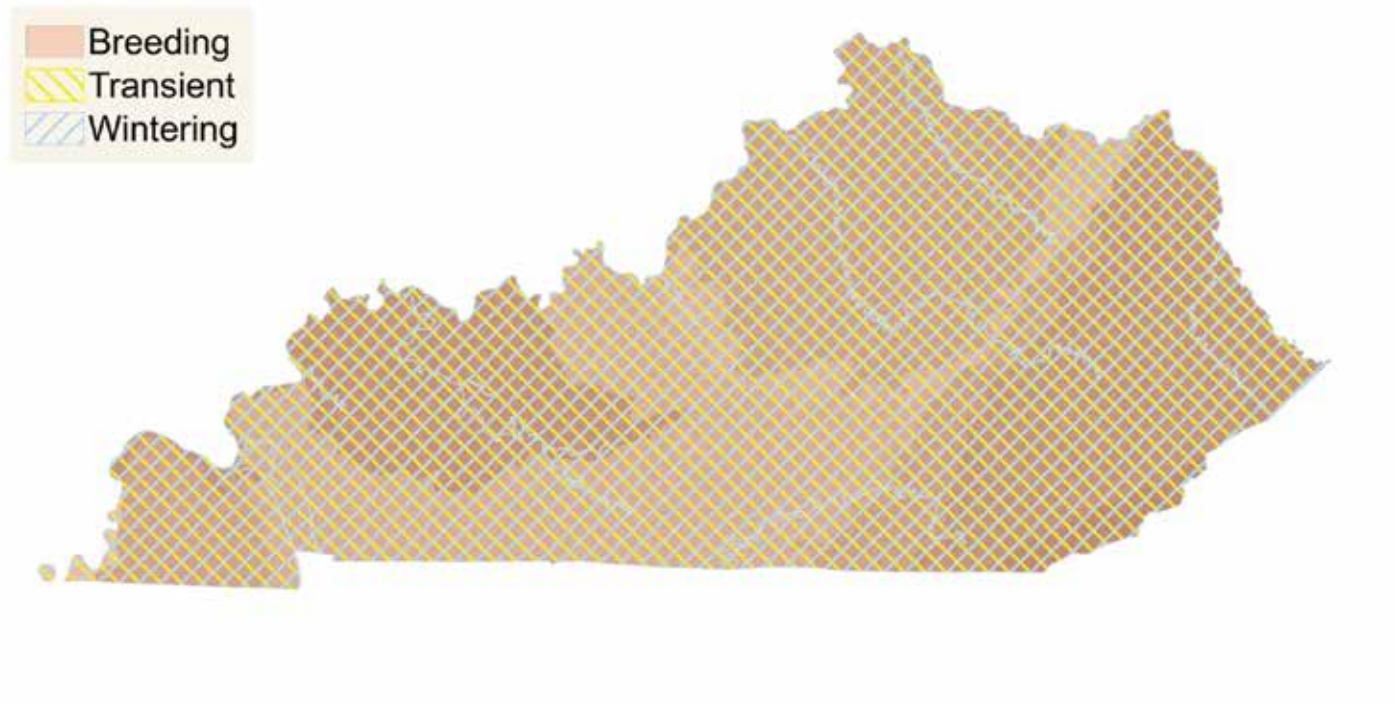


Photo: Jeff Sole



INTERIOR LEAST TERN

(*Sternula antillarum athalassos*)

Conservation Profile

Priority Group: High

KNP Info






G Rank: G4T3Q

S Rank: S1S2B



Federal Status: Delisted

IUCN Red List: N/A

Threats

-  Other Ecosystem Modifications
-  Problematic Native Species
-  Recreational Activities
-  Shipping Lanes
-  Storms and Flooding

Conservation Actions

- Awareness and Communications 
- Compliance and Enforcement 

Needs

Survey: Collect baseline species information

Research: Support and Fund Expansion of the Motus Network in Kentucky

Conservation Goal

Minimize disturbances in the nesting areas of interior least terns.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: River/Streams, Floodplain/Sandbar, Agriculture

This species nests in colonies on open beaches or islands on large rivers. Sparse or absent vegetation is needed on islands for nesting.

Range Map

Breeding

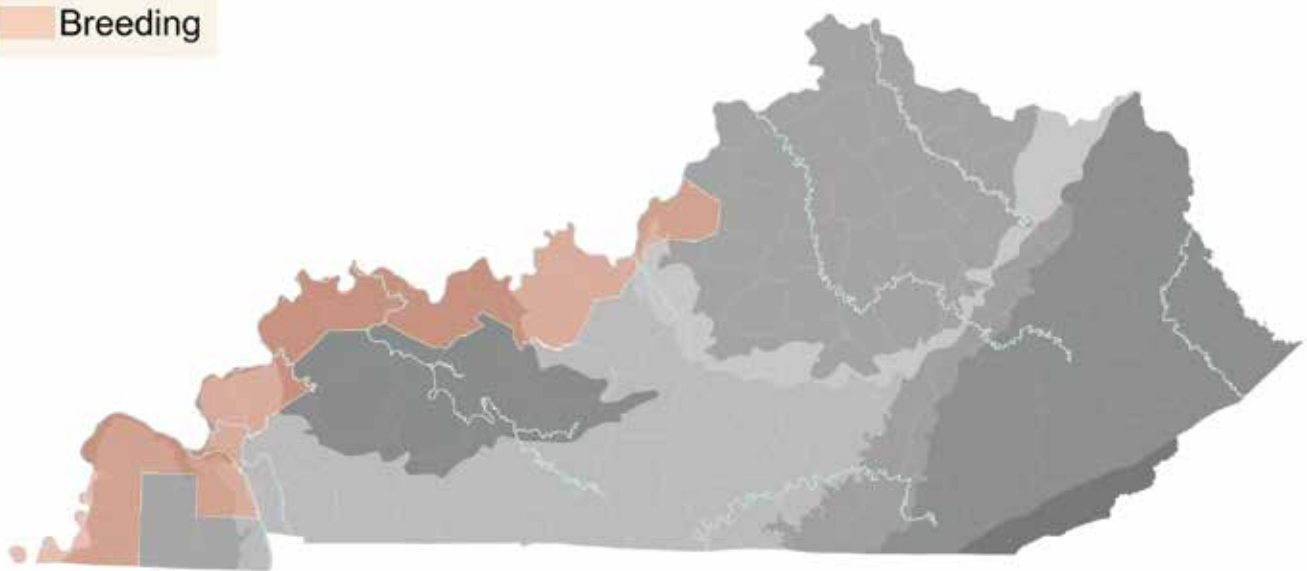





Photo: Mark Lowry



EASTERN MEADOWLARK

(*Sturnella magna*)

Threats

-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development  
- Awareness and Communications  
- Conservation Payments 
- External Capacity Building 
- Resource and Habitat Protection 
- Training 

Needs

Survey: Collect baseline species information

Research: Analyze Data from Kentucky Quail Focal Areas Surveys

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Research: Support and Fund the Southern Grassland Bird Collaborative

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S5B,S5N

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Improve grassland habitat quality and availability on public and private lands. Conduct or support research on the effects of pesticide and fungicide use on bird populations.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture

This species is found year-round in grasslands, prairies, pastures, hayfields, agricultural fields, airports, and other grassy areas. In Kentucky, this species tends to be associated with cool season grasses.

Range Map

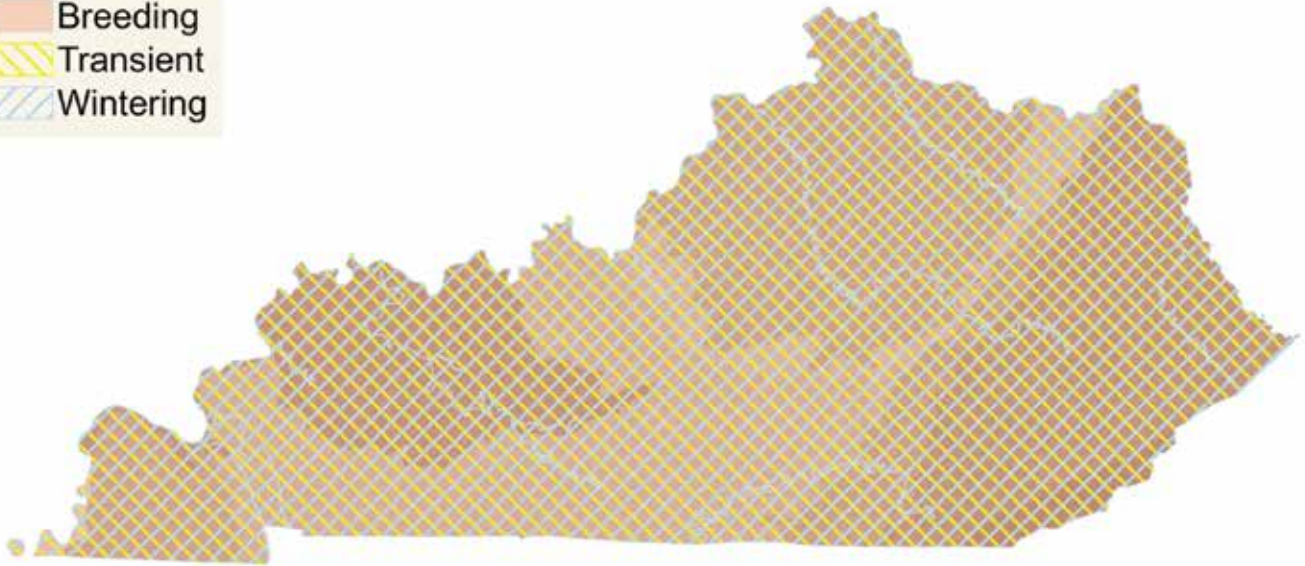




Photo: Don Martin



BEWICK'S WREN

(*Thryomanes bewickii*)

Threats

-  Agricultural and Forestry Effluents
-  Invasive and Other Problematic Species and Genes

Conservation Actions

Policies and Regulations 

Needs

Survey: Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)

Research: Conduct or support research on the effects of pesticide and fungicide use on bird populations

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SHB

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Conduct or support research on the effects of pesticide and fungicide use on bird populations. Evaluate potential policy changes in pesticide and fungicide use at state wildlife management areas.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Agriculture, Scrub-Shrub/Early Successional Forest

This species formerly inhabited natural forest openings, but was more recently found in altered habitats. These wrens used rural farmland, suburban yards, brushy forest margins, and forest clear-cuts during the nesting season.

Range Map

Historic Only

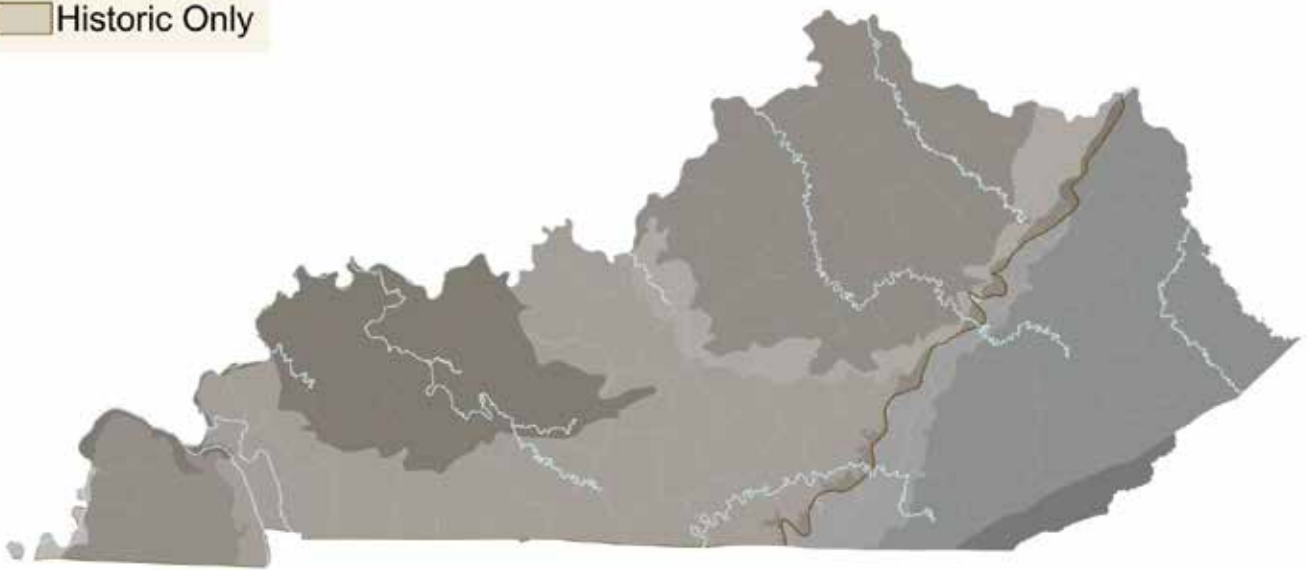


Photo: Hunter Wells



LESSER YELLOWLEGS

(*Tringa flavipes*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands. Fund conservation efforts on the wintering grounds.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

This species uses a wide variety of wetlands, including mudflats, marshes, lake and pond edges, wet meadows, sewage ponds, and flooded agricultural fields.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Climate Change and Severe Weather
- Dams and Water Management/Use
- Hunting and Collecting Terrestrial Animals
- Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Finance
- Conservation Payments
- External Capacity Building
- Resource and Habitat Protection
- Site/Area Management
- Training

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

Research: Support and Fund Expansion of the Motus Network in Kentucky

Range Map

 Transient



Photo: Lee Payne



SOLITARY SANDPIPER

(*Tringa solitaria*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve shorebird habitat quality and availability on public and private lands. Fund conservation efforts on the wintering grounds.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

This species uses muddy margins of lakes and ponds, muddy banks of urban streams, farm puddles, drainage ditches, forested ponds and lakes. They are more often found in wet areas bordered by trees.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Climate Change and Severe Weather
- Dams and Water Management/Use
- Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Finance
- Conservation Payments
- External Capacity Building
- Resource and Habitat Protection
- Site/Area Management
- Training

Needs

Survey: Collect baseline species information

Research: Evaluate and support research on the impacts of climate change on shorebird populations

Range Map

 Transient

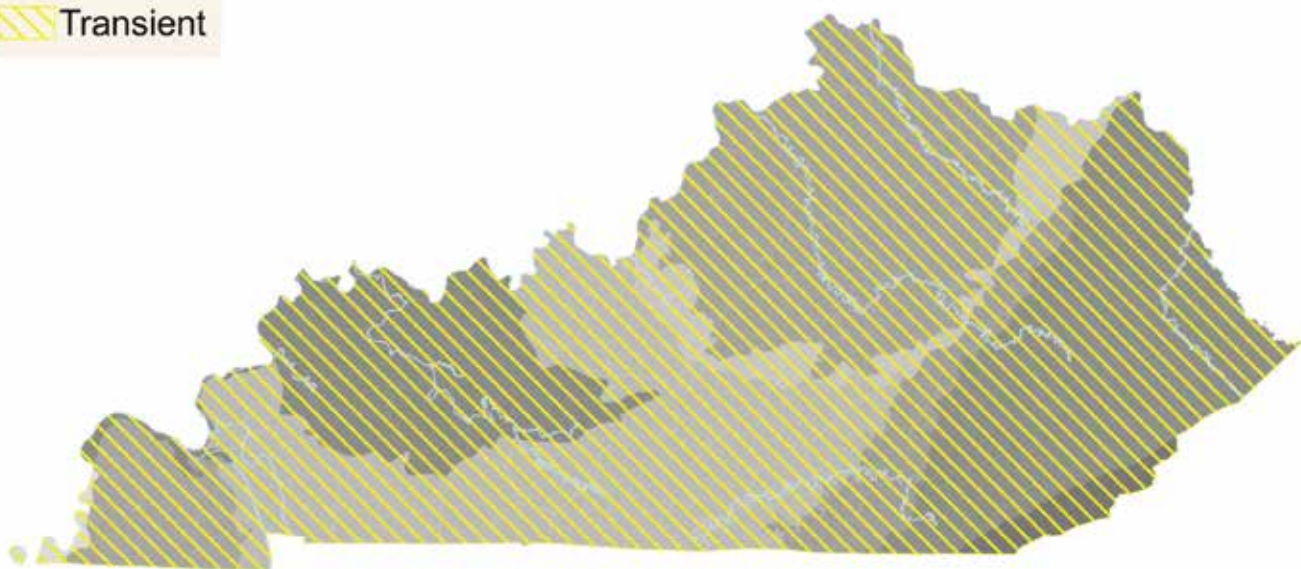


Photo: Mark Salsman



BARN OWL

(*Tyto alba*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve grassland habitat quality and availability on public and private lands. Monitor for exposure to diseases, pesticides, rodenticides, and other contaminants.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Open Wetland, Agriculture, Suburban

This species inhabits a variety of open habitats, including farmland, grassland, fallow fields, hayfields, pasture, open marshes, savannah, and to some extent, cropland. This species will nest in grain bins/silos, hunting blinds, building crevices, haylofts,

Threats

- Agricultural and Forestry Effluents
- Livestock Farming and Ranching
- Pathogens and Microbes
- Problematic Native Species
- Recreational Activities
- Roads and Railroads
- Utility and Service Lines

Conservation Actions

- Awareness and Communications
- Conservation Finance
- Education and Awareness
- External Capacity Building
- Resource and Habitat Protection
- Site/Area Management
- Training

Needs

Survey: Collect baseline species information

Research: Conduct research on genetics

Research: Monitor for exposure to pesticides, rodenticides and other contaminants

Research: Monitor for prevalence and severity of diseases

chimneys, hollow trees, rock shelters, bridges and other structures. Many nests are in nest boxes on such structures, managed by the department.

Range Map

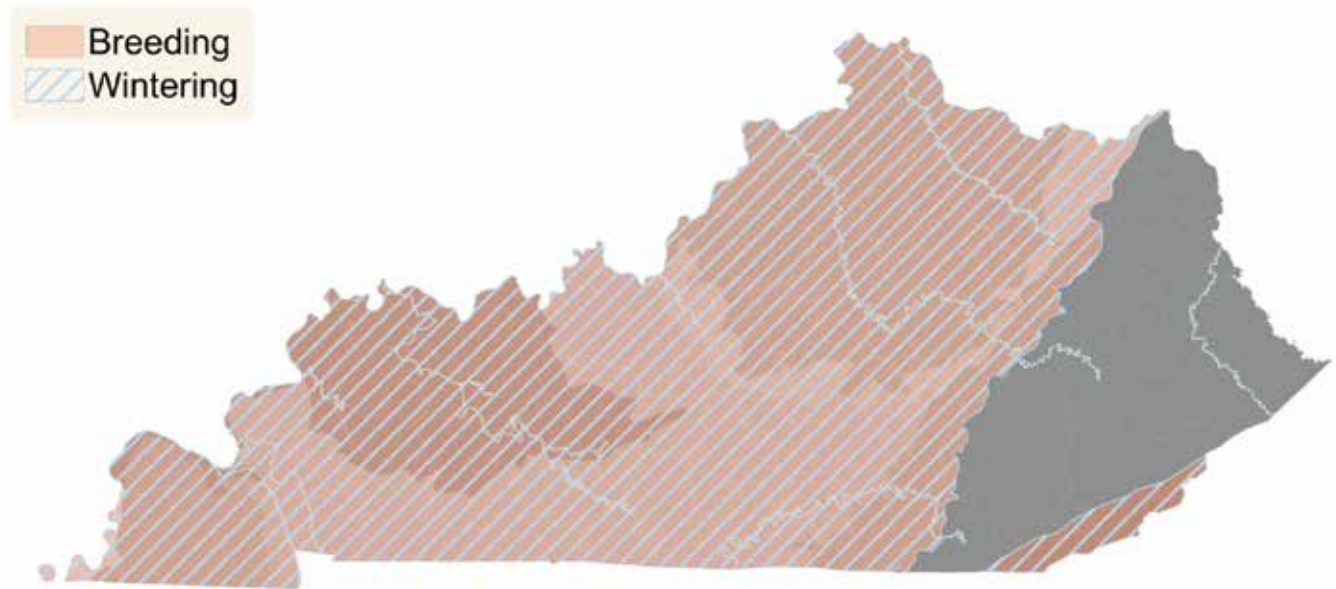


Photo: Jeff Sole



GOLDEN-WINGED WARBLER

(*Vermivora chrysoptera*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4

S Rank: S1B

Federal Status: Not Listed

IUCN Red List: NT - Near threatened

Conservation Goal

Improve early successional on high elevation sites.
Fund conservation efforts on the winter grounds.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Scrub-Shrub/Early Successional Forest

This species nests in early successional habitats, within a forested matrix with a predominance of shrubs or small trees. Golden-winged warblers most commonly occur on reclaimed surface coal mine lands, utility corridors, old fields and clearcuts <20 years old at higher elevations in eastern KY (Elevation 1500-3000 ft+). Territories are usually characterized by a mixture of native and non-native grasses and forbs, patchily distributed shrubs, and

Threats

- Fire and Fire Suppression
- Invasive Non-native/Alien species
- Other Ecosystem Modifications
- Problematic Native Species
- Residential and Commercial Development
- Utility and Service Lines

Conservation Actions

- Alliance and Partnership Development
- Awareness and Communications
- Conservation Finance
- Conservation Payments
- Habitat and Natural Process Restoration
- Invasive/Problematic Species Control

Needs

Survey: Golden Winged Warbler Survey

Research: Support and Fund Expansion of the Motus Network in Kentucky

Research: Support research to identify causes of decline

Management: Collaborate with partners to create tower strike incidental take permit

occasional saplings or small trees. The presence of a dense layer of herbaceous vegetation below shrubs and small trees appears to be critical.

Range Map



Photo: Mark Lowry



BLUE-WINGED WARBLER

(*Vermivora cyanoptera*)

Threats

- Other Ecosystem Modifications
- Residential and Commercial Development
- Utility and Service Lines

Conservation Actions

- Awareness and Communications
- Conservation Finance
- Conservation Payments
- Invasive/Problematic Species Control
- Training

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S4S5B

Federal Status: N/A

IUCN Red List: LC - Least concern

Needs

Survey: Collect baseline species information

Management: Collaborate with partners to create tower strike incidental take permit

Conservation Goal

Improve the diversity and quality of forest structure, including early successional habitat, on public and private lands. Fund conservation efforts on the winter grounds.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Scrub-Shrub/Early Successional Forest

This species nests in early successional habitats within a forested matrix including natural forest openings, woodland borders, overgrown fields, reclaimed strip mines, powerline right-of-ways and regenerating forest clear-cuts. This species requires plentiful small trees, shrubs, in combination with a dense, grassy herbaceous undergrowth.

Range Map

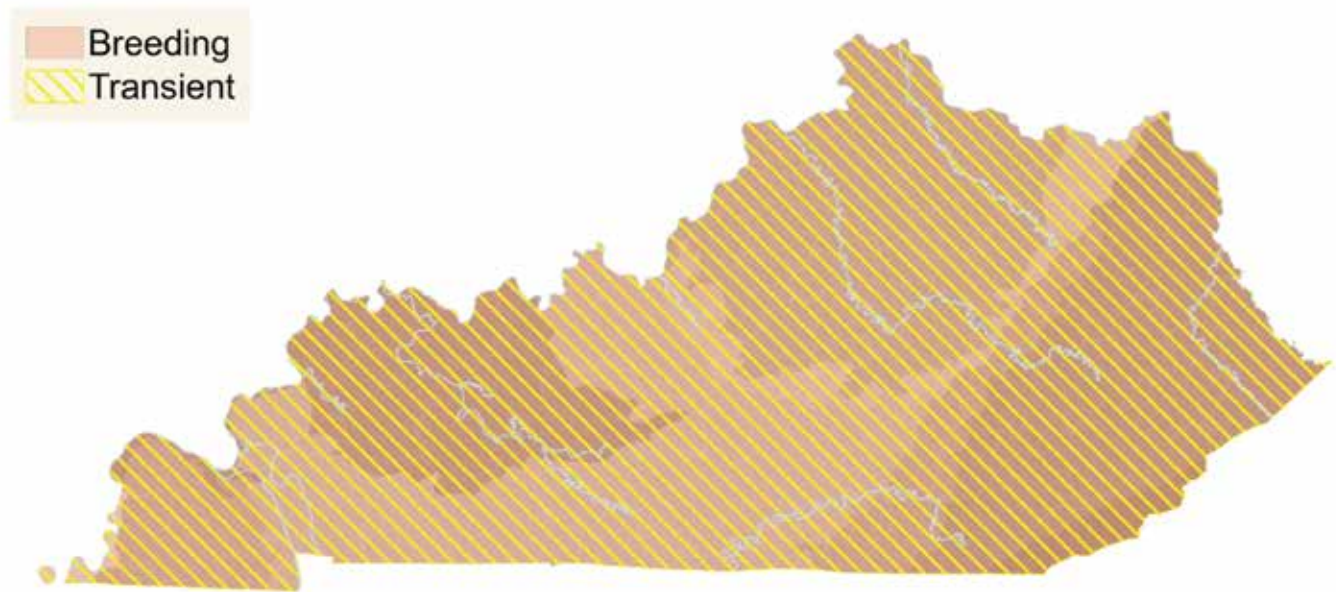


Photo: Rickey Shive



BELL'S VIREO

(*Vireo bellii*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S2S3B

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Improve shrubland habitat quality and availability on public and private lands. Reduce the frequency of mortality events caused by collisions and feral cats. Fund conservation efforts on the wintering grounds.





Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain






Guilds: Grassland/Savannah, Scrub-Shrub/Early Successional Forest

This species nests in large tracts of early successional habitat dominated by deciduous shrubs and small trees. They occur in high abundance on reclaimed surface mines on Peabody Wildlife Management Area and the Wendell H. Ford Regional Training Center.

Threats

-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Other Ecosystem Modifications
-  Residential and Commercial Development

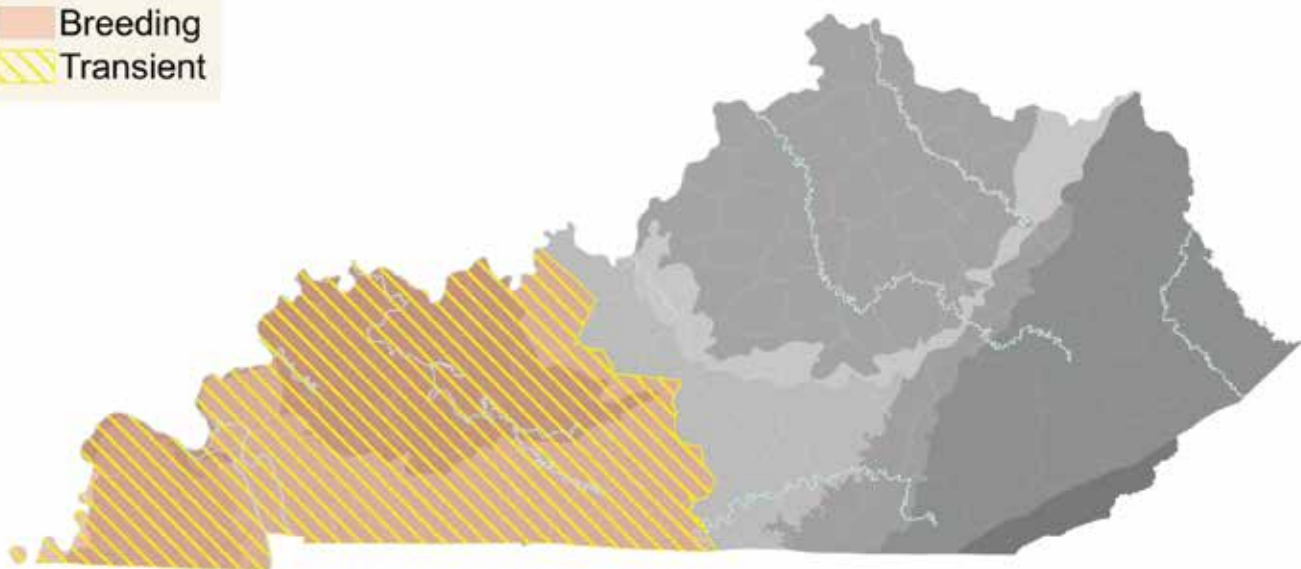
Conservation Actions

- Awareness and Communications  
- Conservation Finance 
- Conservation Payments 
- Training 

Needs

Survey: Collect baseline species information

Range Map



CRUSTACEANS

Introduction

The crustacean fauna of Kentucky includes a diverse assemblage of taxa including crayfishes, amphipods, isopods, and shrimps. For the 2023 State Wildlife Action Plan, 95 taxa were evaluated for inclusion as Species of Greatest Conservation Need. This is not a complete list of crustaceans found within Kentucky. For some crustacean groups, specifically amphipods, isopods, and shrimps, basic research on the fauna is lacking. As a result, data that were available for the Crustacean Taxa Team to evaluate were limited to observational records provided to KDFWR and OKNP. As the bulk of crustacean records are crayfishes, the treatment of amphipods, isopods, and shrimps should not be considered comprehensive. This underscores the need to secure additional funding for basic research on the crustacean biology in Kentucky. Crayfishes, which have been the most studied group of crustaceans in the state, also suffer from a lack of information required by managers to properly initiate conserve efforts.

At present, 62 crayfish species have been reported from Kentucky. Since the publication of *The Crayfishes of Kentucky* in 2004 by Taylor and Schuster, 17 crayfish species that occur within the state have been described or redescribed. While the recent taxonomic studies undertaken have improved our understanding of Kentucky's native crayfish fauna, multiple cryptic species, or species complexes, are still presumed based upon anecdotal evidence available. As a result, species with uncertain taxonomic statuses in the state (for example *Cambarus jezerinaci*, *C. parvocolus*, and *C. dubius*) or species thought to a part of an undescribed species complex (i.e. *Faxonius rusticus*, *C. deweesae*, and *C. rusticiformis*) were treated as Data Deficient thereby making the collection of additional data a priority.

The initial Comprehensive Wildlife Conservation Strategy completed in 2005 did not include crustaceans. As a part of the 2013 revision, 25 crustaceans were included as Species of Greatest Conservation Need.

The 2023 Wildlife Action Plan (Plan) includes 50 crustacean SGCN that were selected by a team of professionals and scholars with expert knowledge of Kentucky's crustacean fauna. One species of crayfish (Big Sandy Crayfish) and one species of shrimp (Mammoth Cave Shrimp) found in Kentucky are listed under the federal Endangered Species Act. Twenty-eight species were designated "data deficient" because they lack sufficient distributional data and basic life history information to make an informed conservation status

assessment. All crustacean taxa listed as SGCN in the 2013 revision were included in the current SGCN list.

Crustaceans inhabit a variety of habitats in Kentucky. Most of the crustaceans listed as SGCN (31 species or 62%) inhabit lotic systems (streams and rivers), a small proportion (5 species or 10%) inhabits lentic systems (wetlands, ponds, and lakes), seven species (14%) are considered terrestrial/burrowing crayfish, and seven species (14%) are restricted to subterranean (cave) systems.

The distributional status of each crustacean SGCN in Kentucky is depicted in a range map showing current or presumed range at the county or 10-12 digit HUC watershed scales. Ranges for lentic and terrestrial species were delineated using county boundaries while ranges for lotic and subterranean species were delineated using watershed boundaries. All occurrence records of SGCN are maintained in the Kentucky Fish and Wildlife Information System database and underwent extensive review before being incorporated into the range maps. Records having questionable identifications or other



High quality stream habitat in eastern Kentucky. Use of streams by native crayfish can be a good indicator of high water quality. Photo: KDFWR

errors were not included in the maps unless they could be verified and corrected.

Twenty crustacean SGCN are considered endemic to Kentucky, many only being known from one stream or cave system. Additionally, many species complexes within the taxonomic group may ultimately result in the discovery of additional Kentucky endemics. This high level of endemism results in these species being particularly vulnerable to anthropogenic impacts and stochastic events.

Threats to crustaceans identified by the taxa team include Agriculture and Aquaculture, Invasive Species and Other Problematic Species and Genes, Energy Production and Mining, Residential and Commercial Development, Natural System Modification, Transportation and Service Corridors, Pollution, and Biological Resource Use. The greatest threats to crustaceans inhabiting lotic systems are sedimentation of aquatic systems (typically because of poor agricultural practices, residential and commercial development, and mineral extraction) and invasive species introductions. Many crustacean SGNC inhabiting lotic habitats require larger substrates (cobble/ boulder) as refugia. Sedimentation often results in the loss of suitable benthic habitat as interstitial areas in cobble/ boulder substrates become sediment traps. Additionally, movement of non-indigenous crayfish species between stream systems has the potential to impact crayfish SGCN via intraspecific competition and hybridization.

The conservation actions proposed to counteract threats to crustacean SGCN include: external capacity building; land and water protection; land and water management; livelihood, economic and other incentives; and law and policy. Given the varied needs of the multitude of species and their habitats, effective implementation of conservation actions will require forming alliances and partnerships with government agencies, nonprofits, universities, businesses, and communities. This includes incorporating the SWAP into local development plans. Further, for most lotic species of crayfishes, amending existing regulations to reduce the potential for bait bucket introductions of invasive crayfish species was often identified as a critical action to undertake. For species impacted by sedimentation, utilization of conservation payments and stream restoration efforts will be key to future management efforts.

For most crustacean SGCN, additional work is needed to determine population status, life history, and habitat requirements. For many species, genetic and morphometric analyses are needed to conduct taxonomic revision. While such work is lacking for many crayfish species native to Kentucky, the paucity of basic biological data for the other groups of crustaceans found in Kentucky is even more stark. Collection of baseline population data and success monitoring throughout action implementation is critical to proper management of Kentucky's crayfish fauna.



High quality wetland habitat in western Kentucky. Wetland habitats are vital habitat for many SGCN and DD SGCN crayfish. Photo: KDFWR



Burrowing crayfish persist in this agricultural setting. Burrowing crayfish create a mud chimney excavated from an underground tunnel. Photo: KDFWR

Sources:

Couch, Zachary L., and Guenter A. Schuster. "Changes to Kentucky's Crayfish Fauna Since 2004 with an Updated Checklist of Kentucky Crayfish Species." *Journal of the Kentucky Academy of Science* 80.1 (2020): 38-46.

Hobbs Jr, Horton Holcombe. "An illustrated checklist of the American crayfishes (Decapoda, Astacidae, Cambaridae, Parastacidae)." (1989).

Mahala, M. 2008. Kentucky Aquatic Nuisance-Species Management Plan. Kentucky Dept. of Fish and Wildlife Resources Technical Publication. Frankfort, KY.

Rhoades, Rendell. "The crayfishes of Kentucky, with notes on variation, distribution and descriptions of new species and subspecies." *The American Midland Naturalist* 31.1 (1944): 111-149.

Taylor, Christopher A., and Guenter A. Schuster. "The crayfishes of Kentucky." *Illinois Natural History Survey Special Publication No. 28* (2004).

Taylor, Christopher A. "Systematic studies of the *Orconectes juvenilis* complex (Decapoda: Cambaridae), with descriptions of two new species." *Journal of Crustacean Biology* 20.1 (2000): 132-152.

Discovery of the Mowild Crayfish, a new species in an urban environment

Kentucky's crayfish fauna, although considered one of the most diverse assemblages in the world, has been historically understudied. Additionally, many crayfish species are endemic not only to the Commonwealth but are often more narrowly restricted to just a few streams. As a result of a study conducted by Kentucky Department of Fish and Wildlife Resources (KDFWR) biologists, a new species of crayfish was discovered and added to the growing list of crustacean Species of Greatest Conservation Need.

A prior study of the Louisville Crayfish (*Faxonius jeffersoni*) indicated, based upon morphological differences, that populations of the species found in southern Louisville may be an undescribed species. Unfortunately, that study lacked funding to complete the necessary genetic analysis to elucidate the taxonomy of *F. jeffersoni*. In 2017, a collaborative project between KDFWR and Eastern Kentucky University (EKU) was initiated. Biologists with KDFWR began collecting tissue samples and morphological data from crayfish specimens throughout the purported range of *F. jeffersoni*. A professor and his students at EKU would be responsible for analyzing the genetic data from the tissue samples. The results of genetic and morphometric analyses concluded that a previously undiscovered crayfish occurred in the Pond Creek drainage of southern Jefferson and northern Bullitt counties.

A formal description of the species was published in a peer-reviewed scientific journal in 2022. The scientific name (*Faxonius elix*) refers to the significant amount of stream channelization that has occurred throughout the species narrow range (elix means ditch or trench in latin). The naming rights for the common name were sold via an online auction to raise funds for conservation of the species. The common name, the Mowild Crayfish, is the result of a partnership between KDFWR and a local social media developer.

The Mowild Crayfish inhabits a few small to medium sized perennial streams. Despite the significant anthropogenic impacts to the streams throughout the species range, the Mowild crayfish continues to occupy sites where substrate (cobble and bedrock fissures) is available for cover. However, many stream reaches have been heavily impacted by upland conversion to an urban environment which has increased sedimentation. Further, one invasive crayfish species has been observed in some portions of the species range where it seems to be outcompeting the Mowild Crayfish for resources.

Funding for the initial study were made possible through State Wildlife Grant (SWG) funding as well as



Mowild Crayfish Photo.: Price Sewell



Degraded habitat still occupied by the Mowild Crayfish. Photo: KDFWR

the Kentucky Wild Program. Since its discovery and description, the Mowild Crayfish has been added to Kentucky's list of Species of Greatest Conservation Need. Additional monitoring projects and conservation efforts are expected to be initiated over the next decade to manage the species into the future.

CRUSTACEAN PROFILE PAGES

Photo: Guenter Schuster



BOTTLEBRUSH CRAYFISH

(*Barbicambarus cornutus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.




Habitat Associations

Current Watersheds: Barren, Upper Green





Stream Type: Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Uses larger streams and rivers and lives under or near large, flat cobbles or boulders that are free of silt. Juveniles are not as reliant on large rocks.

Threats

-  Annual and Perennial Nontimber Crops
-  Dams and Water Management/Use
-  Invasive Non-native/Alien species

Conservation Actions

- External Capacity Building  
- Habitat and Natural Process Restoration 
- Policies and Regulations 

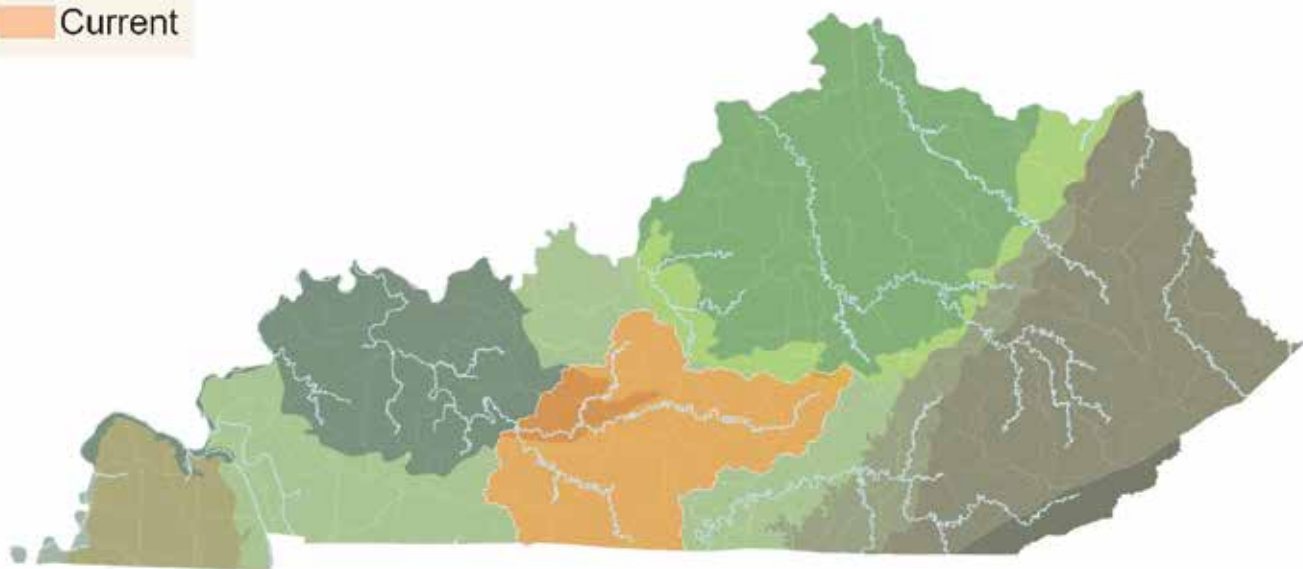
Needs

Survey: Collect baseline species information

Survey: Continued monitoring for non-native species introduction

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: EN - Endangered

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Lower Kentucky

Guilds: Cave/Karst

Found in small, subterranean streams and pools. Previously only known from Clifton Cave in Woodford County, before the cave entrance was sealed. The only other locality is a spring across the valley from Clifton Cave.

CLIFTON CAVE ISOPOD

(Caecidotea barri)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Range Map

Current

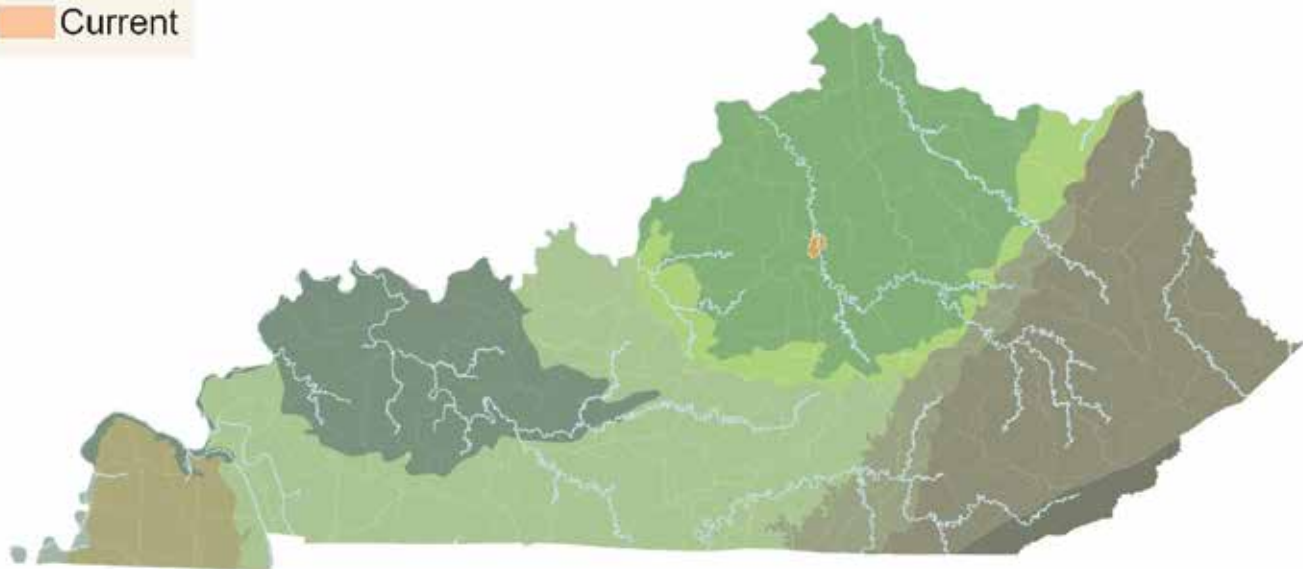


Photo: Guenter Schuster



SWAMP DWARF CRAYFISH

(*Cambarellus puer*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

There are very few records for the Swamp Dwarf Crayfish in Kentucky. Additional survey work is needed.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Physiographic Regions: Mississippi Valley Loess Plain

Guilds: Forested Wetland

Occurs in forested wetlands, cypress swamps, sloughs, sluggish streams, roadside ditches and lowlands (including drained wetlands) on the Mississippi Alluvial Plain, usually among living or dead vegetation (Page 1985). Will burrow during dry periods. Is tolerant of warm water and low dissolved oxygen levels, but seems to require submergent vegetation.

Range Map

Current

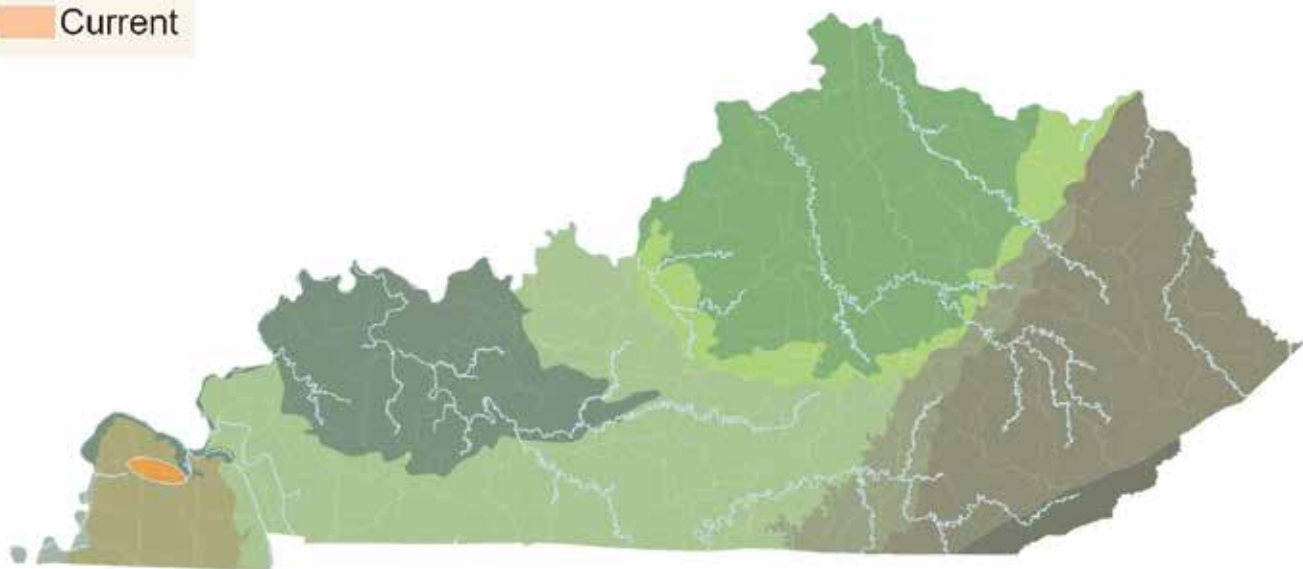


Photo: Guenter Schuster



CAJUN DWARF CRAYFISH

(*Cambarellus shufeldtii*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S2S3

Federal Status: N/A

IUCN Red List: LC - Least concern

There are very few records for the Cajun Dwarf Crayfish in Kentucky. Additional survey work is needed.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

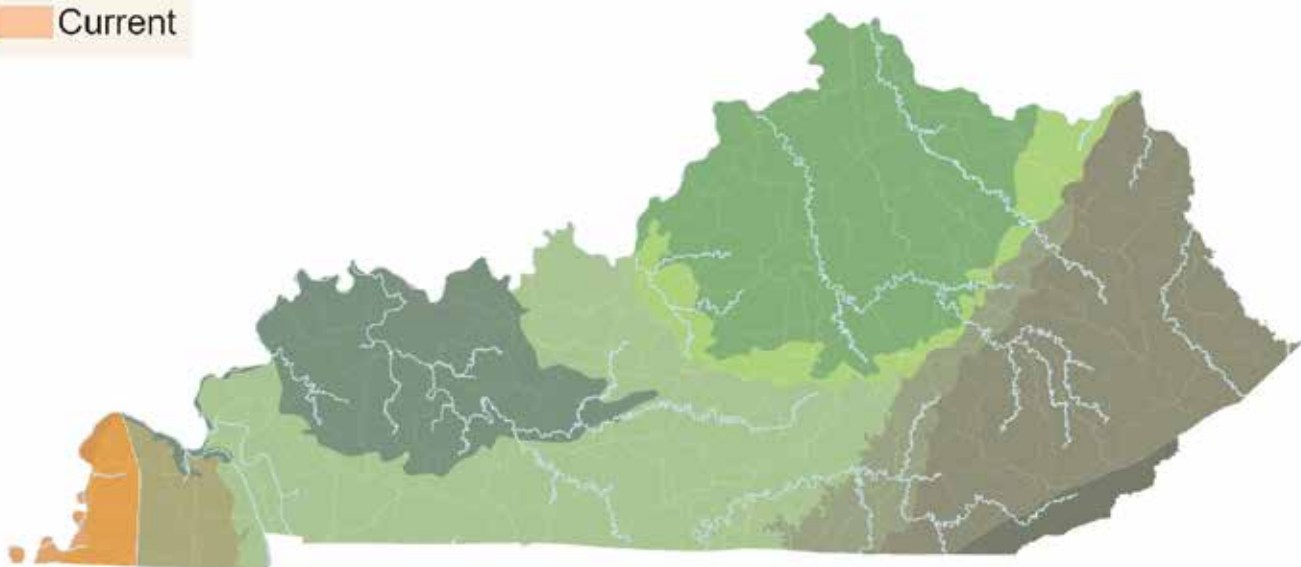
Current Watersheds: Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Ohio, Obion

Guilds: Forested Wetland, Open Wetland, Lake/Pond

"Prefers sluggish to stanging water and is tolerant of elevated temperatures. Typically found in vegetated wetlands with soft mud substrates, such as swamps and sloughs. Also known from ditches, ponds, lakes and river floodplains of rivers on the coastal plain. May burrow to survive droughts.

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: GNR

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Increase habitat management on public and private lands. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Knobs



Guilds: Grassland/Savannah, Mesic Forest, Agriculture, Suburban

Primary burrower. Sparse records are known from floodplain areas adjacent to small to medium sized streams, and from a roadside ditch.



DUSKY MUDBUG

(*Cambarus adustus*)

Threats

-  Annual and Perennial Nontimber Crops
-  Residential and Commercial Development

Conservation Actions

- External Capacity Building 
- Site/Area Protection 

Needs

Survey: Collect baseline species information

Survey: Continued monitoring for new populations

Range Map

Current

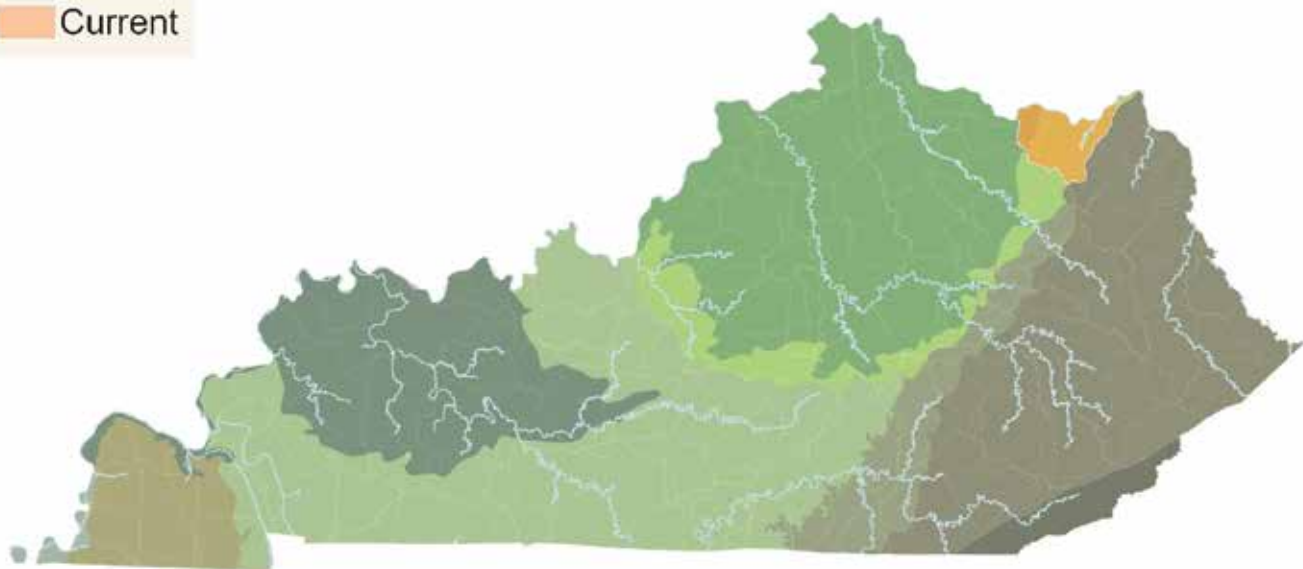


Photo: Guenter Schuster



APPALACHIAN BROOK CRAYFISH

(*Cambarus bartonii cavatus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5T5

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Barren, Big Sandy, Blue-Sinking, Licking, Little Sandy, Little Scioto-Tygarts, Lower Green, Lower Kentucky, Lower Levisa, Lower Ohio-Little Pigeon, Middle Fork Kentucky, Middle Ohio-Laughery, North Fork Kentucky, Obey, Ohio Brush-Whiteoak, Rockcastle, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Tug, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky, Upper Levisa

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

Most often associated with small headwater streams and very small spring-fed headwaters as well as creeks that go dry during the summer months.

Range Map

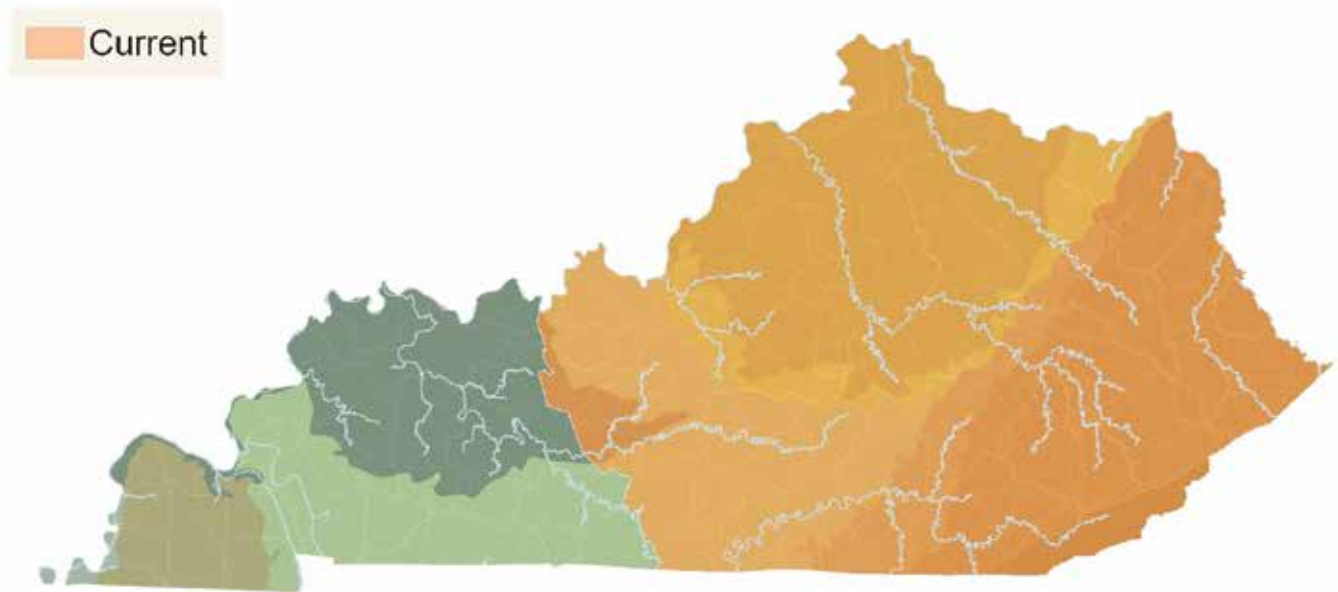


Photo: Guenter Schuster



APPALACHIAN BROOK CRAYFISH

(*Cambarus bartonii cavatus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5T5

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Barren, Big Sandy, Blue-Sinking, Licking, Little Sandy, Little Scioto-Tygarts, Lower Green, Lower Kentucky, Lower Levisa, Lower Ohio-Little Pigeon, Middle Fork Kentucky, Middle Ohio-Laughery, North Fork Kentucky, Obey, Ohio Brush-Whiteoak, Rockcastle, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Tug, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

Most often associated with small headwater streams and very small spring-fed headwaters as well as creeks that go dry during the summer months.

Range Map

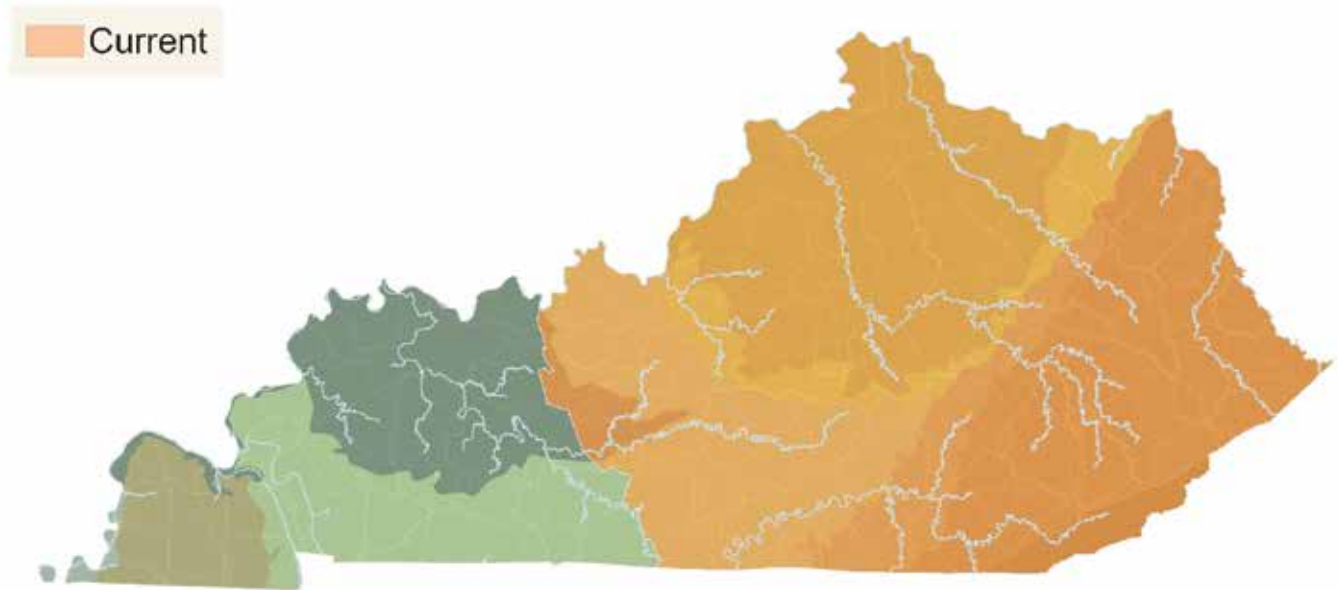


Photo: Guenter Schuster



BLUEGRASS CRAYFISH

(*Cambarus batchi*)

Conservation Profile

Priority Group: High

KNP Info



G Rank: G3

S Rank: S3





Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Annual and Perennial Nontimber Crops
-  Residential and Commercial Development

Conservation Actions

- External Capacity Building 
- Site/Area Management  
- Site/Area Protection 

Needs

Survey: Collect baseline species information

Survey: Surveys in Pulaski and Jackson counties for new populations

Conservation Goal

Increase habitat management on public and private lands. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Bluegrass

Guilds: Forested Wetland, Grassland/Savannah, Agriculture, Suburban

Constructs burrows in hydric soils with an underlying clay fragipan. Also known from wet meadows and upland hay fields with poor drainage.

Range Map

Current

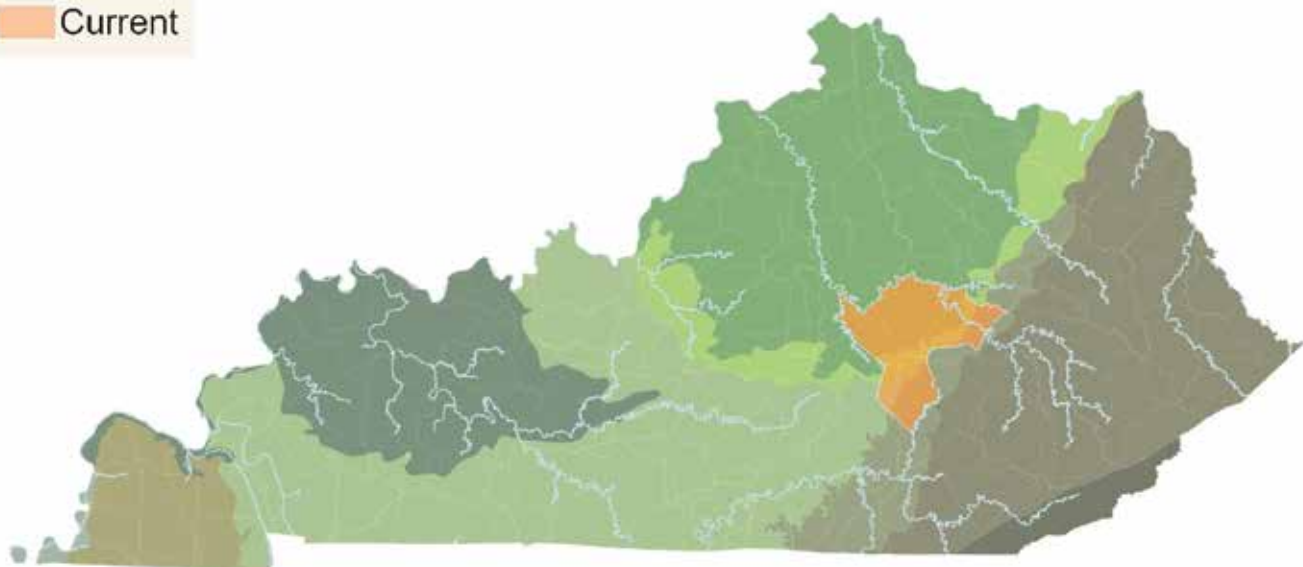


Photo: Guenter Schuster



BIG SOUTH FORK CRAYFISH

(*Cambarus bouchardi*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2

S Rank: S1S2

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: South Fork Cumberland

Stream Type: Warm-Medium Gradient-Small River

Habitat highly variable, including boulder runs and silty pools of streams with moderate current, and vegetation clumps in heavily silted areas from the headwaters to the stream mouth. Typically found under large cobble and boulders. Smaller individuals can be collected from under small cobble and slower water velocity.

Threats

- 🚫 Invasive Non-native/Alien species
- 🛤️ Roads and Railroads

Conservation Actions

- 🏗️ External Capacity Building
- 📜 Policies and Regulations 🚫

Needs

Survey: Collect baseline species information

Survey: Continued monitoring for non-native species introduction

Range Map

Current

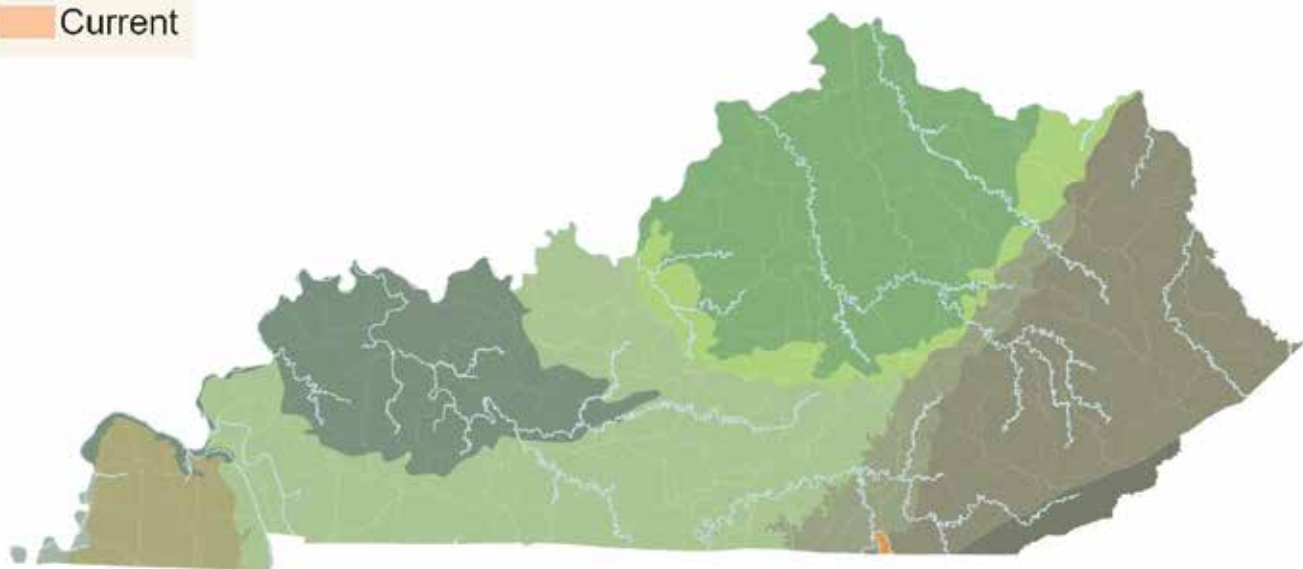


Photo: Guenter Schuster



LONGCLAW CRAYFISH

(*Cambarus buntingi*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4

S Rank: S2S3

Federal Status: N/A

IUCN Red List: LC - Least concern

The Longclaw Crayfish is a possible species complex. More survey work and genetic analysis is needed.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Upper Cumberland

Stream Type: Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-Medium Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Inhabits medium to large creeks with clean cobble substrate, where it uses large cobble and boulder substrates as cover. Typically found in perennial streams upstream of Cumberland Falls.

Range Map

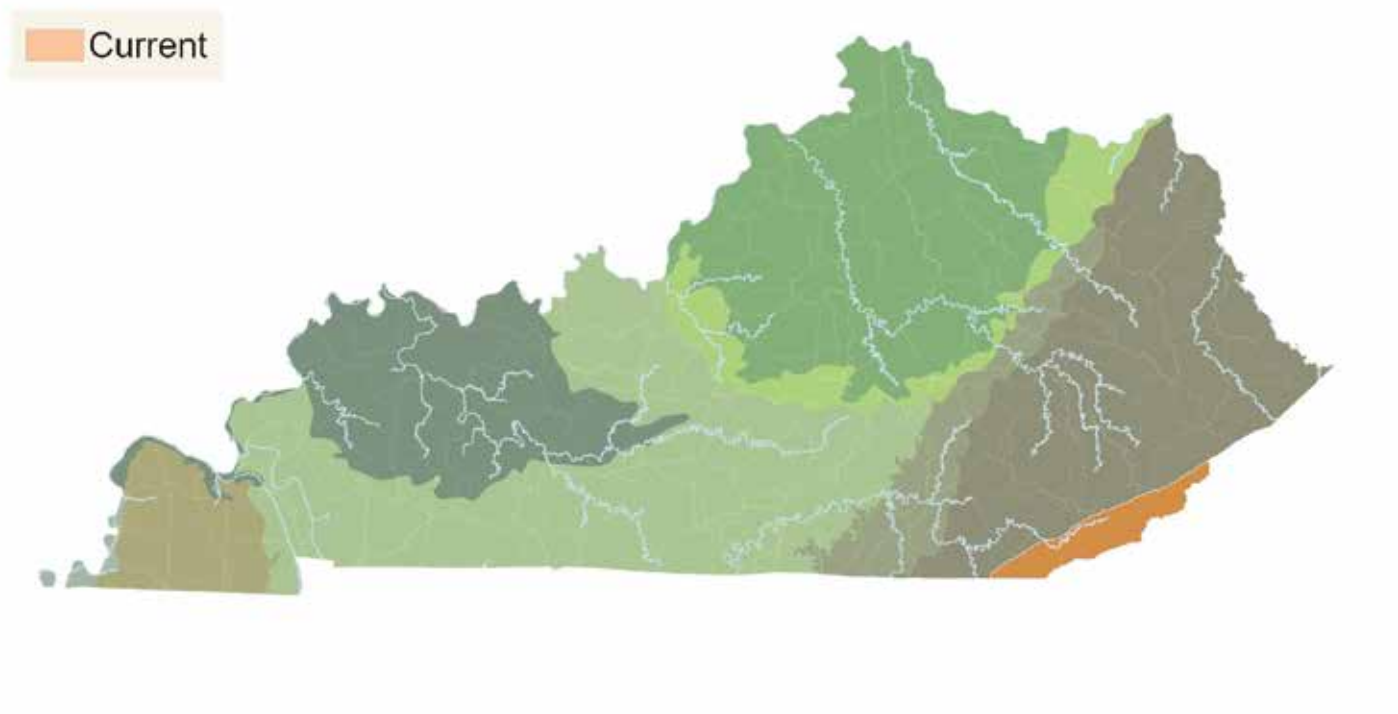


Photo: Guenter Schuster



BIG SANDY CRAYFISH

(*Cambarus callainus*)

Conservation Profile

Priority Group: Highest

KNP Info




G Rank: G2

S Rank: S1





Federal Status: Threatened

IUCN Red List: N/A

Threats

-  Invasive Non-native/Alien species
-  Mining and Quarrying
-  Residential and Commercial Development

Conservation Actions

- External Capacity Building 
- Habitat and Natural Process Restoration  
- Policies and Regulations 

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Lower Levisa, Tug, Upper Levisa

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Typically encountered under large, flat boulders in riffles and pools of moderately sized (10-20 m wide) creeks, streams, and rivers with permanent, fast-flowing water. Requires large cobble, boulder, bedrock and sand substrates without the impact of sedimentation.

Range Map

Current

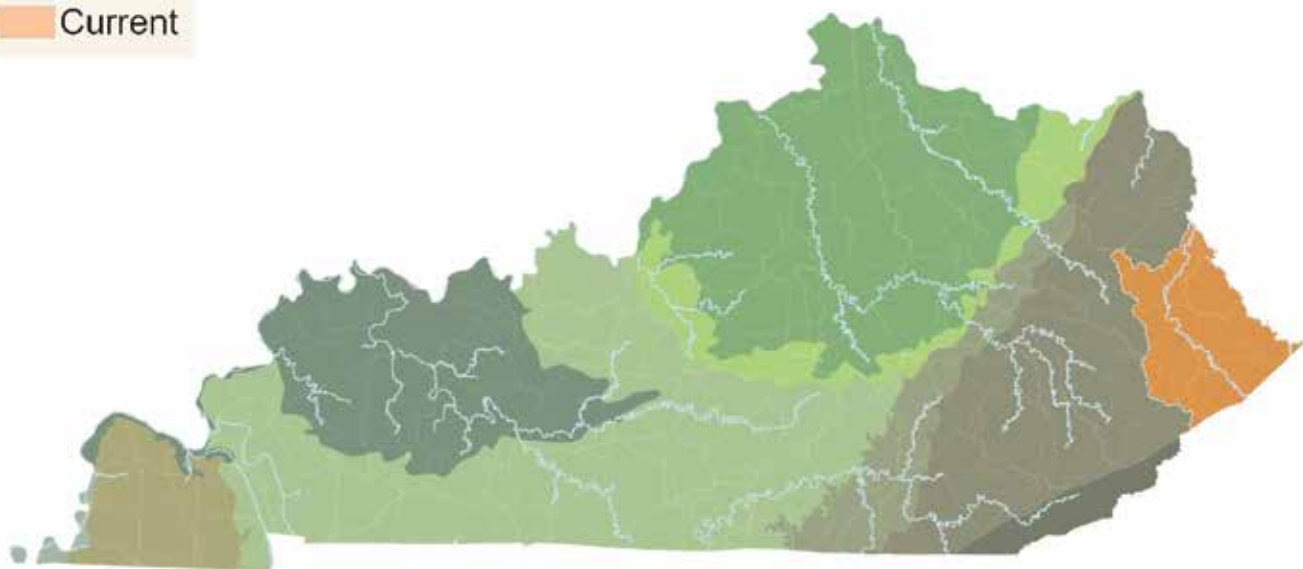


Photo: Guenter Schuster



VALLEY FLAME CRAYFISH

(*Cambarus deweesae*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4

S Rank: S3S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Cambarus deweesae doesn't occur in KY any longer. In Kentucky, this is possibly a three species in complex: one near Winchester, one in the Roaring Paunch area, and at least one more in western Kentucky. More survey work and genetic study is needed.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Lower Kentucky, Obey, Rolling Fork, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green

Guilds: Forested Wetland, Grassland/Savannah, Floodplain/Sandbar, Agriculture

Primary burrowers found in agricultural fields, open wetlands, and forested wetlands with shallow water tables.

Range Map

Current

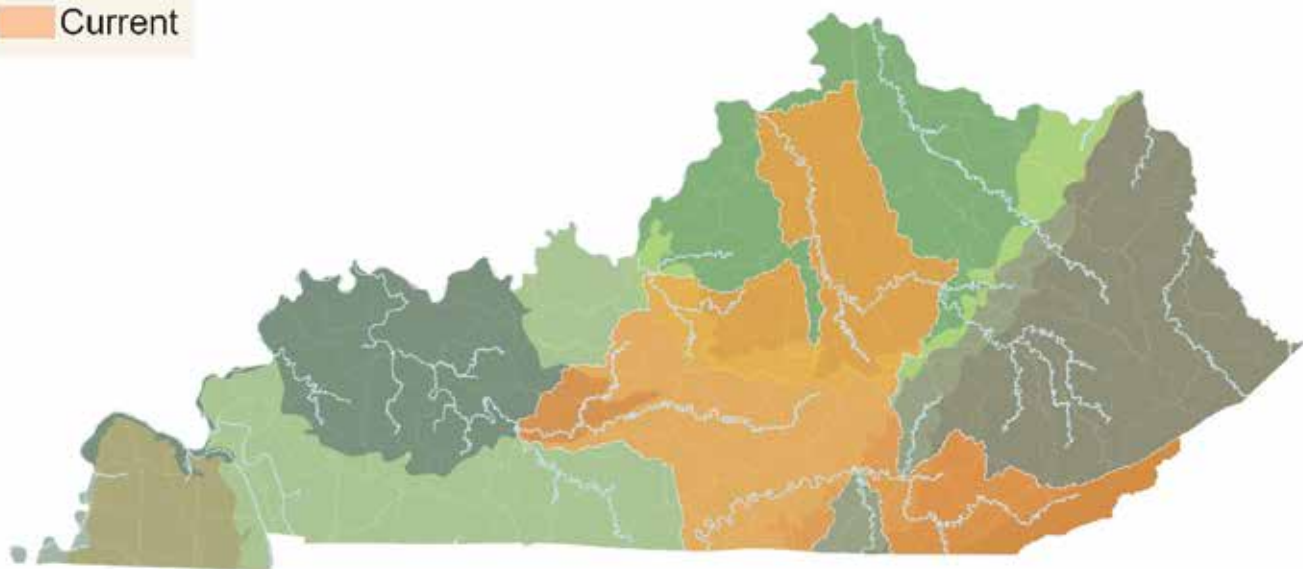


Photo: Guenter Schuster



UPLAND BURROWING CRAYFISH

(*Cambarus dubius*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Upland Burrowing Crayfish is likely a species complex. Additional work is needed to determine what species occur in Kentucky.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

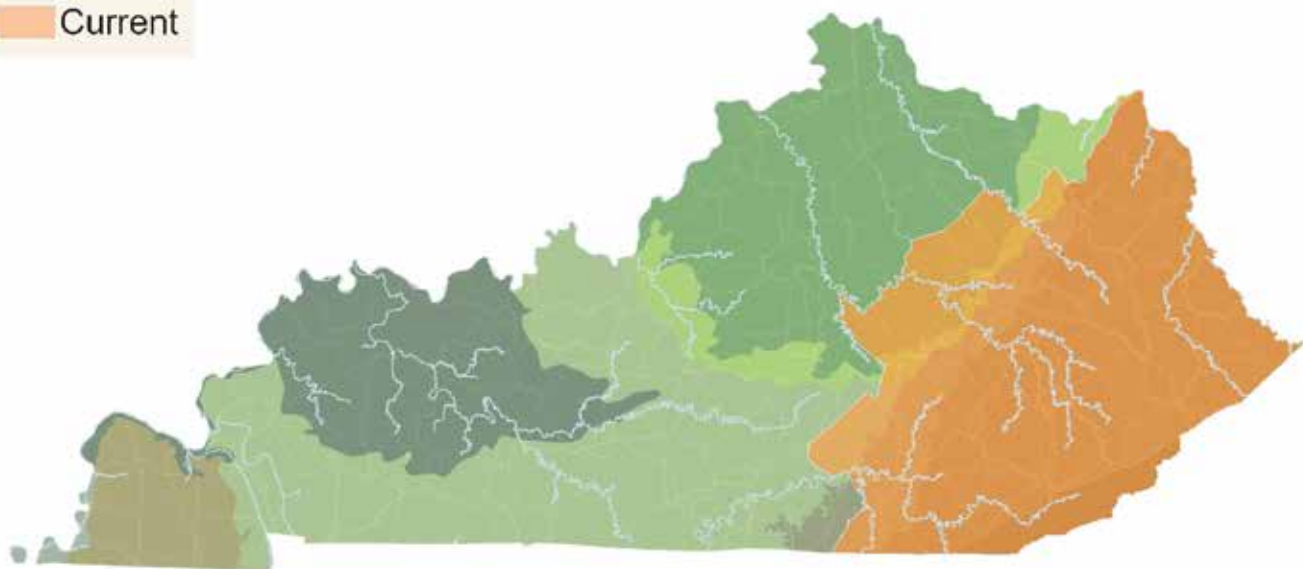
Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment

Guilds: Cliff/Rockshelter, Forested Wetland, Mesic Forest, Open Wetland

Found in wet meadows, wet depressions in uplands, and along cliffs and rockshelters. Surface water isn't necessary as long as soil is available for burrow excavation. Rock talus can also be occupied if sufficient subsurface water is available.

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S3S4


Federal Status: N/A

IUCN Red List: LC - Least concern

HAIRY CRAYFISH

(*Cambarus friaufi*)

Threats

 Invasive Non-native/Alien species

 Livestock Farming and Ranching

Conservation Actions

Conservation Payments 

Policies and Regulations 

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Barren, Lower Cumberland, Red

Stream Type: Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Uses swift sections of small creeks and rivers with substrates ranging from coarse, cherty gravel to small cobble. Individuals make excavations in shallow riffles.

Range Map

Current

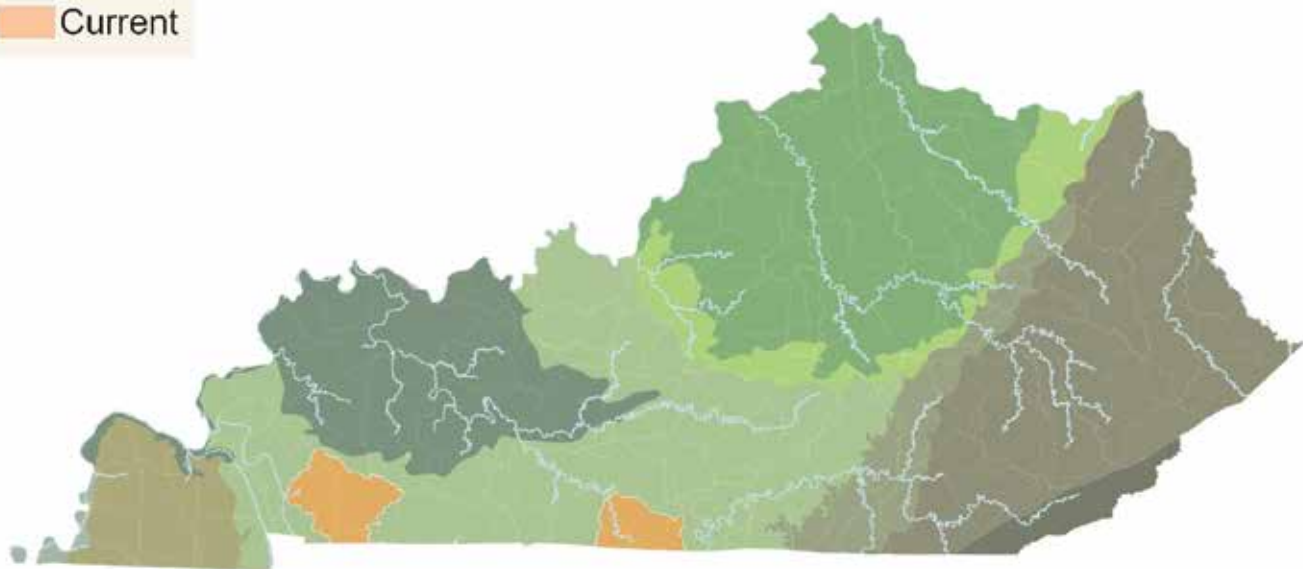


Photo: Guenter Schuster



TWOSPOT CRAYFISH

(*Cambarus graysoni*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4S5

Federal Status: N/A

IUCN Red List: LC - Least concern

Twospot Crayfish is likely a species complex in Kentucky. Additional survey and genetic work is needed.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Barren, Middle Green, Red, Rolling Fork, Rough, Upper Cumberland-Lake Cumberland, Upper Green

Stream Type: Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Secondary burrower often found along the margins or medium to larger streams.

Range Map

Current

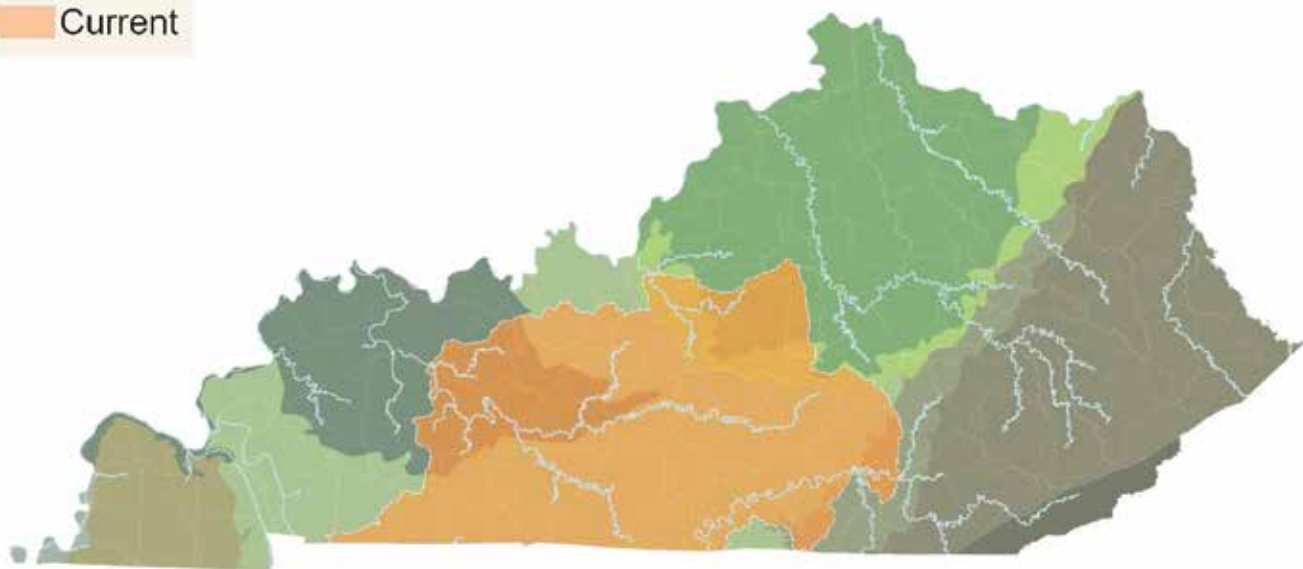


Photo: Guenter Schuster



REDBIRD CRAYFISH

(*Cambarus guenteri*)

Conservation Profile

Priority Group: High

KNP Info



G Rank: GNR

S Rank: S3



Federal Status: N/A

IUCN Red List: N/A

Threats

-  Invasive Non-native/Alien species
-  Mining and Quarrying

Conservation Actions

- Habitat and Natural Process Restoration 
- Policies and Regulations 

Needs

Survey: Collect baseline species information

Survey: Continued monitoring for non-native species introduction

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

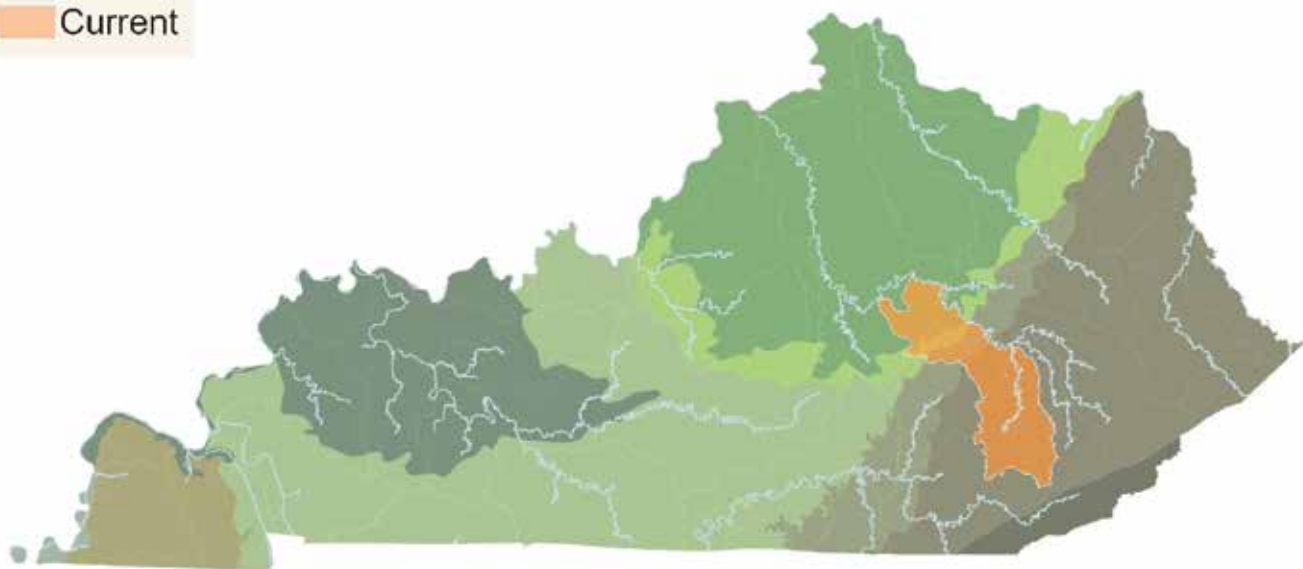
Current Watersheds: Lower Kentucky, South Fork Kentucky, Upper Kentucky

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-Low Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Typically found in medium to large streams with boulder, cobble, of slab rock substrates free of silt. Distribution seems to be restricted to the Middle Fork of the Kentucky River and its tributaries.

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Tug



Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River

Uses small to medium streams with boulder, cobble, and slab rock substrates.



TUG VALLEY CRAYFISH

(*Cambarus hatfieldi*)

Threats

-  Invasive Non-native/Alien species
-  Mining and Quarrying

Conservation Actions

-  Habitat and Natural Process Restoration
-  Policies and Regulations

Needs

Survey: Collect baseline species information

Range Map

Current

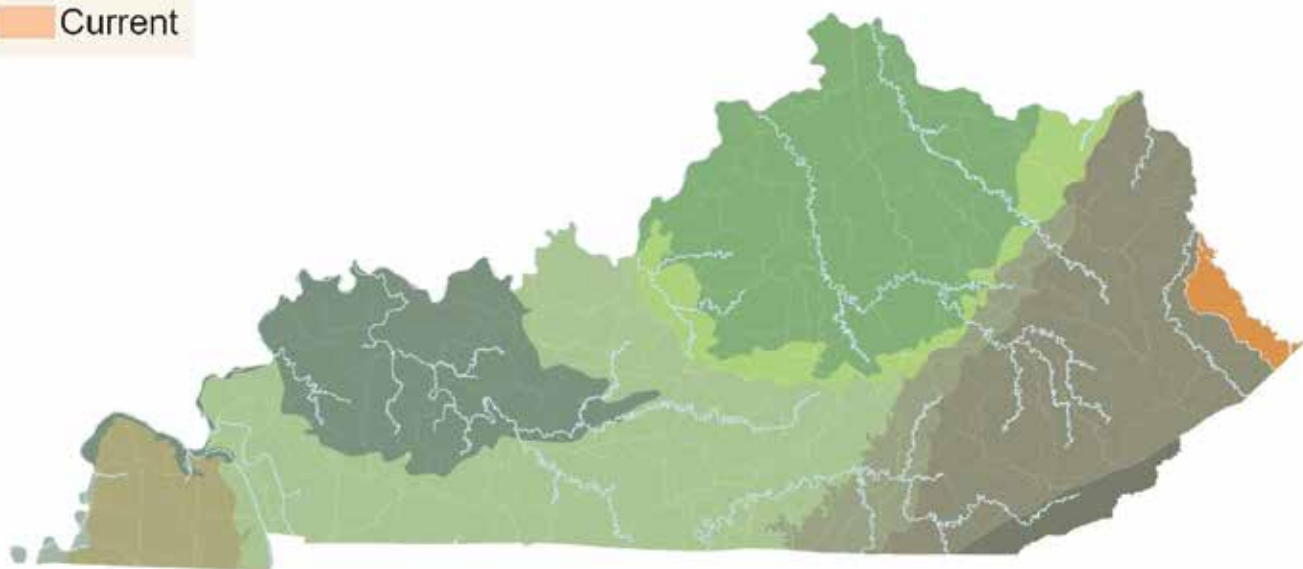


Photo: Guenter Schuster



BRAWNY CRAYFISH

(*Cambarus hazardi*)

Conservation Profile

Priority Group: High

KNP Info



G Rank: GNR

S Rank: S3



Federal Status: N/A

IUCN Red List: N/A

Threats

-  Invasive Non-native/Alien species
-  Mining and Quarrying

Conservation Actions

-  Conservation Payments
-  Policies and Regulations

Needs

Survey: Collect baseline species information

Survey: Continued monitoring for non-native species introduction

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Licking, Lower Kentucky, North Fork-Kentucky, Upper Kentucky

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-Low Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Usually found in medium to large streams. Adults require large boulders or slab rock as habitat.

Range Map

Current

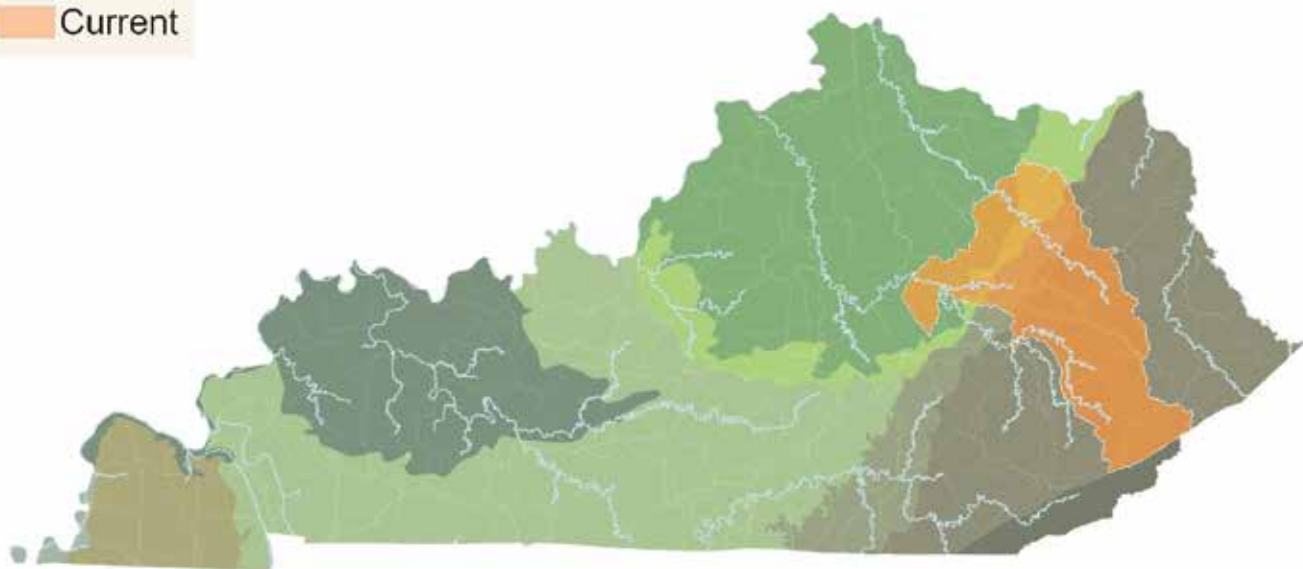


Photo: Guenter Schuster



SPINY SCALE CRAYFISH

(*Cambarus jezerinaci*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3

S Rank: SU

Federal Status: Not Listed

IUCN Red List: DD - Data deficient

The Spiny Scale Crayfish has two distinct genetic clades that are morphologically identical. More survey work and genetic study is needed.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: South Fork Kentucky, Upper Cumberland

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream

Found in high quality streams that lack sedimentation.

Range Map

Current

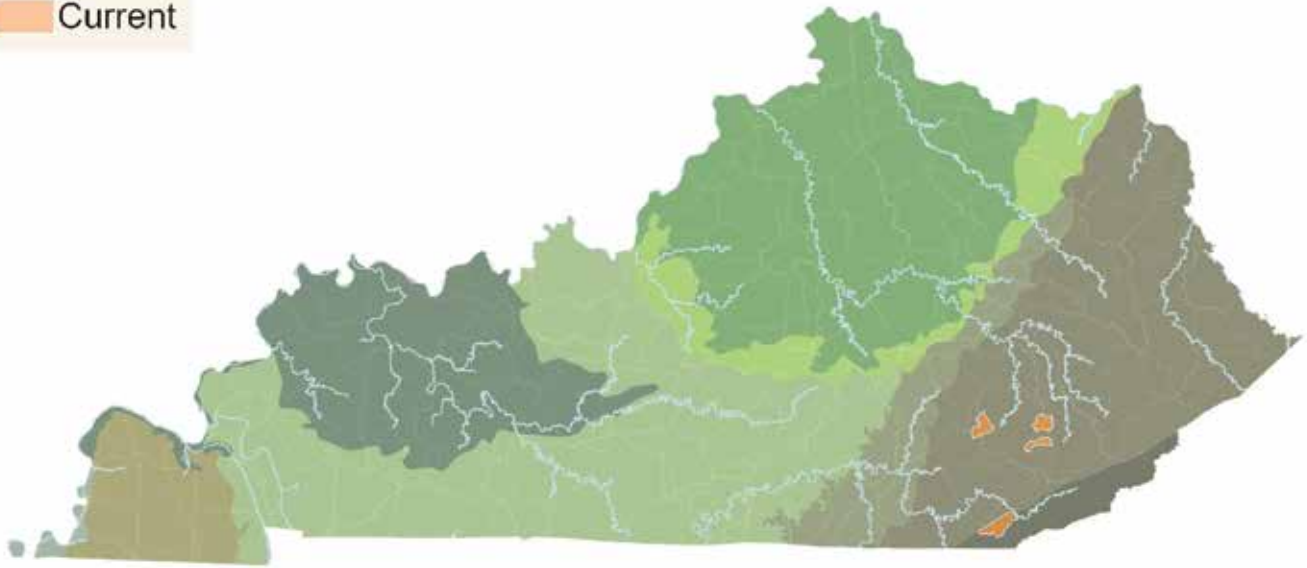


Photo: Guenter Schuster



ORTMANN'S MUDBUG

(*Cambarus ortmanni*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SU

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills

Guilds: Grassland/Savannah, Open Wetland, River/Streams, Agriculture

Inhabits both aquatic and semi-aquatic habitats; ponds and streams as well as ditches and wet meadows. Considered a primary and secondary burrower and can be found in pastures, hay fields, roadside ditches, and lawns with shallow water tables.

Range Map

Current

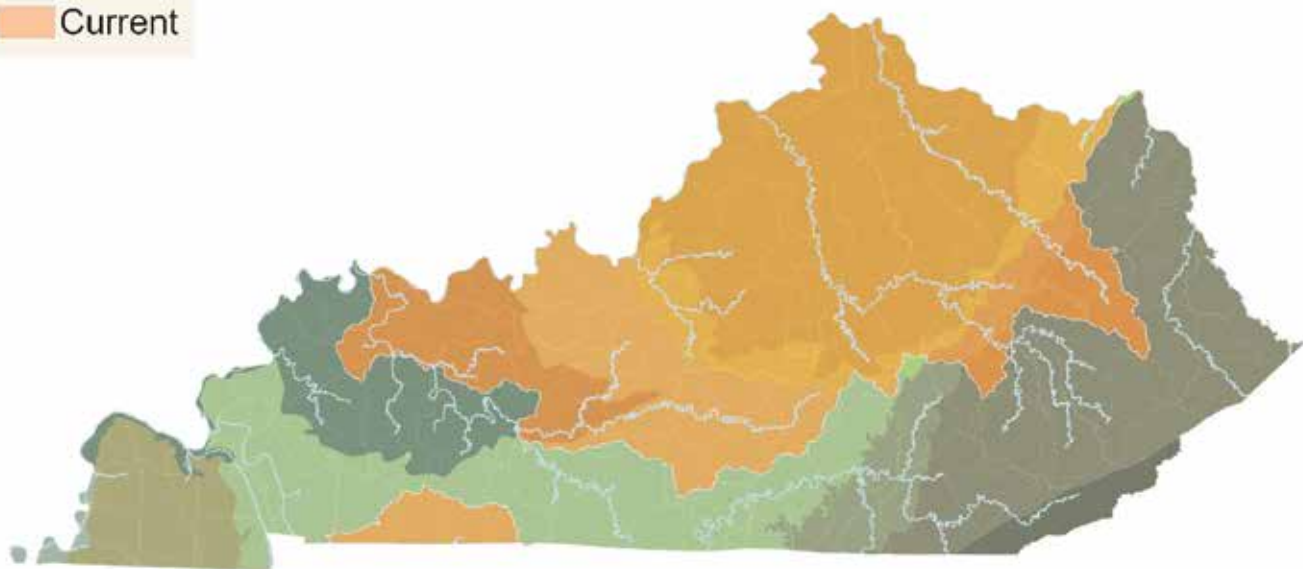


Photo: Guenter Schuster



MOUNTAIN MIDGET CRAYFISH

(*Cambarus parvoculus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

The taxonomic status of specimens previously identified as *Cambarus parvoculus*, Mountain Midget Crayfish, in Kentucky is unclear. Additional morphological and genetic analyses are needed to confirm populations of *C. parvoculus* in Kentucky or if these populations represent species new to science.

Conservation Goal




Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Middle Fork Kentucky, North Fork Kentucky, Powell, South Fork Cumberland, South Fork Kentucky, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Kentucky, Upper Levisa

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream

Threats

-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Mining and Quarrying

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Encourage proper forest management.

Management: Incorporate erosion control and bank stabilization on private tracts

Uses small, cool headwater creeks, springs, rocky streams, and seepages. Found under stones in lotic situations.

Range Map

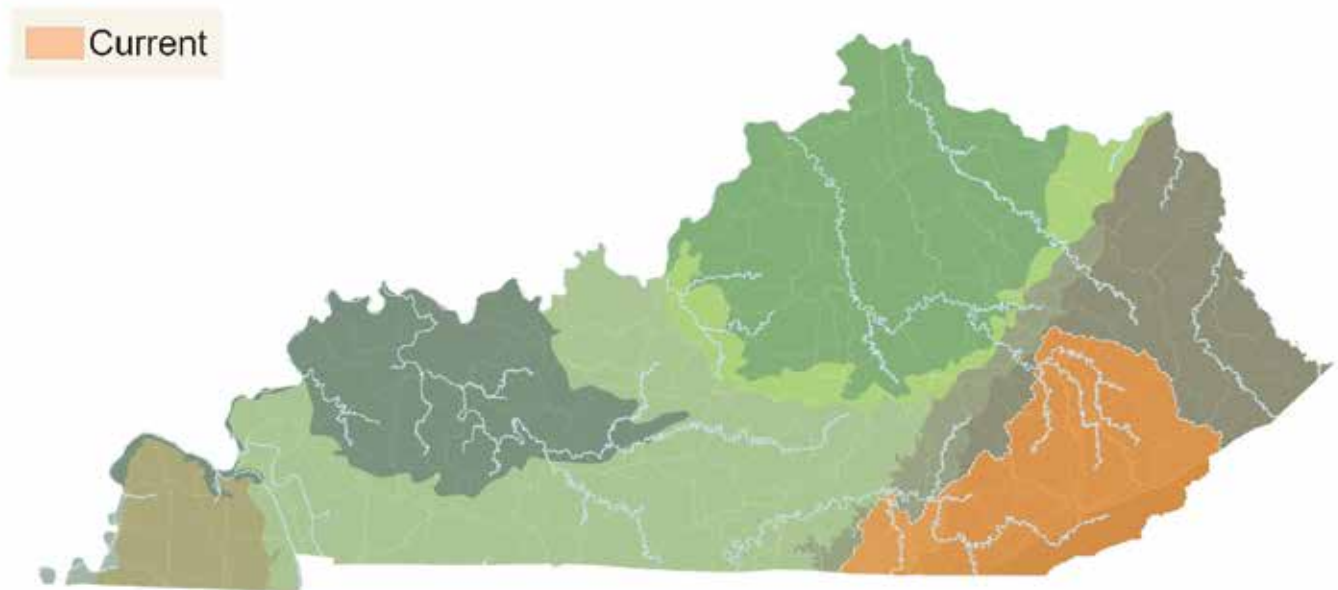


Photo: Guenter Schuster



DEPRESSION CRAYFISH

(*Cambarus rusticiformis*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Depression Crayfish is likely a species complex. Additional survey work and genetic analysis is needed.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

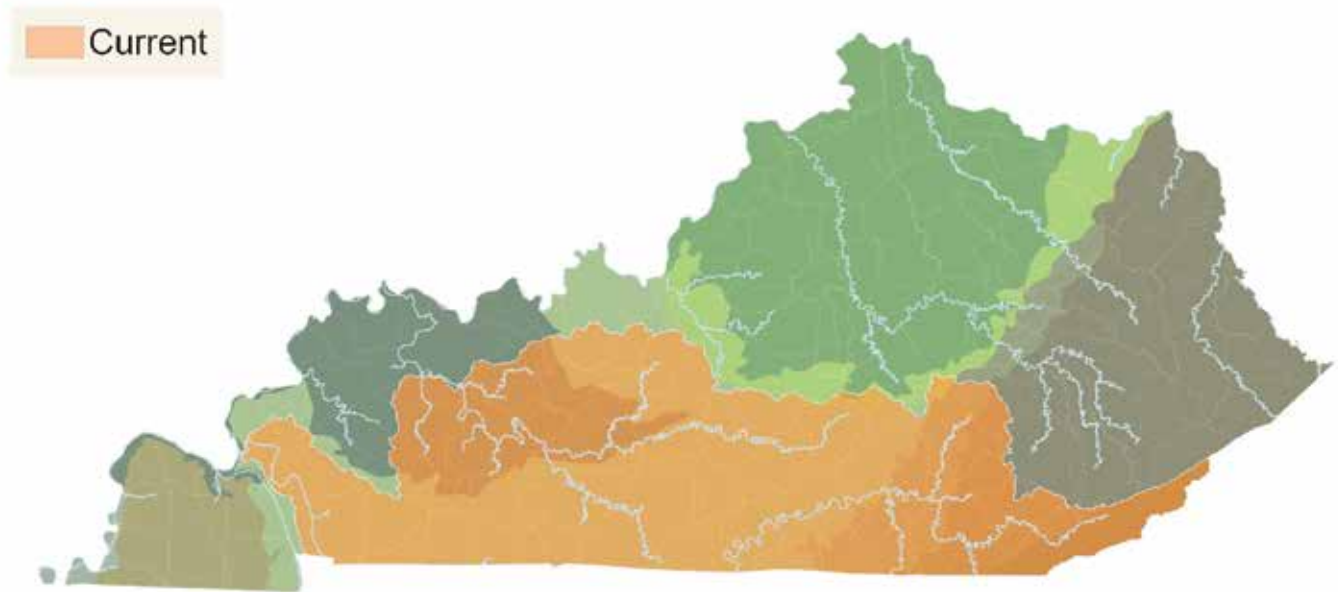
Current Watersheds: Barren, Lower Cumberland, Middle Green, Obey, Pond, Red, Rockcastle, Rough, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Found in the Barren, upper Green, Nolin, and Rough River drainages, and is widespread in the Cumberland River system across the state. It is

generally found in medium sized streams with large boulders along the bottom.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Little Scioto-Tygarts

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

The species is likely restricted to the Tygarts Creek and Kinniconick Creek drainages.

TEAYS RIVER CRAYFISH

(Cambarus sciotensis)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Range Map

Current

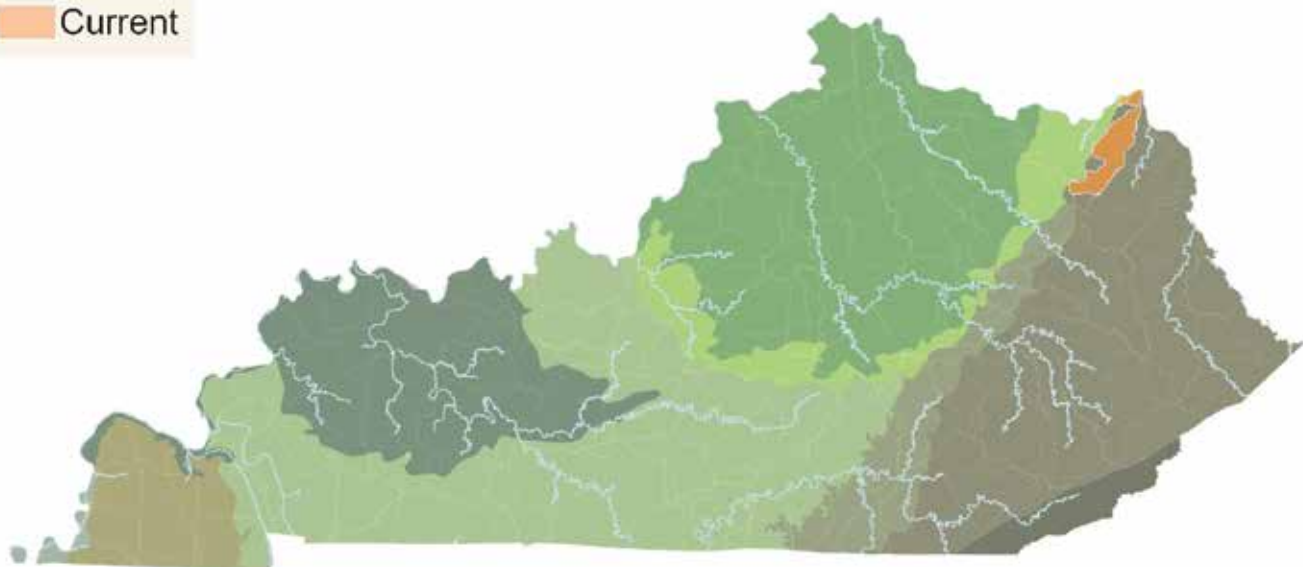
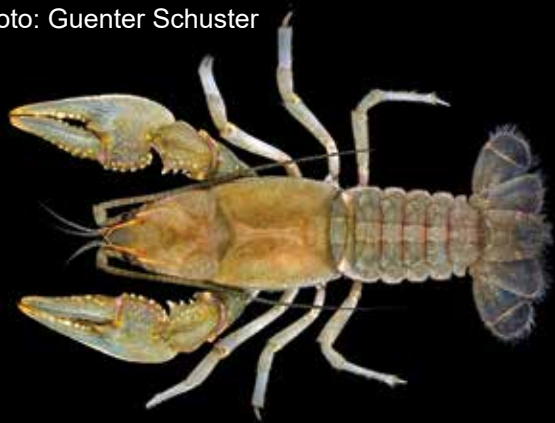


Photo: Guenter Schuster



AMBIGUOUS CRAYFISH

(*Cambarus striatus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SU

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Barren, Lower Green, Lower Kentucky, Middle Green, Middle Kentucky, Upper Green

Stream Type: Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Unconfined-Medium River

Typically found in lotic habitat, but has been reported as a burrowing species throughout its range.

Range Map

Data Insufficient
to Generate
Range Map

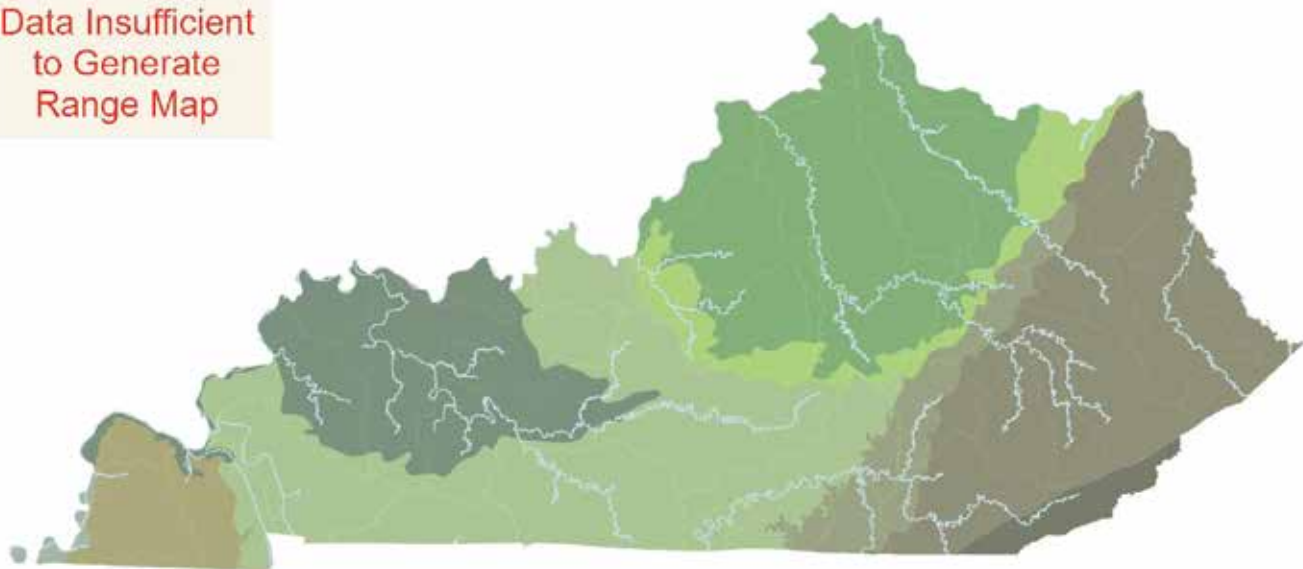


Photo: Guenter Schuster



CUTSHIN CRAYFISH

(*Cambarus taylori*)

Conservation Profile

Priority Group: High

KNP Info



G Rank: GNR

S Rank: S3



Federal Status: N/A

IUCN Red List: N/A

Threats

-  Invasive Non-native/Alien species
-  Mining and Quarrying

Conservation Actions

-  Habitat and Natural Process Restoration
-  Policies and Regulations

Needs

Survey: Collect baseline species information

Survey: Continued monitoring for non-native species introduction

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Middle Fork Kentucky

Stream Type: Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

Typically found in medium to large streams with boulder, cobble, of slab rock substrates free of silt.

Range Map

Current

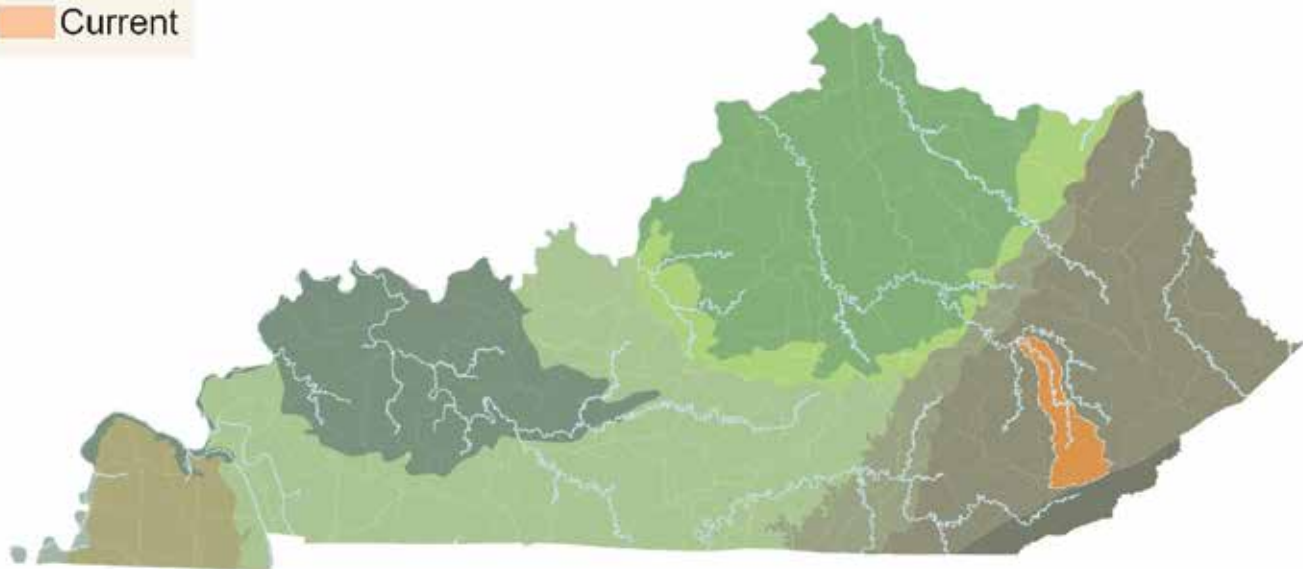


Photo: Guenter Schuster



DIGGER CRAYFISH

(*Creaserinus fodiens*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4S5

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

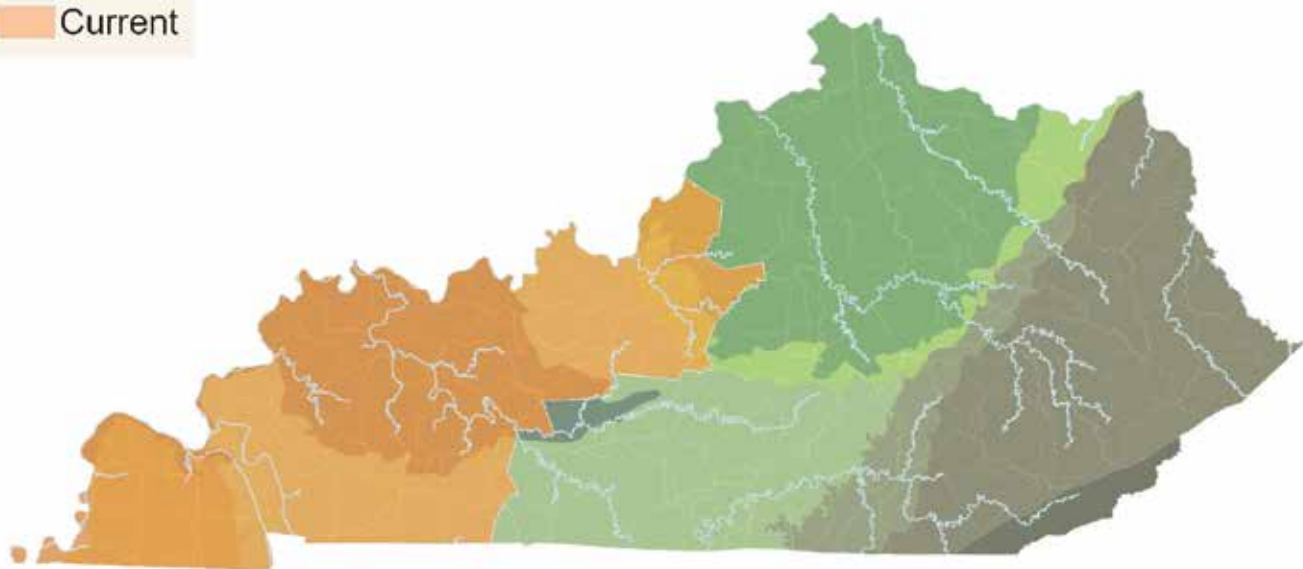
Physiographic Regions: Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Grassland/Savannah, Agriculture

Species is most common between the Tennessee and Mississippi Rivers; known in the northern half of the state from Salt River drainage to the Mississippi Embayment. Primary burrower in ephemeral wetlands, wooded floodplains, and low-lying fields.

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G1

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

The Screaming Eagle Crayfish has a very restricted range and is only found in one stream system in Kentucky. There are very few records for this species and more survey work needed to complete an assessment.

SCREAMING EAGLE CRAYFISH

(*Faxonius bellator*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Physiographic Regions: Interior Plateau

Stream Type: Warm-Medium Gradient-Stream,
Warm-Low Gradient-Stream

This species has only been located in the Red River drainage within the state.

Range Map

Data Insufficient
to Generate
Range Map

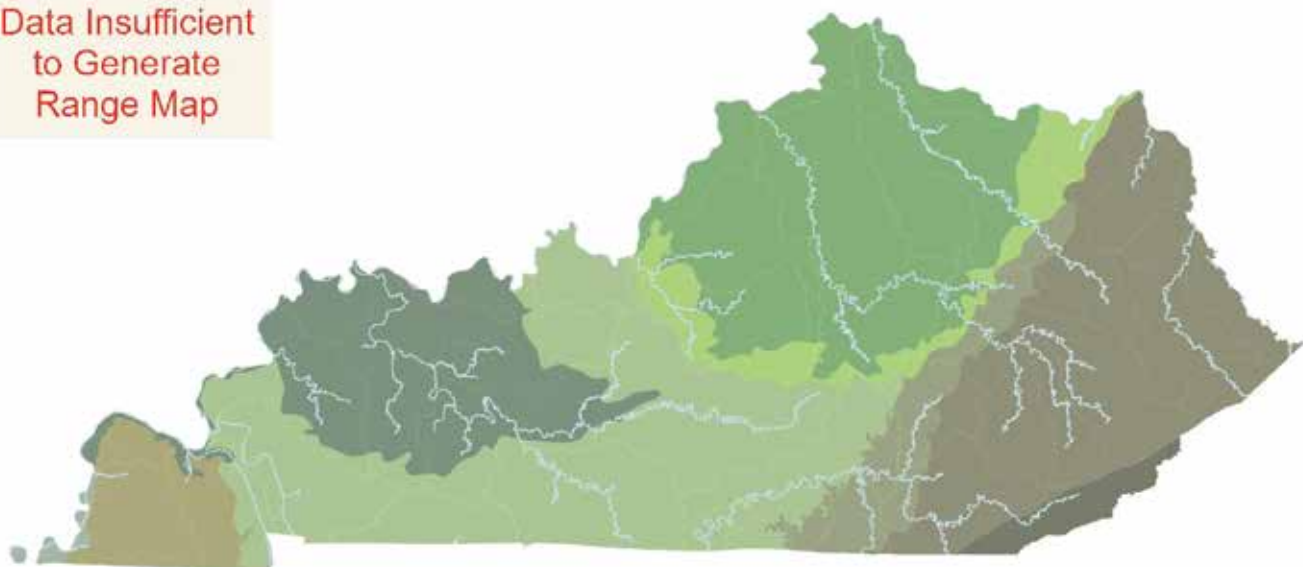


Photo: Guenter Schuster



CRITTENDEN CRAYFISH

(*Faxonius bisectus*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.



Habitat Associations

Current Watersheds: Lower Ohio-Bay




Stream Type: Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

Inhabits small to medium-sized streams and rivers. Uses cobble, boulder, gravel, bedrock and organic debris substrates.

Threats

-  Annual and Perennial Nontimber Crops
-  Invasive Non-native/Alien species

Conservation Actions

- External Capacity Building 
- Habitat and Natural Process Restoration 
- Policies and Regulations 

Needs

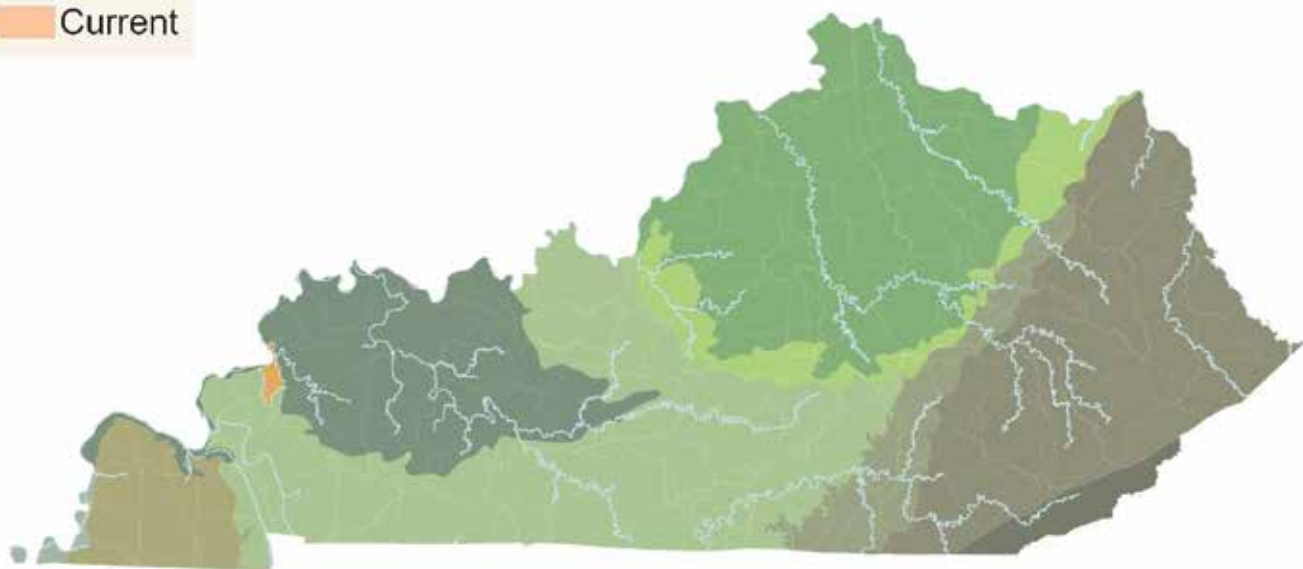
Survey: Collect baseline species information

Survey: Continued monitoring for new populations

Survey: Continued monitoring for non-native species introduction

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2

S Rank: S2

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Kentucky Lake




Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

Uses small to medium-sized streams and small rivers having sufficient sand, gravel, and organic debris. Most commonly in woody debris piles or woody vegetation root masses along stream banks.





BLOOD RIVER CRAYFISH

(*Faxonius burri*)

Threats

-  Annual and Perennial Nontimber Crops
-  Invasive Non-native/Alien species
-  Natural System Modifications

Conservation Actions

- External Capacity Building 
- Habitat and Natural Process Restoration  
- Policies and Regulations 

Needs

Survey: Collect baseline species information

Survey: Continued monitoring for new populations

Survey: Continued monitoring for non-native species introduction

Range Map

Current

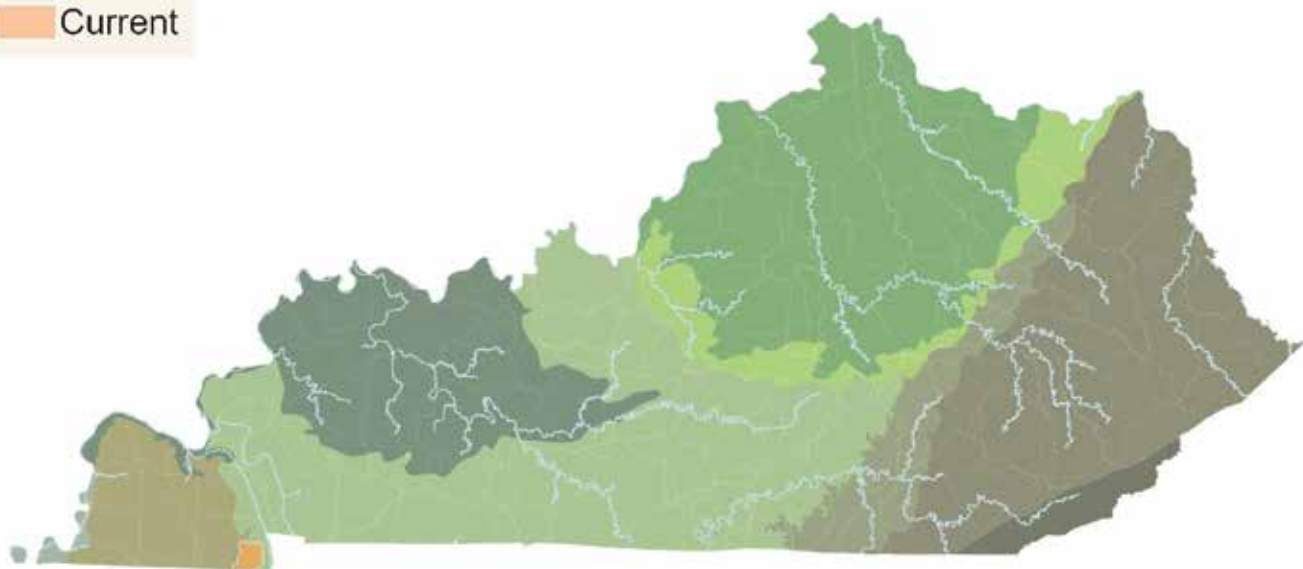





Photo: Price Sewell







MOWILD CRAYFISH

(*Faxonius elix*)

Threats

-  Annual and Perennial Nontimber Crops
-  Invasive Non-native/Alien species
-  Residential and Commercial Development

Conservation Actions

- External Capacity Building  
- Habitat and Natural Process Restoration 
- Policies and Regulations 

Needs

Survey: Collect baseline species information

Survey: Continued monitoring for non-native species introduction

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Blue-Sinking, Salt

Stream Type: Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

Uses extremely degraded systems, but requires water permanence. Prefers boulder and cobble substrate but can also use fissures in bedrock, organic debris and litter/trash.

Range Map

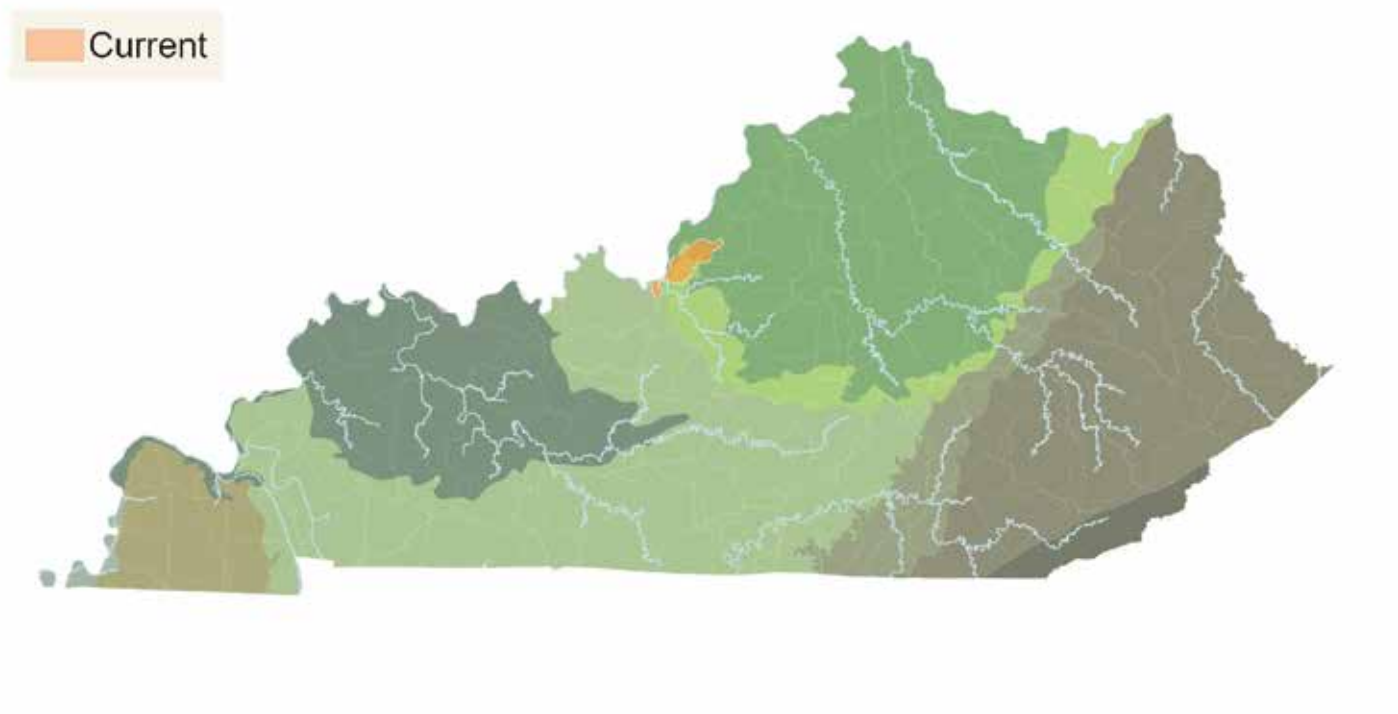





Photo: Guenter Shuster





LOUISVILLE CRAYFISH

(*Faxonius jeffersoni*)

Threats

-  Annual and Perennial Nontimber Crops
-  Invasive Non-native/Alien species
-  Residential and Commercial Development

Conservation Actions

- External Capacity Building  
- Habitat and Natural Process Restoration 
- Policies and Regulations 

Needs

Survey: Collect baseline species information

Survey: Continued monitoring for non-native species introduction

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: EN - Endangered

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

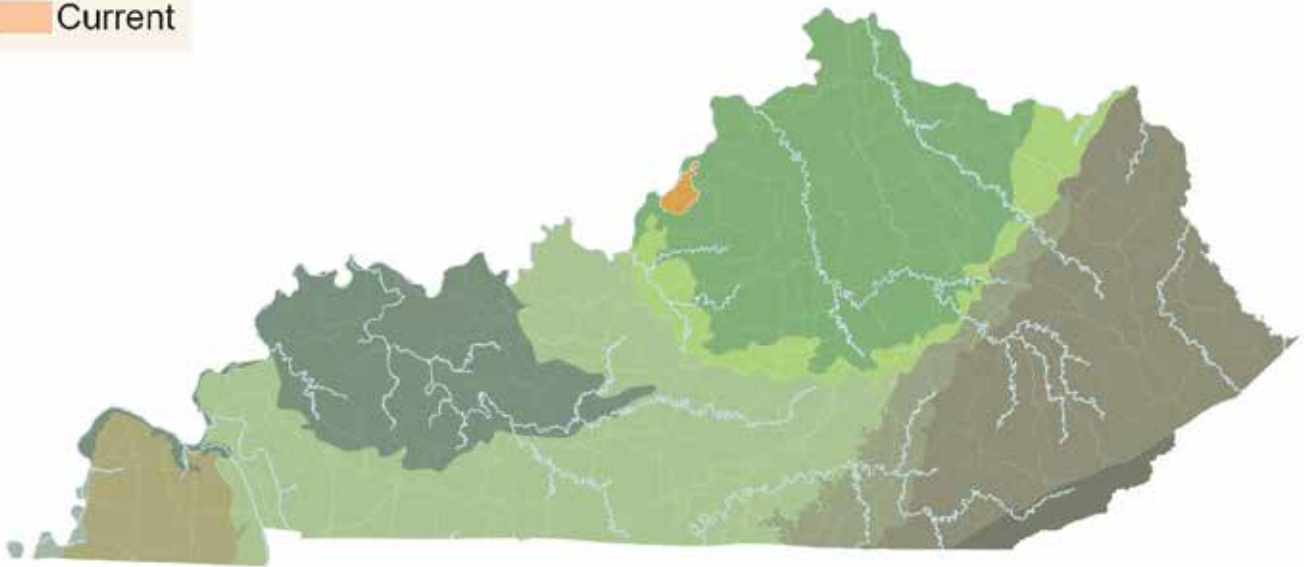
Current Watersheds: Silver-Little Kentucky

Stream Type: Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

Uses extremely degraded systems, but requires water permanence. Occurs in small to medium-sized flat cobble and boulder strewn streams ranging in width from 2 to 10 m. Prefers boulder and cobble substrate but can also use fissures in bedrock, organic debris and litter/trash. It is usually encountered under flat cobble in areas with flow or among woody debris along creek edges.

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2?

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Lower Cumberland, Lower Ohio-Bay, Tradewater



Stream Type: Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Most common in small to large creeks ranging in width from two to eight meters with bottom substrates of cobble or large gravel.




KENTUCKY CRAYFISH

(*Faxonius kentuckiensis*)

Threats

-  Annual and Perennial Nontimber Crops
-  Invasive Non-native/Alien species

Conservation Actions

-  External Capacity Building
-  Habitat and Natural Process Restoration
-  Policies and Regulations

Needs

Survey: Collect baseline species information

Survey: Continued monitoring for new populations

Survey: Continued monitoring for non-native species introduction

Range Map

Current

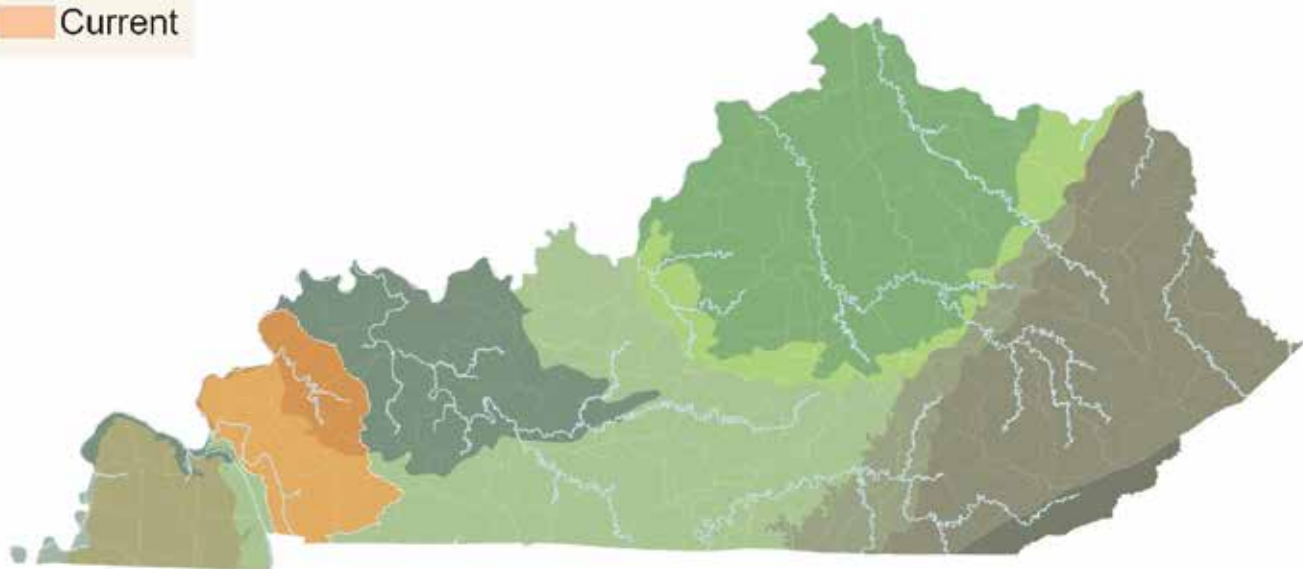


Photo: Guenter Schuster



SHRIMP CRAYFISH

(*Faxonius lancifer*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

There are very few records for the Shrimp Crayfish. More survey work is needed to complete an assessment.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Physiographic Regions: Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland

Typically observed in permanently inundated wetlands but also known to use wetlands that become seasonally dry if suitable refuge/cover is available. Occurs in oxbow lakes and streams on the Gulf Coastal Plain where it lives among organic debris, usually near bald cypress. Generally found in deep water of stiller sections of large streams or lakes but also in roadside ditches.

Range Map

Current

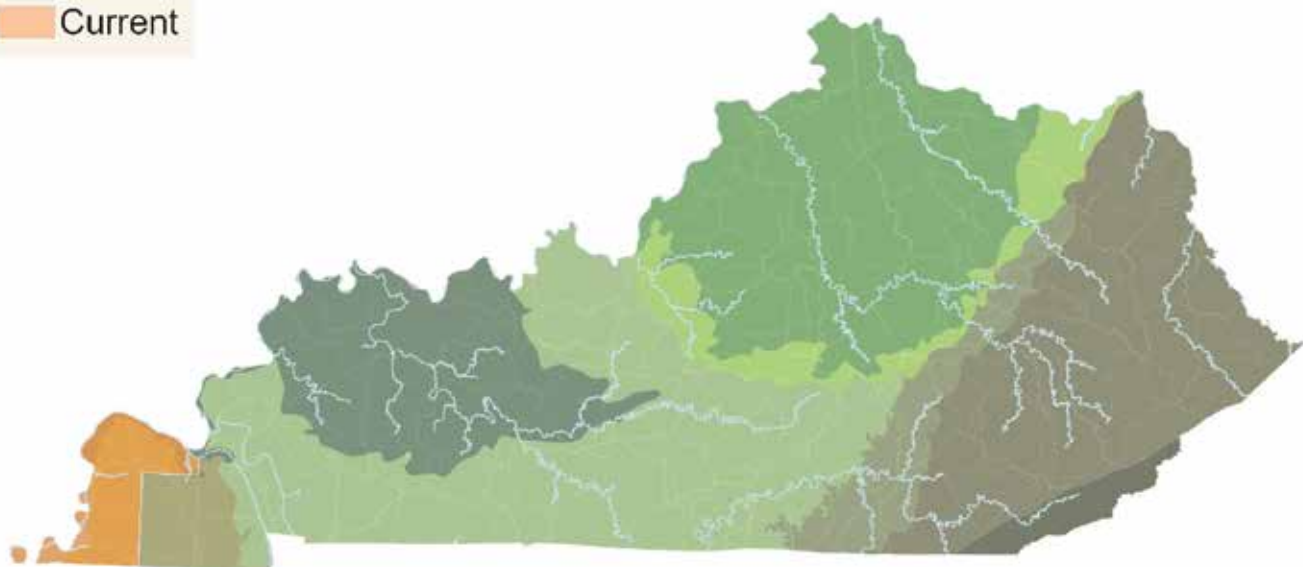


Photo: Guenter Schuster



LIVINGSTON CRAYFISH

(*Faxonius margorectus*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2

S Rank: S2

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.



Habitat Associations

Current Watersheds: Lower Cumberland, Lower Ohio-Bay




Stream Type: Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream

Uses small to medium sized creeks ranging in width from two to ten meters with gravel, cobble, and some mud substrates. Most commonly found under flat cobble in areas of moderate flow.

Threats

-  Annual and Perennial Nontimber Crops
-  Invasive Non-native/Alien species

Conservation Actions

- External Capacity Building 
- Habitat and Natural Process Restoration 
- Policies and Regulations 

Needs

Survey: Collect baseline species information

Survey: Continued monitoring for new populations

Survey: Continued monitoring for non-native species introduction

Range Map

Current

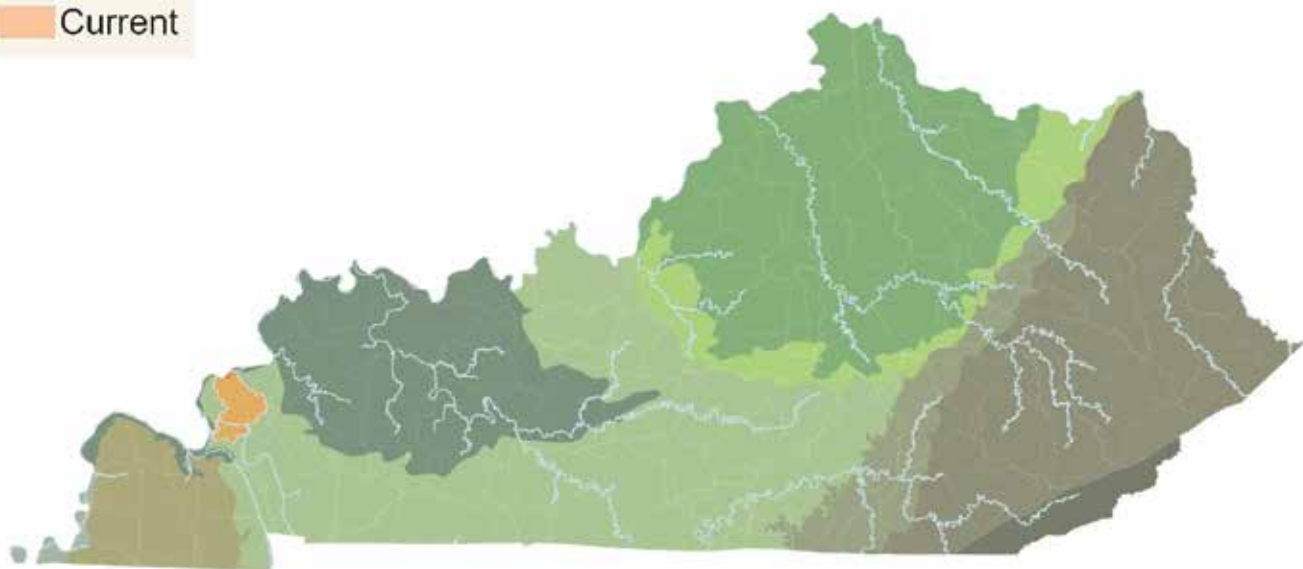


Photo: Guenter Schuster



GRAY-SPECKLED CRAYFISH

(*Faxonius palmeri palmeri*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5T5

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

There are very few records for the Gray-Speckled Crayfish. More survey work is needed to complete an assessment.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

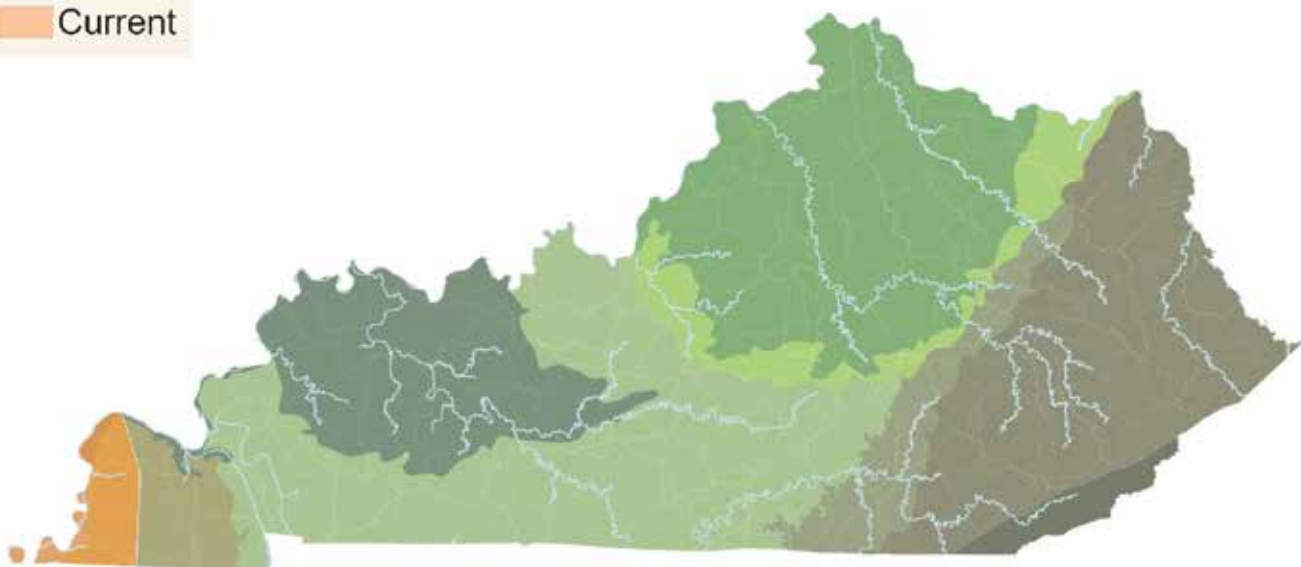
Current Watersheds: Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Ohio, Obion

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Found in lowland creeks, ditches, and in riffles of swift, debris-filled streams over mixed sand, mud, and gravel bottoms. Occurs only found in the far western reaches of the state in the Mississippi River drainage.

Range Map

Current





NO IMAGE AVAILABLE

LEOPARD CRAYFISH

(*Faxonius pardalotus*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G1

S Rank: SNR

Federal Status: N/A

IUCN Red List: EN - Endangered

There are very few records for the Leopard Crayfish. More survey work is needed to complete an assessment.

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Mainstem of Lower Ohio

Stream Type: Warm-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Sparse records- reported from deep (over 6 feet) of water in large river habitat.

Range Map

Current

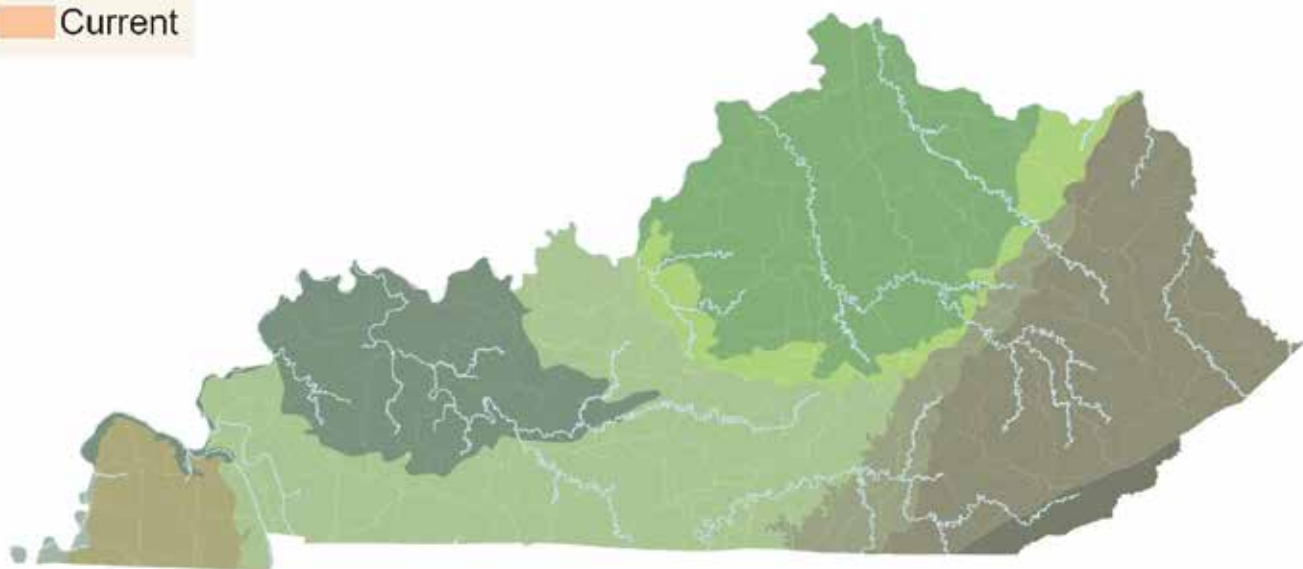


Photo: Guenter Schuster



ROUGH RIVER CRAYFISH

(*Faxonius rafinesquei*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Conduct stream restoration and reduce non-point source pollution throughout the species range. Prevent bait bucket introductions of non-native crayfish species into occupied streams. Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.



Habitat Associations

Current Watersheds: Lower Green, Pond, Rough




Stream Type: Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Uses small creeks and rivers ranging in width from two to twenty meters with gravel, cobble, and mud substrates.

Threats

-  Annual and Perennial Nontimber Crops
-  Invasive Non-native/Alien species

Conservation Actions

- External Capacity Building 
- Habitat and Natural Process Restoration 
- Policies and Regulations 

Needs

Survey: Collect baseline species information

Survey: Continued monitoring for new populations

Survey: Continued monitoring for non-native species introduction

Range Map

Current

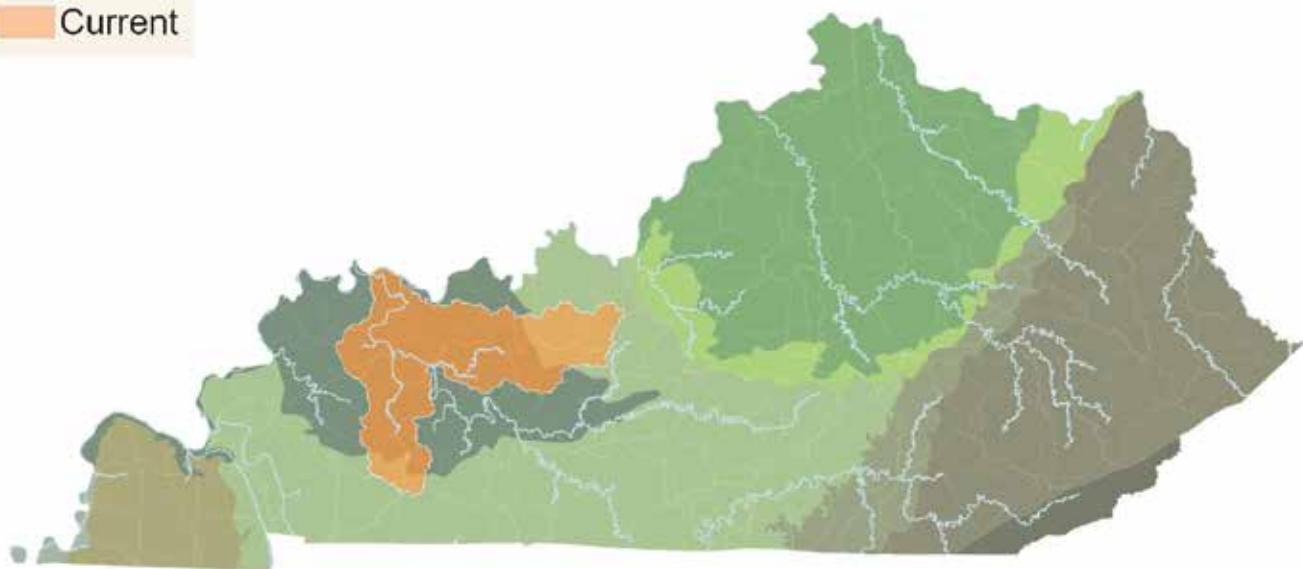


Photo: Guenter Schuster



NORWOOD RIVER CRAYFISH

(*Faxonius raymondi*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

There are very few records for the Norwood River Crayfish. More survey work is needed to complete an assessment.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

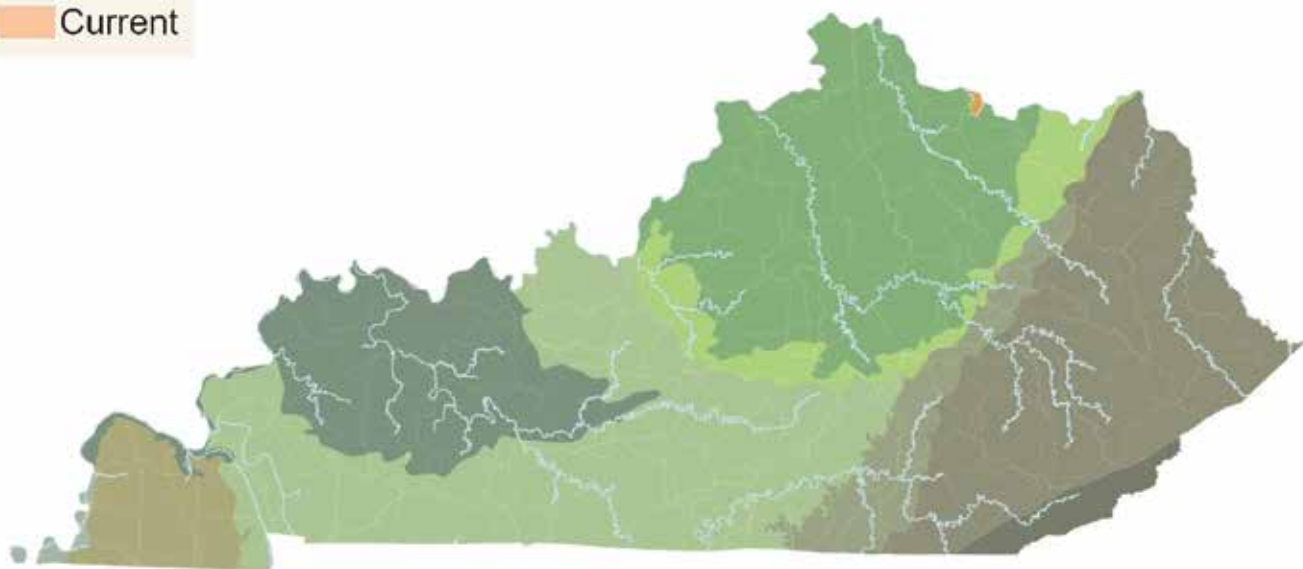
Current Watersheds: Ohio Brush-Whiteoak

Stream Type: Warm-High Gradient-Stream, Warm-Medium Gradient-Stream

Seems to be restricted to direct tributaries to the Ohio River in Mason County. May also reside in direct tributaries to the Ohio River in Bracken and Lewis counties.

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3

S Rank: S2S3

Federal Status: N/A

IUCN Red List: LC - Least concern

There are very few records for the Mud River Crayfish. Recent records are reported from Indiana, but more survey work needed to complete an assessment.

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Middle Green

Stream Type: Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

Occurs in creeks and small rivers with cobble, gravel, and mud substrates; most commonly encountered in shallow riffle areas or among woody debris in slower moving areas. Present in the Mud River and Muddy Creek drainages in Butler, Logan, and Muhlenberg counties.

MUD RIVER CRAYFISH

(*Faxonius ronaldi*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Range Map

Current

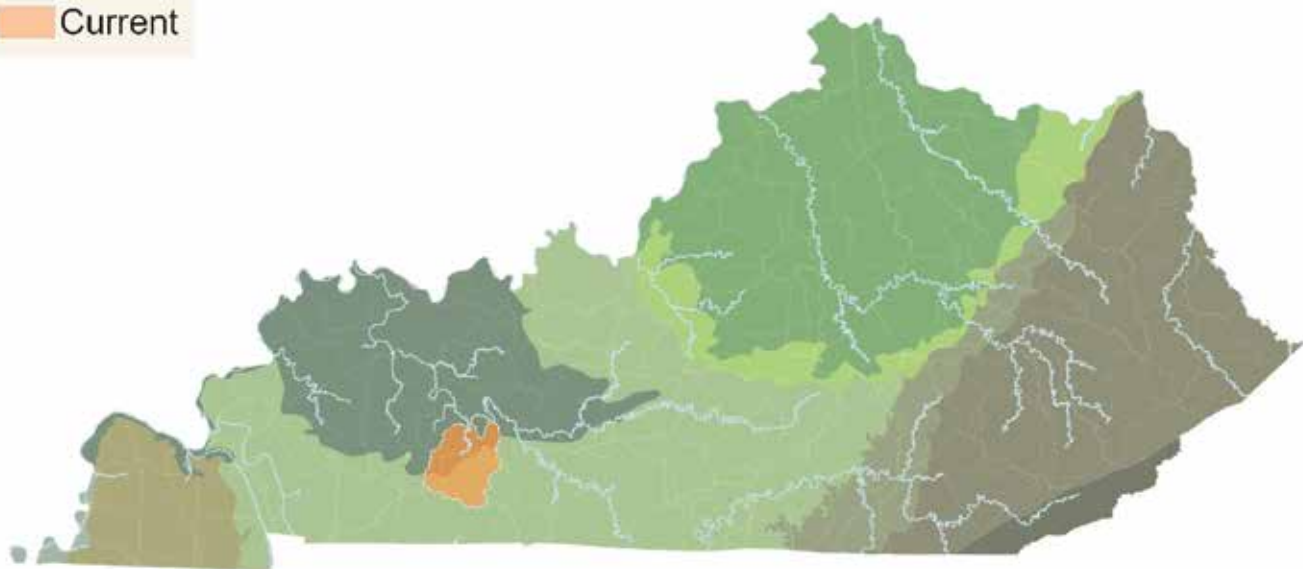


Photo: Guenter Schuster



RUSTY CRAYFISH

(*Faxonius rusticus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SU

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

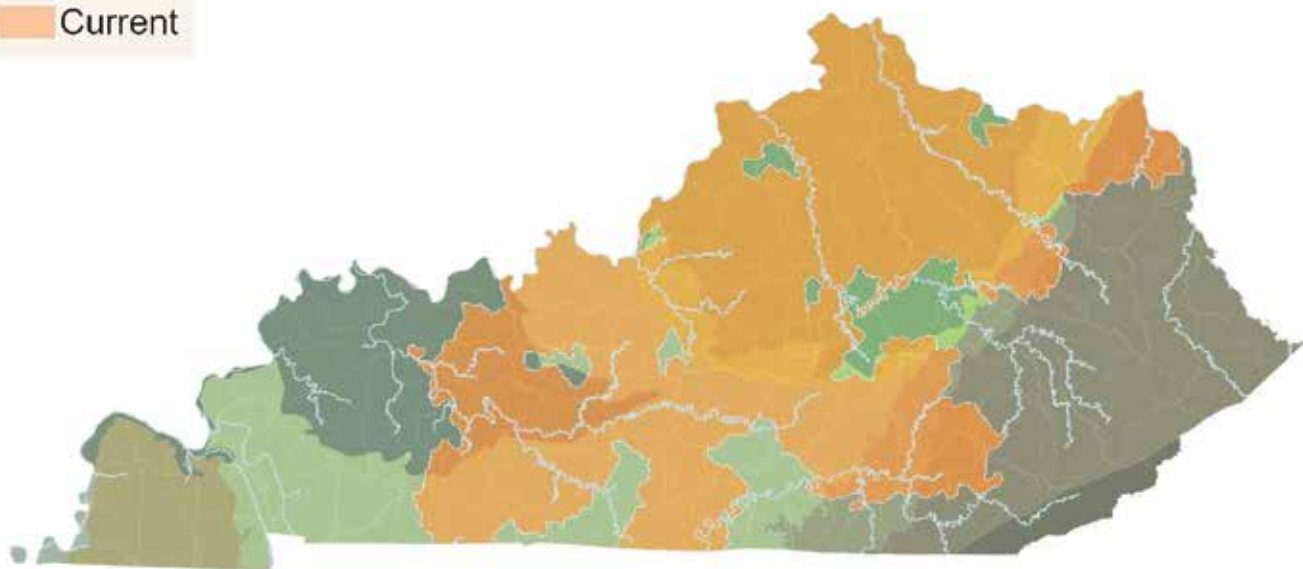
Current Watersheds: Licking, Middle Green, Rolling Fork, Rough, Salt, South Fork Licking, Upper Green

Stream Type: Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Likely a species complex in Kentucky and inhabits a wide range of lotic habitats.

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

There are very few records for the Western Highland Crayfish. More survey work is needed to complete an assessment.

WESTERN HIGHLAND CRAYFISH

(*Faxonius tricuspis*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

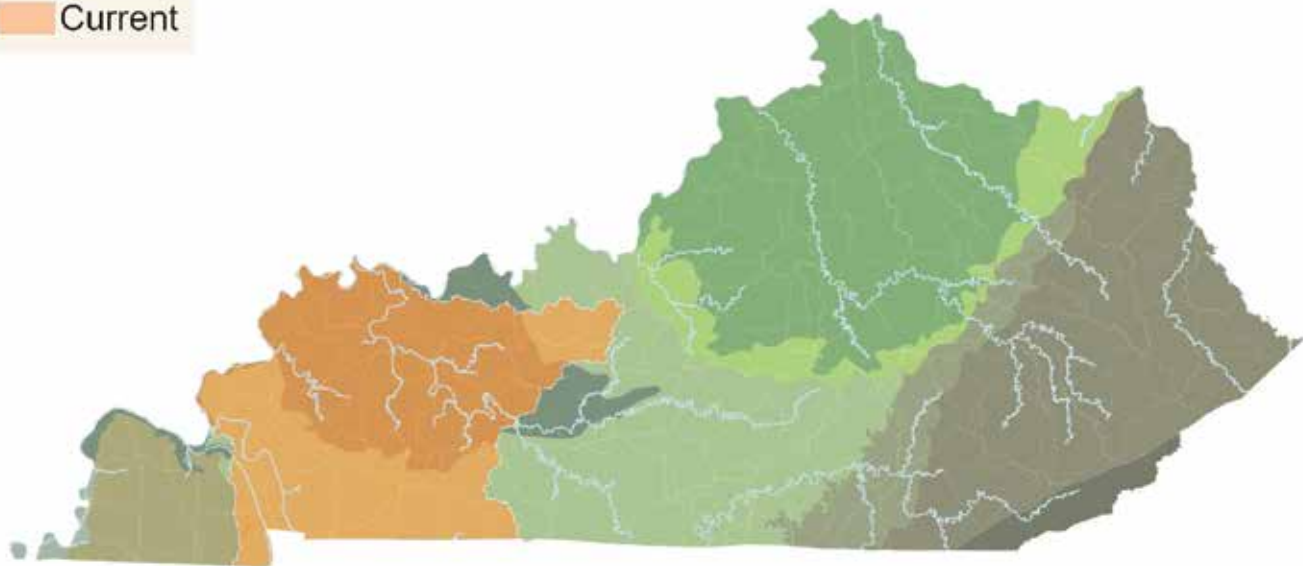
Current Watersheds: Highland-Pigeon, Kentucky Lake, Lower Cumberland, Lower Green, Lower Ohio-Bay, Middle Green, Pond, Red, Rough, Tradewater

Stream Type: Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River

Endemic to the state, this species occurs in the lower Tennessee, lower Cumberland, and Pond River drainages in Christian and Todd counties. It is most common in small to large creeks with bedrock, cobble, or gravel substrates.

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Current Watersheds: Blue-Sinking, Salt

Guilds: River/Streams

Found in pools or areas with little current, deep mud-detritus bottom, and emergent vegetation. Endemic; restricted to two small tributaries of the Ohio River in southcentral Kentucky.

BOUSFIELD'S AMPHIPOD

(Gammarus bousfieldi)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Range Map

Current

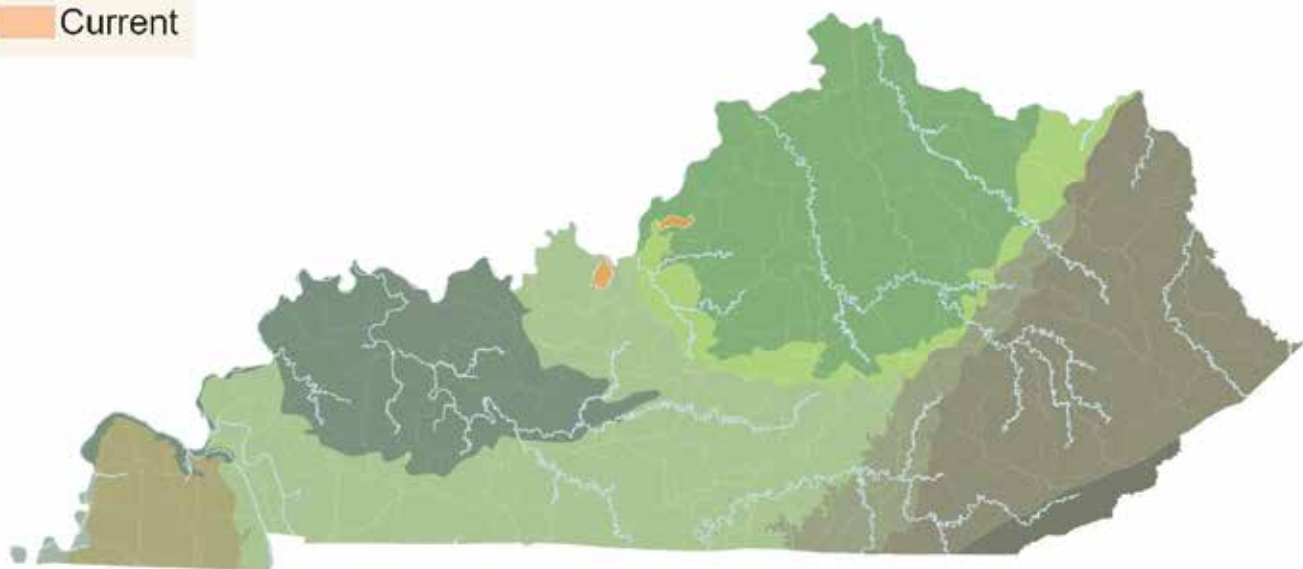


Photo: Guenter Schuster



CRAWZILLA CRAWDAD

(*Lacunicambarus chimera*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: GNR

S Rank: S4

Federal Status: N/A

IUCN Red List: N/A

The Crawzilla Crawdad is likely a species complex. Additional survey, morphometric, and genetic analysis is needed.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs.

Habitat Associations

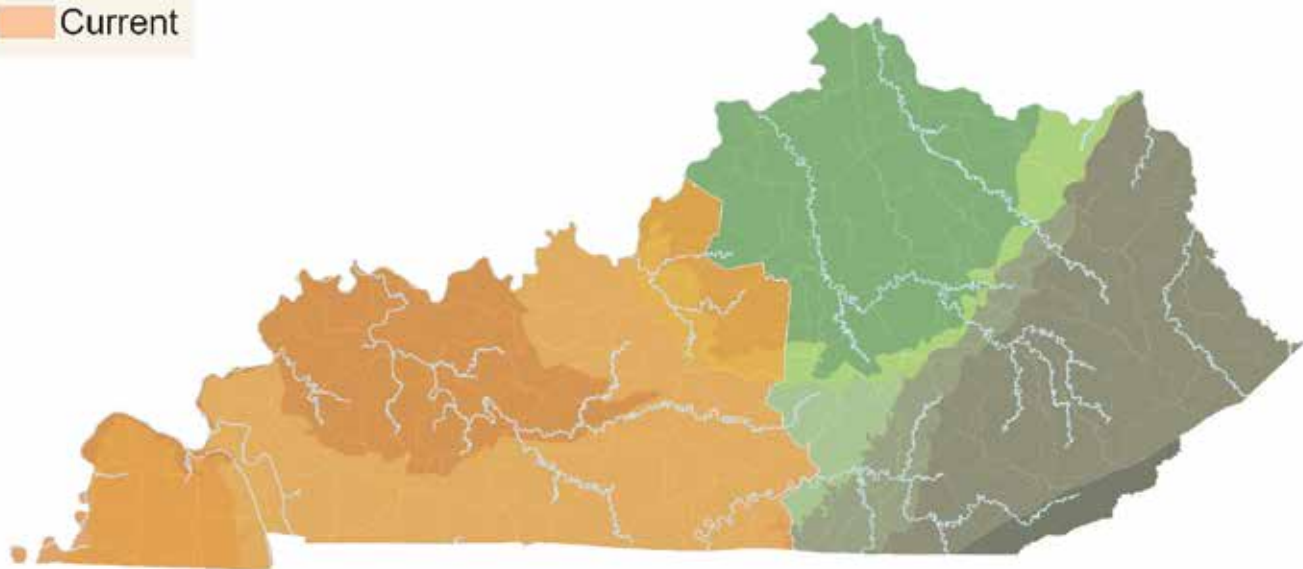
Physiographic Regions: Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Grassland/Savannah, Open Wetland, River/Streams, Agriculture, Suburban

Tolerant of anthropogenic alteration of habitat and is often found in ditches, hay fields, and pastures with shallow water tables.

Range Map

Current





NO IMAGE AVAILABLE

OHIO SHRIMP

(*Macrobrachium ohione*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

There are very few records for the Ohio Shrimp. More survey work is needed to complete an assessment.

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

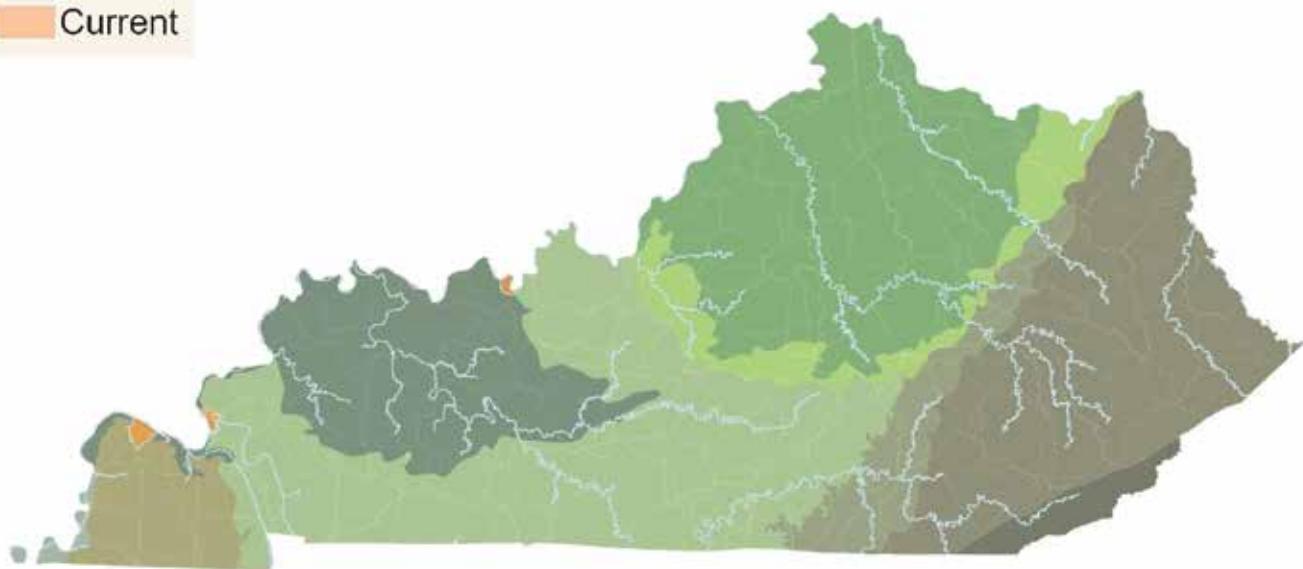
Current Watersheds: Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar

Inhabits large rivers; probably associated with aquatic vegetation or organic debris.

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2

S Rank: S2

Federal Status: N/A

IUCN Red List: DD - Data deficient

Conservation Goal

None

Habitat Associations

Current Watersheds: Obey, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland


Guilds: Cave/Karst


Restricted to caves with permanent underground streams and pools.

CUMBERLAND PLATEAU CAVE CRAYFISH

(*Orconectes barri*)

Threats

 Annual and Perennial Nontimber Crops

 Recreational Activities

Conservation Actions

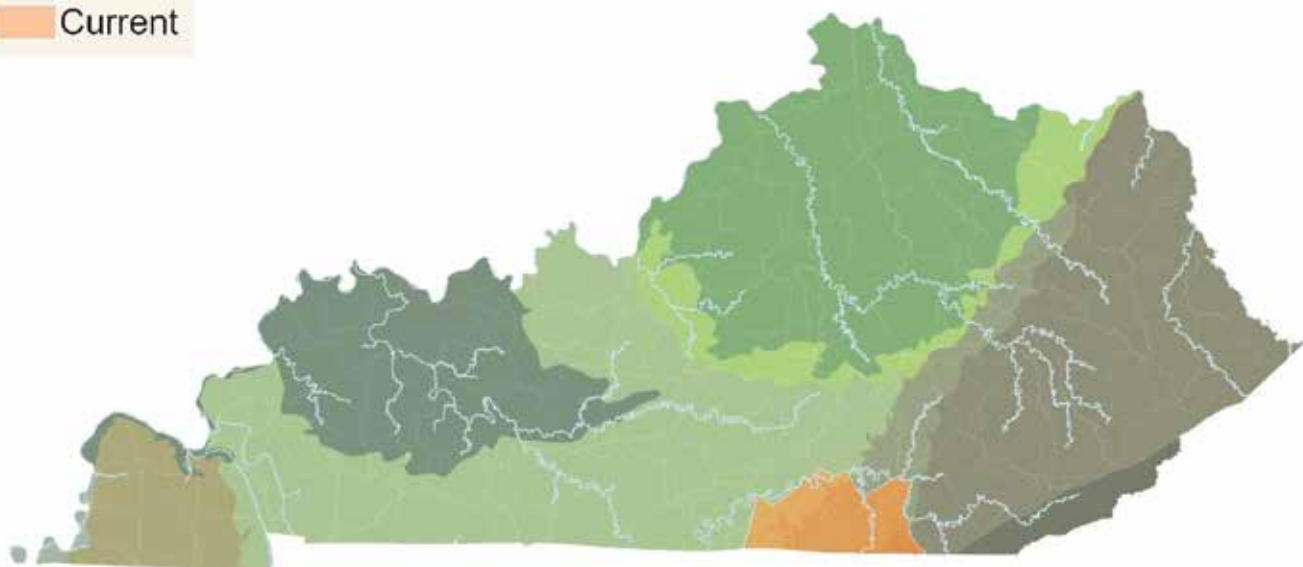
Site/Area Protection  

Needs

Survey: Collect baseline species information

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5T4

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Habitat protection via acquisition or cave gating at occupied sites.

Habitat Associations

Current Watersheds: Blue-Sinking, Lower Green, Lower Ohio-Little Pigeon, Rolling Fork, Rough, Salt, Upper Green



Guilds: Cave/Karst

Occurs in subterranean waters in cave streams. This species is often found in larger base-level pools where mud and silt substrates predominate. Prefers a rocky-gravel substrate in shallow pools where flow gradient is minimal, but freely leaves desired areas in search of food.



GHOST CRAYFISH

(*Orconectes inermis inermis*)

Threats

-  Annual and Perennial Nontimber Crops
-  Recreational Activities

Conservation Actions

Site/Area Protection  

Needs

Survey: Collect baseline species information

Range Map

Current

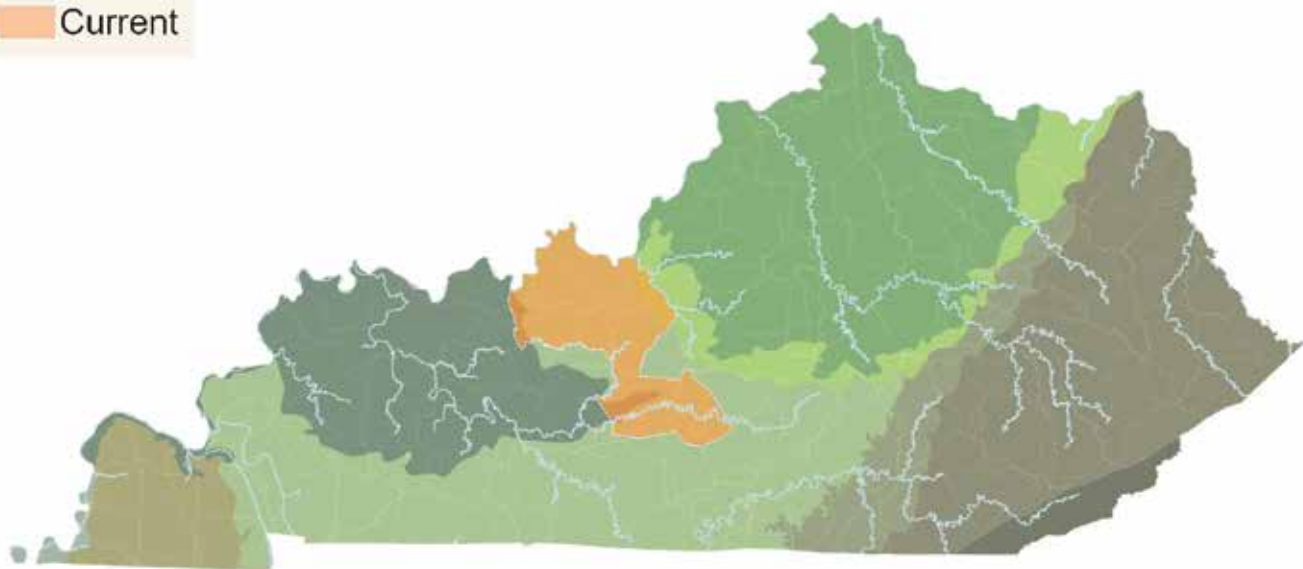


Photo: John MacGregor



APPALACHIAN CAVE CRAYFISH

(*Orconectes packardi*)

Conservation Profile

Priority Group: Highest

KNP Info



G Rank: G2

S Rank: S2S3

Federal Status: N/A

IUCN Red List: EN - Endangered

Threats

-  Annual and Perennial Nontimber Crops
-  Recreational Activities

Conservation Actions

Site/Area Protection  

Needs

Survey: Collect baseline species information

Conservation Goal

Habitat protection via acquisition or cave gating at occupied sites.

Habitat Associations

Current Watersheds: Lower Kentucky, Obey, Rockcastle, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky

Guilds: Cave/Karst

Occurs in subterranean streams and pools with water permanence required.

Range Map

Current

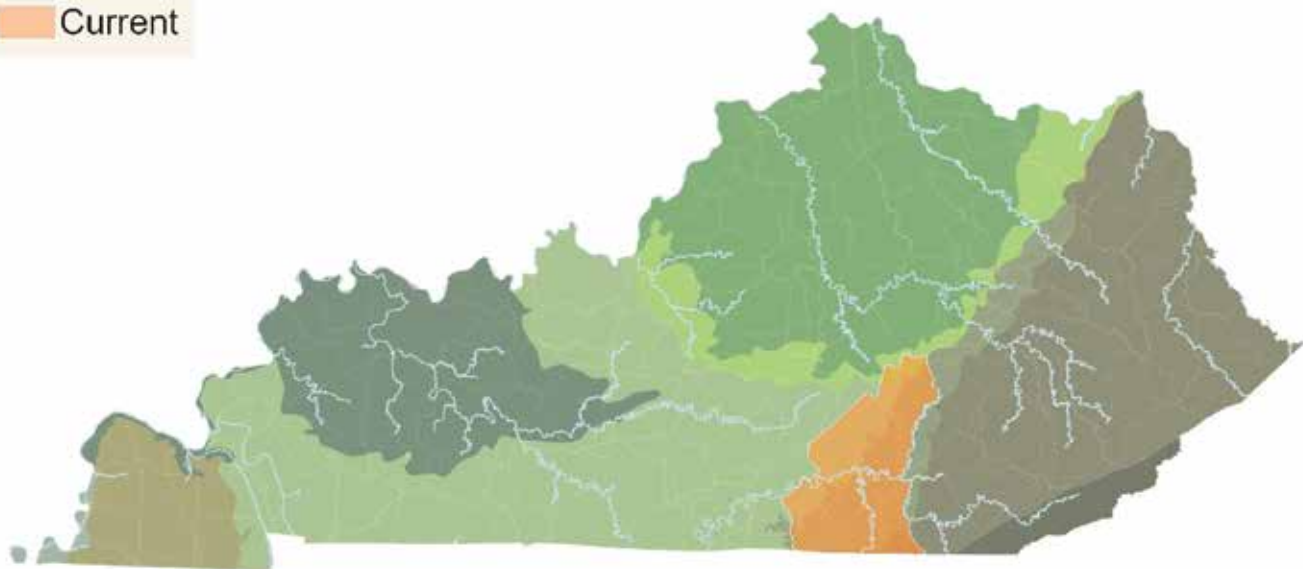


Photo: Kurt Helf, National Park Service



MAMMOTH CAVE CRAYFISH

(*Orconectes pellucidus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats



Annual and Perennial Nontimber Crops



Recreational Activities

Conservation Actions

Site/Area Protection  

Needs

Survey: Collect baseline species information

Conservation Goal

Habitat protection via acquisition or cave gating at occupied sites.

Habitat Associations

Current Watersheds: Barren, Kentucky Lake, Lower Cumberland, Middle Green, Pond, Red, Tradewater, Upper Green

Guilds: Cave/Karst

Cave obligate species found in subterranean stream passages.

Range Map

Current

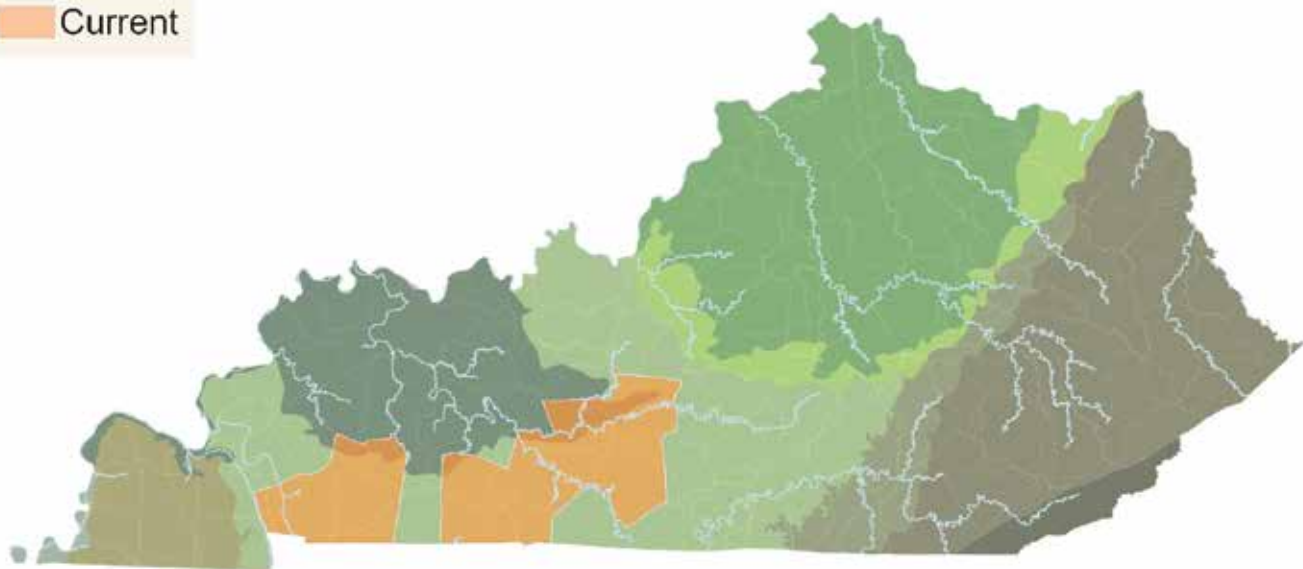


Photo: Michael Durham



MAMMOTH CAVE SHRIMP

(*Palaemonias ganteri*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: VU - Vulnerable

Conservation Goal

Habitat protection via acquisition or cave gating at occupied sites.






Habitat Associations

Current Watersheds: Barren, Upper Green





Guilds: Cave/Karst

Restricted to caves. Inhabits large base level stream passages (i.e., lowest level) and associated tributaries characterized by slow flow, coarse to fine grain sand and coarse silt sediments, and abundant quantities of organic material.

Threats

-  Agricultural and Forestry Effluents
-  Dams and Water Management/Use
-  Housing and Urban Areas
-  Oil and Gas Drilling
-  Roads and Railroads

Conservation Actions

- External Capacity Building  
- Site/Area Protection  

Needs

Survey: Collect baseline species information

Range Map

Current

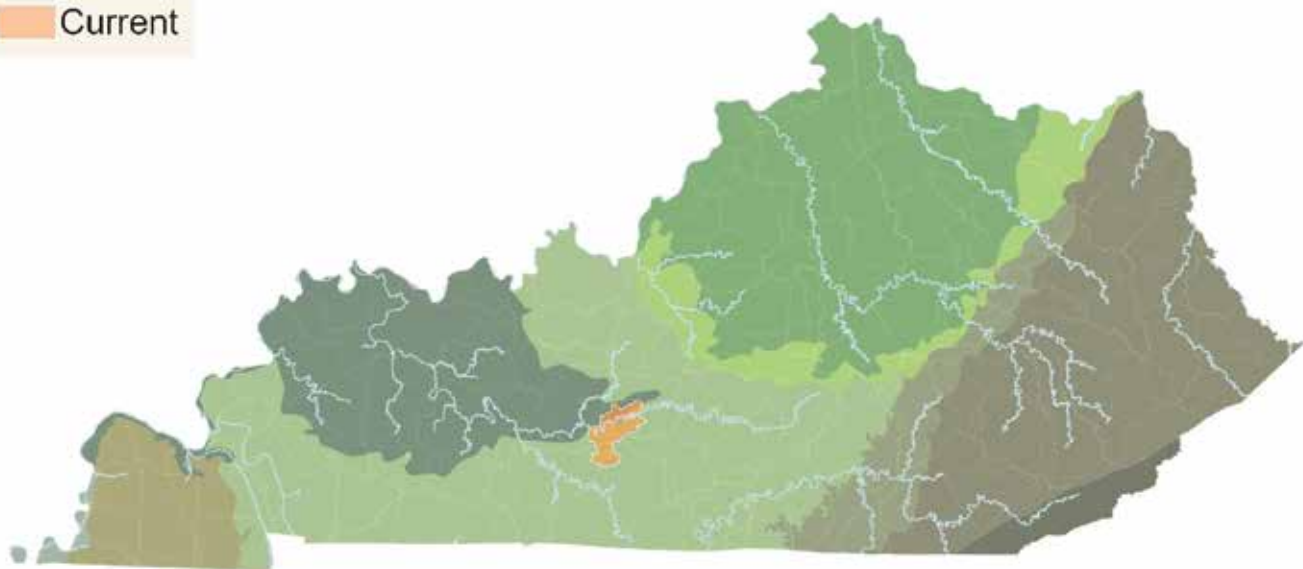
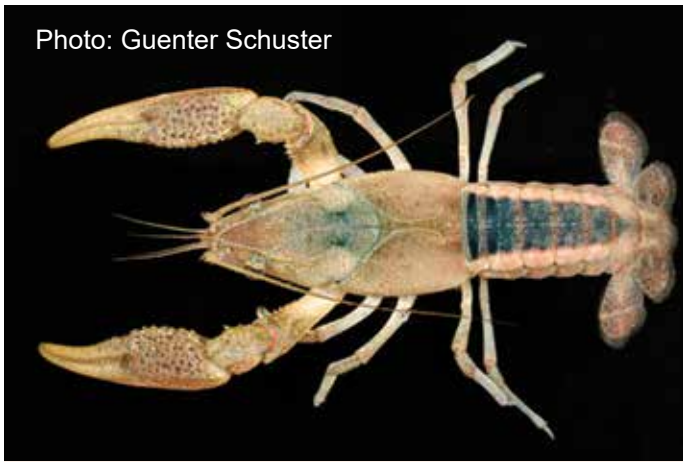


Photo: Guenter Schuster



VERNAL CRAYFISH

(*Procambarus viaeviridis*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S1S2

Federal Status: N/A

IUCN Red List: LC - Least concern

There are very few records for the Vernal Crayfish. More survey work is needed to complete an assessment.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

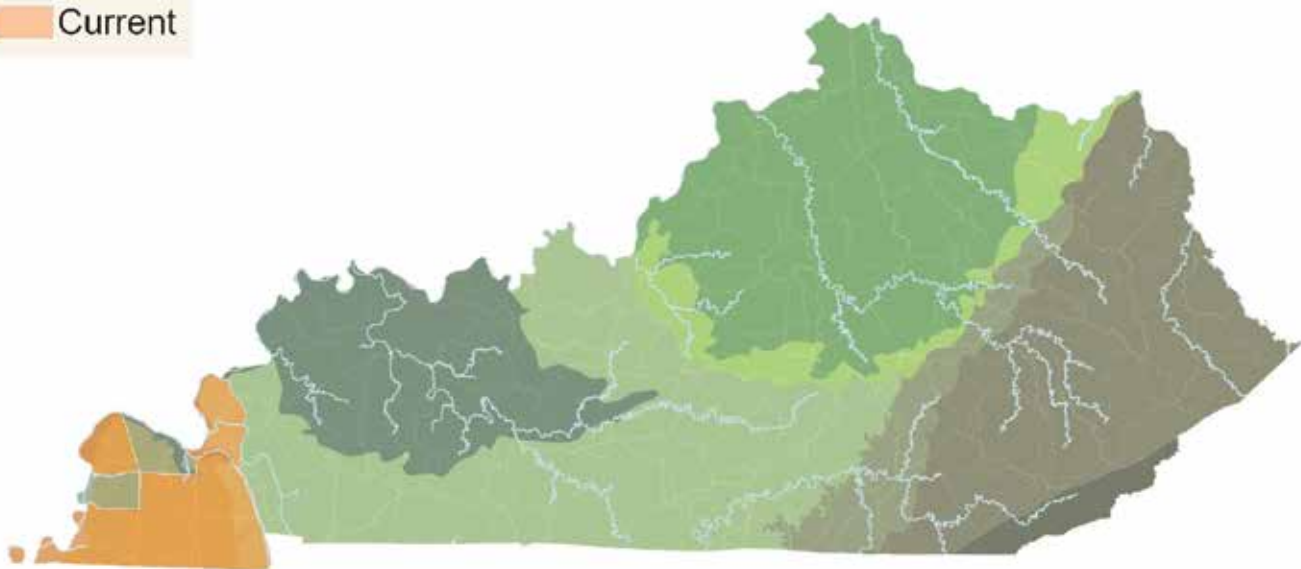
Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond, River/Streams

Inhabits wetlands, ponds, low lying ditches, cypress swamps, floodplain streams, debris-filled pools and lentic situations on Coastal Plain streams. Tolerant of heat and low oxygen levels.

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

None

Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Cave/Karst

Cave obligate species that occurs only in Mississippi Plateau caves in Barren, Edmonson, Hart, and Trigg Counties in the Mammoth Cave system. Utilizes small drip and seep pools in caves, and is occasionally found in surface seeps in the Mammoth Cave area.

AN AMPHIPOD

(Stygobromus vitreus)

Threats

Unknown

Conservation Actions

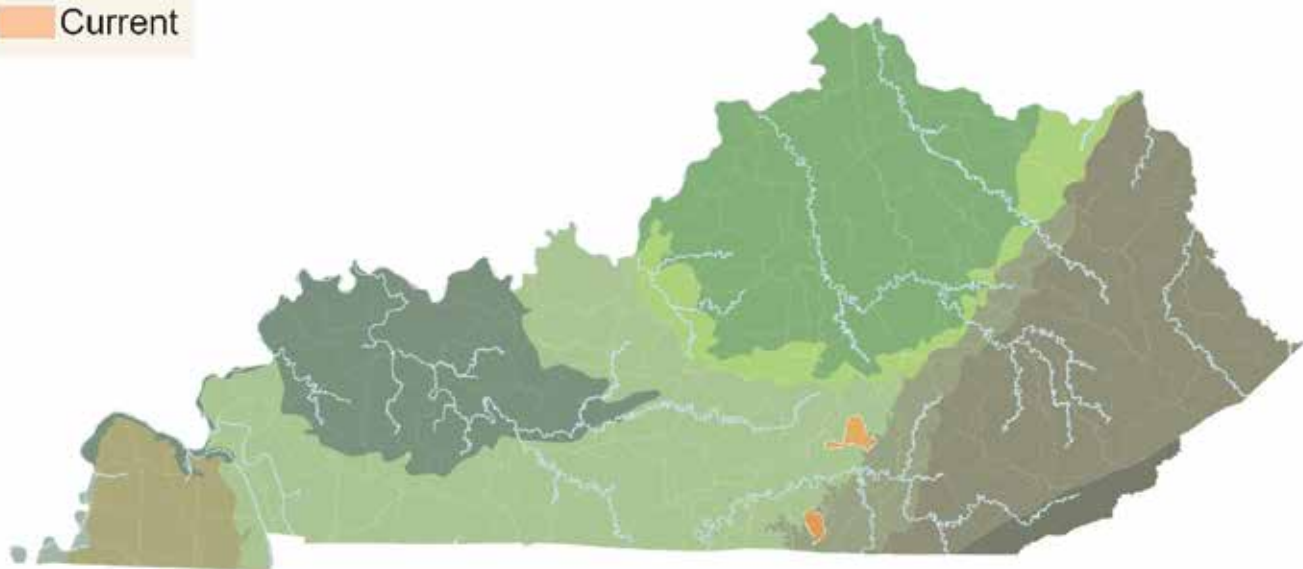
Unknown

Needs

Survey: Collect baseline species information

Range Map

Current



FISHES AND LAMPREYS

Introduction

Kentucky contains one of the most rich and diverse fish faunas in the United States, exceeded only by Alabama, Tennessee, and Georgia. Currently, 278 species are known to occur or have occurred within the state, representing 88 genera and 32 families. Of the 278 species, 26 (9%) are the result of either intentional or accidental introduction by human activities. A total of 243 described and 9 known undescribed species are native, representing nearly a quarter of the entire native North American freshwater fish fauna (just over 1,200 species). Five native species (3%) no longer occur within the state (extirpated) and one species is extinct. The richness and diversity of Kentucky's native fishes are the combined result of being in a geographic position bordering the Ohio and Mississippi rivers, a long geological history involving drainage evolution (e.g., formation of the Appalachian Mountains, inundation by ancient seas, and Pleistocene glaciation), an abundance of natural waters with a wide variety of aquatic habitats, and a stable environment.

During the past decade, the dynamic nature of Kentucky's fish fauna has been demonstrated through additional discoveries of nonindigenous species (Black Carp and Banded Killifish) and native species previously unreported (Bigmouth Shiner) or thought to be extirpated (Southern Brook Lamprey and Flame Chub). In addition to increased fish survey activities that have expanded distributional information, research in systematics and taxonomy has revealed 11 additional species, including new species descriptions (Buck Darter and Clarks Darter), elevation of subspecies to full species status (Finescale Stoneroller and Moonbow Darter) and seven undescribed species considered valid.

The initial Comprehensive Wildlife Conservation Strategy completed in 2005 recognized 59 native fish species of greatest conservation need (SGCN), with an additional nine species added to the list in the 2013 Wildlife Action Plan (SWAP) revision. The list included all federally listed species protected under the Endangered Species Act (ESA), most state listed species recognized by the Office of Kentucky Nature Preserves (OKNP), and others considered to be declining. Since 2013, fish surveys across the state have revealed new information on distribution and conservation status for many species.

The 2023 Wildlife Action Plan (Plan) includes 77 fish SGCN that were selected by a team of professionals and scholars with expert knowledge of Kentucky's fish fauna. The updated list of SGCN includes 64 state listed species currently recognized by OKNP as endangered

(34 species or 14% of the native fauna), threatened (11 or 4%), and special concern (19 or 8%). Seven of those species are federally protected under the ESA and are listed as endangered (Pallid Sturgeon, Palezone Shiner, Tuxedo Darter, and Cumberland Darter) or threatened (Blackside Dace, Relict Darter, and Kentucky Arrow



Goldstripe Darter, *Etheostoma parvipinne*, a small fish (reaching 2.5 inches) in its natural habitat, a small sandy-bottomed Coastal Plain stream in the Terrapin Creek drainage in western Kentucky. Photo: KDFWR

Darter). An additional 13 species were designated SGCN based on newly available data showing range reductions or population declines. Eleven species were designated "data deficient" because they lack sufficient distributional data and basic life history information to make an informed conservation status assessment. A reassessment of the previous list of SGCN accounting for new information resulted in the removal of eight species listed in the 2013 SWAP: Mississippi Silverside, Emerald Darter, Splendid Darter, Highland Rim Darter, Kentucky Darter, Striped Darter, Bloodfin Darter, and Frecklebelly Darter. For these species, increased survey efforts during the past decade resulted in the accumulation of new occurrence records and population data, indicating more extensive distributions and higher abundance levels than previously known. Species that are extinct or extirpated from the state were not considered for inclusion as SGCN.

The distributional status of each fish SGCN in Kentucky is depicted in a range map showing current and historically occupied watersheds at 10-12 digit HUC scales. Historic records include collection data from pre-1920 to 1985, which were published in *A Distributional Atlas of Kentucky Fishes* in 1986. All records accumulated from 1986-2022 are considered to represent the current range; however, it may also include records prior to 1986. Historic range is displayed where the only available records predate 1986 and is shown as "Historic Only". Most historic period records are based on museum vouchered specimens that have been verified. The current period records are based

on vouchered specimens and non-vouchered sampling data collected primarily by government agencies, academic institutions, and biological consultants. All occurrence records of SGCN are maintained in the Kentucky Fish and Wildlife Information System database and underwent extensive review before being incorporated into the range maps. Records having questionable identifications or other errors were not included in the maps unless they could be verified and corrected.

Most of the fishes listed as SGCN (65 species or 84%) inhabit lotic systems (streams and rivers), a small proportion (10 species or 13%) inhabits lentic systems (wetlands, ponds, and lakes), and two species (3%) are restricted to subterranean (cave) systems. Lotic species can be further categorized by stream type (e.g., cold, high gradient streams to warm, unconfined large rivers), which fall into upland and lowland groups. Large river species (e.g., Pallid Sturgeon, Paddlefish, and Silverband Shiner), mostly occur in the Mississippi and Ohio rivers and lower reaches of major tributaries. Lowland species (e.g., Cypress Minnow, Lake Chubsucker, and Dollar Sunfish) are found in wetlands and low gradient streams west of the lower Green River. Upland species (e.g., Blackside Dace, Blackfin Sucker, and Kentucky Arrow Darter) occupy medium to high gradient streams in the eastern two-thirds of the state. Three species of cavefish (Northern Cavefish, Southern Cavefish, and Shawnee Hills Cavefish) inhabit cave streams and springs in the karst region of central and western Kentucky.

The highest concentration of fish SGCN (48 species or 62%) exists in the Four Rivers Basin region of western Kentucky that include the lower portions of the Cumberland, Tennessee and Ohio rivers, and direct tributaries of the Mississippi River. Within this region, Terrapin Creek, a spring-fed Coastal Plain stream, is the most unique system containing seven species found nowhere else in the state and several others with restricted state ranges. The second and third highest concentrations of fish SGCN are in the Cumberland (34 species or 44%) and Green (31 species or 40%) River basins. These two river basins also contain the largest proportion of endemic species, with 19 in the Cumberland and eight in the upper Green and Barren. Five species are restricted range endemics found only within Kentucky: Northern Cavefish (Crawford-Mammoth Cave Uplands and Mitchell Plain cave systems), Relict Darter (Bayou De Chien), Buck Darter (Buck Creek), Kentucky Arrow Darter (upper Kentucky River drainage), and Shawnee Darter (Pond River drainage). A large proportion of fish SGCN (34 species or 44%) have limited distributions in Kentucky because they are on the periphery of their range, making them vulnerable to local extirpation.

The greatest threats to fishes and other aquatic organisms in Kentucky stem from human activities that cause aquatic habitat degradation or destruction, impaired water quality, and altered flows. Activities and

processes having the most severe impacts to the largest proportion of fish SGCN (over 90%) fall under five threat categories: residential and commercial development, agriculture and aquaculture, pollution, natural systems modification, and transportation and service corridors. Residential, commercial, transportation and service corridor developments are pervasive statewide and more concentrated around urban centers. Agricultural land use also occurs statewide but is more intensive west of the Cumberland Plateau. Energy production, mining, and silviculture activities are more regional based on available coal, oil and gas, and timber resources, but have severely impacted watersheds with unique and diverse aquatic faunas (e.g., upper Cumberland River drainage). Collectively, these land use activities have directly or indirectly resulted in chronic increased sedimentation and turbidity, nutrient enrichment, and other pollutants in streams and rivers that are known to be major stressors for fishes and other aquatic organisms. Natural systems



Northern Madtom, *Noturus stigmosus*, a small catfish (reaching 5 inches) inhabiting shallow riffles in free-flowing sections of medium to large rivers in the Ohio River drainage. Photo: KDFWR



Alligator Gar, *Atractosteus spatula*, an immature individual (14 inches long) reared at Pfeiffer Hatchery to be reintroduced into its historic range in large river and floodplain habitats of western Kentucky. The Alligator Gar is a large species, reaching 8 feet in length and weighing over 300 pounds. Photo: KDFWR

modifications including channelization, impoundment, and wetland drainage have eliminated, reduced, and fragmented populations of fishes, making them more vulnerable to stresses caused by invasive species, biological resource use (overexploitation), human intrusions and disturbance, and climate change.

The conservation actions proposed to counteract threats to fish SGCN fall under multiple categories: external capacity building; land and water protection; land and water management; education and awareness; livelihood, economic and other incentives; and law and policy. Given the varied needs of the multitude of species and their habitats, effective implementation of conservation actions will require forming alliances and partnerships with government agencies, nonprofits, universities, businesses, and communities. This includes incorporating the SWAP into local development plans. Specific actions that are common across taxa include: development and implementation of best management practices (BMPs) for aquatic systems; acquisition, protection, and restoration of aquatic habitat; education, outreach, and incentive programs aimed at protecting watersheds and riparian corridors; and regulatory measures designed to prevent water pollution and the introduction and spread of nonindigenous and exotic species.

Although much has been learned about Kentucky's fish fauna over the past two decades, basic biological and distributional information for many species is lacking or incomplete. Research, survey, and management needs were identified for each fish SGCN. All species need continued field surveys, either to fill baseline distributional data gaps or assess changes in distributions for long-term trend monitoring. Undersampled or overlooked habitats such as large rivers, wetlands, and on private lands likely contain undocumented occurrences of SGCN. For nearly all species, life history research is needed to obtain information on reproductive biology, spawning locations, habitat requirements, and sensitivity to environmental stressors. Other top research priorities involve the use of modern DNA technology in surveys and population genetics monitoring. Management needs are largely tied to conservation actions, involving external capacity building and actions aimed at preventing, reducing, or mitigating stressors (e.g., eliminating or reducing barriers to fish passage). For species listed under the ESA, management needs involve working with federal partners on implementation of Recovery Plan actions.

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CASE STUDY

Discovery of the Buck Darter, a new restricted-range endemic species in the Cumberland River drainage

The Cumberland River drainage supports one of the most diverse and unusual assemblage of fishes in Kentucky, including 34 (44%) of the state's 77 fish species of greatest conservation need (SGCN) and the largest number of endemics (found nowhere else). While conducting a fish community survey of Buck Creek during 2010-2012, Kentucky Department of Fish and Wildlife Resources (KDFWR) ichthyologists captured some unusual looking specimens of what had been recognized as the Striped Darter (*Etheostoma virgatum*), a species known from the Rockcastle River, Buck Creek, Beaver Creek, and Mill Creek systems in the Cumberland River drainage below Cumberland Falls. In collaboration with the Yale Peabody Museum of Natural History, further analyses of the darter specimens using DNA and morphological data (e.g., color, body shape measurements, and scale counts) revealed that they represented an undescribed species endemic to the Buck Creek system. A formal description of the new species was published in a peer-reviewed scientific journal in 2015. Aptly named the Buck Darter (*Etheostoma nebra*), this small fish reaches 3 inches in length and the males develop brilliant breeding colors during the spring spawning period.

Fish survey data collected over the past 30 years indicate that the Buck Darter has disappeared from most of its former range in the Buck Creek system. The species is currently known from only three small spring-fed streams in the Flat Lick Creek and Cedar Creek watersheds in Pulaski County. Reasons for its decline are uncertain, but further research is underway to learn



Live breeding male and female Buck Darters.
Photo: KDFWR



Matt Thomas (KDFWR) releasing captive-spawned Buck Darters. Photo: KDFWR



Left-Right: Davy Black (EKU), Patrick Rakes (CFI), Stephanie Brandt (KDFWR), and Michael Floyd (KFO) carrying sampling equipment to the Buck Darter stocking stream. Photo: KDFWR

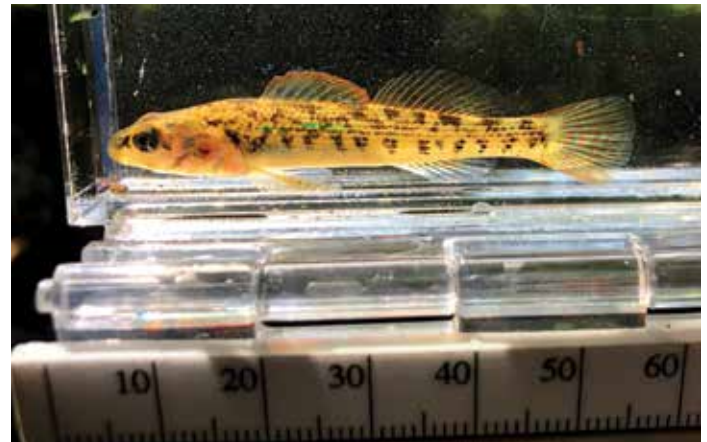
more about its population size, life history, and ecology. A conservation partnership between KDFWR, U.S. Fish and Wildlife Service Kentucky Field Office (KFO), Eastern Kentucky University (EKU), Office of Kentucky Nature Preserves (OKNP) and Conservation Fisheries, Inc. (CFI) was formed to develop and implement conservation actions for the species. Since 2016, EKU has completed research on the Buck Darter's population size and ecology, while CFI initiated a multi-year captive propagation study and is maintaining an ark population.

Buck Darter adults were collected for brood stock in January 2016 to begin developing captive propagation protocols for the species. Each year during 2018-2022 captive-spawned progeny were marked with visible elastomer implant (VIE) tags and released in late summer in a small tributary of Flat Lick Creek, an unoccupied stream within the species' historic range. Each follow-up survey beginning in 2019 has produced recaptures of tagged adults, indicating survival of hatchery propagated fish. The first evidence of natural reproduction was recorded in 2021, with three untagged fish representing Age-0 (young-of-year) and Age 1+ (over 1 year old) age classes. During that survey, 19 tagged recaptures representing four different age classes were recorded.

The discovery and description of the Buck Darter was made possible through State Wildlife Grant (SWG) funding. Conservation actions including the reintroduction of the species into its former native habitat are being implemented through SWG, the Kentucky Aquatic Resource Fund (KARF), and Partners for Fish and Wildlife, a voluntary partnership program administered by the U.S. Fish and Wildlife Service to provide financial and technical assistance to private landowners who wish to protect or restore wetlands, uplands, and riparian and instream habitats.



Seining for Buck Darters. Photo: KDFWR



Recaptured 2018 year-class Buck Darter, marked with green visible implant elastomer tag.
Photo: KDFWR

FISHES AND LAMPREY PROFILE PAGES

Photo: Matt Thomas



LAKE STURGEON

(*Acipenser fulvescens*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G3G4

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Continue reintroduction effort within the native range in the Cumberland River drainage. Continue monitoring reintroduced fish through annual sampling. Collect additional data on movements and habitat use. Assess natural reproduction potential.

Habitat Associations

Current Watersheds: Highland-Pigeon, Lower Cumberland, Lower Ohio, Ohio Brush-Whiteoak, Rockcastle, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Cool-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River, Other

Inhabits deep channels and pools of medium to large rivers and reservoirs with mud, sand, and gravel substrates. Adults require gravel shoals in rivers to spawn. Large sections of unimpounded river are necessary for adults to complete spawning migrations. Juveniles occupy substrates of sand and mud that contain high densities of microcrustaceans and aquatic insect larvae.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Fishing and Harvesting Aquatic Resources
-  Invasive Non-native/Alien species
-  Pollution
-  Residential and Commercial Development
-  Shipping Lanes

Conservation Actions

- Alliance and Partnership Development    
- Compliance and Enforcement 
- Conservation Payments    
- Education and Awareness    
- External Capacity Building 
- Habitat and Natural Process Restoration     
- Land/Water Management    
- Resource and Habitat Protection    

Needs

Survey: Identification and assessment of spawning locations and habitat

Survey: Population monitoring in the upper Cumberland River drainage

Research: Evaluate seasonal movement patterns of adults

Research: Population genetics research

Management: Continue interstate collaboration through the Southeast Lake Sturgeon Working Group on reintroduction and monitoring efforts in the Cumberland River

Range Map

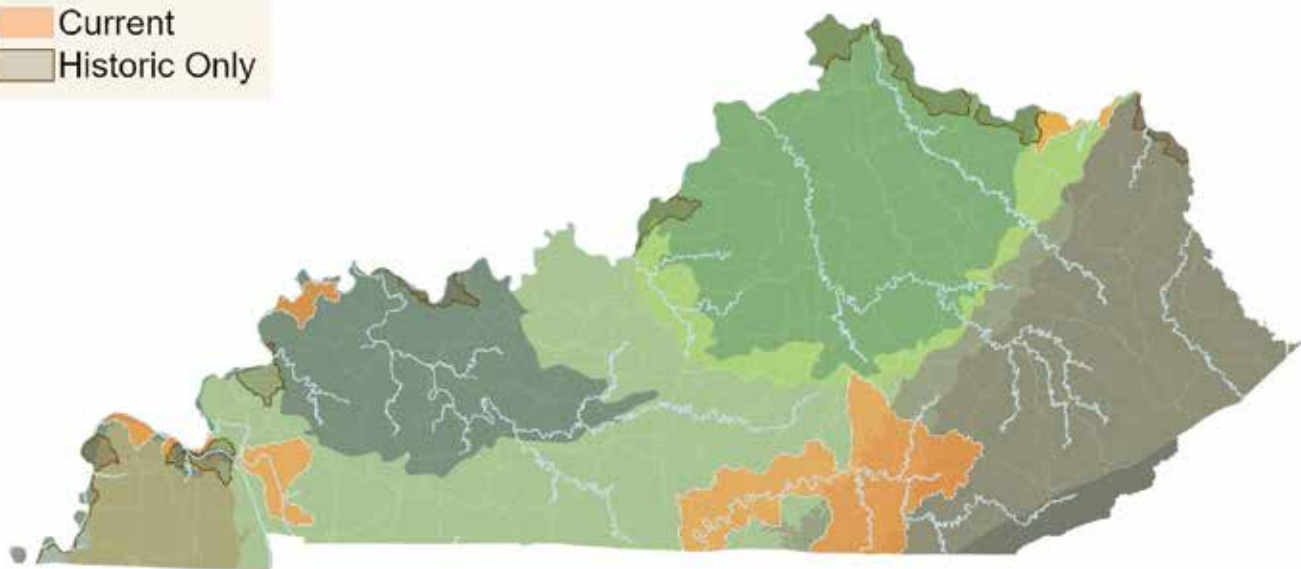


Photo: Matt Thomas



REDLIPS DARTER

(*Allohistium maydeni*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: GNR

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine if the species is present or extirpated in the Red (Lower Cumberland), Obey, and Little South Fork Cumberland River drainages through targeted surveys within those systems. Monitor populations in Buck Creek, Rockcastle River, and Big South Fork Cumberland River. Search for potentially undocumented occurrences within occupied watersheds where suitable habitat exists.

Habitat Associations

Current Watersheds: Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Confined-Medium River

Inhabits clear, upland small to medium rivers. Requires stable rock substrates with presence of large (>0.5 m diameter) boulders, minimal silt, pool habitat, and still water or slow current. Usually in pools, above or below riffles in slow to moderate current at depths of 0.5-1.75 m. Associated with cover including boulders, tree snags, or stands of Water Willow (*Justicia* sp.) with substrates of sand and gravel mixed with organic debris.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments 
- Education and Awareness 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Land/Water Management 
- Resource and Habitat Protection 

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations and work to ensure they are protected

Survey: Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Assessment of watershed size, connectivity, and colonization potential among tributaries currently supporting populations

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

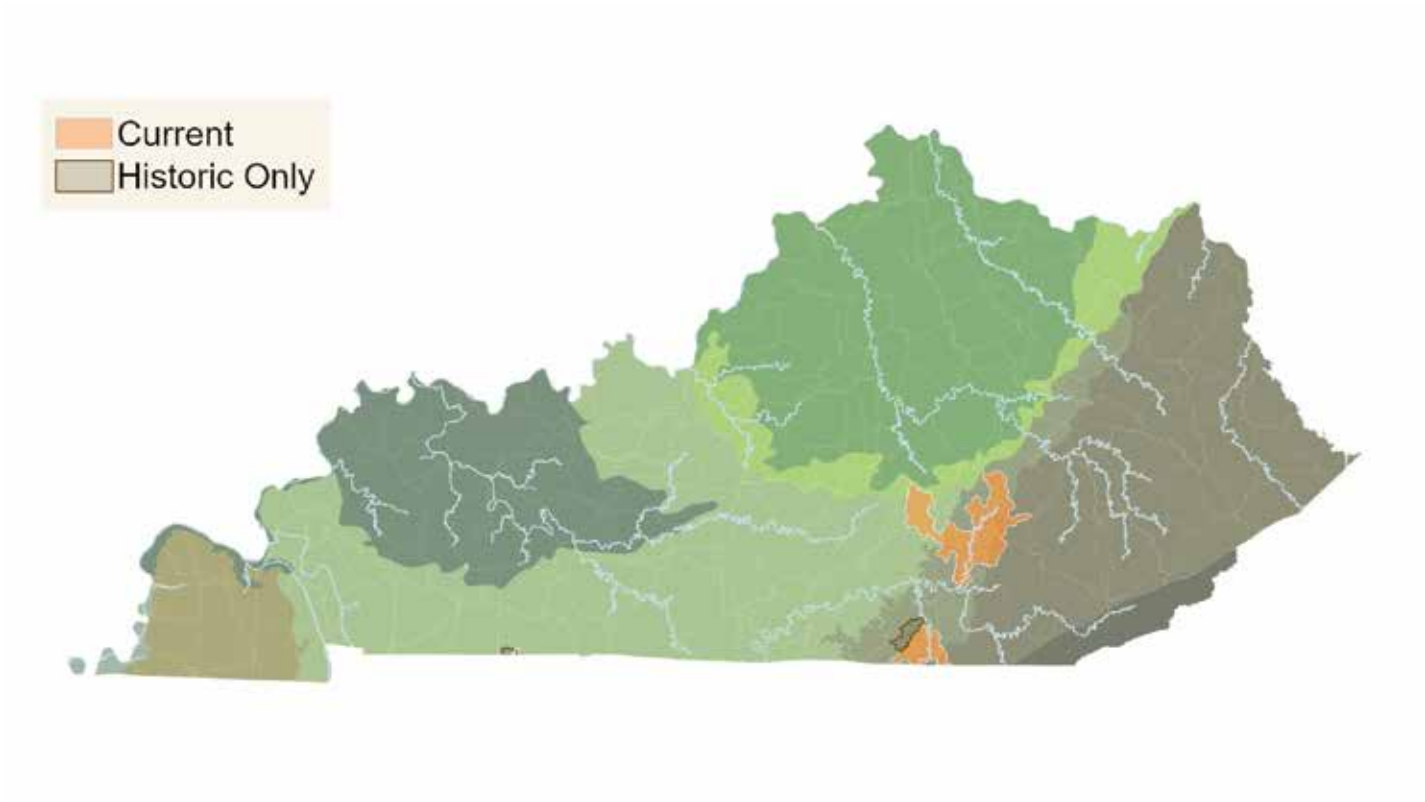


Photo: Zach Randall, Florida Museum of Natural History



ALABAMA SHAD

(*Alosa alabamae*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S1

Federal Status: N/A

IUCN Red List: DD - Data deficient

Conservation Goal

Determine if the species occurs and at what frequency in the lower Ohio, Tennessee, and Cumberland rivers through coordination among and within agencies conducting fish sampling using boat electrofishing.







Habitat Associations

Current Watersheds: Kentucky Lake, Lower Mississippi-Memphis

Stream Type: Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Medium to large free-flowing rivers are necessary to complete spawning migrations. Areas of fast current over sandy substrate, gravel shoals, or limestone outcrops are used for spawning. Sandbar habitat is used by juveniles.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Shipping Lanes

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments   
- Education and Awareness   
- External Capacity Building 
- Habitat and Natural Process Restoration    
- Land/Water Management    
- Resource and Habitat Protection   

Needs

Survey: Targeted surveys in the lower Ohio, Tennessee, and Cumberland Rivers, where the species was known historically

Survey: Targeted surveys in the Mississippi River bordering western Kentucky

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

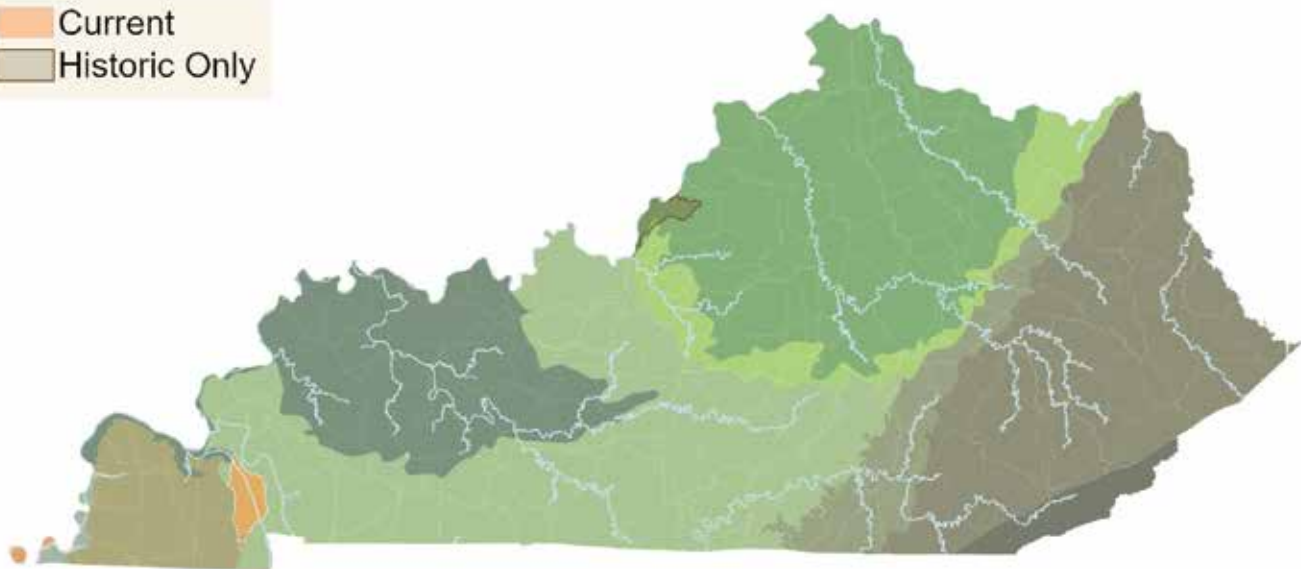


Photo: Danté Fenolio, San Antonio Zoo



NORTHERN CAVEFISH

(*Amblyopsis spelaea*)

Threats

- Dams and Water Management/Use
- Fishing and Harvesting Aquatic Resources
- Mining and Quarrying
- Pollution
- Recreational Activities
- Residential and Commercial Development
- Transportation and Service Corridors

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S3

Federal Status: Not Listed

IUCN Red List: NT - Near threatened

Conservation Actions

- Alliance and Partnership Development
- Compliance and Enforcement
- Conservation Payments
- Education and Awareness
- External Capacity Building
- Land/Water Management
- Land/Water Protection
- Site/Area Protection

Conservation Goal

Complete additional surveys of cave systems in Grayson, Hart, and Hardin counties. Determine population genetics. Work to ensure protection of cave systems supporting populations.

Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Cave/Karst

Endemic to the karst region of the Interior Plateau of central Kentucky. Restricted to subterranean aquatic habitats consisting of deep pools or moderately deep shoals with rock ledges and overhangs, and slackwater areas with an abundance of organic matter.

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Surveys of cave systems between the main population centers in Grayson, Hart, and Hardin counties to determine levels of isolation or continuity

Research: Assess impacts of hydrological manipulations and increased siltation on cavefish populations

Research: Determine if Rainbow Trout and Banded Sculpin significantly prey on Northern Cavefish

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Research: Population genetics research

Range Map

Current
Historic Only

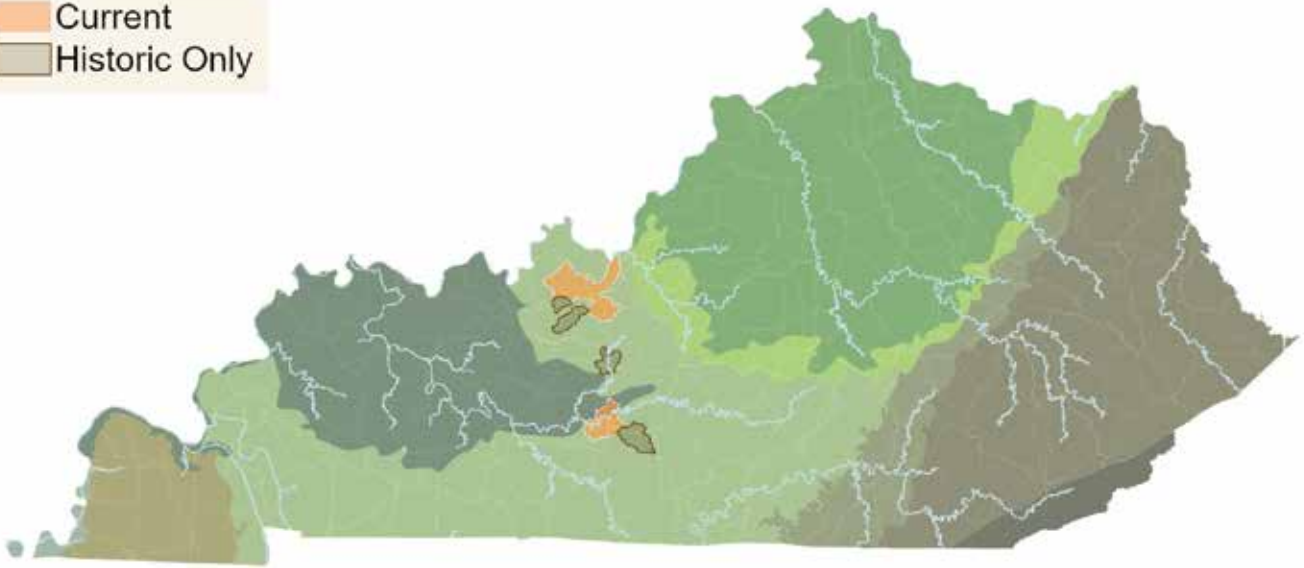


Photo: Matt Thomas



WESTERN SAND DARTER

(*Ammocrypta clara*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Determine if the species is present or extirpated in the North Fork Kentucky River, Cumberland River, and Wolf Creek (Big Sandy) drainages through additional surveys at historic and new localities within those systems. Monitor the population in the Green River. Obtain information on life history and threat sensitivity.






Habitat Associations

Current Watersheds: North Fork Kentucky, Upper Green

Stream Type: Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River

Requires silt-free sand bars in unimpounded reaches of medium to large streams and rivers. Occupies areas of slight to moderate current in clear to slightly turbid water over loose, silt-free sand or sand mixed with gravel substrates.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Natural System Modifications
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments    
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management      
- Resource and Habitat Protection     

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations and work to ensure they are protected

Survey: Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

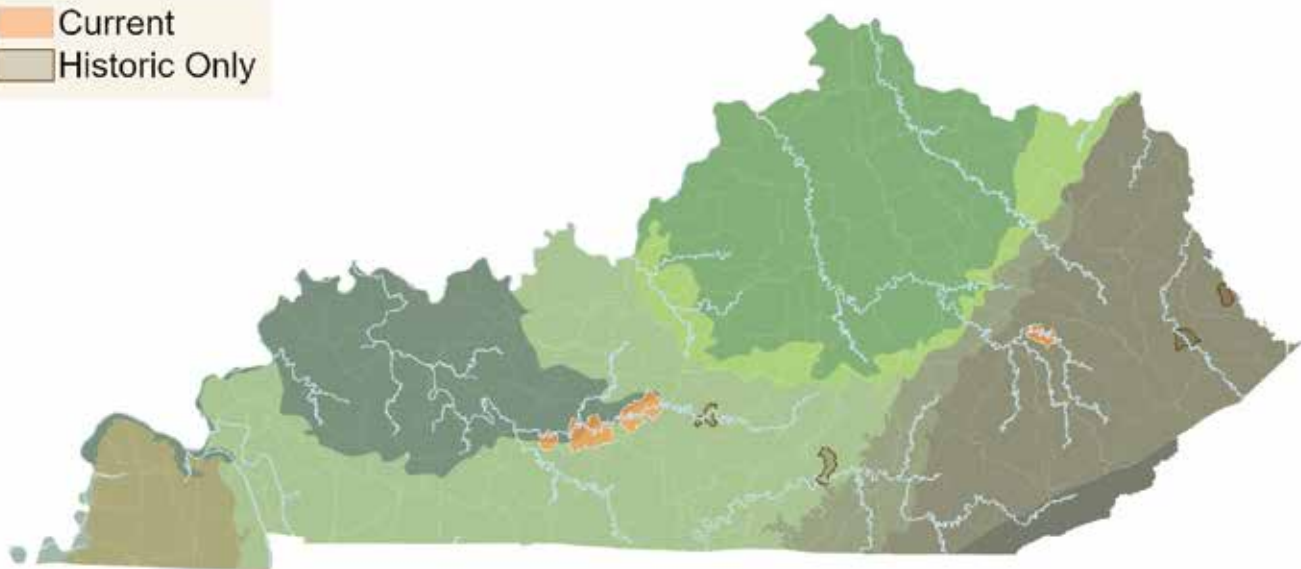


Photo: Matt Thomas



AMERICAN EEL

(*Anguilla rostrata*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4

S Rank: S3S4

Federal Status: N/A

IUCN Red List: EN - Endangered

Assessing the distribution and status of the American Eel is difficult because it occurs primarily in large river habitat and is not easily sampled. There are recent records from most Ohio River tributaries, and it is captured with regularity in the Green, lower Tennessee and Cumberland rivers, and mainstem Ohio River. Although extirpated from some portions, it remains widely distributed over the majority of its historical range. This extensive range provides multiple freshwater and estuarine areas that support its life history stages and thus buffer the species from stressors in any one area.

Conservation Goal

Refine the current distribution and status in Kentucky through improved coordination between and within agencies conducting fish sampling using multiple gear types on rivers and large streams statewide.

Habitat Associations

Current Watersheds: Barren, Highland-Pigeon, Kentucky Lake, Little Sandy, Lower Cumberland, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, Middle Green, Obey, Ohio Brush-Whiteoak, Red, Tradewater, Upper Green

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Improve coordination between agencies and divisions conducting fish sampling using multiple gear types on large streams and rivers to report eel captures

Survey: Public outreach encouraging anglers who capture eels to report photos, location data, and other information (e.g., length and weight) to help with monitoring efforts

Survey: Targeted surveys at historic and new locations in large rivers and tributaries to determine the species' distributional status and population densities

Research: Habitat use, movements, and basic population information

Management: Eliminate or reduce barriers to fish passage

High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Cool-Unconfined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Primarily inhabits large rivers, but also ascends smaller rivers and streams in upland and lowland regions. Generally associated with instream cover, including undercut banks, debris piles, logs, and boulders.

Range Map

Current
Historic Only

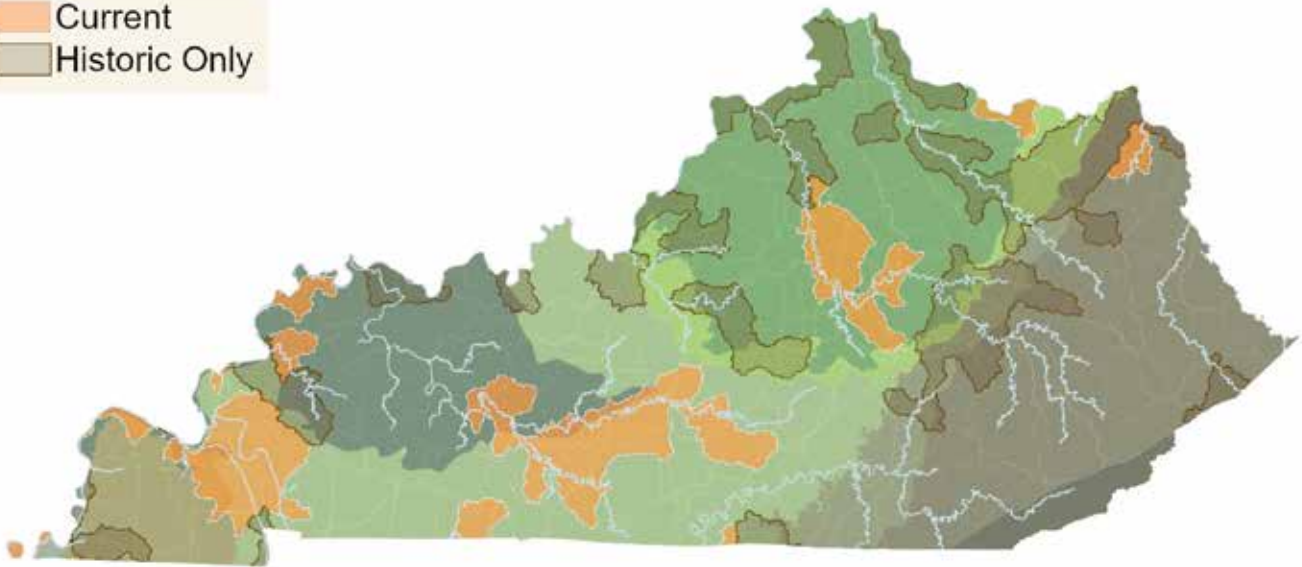


Photo: Matt Thomas



ALLIGATOR GAR

(*Atractosteus spatula*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G3G4

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Continue reintroduction effort within the native range in western Kentucky. Establish a monitoring plan and sampling strategy. Collect additional data on movements and habitat use. Assess natural reproduction potential.






Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Kentucky Lake, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, Tradewater

Stream Type: Warm-Moderately Confined-Large River, Warm-Unconfined-Large River, Other

Northern periphery of range in the Four Rivers Basin region of western Kentucky. Inhabits sluggish pools, backwaters, and embayments of large rivers and associated floodplain lakes, sloughs, and oxbows. Requires access to seasonally inundated floodplain habitats for spawning.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Fishing and Harvesting Aquatic Resources
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments   
- Education and Awareness   
- External Capacity Building  
- Habitat and Natural Process Restoration   
- Land/Water Management    
- Resource and Habitat Protection   

Needs

Survey: Collect baseline species information

Survey: Targeted surveys of lotic and lentic habitats in the Four Rivers region of western Kentucky using gill nets with appropriately sized bar-mesh sizes.

Research: Additional research to determine movements and habitat use in western Kentucky

Management: Continue interstate collaboration and information exchange on management and conservation through the Alligator Gar Technical Committee (website: <https://lepisosteidae.net/>)

Management: Improve communication and cooperation with commercial fishers and recreational anglers on reporting Alligator Gar captures

Range Map

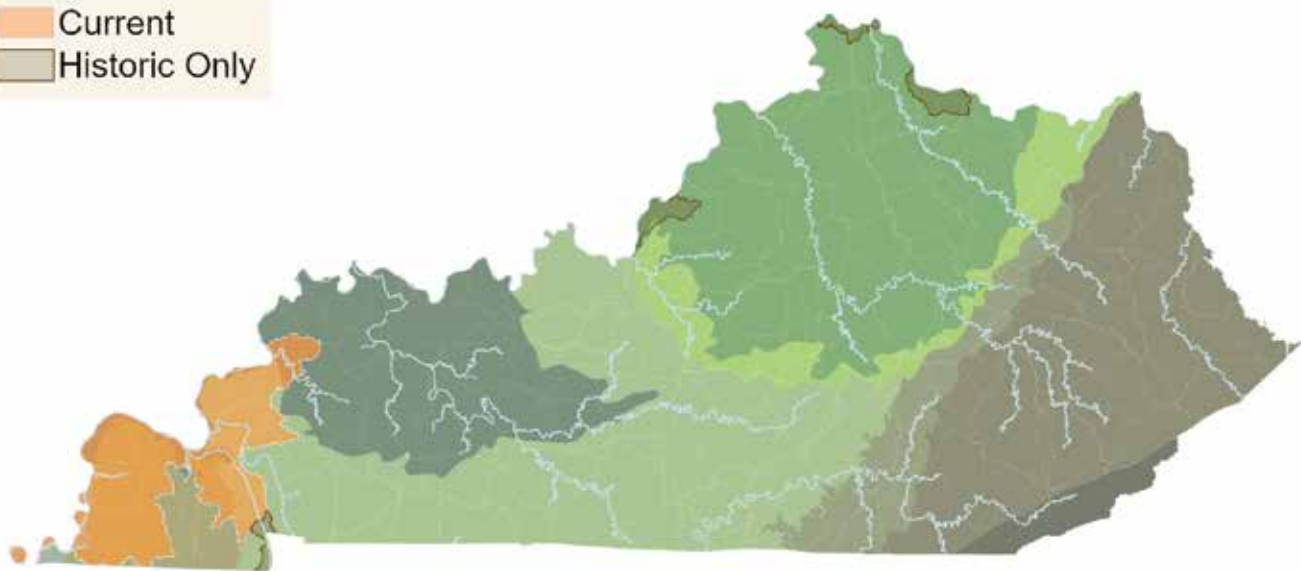


Photo: Brian Zimmerman, Ohio State University



HIGHFIN CARPSUCKER

(*Carpiodes velifer*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4G5

S Rank: S3S4

Federal Status: N/A

IUCN Red List: LC - Least concern

The Highfin Carpsucker is the rarest of the carpsuckers in Kentucky. Accurate assessment of distribution and status is difficult because there are very few vouchered records available. 93% of pre-1986 records are from Ohio River tributaries, including the lower Tennessee, Green, Cumberland, Salt, Kentucky, and Licking rivers. Conversely, 93% of post-1986 records are from the mainstem Ohio River. Similarity of appearance and hybridization with other *Carpiodes*, especially *C. cyprinus* (Quillback) makes any non-vouchered record questionable. More sampling is needed to obtain voucher specimens or photos and DNA samples.







Conservation Goal

Determine the current distribution and status of the species in the Ohio River and tributaries statewide through improved coordination between and within agencies conducting fish sampling using multiple gear types on rivers and large streams.

Habitat Associations

Current Watersheds: Blue-Sinking, Highland-Pigeon, Little Sandy, Little Scioto-Tygarts, Lower Green, Lower Kentucky, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Silver-Little Kentucky

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

Unknown

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Improve coordination between agencies and divisions conducting fish sampling using multiple gear types on large streams and rivers to acquire additional records and specimens

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: DNA sampling for specimen identification and to assess introgressive hybridization with other carpsuckers

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Eliminate or reduce barriers to fish passage

Management: Modify current dam operations on large rivers to restore a more natural hydrograph

Stream Type: Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Cool-Unconfined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Cool-Confined-Large River, Warm-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River, Other

Inhabits streams and small to large rivers and reservoirs, most often associated with pools and backwaters. Usually occurs in relatively clear water over clean sand or gravel substrates in areas free of submerged aquatic vegetation.

Range Map

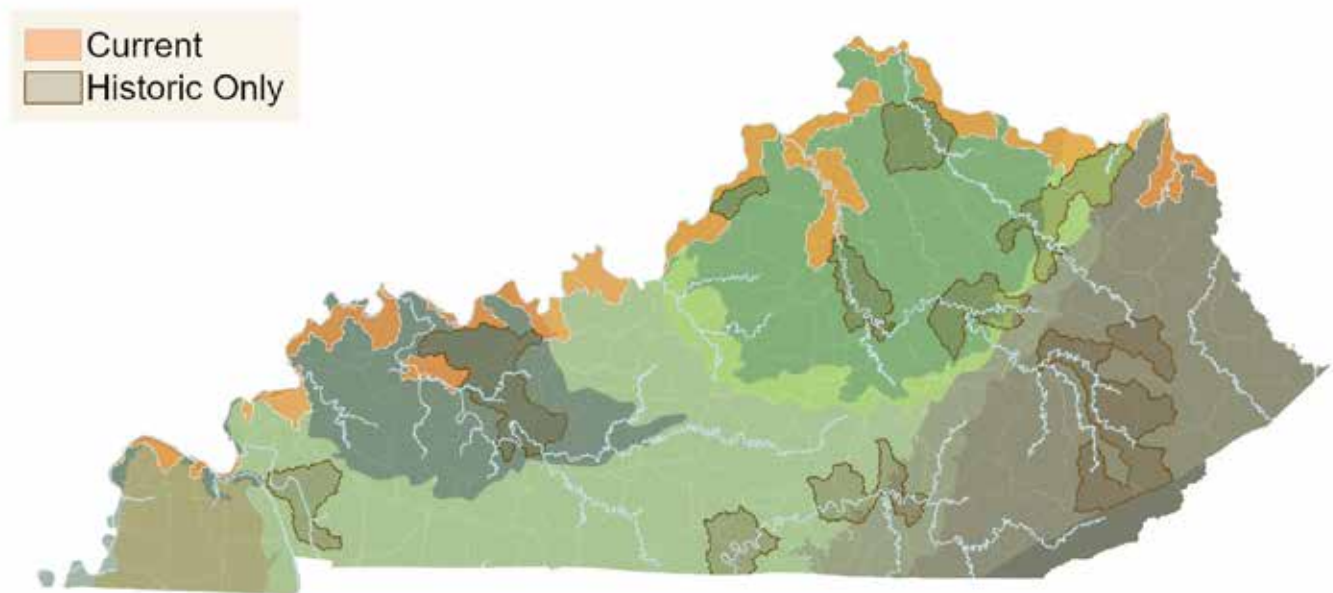


Photo: Matt Thomas



BLACKSIDE DACE

(*Chrosomus cumberlandensis*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G2

S Rank: S2

Federal Status: Threatened

IUCN Red List: EN - Endangered

Conservation Goal

Implement actions necessary for species recovery and delisting in cooperation with state and federal partners as prescribed in the Recovery Plan. Complete research to better understand sensitivity to elevated stream conductivity levels.









Habitat Associations

Current Watersheds: North Fork Kentucky, Rockcastle, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Cold-High Gradient-Stream, Cool-High Gradient-Stream

Endemic to the upper Cumberland River drainage and introduced in North Fork Kentucky River drainage. Requires well-forested streams that are shaded and cool. Occupies shallow pools of small, high gradient streams, generally 1.2-4.6 m wide, with moderate flows and generally silt-free substrates. Usually associated with cover in the form of overhanging root masses, logs, and boulders.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments      
- Education and Awareness      
- External Capacity Building  
- Habitat and Natural Process Restoration       
-  
- Land/Water Management       
- Resource and Habitat Protection       

Needs

Survey: Conduct periodic monitoring (5-year intervals) of extant populations and search for new populations following established methods

Research: Continue research on population genetics

Management: Consult with agency partners and species experts to determine what biological or ecological studies are needed to better understand the species' life history and sensitivity to threats

Management: Work with federal and other state partners with implementation of actions necessary for species recovery and delisting, as described in the Recovery Plan (available at: https://ecos.fws.gov/docs/recovery_plan/880817.pdf)

Range Map

Current
Historic Only

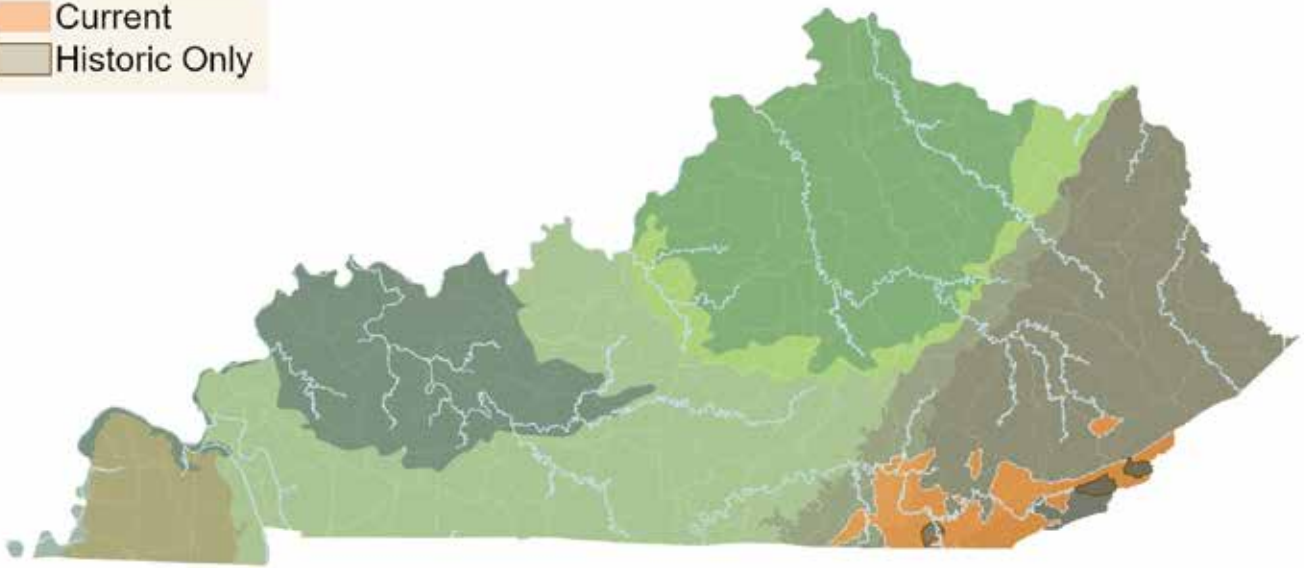


Photo: Matt Thomas



REDSIDE DACE

(*Clinostomus elongatus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3G4

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor existing populations and survey undersampled watersheds in the Red and Licking River drainages for new occurrences. Obtain information on life history and threat sensitivity.









Habitat Associations

Current Watersheds: Licking, Upper Kentucky

Stream Type: Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream

Southern periphery of range in northeastern Kentucky. Inhabits forested, cool headwater streams in clear pools less than 2 m deep over sand, gravel, and cobble substrates.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Invasive and Other Problematic Species and Genes
-  Logging and Wood Harvesting
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Conservation Payments      
- Education and Awareness      
- External Capacity Building  
- Habitat and Natural Process Restoration      
-  Invasive/Problematic Species Control 
- Land/Water Management      
- Resource and Habitat Protection      

Needs

Survey: Conduct periodic monitoring (5-year intervals) of extant populations and search for new populations following established methods.

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Range Map

Current

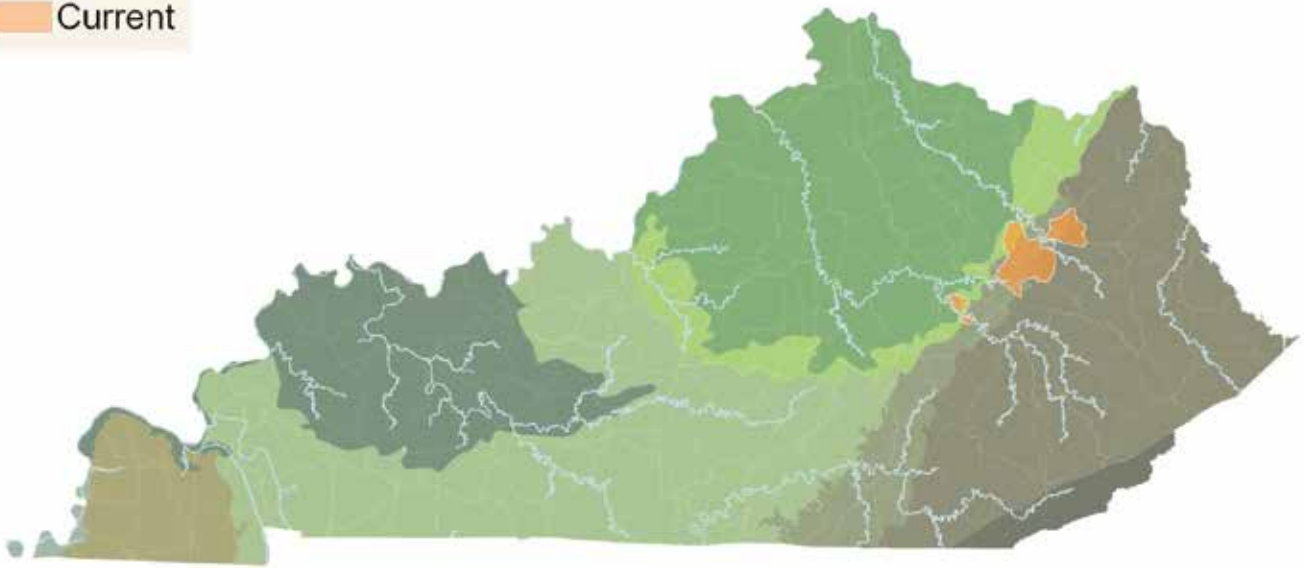


Photo: Matt Thomas



BLUE SUCKER

(*Cyprinus elongatus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3G4

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

The paucity of Blue Sucker records in Kentucky may indicate it is undersampled, as is the case with some other big river fishes. It is considered occasional and locally common at the Falls of the Ohio, lower Green River, and lower Licking River and sporadic in the Ohio River, lower Kentucky, and lower Tennessee (below Kentucky Dam) rivers. This distribution appears to agree with currently available data, although more sampling is needed in deep, swift channels, as well as riffles and shoals of large rivers.




Conservation Goal

Determine the current distribution and status of the species in the Ohio River and tributaries statewide through improved coordination between and within agencies conducting fish sampling using multiple gear types on rivers and large streams. Assess exploitation from recreational fisheries and adjust harvest regulations accordingly.

Habitat Associations

Current Watersheds: Highland-Pigeon, Licking, Lower Cumberland, Lower Green, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Silver-Little Kentucky, Upper Green

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Fishing and Harvesting Aquatic Resources
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

Unknown

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Improve coordination between agencies and divisions conducting fish sampling using multiple gear types on large streams and rivers to acquire additional records and specimens

Survey: Targeted surveys at historic and new locations in large rivers and tributaries to determine the species' distributional status and population densities

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Eliminate or reduce barriers to fish passage

Management: Prevent overharvest that could result in population extirpations

Management: Reduce waste effluents and runoff into aquatic systems

Stream Type: Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Cool-Unconfined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Cool-Confined-Large River, Warm-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Inhabits main channels of medium to large rivers in strong current over sand, gravel, and cobble substrates. Often associated with wing dikes, bases of dams, and bridge abutments. Riffles or shoals are required for spawning. Adults primarily occupy deep (1-2.5 m) channels and juveniles occur in riffles at depths of less than 1 m. Larvae and small juveniles occur in shallow shorelines and off-channel backwater habitats of large rivers.

Range Map

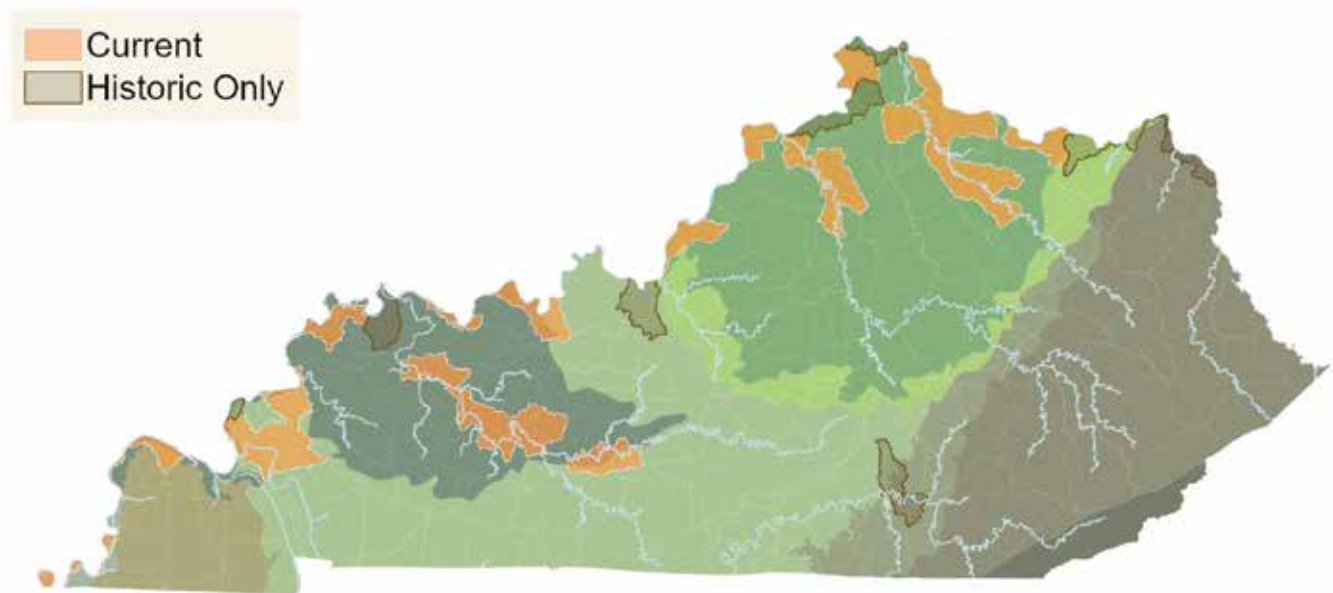


Photo: Matt Thomas



BLUNTFACE SHINER

(*Cyprinella camura*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine the species' status in the Obion Creek watershed and possibility of new occurrences in the Reelfoot Lake drainage through additional surveys within those systems. Continue monitoring the Terrapin Creek population. Obtain information on life history and threat sensitivity.







Habitat Associations

Current Watersheds: Obion

Stream Type: Warm-Low Gradient-Stream

Northern periphery of range in the Coastal Plain of western Kentucky. Inhabits small, clear streams having sand and gravel substrates. Adults typically occur in runs and riffles, and around submerged logs or other instream cover. Juveniles occupy margins of pools below riffles.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Invasive and Other Problematic Species and Genes
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement  
- Conservation Payments    
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration    
- Land/Water Management     
- Resource and Habitat Protection    

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys in the Obion Creek and Reelfoot Lake watersheds to determine status in historical range and potential new occurrences

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Determine vulnerability to displacement or loss through introgressive hybridization and competition with the Red Shiner (*Cyprinella lutrensis*)

Range Map

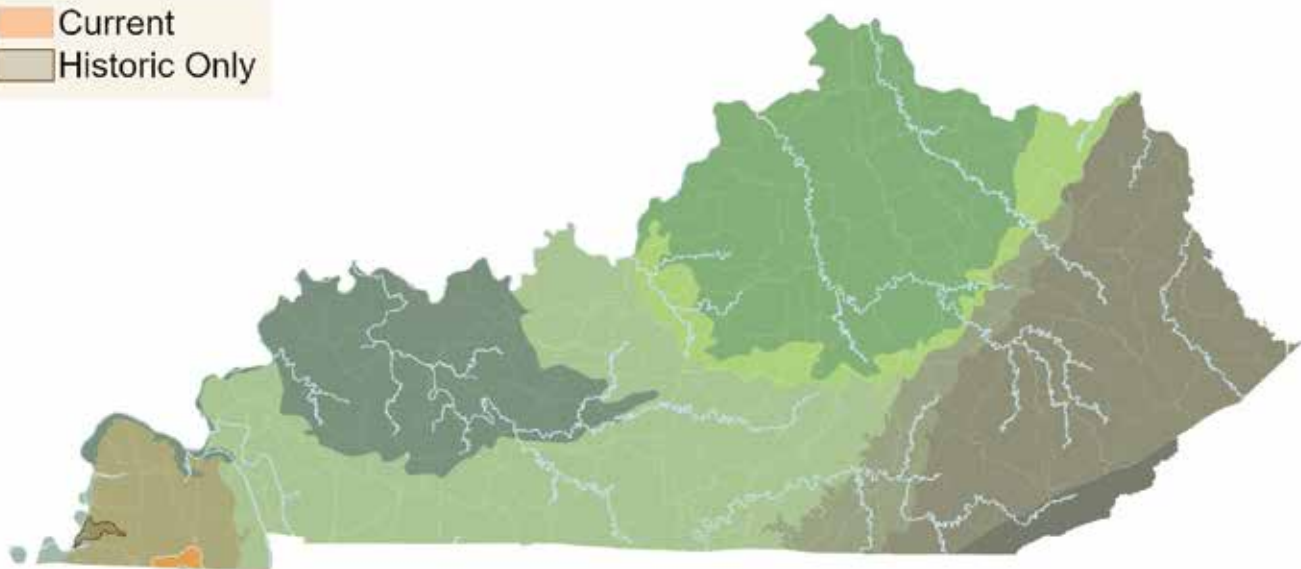


Photo: Matt Thomas



BLACKTAIL SHINER

(*Cyprinella venusta*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Refine the current distribution and status of the species through additional surveys in the lower Ohio and Tennessee River drainages. Determine genetic makeup of populations in western Kentucky.

Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Kentucky Lake, Lower Ohio, Lower Tennessee, Obion

Stream Type: Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Cool-Moderately Confined-Medium River, Cool-Unconfined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Northern periphery of range in the Coastal Plain of western Kentucky. Inhabits small, clear streams and occasionally small to large rivers. Occupies riffles, runs, and shallow pools along undercut banks and around submerged woody debris. In large rivers, occurs along the shoreline over firm sand or gravel in current.

Threats

- Agriculture and Aquaculture
- Invasive and Other Problematic Species and Genes
- Pollution
- Residential and Commercial Development
- Transportation and Service Corridors

Conservation Actions

- Conservation Payments
- Education and Awareness
- External Capacity Building
- Habitat and Natural Process Restoration
- Land/Water Management
- Policies and Regulations
- Resource and Habitat Protection

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys in the Four Rivers region of western Kentucky to refine distributional limits and population densities

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Determine vulnerability to displacement or loss through introgressive hybridization and competition with the Red Shiner (*Cyprinella lutrensis*)

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Range Map

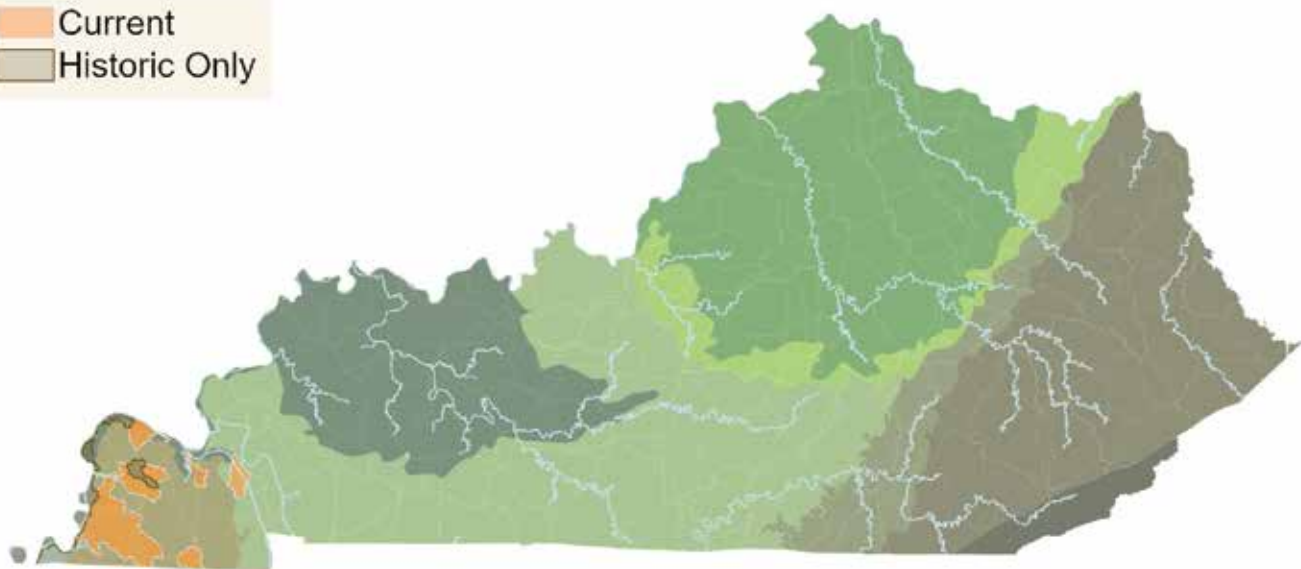


Photo: Matt Thomas



BLOTCHED CHUB

(*Erimystax insignis*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine if the species is present or extirpated in the Little South Fork Cumberland River through additional surveys within the system. Monitor existing population in the Red River (Lower Cumberland) drainage. Obtain information on life history and threat sensitivity.








Habitat Associations

Current Watersheds: Red

Stream Type: Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River

Inhabits small and medium rivers having clear water and mixed gravel and cobble substrates. Occupies pools immediately above or below riffles (occasionally in riffles) at depths of less than 1 m.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management      
- Resource and Habitat Protection     

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys in the Little South Fork Cumberland River

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

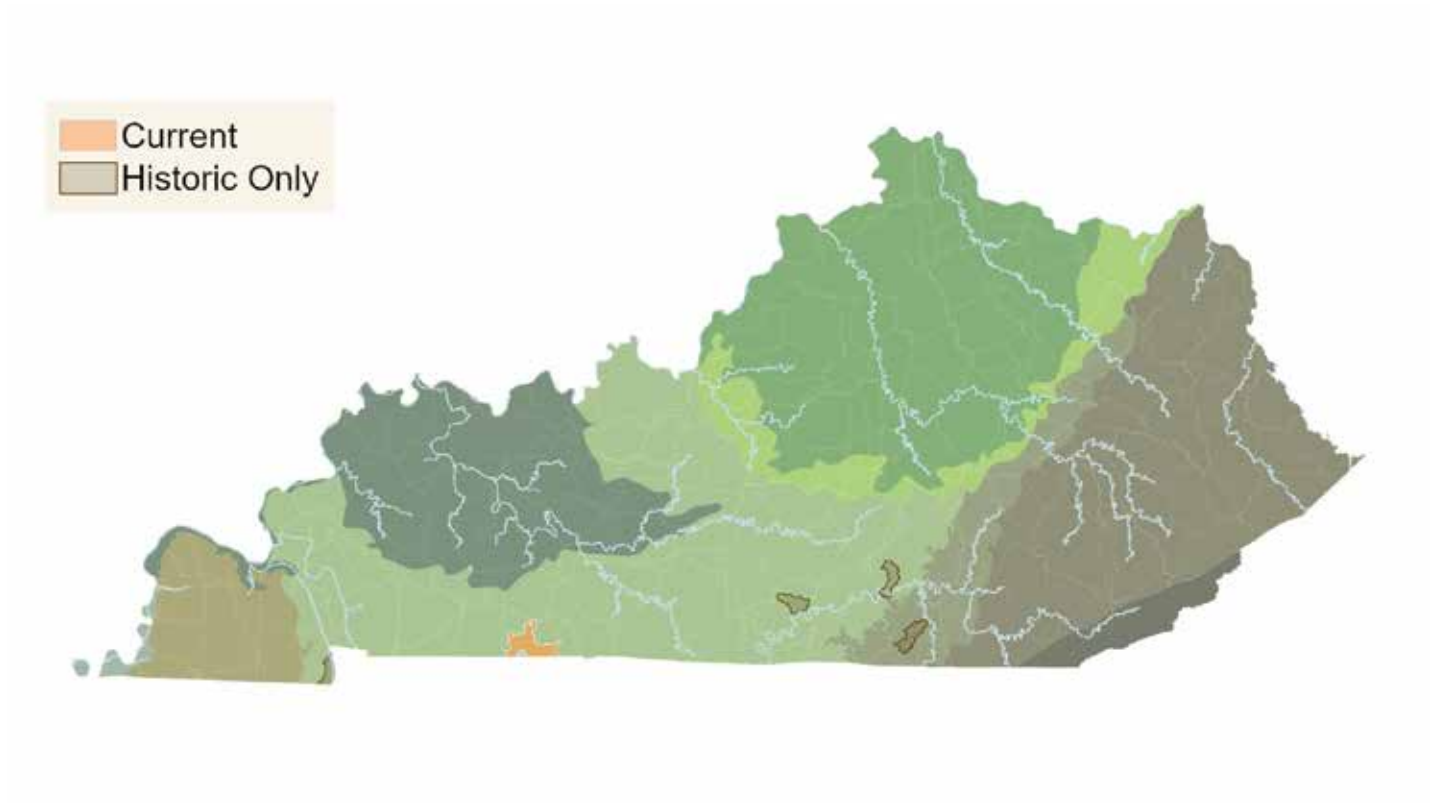


Photo: Brian Zimmerman, Ohio State University



GRAVEL CHUB

(*Erimystax x-punctatus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

The Gravel Chub is presumed extirpated from Green River, with just a single pre-1900 record. Three records are known from the mainstem Ohio River bordering northeastern Kentucky, including one confirmed post-2000 record. More surveys targeting small benthic fishes are needed in the Ohio River.

Conservation Goal

Determine if an established population exists in the Ohio River through additional surveys using multiple gear types.








Habitat Associations

Current Watersheds: Ohio Brush-Whiteoak

Stream Type: Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Cool-Confined-Large River, Warm-Moderately Confined-Large River

Inhabits medium to large rivers in reaches where there is enough flow to keep the bottom silt-free and low in turbidity. Occupies riffles, pools with current, and runs over clean-swept gravel and sand substrates at depths of 0.3 to 1.8 m. Historically occurred in the Green River (now extirpated). Currently restricted to the Ohio River mainstem (status uncertain).

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

Unknown

Needs

Survey: Targeted surveys in the Ohio River at historic and recent occurrence localities to assess the species' current status as part of Kentucky's ichthyofauna

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Eliminate or reduce barriers to fish passage

Range Map

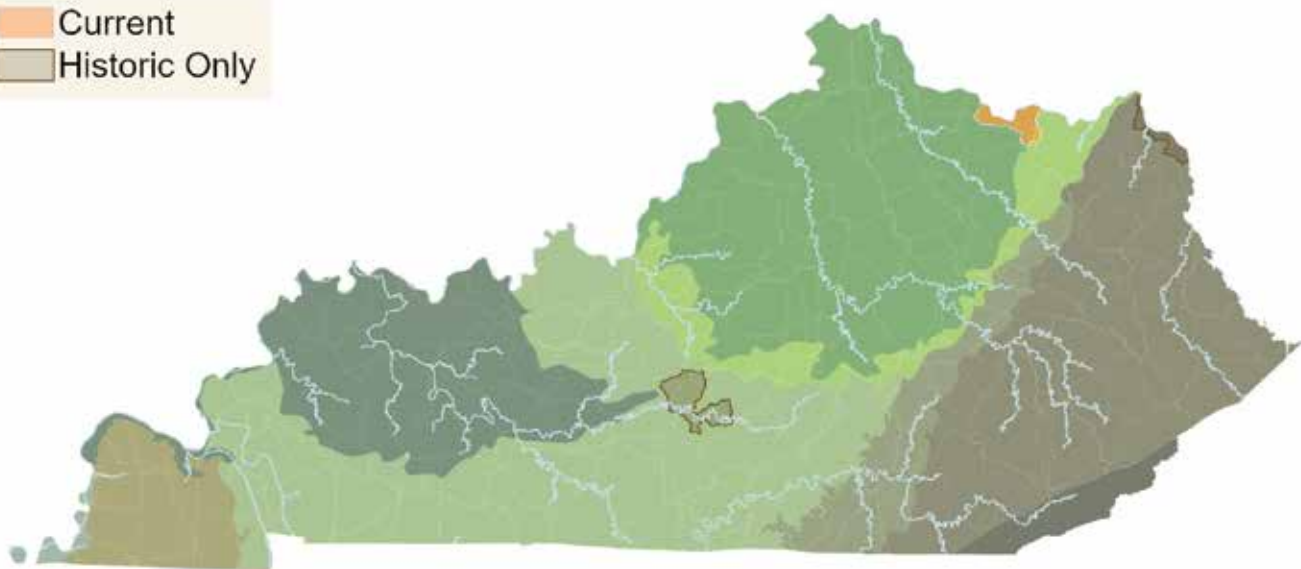


Photo: Matt Thomas



LAKE CHUBSUCKER

(*Erimyzon sucetta*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor known populations and survey undersampled locations in the Jackson Purchase area of western Kentucky for new occurrences. Determine the status of lower Green River drainage populations through surveys of wetland habitats. Identify and protect areas supporting the most robust populations.





Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Obion, Tradewater

Guilds: Open Wetland, Lake/Pond

Inhabits floodplain lakes, sloughs, oxbows, and open wetlands in western Kentucky. Associated with dense beds of submergent and floating aquatic plants. Rarely enters streams, where individuals are usually waifs from nearby lentic habitats.

Threats

-  Agriculture and Aquaculture
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments   
- Education and Awareness   
- External Capacity Building  
- Habitat and Natural Process Restoration   
- Land/Water Management   
- Resource and Habitat Protection   

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

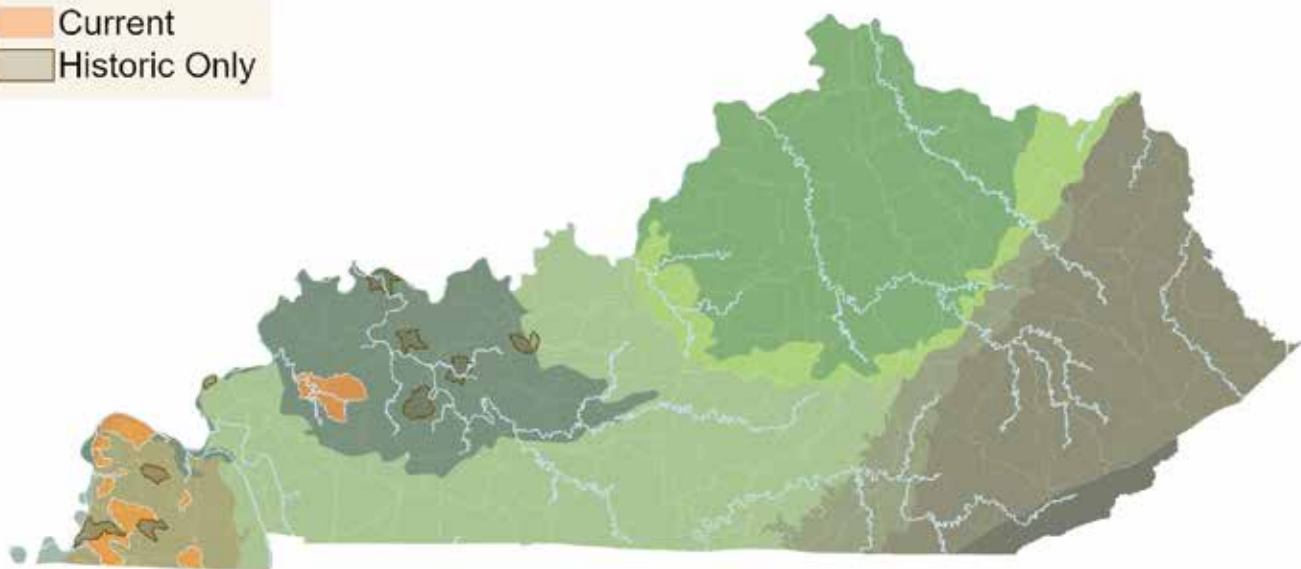


Photo: Zach Randall, Florida Museum of Natural History



CHAIN PICKEREL

(*Esox niger*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Although considered a game species, Chain Pickerel maintain a very restricted distribution and are rare in Kentucky. It has not been confirmed from historical locations in the Jackson Purchase (lower Ohio and Mississippi River floodplain tributaries) since 1997. Currently, it is known only from occasional angler captures in Kentucky Lake and one 2021 record in the lower Green River.

Conservation Goal

Refine the current distribution and status of the species in Kentucky through coordination among and within agencies conducting fish sampling using boat electrofishing. Assess exploitation from recreational fisheries and adjust harvest regulations accordingly.




Habitat Associations

Current Watersheds: Kentucky Lake, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Middle Green

Guilds: Open Wetland, Lake/Pond, River/Streams

Northern periphery of range in western Kentucky. Occupies sluggish lowland streams, cypress-bordered oxbow lakes, and vegetated shorelines and embayments of large reservoirs.

Threats

-  Agriculture and Aquaculture
-  Fishing and Harvesting Aquatic Resources
-  Residential and Commercial Development

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration  
- Land/Water Management  
- Policies and Regulations 
- Resource and Habitat Protection  

Needs

Survey: Improve coordination between agencies and divisions conducting fish sampling using multiple gear types on large rivers and reservoirs in western Kentucky to report Chain Pickerel captures

Survey: Targeted surveys to determine the current distribution in Kentucky

Research: Assess exploitation from recreational fisheries

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

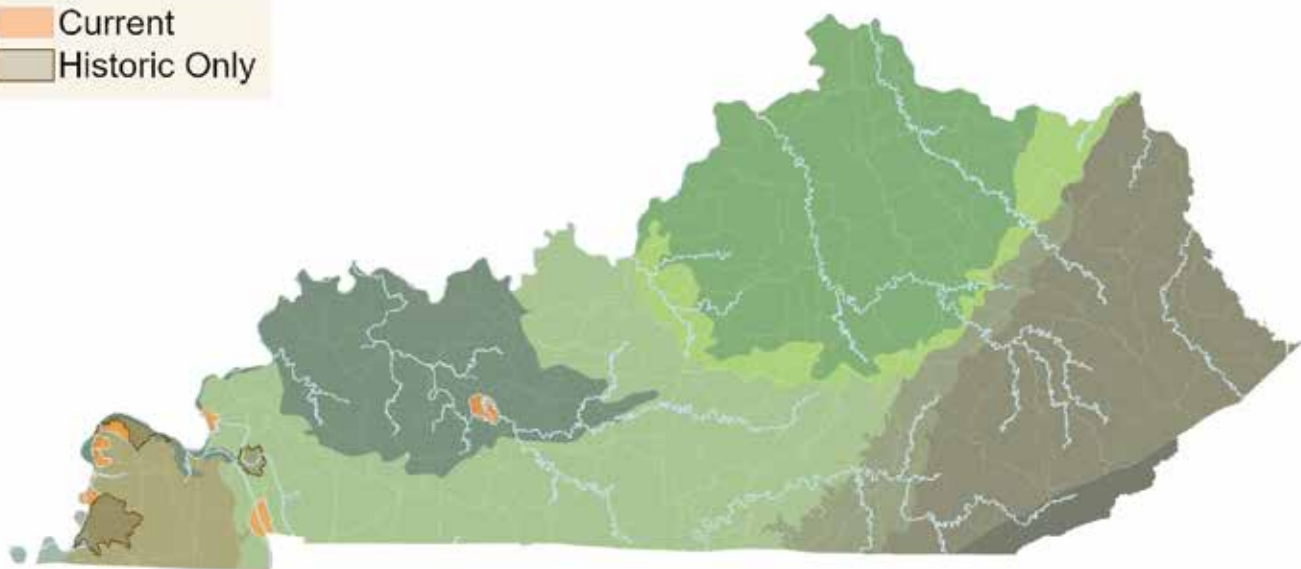


Photo: Matt Thomas



TEARDROP DARTER

(*Etheostoma barbouri*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G4G5

S Rank: S4S5

Federal Status: N/A

IUCN Red List: LC - Least concern

Recent survey data suggest a substantial decline in the Teardrop Darter. It has an extremely restricted range, and recent surveys indicate that it may be extirpated entirely from the Barren River drainage.

Conservation Goal

Determine the current distribution and status of the species through additional surveys in the upper Green and Barren River drainages. Obtain information on life history and threat sensitivity. Identify watersheds supporting the most robust populations and recommend measures for their protection.







Habitat Associations

Current Watersheds: Barren, Upper Green

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River

Endemic to the upper Green and Barren River drainages. Inhabits upland streams to small-size rivers in cobble, gravel and slab rock-bottomed pools. Also associated with overhanging vegetation and woody debris.

Threats

-  Agriculture and Aquaculture
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management     
- Resource and Habitat Protection     

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations and work to ensure they are protected

Survey: Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

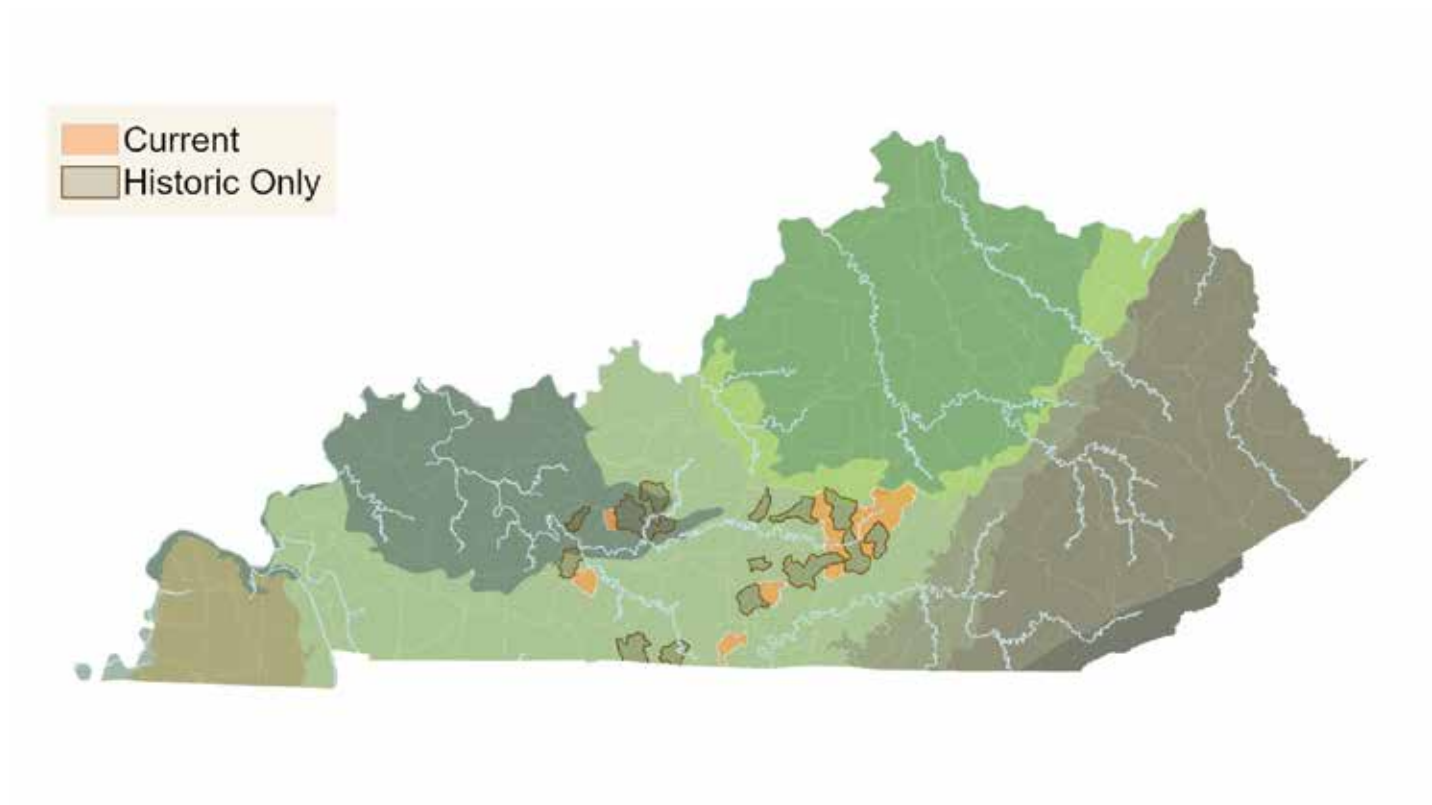


Photo: Matt Thomas



RELICT DARTER

(*Etheostoma chienense*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: EN - Endangered

Conservation Goal

Implement actions necessary for species recovery and delisting in cooperation with state and federal partners as prescribed in the Recovery Plan. Refine the current distribution and status through surveys of undersampled reaches of Bayou de Chien and minor tributaries potentially supporting undocumented occurrences. Monitor population genetics.








Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield

Stream Type: Warm-Low Gradient-Stream

Endemic to the Bayou De Chien watershed. Inhabits small to medium sized streams in shallow reaches with clear water, abundant woody debris, well-developed riparian zones, and mixed gravel and sand substrates. Often associated with stream margins having undercut banks, tree roots, and coarse woody debris. Requires in-stream cover and stable spawning substrates.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Natural System Modifications
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management      
- Resource and Habitat Protection     

Needs

Survey: Collect baseline species information

Survey: Search for unknown occupied reaches in other Bayou de Chien tributaries and downstream reaches of Bayou de Chien and Little Bayou de Chien

Research: Continue research on population genetics

Research: Determine habitat preferences of juveniles and larvae

Management: Work with federal and other state partners on conservation and management actions identified in the Species Recovery Plan and 5-year review (available at: https://ecos.fws.gov/docs/tess/species_nonpublish/2778.pdf)

Range Map

Current

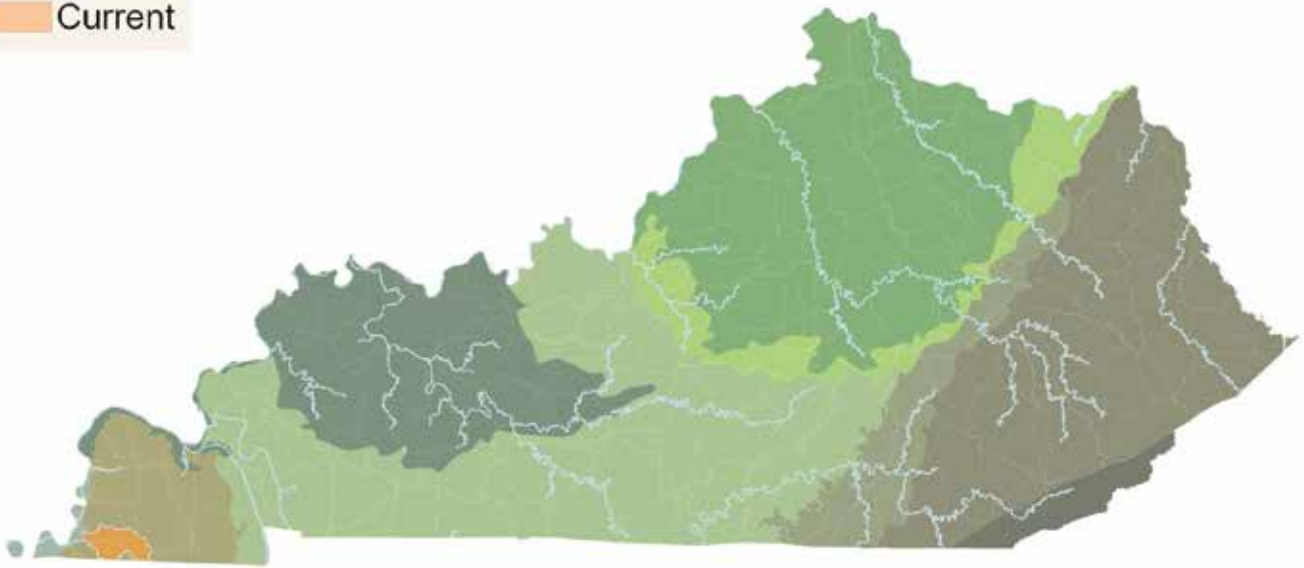


Photo: Matt Thomas



STONE DARTER

(*Etheostoma derivativum*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G4

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor the existing population in Whippoorwill Creek and complete additional surveys in Elk Fork where the species occurred historically. Work to ensure habitat protection within the Whippoorwill Creek watershed.







Habitat Associations

Current Watersheds: Red

Stream Type: Cool-Medium Gradient-Stream

Northern periphery of range in the Red River (lower Cumberland) drainage. Inhabits high quality streams with intact wooded riparian corridors that are minimally affected by siltation. Occupies clear, shallow (<30 cm deep) pools lined with cobble and slab rocks, or at the bases of riffles in slow current.

Threats

-  Agriculture and Aquaculture
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments 
- Education and Awareness 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Land/Water Management 
- Resource and Habitat Protection 

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Work to ensure that the population is protected in Whippoorwill Creek, Todd and Logan counties

Range Map

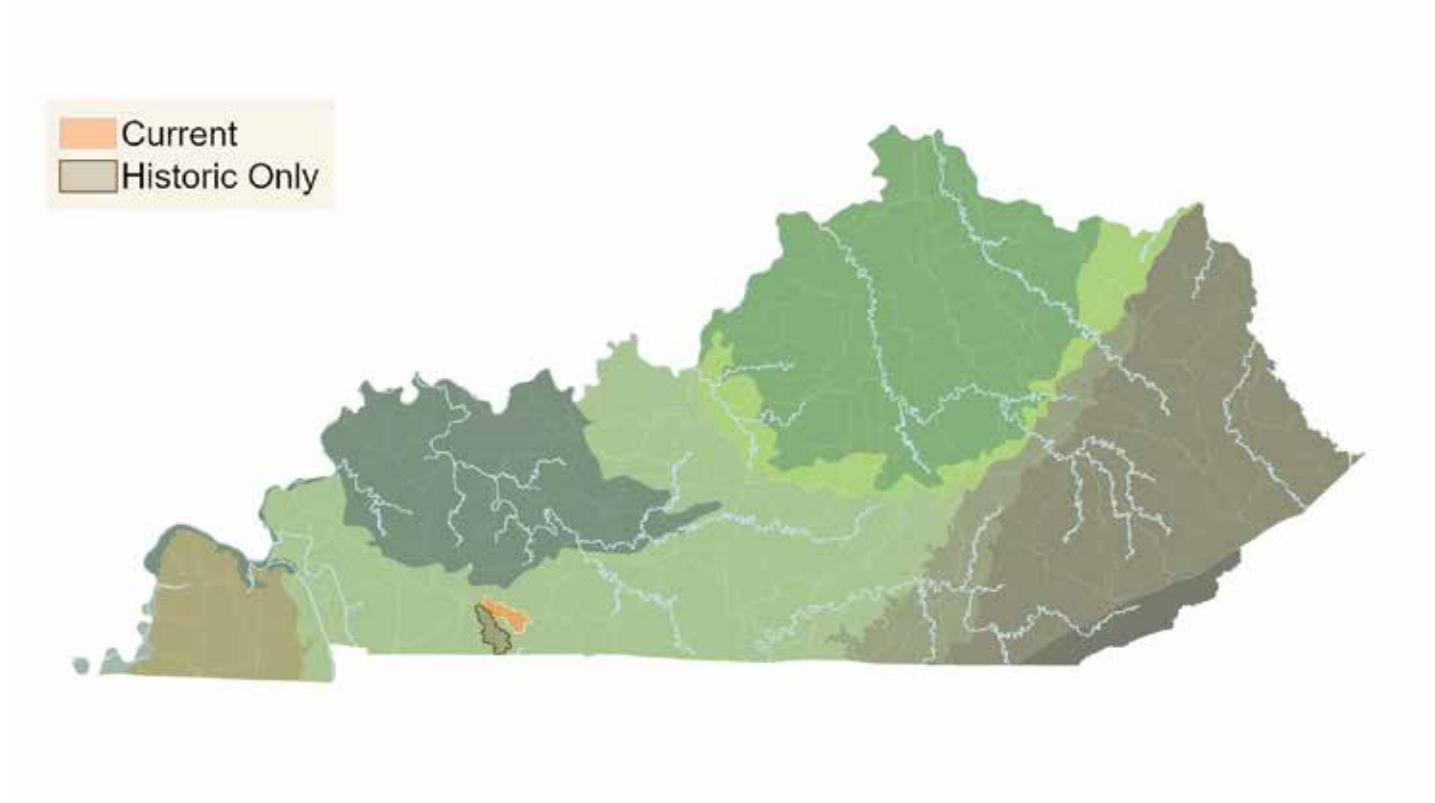


Photo: Matt Thomas



SWAMP DARTER

(*Etheostoma fusiforme*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine the current distribution and status of the species through surveys of undersampled habitats in the Running Slough and Reelfoot Lake systems in Fulton County. Work to ensure protection of Hamby Pond where the only currently known population exists.






Habitat Associations

Current Watersheds: Obion

Guilds: Forested Wetland, Open Wetland, Lake/Pond

Northern periphery of range in far southwestern Kentucky. Inhabits sloughs, ditches, vegetated wetlands, and floodplain lakes. Associated with dense beds of submerged aquatic vegetation and detritus piles.

Threats

-  Agriculture and Aquaculture
-  Invasive Non-native/Alien species
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement  
- Conservation Payments   
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration   
- Land/Water Management    
- Resource and Habitat Protection   

Needs

Survey: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Survey: Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Work to ensure that the population is protected in Hamby Pond, Fulton County

Range Map

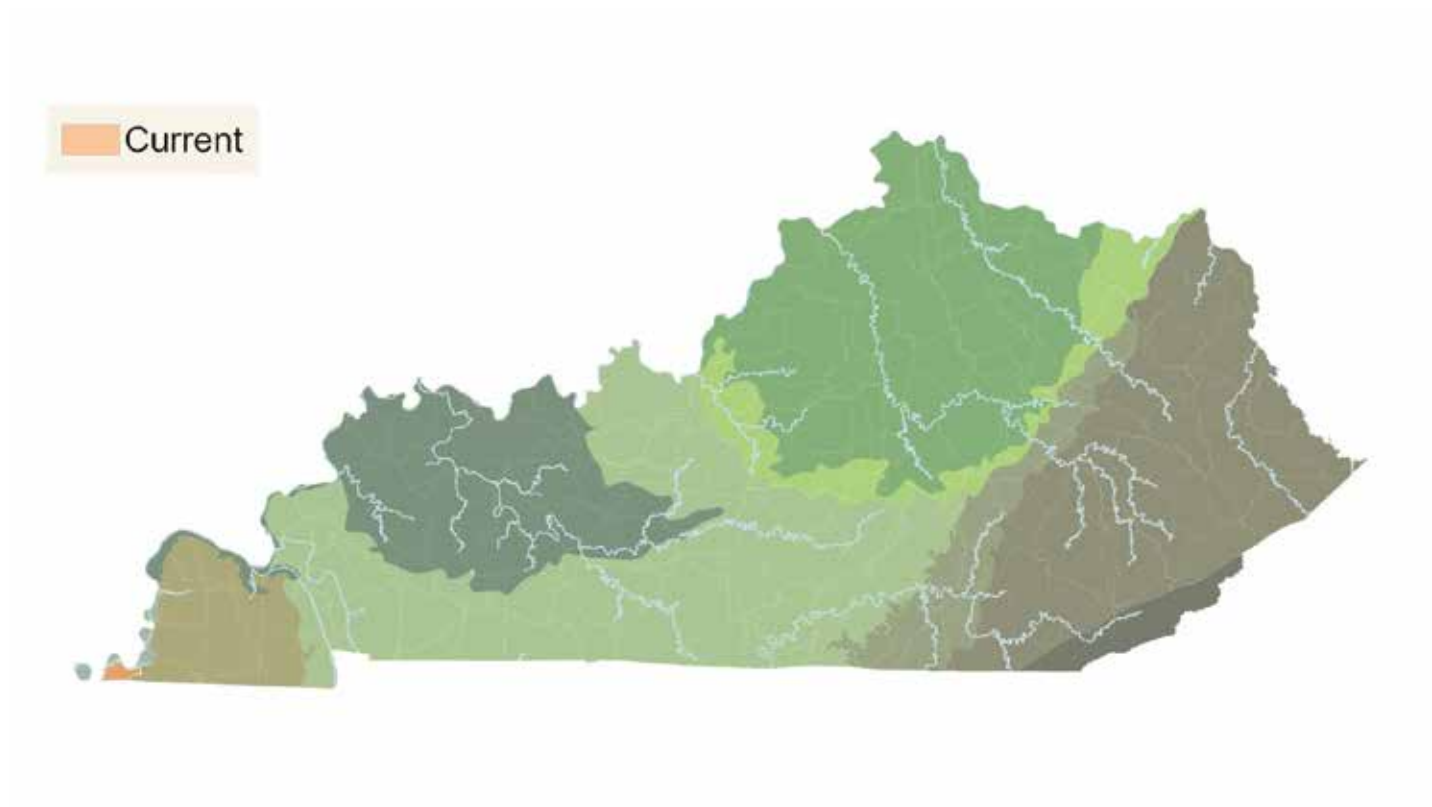


Photo: Matt Thomas



TUXEDO DARTER

(*Etheostoma lemniscatum*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: VU - Vulnerable

Conservation Goal

Implement actions necessary for species recovery and delisting in cooperation with state and federal partners as prescribed in the Recovery Plan. Monitor population genetics. Mitigate acid mine drainage in affected areas within the Big South Fork Cumberland River system.

Habitat Associations

Current Watersheds: South Fork Cumberland

Stream Type: Cool-Confined-Medium River

Endemic to the Big South Fork Cumberland River, occupying clear, silt-free pools and runs over cobble and slab rock substrates at depths of 20-80 cm, with slow current (<0.10 m/s). Typically utilizes cover rocks with a surface area of 200-400 square cm.

Threats

- Climate Change and Severe Weather
- Dams and Water Management/Use
- Energy Production and Mining
- Invasive Non-native/Alien species
- Logging and Wood Harvesting
- Pollution
- Residential and Commercial Development
- Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development
- Compliance and Enforcement
- Conservation Payments
- Education and Awareness
- External Capacity Building
- Habitat and Natural Process Restoration
- Land/Water Management
- Policies and Regulations
- Resource and Habitat Protection

Needs

Survey: Determine permanence of the species in the lower Big South Fork affected by impoundment

Research: Continue population genetics research

Research: Determine if the introduced Rusty Crayfish is causing displacement of Tuxedo Darter nesting habitat

Management: Continue to remediate areas affected by acid mine drainage in the Big South Fork

Management: Work with federal and other state partners on conservation and management actions identified in the Species Recovery Plan and 5-year review (available at: https://ecos.fws.gov/docs/tess/species_nonpublish/3358.pdf)

Range Map

Current

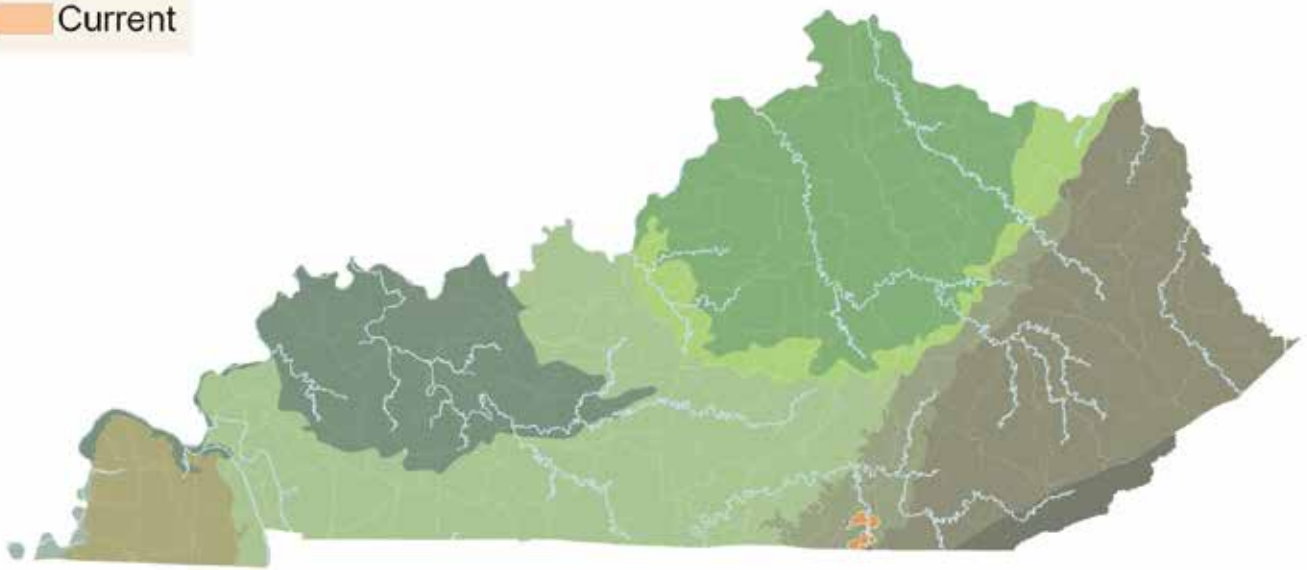


Photo: Matt Thomas



BRIGHTEYE DARTER

(*Etheostoma lynceum*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor the existing population in Terrapin Creek.
Determine sensitivity to environmental stressors.






Habitat Associations

Current Watersheds: Obion

Stream Type: Warm-Low Gradient-Stream

Northern periphery of range in the Coastal Plain of western Kentucky. Restricted to Terrapin Creek, occupying shallow riffles with moderate current over shifting sand and fine gravel substrates. Also associated with undercut banks, leaf piles, and other debris.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments    
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration    
- Land/Water Management     
- Resource and Habitat Protection    

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Research: Determine sensitivity to environmental stressors

Range Map

Current

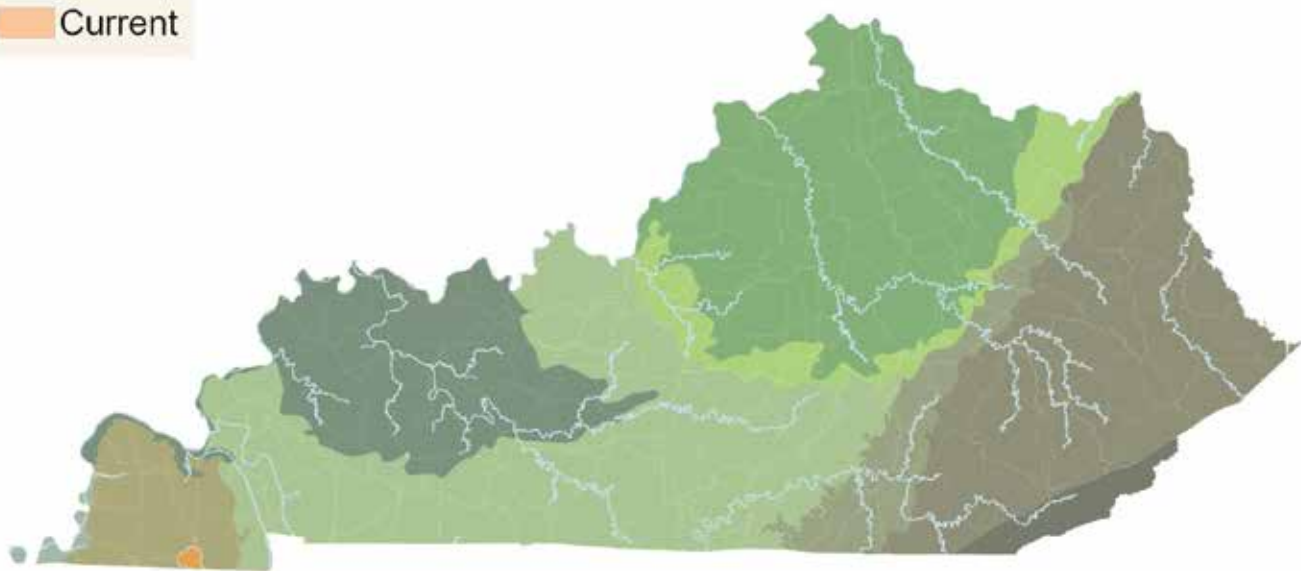


Photo: Matt Thomas



BUCK DARTER

(*Etheostoma nebra*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Develop a conservation strategy for the species with federal and state partners. Successfully reintroduce the species into at least two streams within its historical range in the Buck Creek system.

Habitat Associations

Current Watersheds: Upper Cumberland-Lake Cumberland

Stream Type: Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River

Endemic to the Buck Creek watershed. Requires clear, low-silt streams that maintain good water quality and cool summer temperatures through groundwater discharge and/or forest cover. Occupies pools and runs in slow current at depths less than 0.5 m over a loose mixture of coarse sand, gravel, cobble, and scattered large slab rocks.

Threats

- Agriculture and Aquaculture
- Climate Change and Severe Weather
- Invasive Non-native/Alien species
- Natural System Modifications
- Pollution
- Residential and Commercial Development
- Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development
- Compliance and Enforcement
- Conservation Payments
- Education and Awareness
- External Capacity Building
- Habitat and Natural Process Restoration
- Land/Water Management
- Policies and Regulations
- Resource and Habitat Protection

Needs

Survey: Continue monitoring reintroductions in the Flat Lick Creek watershed and survey areas outside of reintroduction sites to assess dispersal.

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Research: Population genetics research

Management: Continue captive propagation efforts to maintain both an ark population and for reintroduction into streams within the species' historic range

Management: Identify candidate streams within the Buck Creek drainage with suitable habitat for reintroduction, and expand reintroduction efforts

Range Map

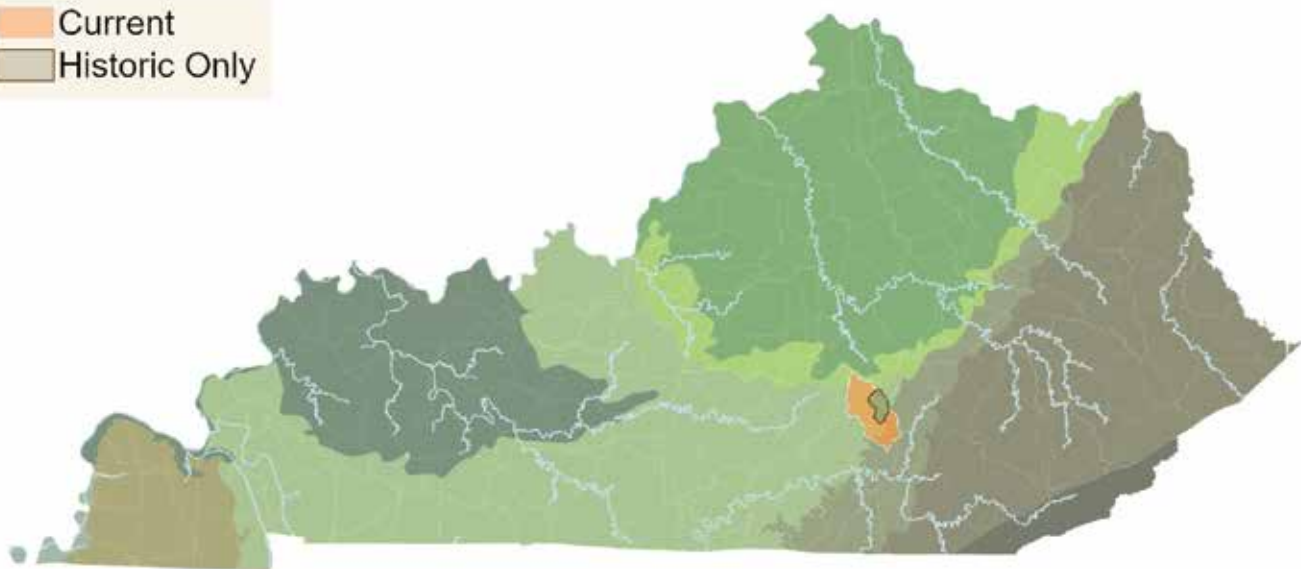


Photo: Matt Thomas



GOLDSTRIPE DARTER

(*Etheostoma parvipinne*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor existing populations and survey undersampled locations in the Jackson Purchase area of western Kentucky for new occurrences. Obtain information on life history and threat sensitivity. Identify areas supporting the most robust populations and recommend measures for their protection.






Habitat Associations

Current Watersheds: Kentucky Lake, Obion

Stream Type: Cool-Low Gradient-Stream, Cold-Low Gradient-Stream, Other

Northern periphery of range in the Coastal Plain of western Kentucky. Inhabits slow-flowing streams and spring runs over sand and fine gravel substrates along undercut banks, tree roots, and piles of organic debris. Also occurs in ditches and vegetated wetlands associated with spring seeps. Requires well forested streams and wooded wetlands receiving spring discharge.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments   
- Education and Awareness   
- External Capacity Building  
- Habitat and Natural Process Restoration   
- Land/Water Management    
- Resource and Habitat Protection   

Needs

Survey: Conduct periodic monitoring (5-year intervals) of extant populations and search for new populations following established methods.

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Range Map

Current

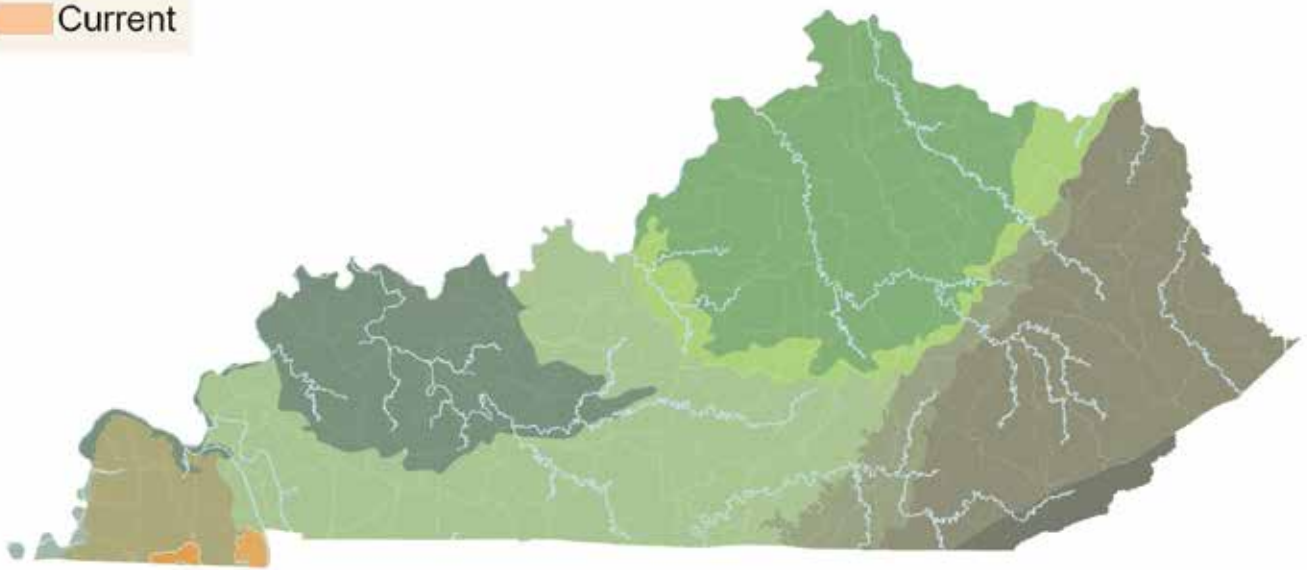


Photo: Matt Thomas



CYPRESS DARTER

(*Etheostoma proeliare*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor existing populations and survey undersampled locations in the Four Rivers region of western Kentucky for new occurrences.






Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Kentucky Lake, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, Obion

Stream Type: Cool-Low Gradient-Stream, Warm-Low Gradient-Stream, Other

Northern periphery of range in the Four Rivers Basin region of western Kentucky. Inhabits lowland streams, oxbows, and wetlands on the floodplains. Associated with leaf-laden or densely vegetated water bodies slow current, pools, or shorelines of lakes. Also occurs around tree roots in undercut banks of streams.

Threats

-  Agriculture and Aquaculture
-  Invasive Non-native/Alien species
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments   
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration   
- Land/Water Management   
- Resource and Habitat Protection   

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations and work to ensure they are protected

Survey: Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

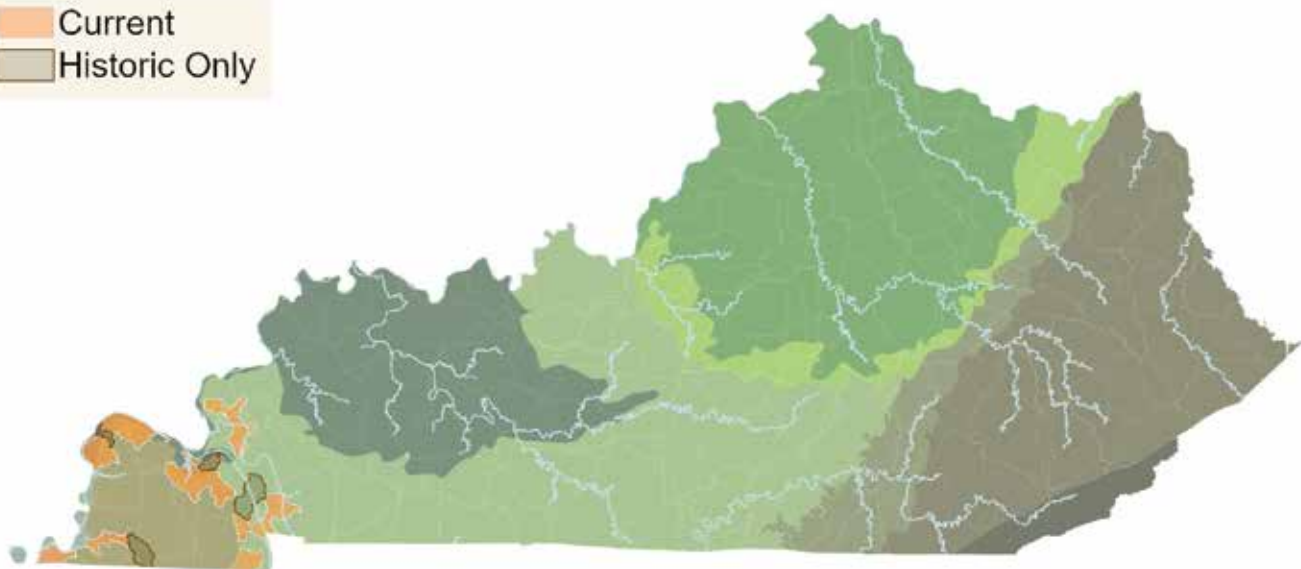


Photo: Matt Thomas



FIREBELLY DARTER

(*Etheostoma pyrrhogaster*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S1

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Monitor the existing population in Terrapin Creek.
Determine sensitivity to environmental stressors.

Habitat Associations

Current Watersheds: Obion

Stream Type: Warm-Low Gradient-Stream, Other

Northern periphery of range in the Coastal Plain of western Kentucky. Restricted to Terrapin Creek, occupying pools and stream margins with slow to moderate flow over gravel, sand, and organic debris substrates. Often associated with exposed tree roots and undercut banks.

Threats

- Agriculture and Aquaculture
- Dams and Water Management/Use
- Pollution
- Residential and Commercial Development
- Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development
- Compliance and Enforcement
- Conservation Payments
- Education and Awareness
- External Capacity Building
- Habitat and Natural Process Restoration
- Land/Water Management
- Resource and Habitat Protection

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Research: Determine sensitivity to environmental stressors

Range Map

Current

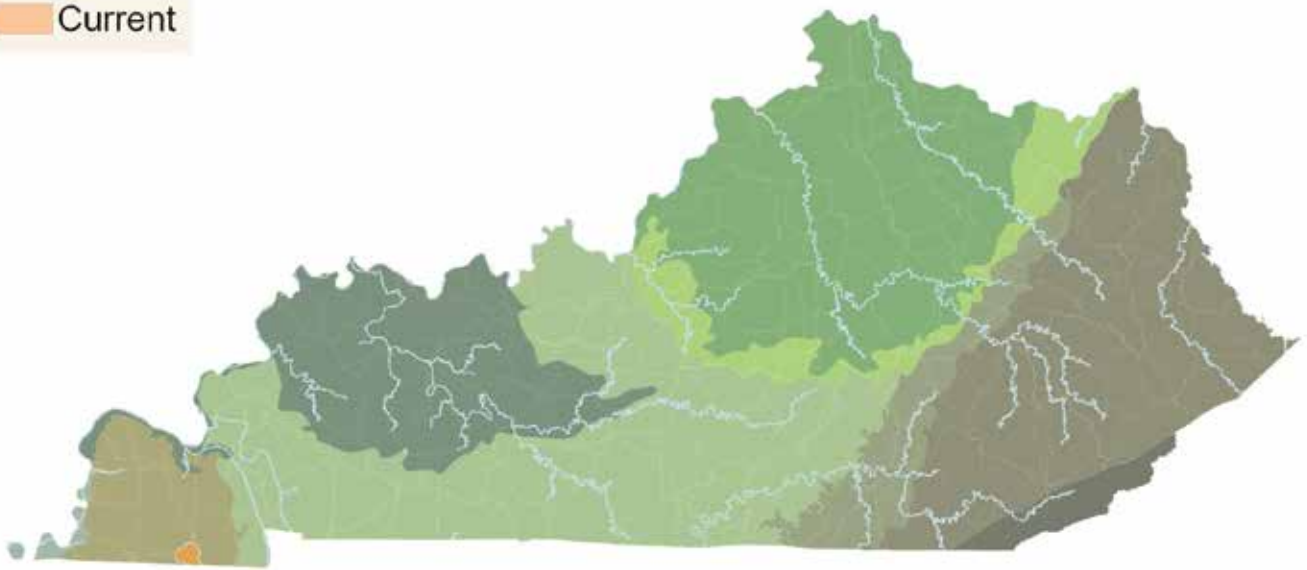


Photo: Matt Thomas



CUMBERLAND ARROW DARTER

(*Etheostoma sagitta*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G3

S Rank: S3

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Monitor existing populations and survey additional streams in the upper Cumberland River drainage that could potentially contain unreported occurrences. Monitor population genetics in conjunction with the Kentucky Arrow Darter.









Habitat Associations

Current Watersheds: South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Cold-High Gradient-Stream, Cool-High Gradient-Stream

Endemic to the upper Cumberland River drainage. Requires well forested headwater streams that are cool (23° C or less) and may have seasonally intermittent flows. Occurs in pools or transitional areas above and below riffles in moderate to high gradient streams. Associated with rocky substrates and cover in the form of bedrock ledges, boulders, and woody debris at depths usually less than 50 cm. Occasionally ventures into larger streams and small rivers.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments      
- Education and Awareness      
- External Capacity Building  
- Habitat and Natural Process Restoration      
-  
- Land/Water Management      
- Resource and Habitat Protection      

Needs

Survey: Monitor existing populations and initiate searches for unknown populations within the species' historic range

Research: Additional research on life-history and sensitivity to environmental stressors

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Research: Population genetics research

Range Map

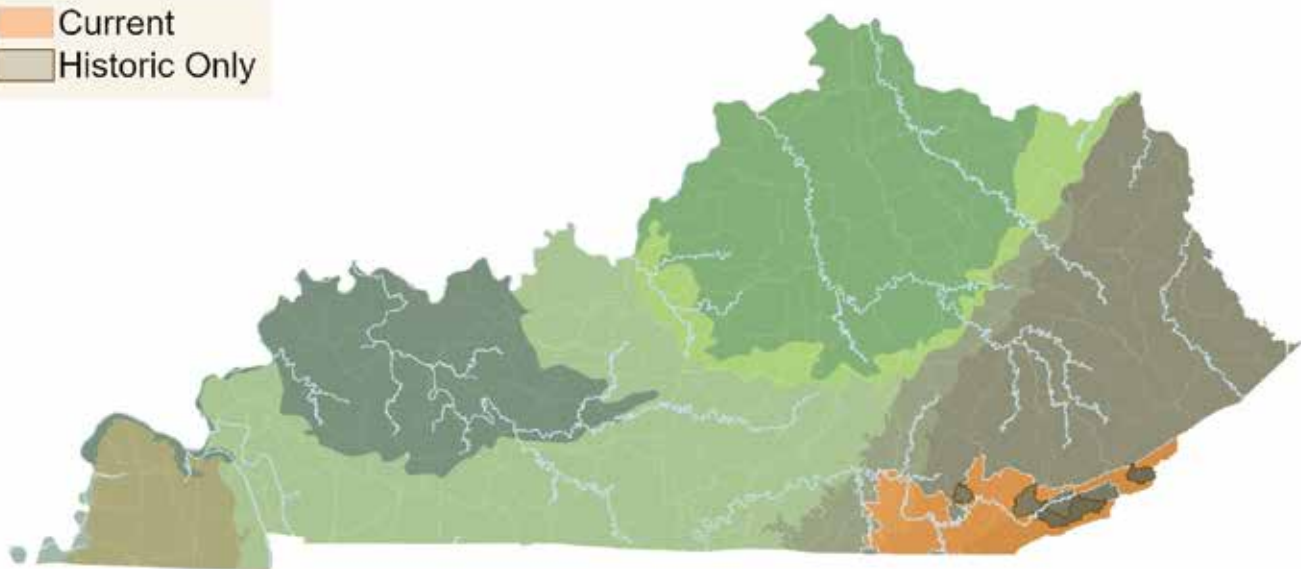


Photo: Matt Thomas



KENTUCKY ARROW DARTER

(*Etheostoma spilotum*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S2

Federal Status: Threatened

IUCN Red List: NT - Near threatened

Conservation Goal

Complete a Species Recovery Plan and work with federal and state partners to implement conservation actions as prescribed in the Plan. Monitor existing populations and survey additional streams in the upper Kentucky River drainage that could potentially contain unreported occurrences. Monitor population genetics in conjunction with the Cumberland Arrow Darter.







Habitat Associations

Current Watersheds: Middle Fork Kentucky, North Fork Kentucky, South Fork Kentucky, Upper Kentucky

Stream Type: Cold-High Gradient-Stream, Cool-High Gradient-Stream

Endemic to the upper Kentucky River drainage. Requires well forested headwater streams that are cool (23° C or less) and may have seasonally intermittent flows. Primarily occurs in pools or transitional areas above and below riffles in moderate to high gradient streams. Associated with rocky substrates and cover in the form of bedrock ledges, boulders, and woody debris at depths ranging from 10-45 cm. Occasionally ventures into larger streams and small rivers.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments       
- Education and Awareness       
- External Capacity Building  
- Habitat and Natural Process Restoration       
-  
- Land/Water Management       
- Resource and Habitat Protection       

Needs

Survey: Monitor existing populations and initiate searches for unknown populations within the species' historic range

Research: Additional research on life-history and sensitivity to environmental stressors

Research: Continue research on population genetics

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Continue to develop and implement technology for maintaining and propagating the species in captivity

Management: Evaluate reintroduction potential in additional streams having suitable habitat within the species' historic range

Management: Work with federal and other state partners on conservation and management actions identified in the Recovery Outline (available at: https://ecos.fws.gov/docs/recovery_plan/2017.02.15_recovery_outline_KY_arrow_darter.pdf)

Range Map

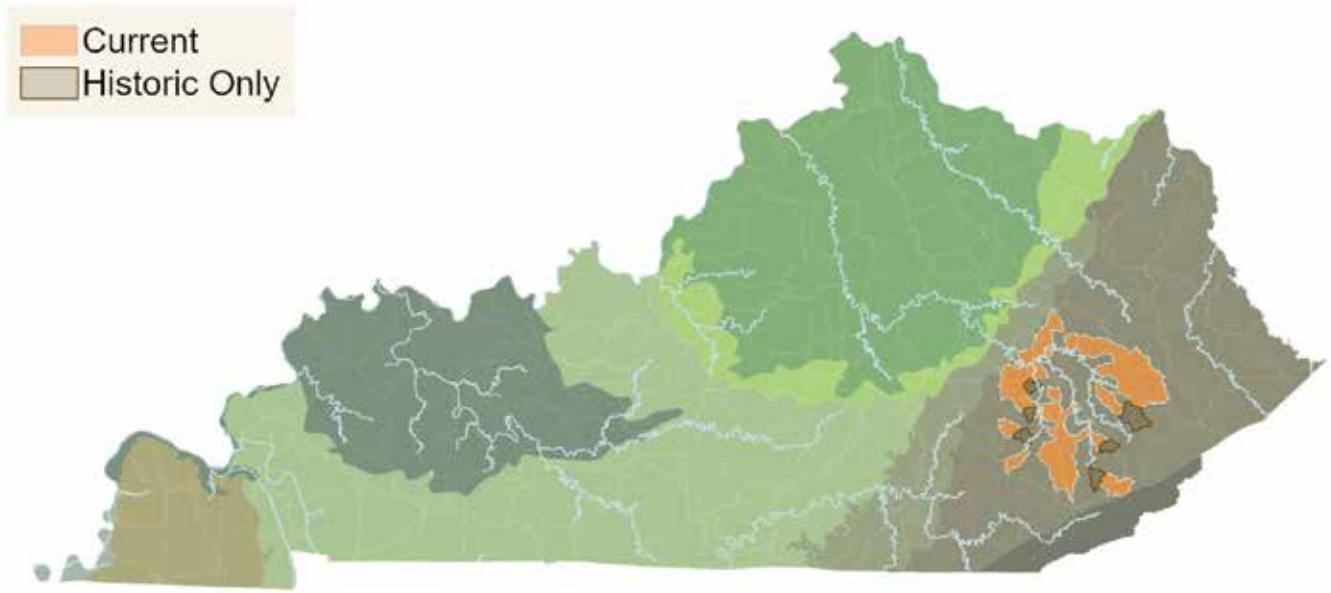


Photo: Matt Thomas



CUMBERLAND DARTER

(*Etheostoma susanae*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1G2

S Rank: S1

Federal Status: Endangered

IUCN Red List: EN - Endangered

Conservation Goal

Implement actions necessary for species recovery and delisting in cooperation with state and federal partners as prescribed in the Recovery Plan. Obtain information on life history and threat sensitivity. Monitor population genetics.




Habitat Associations

Current Watersheds: Upper Cumberland

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River

Endemic to the upper Cumberland River drainage. Inhabits small to medium sized upland streams (second- to fourth-order) ranging from 4-9 m in width and depths of 20-76 cm over sand, silt, or sand-covered bedrock substrates. Most occupied streams are in well-forested watersheds and often contain scattered boulders and large cobble that the species likely uses as cover.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments       
- Education and Awareness       
- External Capacity Building  
- Habitat and Natural Process Restoration      
-  
- Land/Water Management        
- Resource and Habitat Protection        

Needs

Survey: Quantitative surveys in occupied streams to determine population size for each management unit

Research: Continue research on population genetics

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Continue to develop and implement technology for maintaining and propagating the species in captivity

Management: Evaluate reintroduction potential in additional streams having suitable habitat within the species' historic range

Management: Work with federal and other state partners on conservation and management actions identified in the Species Recovery Plan and 5-year review (available at: <https://ecos.fws.gov/ecp/species/1011>)

Range Map

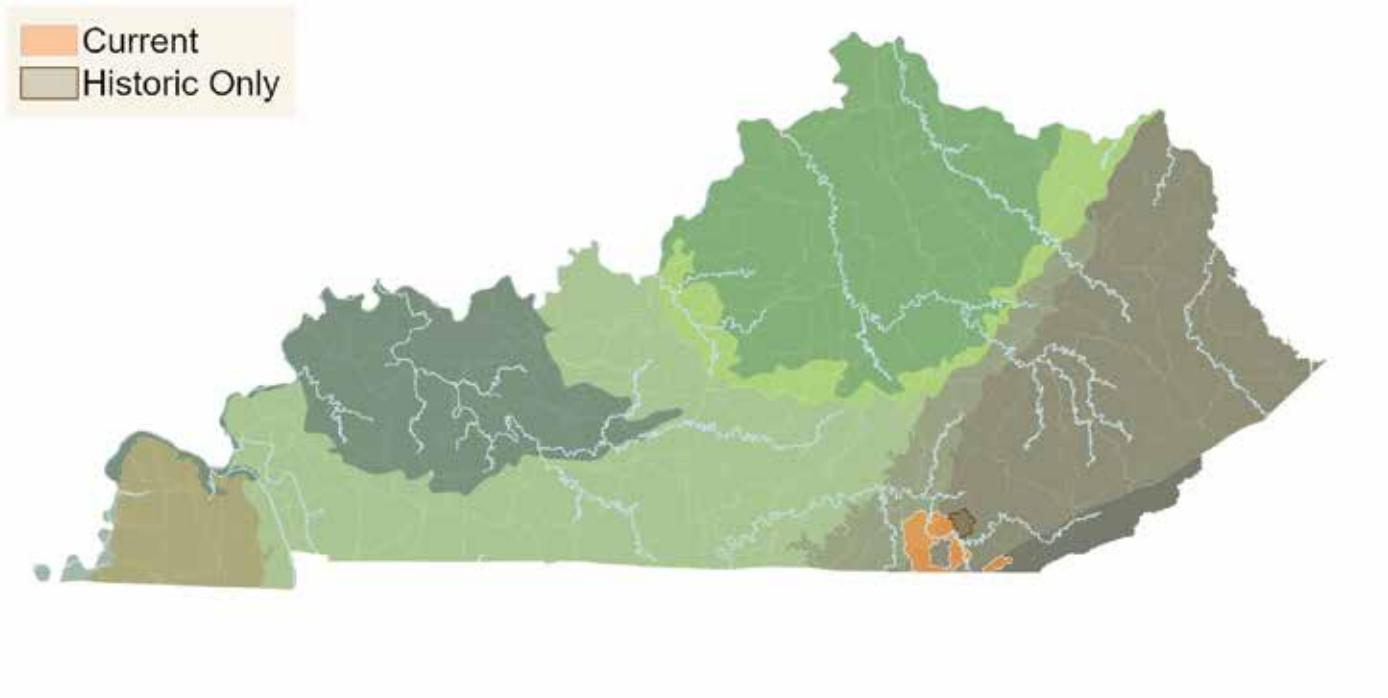


Photo: Matt Thomas



GULF DARTER

(*Etheostoma swaini*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor the existing population in Terrapin Creek and minor North Fork Obion River tributaries in Graves County. Determine sensitivity to environmental stressors.






Habitat Associations

Current Watersheds: Obion

Stream Type: Warm-Low Gradient-Stream

Northern periphery of range in the Coastal Plain of western Kentucky. Restricted to Terrapin Creek and other small, lowland tributaries of the Obion River drainage occupying shallow riffles with moderate current over gravel substrates often strewn with sticks, leaves, and organic debris. Also occurs near stream margins in slow current around tree roots and undercut banks.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments    
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration    
- Land/Water Management     
- Resource and Habitat Protection    

Needs

- Survey:** Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions
- Research:** Determine sensitivity to environmental stressors

Range Map

Current

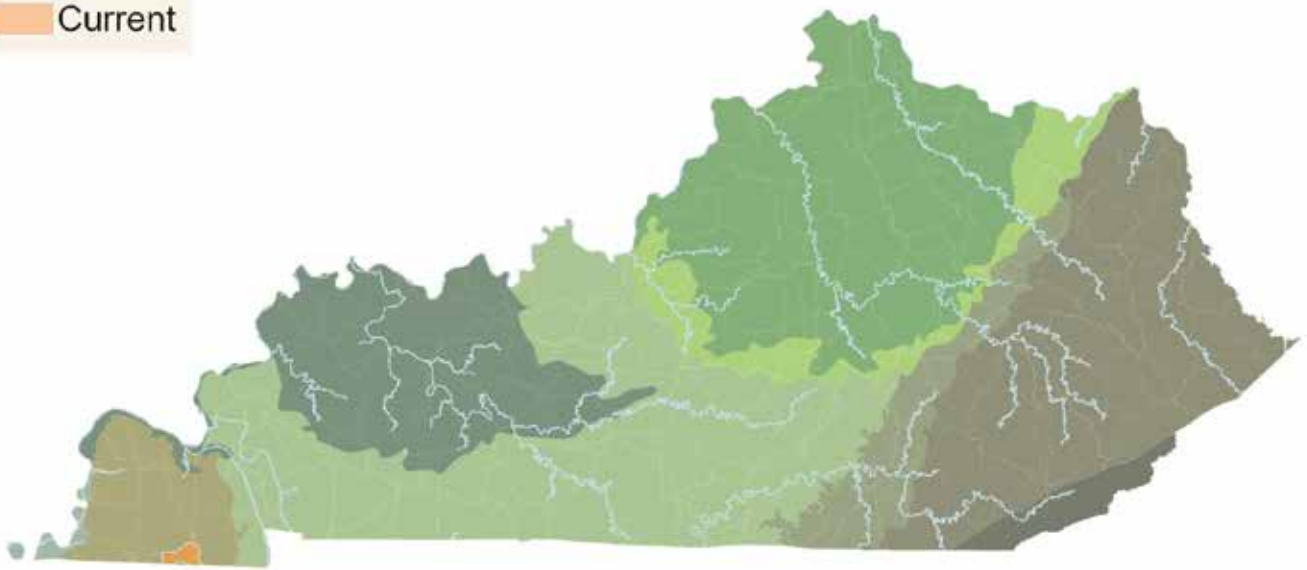


Photo: Matt Thomas



SHAWNEE DARTER

(*Etheostoma tecumsehi*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S2S3

Federal Status: N/A

IUCN Red List: EN - Endangered

Conservation Goal

Monitor existing populations in the upper Pond River system. Determine population genetics. Obtain information on life history and threat sensitivity.






Habitat Associations

Current Watersheds: Pond

Stream Type: Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream

Endemic to the Pond River drainage. Inhabits small upland and headwater streams in riffles and runs over gravel and cobble substrates. Moves from riffles into pools during dry periods when stream flow is diminished.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments    
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration    
- Land/Water Management    
- Resource and Habitat Protection    

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Population genetics research

Range Map

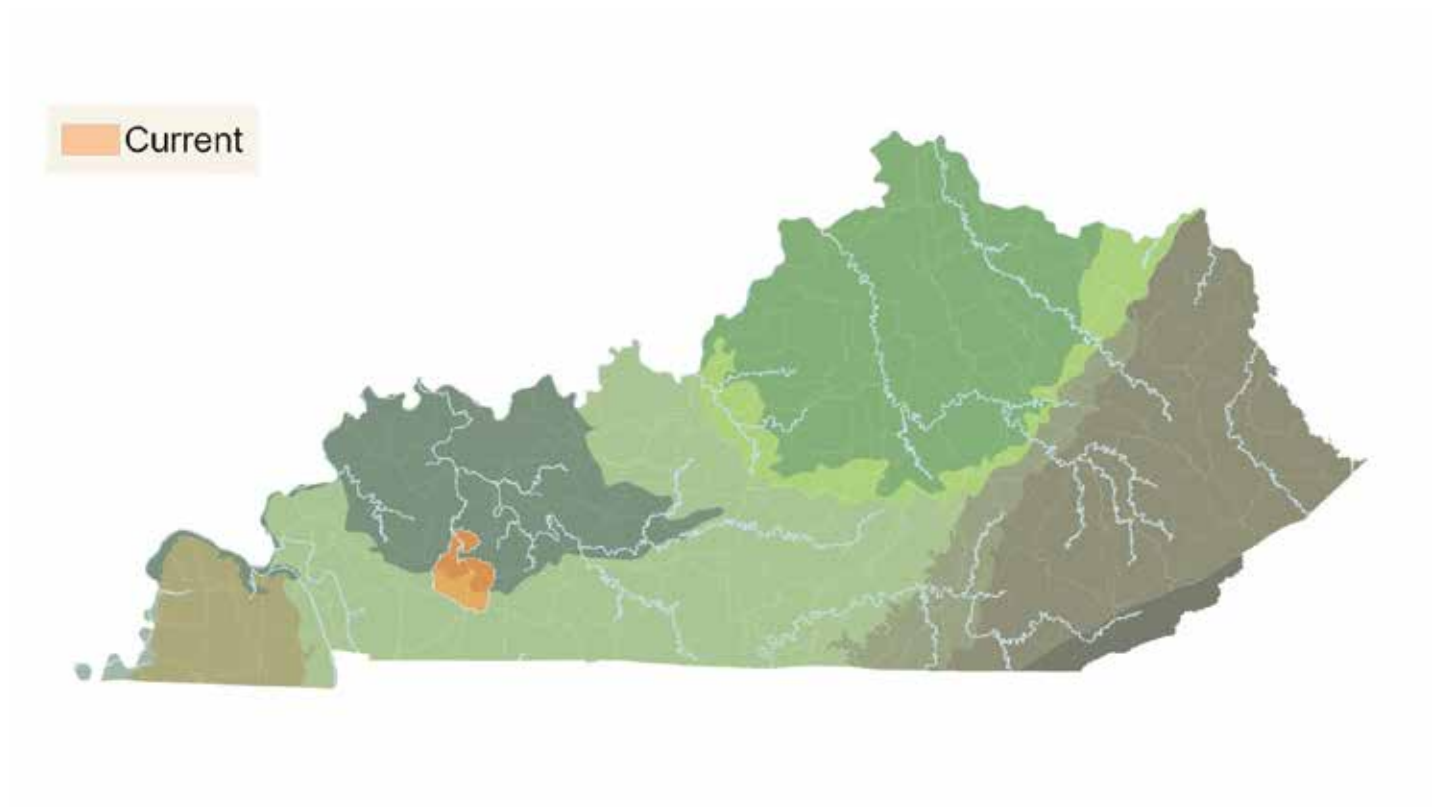


Photo: Matt Thomas



SHAWNEE HILLS CAVEFISH

(*Forbesichthys papilliferus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: GNR

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

The subspecies *Forbesichthys agassizii* *papilliferus* has been recently elevated to species rank. The distributional boundaries of *F. agassizii* and *F. papilliferus* are unclear and warrant further study, but preliminary evidence shows *F. papilliferus* to be the only species occurring in Kentucky. *Forbesichthys papilliferus* is a habitat specialist in springs and caves, which increases its vulnerability to anthropogenic stressors and natural events.

Conservation Goal

Complete additional surveys of springs located on private property for additional occurrences. Determine population genetics. Work to ensure protection of Rich Pond in Warren County and establish an annual monitoring plan for the site.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills

Stream Type: Cold-Medium Gradient-Stream, Cold-Low Gradient-Stream, Other

Inhabits caves, springs, spring seeps, and spring runs where water temperatures range from 5-15° C. Often flushed out from nearby caves and springs into small streams, ditches, and ponds during periods of heavy rain.

Threats



Agriculture and Aquaculture



Dams and Water Management/Use



Pollution



Residential and Commercial Development



Transportation and Service Corridors

Conservation Actions

Unknown

Needs

Survey: Establish a yearly census of two of the most significant populations during April or May to monitor population and demographic trends over time

Survey: Identify and survey springs located on private property within the suspected distribution of the species to discover additional populations

Research: Additional population genetic analyses to determine connectivity of populations in the Western Pennyroyal Karst

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Delineate the recharge zone and conduct annual monitoring of water quality at Rich Pond

Management: Work to protect the Rich Pond in Warren County, which supports a significant population

Range Map

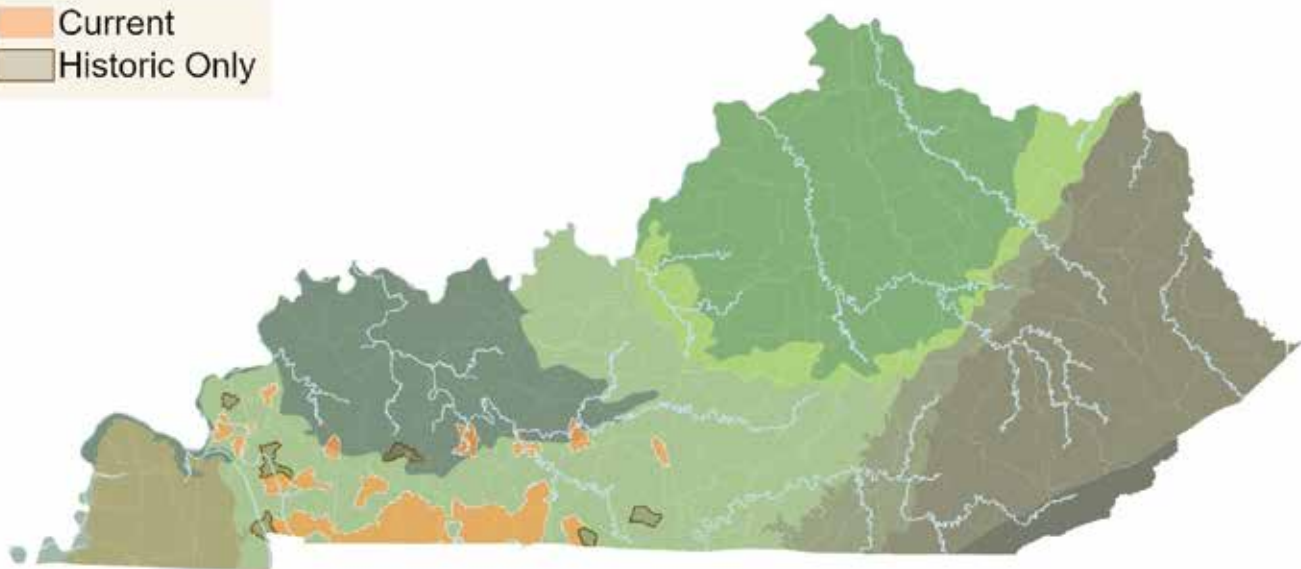


Photo: Matt Thomas



GOLDEN TOPMINNOW

(*Fundulus chrysotus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Refine the current distribution and status of populations in Fulton County through surveys of undersampled habitats in the Running Slough and Reelfoot Lake systems. Obtain information on life history and threat sensitivity.






Habitat Associations

Current Watersheds: Obion

Guilds: Open Wetland, Lake/Pond

Northern periphery of range in far southwestern Kentucky. Inhabits floodplain lakes, open wetlands, sloughs, swamps, and ditches. A surface dweller, associated with submerged beds of aquatic plants near the shoreline.

Threats

-  Agriculture and Aquaculture
-  Invasive Non-native/Alien species
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments   
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration   
- Land/Water Management   
- Resource and Habitat Protection   

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

Current

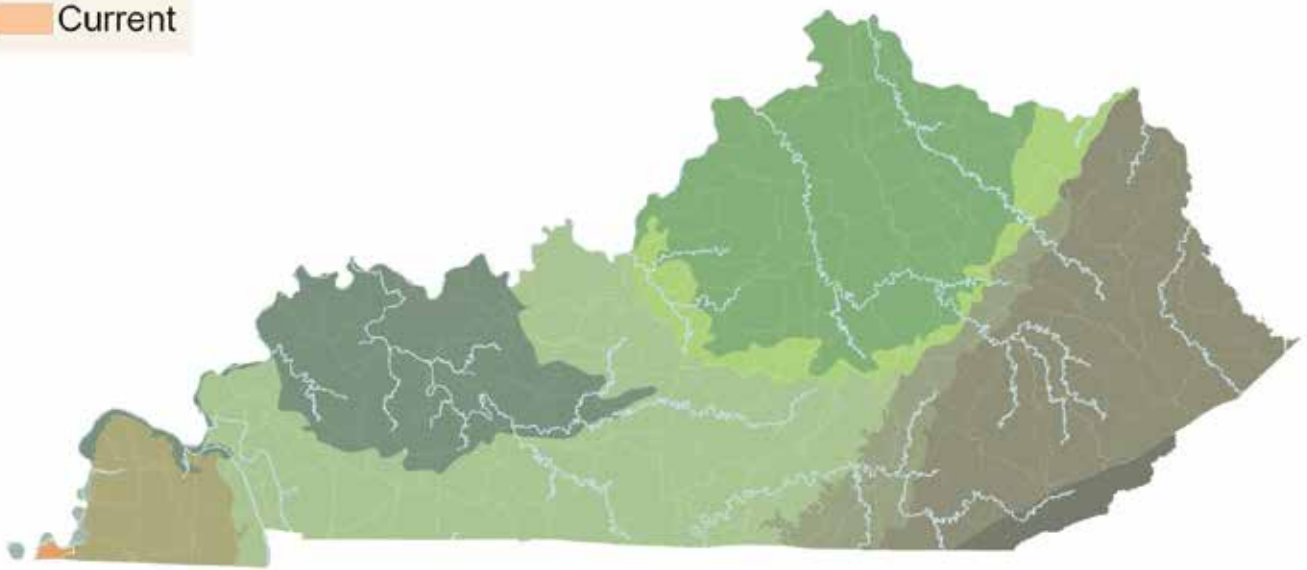


Photo: Matt Thomas



STARHEAD TOPMINNOW

(*Fundulus dispar*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine if the species is present or extirpated in Murphy Pond and surrounding wetlands in the Obion Creek system through additional surveys within the area. Refine the current distribution and status of populations in Fulton County through surveys of undersampled habitats in the Running Slough and Reelfoot Lake systems. Obtain information on life history and threat sensitivity.






Habitat Associations

Current Watersheds: Obion

Guilds: Open Wetland, Lake/Pond

Inhabits floodplain lakes, open wetlands, sloughs, swamps, and ditches in far western Kentucky. A surface dweller, associated with submerged beds of aquatic plants near the shoreline.

Threats

-  Agriculture and Aquaculture
-  Invasive Non-native/Alien species
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments   
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration   
- Land/Water Management   
- Resource and Habitat Protection   

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

Current
Historic Only

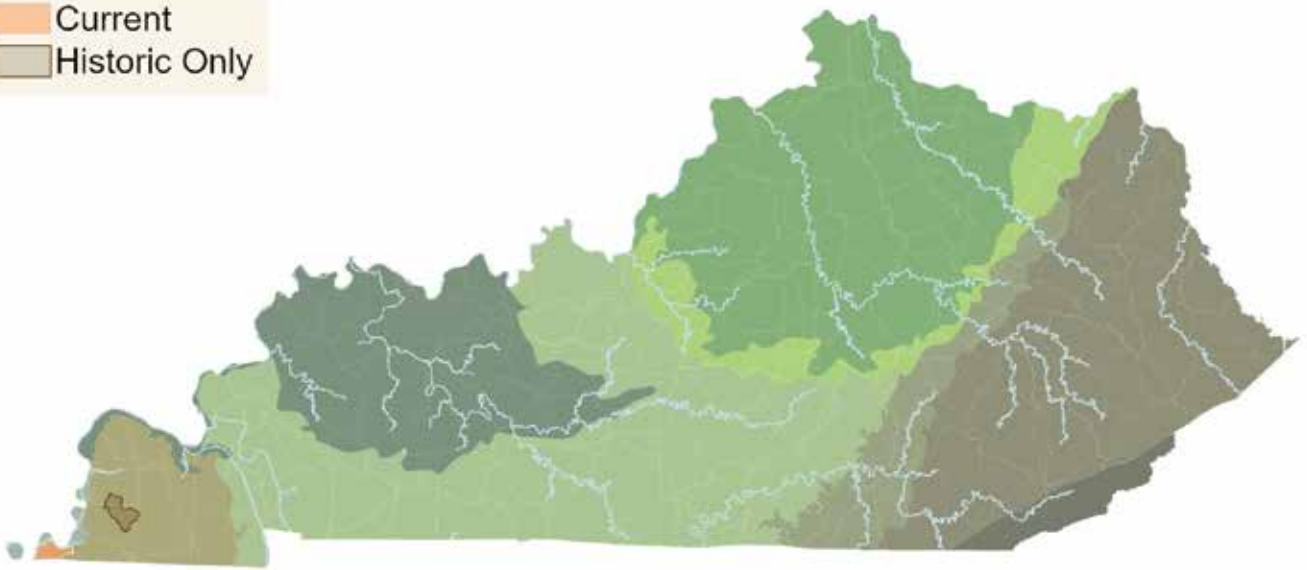


Photo: Matt Thomas



FLAME CHUB

(*Hemitremia flammea*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Monitor the existing population in Spring and Sinking Creek drainages. Survey other undersampled endorheic watersheds in the Cumberland and Barren River drainages for new occurrences. Obtain information on life history and threat sensitivity. Work to ensure protection of stream habitat in and around Robey Swamp in Simpson County.







Habitat Associations

Current Watersheds: Barren, Red

Stream Type: Cold-Medium Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Cold-Low Gradient-Stream

Northern periphery of range in southcentral Kentucky. Inhabits cool, clear, spring-fed streams. Associated with woody and organic debris, rooted vegetation, and predominantly soft mud or silt substrates.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments 
- Education and Awareness 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Land/Water Management 
- Resource and Habitat Protection 

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Search for undocumented occurrences or populations in endorheic watersheds and spring-fed streams in the karst regions of the Interior Plateau

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Range Map

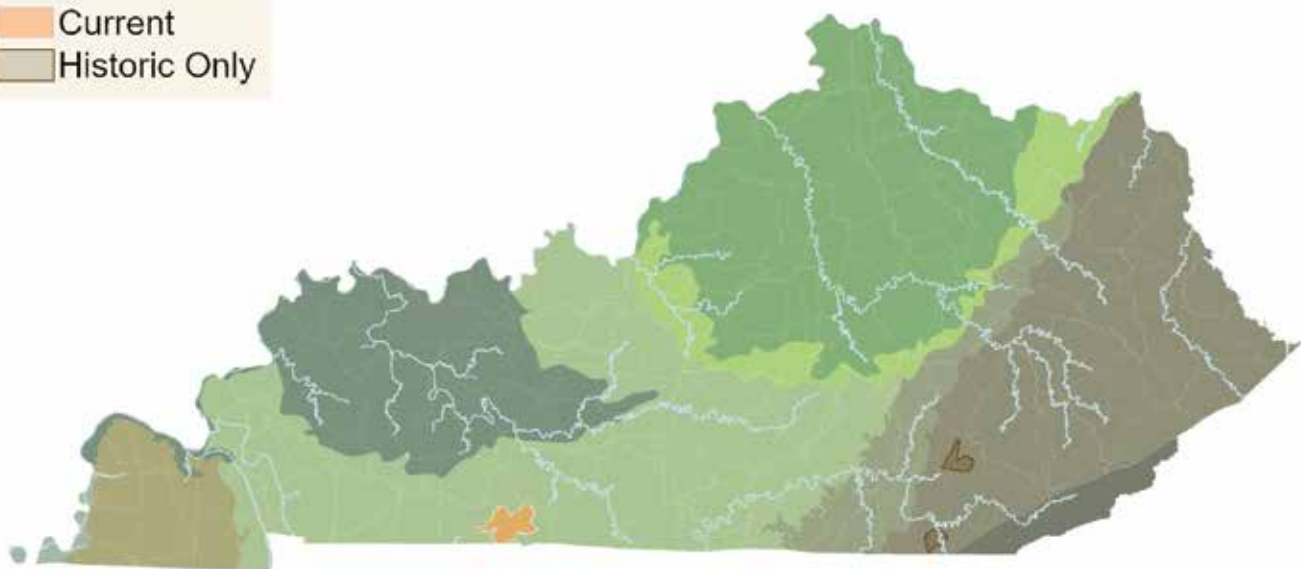


Photo: Zach Randall, Florida Museum of Natural History



CYPRESS MINNOW

(*Hybognathus hayi*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine the current distribution and status of the species through additional surveys within its range in western Kentucky. Obtain information on life history and threat sensitivity. Identify areas supporting the most robust populations and recommend measures for their protection.






Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Ohio, Middle Green

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Other

Northern periphery of range in western Kentucky. Inhabits small to medium sized streams, sloughs, ditches, and oxbow lakes. Typically in open water over mud or sand substrates. Occasionally associated with submerged aquatic vegetation or other cover.

Threats

-  Agriculture and Aquaculture
-  Invasive Non-native/Alien species
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments   
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration   
- Land/Water Management   
- Resource and Habitat Protection   

Needs

Survey: Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

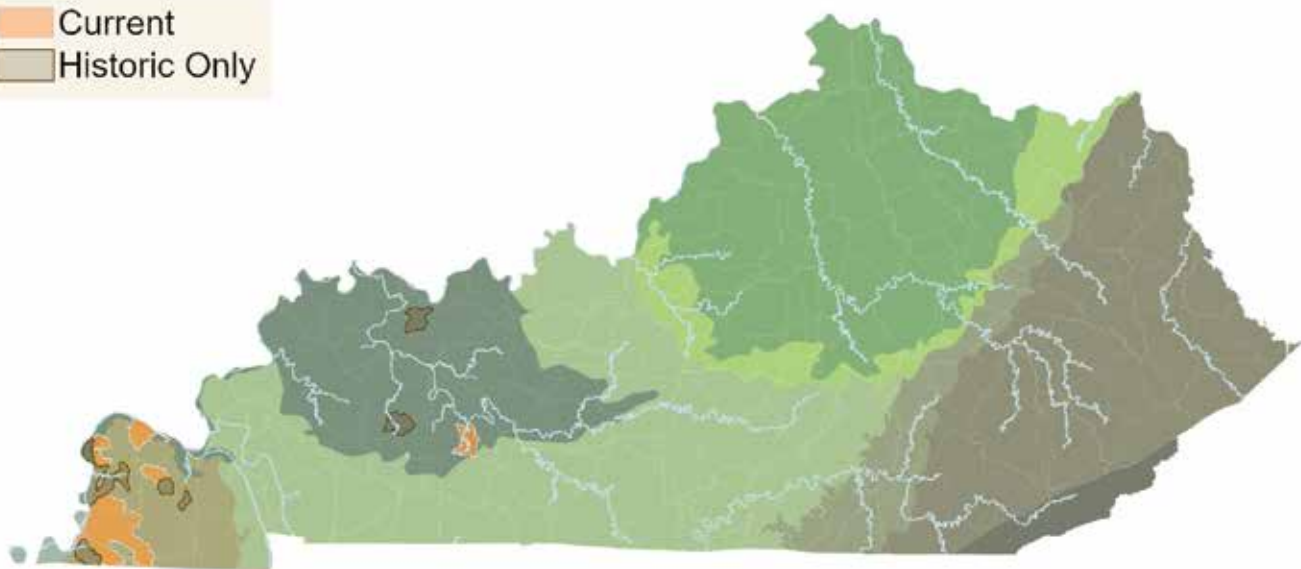


Photo: Lance Merry and Robert Hrabik, copyright Missouri Department of Conservation



PLAINS MINNOW

(*Hybognathus placitus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine the status of the species through additional surveys in the lower Ohio and Mississippi rivers bordering western Kentucky.






Habitat Associations

Physiographic Regions: Interior River Valley And Hills, Mississippi Alluvial Plain

Stream Type: Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Eastern periphery of range in far western Kentucky. Limited to the Mississippi River in areas of slow current over mixed sand and silt substrates. May also occupy shallow backwaters, eddies, and along deeper edges of sandbars.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Invasive Non-native/Alien species
-  Pollution
-  Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development  
- Compliance and Enforcement 
- Conservation Payments  
- Education and Awareness   
- External Capacity Building 
- Habitat and Natural Process Restoration  
- Land/Water Management   
- Resource and Habitat Protection  

Needs

Survey: Targeted surveys in the Mississippi River bordering western Kentucky to assess the species' current status as part of Kentucky's ichthyofauna

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

Historic Only

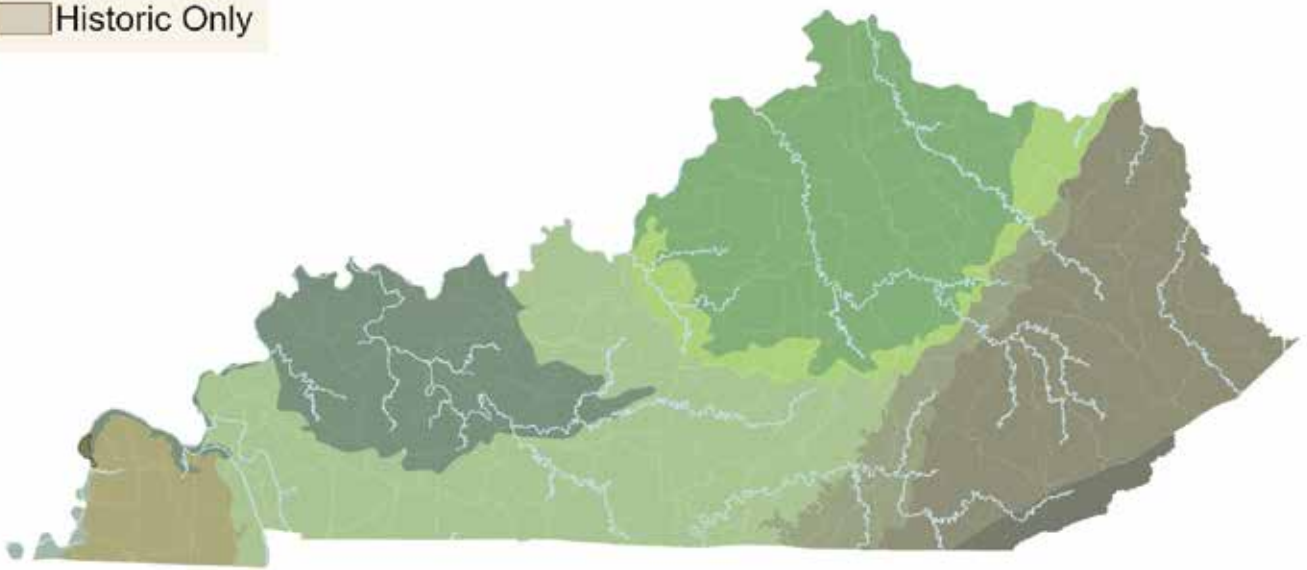


Photo: Matt Thomas



PALLID SHINER

(*Hybopsis amnis*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine if the species is present or extirpated in the lower Tennessee and Green River drainages through targeted surveys. Obtain information on life history and threat sensitivity for the Big South Fork Cumberland River population.



Habitat Associations

Current Watersheds: South Fork Cumberland

Stream Type: Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Moderately Confined-Large River

Eastern periphery of range in Kentucky. Only known extant population in the Big South Fork Cumberland River occurs in pools with gentle current at depths of 30-75 cm near Water Willow (*Justicia* sp.) over mixed sand, gravel, pebble, and cobble substrates with minimal siltation.

Threats

-  Agriculture and Aquaculture
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management       
- Resource and Habitat Protection     

Needs

Survey: Targeted surveys throughout the known historic range in Kentucky, including the lower Tennessee, Green, and upper Cumberland River drainages

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

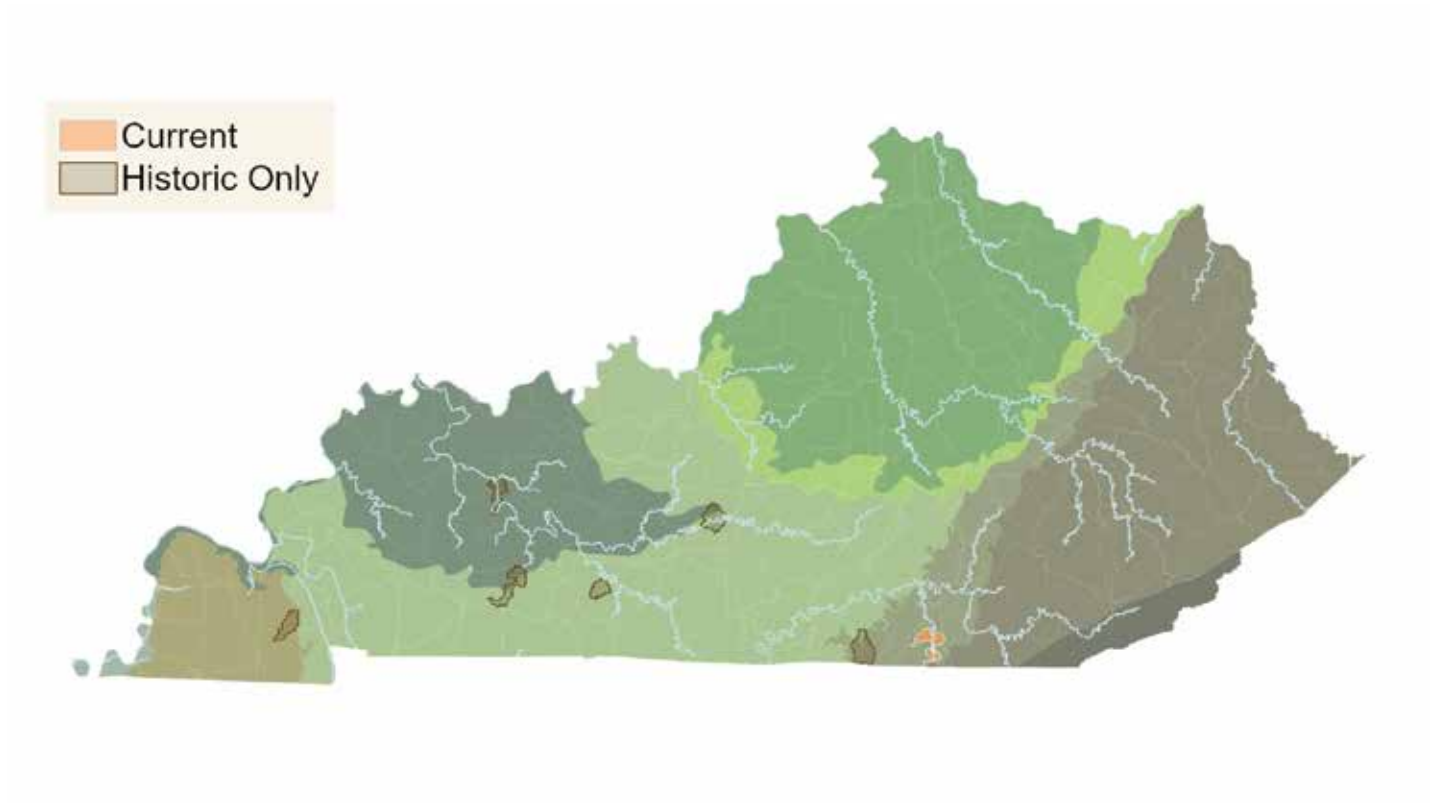


Photo: Matt Thomas



CHESTNUT LAMPREY

(*Ichthyomyzon castaneus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Refine the current distribution and status of populations through additional surveys in the western half of the state. Determine locations of spawning habitat during spring surveys.




Habitat Associations

Current Watersheds: Barren, Kentucky Lake, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Obion, Rolling Fork, Rough, Upper Green

Stream Type: Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Inhabits streams to large rivers. Runs and riffles of silt-free gravel and cobble are required for spawning. Slow-flowing backwaters and pools with soft substrates and high detrital content are required for larval development.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Residential and Commercial Development

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration  
- Land/Water Management   
- Resource and Habitat Protection  

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations

Survey: Intensive surveys during the spring spawning period at historic and new localities to more accurately determine the species' distributional status and population densities

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

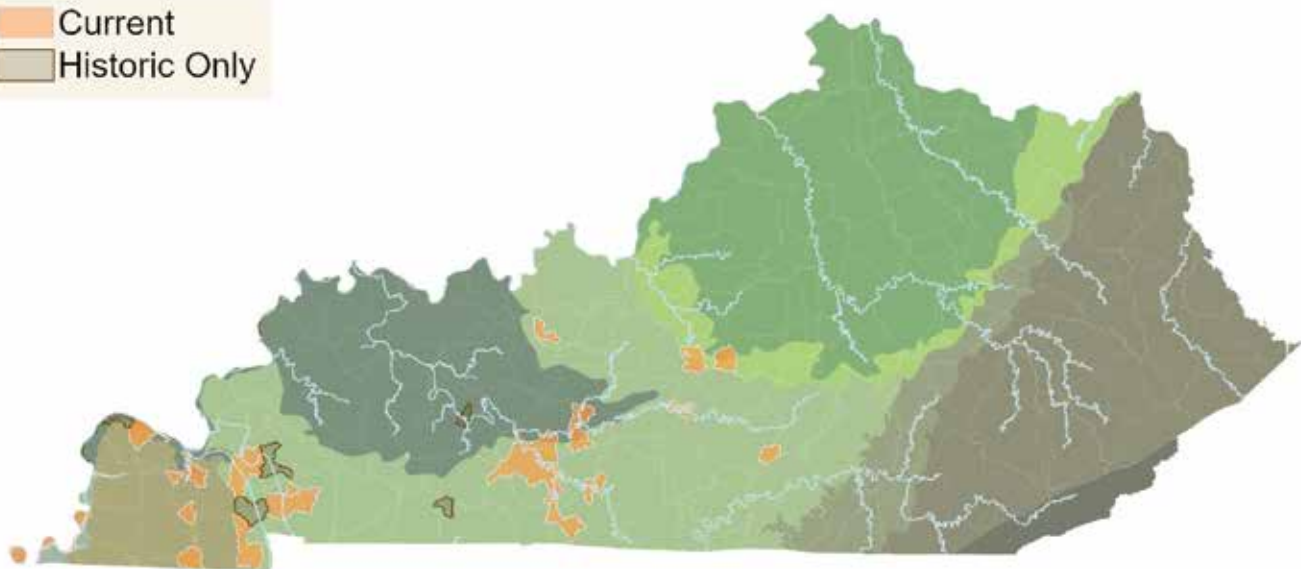


Photo: Matt Thomas



NORTHERN BROOK LAMPREY

(*Ichthyomyzon fossor*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Refine the current distribution and status of populations through additional surveys in the upper Kentucky, Licking, Big Sandy and Little Sandy rivers, and Tygarts Creek. Determine locations of spawning habitat during spring surveys.





Habitat Associations

Current Watersheds: Licking, Little Sandy, Lower Levisa, North Fork Kentucky, South Fork Kentucky, Upper Kentucky

Stream Type: Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River

Inhabits upland streams to small rivers. Runs and riffles of silt-free sand and gravel are required for spawning. Slow-flowing runs and pools with soft substrates and high detrital content are required for larval development.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Residential and Commercial Development

Conservation Actions

- Conservation Payments   
- Education and Awareness   
- External Capacity Building 
- Habitat and Natural Process Restoration   
- Land/Water Management   
- Resource and Habitat Protection   

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations

Survey: Intensive surveys during the spring spawning period at historic and new localities to more accurately determine the species' distributional status and population densities

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

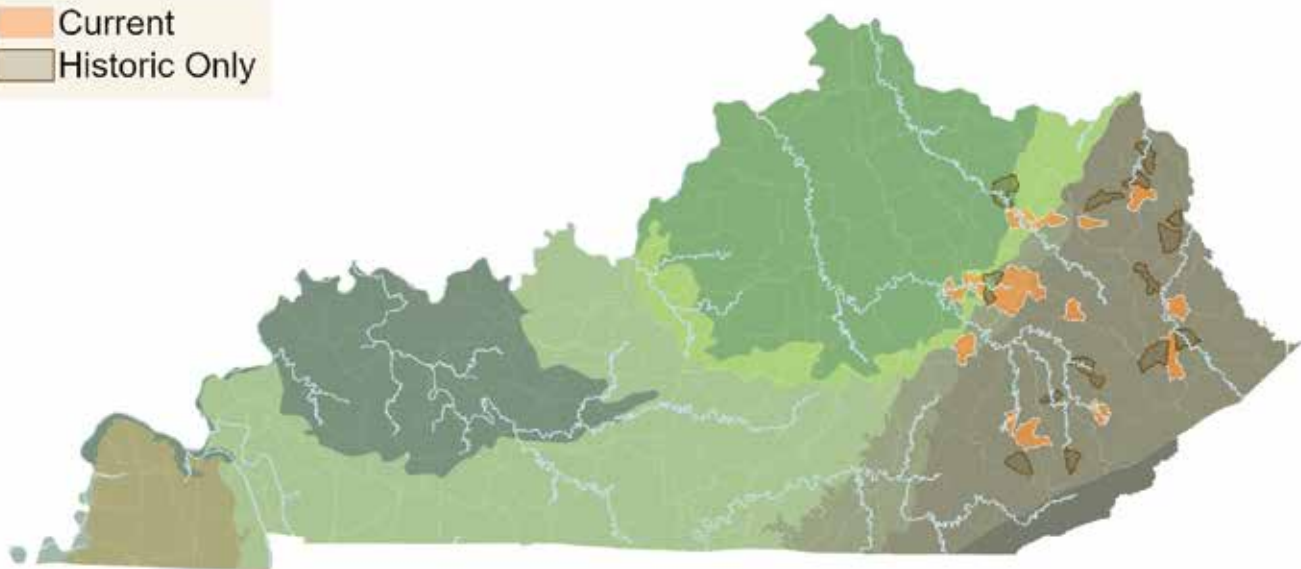


Photo: Matt Thomas



SOUTHERN BROOK LAMPREY

(*Ichthyomyzon gagei*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine the extent of the species' distribution in the West Fork Clarks River drainage and if it occurs in additional Coastal Plain watersheds in western Kentucky. Determine locations of spawning habitat during spring surveys.





Habitat Associations

Current Watersheds: Lower Tennessee

Stream Type: Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

Northern periphery of range in the Coastal Plain of western Kentucky. Inhabits small to medium sized streams. Runs and riffles of silt-free gravel and cobble are required for spawning. Slow-flowing backwaters and pools with soft substrates and high detrital content are required for larval development.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Pollution
-  Residential and Commercial Development

Conservation Actions

- Compliance and Enforcement 
- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration  
- Land/Water Management    
- Resource and Habitat Protection  

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Intensive surveys during the spring spawning period in the Clarks River drainage and other Coastal Plain streams in western Kentucky to determine distributional limits and population estimates

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

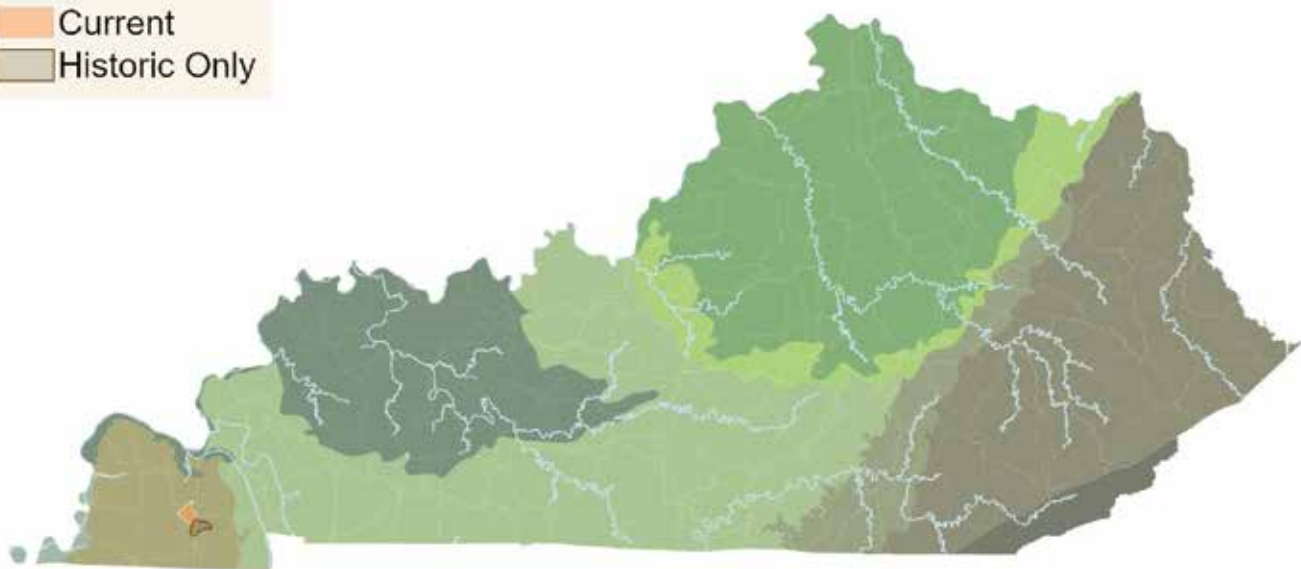


Photo: Matt Thomas



MOUNTAIN BROOK LAMPREY

(*Ichthyomyzon greeleyi*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Refine the current distribution and status of populations through additional surveys in the Green, Barren, and Cumberland River drainages. Determine locations of spawning habitat during spring surveys.





Habitat Associations

Current Watersheds: Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland, Upper Green

Stream Type: Cold-High Gradient-Stream, Cool-High Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River

Inhabits clear, upland streams and small rivers with riffle-pool complexes. Riffles of silt-free gravel and cobble are required for spawning. Slow-flowing runs and pools with soft substrates and high detrital content are required for larval development.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Residential and Commercial Development

Conservation Actions

- Conservation Payments   
- Education and Awareness   
- External Capacity Building 
- Habitat and Natural Process Restoration   
- Land/Water Management   
- Resource and Habitat Protection   

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations

Survey: Intensive surveys during the spring spawning period at historic and new localities to more accurately determine the species' distributional status and population densities

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

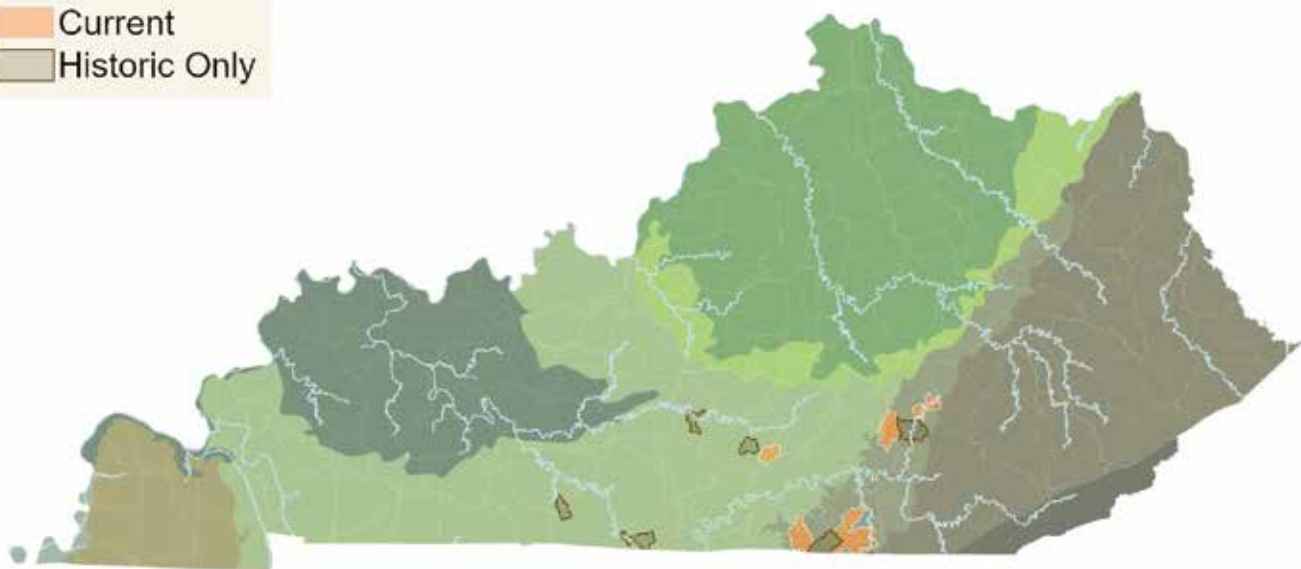


Photo: Matt Thomas



BLACK BUFFALO

(*Ictiobus niger*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Accurate assessment of the distribution and status of the Black Buffalo is difficult due to similarity of appearance and hybridization with other *Ictiobus* species, especially *I. bubalus* (Smallmouth Buffalo). 65% of pre-1986 records are from Ohio and Mississippi River tributaries while 61% of post-1986 records are from the mainstem Ohio River. Any non-vouchered record is questionable due to the problems indicated above. More sampling is needed to obtain voucher specimens or photos and DNA samples.




Conservation Goal

Refine the current distribution and status of the species through additional surveys in the Ohio River and major tributaries in Kentucky. Collect DNA samples to assess hybridization with other buffalofishes. Determine if current levels of commercial and recreational fishing pressure are sustainable.

Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Green, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green,

Threats

-  Dams and Water Management/Use
-  Fishing and Harvesting Aquatic Resources
-  Invasive Non-native/Alien species

Conservation Actions

Unknown

Needs

Survey: Targeted surveys at historic and new locations in large rivers and tributaries to determine the species' distributional status and population densities

Research: Assessment of exploitation rates from commercial and recreational fisheries

Research: DNA sampling for specimen identification and to assess introgressive hybridization with other carpsuckers

Management: Eliminate or reduce barriers to fish passage

Management: Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems

Management: Prevent overharvest that could result in population extirpations

Middle Ohio-Laughery, Obion, Ohio Brush-Whiteoak,
Red, Rough, Silver-Little Kentucky, South Fork
Licking, Tradewater

Stream Type: Cool-Medium Gradient-Stream,
Cool-Low Gradient-Stream, Warm-Medium Gradient-
Stream, Warm-Low Gradient-Stream, Cool-Medium
Gradient-Small River, Cool-Low Gradient-Small
River, Warm-Medium Gradient-Small River, Warm-
Low Gradient-Small River, Cool-Moderately
Confined-Medium River, Cool-Unconfined-Medium
River, Warm-Moderately Confined-Medium River,
Warm-Unconfined-Medium River, Warm-Moderately
Confined-Large River, Warm-Unconfined-Large
River, Other

Inhabits pools and backwaters in streams to large
rivers. Also occurs in reservoirs, oxbows and
floodplain lakes. Associated with soft substrates
consisting of sand, silt (mud), and detritus.

Range Map

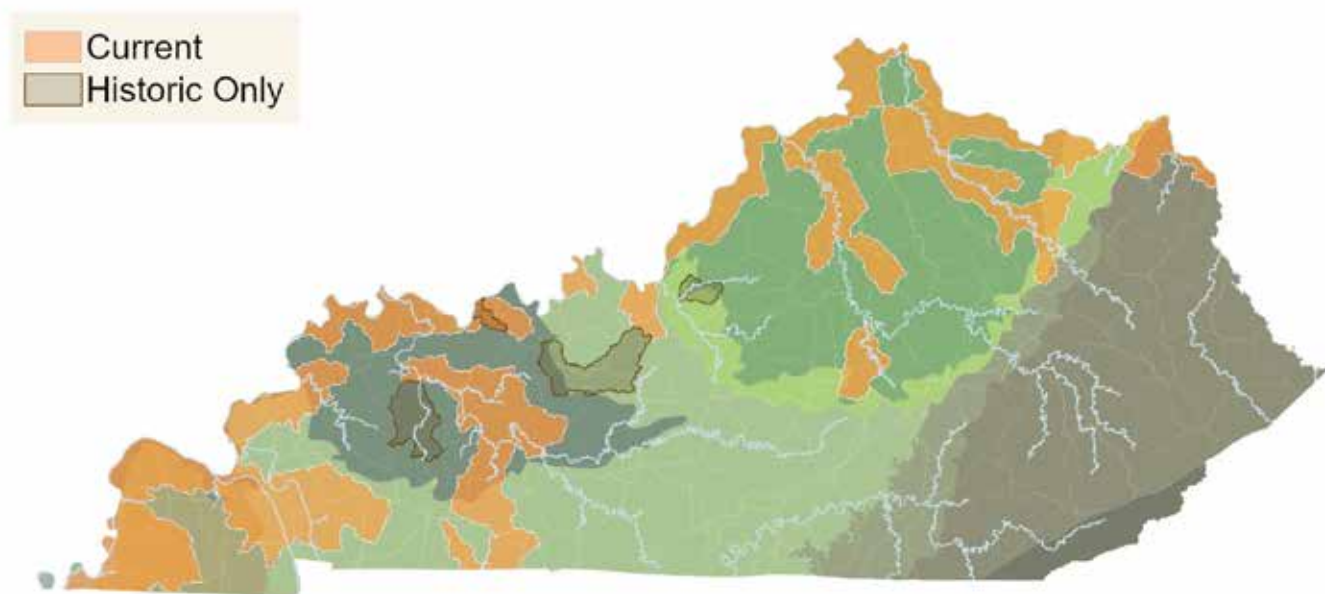


Photo: Matt Thomas



DOLLAR SUNFISH

(*Lepomis marginatus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Refine the current distribution and status of the species through surveys of undersampled habitats in the Jackson Purchase area of western Kentucky. Obtain information on life history and threat sensitivity.

Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Kentucky Lake, Lower Tennessee, Obion

Guilds: Open Wetland, Lake/Pond, River/Streams

Northern periphery of range in western Kentucky. Inhabits oxbow lakes, sloughs, and wetlands with sand, mud, and organic debris substrates. Often associated with submerged aquatic vegetation, hydrophytes, and overhanging vegetation along undercut banks. Occasionally in lowland streams connected to lentic habitats.

Threats

- Agriculture and Aquaculture
- Pollution
- Residential and Commercial Development
- Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development
- Conservation Payments
- Education and Awareness
- External Capacity Building
- Habitat and Natural Process Restoration
- Land/Water Management
- Resource and Habitat Protection

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations and work to ensure they are protected

Survey: Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

Current

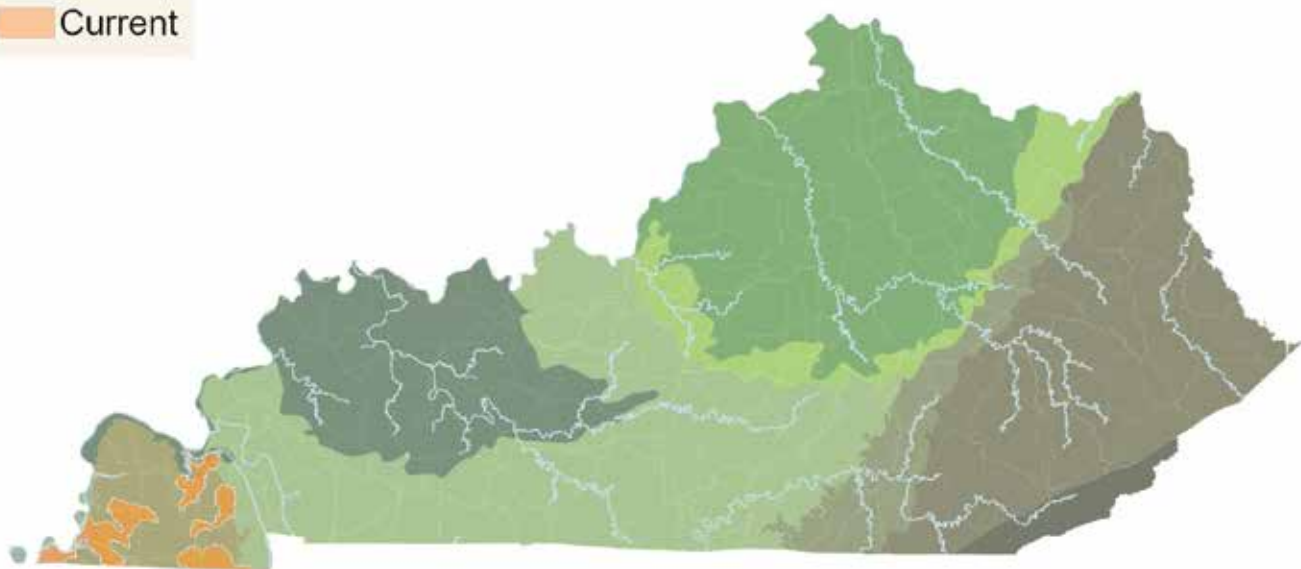


Photo: Matt Thomas



REDSPOTTED SUNFISH

(*Lepomis miniatus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine the current distribution and status of the species through additional surveys in the lower Green, Tradewater, and the Four Rivers region of western Kentucky. Obtain information on life history and threat sensitivity.





Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Middle Green, Obion, Pond

Guilds: Open Wetland, Lake/Pond, River/Streams

Inhabits floodplain lakes, sloughs, oxbows, and wetlands in western Kentucky. Often associated with cypress trees and submerged aquatic vegetation and substrates of sand and mud overlain with organic debris. May also occur in backwaters and pools of lowland streams.

Threats

-  Agriculture and Aquaculture
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments   
- Education and Awareness   
- External Capacity Building  
- Habitat and Natural Process Restoration   
- Land/Water Management   
- Resource and Habitat Protection   

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations and work to ensure they are protected

Survey: Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

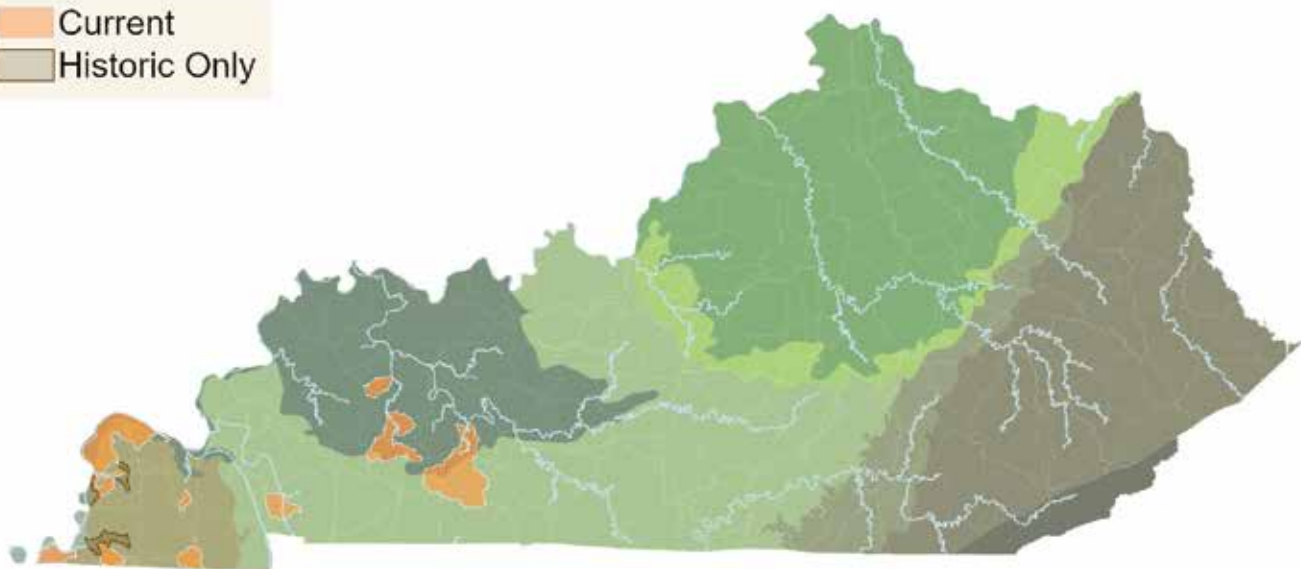


Photo: Matt Thomas



AMERICAN BROOK LAMPREY

(*Lethenteron appendix*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Refine the current distribution and status of populations through additional surveys in the Green, Barren, upper Kentucky, Licking, and Big Sandy River drainages. Determine locations of spawning habitat during spring surveys.





Habitat Associations

Current Watersheds: Barren, Licking, Little Sandy, Little Scioto-Tygarts, Lower Levisa, Middle Fork Kentucky, North Fork Kentucky, Ohio Brush-Whiteoak, South Fork Kentucky, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky

Stream Type: Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Moderately Confined-Large River

Inhabits upland streams to small rivers. Riffles of silt-free gravel and cobble are required for spawning. Slow-flowing runs and pools with soft substrates and high detrital content are required for larval development.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Residential and Commercial Development

Conservation Actions

- Conservation Payments   
- Education and Awareness   
- External Capacity Building 
- Habitat and Natural Process Restoration   
- Land/Water Management   
- Resource and Habitat Protection   

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations

Survey: Intensive surveys during the spring spawning period at historic and new localities to more accurately determine the species' distributional status and population densities

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

Current
Historic Only

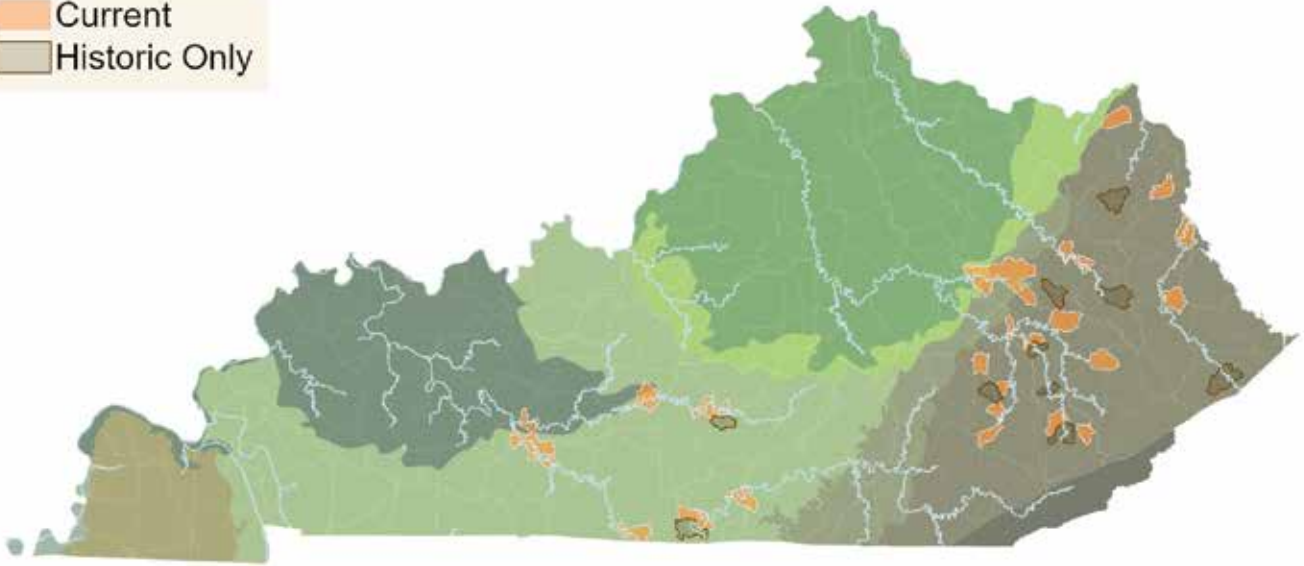


Photo: Brian Zimmerman and Danielle Cook, Ohio State University



BURBOT

(*Lota lota*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine the current distribution and status of the species in the Ohio River and its major tributaries in Kentucky through coordination between agencies and divisions conducting fish sampling using multiple gear types on large rivers and streams. Collect DNA samples to assess interrelationships with populations in different parts of the species' range. Determine if specimens from the Ohio River are native or introduced.




Habitat Associations

Current Watersheds: Blue-Sinking, Lower Ohio-Bay, Ohio Brush-Whiteoak





Stream Type: Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Cool-Confined-Large River, Warm-Moderately Confined-Large River

Southern periphery of range in the Ohio River. Restricted to large river habitat in cool water at depths over 1.5 m with substrates of rock, sand, and mud. Juveniles occur in riffles, vegetated areas, organic debris, and along undercut banks.

Threats

-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Habitat and Natural Process Restoration 
- Land/Water Management 

Needs

Survey: Improve coordination between agencies and divisions conducting fish sampling using multiple gear types on large streams and rivers to report Burbot captures

Survey: Public outreach encouraging anglers who capture Burbot to report photos, location data, and other information (e.g., length and weight) to help with monitoring efforts

Survey: Targeted surveys at historic and new locations in the Ohio River and lower reaches of major tributaries to determine if the species is established

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Research: Population genetics research

Range Map

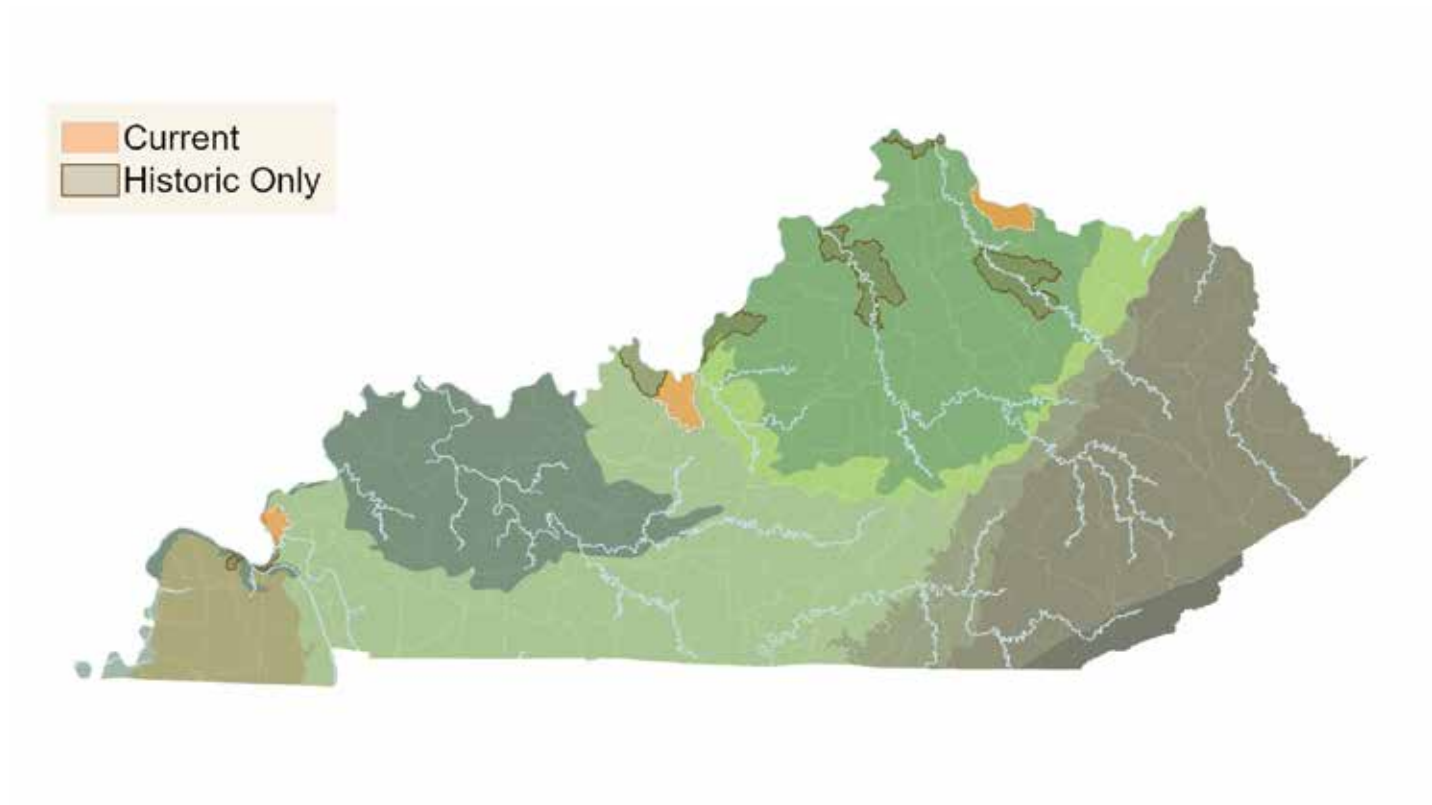


Photo: Lance Merry and Robert Hrabik, copyright Missouri Department of Conservation



STURGEON CHUB

(*Macrhybopsis gelida*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G3

S Rank: S1

Federal Status: Not Listed

IUCN Red List: LC - Least concern

Conservation Goal

Determine the current status of the species through additional surveys in the Mississippi River bordering western Kentucky. In coordination with federal and other state partners, implement conservation and management actions identified in the Species Status Assessment (SSA).






Habitat Associations

Current Watersheds: Lower Mississippi-Memphis

Stream Type: Warm-Unconfined-Large River

Eastern periphery of range in far western Kentucky. Limited to the Mississippi River in open channels with strong current over sand and fine gravel. Most often occurs at depths less than 2 m. Shallow shoal habitat is important to the survival of the species.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Pollution
-  Residential and Commercial Development
-  Shipping Lanes

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration   
- Land/Water Management  
- Resource and Habitat Protection   

Needs

Survey: Targeted surveys in the Mississippi River bordering western Kentucky

Management: Work with federal and other state partners on conservation and management actions identified in the Species Status Assessment (SSA)

Range Map

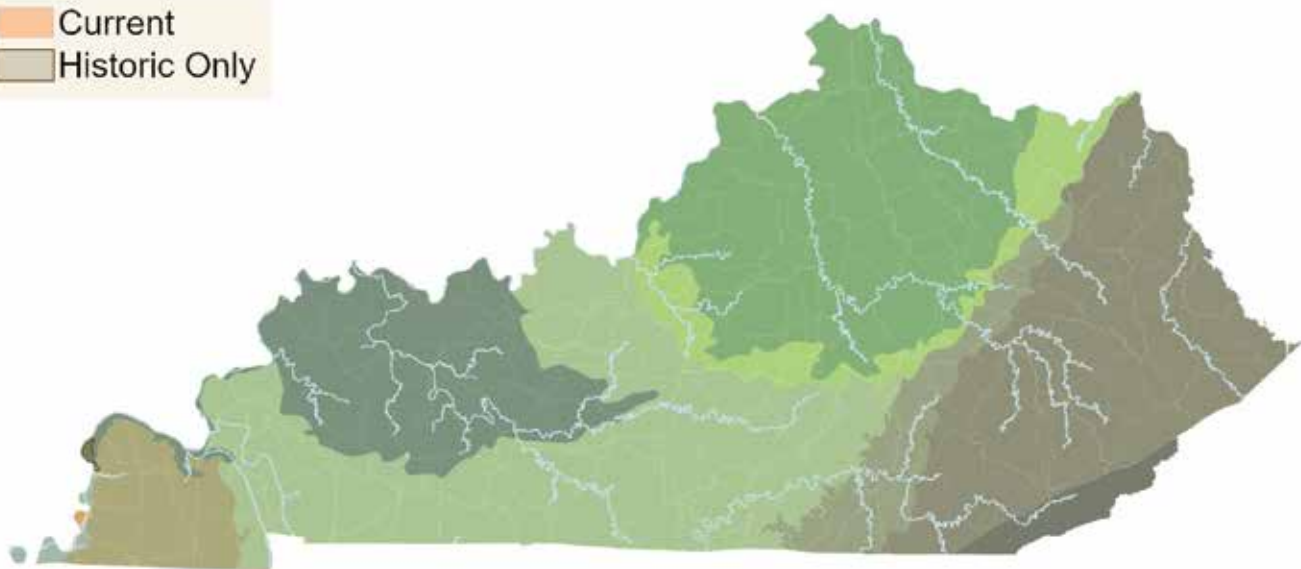


Photo: Matt Thomas



SHOAL CHUB

(*Macrhybopsis hyostoma*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal







Determine the current distribution and status of the species through additional surveys in the Green, Barren, upper Cumberland, upper Kentucky, Licking, and Big Sandy River drainages. Obtain information on life history and threat sensitivity. Identify watersheds supporting the most robust populations and recommend measures for their protection.

Habitat Associations

Current Watersheds: Big Sandy, Blue-Sinking, Highland-Pigeon, Licking, Little Sandy, Little Scioto-Tygarts, Lower Levisa, Lower Mississippi-Memphis, Lower Ohio, Middle Fork Kentucky, North Fork Kentucky, Ohio Brush-Whiteoak, Silver-Little Kentucky, South Fork Kentucky, Tug, Upper Green, Upper Levisa

Stream Type: Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Cool-Unconfined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Cool-Confined-Large River, Warm-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management     
- Resource and Habitat Protection     

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations

Survey: Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Inhabits unimpounded reaches of small to large rivers with moderate to swift current over firm sand or fine gravel substrates. In small to medium rivers, occupies areas immediately below riffles and in deep, swift flowing runs over coarse sand or gravel substrates.

Range Map

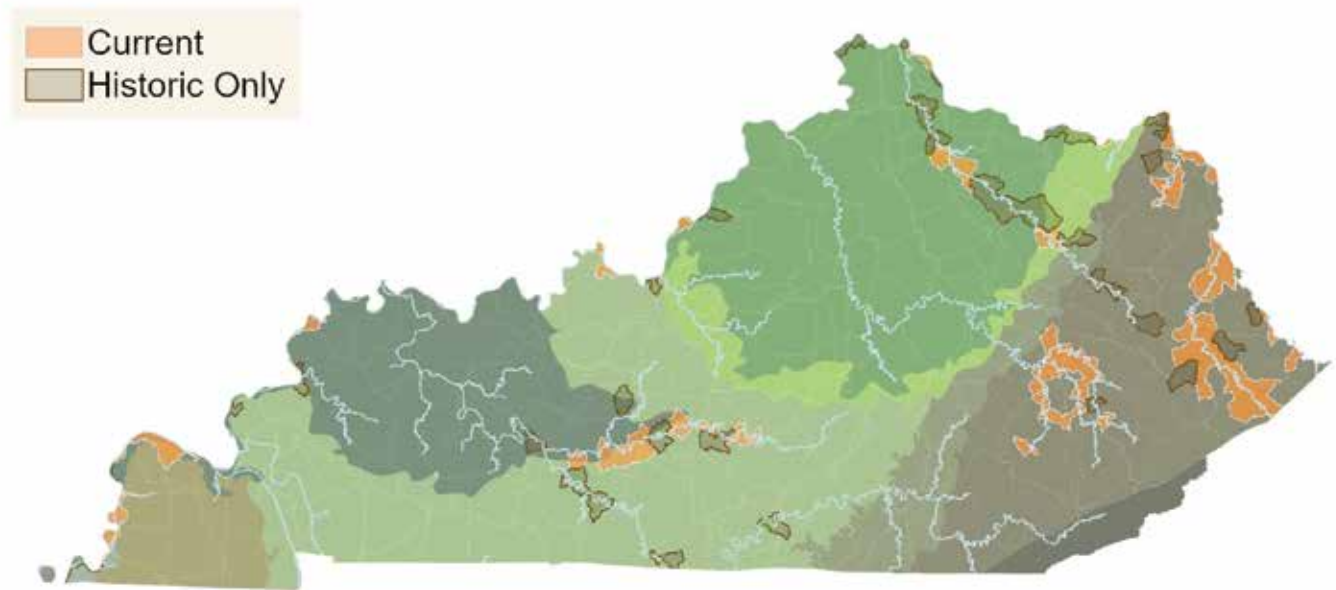


Photo: Lance Merry and Robert Hrabik, copyright Missouri Department of Conservation



SICKLEFIN CHUB

(*Macrhybopsis meeki*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G3

S Rank: S1

Federal Status: Not Listed

IUCN Red List: LC - Least concern

Conservation Goal

Determine the current status of the species in the Mississippi River bordering western Kentucky. In coordination with federal and other state partners, implement conservation and management actions identified in the Species Status Assessment (SSA).






Habitat Associations

Current Watersheds: Lower Mississippi-Memphis

Stream Type: Warm-Unconfined-Large River

Eastern periphery of range in far western Kentucky. Limited to the Mississippi River in open channels and ends of islands, usually over firm sand in strong current. Most often occurs at depths greater than 4 m, but juveniles occupy shallower depths with slower current. Shoals and sand bar habitats are important to the survival of the species.

Threats

-  Agriculture and Aquaculture
-  Fire and Fire Suppression
-  Pollution
-  Residential and Commercial Development
-  Shipping Lanes

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration   
- Land/Water Management  
- Resource and Habitat Protection   

Needs

Survey: Targeted surveys in the Mississippi River bordering western Kentucky

Management: Work with federal and other state partners on conservation and management actions identified in the Species Status Assessment (SSA)

Range Map

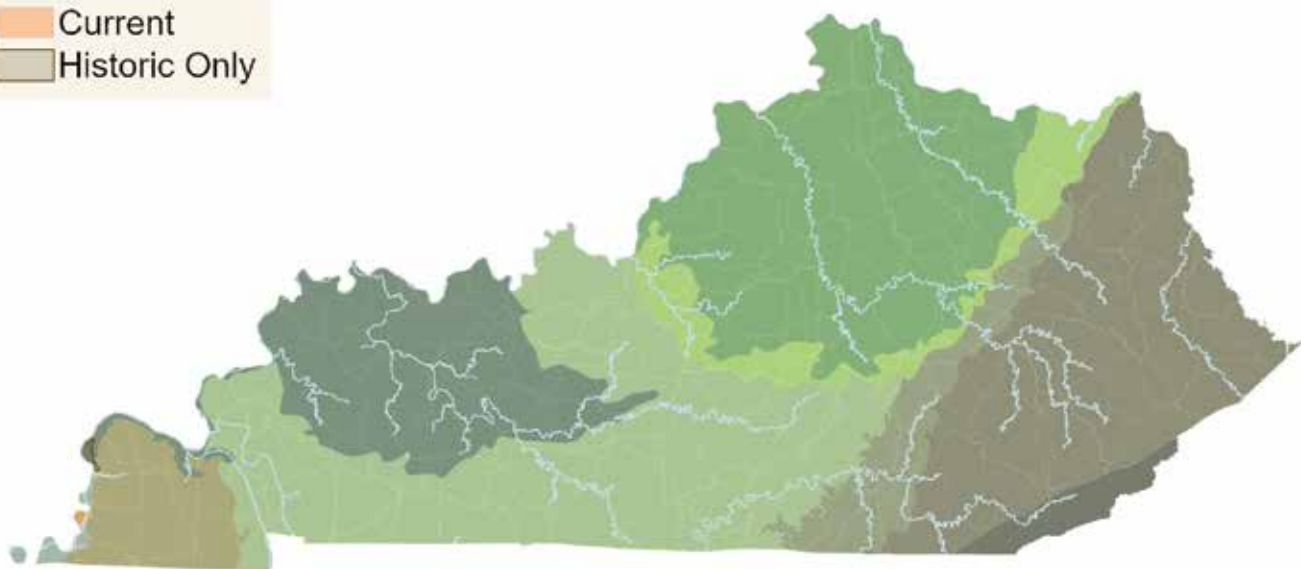


Photo: Matt Thomas



BLACKTAIL REDHORSE

(*Moxostoma poecilurum*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor the existing population in Terrapin Creek.
Determine sensitivity to environmental stressors.






Habitat Associations

Current Watersheds: Obion

Stream Type: Warm-Low Gradient-Stream

Northern periphery of range in the Coastal Plain of western Kentucky. Restricted to Terrapin Creek, occupying runs and pools with gentle current and mixed sand and fine gravel substrates. Generally associated with logs, brush piles, and other organic debris.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments    
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration    
- Land/Water Management     
- Resource and Habitat Protection    

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Research: Determine sensitivity to environmental stressors

Range Map

Current

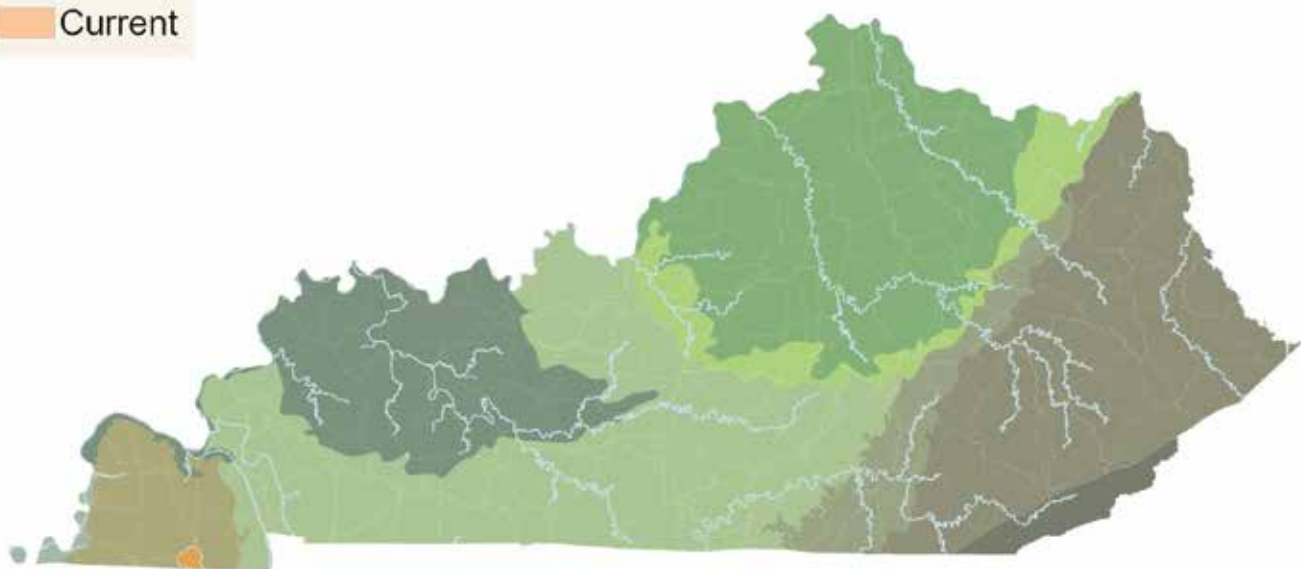


Photo: Brian Zimmerman, Ohio State University



HORNYHEAD CHUB

(*Nocomis biguttatus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

The Hornyhead Chub is restricted to the Elkhorn and Benson Creek systems in the Kentucky River drainage. The most recent confirmed record is from 1999, but more recent targeted surveys failed to detect the species at historic localities. While early accounts speculated that this population was the result of a bait introduction, more recent studies suggest that it may be a native population. More surveys are needed to determine species presence and to obtain DNA samples for analysis.

Conservation Goal

Determine if the species is present or extirpated in Kentucky through additional surveys in the Elkhorn and Benson Creek watersheds. If present, determine through genetic analysis whether the population represents a native glacial relict or artificial introduction.

Habitat Associations

Current Watersheds: Lower Kentucky

Stream Type: Warm-Medium Gradient-Stream, Warm-Medium Gradient-Small River

Southern periphery of range in northcentral Kentucky. Inhabits pools and areas of moderate current in small to medium-size, clear streams with moderate gradient and gravel, cobble, rubble, and limestone bedrock substrates.

Threats



Agriculture and Aquaculture



Dams and Water Management/Use



Invasive and Other Problematic Species and Genes



Pollution



Residential and Commercial Development



Transportation and Service Corridors

Conservation Actions

Unknown

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys in Elkhorn and Benson Creek watersheds to determine if the only known Kentucky population still exists

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Research: Population genetics research

Management: Eliminate or reduce barriers to fish passage

Management: Prevent habitat loss and water quality degradation

Management: Prevent predation impacts to Hornyhead Chub populations

Management: Protect riparian corridor habitat and maintain good water quality

Management: Reduce impacts of acute pollution incidents

Management: Reduce waste effluents and runoff into aquatic systems.

Range Map

Current
Historic Only

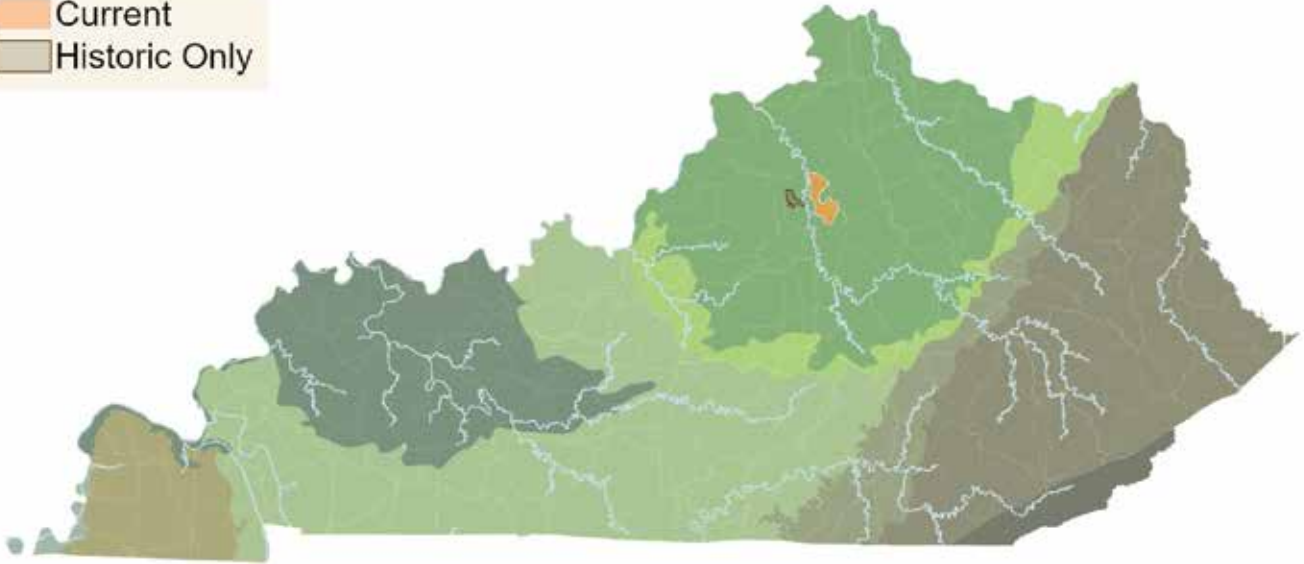


Photo: Matt Thomas



SPOTTED DARTER

(*Nothonotus maculatus*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S2

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Monitor existing populations in the upper Green and lower Barren River drainages. Determine if the species is present or extirpated in the lower North Fork Kentucky River and upper Barren River drainage through additional surveys.







Habitat Associations

Current Watersheds: Barren, Upper Green

Stream Type: Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River

Inhabits unimpounded reaches of small to medium-size rivers. Occupies deeper portions of riffles in fast current and in glides with moderate current over substrates of cobble, gravel, and large slab rocks or boulders.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Natural System Modifications
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management     
- Resource and Habitat Protection     

Needs

Survey: Additional survey effort is needed to assess the current distribution and status in the Barren River drainage and North Fork Kentucky River

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

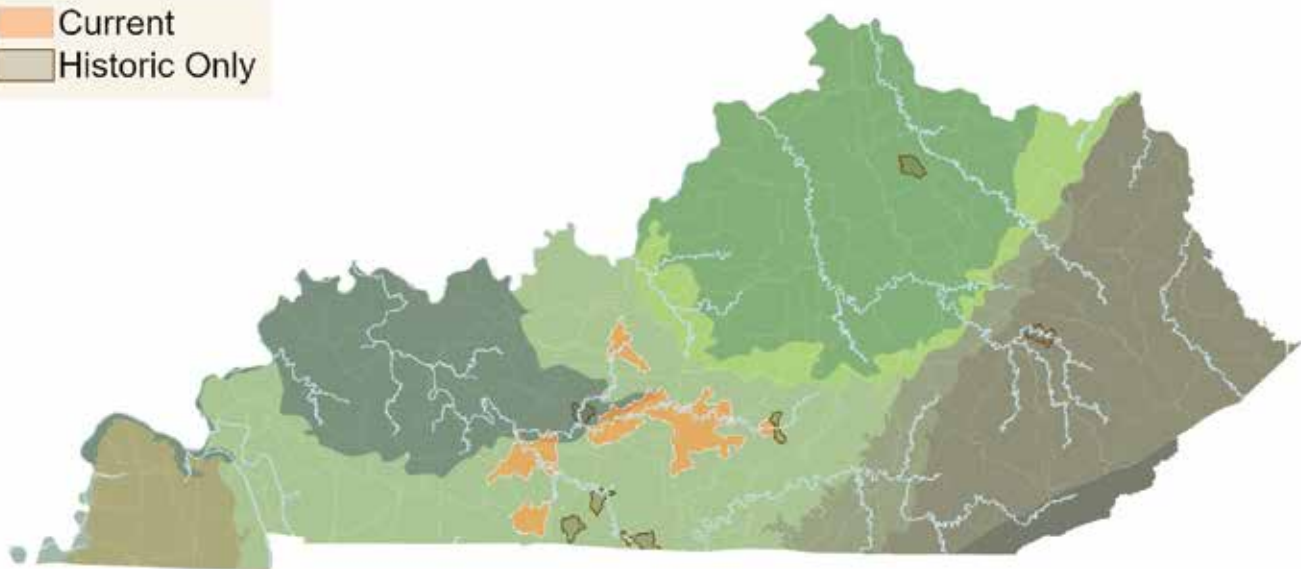


Photo: Matt Thomas



SMALLSCALE DARTER

(*Nothonotus microlepidus*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S1

Federal Status: Not Listed

IUCN Red List: NT - Near threatened

Conservation Goal

Monitor existing populations in the Little River and Red River (Lower Cumberland drainage) and survey additional locations within these systems that may result in new occurrences. Obtain information on life history and threat sensitivity.







Habitat Associations

Current Watersheds: Lower Cumberland, Red

Stream Type: Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River

Inhabits unimpounded reaches of small to medium-size upland rivers. Occupies riffles in moderate to fast current at depths of 0.5 m or less over cobble, gravel, boulder, and coarse rubble substrates. Juveniles occupy shallower portions of riffles over gravel substrate.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Natural System Modifications
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments    
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration    
- Land/Water Management    
- Resource and Habitat Protection    

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Survey additional locations within the Red and Little River drainages having suitable habitat that may harbor unreported populations

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

Current

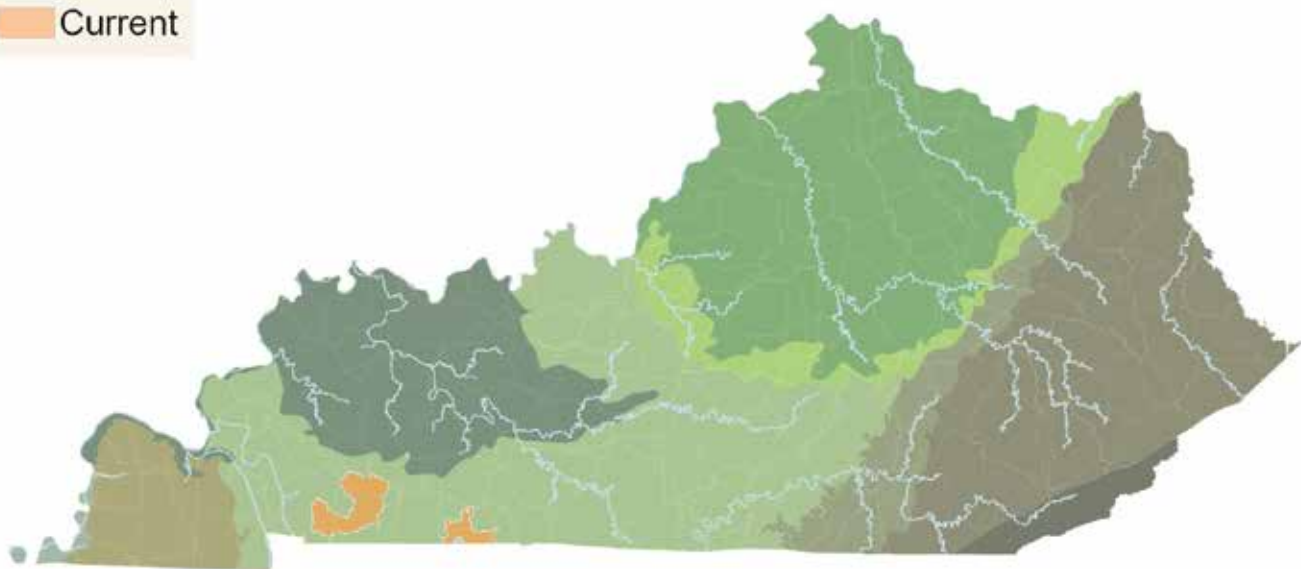


Photo: Matt Thomas



PALEZONE SHINER

(*Notropis albizonatus*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: EN - Endangered

Conservation Goal

Implement actions necessary for species recovery and delisting in cooperation with state and federal partners as prescribed in the Recovery Plan. Determine if the species is present in Rock Creek, Big South Fork, and Marrowbone Creek through targeted surveys within those systems.

Habitat Associations








Current Watersheds: South Fork Cumberland

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River

Inhabits clear, upland streams and small rivers. Requires good water quality, natural (unaltered) flow conditions, and an intact wooded riparian zone. Occupies shallow (30-45 cm) slow-flowing runs and pools underlain by fractured bedrock and scattered patches of fine gravel.

Species Recovery Plan and 5-year review (available at: https://ecos.fws.gov/docs/tess/species_nonpublish/3204.pdf)

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management         
- Resource and Habitat Protection     

Needs

Survey: Continue to conduct fish inventories (at approximate 5-year intervals) in the Little South Fork to monitor the status and distribution of the species within the system

Survey: Targeted surveys in Rock Creek, lower Big South Fork Cumberland River, and Marrowbone Creek to determine the species' status in these watersheds

Research: Continue research on population genetics

Research: Determine habitat preferences of larvae and juveniles

Management: Consult with agency partners and species experts to determine what biological or ecological studies are needed to better understand the species' life history and sensitivity to threats.

Management: Work with federal and other state partners on conservation and management actions identified in the

Range Map

Current
Historic Only

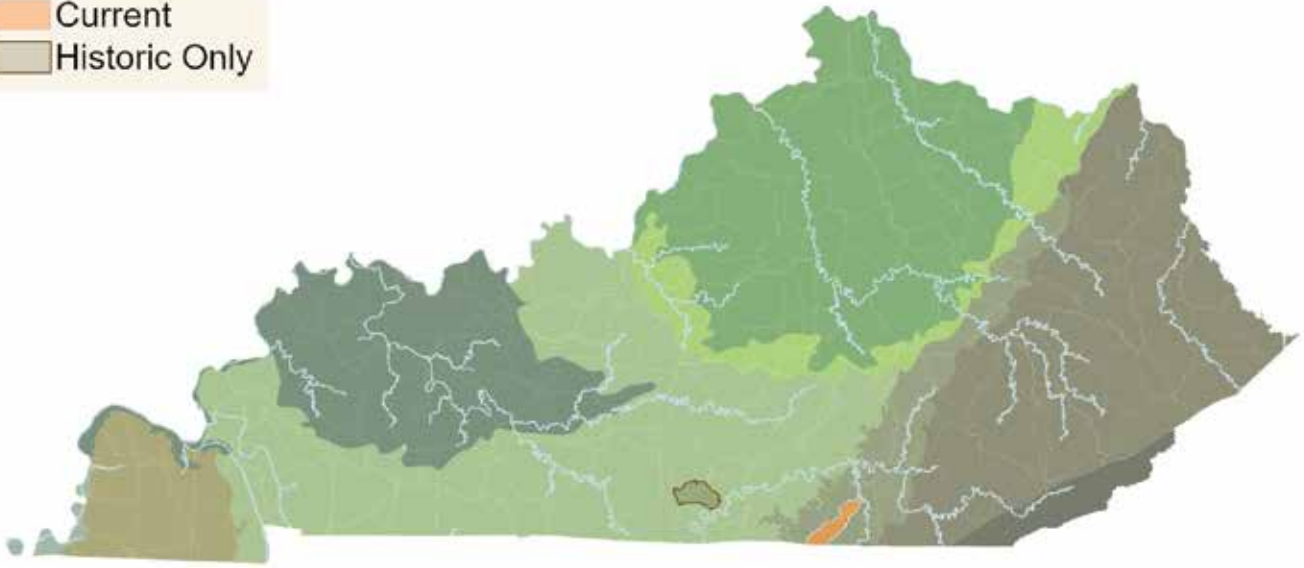


Photo: Matt Thomas



GHOST SHINER

(*Notropis buchanani*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4S5

Federal Status: N/A

IUCN Red List: LC - Least concern

The Ghost Shiner is considered an occasional species in big rivers and their major tributaries throughout Kentucky, though there has been a reduction of records post-1986. Lack of data on this species in Kentucky likely reflects a lack of sampling effort targeting small, benthic fishes in large river habitats.

Conservation Goal

Determine the current distribution and status of the species through additional surveys in the Licking, Kentucky, Salt, Cumberland, and Green River drainages. Obtain information on life history and threat sensitivity.








Habitat Associations

Current Watersheds: Licking, Little Sandy, Little Scioto-Tygart, Lower Green, Lower Kentucky, Lower Ohio-Little Pigeon, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Rolling Fork, Rough, Silver-Little Kentucky, South Fork Cumberland, Upper Green

Stream Type: Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Inhabits main channels of medium to large streams, rivers, and large rivers statewide. In large rivers, occupies moderately turbid, sluggish waters over

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

Unknown

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations

Survey: Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Eliminate or reduce barriers to fish passage

mixed sand, silt, and mud. In smaller rivers and streams, occupies moderately clear water in pools below riffles over mixed gravel, cobble, and broken bedrock substrates.

Range Map

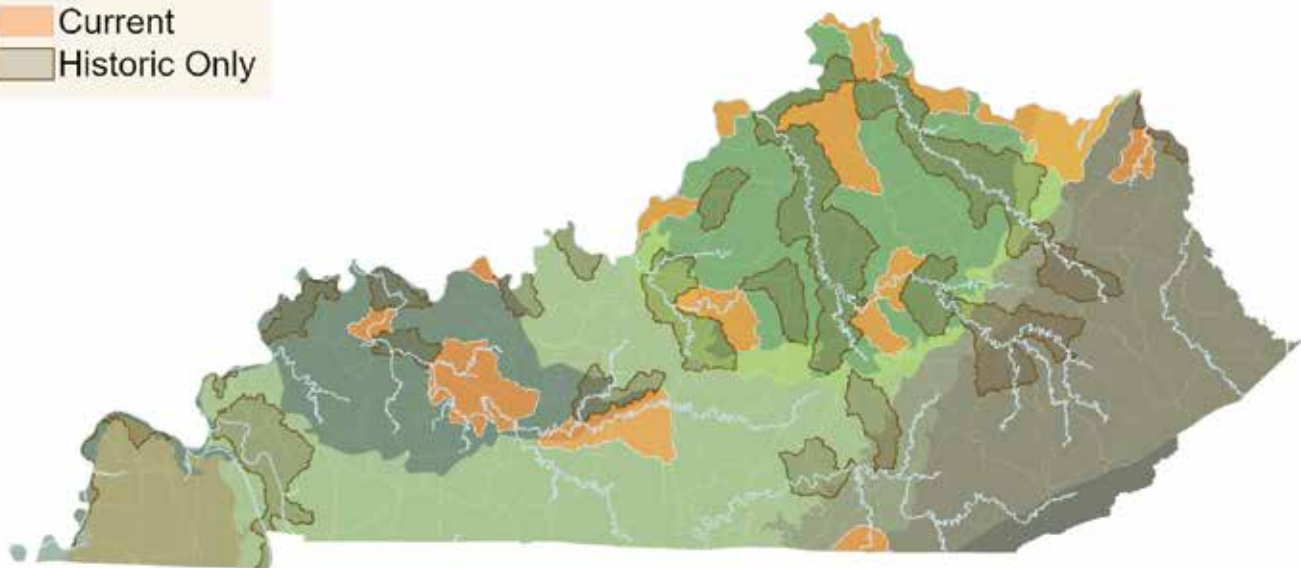


Photo: Matt Thomas



BIGMOUTH SHINER

(*Notropis dorsalis*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor the population in Mayfield Creek and survey additional locations in the Mississippi River and other direct tributaries bordering western Kentucky for new occurrences. Obtain information on life history and dispersal in Mayfield Creek.





Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Lower Mississippi-Memphis

Stream Type: Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

Southern periphery of range in the Coastal Plain of western Kentucky. Inhabits lowland streams and small rivers in shallow pools and runs with slow current over sand and gravel substrates.

Threats

-  Agriculture and Aquaculture
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Compliance and Enforcement 
- Conservation Payments 
- Education and Awareness 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Land/Water Management 
- Resource and Habitat Protection 

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys in other Coastal Plain tributaries of the Mississippi and Ohio Rivers in western Kentucky to determine the species' current distributional status and population densities

Survey: Targeted surveys in the Mayfield Creek drainage to determine distributional limits and population density within the system

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Range Map

Current

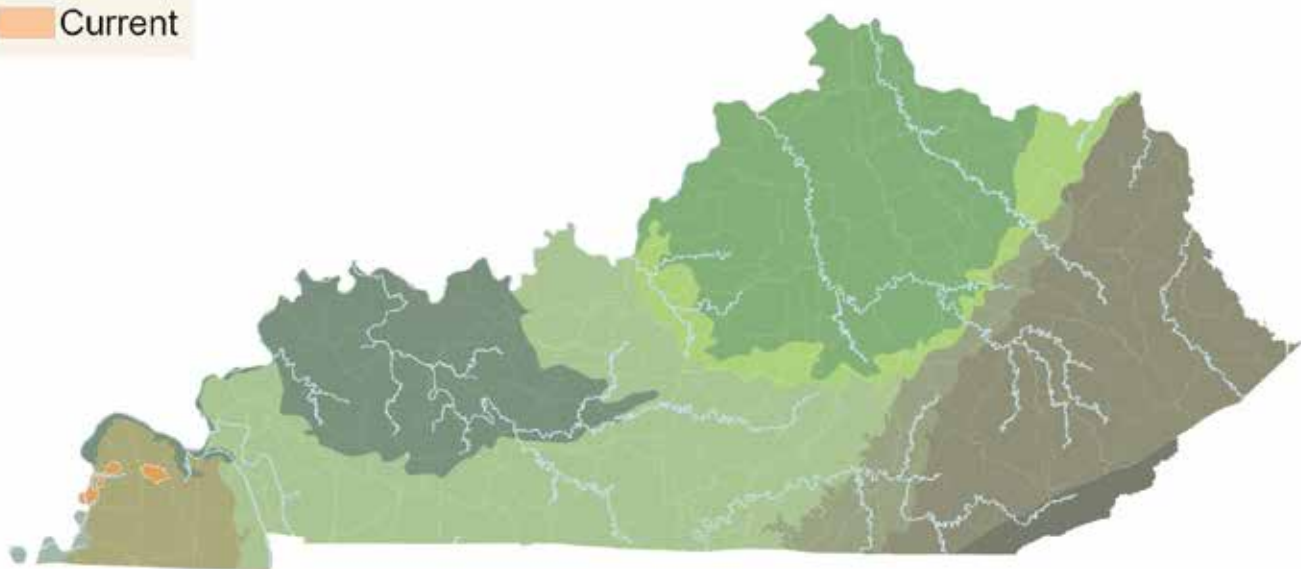


Photo: Brian Zimmerman, Ohio State University



SPOTTAIL SHINER

(*Notropis hudsonius*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

The Spottail Shiner may be native to the Ohio River drainage, but the origin of recent records there are uncertain. Its recent and expanding presence in the Ohio River could be the result of introductions due to its widespread use as a baitfish. The single historic record at the Ohio-Mississippi River confluence, the southernmost tip of the species' range in the Mississippi River basin, is considered native.

Conservation Goal

Determine the current distribution and status of the species through additional surveys in the Mississippi and Ohio rivers. Collect DNA samples to assess interrelationships with populations in different parts of the species' range. Determine if specimens from the Ohio River are native or introduced.









Habitat Associations

Current Watersheds: Little Scioto-Tygarts, Ohio
Brush-Whiteoak

Stream Type: Cool-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Southern periphery of range in far western Kentucky with uncertain status in the Ohio River. Restricted to large river habitat including shoreline areas over firm sand and gravel substrates. Generally avoids swift current.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Invasive and Other Problematic Species and Genes
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

Unknown

Needs

Survey: Targeted surveys in the Ohio and Mississippi River at historic and recent localities

Research: Population genetics research

Management: Adjust live bait regulations to ban the sale or use of bait originating from outside of Kentucky waters

Range Map

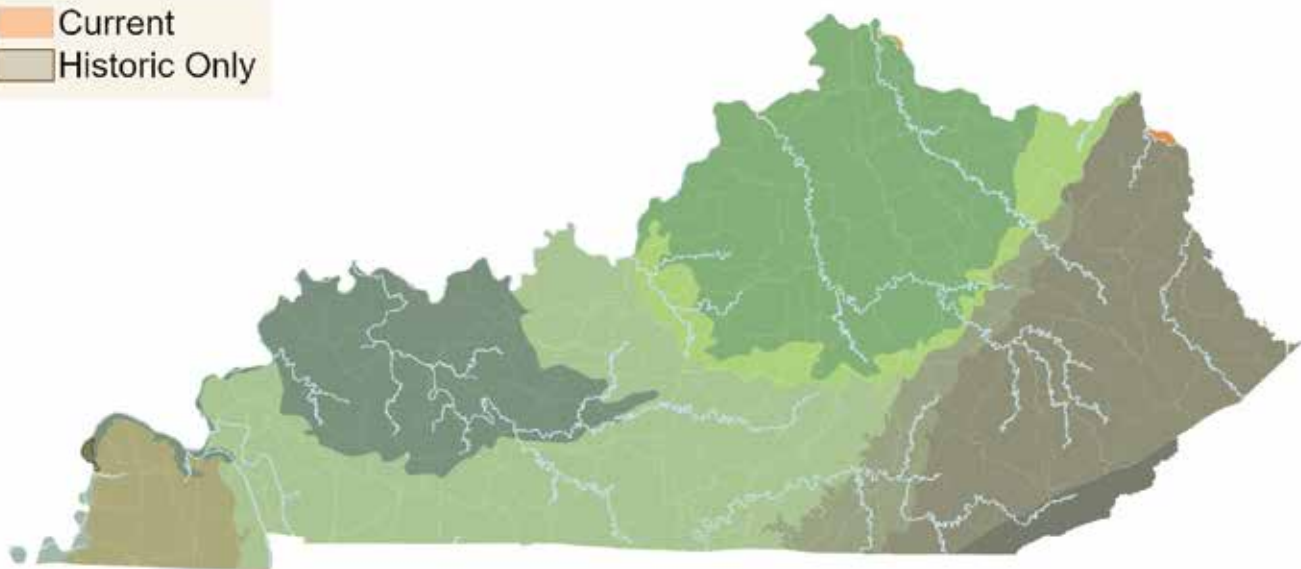


Photo: Matt Thomas



TAILLIGHT SHINER

(*Notropis maculatus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S2S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor existing populations and survey undersampled locations in the Jackson Purchase area of western Kentucky for new occurrences. Identify and protect areas supporting the most robust populations. Obtain information on life history and threat sensitivity.






Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Obion

Guilds: Open Wetland, Lake/Pond, River/Streams

Northern periphery of range in the Coastal Plain of western Kentucky. Inhabits low gradient streams, oxbow lakes, and sloughs. Occurs around cypress trees and emergent vegetation near shallow margins of floodplain lakes, oxbows, sloughs, and other open wetland habitats with soft mud and detritus substrates. Occasionally ventures into low-gradient, sluggish streams adjacent to wetlands.

Threats

-  Agriculture and Aquaculture
-  Invasive Non-native/Alien species
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments   
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration   
- Land/Water Management   
- Resource and Habitat Protection   

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations

Survey: Search for undocumented occurrences or populations within the historically occupied range in western Kentucky

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

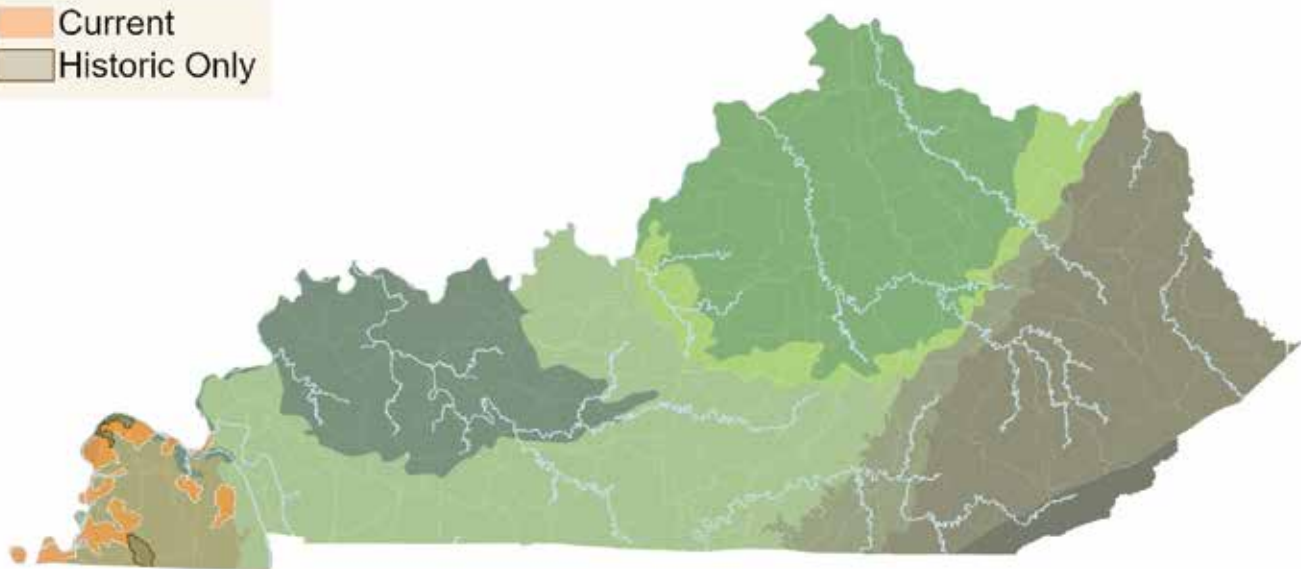
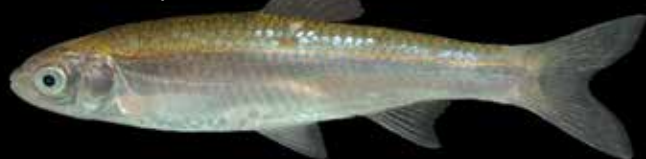


Photo: Lance Merry and Robert Hrabik, copyright Missouri Department of Conservation



SILVERBAND SHINER

(*Notropis shumardi*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4S5

Federal Status: N/A

IUCN Red List: LC - Least concern

The paucity of records for the Silverband Shiner may indicate it is undersampled, as is the case with some other big river fishes. It has been considered occasional and common in the main channels of the lower Ohio and Mississippi rivers, but more sampling in these large rivers using methods targeting small benthic fishes is needed.

Conservation Goal

Determine the current distribution and status of the species through additional surveys in the lower Green River and Four Rivers region of western Kentucky. Obtain information on life history and threat sensitivity.

Habitat Associations

Current Watersheds: Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Obion

Stream Type: Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Inhabits main channels and shorelines of large, low-gradient, turbid rivers in western Kentucky. Occurs in moderate to swift current over gravel and sand substrates.

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys at historic and new locations in the lower Green and Four Rivers region of western Kentucky to determine the species' current distributional status and population densities

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Eliminate or reduce barriers to fish passage

Range Map

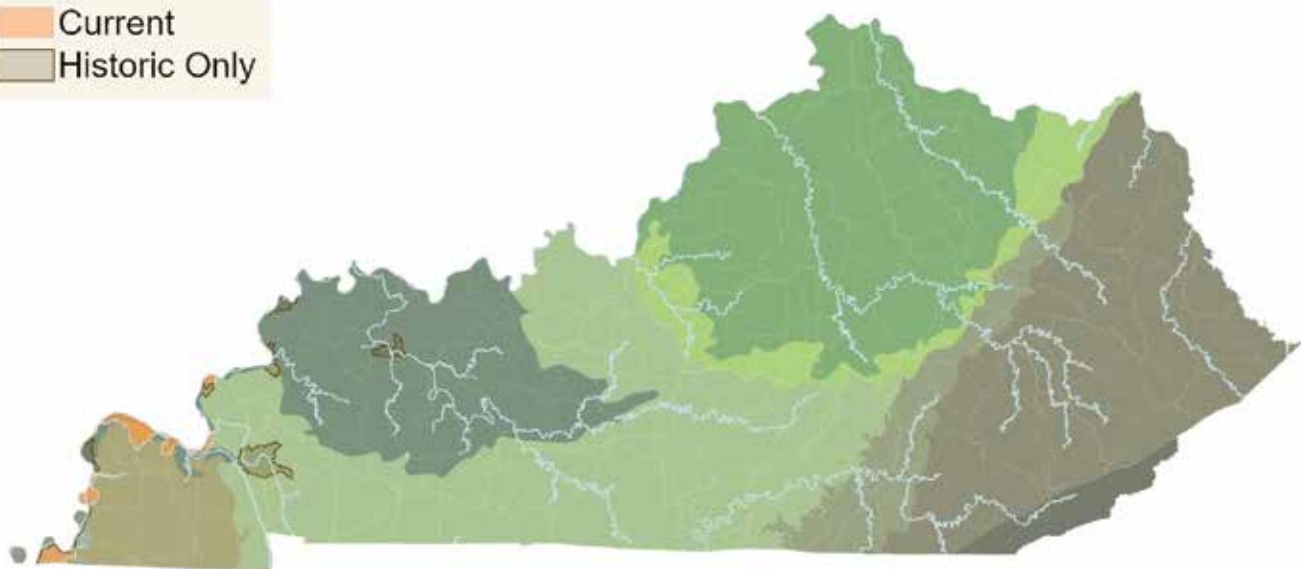


Photo: Matt Thomas



SAWFIN SHINER

(*Notropis sp. cf. spectrunculus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine if the species is present or extirpated in the Little South Fork Cumberland River through targeted surveys within the system. Monitor existing populations in Pitman Creek and Big South Fork Cumberland River. Obtain information on life history and threat sensitivity.








Habitat Associations

Current Watersheds: South Fork Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River

Inhabits clear, upland streams and small rivers. Requires good water quality, natural (unaltered) flow conditions, and an intact wooded riparian zone. Occupies pools and runs with slow current over bedrock, mixed cobble, gravel, and sand substrates. Often associated with Water Willow (*Justicia sp.*).

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management     
- Resource and Habitat Protection     

Needs

Survey: Conduct periodic monitoring (5-year intervals) of extant populations and search for new populations following established methods.

Survey: Targeted surveys in the Little South Fork Cumberland River and Rock Creek

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

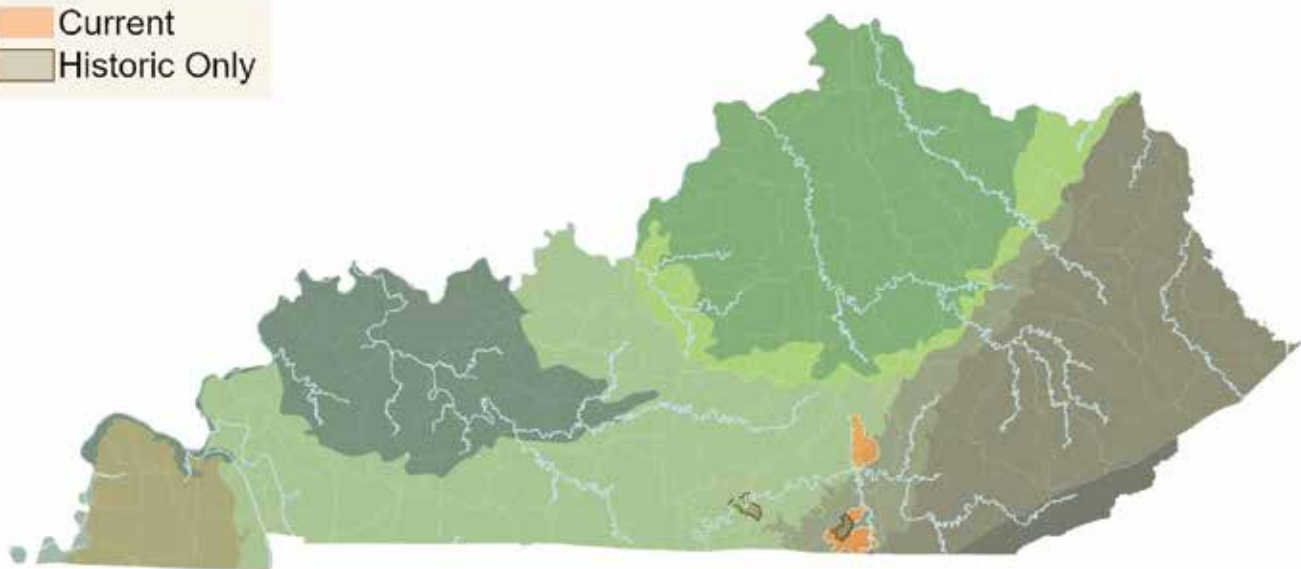


Photo: Matt Thomas



SLENDER MADTOM

(*Noturus exilis*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Refine the current distribution and status of the population in the Red River (Lower Cumberland) drainage through additional surveys within the system. Monitor the population in Donaldson Creek.






Habitat Associations

Current Watersheds: Lower Cumberland, Red, South Fork Licking

Stream Type: Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River

Inhabits clear streams to medium-size rivers in moderate to swift current. Occupies riffles and shallow, flowing pools over loose cobble and gravel substrates.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments    
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration    
- Land/Water Management    
- Resource and Habitat Protection    

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys in the Red River (lower Cumberland) drainage to assess distributional limits and population density

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

Current
Historic Only

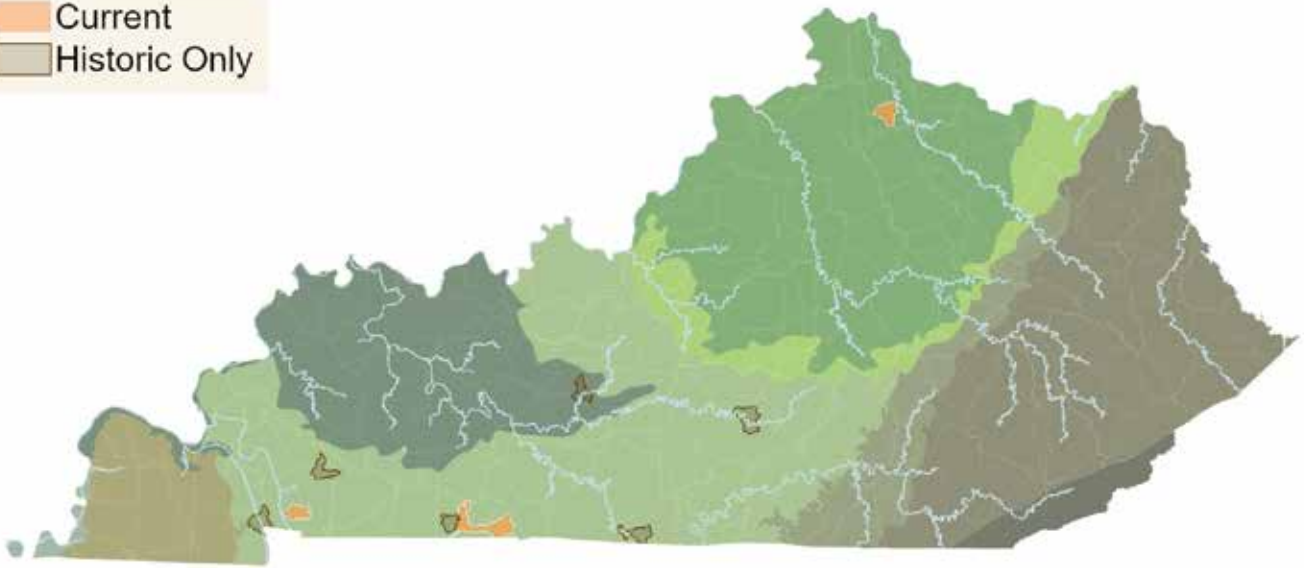


Photo: Matt Thomas



LEAST MADTOM

(*Noturus hildebrandi*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor the existing population in Terrapin Creek.
Determine sensitivity to environmental stressors.






Habitat Associations

Current Watersheds: Obion

Stream Type: Warm-Low Gradient-Stream

Northern periphery of range in the Coastal Plain of western Kentucky. Restricted to Terrapin Creek, occupying riffles and shallow pools with mixed sand and gravel substrates. Often occurs below clumps of accumulated organic debris, logs, and brush.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments    
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration    
- Land/Water Management     
- Resource and Habitat Protection    

Needs

- Survey:** Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions
- Research:** Determine sensitivity to environmental stressors

Range Map

Current

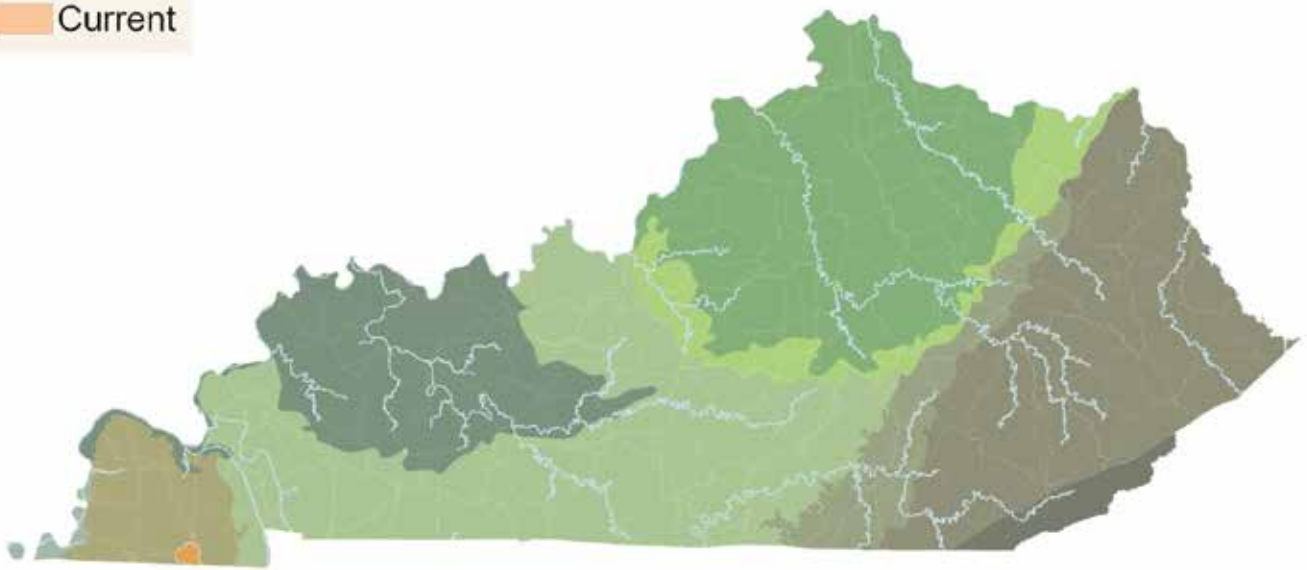


Photo: Matt Thomas



BROWN MADTOM

(*Noturus phaeus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor the existing population in Terrapin Creek and minor North Fork Obion River tributaries in Graves County. Determine sensitivity to environmental stressors.

Habitat Associations

Current Watersheds: Obion

Stream Type: Warm-Low Gradient-Stream

Northern periphery of range in the Coastal Plain of western Kentucky. Restricted to Terrapin Creek and other small, lowland tributaries of the Obion River drainage occupying riffles and runs with mixed sand and gravel substrates. Often associated with undercut banks around tree roots and accumulations of sticks logs, leaves, rocks, and other woody debris.

Threats

- Agriculture and Aquaculture
- Dams and Water Management/Use
- Pollution
- Residential and Commercial Development
- Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development
- Compliance and Enforcement
- Conservation Payments
- Education and Awareness
- External Capacity Building
- Habitat and Natural Process Restoration
- Land/Water Management
- Resource and Habitat Protection

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Research: Determine sensitivity to environmental stressors

Range Map

Current

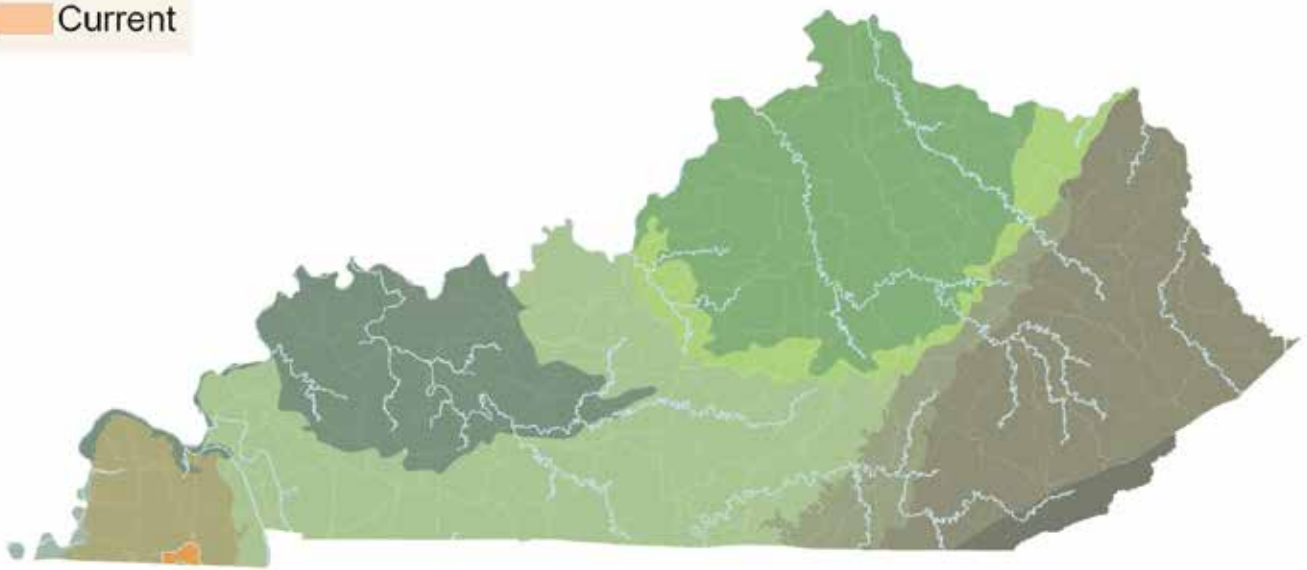


Photo: Matt Thomas



NORTHERN MADTOM

(*Noturus stigmosus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S2S3

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Determine the current distribution and status of the species through additional surveys in the Salt, upper Kentucky, and Big Sandy River drainages. Identify watersheds supporting the most robust populations and recommend measures for their protection.







Habitat Associations

Current Watersheds: Blue-Sinking, Licking, Lower Levisa, Lower Ohio, Lower Ohio-Little Pigeon, Middle Fork Kentucky, Rolling Fork, Salt, Silver-Little Kentucky, Upper Levisa

Stream Type: Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Moderately Confined-Large River

Inhabits unimpounded reaches of small to large rivers with moderate to strong current velocity over clean sand or gravel substrates. Avoids heavily silted areas. In small to medium-size rivers, usually occupies shallow riffles with mixed cobble and gravel substrates. In large rivers, occupies areas of moderate current over firm, mixed-size gravel substrates at depths of 1-5 m.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments    
- Education and Awareness    
- External Capacity Building  
- Habitat and Natural Process Restoration    
- Land/Water Management    
- Resource and Habitat Protection    

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations

Survey: Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

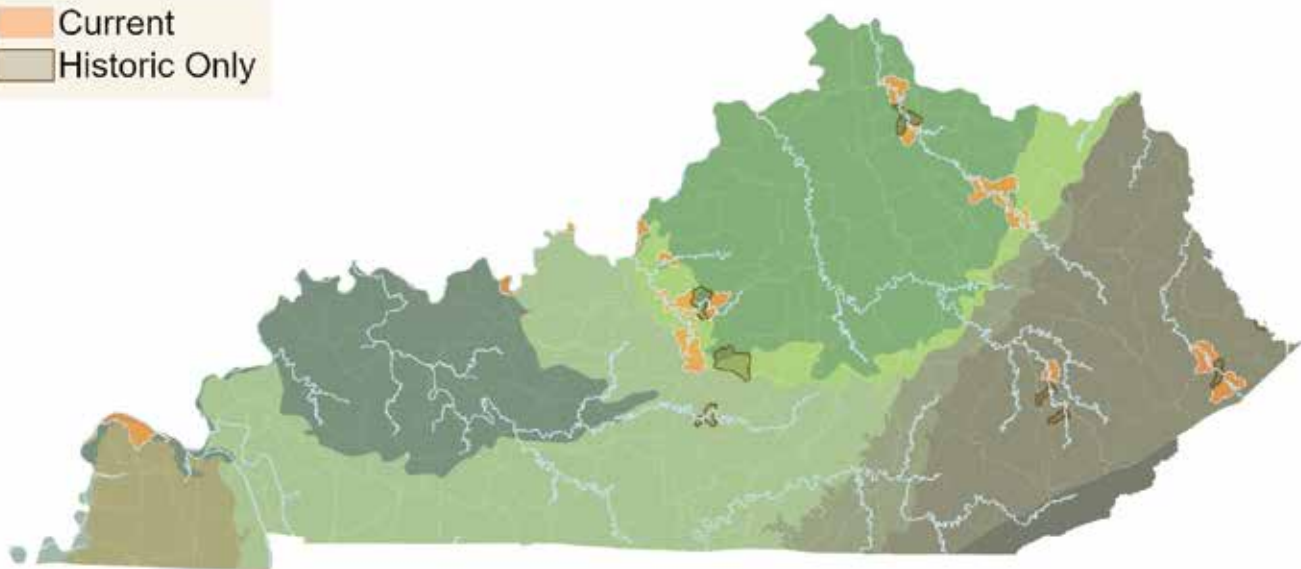


Photo: Matt Thomas



PUGNOSE MINNOW

(*Opsopoeodus emiliae*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4S5

Federal Status: N/A

IUCN Red List: LC - Least concern

The Pugnose minnow is reported to be sporadic and locally common throughout the western half of Kentucky, though there has been a reduction of records post-1986. This suggests possible declines, but more surveys are needed in lowland streams, sloughs, oxbows, and wetlands in western Kentucky.

Conservation Goal

Determine the current distribution and status of the species through additional surveys in the Coastal Plain and lower Green River drainage in western Kentucky. Obtain information on life history and threat sensitivity.






Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Obion, Pond, Rough, Tradewater, Upper Green

Guilds: Open Wetland, Lake/Pond, River/Streams

Inhabits open floodplain lakes, oxbows, sloughs, and ditches or clear, quiet pools of small to medium-size lowland streams in the western half of the state. Usually associated with submerged aquatic vegetation or other cover over a mixed gravel, sand, mud, and detritus substrate.

Threats

-  Agriculture and Aquaculture
-  Energy Production and Mining
-  Invasive Non-native/Alien species
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

Unknown

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Prevent habitat loss and water quality degradation

Management: Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems

Management: Protect riparian corridor habitat and maintain good water quality

Management: Restore stream and wetland habitat and improve water quality

Range Map

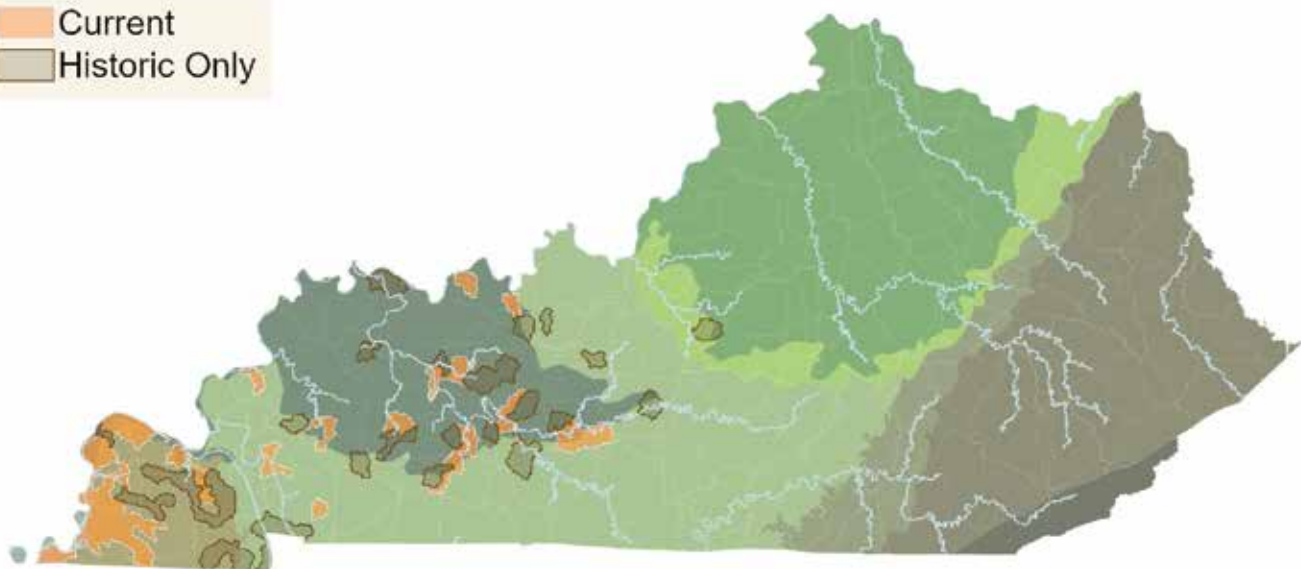


Photo: Matt Thomas



LONGHEAD DARTER

(*Percina macrocephala*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: DD - Data deficient

Conservation Goal

Monitor existing populations in the Green and Barren River drainages and in Kinniconick Creek. Determine if the species is present or extirpated in Wolf Creek (Big Sandy River drainage) and Little South Fork Cumberland River through additional surveys in those systems. Obtain information on life history and threat sensitivity.








Habitat Associations

Current Watersheds: Barren, Ohio Brush-Whiteoak, Upper Green

Stream Type: Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River

Inhabits clear upland streams and small to medium rivers. Requires intact wooded riparian zones and watersheds that are largely forested. Occupies pools in slow to moderate flow with boulder and cobble substrates and often large woody debris. Also occurs in areas above and below deep, fast-flowing riffles over cobble substrates.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments 
- Education and Awareness 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Land/Water Management 
- Resource and Habitat Protection 

Needs

Survey: Additional survey effort is needed at historic localities in the Big Sandy, upper Kentucky, and South Fork Cumberland drainages

Survey: Details of the species' reproductive biology and sensitivity to environmental stressors

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations and work to ensure they are protected

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

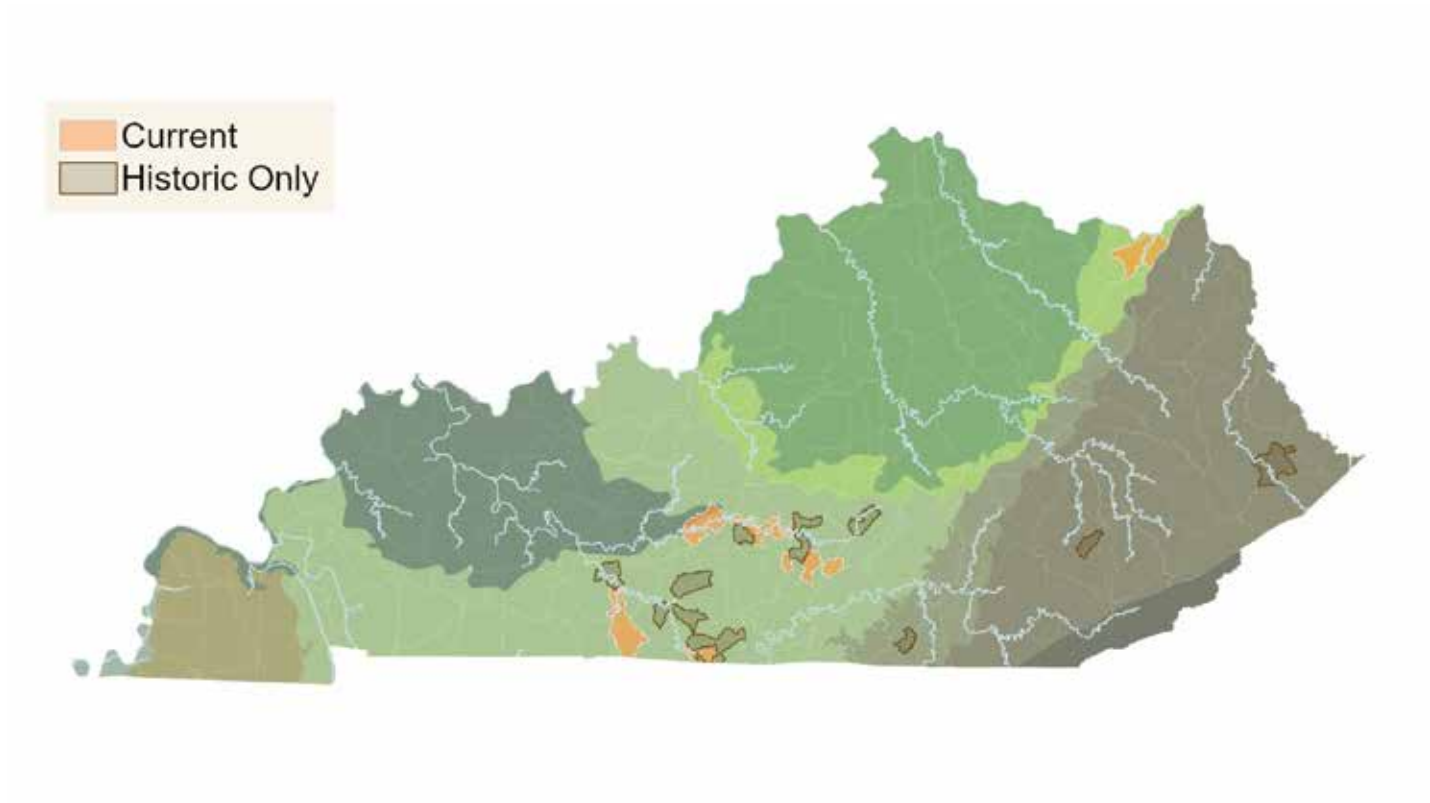


Photo: Matt Thomas



OLIVE DARTER

(*Percina squamata*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Refine the current distribution and status of the species in Kentucky through additional surveys in the Rockcastle River and Big South Fork Cumberland River. Obtain information on life history and threat sensitivity.









Habitat Associations

Current Watersheds: Rockcastle, South Fork Cumberland

Stream Type: Cool-High Gradient-Small River, Cool-Confined-Medium River

Inhabits upland small to medium rivers with intact wooded riparian zones and watersheds that are largely forested. Found in main channels and deep, cobble and boulder-strewn riffles.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Compliance and Enforcement 
- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management     
- Resource and Habitat Protection     

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations and work to ensure they are protected

Survey: Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

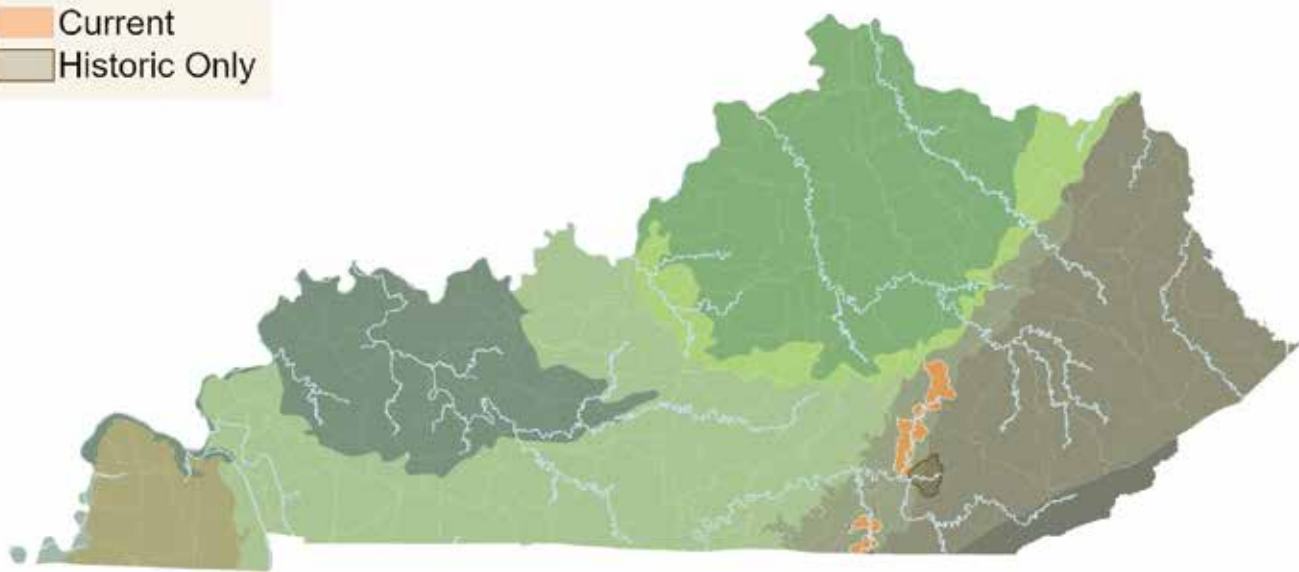


Photo: Matt Thomas



TROUT-PERCH

(*Percopsis omiscomaycus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Complete an assessment of the species' current distribution and status through additional surveys of historic and new localities in northeastern Kentucky. Obtain information on life history and threat sensitivity. Identify areas supporting the most robust populations and recommend measures for their protection.







Habitat Associations

Current Watersheds: Little Sandy, Little Scioto-Tygarts, Lower Levisa, Ohio Brush-Whiteoak

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River

Southern periphery of range in northeastern Kentucky. Inhabits upland streams in deeper areas of clear pools having instream cover and substrates of sand and fine gravel. Moves from pools into shallow runs at night. Occasionally occurs in rivers and rarely in reservoirs.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management     
- Resource and Habitat Protection     

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Identify watersheds containing the most robust populations

Survey: Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

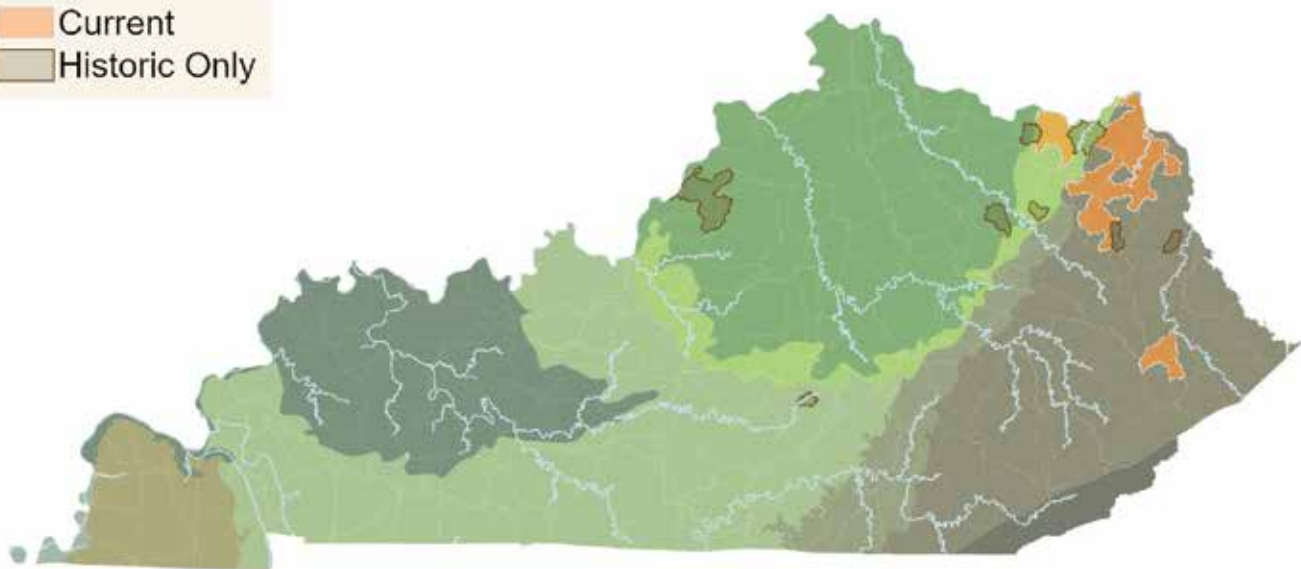


Photo: Matt Thomas



STARGAZING MINNOW

(*Phenacobius uranops*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor the existing population in the upper Green River drainage. Obtain information on life history and threat sensitivity.








Habitat Associations

Current Watersheds: Barren, Upper Green

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River

Inhabits clear, moderate to high-gradient streams and small to medium rivers. Requires good water quality, natural (unaltered) flow conditions, and gravel-dominated substrates free of silt. Occupies riffles and runs at depths of 15-50 cm. Juveniles often occur near beds of Water Willow (*Justicia* sp.) or in the margins of flowing pools.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Logging and Wood Harvesting
-  Pollution
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development 
- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Habitat and Natural Process Restoration     
- Land/Water Management     
- Resource and Habitat Protection     

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Targeted surveys in the Barren River at historic localities and additional locations having suitable habitat

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

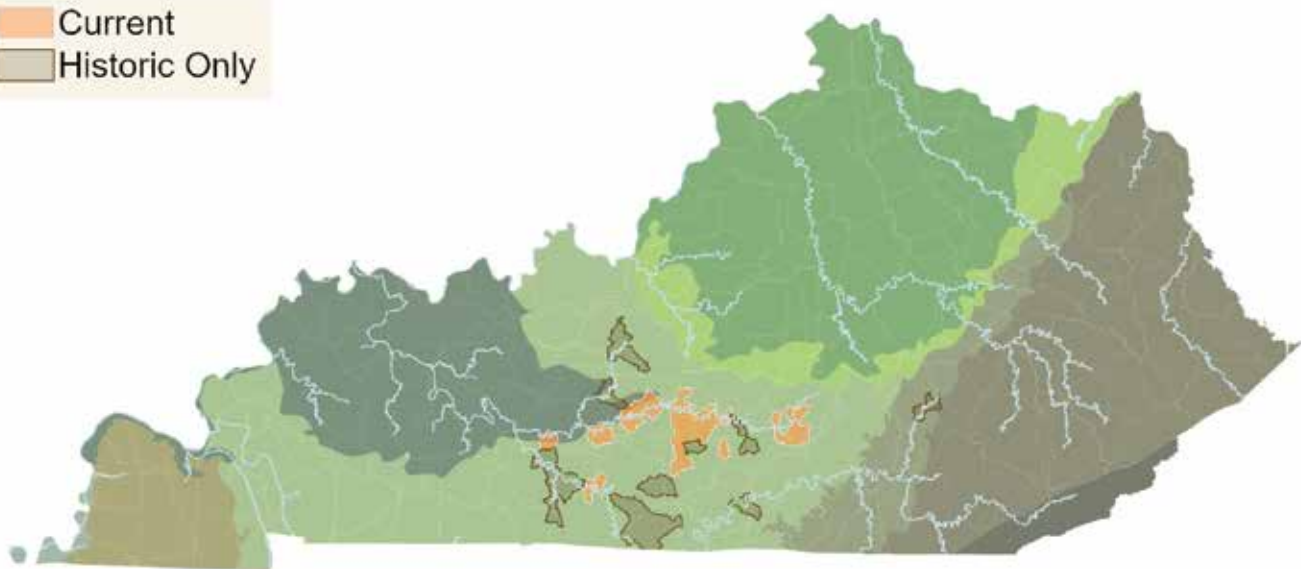


Photo: Lance Merry and Robert Hrabik, copyright Missouri Department of Conservation



FLATHEAD CHUB

(*Platygobio gracilis*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine the status of the species through additional surveys in the lower Ohio and Mississippi rivers bordering western Kentucky.





Habitat Associations

Current Watersheds: Unknown

Stream Type: Warm-Unconfined-Large River

Eastern periphery of range in far western Kentucky. Inhabits large, turbid rivers in moderate to strong current over firm gravel, sand, or silt substrates. Juveniles occupy silty backwaters or areas of slow current.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Pollution
-  Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration  
- Land/Water Management  
- Resource and Habitat Protection  

Needs

Survey: Targeted surveys at historic localities in the lower Ohio and Mississippi Rivers bordering western Kentucky to assess the species' current status as part of Kentucky's ichthyofauna

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Range Map

Historic Only

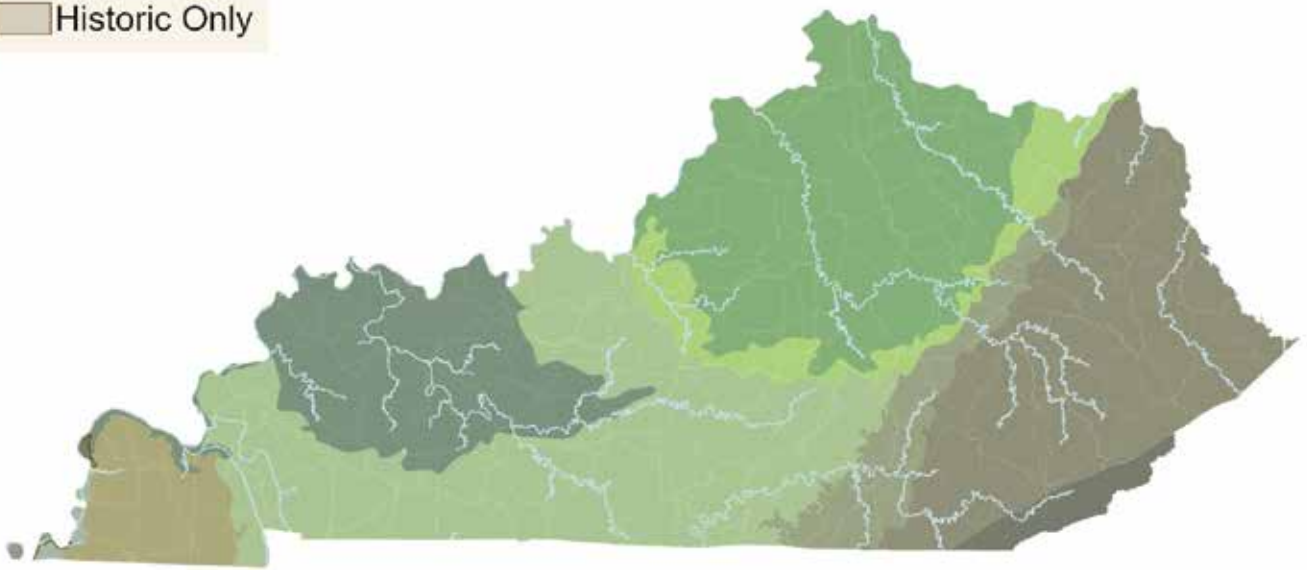


Photo: Matt Thomas



PADDLEFISH

(*Polyodon spathula*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4

S Rank: S4

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Continue sampling as part of the cooperative program coordinated by the Ohio River Fisheries Management Team and the Mississippi Interstate Cooperative Resource Association (MICRA). Assess exploitation rates from commercial and recreational fisheries. Assess population trends and adjust regulations based on data collected on population sizes, age structure, growth, and harvest rates.

Habitat Associations

Current Watersheds: Blue-Sinking, Kentucky Lake, Licking, Little Sandy, Lower Cumberland, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Salt, Silver-Little Kentucky, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River, Other

Typically inhabits large rivers with oxbows and backwaters, but also found in backwaters and embayments of artificial reservoirs. Requires calm or slow-moving waters rich with zooplankton. Must have access to gravel bars subject to sustained flooding during spring months for spawning.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Fishing and Harvesting Aquatic Resources
-  Invasive Non-native/Alien species
-  Pollution
-  Residential and Commercial Development
-  Shipping Lanes

Conservation Actions

- Alliance and Partnership Development    
- Compliance and Enforcement 
- Conservation Payments    
- Education and Awareness    
- External Capacity Building 
- Habitat and Natural Process Restoration     
- Land/Water Management    
- Policies and Regulations 
- Resource and Habitat Protection    

Needs

Survey: Population monitoring in the Ohio River basin in cooperation with the Ohio River Fisheries Management Team and the Mississippi Interstate Cooperative Resource Association (MICRA)

Research: Assess potential for entrainment losses associated with commercial navigation

Research: Assessment of exploitation rates from commercial and recreational fisheries

Management: Maintain commitment to the Joint Strategic Plan for Management of Mississippi River Basin Fisheries (available at: http://micrarivers.org/wp-content/uploads/2021/07/MRB-Joint-Strategic-Plan-2_2021.pdf)

Range Map

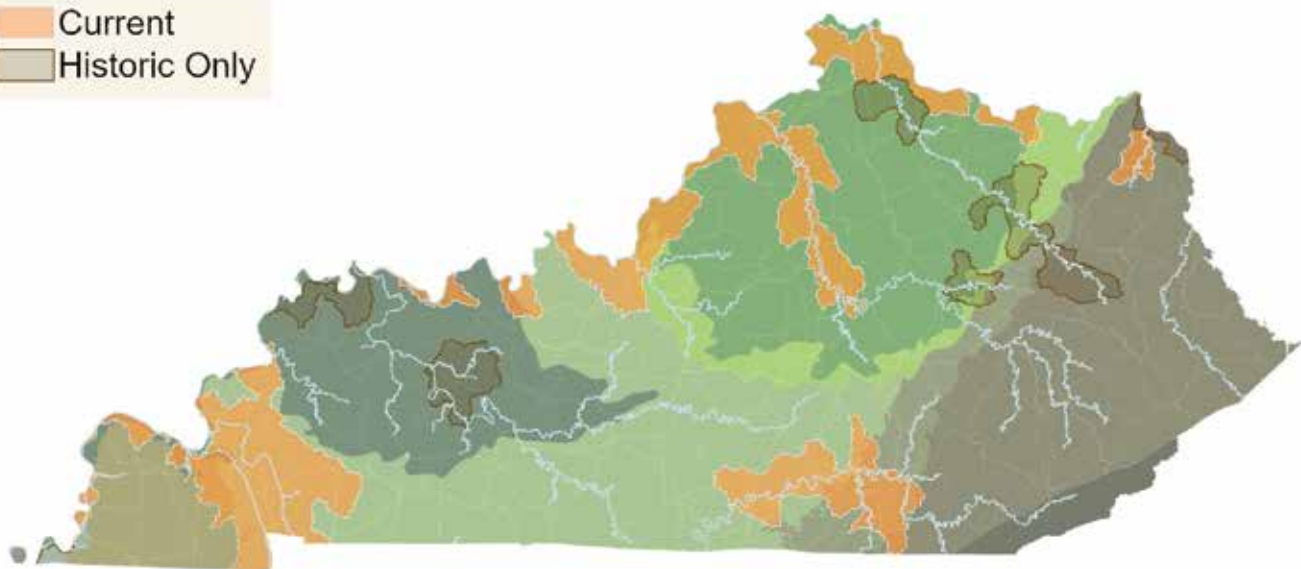


Photo: Lance Merry and Robert Hrabik, copyright Missouri Department of Conservation



PALLID STURGEON

(*Scaphirhynchus albus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G2

S Rank: S1

Federal Status: Endangered

IUCN Red List: EN - Endangered

Conservation Goal

Implement actions necessary for species recovery and delisting in cooperation with state and federal partners as prescribed in the Recovery Plan. Determine if the species is present in the lower Ohio River through additional surveys and genetic testing of individuals captured between Smithland Lock and Dam and the Mississippi River confluence.

Habitat Associations

Current Watersheds: Lower Mississippi-Memphis

Stream Type: Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Eastern periphery of range in far western Kentucky. Requires large river habitat that has a diversity of depths and current velocities formed by braided channels, sand bars, sand flats, and gravel bars. Typically occupies turbid, main river channels in areas of strong current over firm sand substrates, including along sand bars and behind wing dikes with deeply scoured trenches.

content/uploads/2021/07/MRB-Joint-Strategic-Plan-2_2021.pdf)

Management: Work with federal and other state partners with implementation of actions necessary for species recovery and delisting, as described in the Recovery Plan (available at: <https://ecos.fws.gov/ecp/species/7162>)

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Energy Production and Mining
-  Fishing and Harvesting Aquatic Resources
-  Invasive Non-native/Alien species
-  Pollution
-  Problematic Native Species
-  Residential and Commercial Development
-  Shipping Lanes

Conservation Actions

- Alliance and Partnership Development     
- Compliance and Enforcement 
- Conservation Payments    
- Education and Awareness    
- External Capacity Building 
- Habitat and Natural Process Restoration    
- Land/Water Management    
- Resource and Habitat Protection    

Needs

Survey: Collect baseline species information

Survey: Investigate potential presence of Pallid Sturgeon in the Lower Ohio River

Research: Assess potential for entrainment losses associated with commercial navigation

Research: Life-history research

Research: Population genetics research

Research: Research to evaluate genetic differences across the species' range

Management: Maintain commitment to the Joint Strategic Plan for Management of Mississippi River Basin Fisheries (available at: <http://micrarivers.org/wp->

Range Map

Current

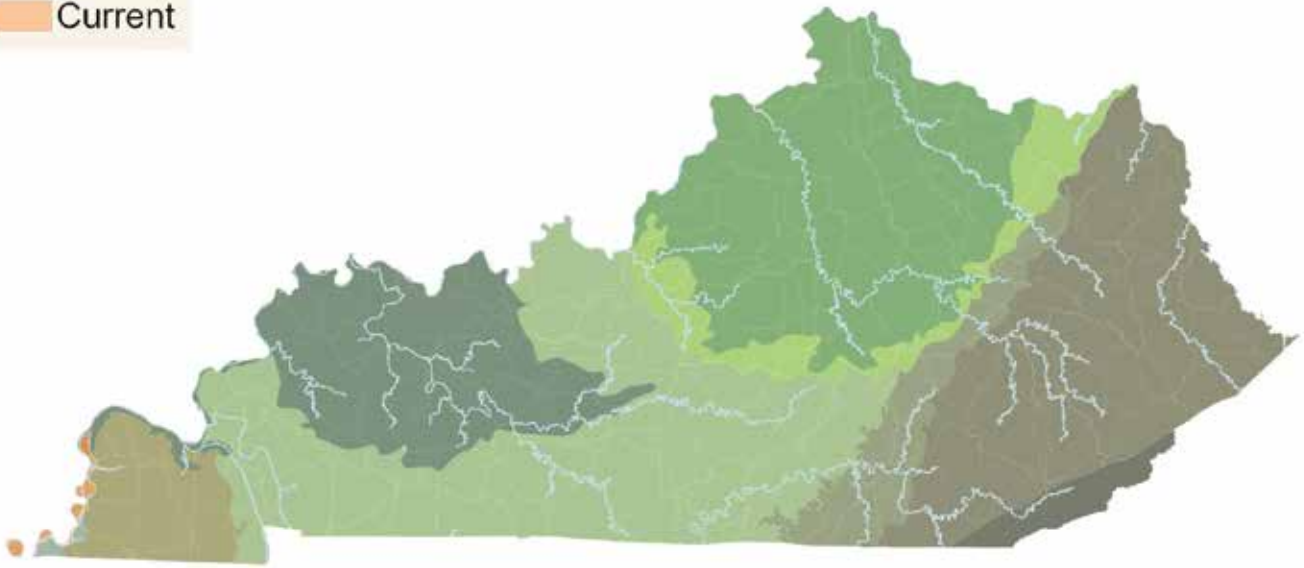


Photo: Matt Thomas



BLACKFIN SUCKER

(*Thoburnia atripinnis*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G3

S Rank: S2

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Monitor existing populations and survey undersampled locations in the Barren River drainage for new occurrences. Determine population genetics.







Habitat Associations

Current Watersheds: Barren

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River

Endemic to the Barren River drainage. Inhabits clear, upland streams to small rivers. Occupies pools and bases of riffles over creviced bedrock and gravel substrates. Juveniles occur in pool margins with undercut banks.

Threats

-  Agriculture and Aquaculture
-  Dams and Water Management/Use
-  Invasive and Other Problematic Species and Genes
-  Logging and Wood Harvesting
-  Residential and Commercial Development
-  Transportation and Service Corridors

Conservation Actions

- Conservation Payments     
- Education and Awareness     
- External Capacity Building  
- Invasive/Problematic Species Control 
- Land/Water Management     
- Resource and Habitat Protection     

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Survey: Search for undocumented occurrences or populations within the historically occupied range in the Barren River drainage

Research: Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Research: Population genetics research

Range Map

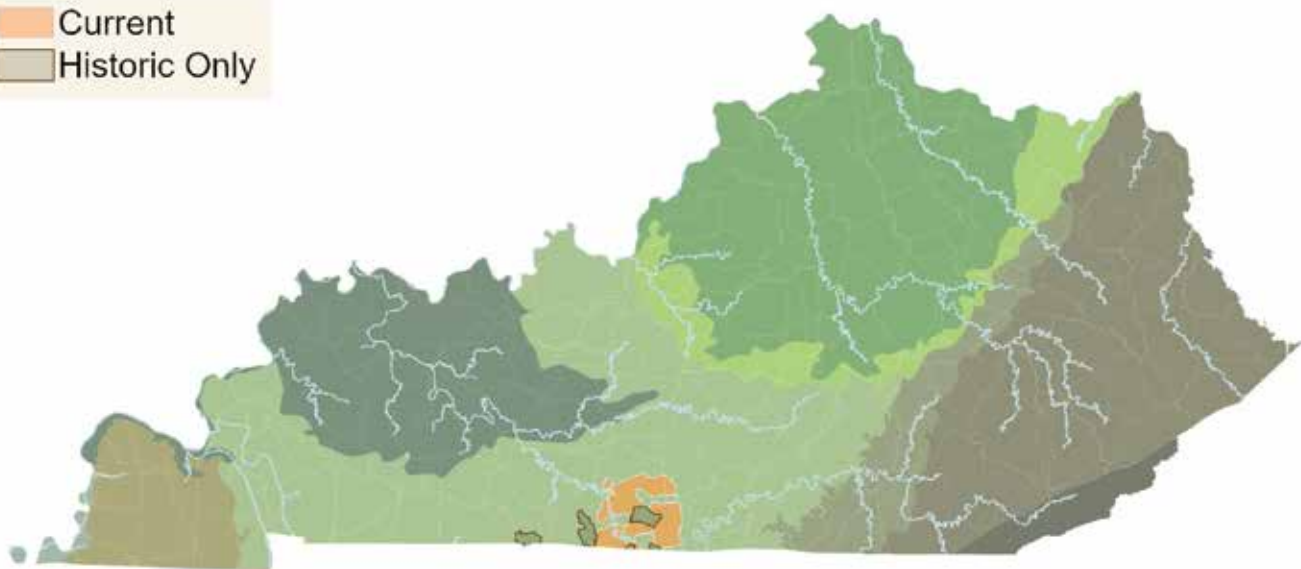


Photo: Matt Thomas



SOUTHERN CAVEFISH

(*Typhlichthys subterraneus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2S3

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Complete additional surveys to determine the distributional boundaries of the undescribed species in Pulaski County and delineate recharge zones of occupied localities. Eliminate or reduce groundwater contamination at Friendship Cave in Warren County. Clean up the cave entrance and improve habitat at L&N Railroad Cave in Barren County.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Interior Plateau

Guilds: Cave/Karst

Restricted to subterranean aquatic habitats in large pools with mixed gravel, sand and silt (mud) substrates. Typically inhabits major stream passages or smaller infeeder streams with little current near

Threats

- Dams and Water Management/Use
- Fishing and Harvesting Aquatic Resources
- Mining and Quarrying
- Pollution
- Recreational Activities
- Residential and Commercial Development
- Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development
- Compliance and Enforcement
- Conservation Payments
- Education and Awareness
- External Capacity Building
- Land/Water Management
- Land/Water Protection
- Site/Area Protection

Needs

Survey: Additional surveys to circumscribe the distributional limits of the undescribed species in Pulaski County and document additional occurrences

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

Research: Assess impacts of hydrological manipulations and increased siltation on cavefish populations

Research: Delineate the recharge zones of known localities of the undescribed species in Pulaski County

Research: Evaluate use of environmental DNA for identifying occupancy and distribution

Management: Determine the point source of groundwater contamination at Friendship Cave in Warren County and initiate a chemical cleanup of the cave

breakdown and other rock piles, which offer protection from increased water flow and safety when alarmed.

Management: Remove delapidated pump house and other debris at the entrance of L & N Railroad Cave in Barren County to improve cave habitat

Range Map

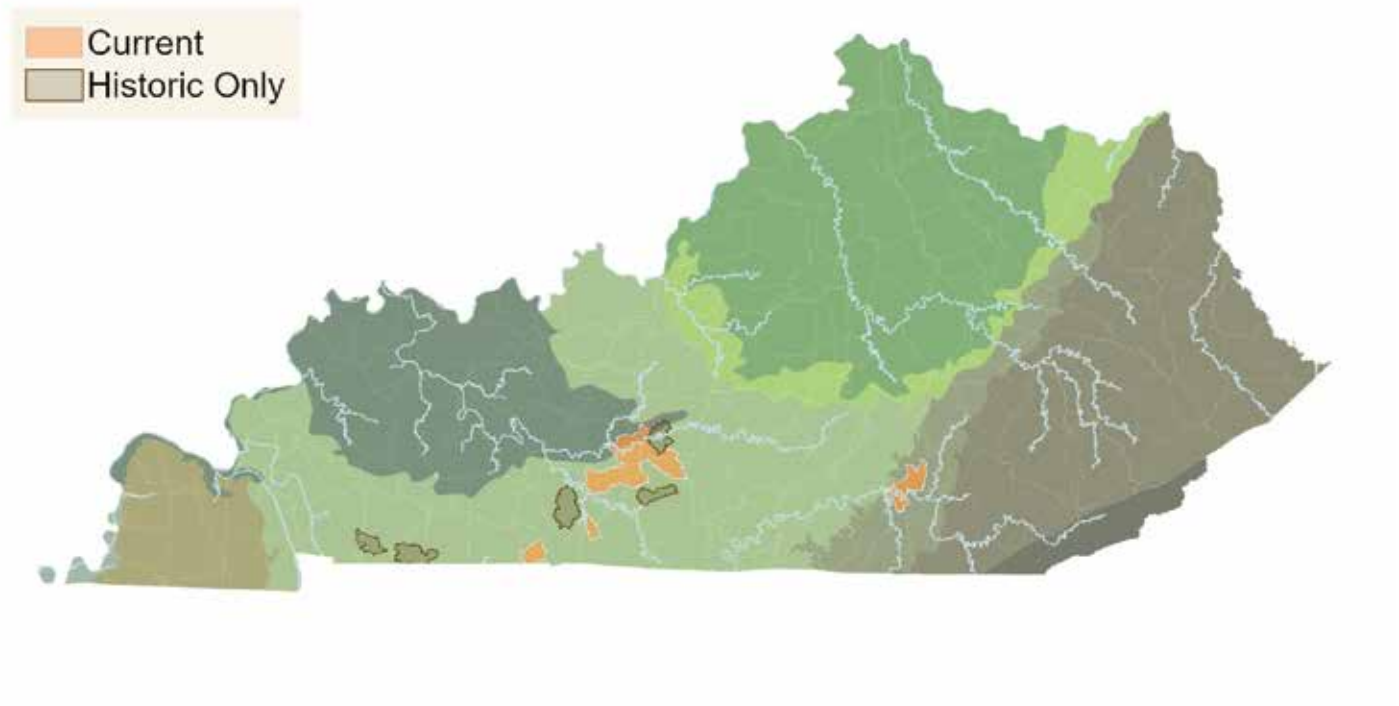


Photo: Matt Thomas



CENTRAL MUDMINNOW

(*Umbra limi*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S2S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor existing populations and survey undersampled locations in the Jackson Purchase area of western Kentucky for new occurrences. Obtain information on life history and threat sensitivity. Identify areas supporting the most robust populations and recommend measures for their protection.





Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Kentucky Lake, Lower Tennessee, Obion

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams

Southern periphery of range in the Coastal Plain of western Kentucky. Occupies spring-fed wetlands, ditches, and shallow margins of lowland lakes. Associated with dense beds of submergent aquatic plants and organic debris. Individuals occasionally venture into small streams.

Threats

-  Agriculture and Aquaculture
-  Climate Change and Severe Weather
-  Invasive and Other Problematic Species and Genes
-  Residential and Commercial Development

Conservation Actions

- Conservation Payments   
- Education and Awareness   
- External Capacity Building 
- Habitat and Natural Process Restoration   
- Invasive/Problematic Species Control 
- Land/Water Management   
- Resource and Habitat Protection  

Needs

Survey: Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions

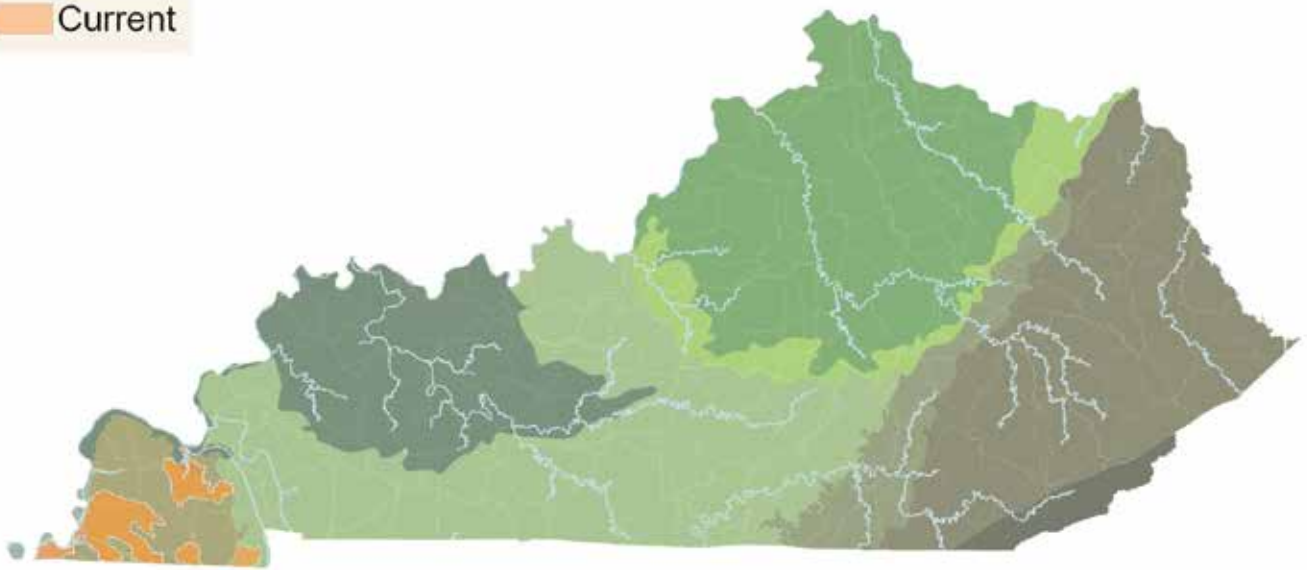
Survey: Identify watersheds containing the most robust populations

Survey: Survey additional locations in the Jackson Purchase area of western Kentucky having suitable habitat that could reveal previously undetected occurrences

Research: Details of the species' life history, habitat requirements, and threat sensitivity

Range Map

Current



FRESHWATER MUSSELS AND SNAILS

Introduction

Freshwater mussels are the most at-risk group of animals in North America. Of the 298 native mussel species in the United States, 95 are considered endangered (77) or threatened (18), representing 32% of all species. Twenty-one mussels are endangered and/or presumed to be extinct. Seventy species were considered to have stable populations around 30 years ago, although information is lacking for many of these species. Many species are considered extinct. Mussel and their host fish populations are projected to decline if habitats are not restored, and individual species' numbers are not increased.

The extinction and decline of mussels can be attributed to biological and ecological requirements that make some species more vulnerable to human-caused effects. Modern day threats to mussels include habitat destruction from a variety of factors, including sedimentation from agricultural land, logging and mining operations, construction projects, stream channelization and dredging, toxic spills (oil, gas, industrial acids, pesticides, fertilizers) and resulting fish kills, and invasion from exotic species. With the low numbers of mussels and continuing population declines, protecting each stage in the life cycle of the mussel becomes critical. Life history stages include the production of larvae, host fish attachment and development, and juvenile/adult survival. Suitable hosts must be present in adequate numbers. Sufficient habitat must also be present for grow-out of juveniles to the adult stage. Good water quality and habitat is critical to all stages of development, especially so for the larval and juvenile stage.

Kentucky has one of the most diverse mussel populations in North America with 43 genera and 105 recognized species. Twelve mussels are presumed extinct, and 29 species are listed by the U.S. Fish and Wildlife Service as endangered or threatened (at least 8 of the 29 are currently considered extirpated from the state). The initial Comprehensive Wildlife Conservation Strategy completed in 2005 recognized 46 native mussel species of greatest conservation need (SGCN) and did not include snails. The 46 species were all included in the 2013 Wildlife Action Plan (SWAP) revision. The list included all federally listed species protected under the Endangered Species Act (ESA), and the associated global (G) and state (S) ranks recognized by the Office of Kentucky Nature Preserves (OKNP). Since 2013, mussel surveys across the state have revealed new information on distribution and conservation status for many species, resulting in the addition of 8 species to the SGCN list in the current revision. Kentucky has identified 54 mussels (51% of 105)

that are considered species of greatest conservation need. These include 29 species listed as federally threatened or endangered. Within the 54 species of greatest conservation need, there are 26 species listed as globally rare (G1 or G2) and 35 species as rare (S1 or S2) within Kentucky. Some species were termed "data deficient", meaning that

54 mussels (51% of 105) are considered species of greatest conservation need.

there is not enough information to classify the species as SGCN or stable. However, some species have recently been renamed or split from one species into multiple species, and the new splits may have limited distribution information creating a data deficiency.

Diverse mussel and fish populations occur in many of the state's river systems. The Ohio River drainage has historically been an important area for mussel diversity, with over 80 species. Its tributaries now support some of the last few strongholds of rare and endangered mussels. The highest diversity occurs in the Green and Cumberland Rivers, both having over 70 species each. Some of the best populations of SGCN mussels, including the endangered fanshell, *Cyprogenia stegaria*, are found in the state. The remaining tributaries in Kentucky have from 32 to over 60 species depending on the location and size of the river system. It is common to find over 25-30 species and several thousand individuals at a single



Freshwater mussel assemblage. Photo: Monte McGregor

site in Kentucky. Several SGCN mussels have limited distributions in Kentucky because they are on the periphery of their range and may be cut off from other historic locations because of dams or other barriers. These include species in the Upper Cumberland River system, which only covers a small portion of Eastern Kentucky, before the river flows into Tennessee.

Freshwater gastropods or snails are an important part of the freshwater ecosystems in Kentucky's rivers, streams, lakes, and virtually any other body of water. The majority of snail species eat algae from the surfaces of rocks or debris, although some are suspension feeders. Most aquatic snails breathe with gills, but a few are air breathers. Snails can be the most encountered organism in a stream and often play an important role in the food webs in those environments. Many aquatic snails have an operculum, breathe with gills, live a few years, have separate sexes, lay eggs to produce young, and can be very sensitive to changes in water quality. Some of the other groups breathe with a modified mantle (lung) and tend to live in a wide variety of conditions. However, many are tolerant to things such as ammonia or low oxygen levels. Some species are very habitat specific, such as small springs, cave streams, lakes, or large rivers, while others can be found in virtually every type of water. Threats are similar between snails and mussels, and include dams and water management, ecosystem modifications, pollution, and invasive species, although snails seem to be more tolerant to some forms of pollution than mussels.

The Freshwater Mollusk Conservation Society in 2023 currently recognizes 729 species in 16 family groups of freshwater gastropods from North America, with 51 species considered threatened or endangered. The National Society considers snails in the United States to be the most diverse snail fauna in the world. In Kentucky, we have 76 species in 10 family groups. The most diverse group is the Pleuroceridae, with 27 species (36% of all snails). Kentucky has identified 40 snails that are considered species of greatest conservation need, but these all are considered data deficient. There are currently no listed endangered or threatened snails in Kentucky. However, new information using genetic analysis may reveal even more species than previously determined. Freshwater gastropods are poorly understood and need basic information on distribution, life history, sensitivity to pollutants, and systematic work to identify what species names are currently valid. Many snail species have limited information on distribution in Kentucky, and therefore are considered data deficient in the plan.

Distribution maps for aquatic species were made separating historic and current records. Historic records are species that were last found live or fresh dead prior to 1980. Current records include live or fresh dead animals collected after 1980. These are displayed on the maps by different color combinations that are bound within a major

watershed. For example, the littlewing pearly mussel was historically found in the entire Upper and Lower Cumberland River system (indicated by the dark, bold border around the watershed). The current distribution is shown with a solid orange color within the historic range. Specific watersheds that contain the species are indicated on the species profile sheets.

The top four threats to mollusk species in Kentucky include dams and water management, ecosystem modifications, pollution, and invasive species. Over 90% of the SGCN species are impacted by natural system modifications, which include the impacts of dams on fish movements as well as the changes in water use and management by municipalities and operators of the dams.



The Plain pocketbook mussel, *Lampsilis cardium*, with its fish-like lure extended. Photo: Monte McGregor



A Pleurocerid Snail. Photo: Monte McGregor

These changes in water management can impact the natural riffle-pool-run sequences, temperatures, and water levels throughout the year. Natural system modifications can also be contributed to habitat loss and degraded water quality from historical commercial harvest, mining, channel degradation, chemical non-point and point source

pollutants, and many other factors that have contributed to the downward spiral of mussel populations. Many of these threats occur more widespread around urban and agricultural areas where impacts to the watershed occur directly and change the natural habitat and water quality. Additional threats that have contributed to mussel declines include sedimentation from agricultural land, logging and mining operations, construction projects, stream channelization and dredging, toxic spills and resulting fish kills, and invasion from exotic species.

Preserving, protecting, and enhancing Kentucky's native species is a priority for optimizing populations of the state's species of greatest conservation need. Conservation needs for mussels and snails include research with propagation and culture, basic life history studies, status distribution surveys, monitoring, partnership development, and education and awareness. Conservation actions for both snails and mussels include education and awareness, alliance and partnership development, habitat and natural process restoration, conservation payments, along with species augmentations/reintroductions. Education and awareness are needed to help teach the public as well as organizations about these cryptic species as well as the impacts that have occurred to change their populations overall. Alliance and partnership development is a necessary action in order to work with dam operators, municipalities, industries, and other governmental agencies to help reduce the impact of threats such as dams and local development that directly or indirectly changes the habitat and water quality. Working with local governments to consider SGCN species habitat in their development plans is also an important action to consider. A large part of our existing work includes propagating and releasing stockable sized mussels back into areas where numbers are depleted. The Kentucky Department of Fish and Wildlife's Center for Mollusk Conservation has been successful in developing techniques for rearing juvenile freshwater mussels and successful in developing techniques and methods for holding juveniles and adults. There have been several endangered species successfully cultured and released and/or reintroduced throughout the state. Long-term monitoring of sites throughout the state has shown the success of such releases with detection of the stocked species at release sites.

Although increased research and surveys have helped to improve the knowledge about Kentucky's mussel fauna over the past two decades, basic biological and distributional information for many species is lacking or incomplete. Conservation needs were identified for each SGCN and broken into research, survey, and management needs. All species need updated surveys, either to fill baseline distributional data gaps or assess changes in distributions for long-term trend monitoring. Many areas throughout the state have under sampled habitats including the smallest streams and the largest rivers. Mainly these are areas that are harder to sample or gain access due

to location. These areas likely contain undocumented occurrences of SGCN mussels. Life history research is needed for many species to obtain information on host fishes, age and growth, and sensitivity to environmental stressors. Other top research priorities involve the use of modern DNA technology in classification to identify species complexes or even new species. Species needs are largely tied to conservation actions, including propagation and culture, augmentation and reintroduction, external capacity building, and actions aimed at preventing, reducing, or mitigating stressors. For species listed under the ESA, needs involve working with federal partners on implementation of Recovery Plan actions.



Mussel teams use a quantitative grid sampling technique to survey for freshwater mussels.
Photo: Monte McGregor

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Recovering the Catspaw Mussel

Freshwater mussels have been declining at an alarming rate over the last 100 years, and many species have disappeared entirely from Kentucky. The catspaw mussel, *Epioblasma obliquata*, is one of 25 species in the genus *Epioblasma* that was thought to be extinct until a few individuals were found in a small northern Ohio stream during the mid-1990's. It took several years to locate enough individuals to attempt propagation, but in 2012, Kentucky's Center for Mollusk Conservation (CMC) began culture of this species with just a handful of catspaw mussels.

In 2016, the CMC staff achieved an important breakthrough for the catspaw by successfully rearing over 1,000 individuals. This effort was accomplished using a process called in vitro culture, which is an artificial culture method that uses petri dishes in an incubator. During this process, mussels are raised without using a fish host. Larval mussels are placed in a nutrient-rich solution made with rabbit serum and grown in a temperature-controlled laboratory environment.

Juvenile catspaw mussels were transferred from the laboratory to a raceway at the Minor Clark Fish Hatchery so that they could be grown to a stockable size. In 2017, releases of one and a half year old mussels began at multiple sites in the catspaw's historic range which includes Kentucky, Tennessee, Ohio, and West Virginia.

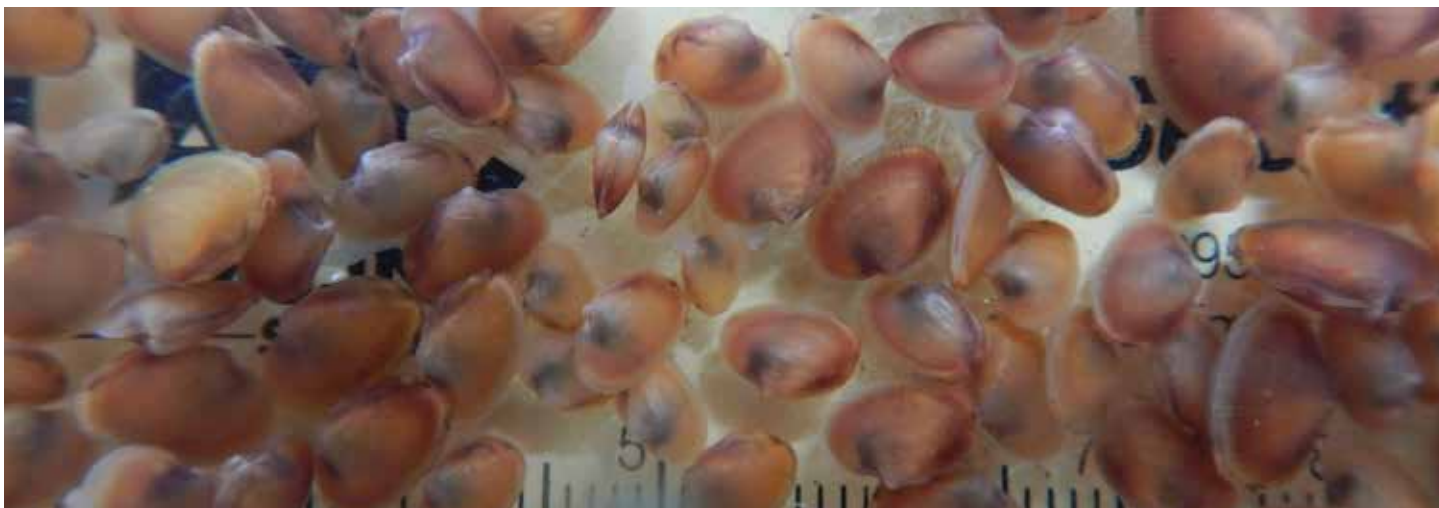
As of 2023, the CMC has released over 5,000 catspaw mussels into wild streams and staff have already observed evidence of reproduction at all five Kentucky release sites. The CMC will continue to work with this species until multiple sites are self-sustaining, in hopes of removing the catspaw mussel from the list of federally endangered species.



A catspaw mussel marked and ready for release in the Green River. Photo: KDFWR



Juvenile catspaw mussels are reared to a stockable size and then marked for release at multiple sites in their historic range. Photo: KDFWR



Tiny catspaw mussels grown using artificial culture methods at the Center for Mollusk Conservation. Photo: KDFWR

FRESHWATER MUSSELS AND SNAIL PROFILE PAGES

Photo: Monte McGregor



PHEASANTSHELL

(*Actinonaias pectorosa*)

Conservation Profile

Priority Group: High

KNP Info



G Rank: G4

S Rank: S2S3








Federal Status: N/A

IUCN Red List: NT - Near threatened

Threats

-  Dams and Water Management/Use
-  Industrial and Military Effluents

Conservation Actions

- Awareness and Communications  
- Conservation Payments 
- External Capacity Building  
- Species Management  

Needs

Survey: Collect baseline species information

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Augment existing low population areas with cultured juveniles. Establish an ARK population in captivity at KDFWR hatcheries.

Habitat Associations

Current Watersheds: Powell, Red, Rockcastle, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fish, black basses.

Range Map

Current

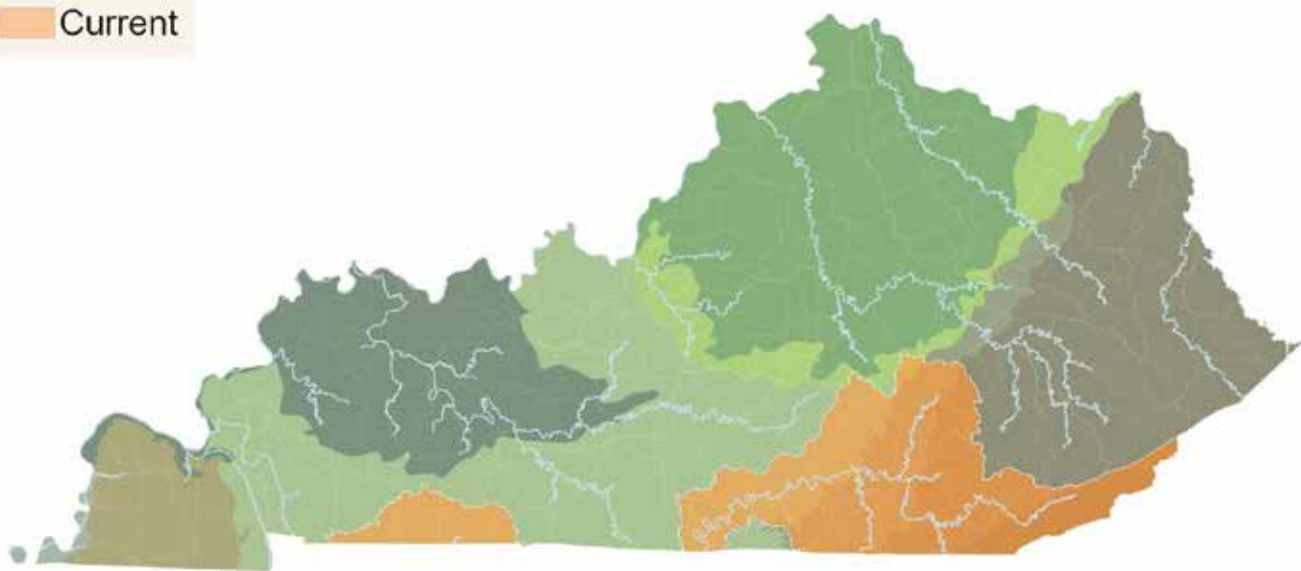


Photo: Monte McGregor



CUMBERLAND ELKTOE

(*Alasmodonta atropurpurea*)

Conservation Profile

Priority Group: Highest

KNP Info




G Rank: G1G2

S Rank: S1








Federal Status: Endangered

IUCN Red List: EN - Endangered

Threats

-  Dams and Water Management/Use
-  Industrial and Military Effluents
-  Invasive Non-native/Alien species

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- Species Management   

Needs

Survey: Collect baseline species information

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Augment existing low population areas with cultured juveniles. Establish an ARK population in captivity at KDFWR hatcheries.

Habitat Associations

Current Watersheds: Powell, Rockcastle, South Fork Cumberland, Upper Cumberland

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found inflowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fish, the northern hog sucker.

Range Map

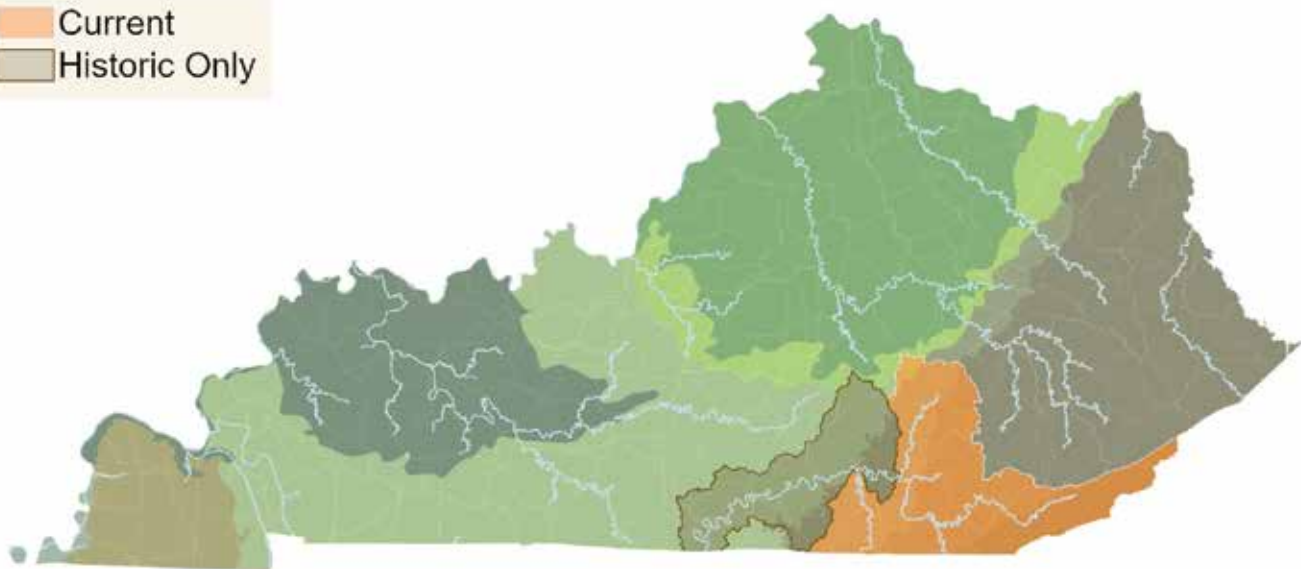


Photo: Monte McGregor



ELKTOE

(*Alasmodonta marginata*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G4

S Rank: S2








Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Agricultural and Forestry Effluents
-  Dams and Water Management/Use
-  Invasive Non-native/Alien species

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness   

Needs

Survey: Monitoring

Research: Propagation and Culture

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed.

Habitat Associations

Current Watersheds: Barren, Licking, Little Sandy, Lower Kentucky, Middle Fork Kentucky, North Fork Kentucky, Rockcastle, South Fork Licking, Upper Green, Upper Kentucky

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, suckers.

Range Map

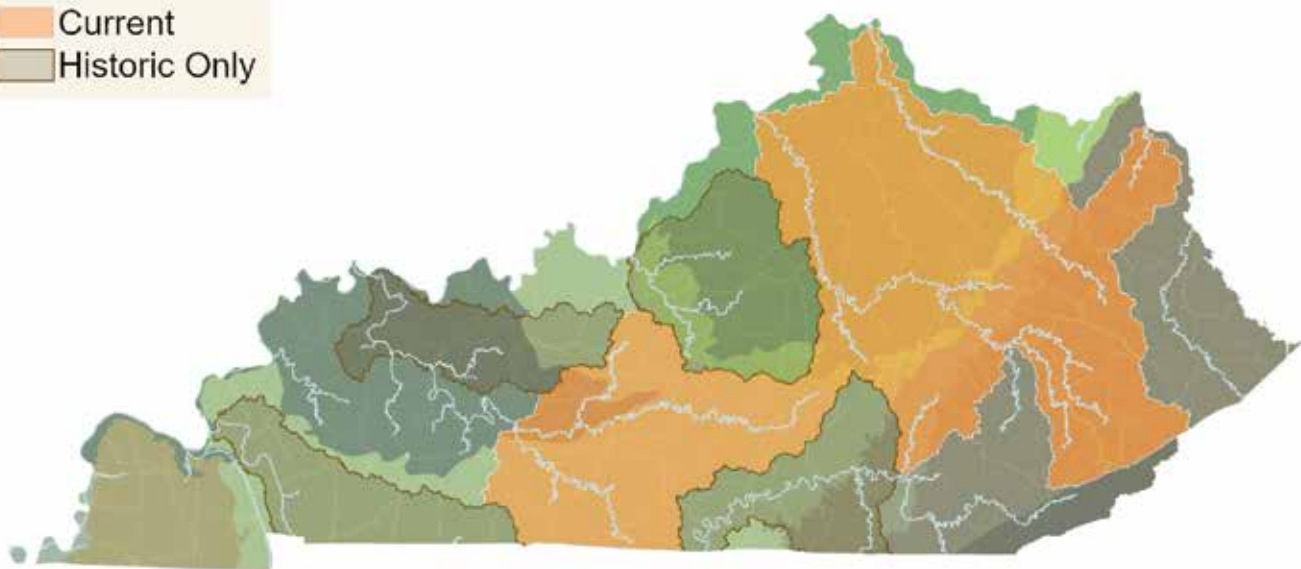
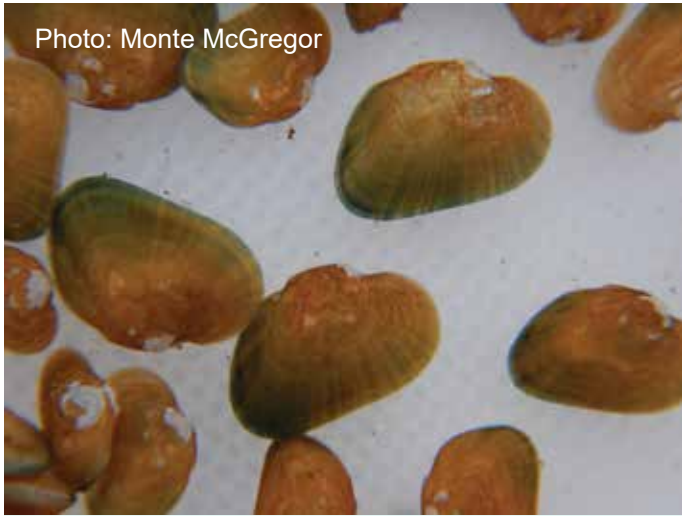


Photo: Monte McGregor



SLIPPERSHELL MUSSEL

(*Alasmodonta viridis*)

Conservation Profile

Priority Group: High

KNP Info



G Rank: G4G5

S Rank: S3S4








Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Dams and Water Management/Use
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- Habitat and Natural Process Restoration 
- Species Management  

Needs

Survey: Monitoring

Research: Status Surveys

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Augment existing low population areas if needed.

Habitat Associations

Current Watersheds: Barren, Licking, Lower Kentucky, Middle Fork Kentucky, North Fork Kentucky, Rockcastle, Rolling Fork, Rough, Salt, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky

Stream Type: Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in flowing waters of small to medium streams over firm sand and gravel substrates. Habitat is associated with its host fishes, sculpins and darters.

Range Map

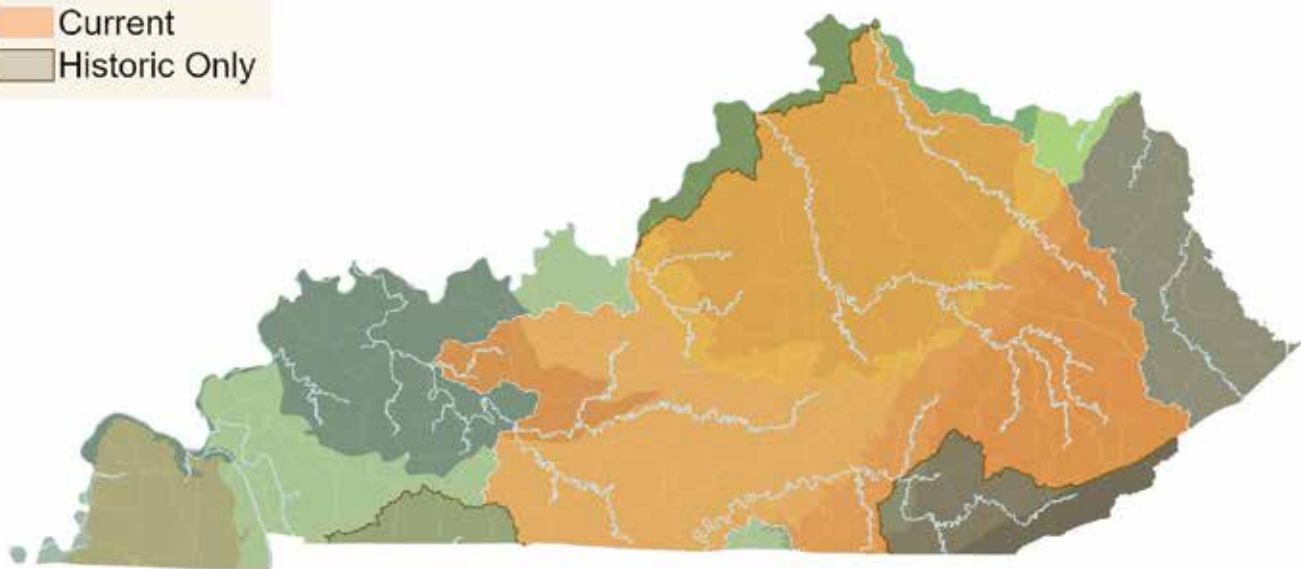


Photo: Monte McGregor



CUMBERLAND PAPERSHELL

(*Anodontoides denigrata*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed. Establish an ARK population in captivity at KDFWR hatcheries.



Habitat Associations

Current Watersheds: Powell, Rockcastle, Upper Cumberland

Stream Type: Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, minnows.

Threats

-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- Habitat and Natural Process Restoration 

Needs

Survey: Monitoring

Research: Propagation and Culture

Research: Research

Range Map

Current

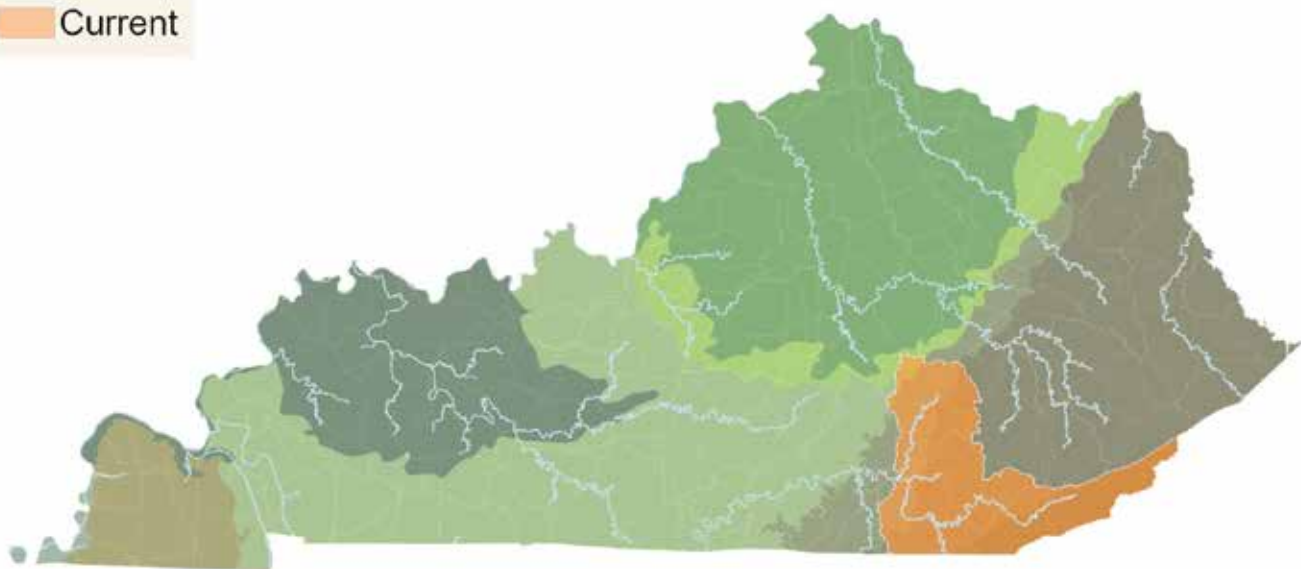


Photo: Monte McGregor



CYLINDRICAL PAPERSHELL

(*Anodontoidea ferussacianus*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G5

S Rank: S3S4

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal



Survey for new areas with qualitative methods to establish long-term monitoring sites. Develop culture and propagation methods. Verify species taxonomy with genetics or other methods.

Habitat Associations


Current Watersheds: Barren, Bayou De Chien-Mayfield, Big Sandy, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Sandy, Little Scioto-Tygarts, Lower Cumberland, Lower Green, Lower Kentucky, Lower Levisa, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Fork Kentucky, Middle Green, Middle Ohio-Laughery, North Fork Kentucky, Obey, Obion, Ohio Brush-Whiteoak, Pond, Red, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Tradewater, Tug, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky, Upper Levisa

Stream Type: Warm-Low Gradient-Stream

Threats

-  Agricultural and Forestry Effluents
-  Other Ecosystem Modifications

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration 

Needs

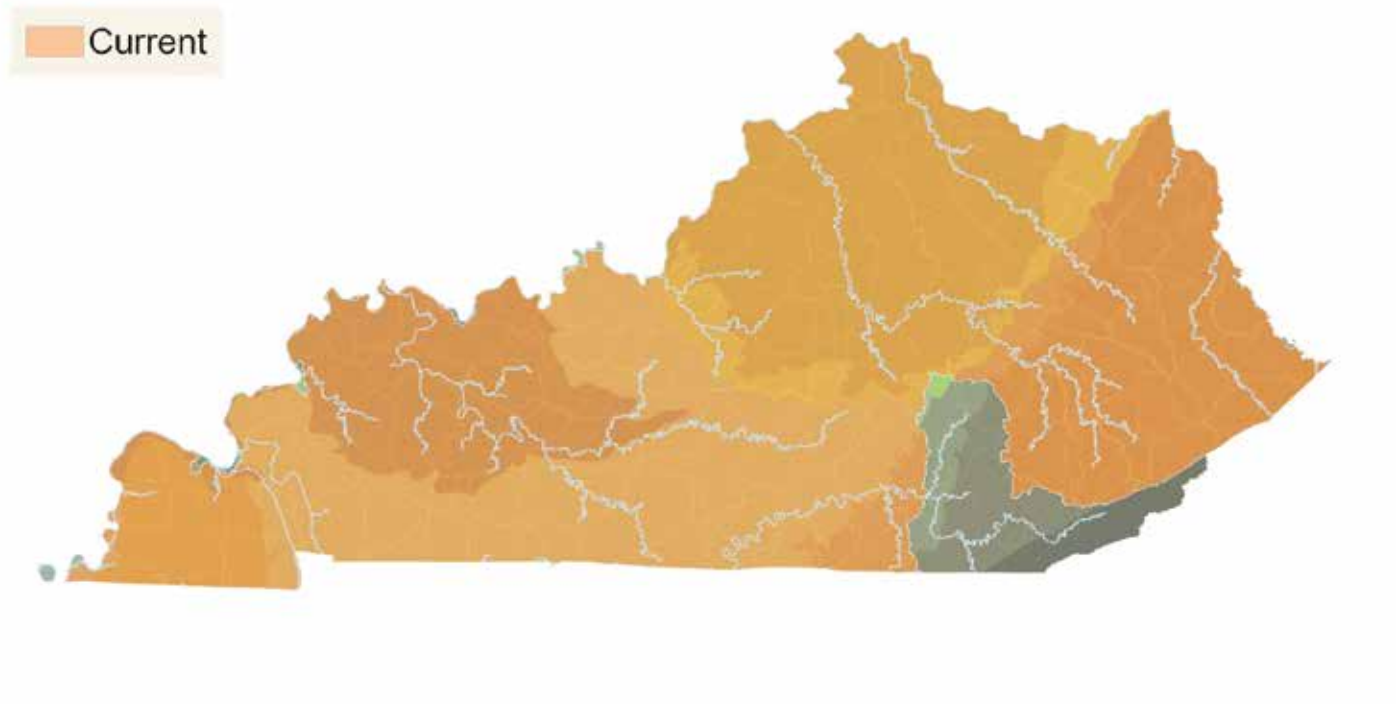
Survey: Status Surveys

Research: Propagation and Culture

Research: Life history studies

Typically found in flowing waters of small to medium streams over firm sand and gravel substrates. Habitat is associated with a wide variety of host fishes.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Physiographic Regions: Interior Plateau



Stream Type: None

Typically found in flowing waters of small to medium streams running through caves and sinks over large stones.

SHAGGY CAVESNAIL

(*Antroselates spiralis*)

Threats

-  Dams and Water Management/Use
-  Pollution

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Research: Life History Studies

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Range Map

Data Insufficient
to Generate
Range Map

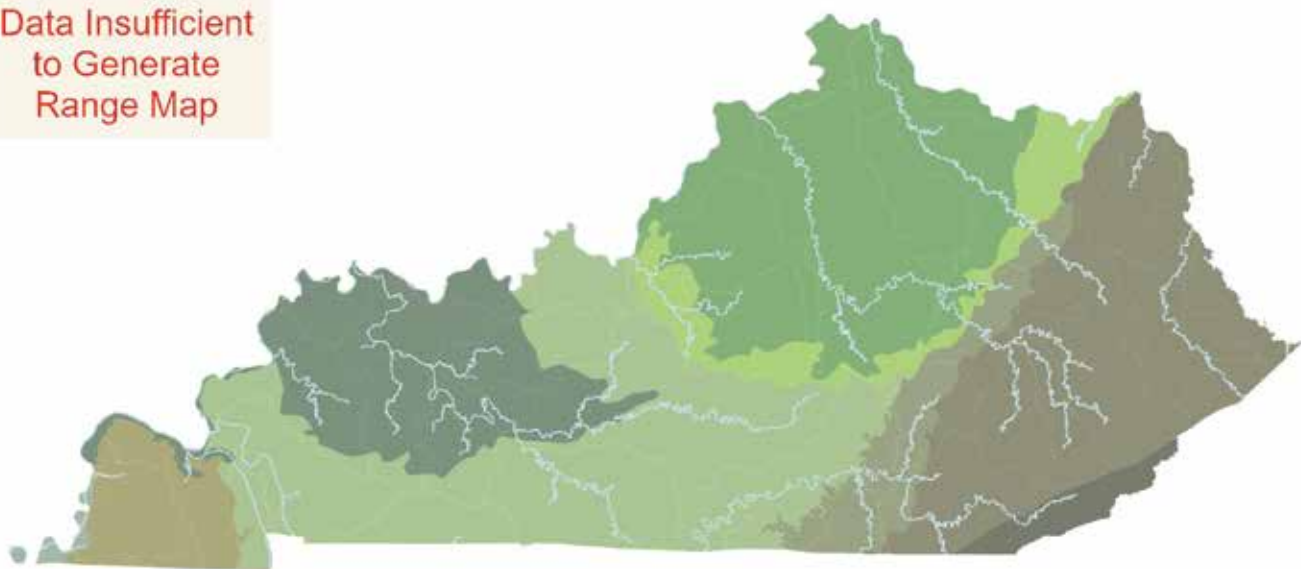


Photo: Monte McGregor



BANDED MYSTERYSNAIL

(*Callinina georgiana*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills

Stream Type: Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Life History Studies

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Range Map

Data Insufficient
to Generate
Range Map

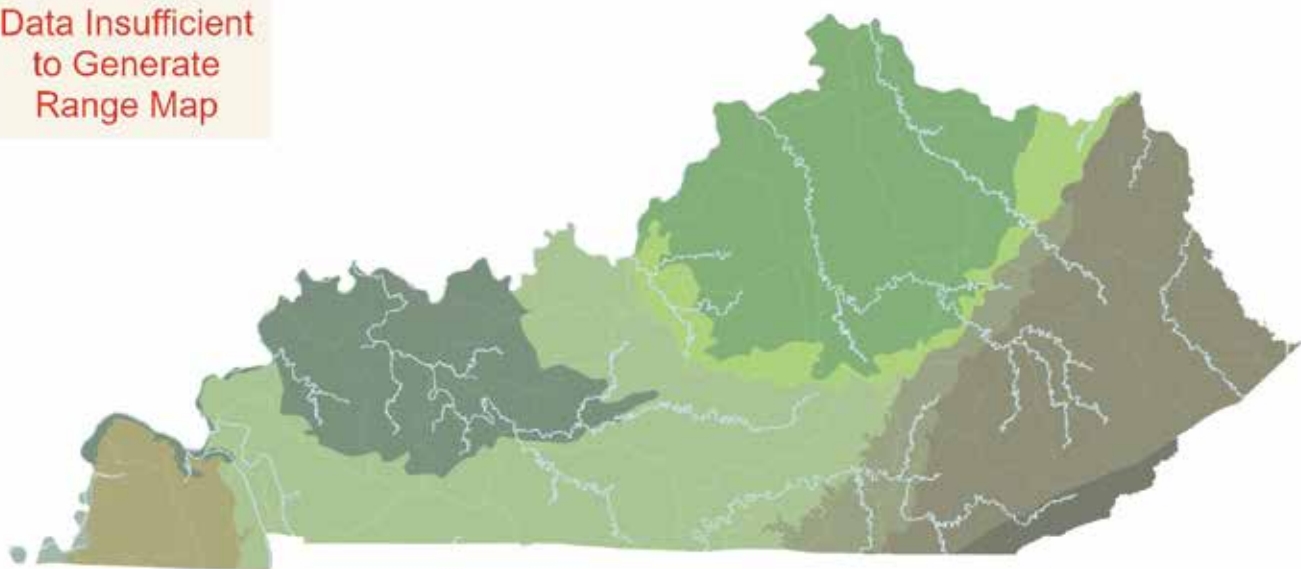


Photo: Monte McGregor



CUMBERLAND RIVER RAINBOW

(*Cambarunio dactylus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: GNR

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods. Augment existing low population areas with cultured juveniles.






Habitat Associations

Current Watersheds: Barren, Lower Cumberland, Lower Green, Middle Green, Obey, Pond, Powell, Red, Rockcastle, Rough, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, black basses.

Threats

-  Agricultural and Forestry Effluents
-  Dams and Water Management/Use
-  Household Sewage and Urban Waste Water
-  Industrial and Military Effluents
-  Other Ecosystem Modifications

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Genetic Testing

Research: Life History Studies

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Species Management

Range Map

Current

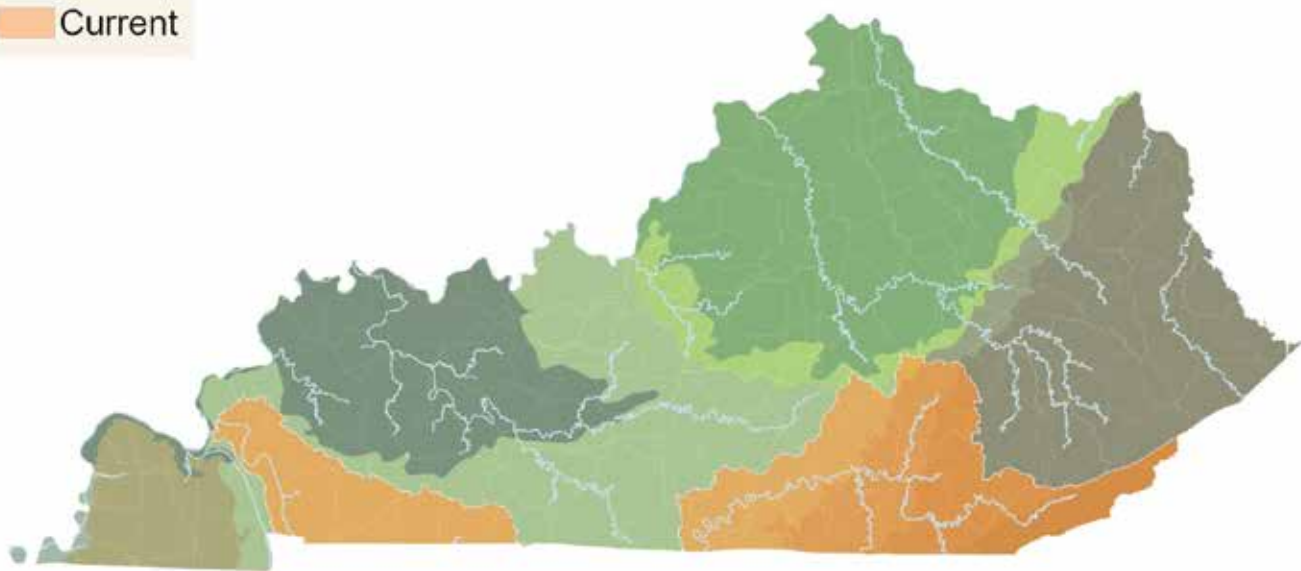


Photo: Monte McGregor



RAINBOW

(*Cambarunio iris*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: GNR

S Rank: S4S5

Federal Status: N/A

IUCN Red List: N/A

There is taxonomic uncertainty within the *Villosa* group, which has been reclassified into multiple genera.

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods. Augment existing low population areas with cultured juveniles.




Habitat Associations

Current Watersheds: Big Sandy, Licking, Little Sandy, Little Scioto-Tygarts, Lower Kentucky, Lower Levisa, Middle Fork Kentucky, Middle Ohio-Laughery, North Fork Kentucky, Ohio Brush-Whiteoak, Raccoon-Symmes, Rolling Fork, Saline, Salt, Silver-Little Kentucky, South Fork Kentucky, South Fork Licking, Tug, Upper Kentucky, Upper Levisa

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Unconfined-Medium River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, black basses.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Monitoring

Survey: Status Surveys

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Range Map

Current

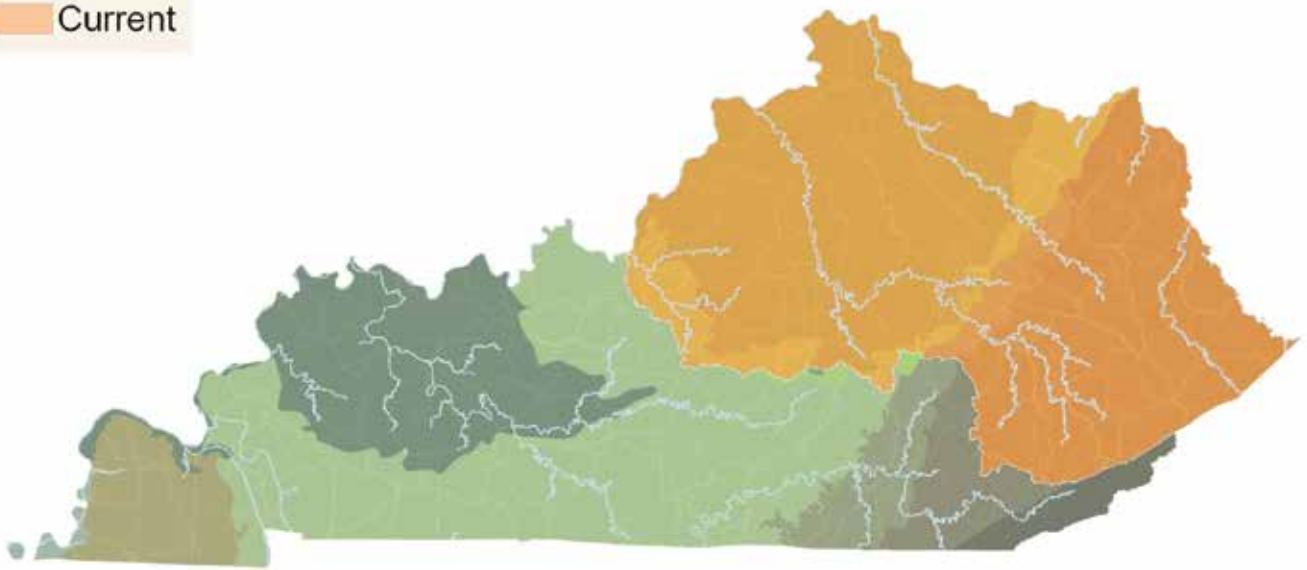


Photo: Monte McGregor



PAINTED CREEKSHELL

(*Cambarunio taeniatus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4

S Rank: SNR

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods. Augment existing low population areas with cultured juveniles.




Habitat Associations

Current Watersheds: Lower Cumberland, Red, Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, black basses and rock bass.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Genetic Testing

Research: Life History Studies

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Management: Species Management

Range Map

Current

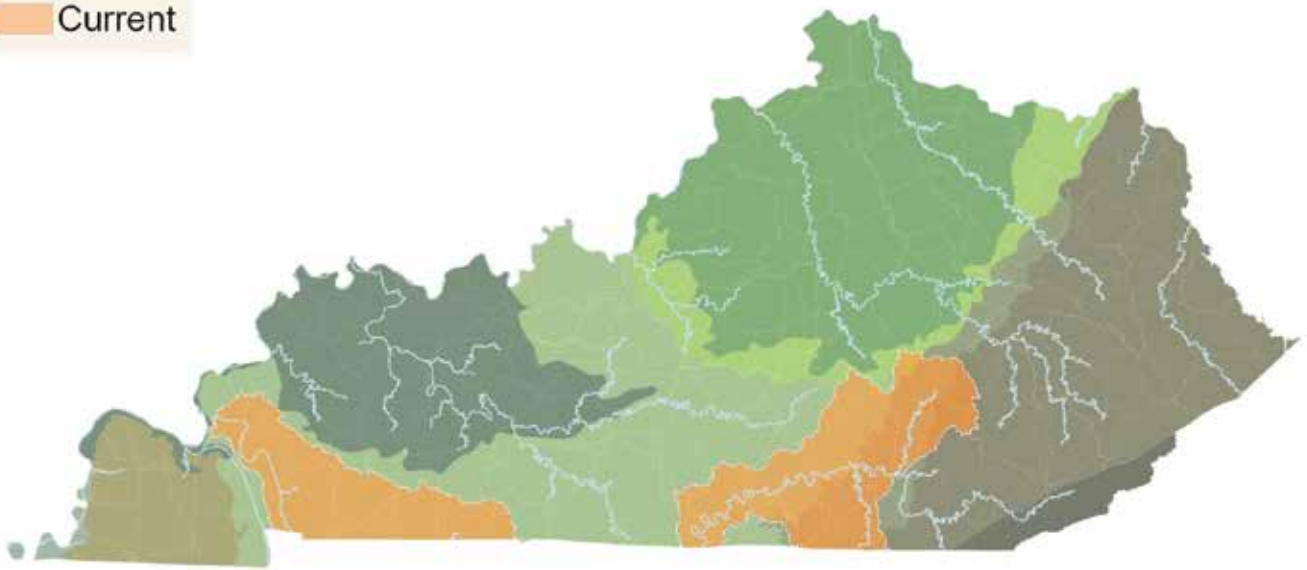





Photo: Monica McGregor











SPECTACLECASE

(*Cumberlandia monodonta*)

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  
- Species Reintroduction  

Needs

Survey: Collect baseline species information

Survey: Monitoring

Research: Propagation and Culture

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S1

Federal Status: Endangered

IUCN Red List: EN - Endangered

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Maintain a captive population in the wild.

Habitat Associations

Current Watersheds: Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, South Fork Cumberland, Upper Cumberland-Lake Cumberland, Upper Green

Stream Type: Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of large rivers in main channels over firm sand and gravel under large rocks. Habitat is associated with its host fishes, mooneye and goldeye.

Range Map

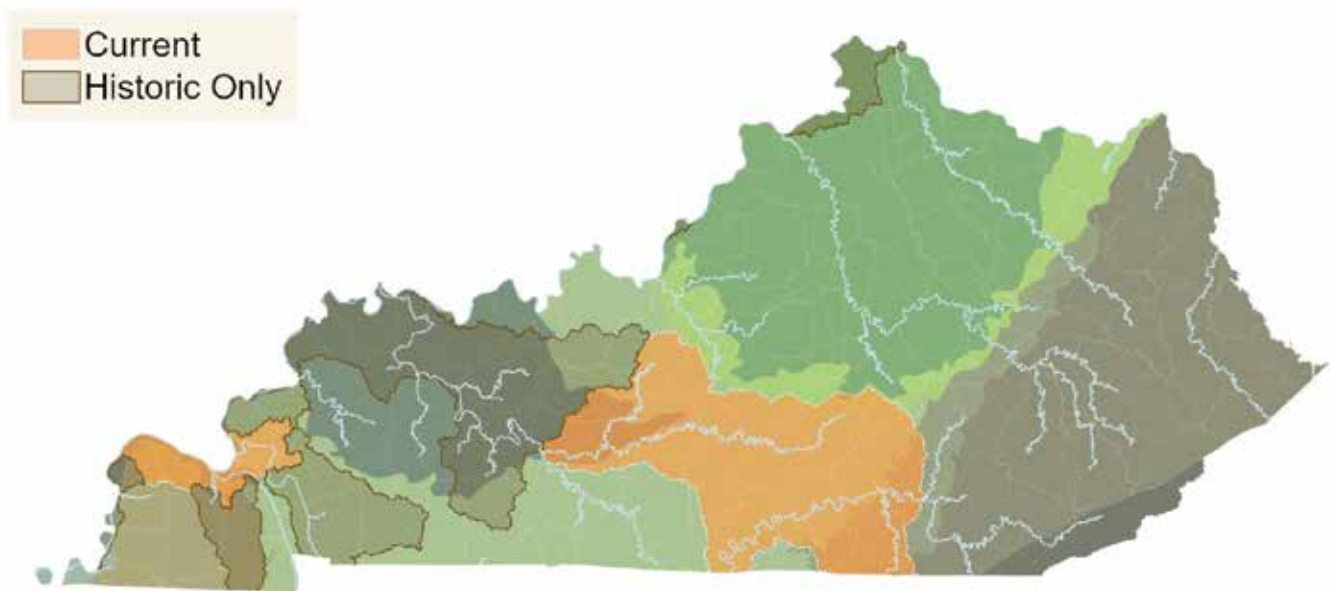


Photo: Monte McGregor



FANSHELL

(*Cyprogenia stegaria*)

Conservation Profile

Priority Group: High

KNP Info



G Rank: G1

S Rank: S1








Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Threats

-  Dams and Water Management/Use
-  Pollution

Conservation Actions

- Conservation Payments 
- Education and Awareness  
- External Capacity Building  
- Species Management  

Needs

Survey: Monitoring

Survey: Status Surveys

Research: Collect baseline species information

Conservation Goal

Monitor three populations with at least one area every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas with cultured juveniles.

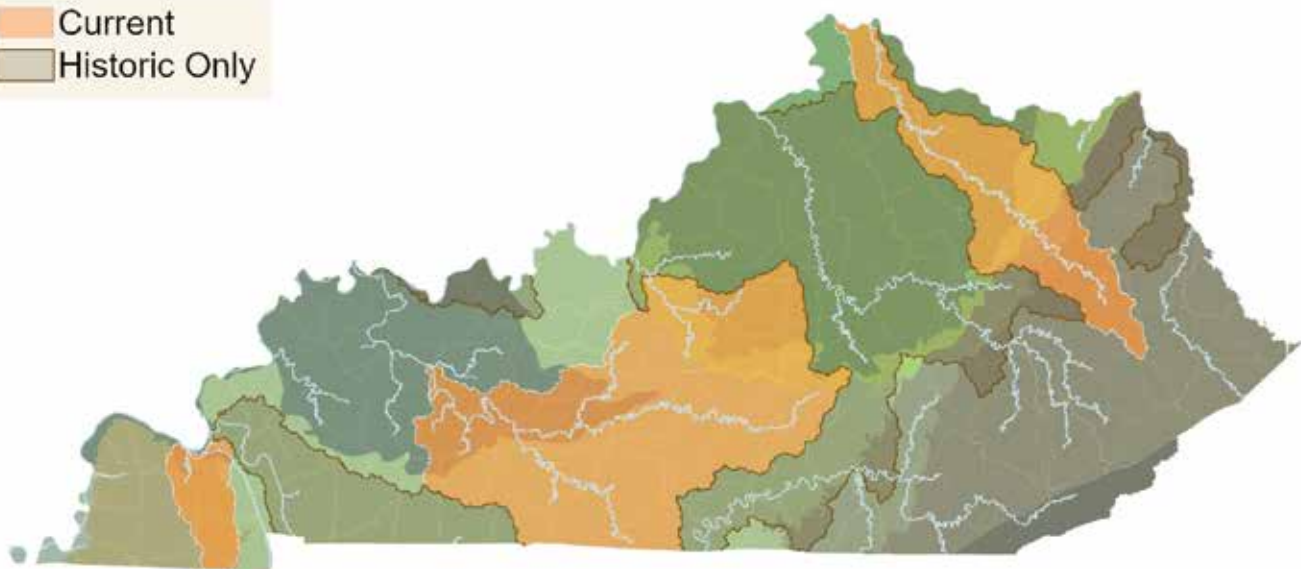
Habitat Associations

Current Watersheds: Barren, Licking, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Rolling Fork, Upper Green

Stream Type: Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, darters.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G2G3

S Rank: SNR

Federal Status: N/A

IUCN Red List: DD - Data deficient

SAMPSON SPRITE

(Dilatata sampsoni)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

None

Stream Type: None

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

Range Map

Data Insufficient
to Generate
Range Map

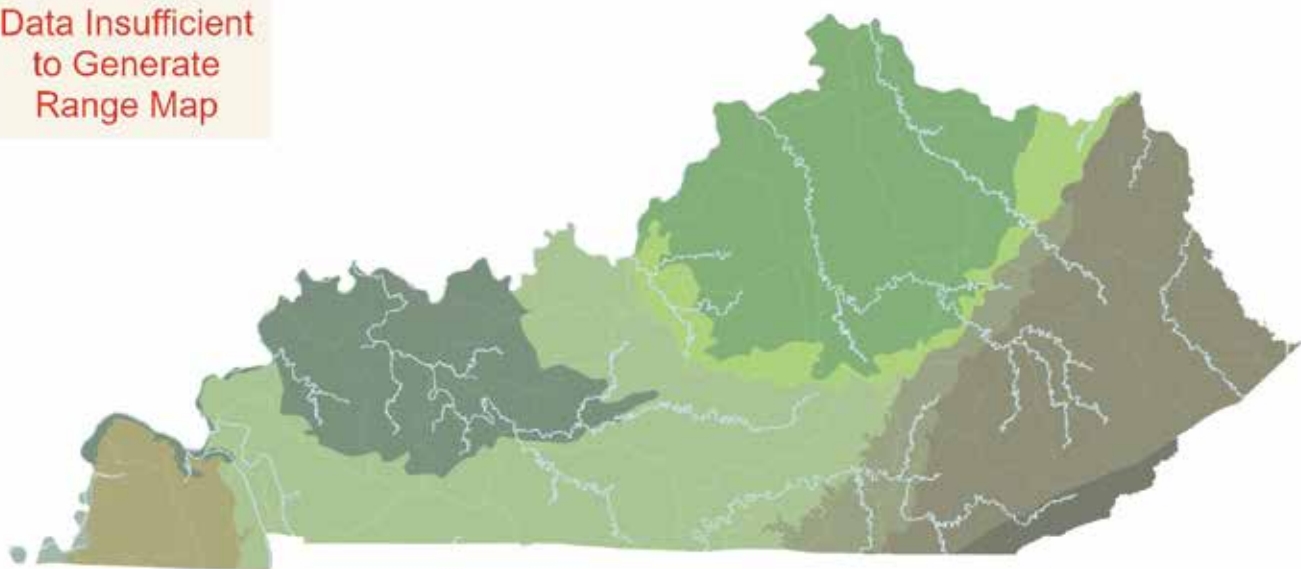


Photo: Monte McGregor



DROMEDARY PEARLYMUSSEL

(*Dromus dromas*)


Threats

 Dams and Water Management/Use

Conservation Actions

Awareness and Communications 

Conservation Payments 

External Capacity Building 

Needs

Survey: Collect baseline species information

Research: Propagation and Culture

Conservation Profile

Priority Group: High

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Establish an ARK population in captivity at KDFWR hatcheries.

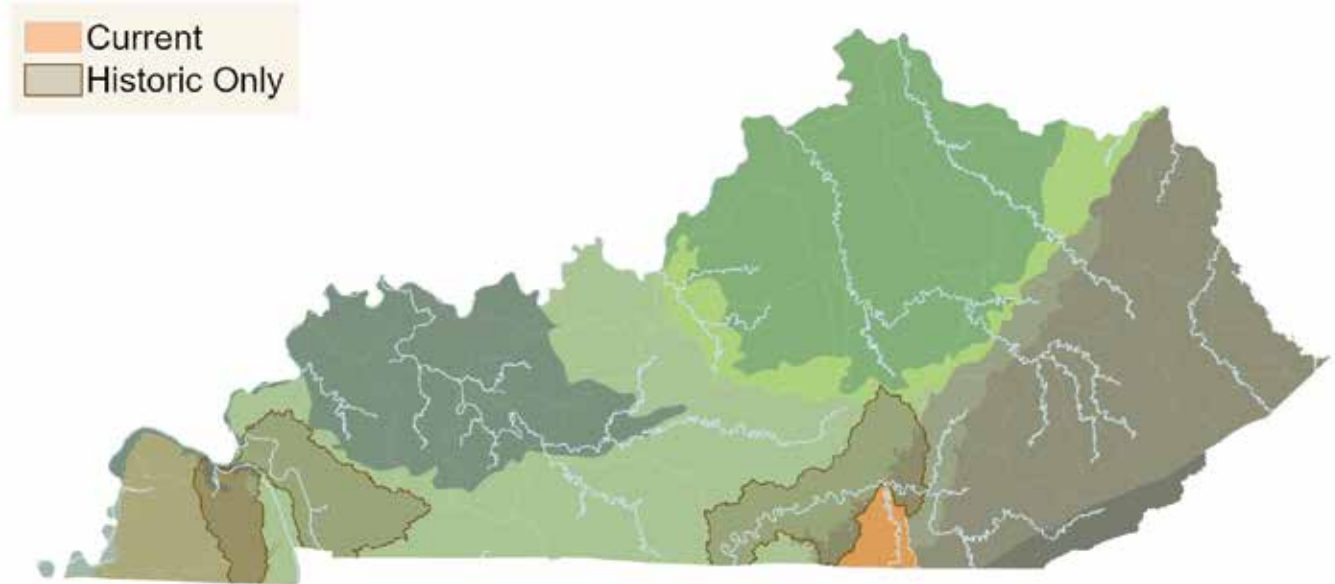
Habitat Associations

Current Watersheds: South Fork Cumberland

Stream Type: Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, darters.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G2G4

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Pond, Red, Salt, South Fork Kentucky, Upper Cumberland, Upper Green

Stream Type: Warm-Low Gradient-Stream

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

CORDED ELIMIA

(Elimia costifera)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Range Map

Data Insufficient
to Generate
Range Map

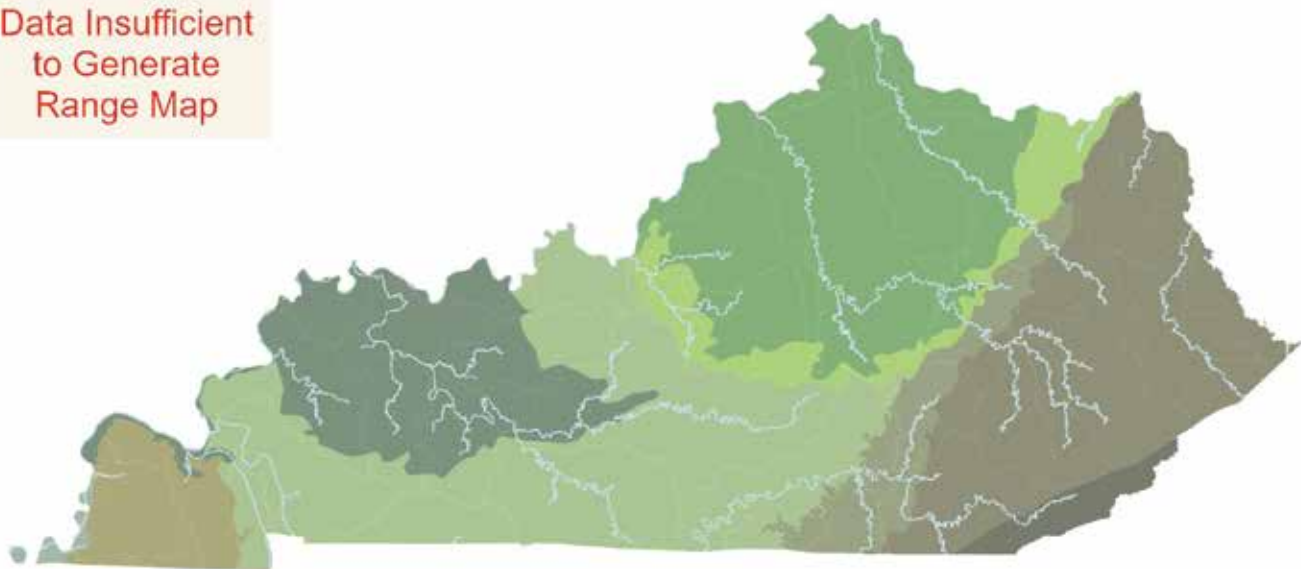


Photo: Monte McGregor



AMBER ELIMIA

(*Elimia curreyana*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Life history studies

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Upper Green

Stream Type: Warm-Low Gradient-Stream

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

Range Map

Data Insufficient
to Generate
Range Map

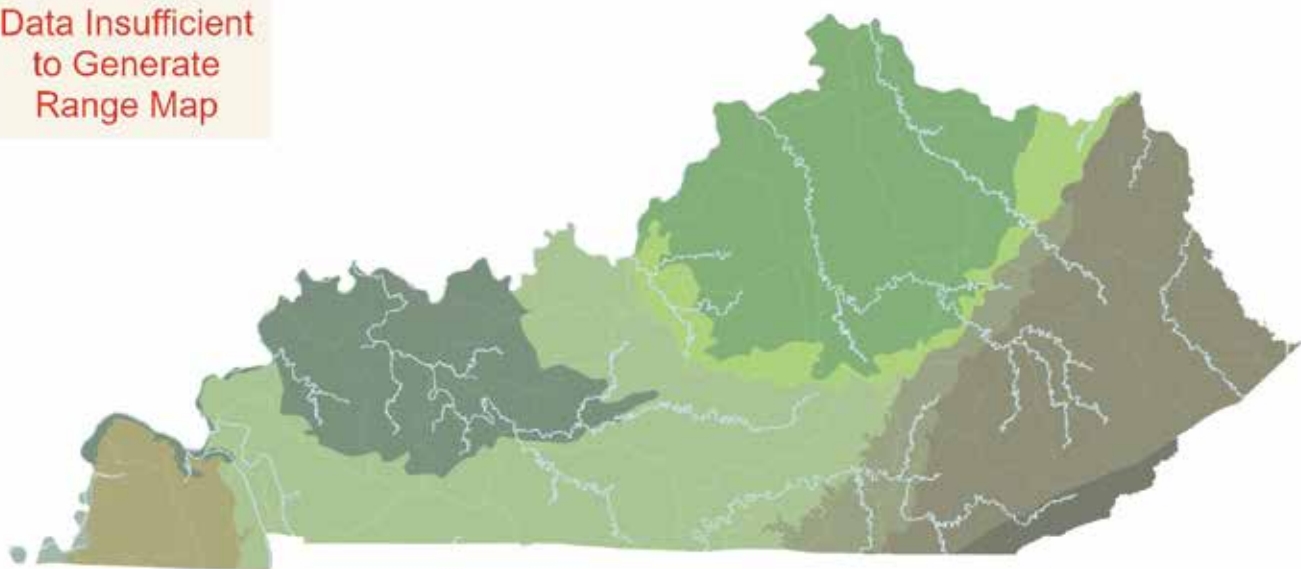


Photo: Monte McGregor



EBONY ELIMIA

(*Elimia ebenum*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Life history studies

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Licking, Lower Cumberland, Lower Kentucky, Middle Fork Kentucky, Middle Green, North Fork Kentucky, Obey, Ohio Brush-Whiteoak, Red, Rockcastle, Rolling Fork, Rough, Salt, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

This species is typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

Range Map

Data Insufficient
to Generate
Range Map

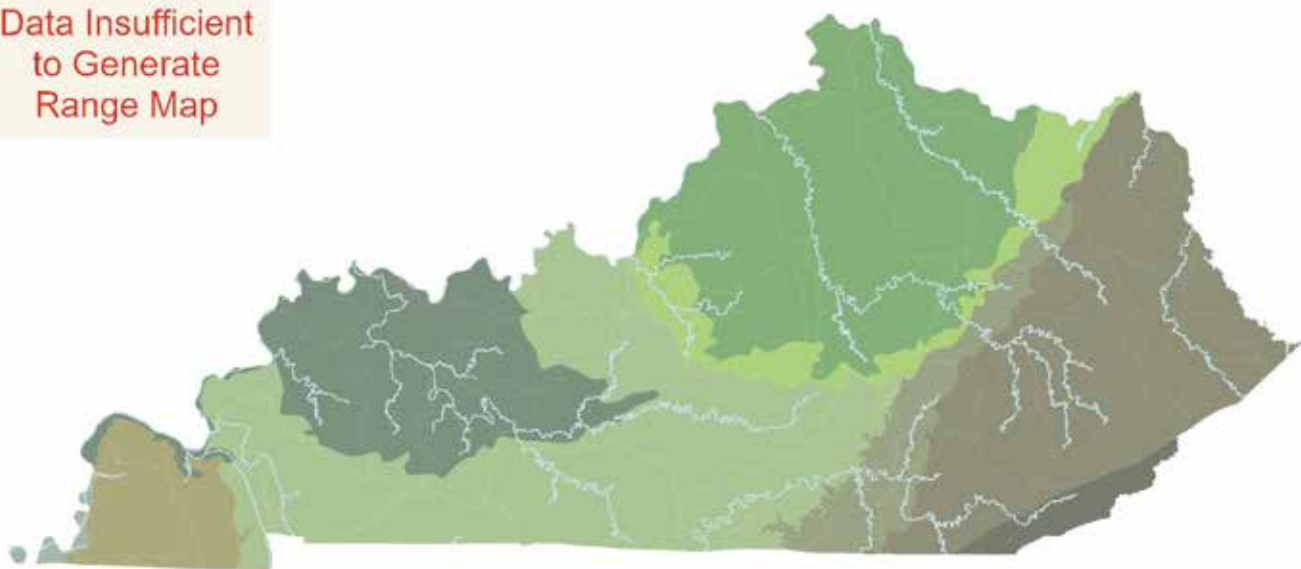


Photo: Monte McGregor



CUMBERLAND ELIMIA

(*Elimia edgariana*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Lower Cumberland, Middle Green, Obey, Red, South Fork Cumberland, Upper Cumberland-Lake Cumberland, Upper Green

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

Range Map

Data Insufficient
to Generate
Range Map

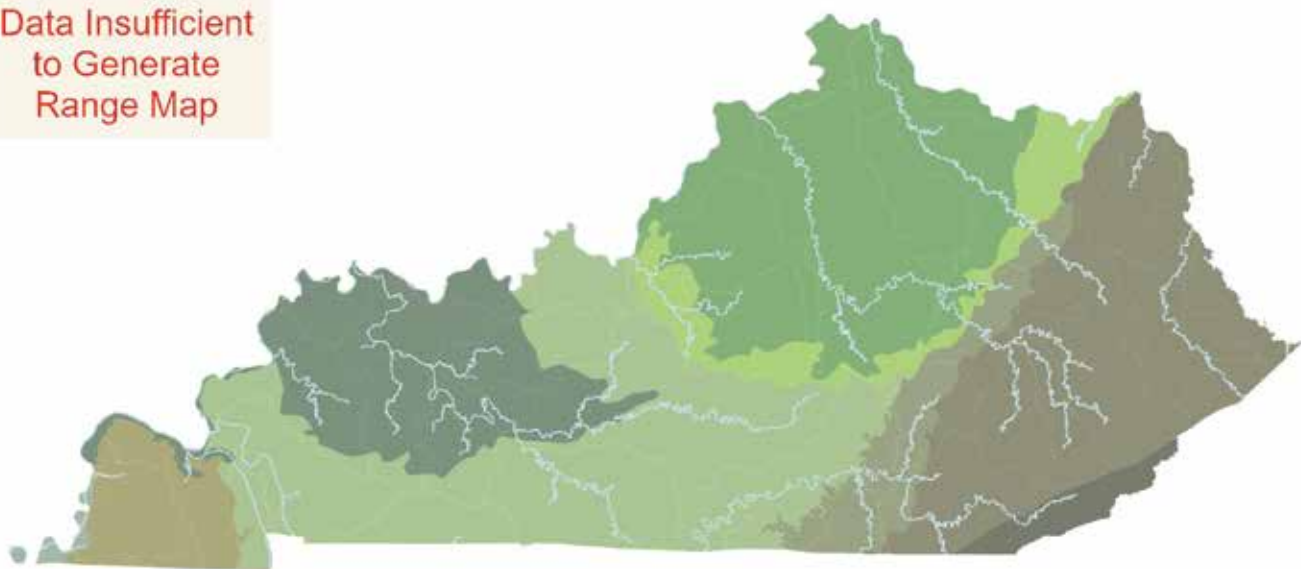


Photo: Monte McGregor



PANEL ELIMIA

(*Elimia laqueata*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

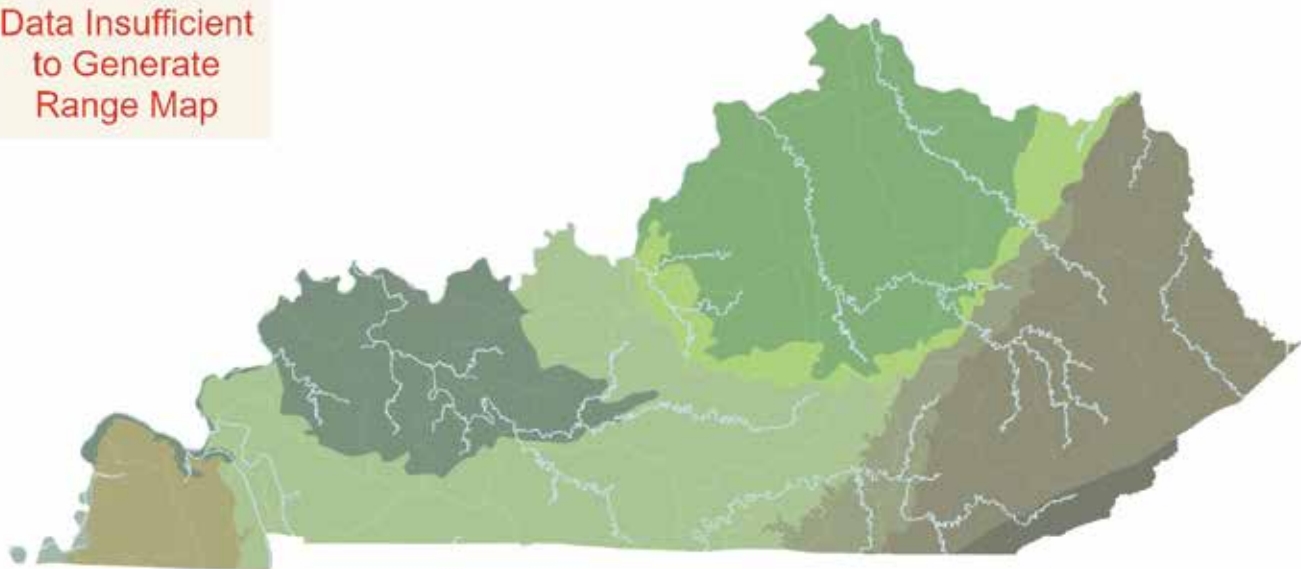
Current Watersheds: Barren, Blue-Sinking, Lower Cumberland, Middle Green, Obey, Pond, Red, Rockcastle, Rough, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

Range Map

Data Insufficient
to Generate
Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Licking, Lower Kentucky, Lower Ohio-Bay, Middle Fork Kentucky, Rockcastle, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Licking, Tradewater, Upper Cumberland, Upper Green

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

LIVER ELIMIA

(*Elimia livescens*)

Threats

Unknown

Conservation Actions

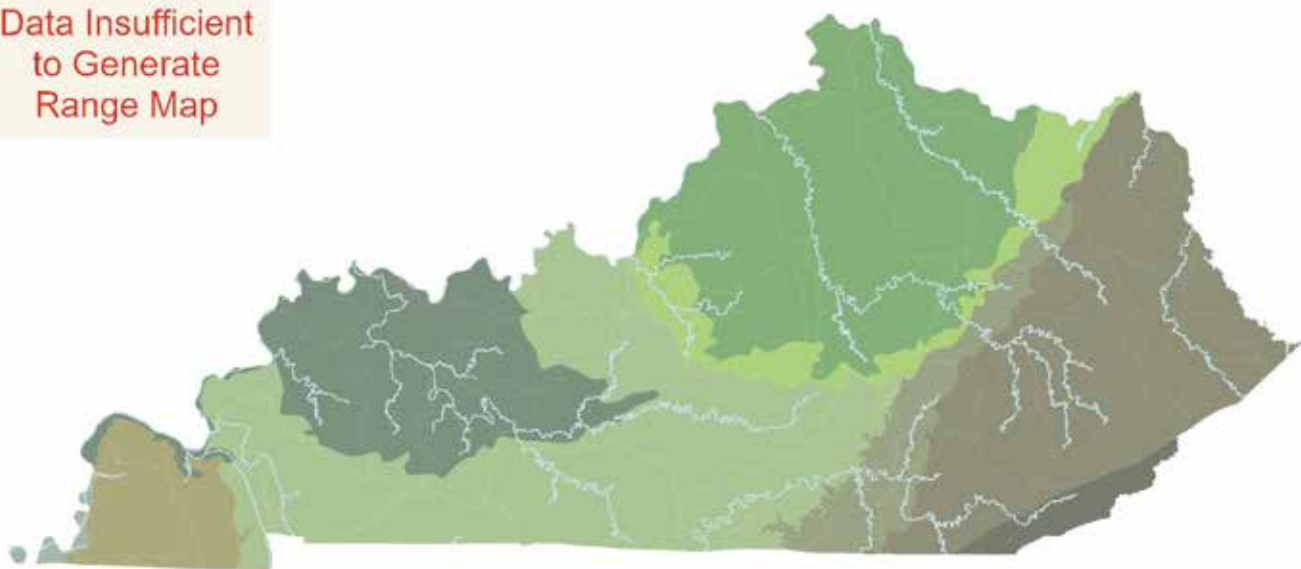
Unknown

Needs

Survey: Status Surveys

Range Map

Data Insufficient
to Generate
Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G2G3

S Rank: S3S4

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Obey, Rockcastle, Rolling Fork, South Fork Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

CARVED ELIMIA

(*Elimia plicatastriata*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Range Map

Data Insufficient
to Generate
Range Map

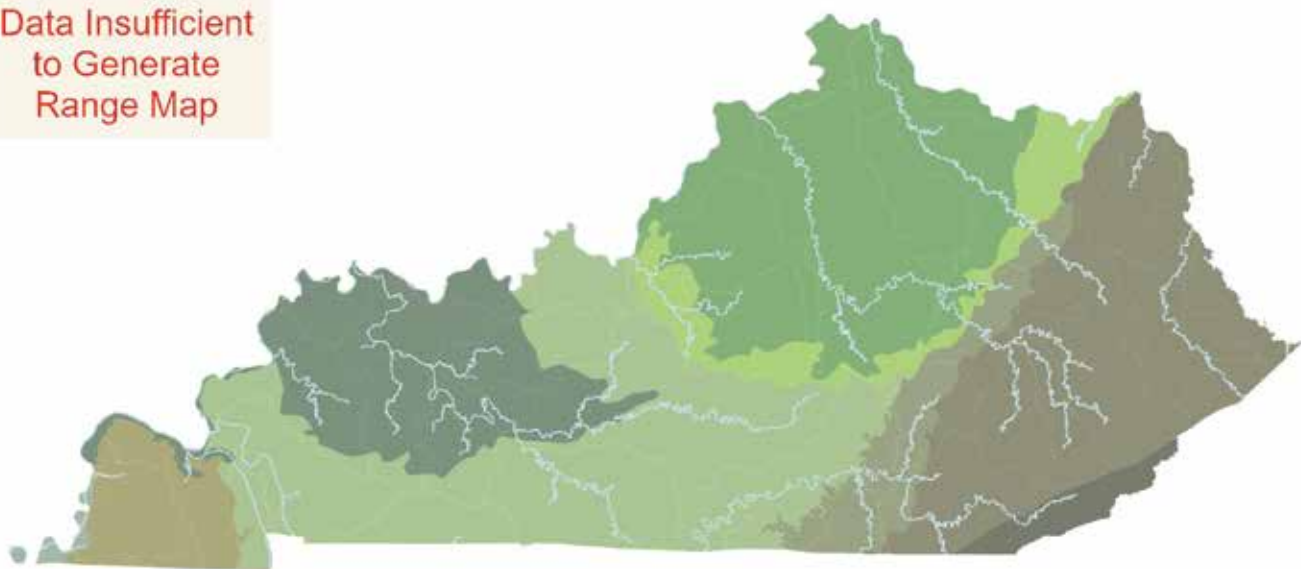


Photo: Monte McGregor



BUTTERFLY

(*Ellipsaria lineolata*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G4G5

S Rank: S4S5




Federal Status: N/A

IUCN Red List: NT - Near threatened

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

-  Conservation Payments
-  Education and Awareness
-  External Capacity Building

Needs

Survey: Monitoring

Research: Propagation and Culture

Conservation Goal

Monitor at least two populations with at least one area every three to six years with quantitative sampling. Develop culture and propagation methods.

Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Green, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Raccoon-Symmes, Rolling Fork, Saline, Salt, Silver-Little Kentucky, South Fork Licking, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky

Stream Type: Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates. Habitat is associated with its host fishes, skipjack herring and Alabama shad.

Range Map

Current
Historic Only

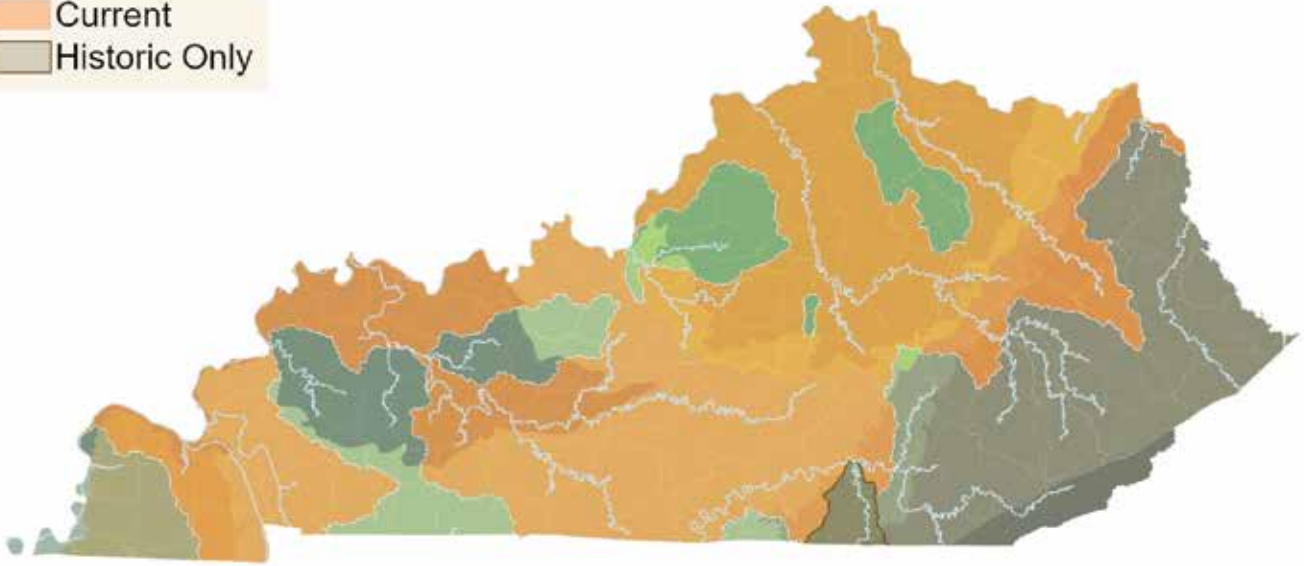


Photo: Monte McGregor



ELEPHANTEAR

(*Elliptio crassidens*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G5

S Rank: S3S4




Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Dams and Water Management/Use
-  Industrial and Military Effluents
-  Other Ecosystem Modifications

Conservation Actions

-  Conservation Payments
-  Education and Awareness
-  External Capacity Building

Needs

Research: Collect baseline species information

Research: Life History Studies

Research: Propagation and Culture

Conservation Goal

Monitor at least two populations with at least one area every three to six years with quantitative sampling. Develop culture and propagation methods.

Habitat Associations

Current Watersheds: Barren, Big Sandy, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Sandy, Little Scioto-Tygarts, Lower Cumberland, Lower Green, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Raccoon-Symmes, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, Upper Green

Stream Type: Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates. Habitat is associated with its host fish, the freshwater drum.

Range Map

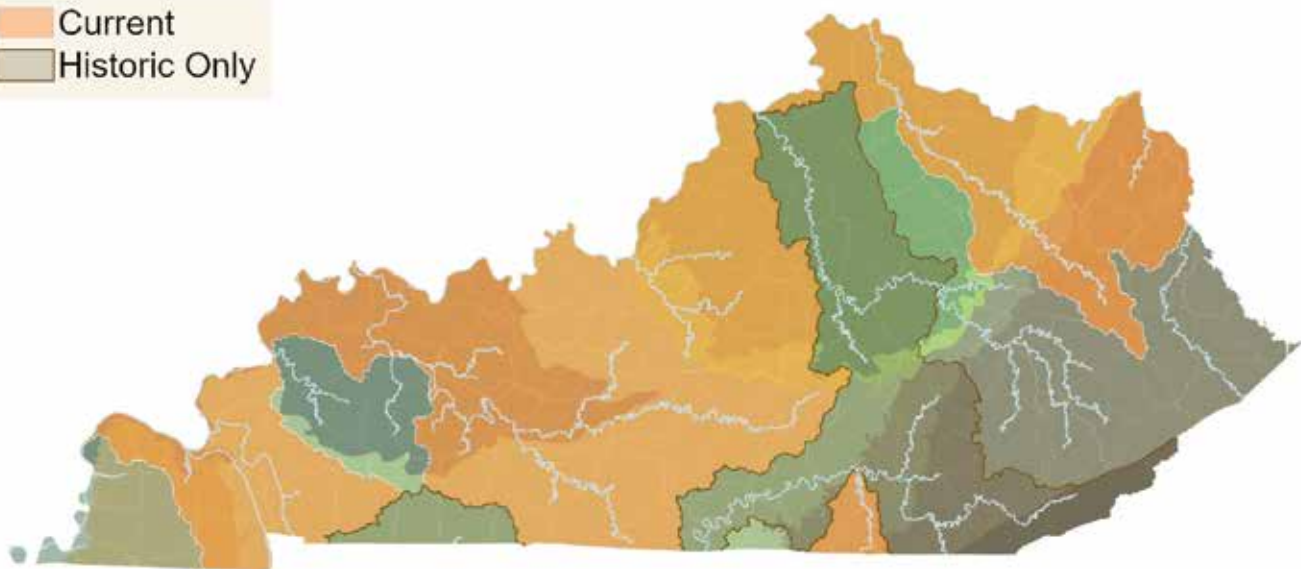


Photo: Monte McGregor



CUMBERLANDIAN COMBSHELL

(*Epioblasma brevidens*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas with cultured juveniles. Establish an ARK population in captivity at KDFWR hatcheries.




Habitat Associations

Current Watersheds: South Fork Cumberland, Upper Cumberland-Lake Cumberland












Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confining-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, darters and sculpin.

Threats

-  Dams and Water Management/Use
-  Mining and Quarrying
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness   
- External Capacity Building   
- Species Management   

Needs

Survey: Status Surveys

Research: Augmentation and Reintroduction

Range Map

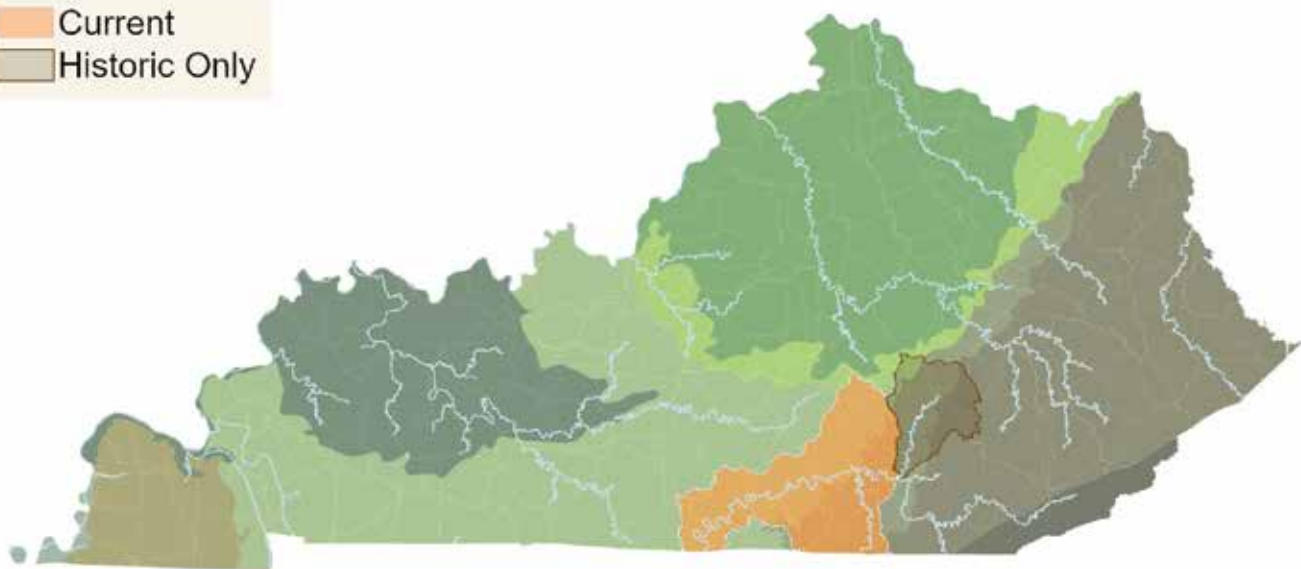


Photo: Monte McGregor



OYSTER MUSSEL

(*Epioblasma capsaeformis*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: EN - Endangered

Conservation Goal

Reintroduce the species into historic habitat from cultured juveniles. Monitor once established at least one area. Establish an ARK population in captivity at KDFWR hatcheries.



Habitat Associations

Current Watersheds: South Fork Cumberland









Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, darters and sculpin.

Threats

-  Dams and Water Management/Use
-  Household Sewage and Urban Waste Water

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  
- Species Reintroduction  

Needs

Survey: Collect baseline species information

Research: Propagation and Culture

Range Map

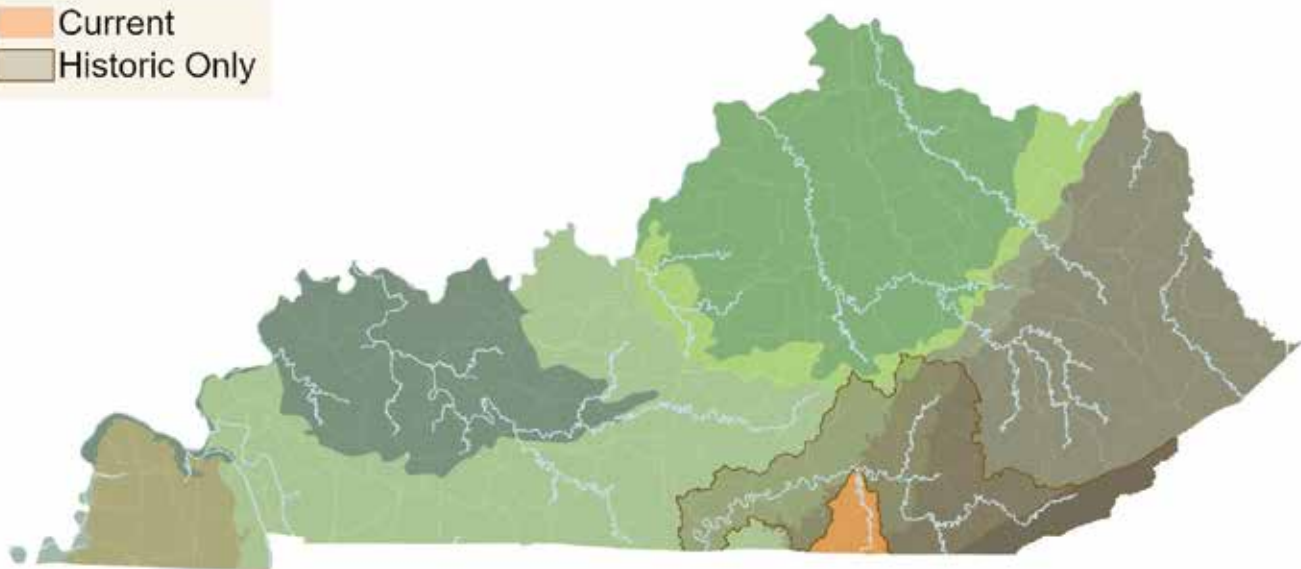


Photo: Monte McGregor



CATSPAW

(*Epioblasma obliquata*)

Conservation Profile

Priority Group: Highest

KNP Info



G Rank: G1

S Rank: S1









Federal Status: Endangered

IUCN Red List: EN - Endangered

Threats

-  Dams and Water Management/Use
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  
- Species Management  

Needs

Survey: Collect baseline species information

Research: Life History Studies

Conservation Goal

Reintroduce the species into historic habitat from cultured juveniles in two river systems. Monitor once established at least one area. Establish an ARK population in captivity at KDFWR hatcheries.

Habitat Associations

Current Watersheds: Licking, Upper Green

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates. Habitat is associated with its host fishes, darters and sculpin.

Range Map

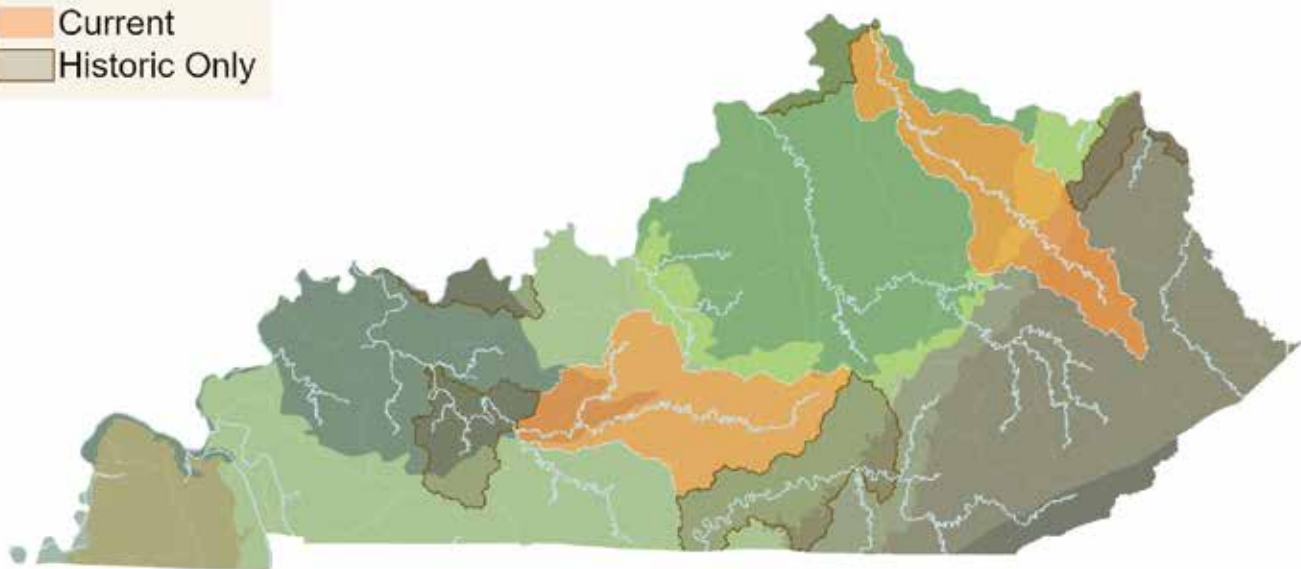


Photo: Monte McGregor



NORTHERN RIFFLESHELL

(*Epioblasma rangiana*)

Conservation Profile

Priority Group: Highest

KNP Info




G Rank: G1

S Rank: S1









Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  
- Species Management  

Needs

Survey: Collect baseline species information

Research: Life History Studies

Research: Monitoring

Conservation Goal

Reintroduce the species into historic habitat in two river systems. Monitor once established at least one area. Develop culture and propagation methods. Augment existing low population areas if needed.

Habitat Associations

Current Watersheds: Licking

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, darters and sculpin.

Range Map

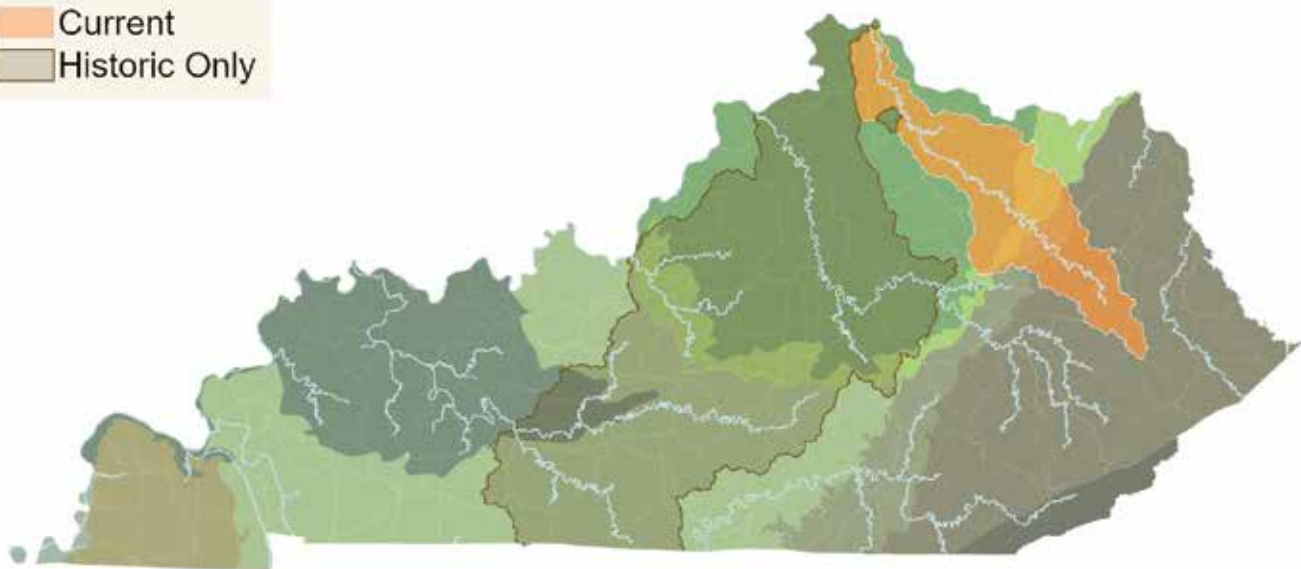


Photo: Monte McGregor



SNUFFBOX

(*Epioblasma triquetra*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G3

S Rank: S1



Federal Status: Endangered

IUCN Red List: EN - Endangered

Threats

-  Dams and Water Management/Use
-  Natural System Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Species Management  

Needs

Survey: Status Surveys

Conservation Goal

Monitor at least two populations with at least one area every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas with cultured juveniles.

Habitat Associations

Current Watersheds: Licking, Little Scioto-Tygarts, Middle Fork Kentucky, Ohio Brush-Whiteoak, Red, Rolling Fork, South Fork Kentucky, Upper Green, Upper Kentucky

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, darters and sculpin.

Range Map

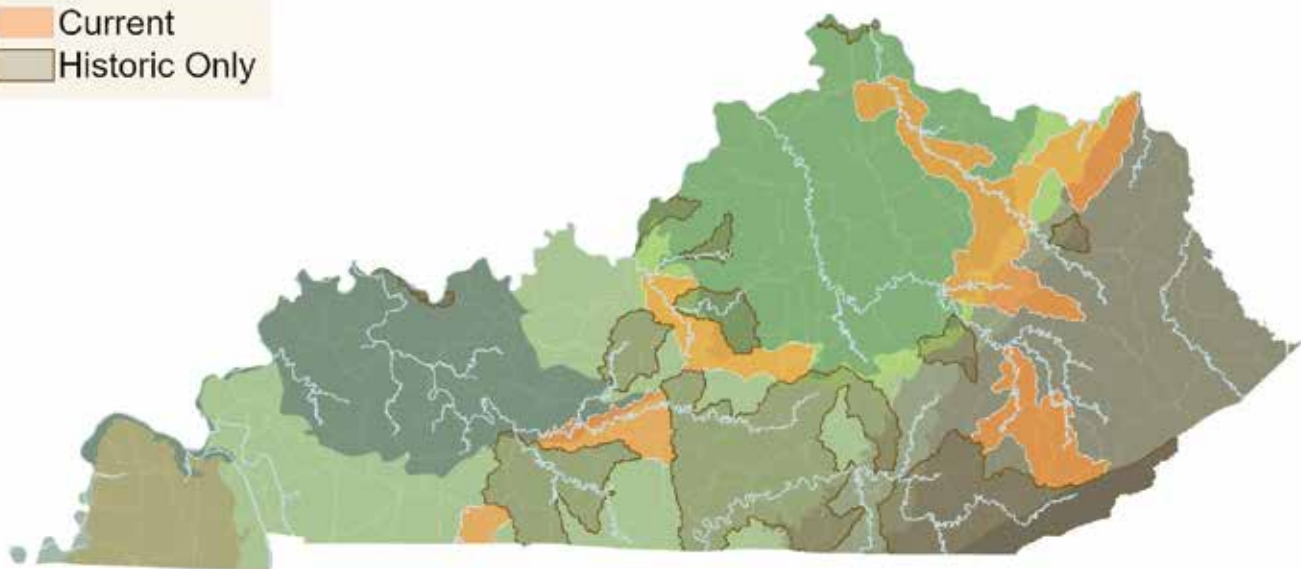




Photo: Monte McGregor



TAN RIFFLESHELL

(*Epioblasma walkeri*)

Threats

-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Species Management  

Needs

Survey: Collect baseline species information

Research: Augmentation and Reintroduction

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed. Establish an ARK population in captivity at KDFWR hatcheries.

Habitat Associations

Current Watersheds: South Fork Cumberland

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, darters.

Range Map

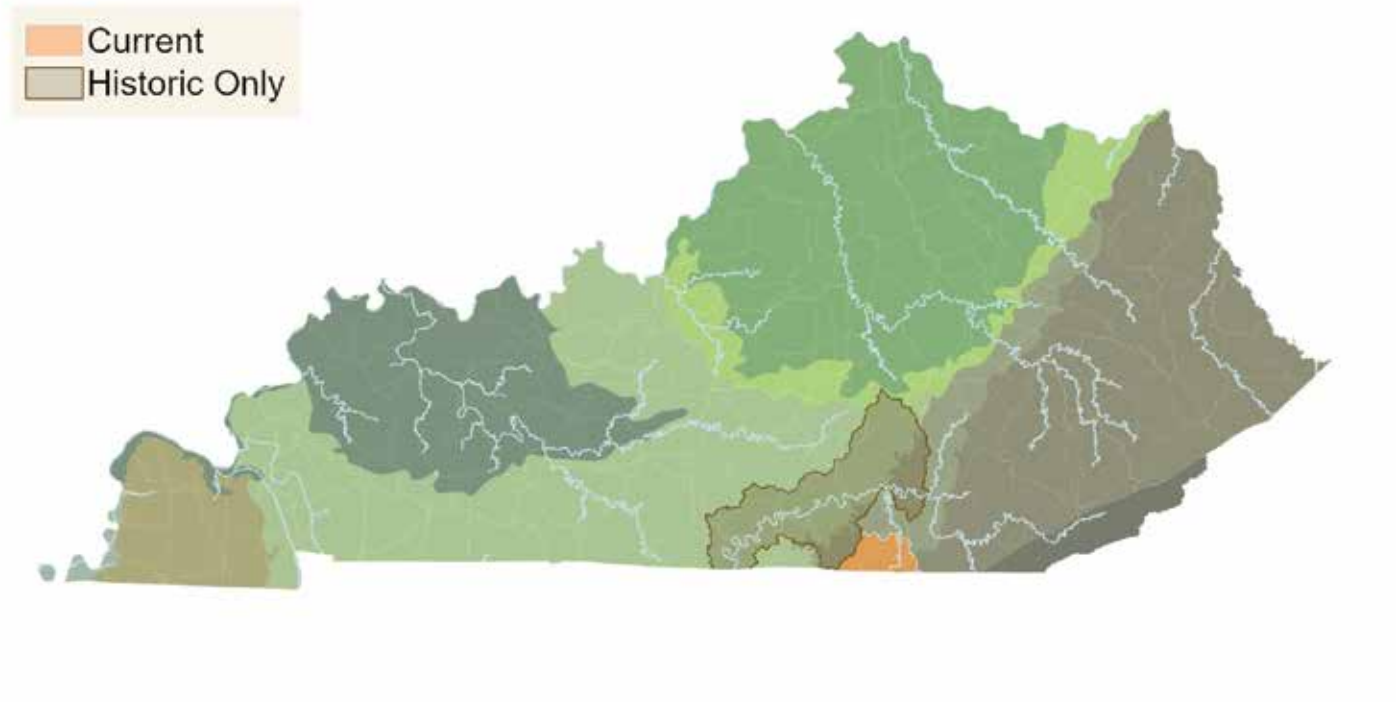


Photo: Tiemann, J., Stodola, A., Douglass, S., Vinsel, R., & Cummings, K. (2022). Nonindigenous Aquatic Mollusks in Illinois. Illinois Natural History Survey Bulletin, 43. <https://doi.org/10.21900/j.inhs.v43.862>



MOTTLED FINGERNAIL CLAM

(*Eupera cubensis*)

Threats

Other Ecosystem Modifications

Conservation Actions

Unknown

Needs

Survey: Basic distribution information

Survey: Status Surveys

Research: Life history studies

Management: Prevent wetland habitat loss

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SU

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

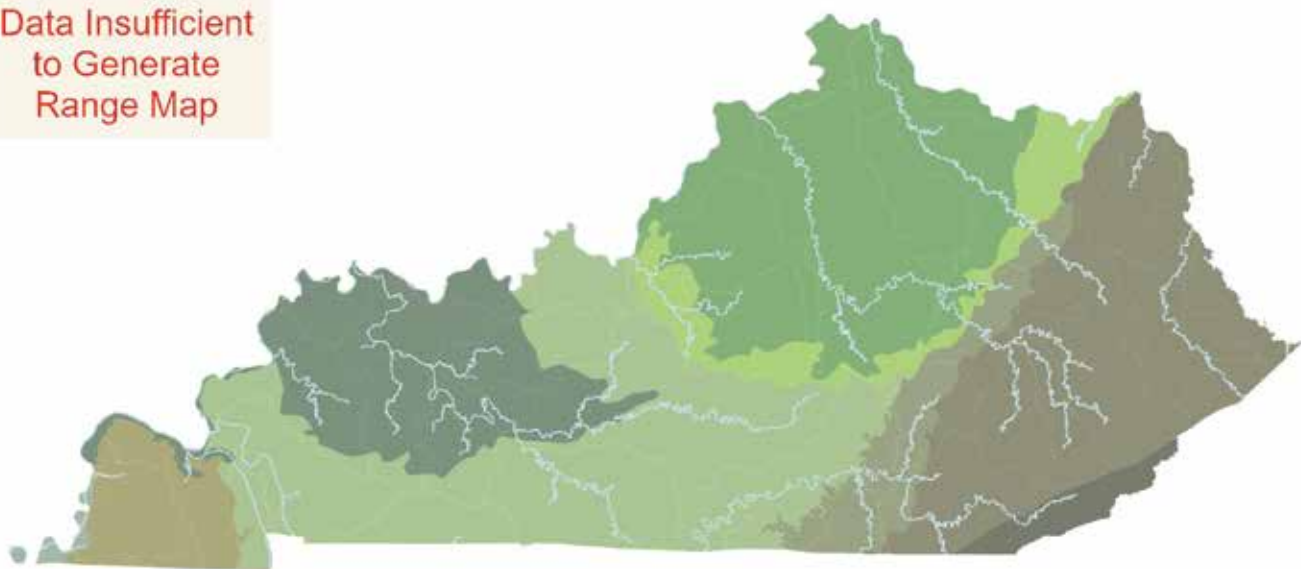
Physiographic Regions: Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Stream Type: Other

Found in rivers and streams of all sizes and appears to show a preference for ephemeral ponds, lakes, and streams.

Range Map

Data Insufficient
to Generate
Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Little Sandy, Little Scioto-Tygarts, Lower Kentucky, Lower Levisa, Lower Tennessee, Red, South Fork Licking, Upper Green

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

FRAGILE ANCYLID

(Ferrissia californica)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Range Map

Data Insufficient
to Generate
Range Map

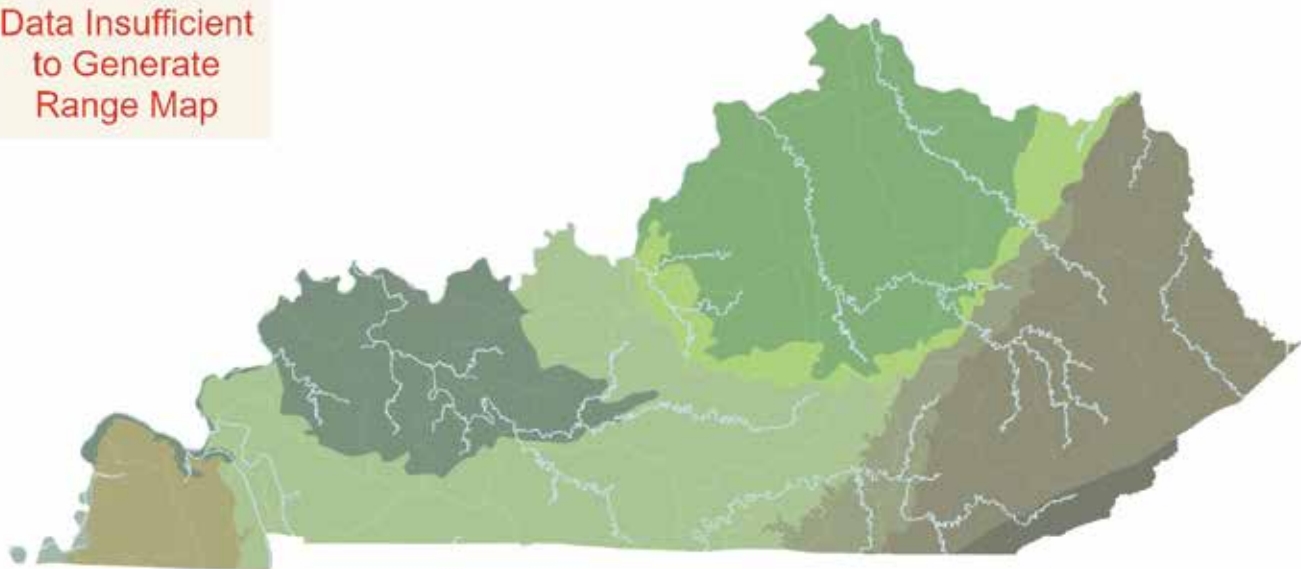
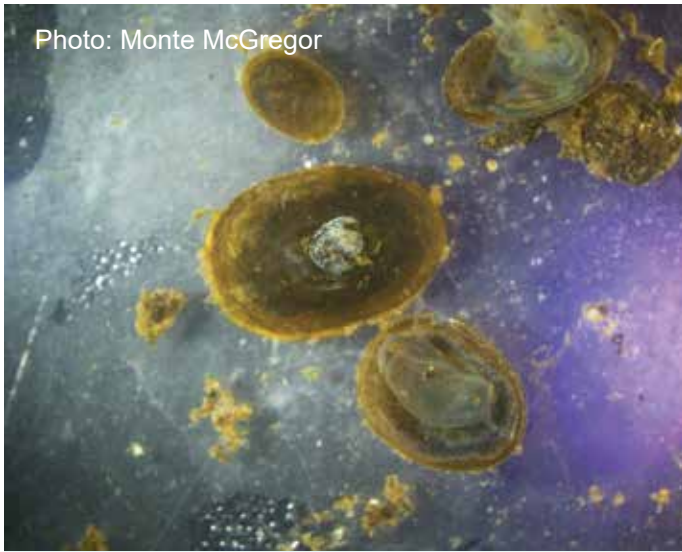


Photo: Monte McGregor



CREEPING ANCYLID

(*Ferrissia rivularis*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Bayou De Chien-Mayfield, Big Sandy, Blue-Sinking, Licking, Little Sandy, Little Scioto-Tygarts, Lower Green, Lower Kentucky, Lower Levisa, Lower Tennessee, Middle Fork Kentucky, Middle Green, Middle Ohio-Laughery, North Fork Kentucky, Obey, Ohio Brush-Whiteoak, Red, Rockcastle, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Tradewater, Tug, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

Range Map

Data Insufficient
to Generate
Range Map

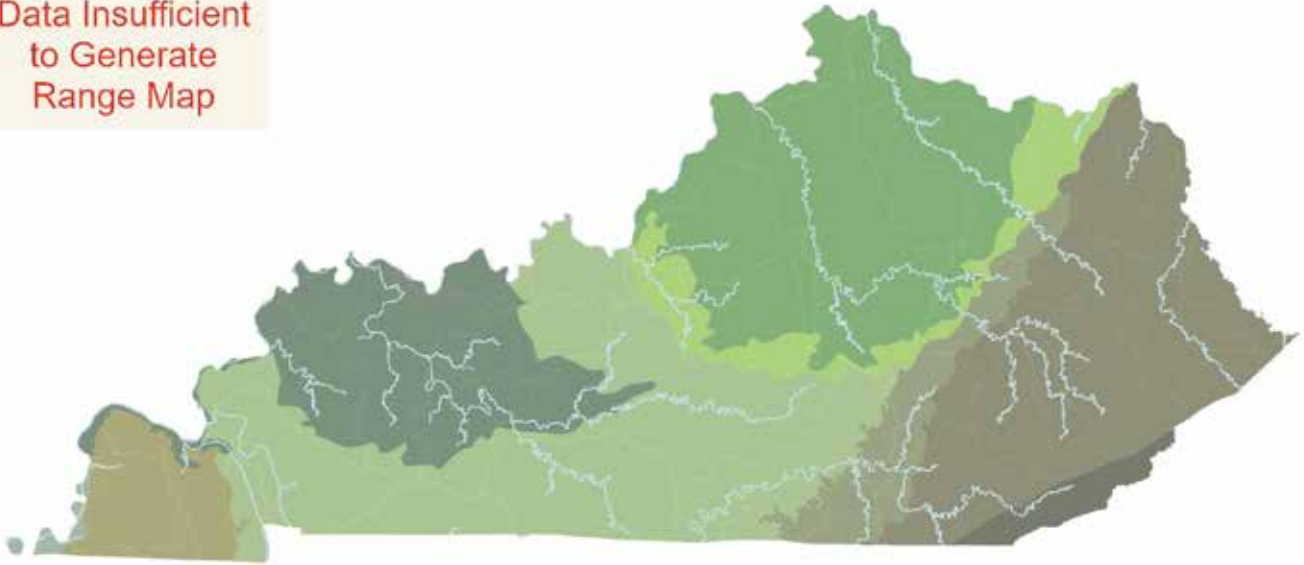


Photo: Monte McGregor



LONGSOLID

(*Fusconaia subrotunda*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S3

Federal Status: Threatened

IUCN Red List: VU - Vulnerable

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed.




Habitat Associations

Current Watersheds: Barren, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Green, Lower Levisa, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, North Fork Kentucky, South Fork Kentucky, Upper Green




Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Host fishes are unknown.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

-  Conservation Payments
-  Education and Awareness
-  External Capacity Building

Needs

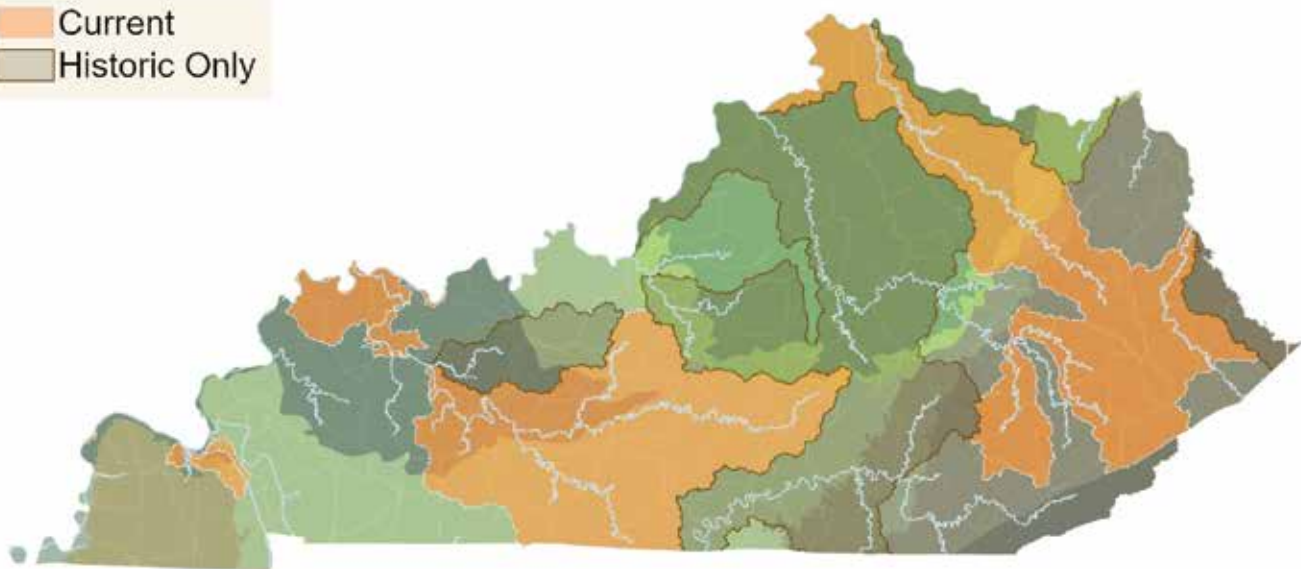
Survey: Monitoring

Survey: Status Surveys

Research: Life History Studies

Research: Propagation and Culture

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

None

Stream Type: None

Typically found in flowing waters of medium to large rivers on channel edges over firm sand and mud substrates.

FLEXED GYRO

(*Gyraulus deflectus*)

Threats

Unknown

Conservation Actions

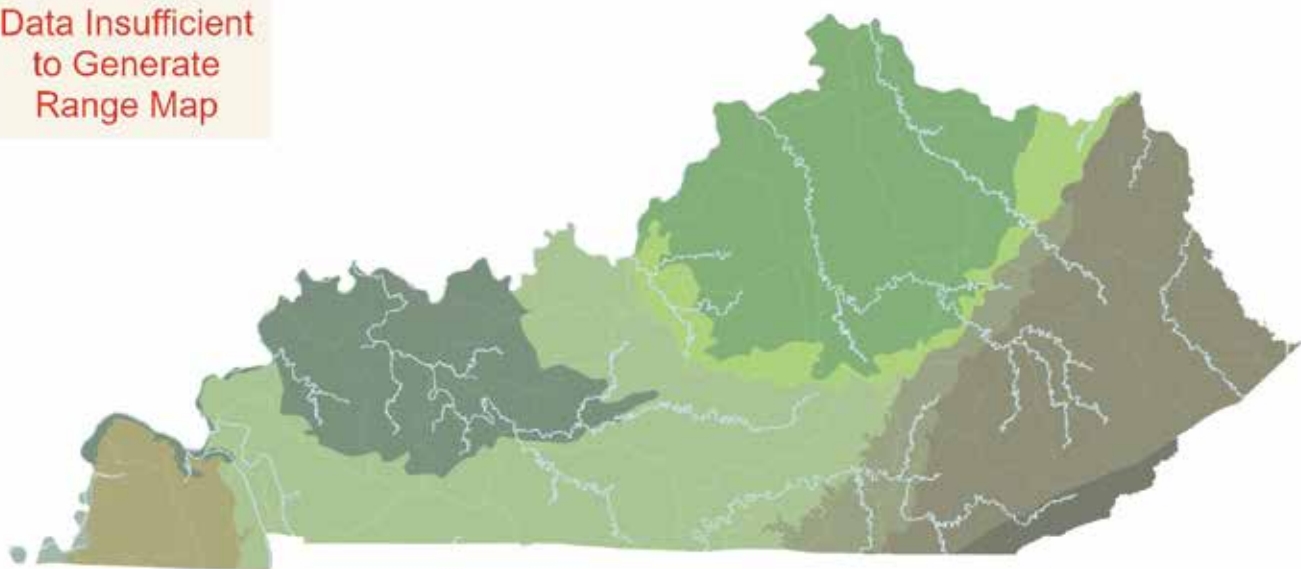
Unknown

Needs

Survey: Status Surveys

Range Map

Data Insufficient
to Generate
Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: LC - Least concern

ASH GYRO

(*Gyraulus parvus*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Bayou De Chien-Mayfield, Blue-Sinking, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Tennessee, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Pond, Rolling Fork, Rough, Salt, Silver-Little Kentucky, Tug, Upper Cumberland

Stream Type: None

Typically found in flowing waters of medium to large rivers on channel edges over firm sand and mud substrates.

Range Map

Data Insufficient
to Generate
Range Map

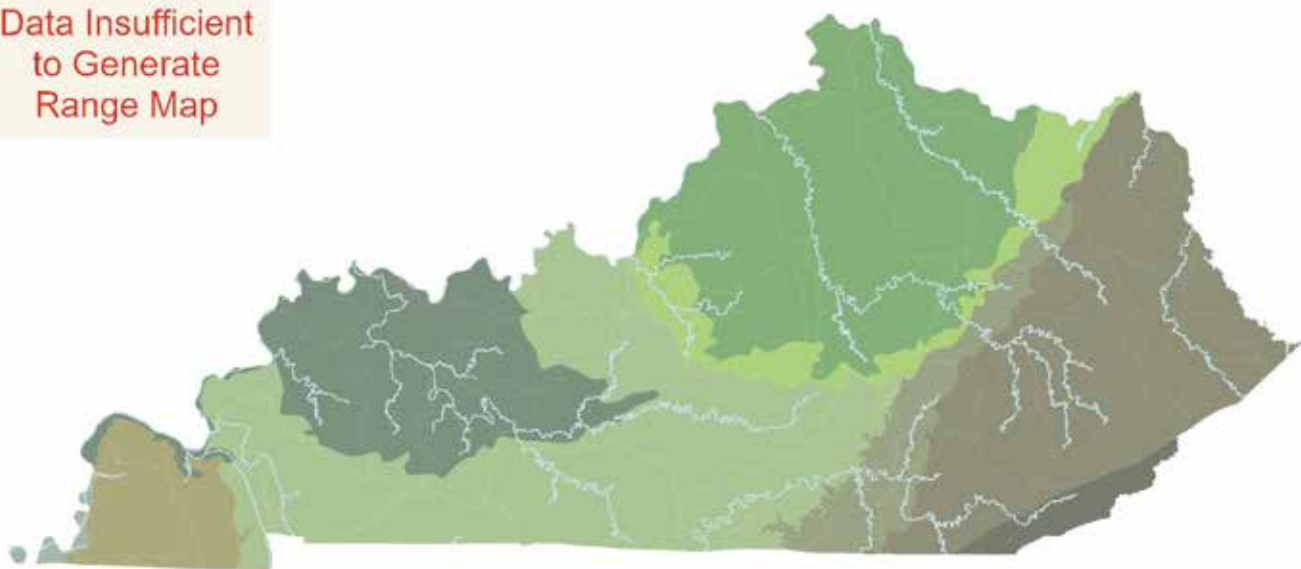


Photo: Monte McGregor



CRACKING PEARLYMUSSEL

(*Hemistena lata*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G1

S Rank: SX

Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Conservation Goal

Reintroduce the species into historic habitat in the Green River from cultured juveniles. Monitor once established at least one area. Establish an ARK population in captivity at KDFWR hatcheries.




Habitat Associations

Current Watersheds: Unknown







Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, minnows.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  

Needs

Survey: Collect baseline species information

Research: Life History Studies

Research: Propagation and Culture

Range Map

Historic Only

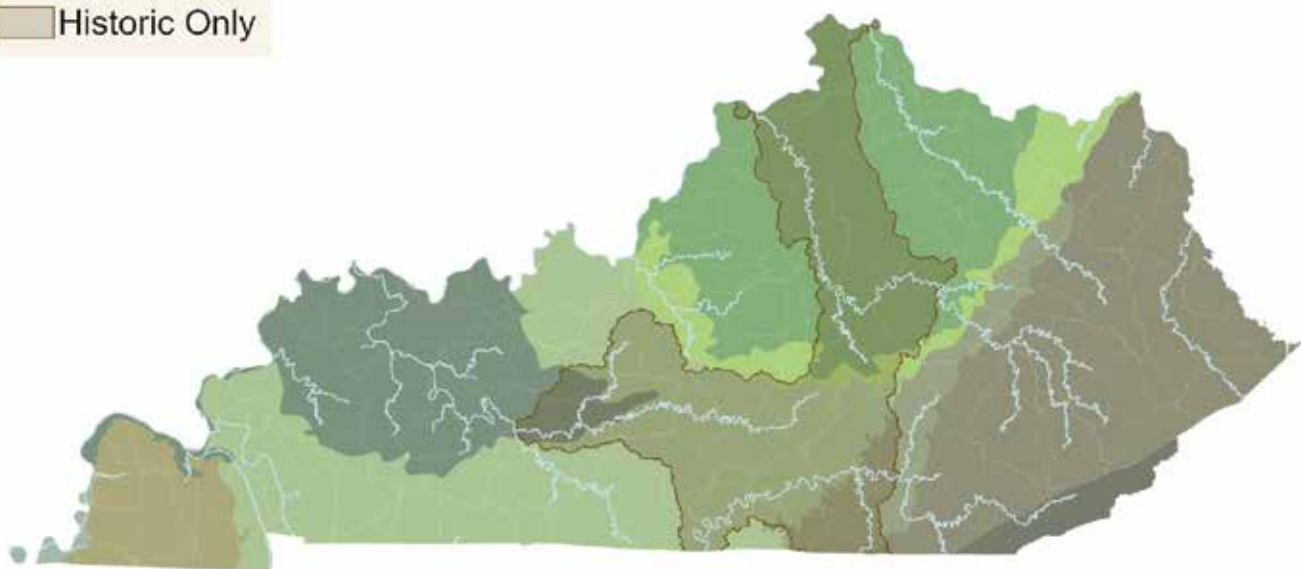
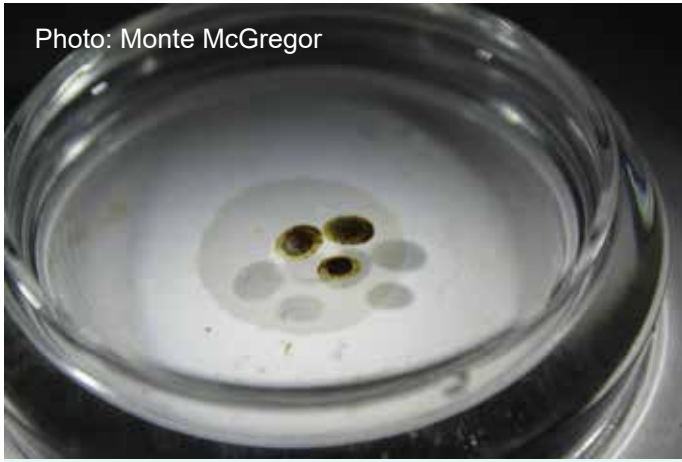


Photo: Monte McGregor



DUSKY ANCYLID

(*Laevapex fuscus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Licking, Lower Cumberland, Lower Kentucky, Lower Ohio-Bay, Lower Tennessee, Middle Fork Kentucky, Middle Green, Middle Ohio-Laughery, North Fork Kentucky, Obion, Ohio Brush-Whiteoak, Red, Rockcastle, Rolling Fork, Salt, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Tradewater, Tug, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

Range Map

Data Insufficient
to Generate
Range Map

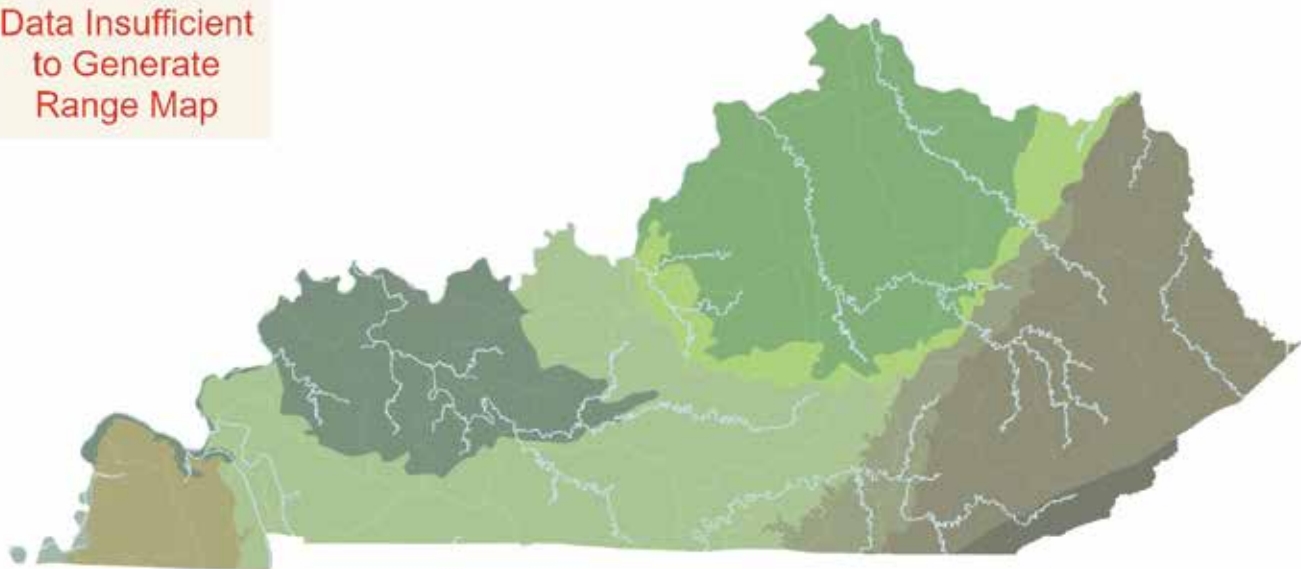


Photo: Monte McGregor



PINK MUCKET

(*Lampsilis abrupta*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G1G2

S Rank: S1

Federal Status: Endangered

IUCN Red List: VU - Vulnerable

Conservation Goal

Reintroduce the species into historic habitat in the Green, Licking and Ohio Rivers from cultured juveniles. Monitor once established at least one reintroduction area.




Habitat Associations

Current Watersheds: Barren, Kentucky Lake, Licking, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Middle Ohio-Laughery, Upper Green, Upper Mississippi-Cape Girardeau









Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates. Habitat is associated with its host fishes, black basses, walleye and sauger.

Threats

-  Agricultural and Forestry Effluents
-  Dams and Water Management/Use
-  Other Ecosystem Modifications

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  
- Species Management  

Needs

Survey: Status Surveys

Research: Collect baseline species information

Research: Monitoring

Range Map

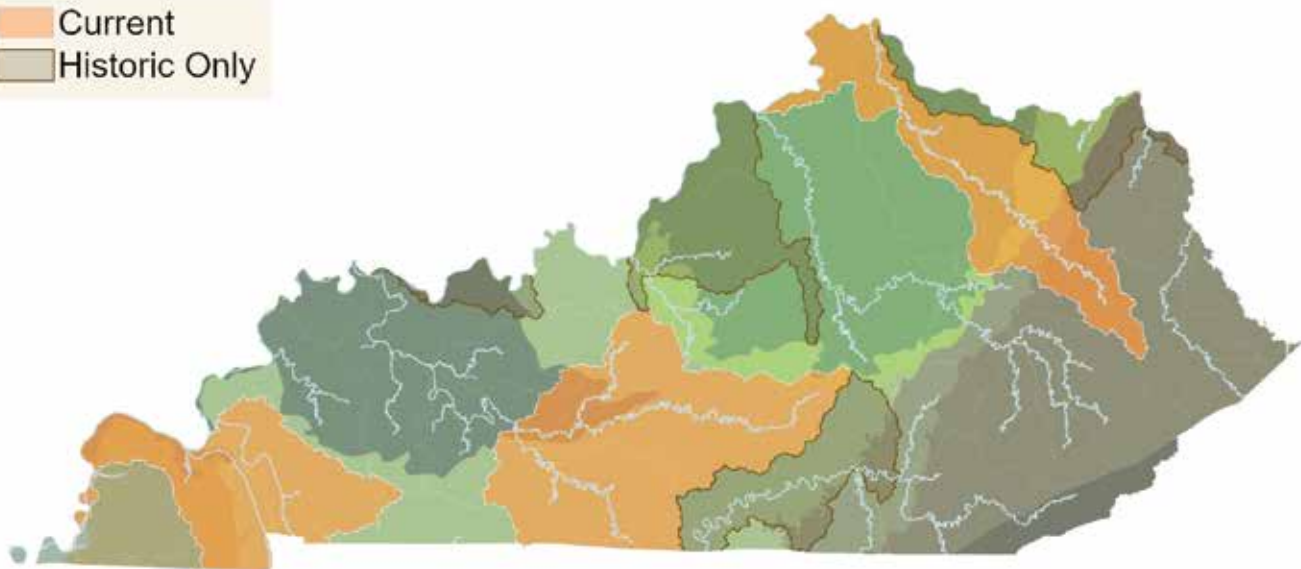


Photo: Monte McGregor



LOUISIANA FATMUCKET

(*Lampsilis hydlana*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Augment existing low population areas with cultured juveniles. Verify species taxonomy with genetics or other methods.



Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Obion











Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in slack waters or pool habitat of medium to large streams over sand, mud and organic debris substrates. Habitat is associated with its host fishes, sunfishes.

Threats

-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Species Management  

Needs

Survey: Status Surveys

Research: Genetic testing

Range Map

Current

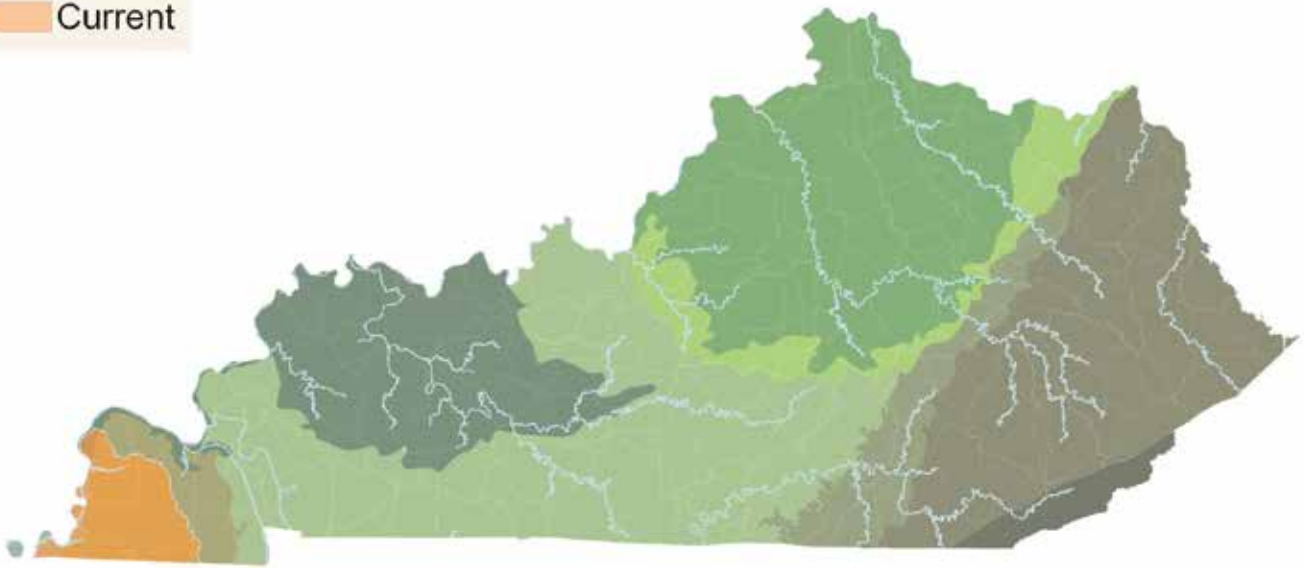


Photo: Monte McGregor



POCKETBOOK

(*Lampsilis ovata*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G5

S Rank: S1









Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  
- Species Management  

Needs

Survey: Monitoring

Research: Collect baseline species information

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed.

Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Raccoon-Symmes, Rockcastle, Rolling Fork, Saline, Silver-Little Kentucky, South Fork Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Mississippi-Cape Girardeau

Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fish, sauger and black basses.

Range Map

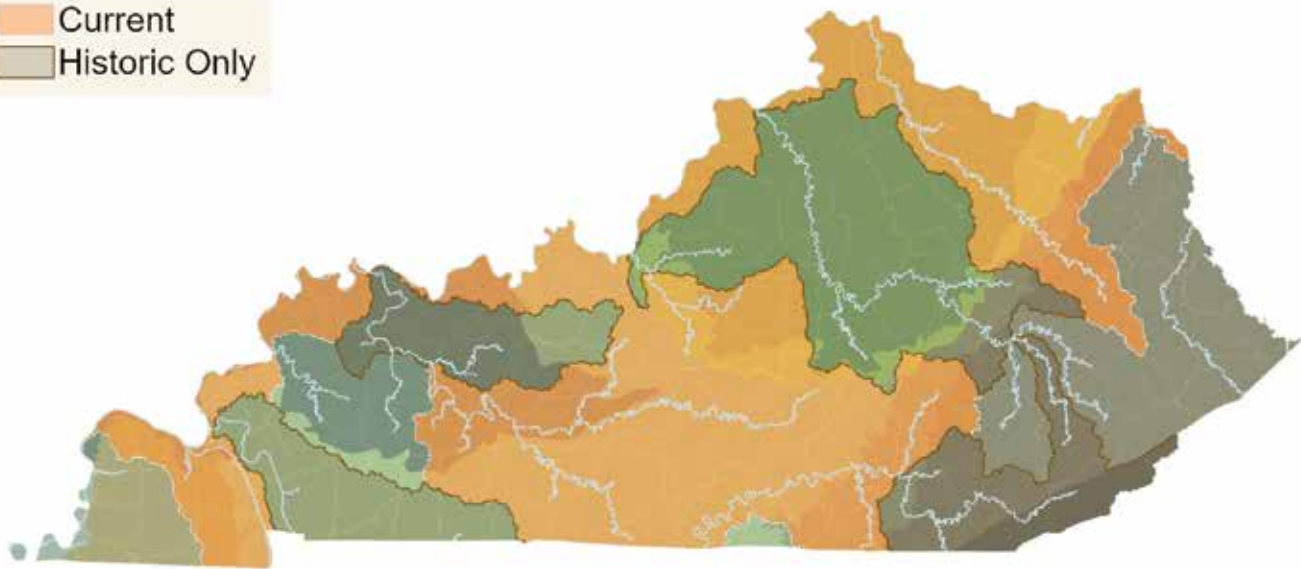


Photo: Monte McGregor



CREEK HEELSPLITTER

(*Lasmigona compressa*)

Conservation Profile

Priority Group: High

KNP Info



G Rank: G5

S Rank: S1






Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- Habitat and Natural Process Restoration 

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Propagation and Culture

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Augment existing low population areas with cultured juveniles.

Habitat Associations

Current Watersheds: Little Scioto-Tygarts, Ohio
Brush-Whiteoak, Raccoon-Symmes

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in flowing waters of small to medium streams over firm sand and gravel substrates. Habitat is associated with a wide variety of host fishes.

Range Map

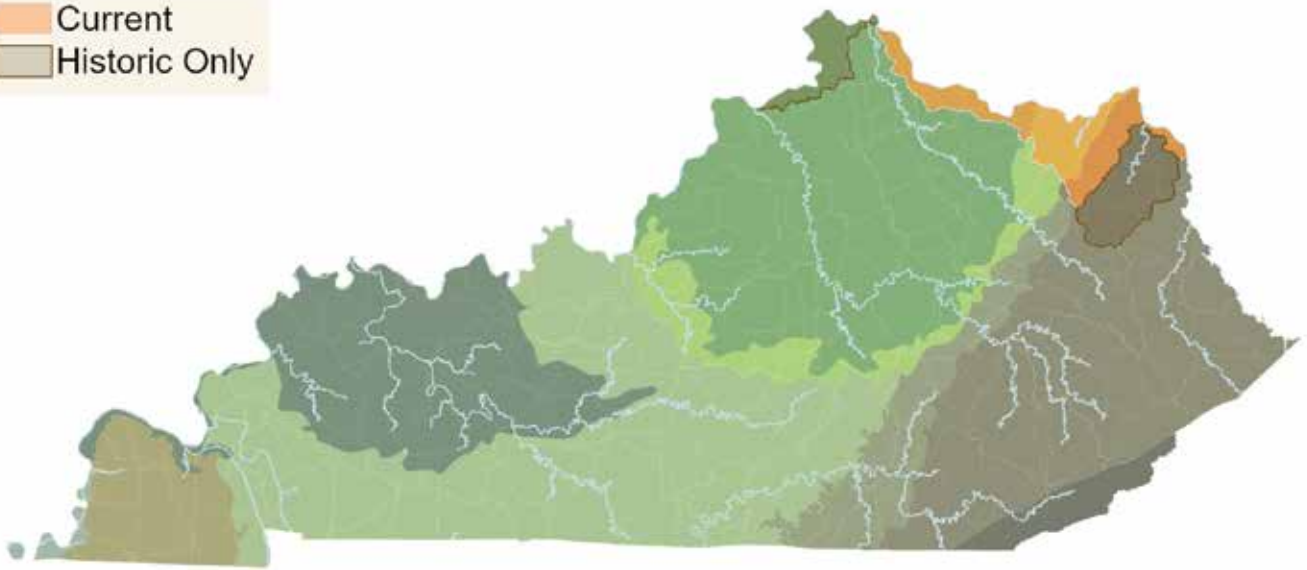


Photo: Monte McGregor



LITTLE SPECTACLECASE

(*Leaunio lienosus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S2S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed.



Habitat Associations

Current Watersheds: Barren, Bayou De Chien-Mayfield, Highland-Pigeon, Little Sandy, Lower Green, Lower Kentucky, Lower Levisa, Lower Tennessee, Middle Fork Kentucky, Middle Green, Obion, Ohio Brush-Whiteoak, Pond, Rockcastle, Rolling Fork, Rough, South Fork Kentucky, Upper Green, Upper Kentucky

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

None

Threats

-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- Habitat and Natural Process Restoration 

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Genetic Testing

Research: Propagation and Culture

Range Map

Current
Historic Only

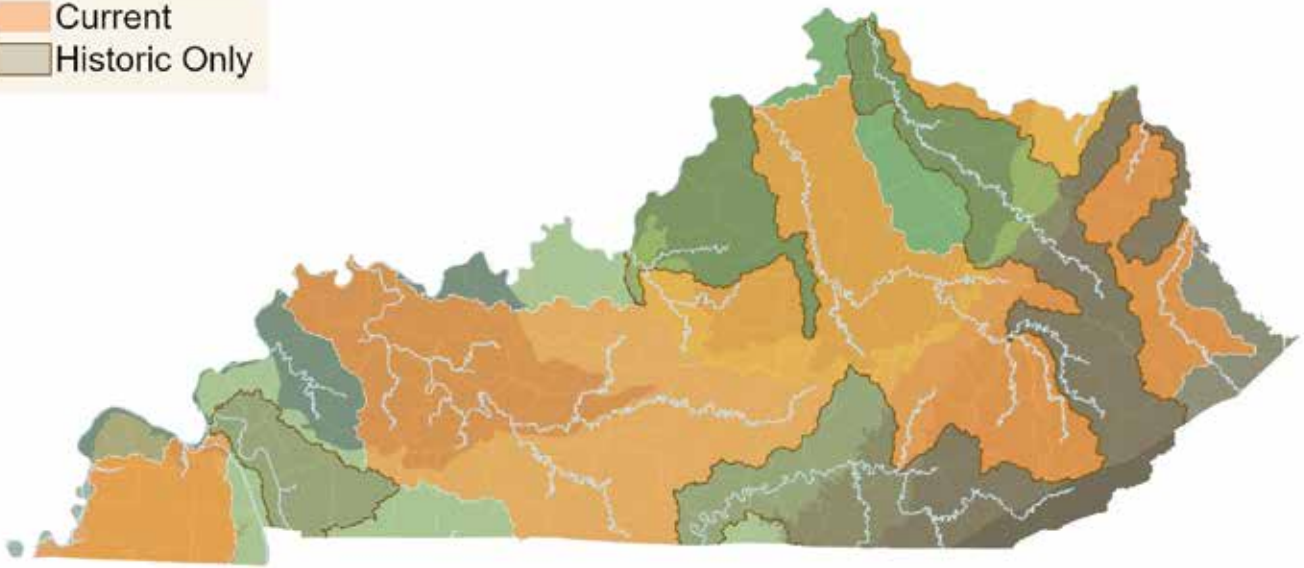


Photo: Monte McGregor



KENTUCKY CREEKSHELL

(*Leaunio ortmanni*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2

S Rank: S1S2

Federal Status: Not Listed

IUCN Red List: N/A

Conservation Goal

Monitor at least two populations with at least one area every three to six years with quantitative sampling. Augment existing low population areas with cultured juveniles. Verify species taxonomy with genetics or other methods.




Habitat Associations

Current Watersheds: Barren, Rough, Upper Green









Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confining-Medium River

Typically found in flowing waters of small, medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, sculpin.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Awareness and Communications  
- Conservation Payments  
- External Capacity Building  
- Species Management  

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Augmentation and Reintroduction

Research: Genetic Testing

Range Map

Current

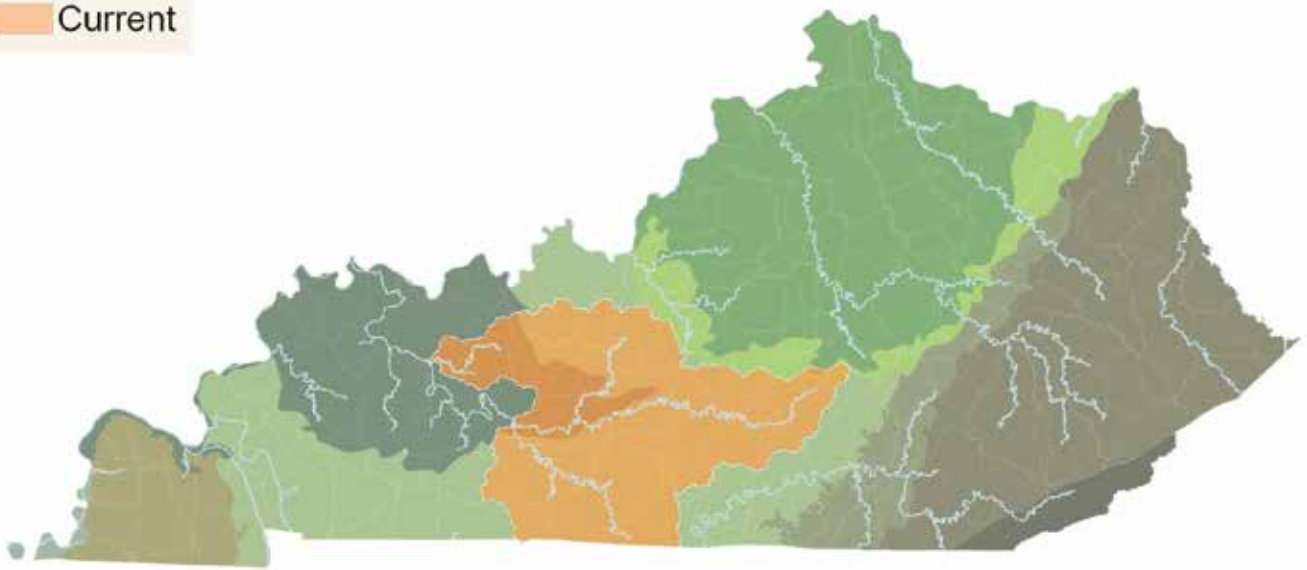


Photo: Monte McGregor



DWARF RAINBOW

(*Leaunio pataecus*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: GNR

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods. Develop culture and propagation methods. Establish an ARK population in captivity at KDFWR hatcheries.




Habitat Associations

Current Watersheds: Lower Cumberland

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Host fish is unknown.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Awareness and Communications  
- Conservation Payments  
- External Capacity Building 
- Habitat and Natural Process Restoration 

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Genetic Testing

Research: Propagation and Culture

Range Map

Current

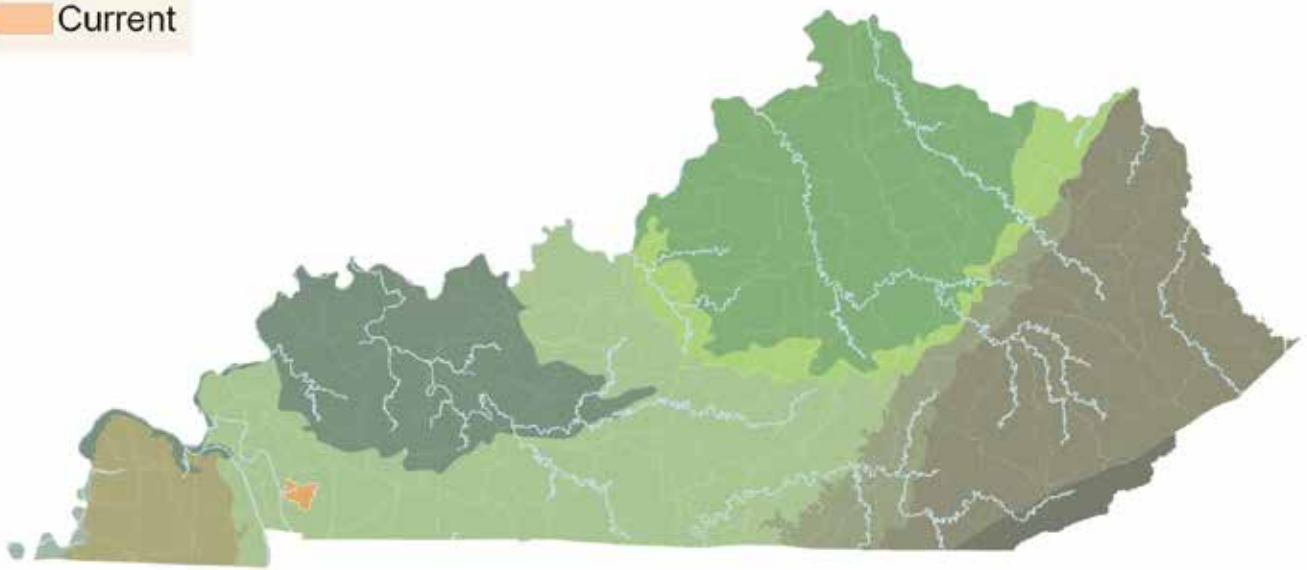


Photo: Monte McGregor



MOUNTAIN CREEKSHELL

(*Leaunio vanuxemensis*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: GNR

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.




Habitat Associations

Current Watersheds: Lower Cumberland, Red











Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, sculpins.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Awareness and Communications  
- Conservation Payments  
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Species Management  

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Genetic Testing

Range Map

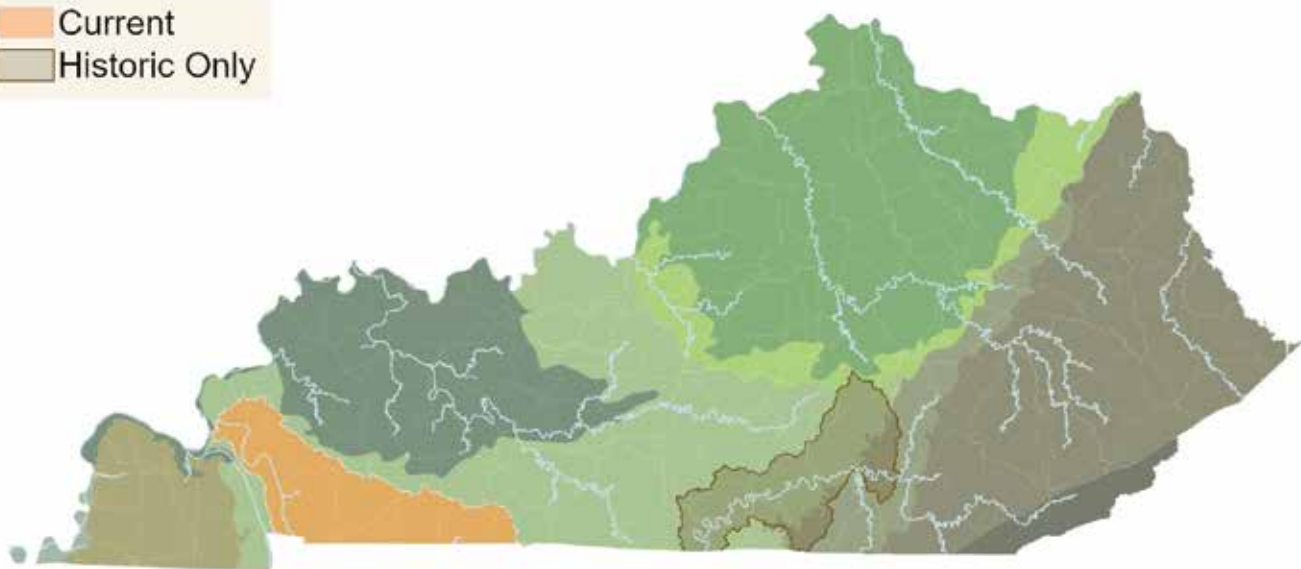


Photo: Monte McGregor



SCALESHELL

(*Leptodea leptodon*)

Conservation Profile

Priority Group: Moderate

KNP Info




G Rank: G1G2

S Rank: SX







Federal Status: Endangered

IUCN Red List: NT - Near threatened

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  

Needs

Survey: Collect baseline species information

Research: Augmentation and Reintroduction

Research: Propagation and Culture

Conservation Goal

Reintroduce the species into historic habitat from cultured juveniles, mostly the Green River. Monitor once established at least one area. Establish an ARK population in captivity at KDFWR hatcheries.

Habitat Associations

Current Watersheds: Unknown

Stream Type: Warm-Confined-Medium River,
Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates. Habitat is associated with its host fish, the freshwater drum.

Range Map

Historic Only

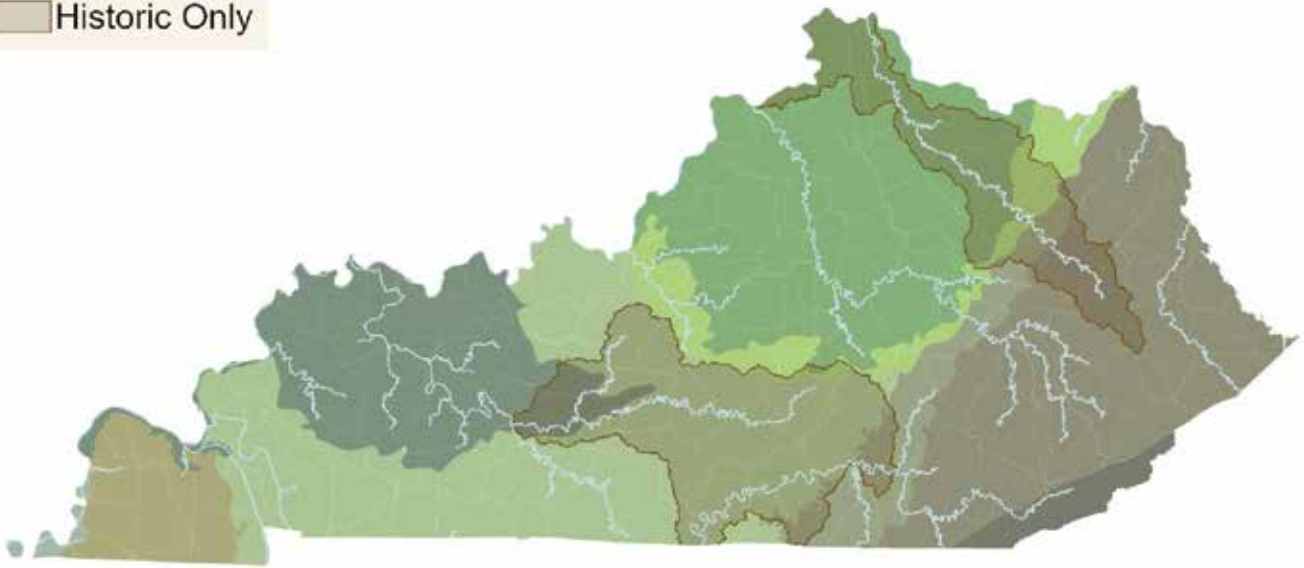


Photo: Monte McGregor



ONYX ROCKSNAIL

(*Leptoxis praerosa*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S3S4

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

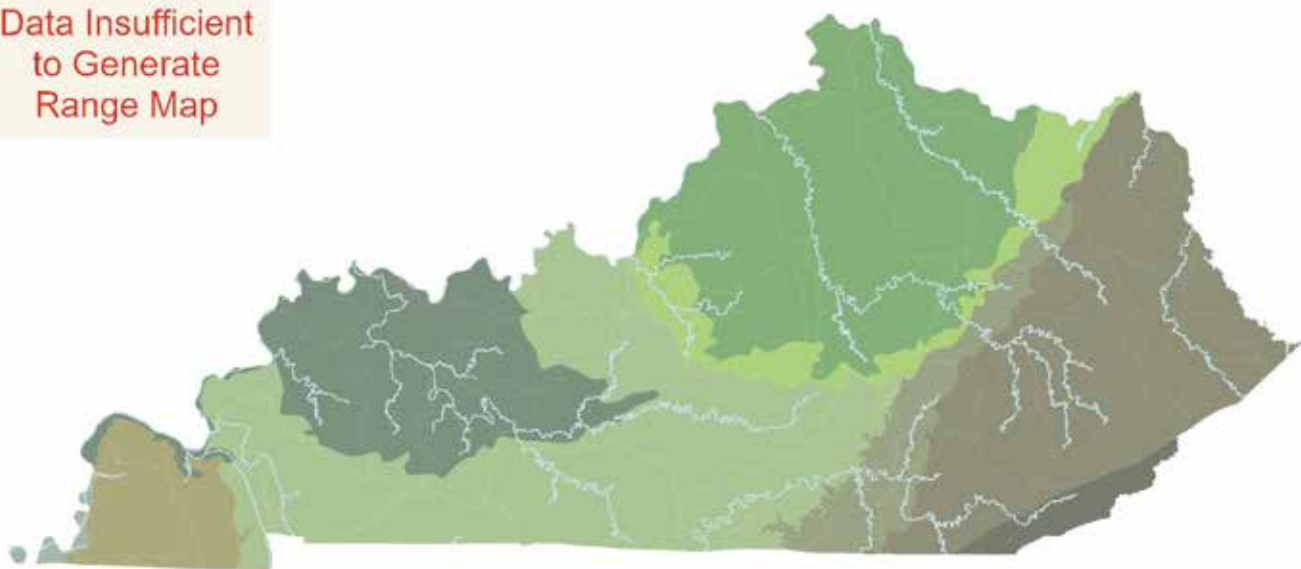
Current Watersheds: Barren, Licking, Lower Kentucky, Lower Ohio, Middle Ohio-Laughery, Red, Rockcastle, Silver-Little Kentucky, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green

Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

Range Map

Data Insufficient
to Generate
Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: GX

S Rank: SU

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Physiographic Regions: Bluegrass

Stream Type: Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

BROAD MUDALIA

(*Leptoxis trilineata*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Range Map

Data Insufficient
to Generate
Range Map

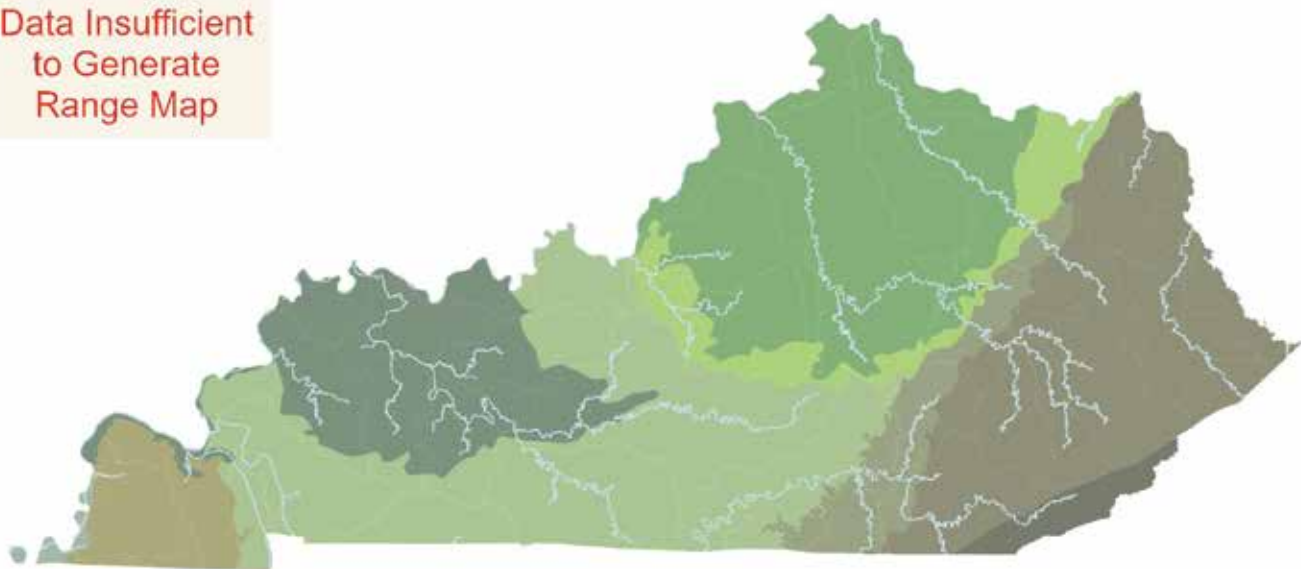


Photo: Monte McGregor



BLACK SANDSHELL

(*Ligumia recta*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4G5

S Rank: S4

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal




Monitor three populations with at least one area every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas with cultured juveniles.

Habitat Associations









Current Watersheds: Barren, Bayou De Chien-Mayfield, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Green, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Rockcastle, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Licking, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Levisa, Upper Mississippi-Cape Girardeau

Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Awareness and Communications  
- Conservation Payments  
- External Capacity Building  
- Species Management  

Needs

Survey: Collect baseline species information

Survey: Monitoring

Survey: Status Surveys

Research: Augmentation and Reintroduction

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, darters.

Range Map

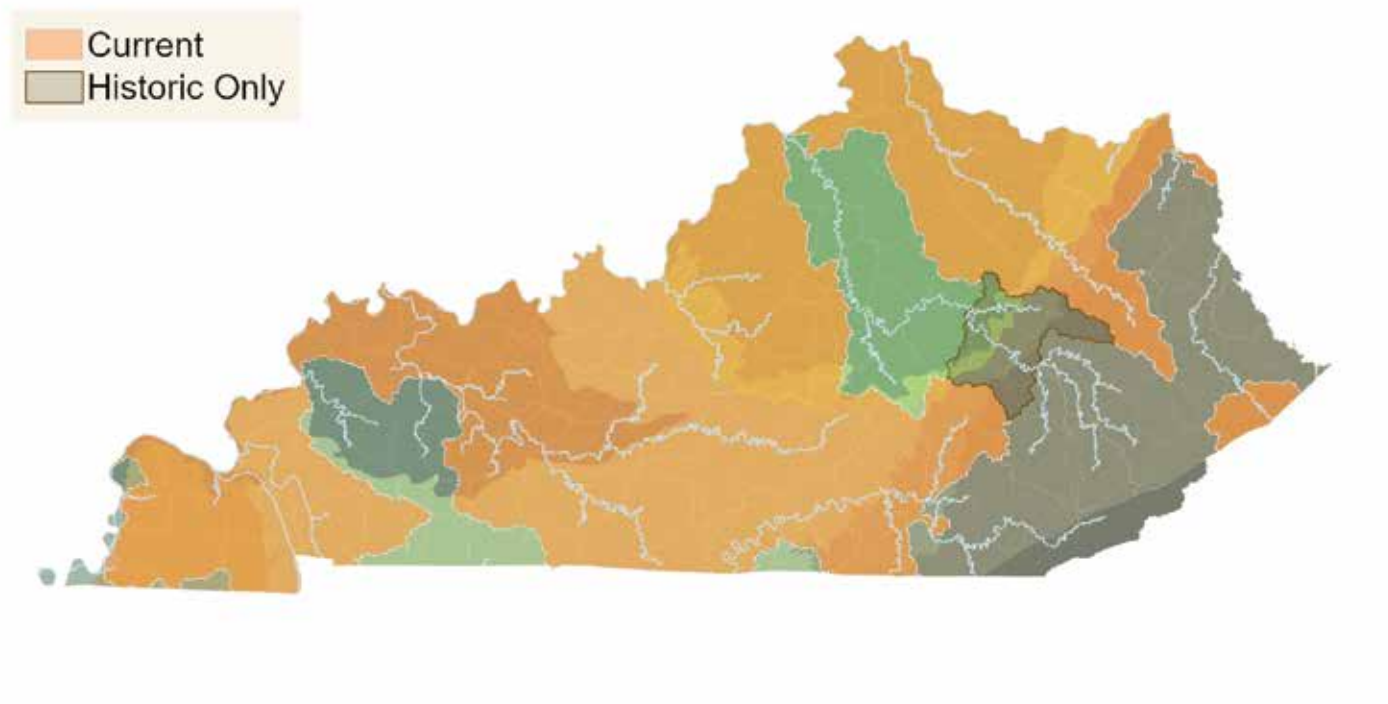


Photo: Monte McGregor



FURROWED LIOPLAX

(*Lioplax sulculosa*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S3S4

Federal Status: N/A

IUCN Red List: N/A

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Licking, Lower Kentucky, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Rough, Salt, South Fork Licking

Stream Type: Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

Range Map

Data Insufficient
to Generate
Range Map

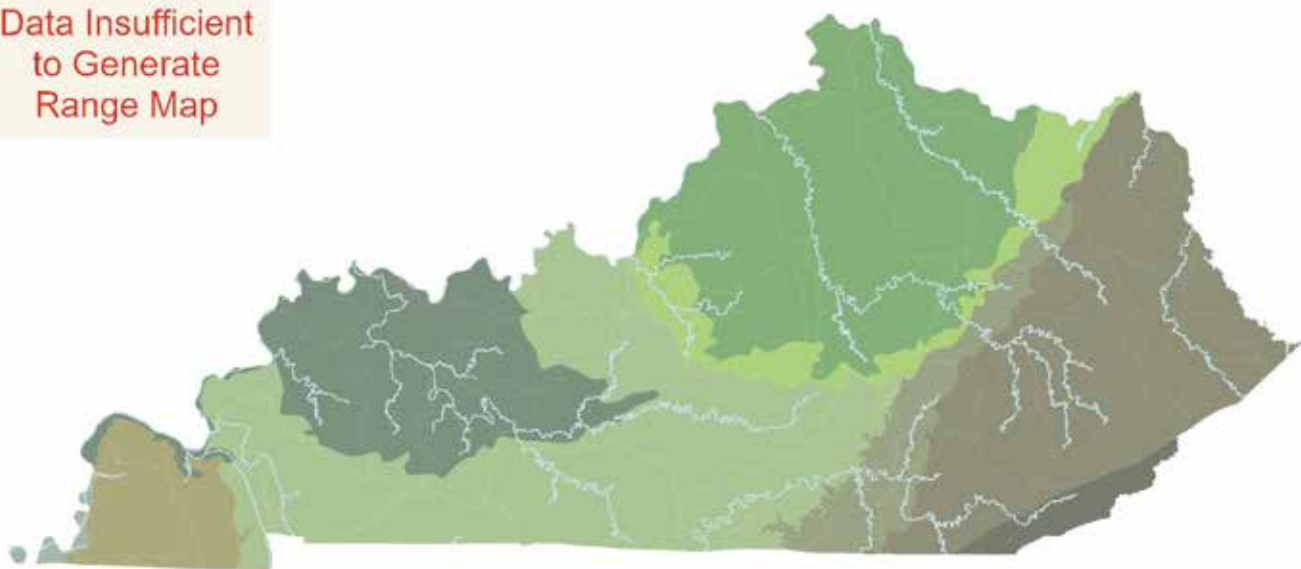


Photo: Monte McGregor



ARMORED ROCKSNAIL

(*Lithasia armigera*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3G4

S Rank: S3S4

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Highland-Pigeon, Kentucky Lake, Lower Cumberland, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Red, Upper Cumberland-Lake Cumberland

Stream Type: Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Life History Studies

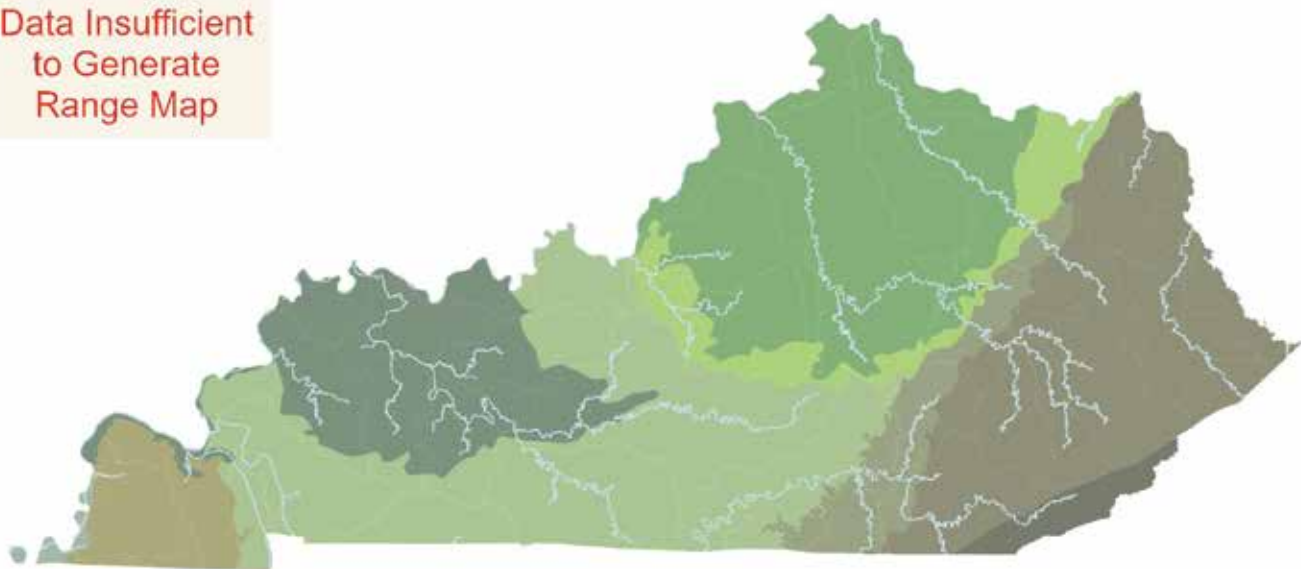
Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Range Map

Data Insufficient
to Generate
Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G1

S Rank: SNR

Federal Status: N/A

IUCN Red List: DD - Data deficient

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain


Stream Type: Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

KNOBBY ROCKSNAIL

(*Lithasia curta*)

Threats

 Other Ecosystem Modifications

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Range Map

Data Insufficient
to Generate
Range Map

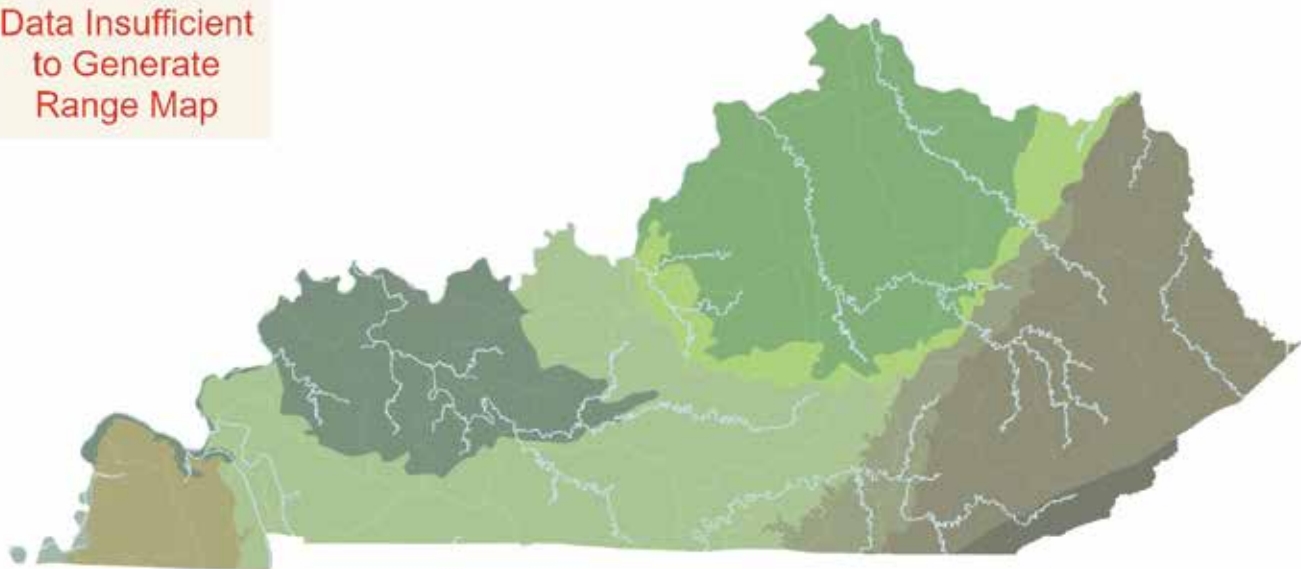


Photo: Monte McGregor



ORNATE ROCKSNAIL

(*Lithasia geniculata*)

Conservation Profile

Priority Group: Data Deficient

KNP Info



G Rank: G3Q

S Rank: S1

Federal Status: N/A

IUCN Red List: NT - Near threatened

Threats

-  Dams and Water Management/Use
-  Pollution

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

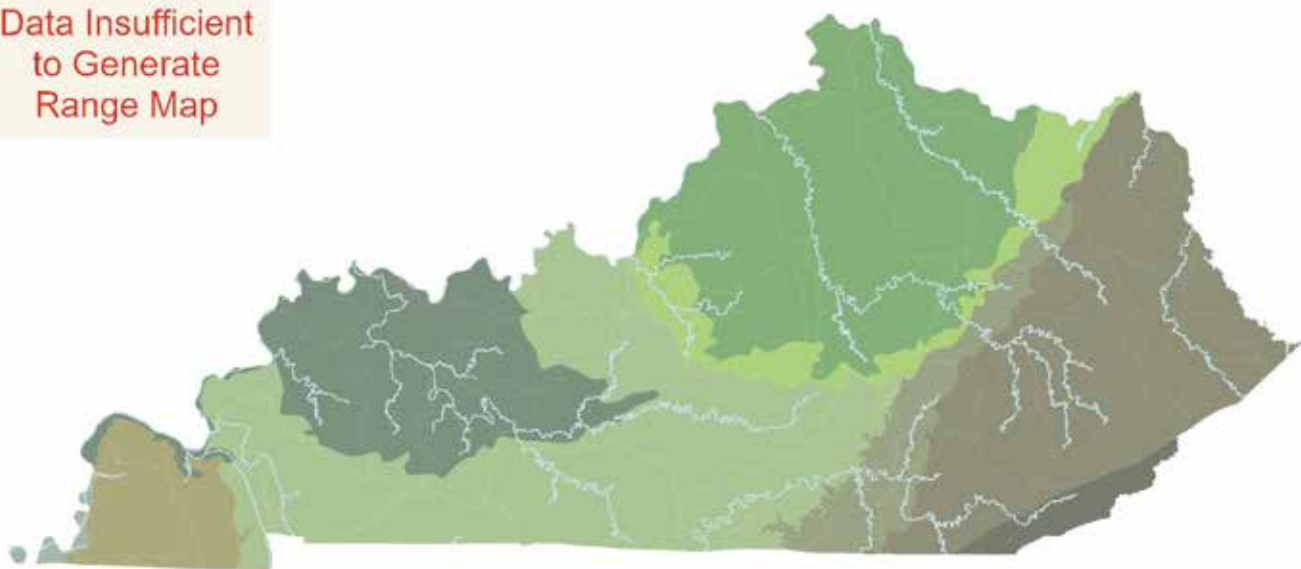
Physiographic Regions: Plateau Escarpment, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Stream Type: Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

Range Map

Data Insufficient
to Generate
Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G2G3Q

S Rank: S2S4

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills

Stream Type: Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

MUDDY ROCKSNAIL

(*Lithasia salebrosa*)

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Range Map

Data Insufficient
to Generate
Range Map

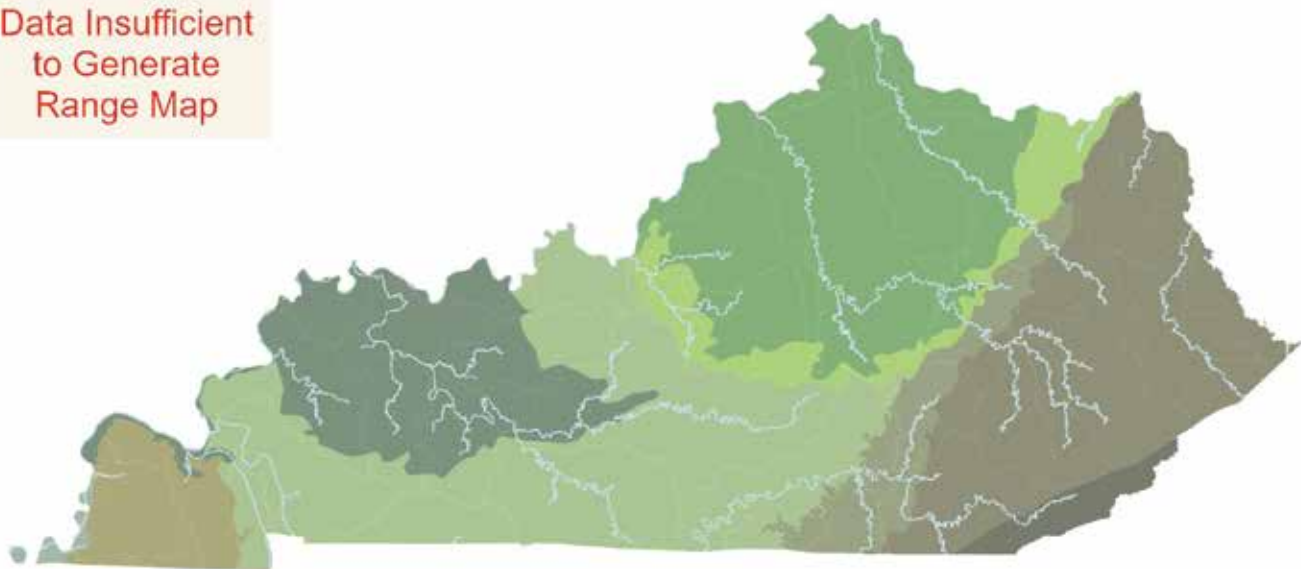


Photo: Monte McGregor



VARICOSE ROCKSNAIL

(*Lithasia verrucosa*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4Q

S Rank: S3S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Physiographic Regions: Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Stream Type: Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

Range Map

Data Insufficient
to Generate
Range Map

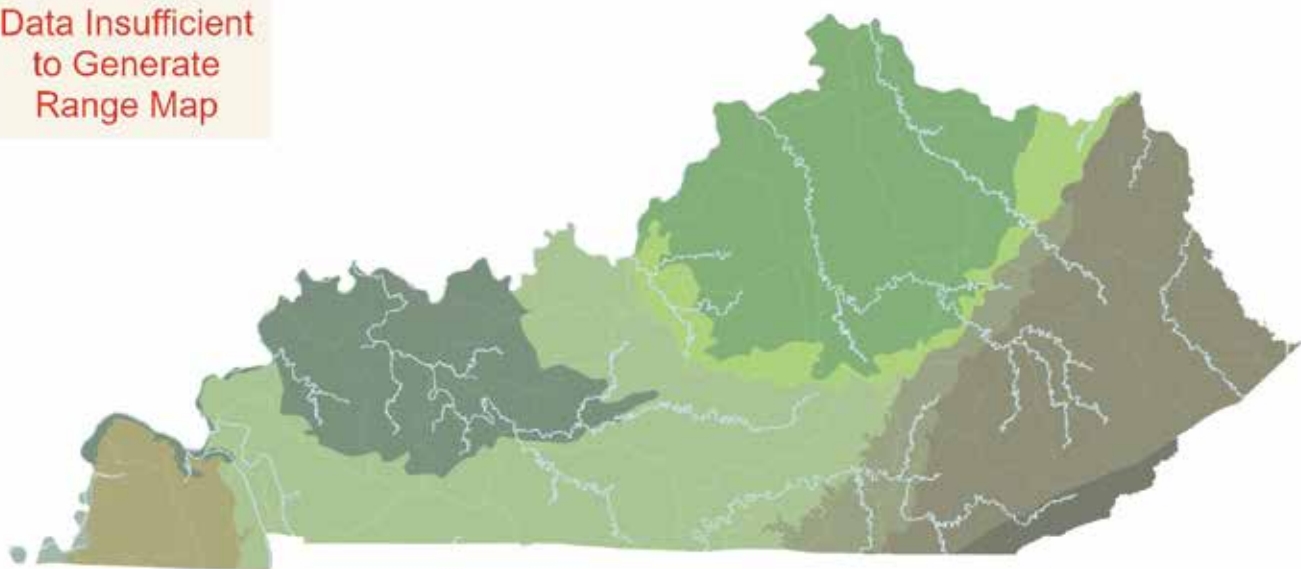


Photo: Monte McGregor



CUMBERLAND MOCCASINSHELL

(*Medionidus conradicus*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G3G4

S Rank: S1S2

Federal Status: Not Listed

IUCN Red List: NT - Near threatened

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Augment existing low population areas if needed. Establish an ARK population in captivity at KDFWR hatcheries.



Habitat Associations

Current Watersheds: Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland




Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, darters.

Threats

-  Natural System Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Awareness and Communications  
- Conservation Payments  
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Species Management  

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Augmentation and Reintroduction

Range Map

Current
Historic Only

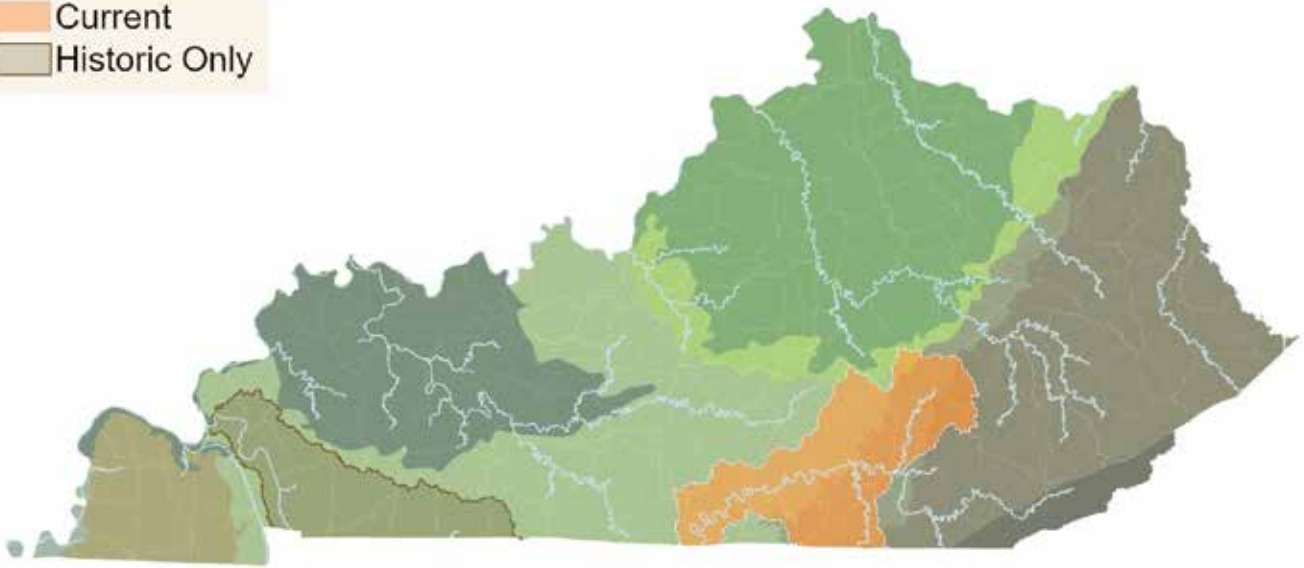


Photo: Monte McGregor



HICKORYNUT

(*Obovaria olivaria*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S4S5

Federal Status: N/A

IUCN Red List: LC - Least concern

The Hickorynut has declined in most of the state and is now restricted to the lower Ohio River and lower Cumberland Rivers.

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Verify species taxonomy with genetics or other methods. Develop culture and propagation methods.




Habitat Associations

Current Watersheds: Barren, Bayou De Chien-Mayfield, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Lower Cumberland, Lower Green, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Upper Green, Upper Mississippi-Cape Girardeau









Stream Type: Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of large rivers in main channels over firm sand, gravel, and mud substrates. Habitat is associated with its host fishes, lake and shovelnose sturgeon.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  
- Species Management  

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Range Map

Current
Historic Only

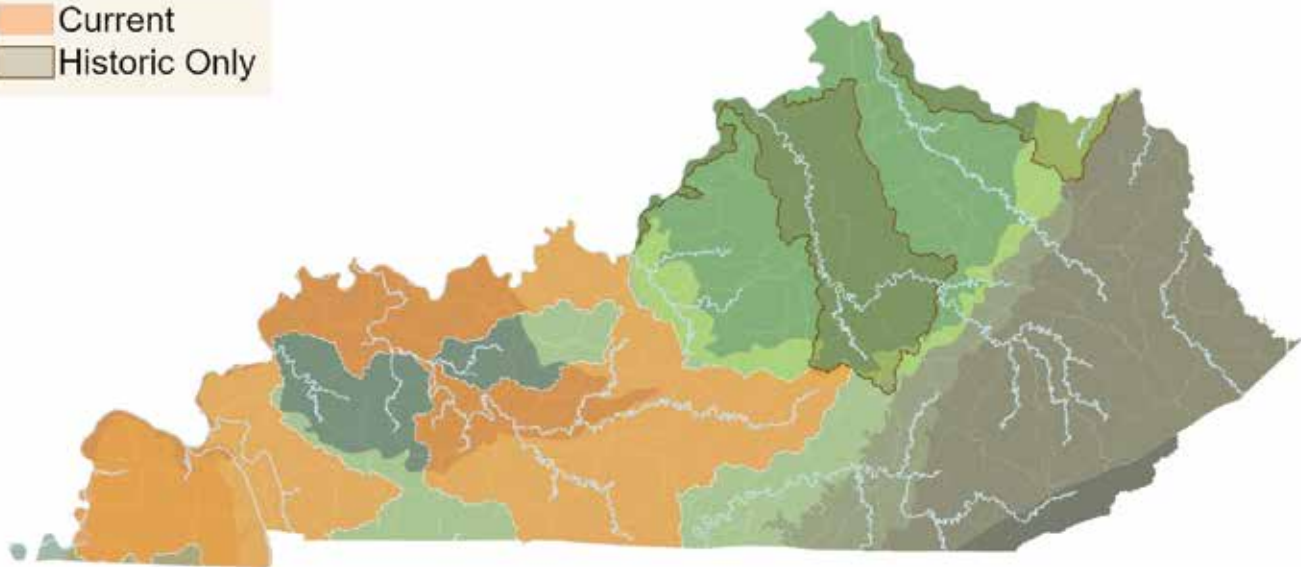




Photo: Monte McGregor

RING PINK

(*Obovaria retusa*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Conservation Goal

Locate live individuals for culture and propagation. Survey for new areas with qualitative methods to establish long-term monitoring sites. Develop culture and propagation methods. Establish an ARK population in captivity at KDFWR hatcheries.




Habitat Associations

Current Watersheds: Upper Green




Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates. Host fish is unknown.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

-  Conservation Payments
-  Education and Awareness
-  External Capacity Building

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Establish a Captive Population

Research: Genetic testing

Research: Life History Studies

Research: Propagation and Culture

Range Map

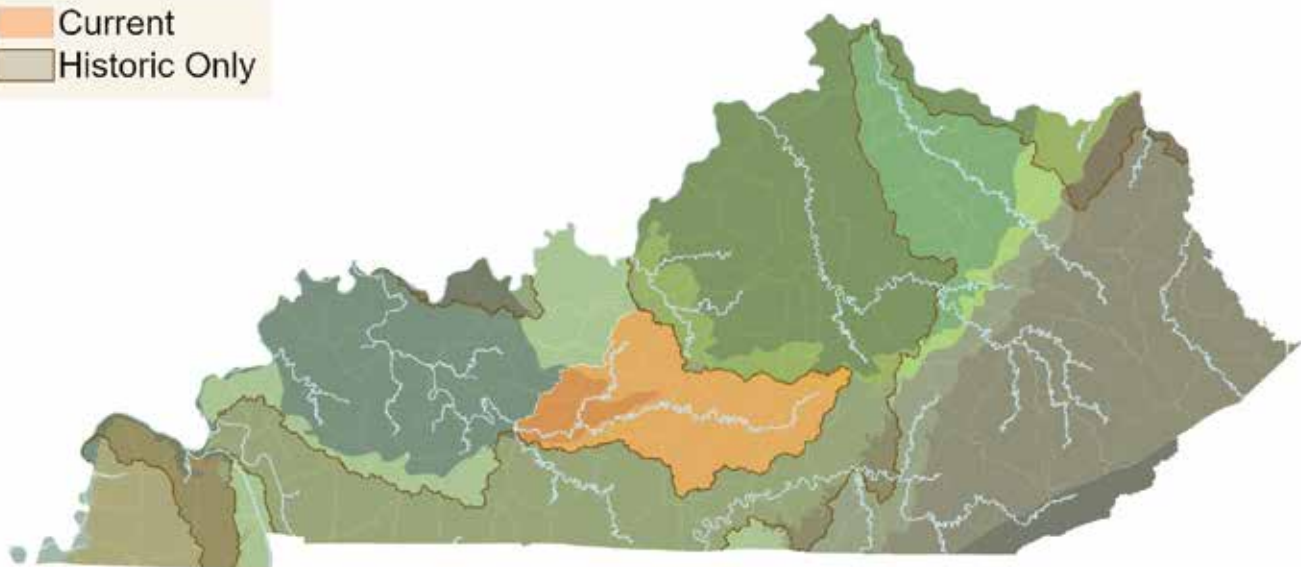


Photo: Monte McGregor



ROUND HICKORYNUT

(*Obovaria subrotunda*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2S3

Federal Status: Threatened

IUCN Red List: EN - Endangered

Conservation Goal

Monitor at least two populations with at least one area every three to six years with quantitative sampling. Augment existing low population areas if needed.




Habitat Associations

Current Watersheds: Highland-Pigeon, Licking, Middle Fork Kentucky, South Fork Kentucky, South Fork Licking, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky









Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of small, medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, darters.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  
- Species Management  

Needs

Survey: Collect baseline species information

Survey: Monitoring

Survey: Status Surveys

Research: Augmentation and Reintroduction

Range Map

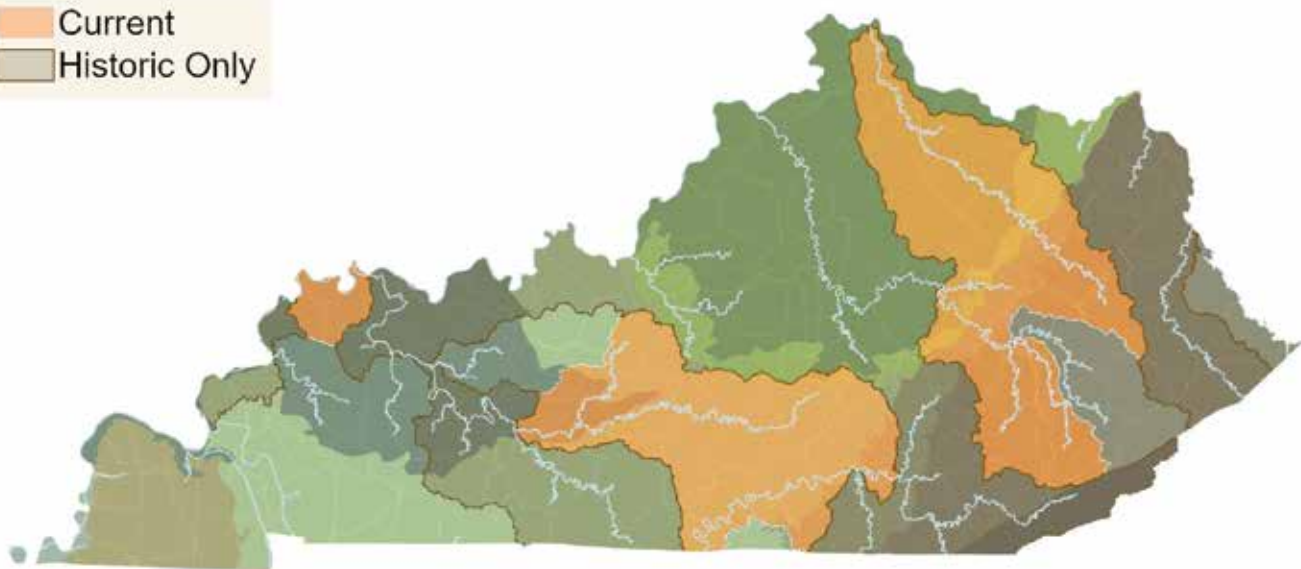


Photo: Monte McGregor



RAYED BEAN

(*Paetulunio fabalis*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G2

S Rank: SX

Federal Status: Endangered

IUCN Red List: EN - Endangered

Conservation Goal

Reintroduce the species into historic habitat from cultured juveniles or translocated adults. Monitor once established at least one area. Establish an ARK population in captivity at KDFWR hatcheries.




Habitat Associations

Current Watersheds: Licking









Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, darters.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Species Management  

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Genetic Testing

Research: Life History Studies

Range Map

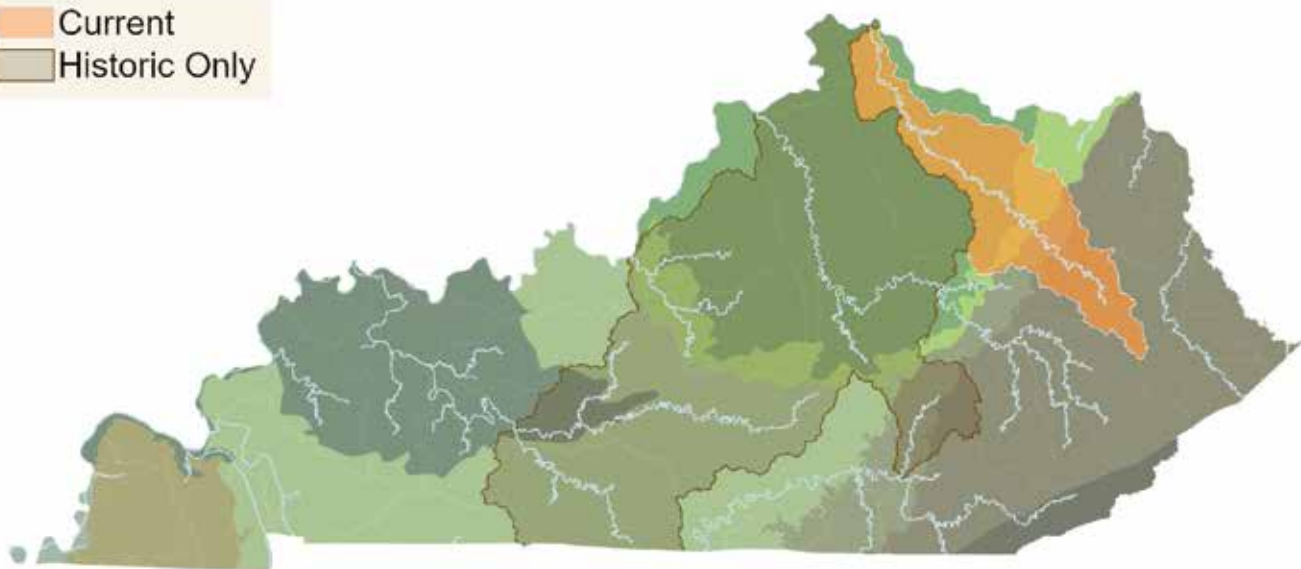
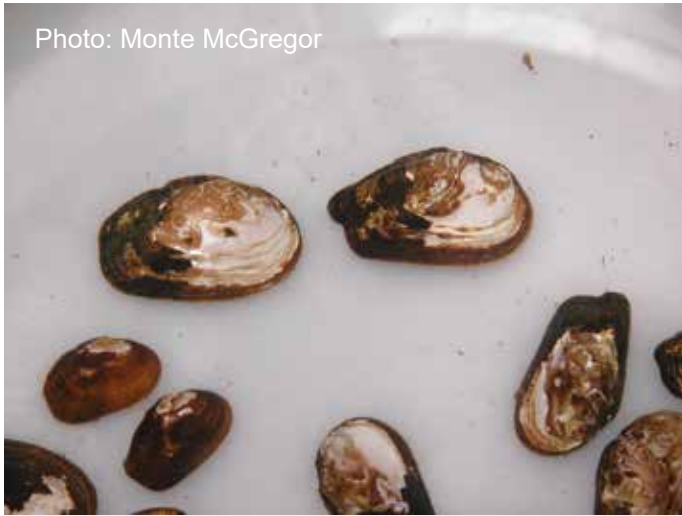


Photo: Monte McGregor



LITTLEWING PEARLYMUSSEL

(*Pegias fabula*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed. Establish an ARK population in captivity at KDFWR hatcheries.




Habitat Associations

Current Watersheds: Rockcastle, South Fork Cumberland

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, darters.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- Habitat and Natural Process Restoration 

Needs

Survey: Monitoring

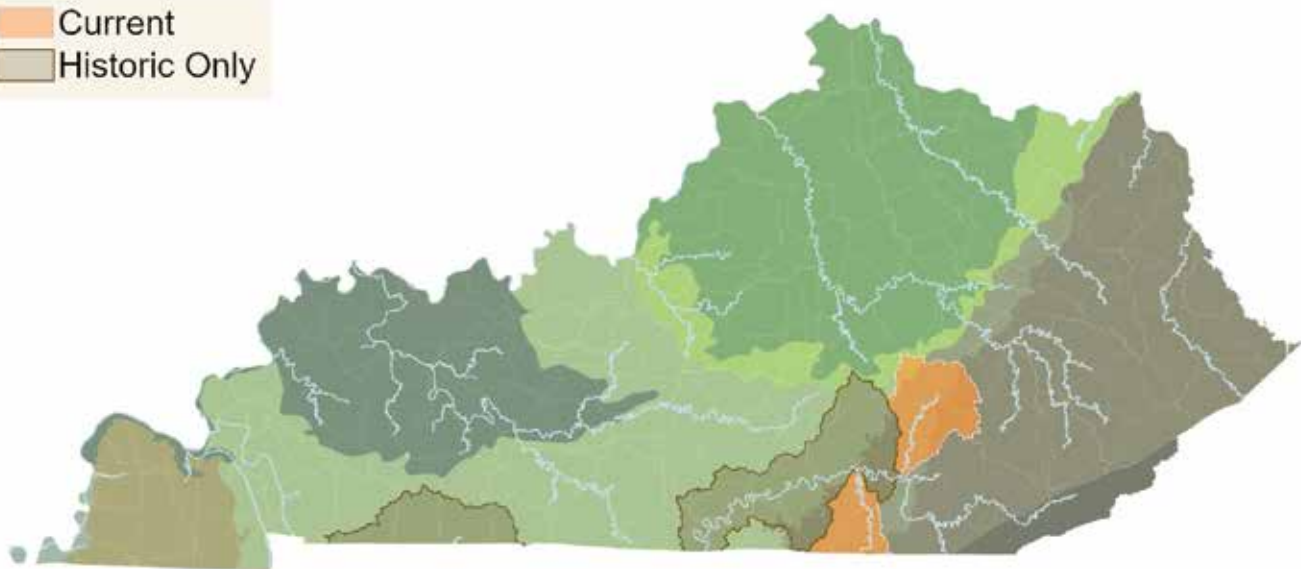
Survey: Status Surveys

Research: Augmentation and Reintroduction

Research: Life History Studies

Research: Propagation and Culture

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Lower Ohio-Bay, Rolling Fork, Salt, Upper Green

Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in slack waters of medium to large rivers in side channels over sand, mud and organic debris substrates.

CLAIBORNE PHYSA

(*Physa pomilia*)

Threats

Unknown

Conservation Actions

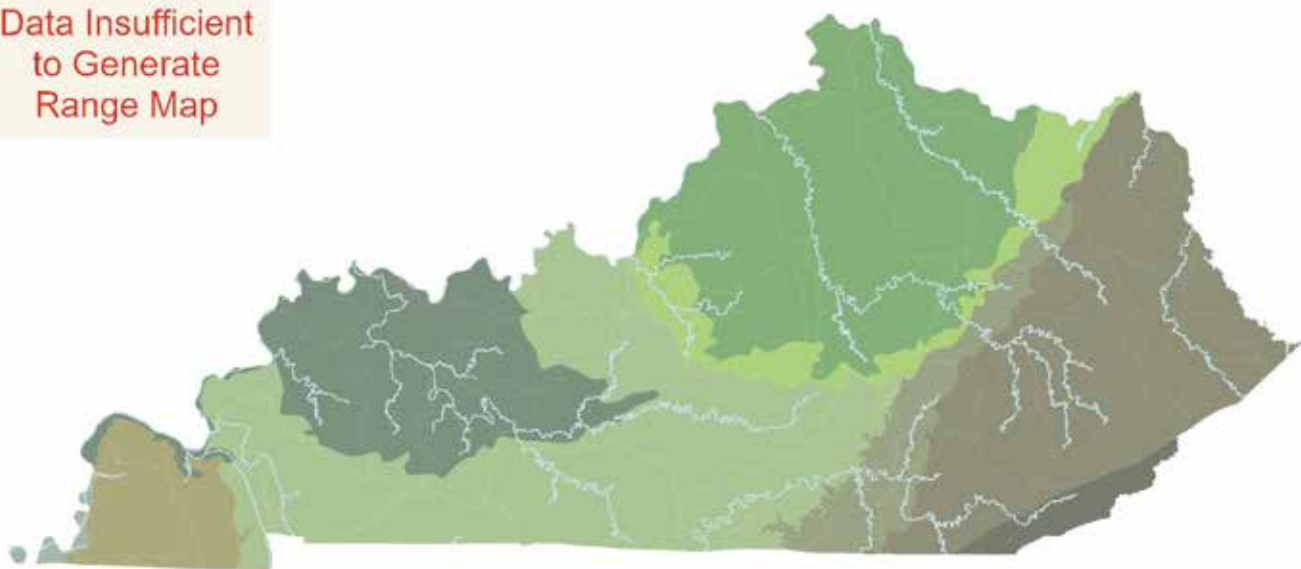
Unknown

Needs

Survey: Status Surveys

Range Map

Data Insufficient
to Generate
Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3Q

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

None

Stream Type: None

Typically found in flowing waters and rapids of medium to large rivers in main channels over firm sand and gravel substrates.

GLOBOSE PHYSA

(*Physella globosa*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Range Map

Data Insufficient
to Generate
Range Map

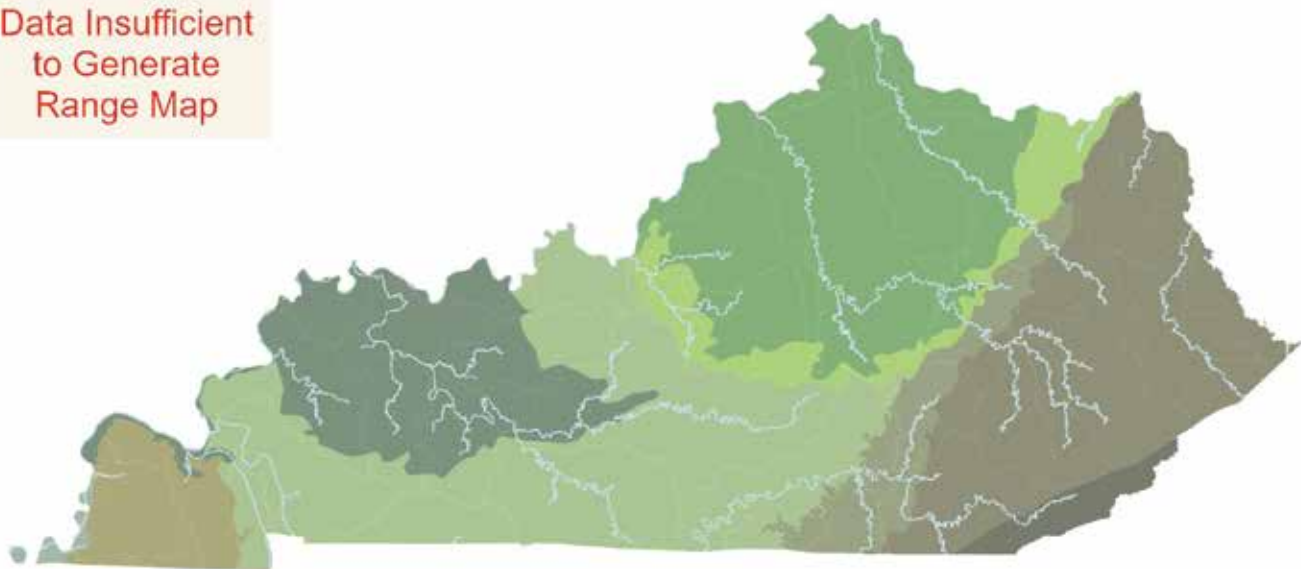


Photo: University of Michigan Museum



RIDGEDBEAKED PEACLAM

(Pisidium compressum)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SU

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

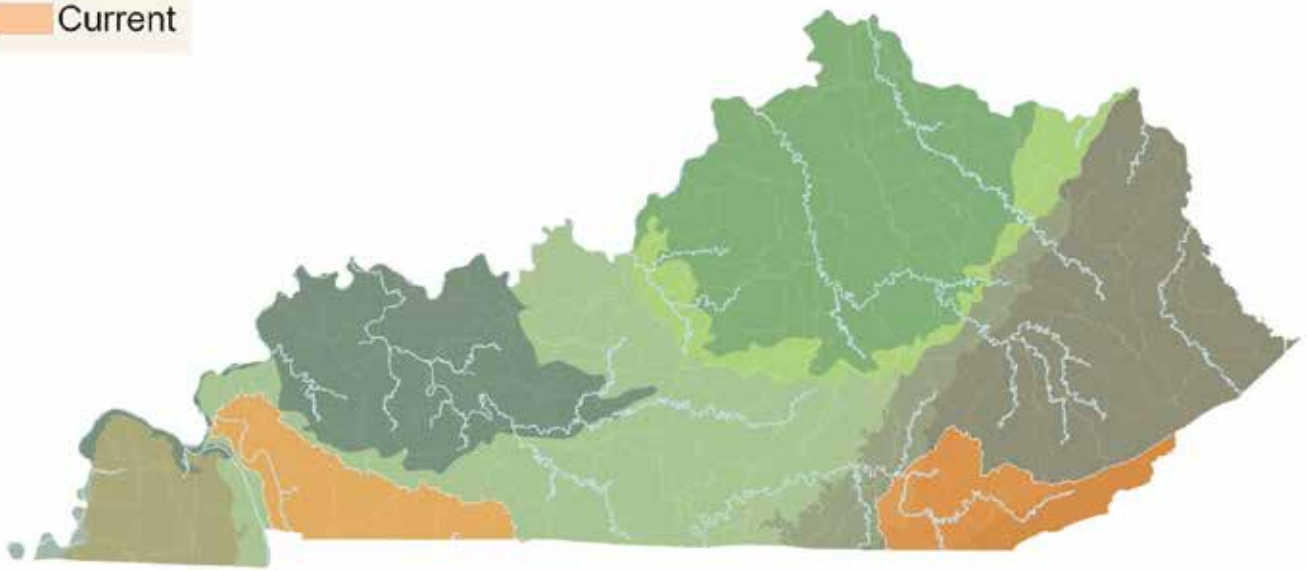
Current Watersheds: Lower Cumberland, Powell, Red, Upper Cumberland

Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

Range Map

Current





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: LC - Least concern

THICKLIP RAMS HORN

(*Planorbula armigera*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Lower Green, Lower Ohio-Bay

Stream Type: None

Typically found in slack waters of medium to large rivers in side channels over sand, mud and organic debris substrates.

Range Map

Data Insufficient
to Generate
Range Map

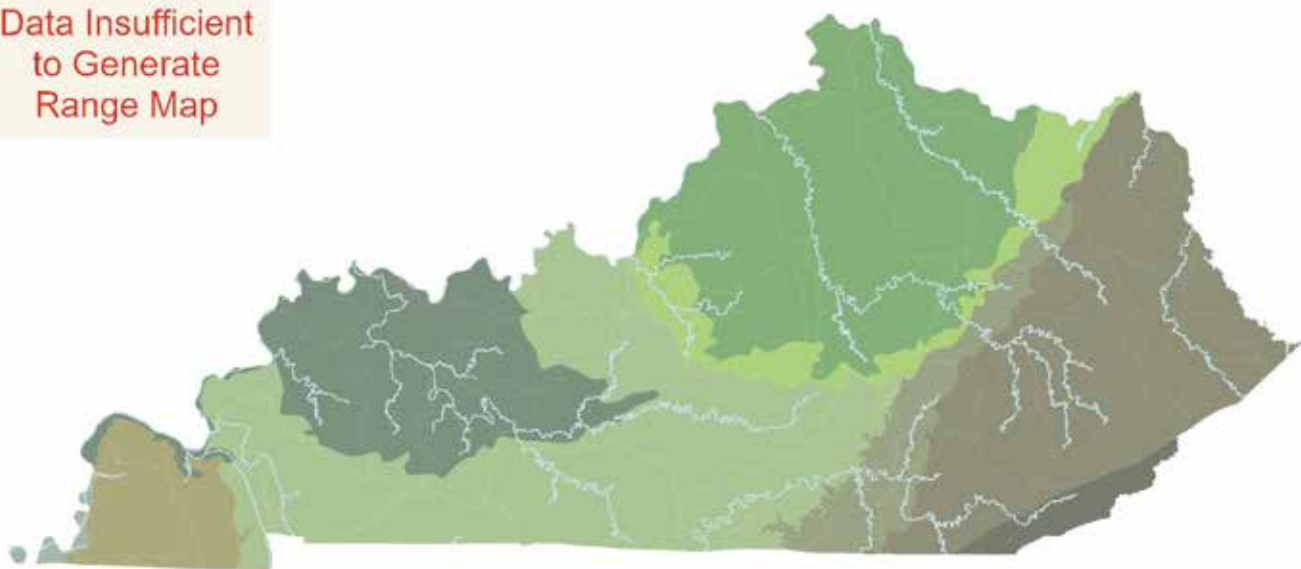





Photo: Monte McGregor









WHITE WARTYBACK

(*Plethobasus cicatricosus*)

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Awareness and Communications  
- Conservation Payments  
- External Capacity Building  

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Life History Studies

Research: Propagation and Culture

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G1

S Rank: SX

Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods. Develop culture and propagation methods. Establish an ARK population in captivity at KDFWR hatcheries.

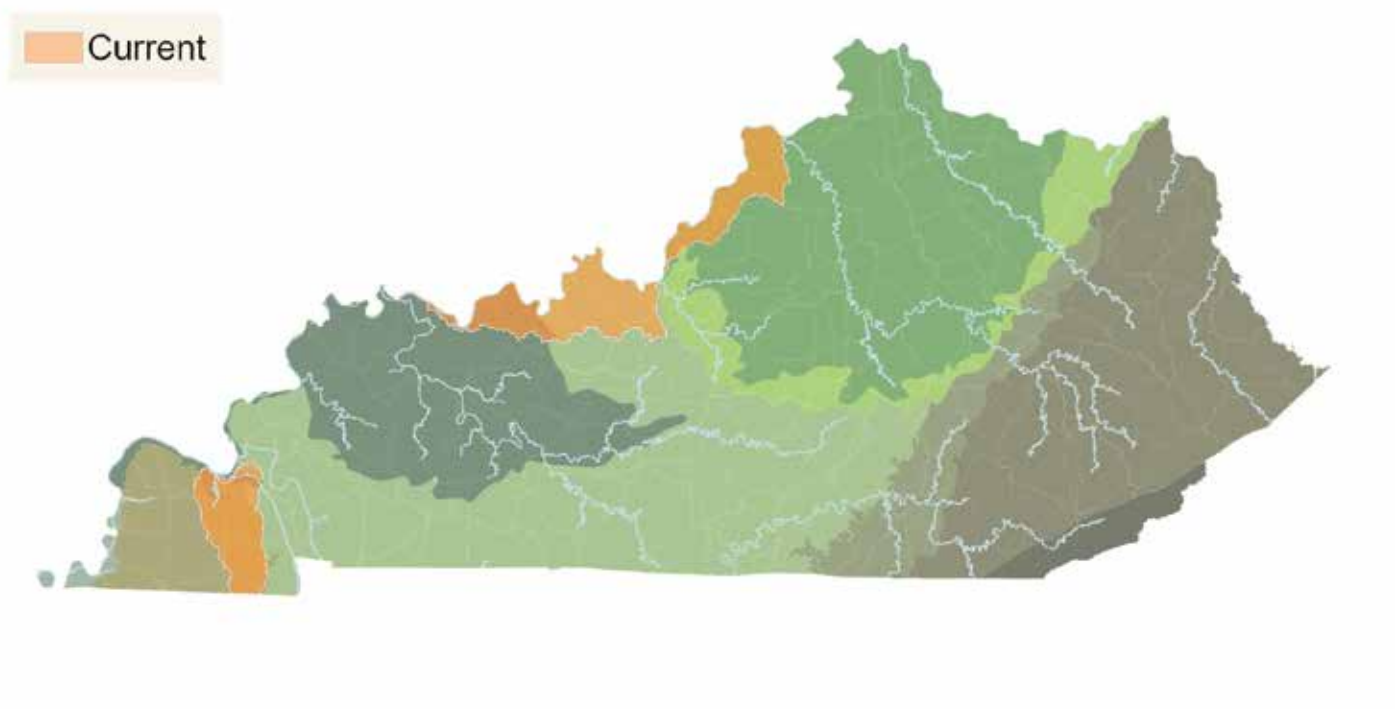
Habitat Associations

Current Watersheds: Blue-Sinking, Lower Ohio-Little Pigeon, Lower Tennessee, Silver-Little Kentucky

Stream Type: Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of large rivers in main channels over firm sand, gravel, and mud substrates. Host fish is unknown.

Range Map





ORANGEFOOT PIMPLEBACK

(*Plethobasus cooperianus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Develop culture and propagation methods. Establish an ARK population in captivity at KDFWR hatcheries.




Habitat Associations

Current Watersheds: Kentucky Lake, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Upper Mississippi-Cape Girardeau







Stream Type: Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of large rivers in main channels over firm sand, gravel, and mud substrates. Host fish is unknown.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Life History Studies

Research: Propagation and Culture

Range Map

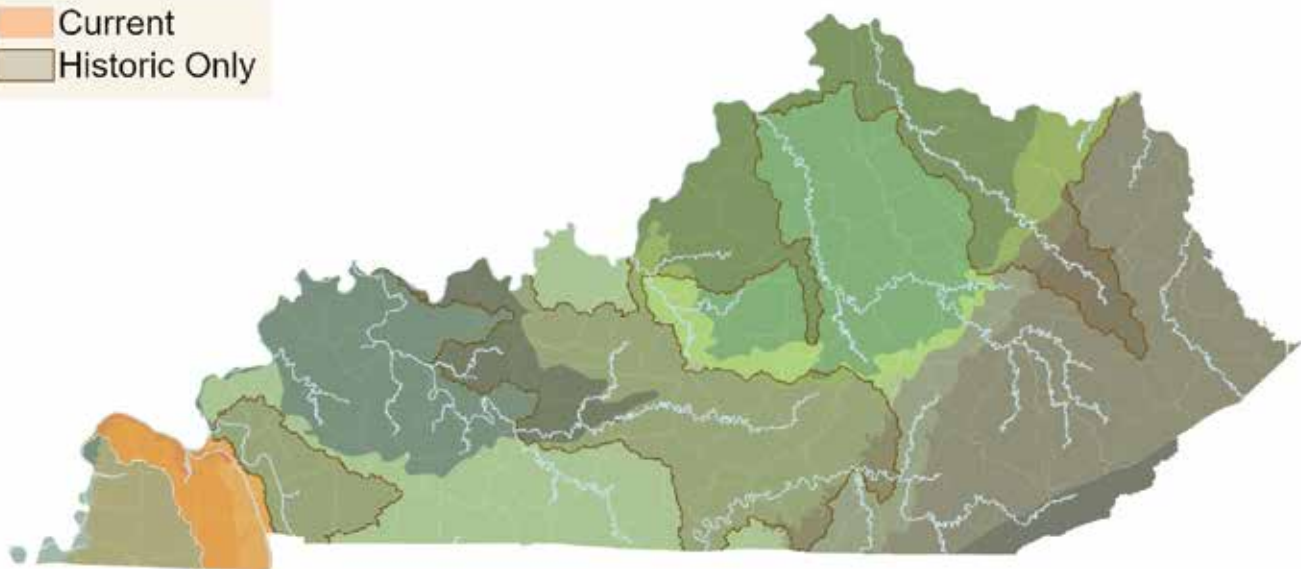


Photo: Monte McGregor



SHEEPNOSE

(*Plethobasus cyphus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S1

Federal Status: Endangered

IUCN Red List: EN - Endangered

Conservation Goal

Monitor at least two populations with at least one area every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed.




Habitat Associations

Current Watersheds: Barren, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Raccoon-Symmes, Upper Green, Upper Mississippi-Cape Girardeau







Stream Type: Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates. Habitat is associated with its host fishes, minnows and sauger.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  

Needs

Survey: Collect baseline species information

Survey: Monitoring

Survey: Status Surveys

Research: Propagation and Culture

Range Map

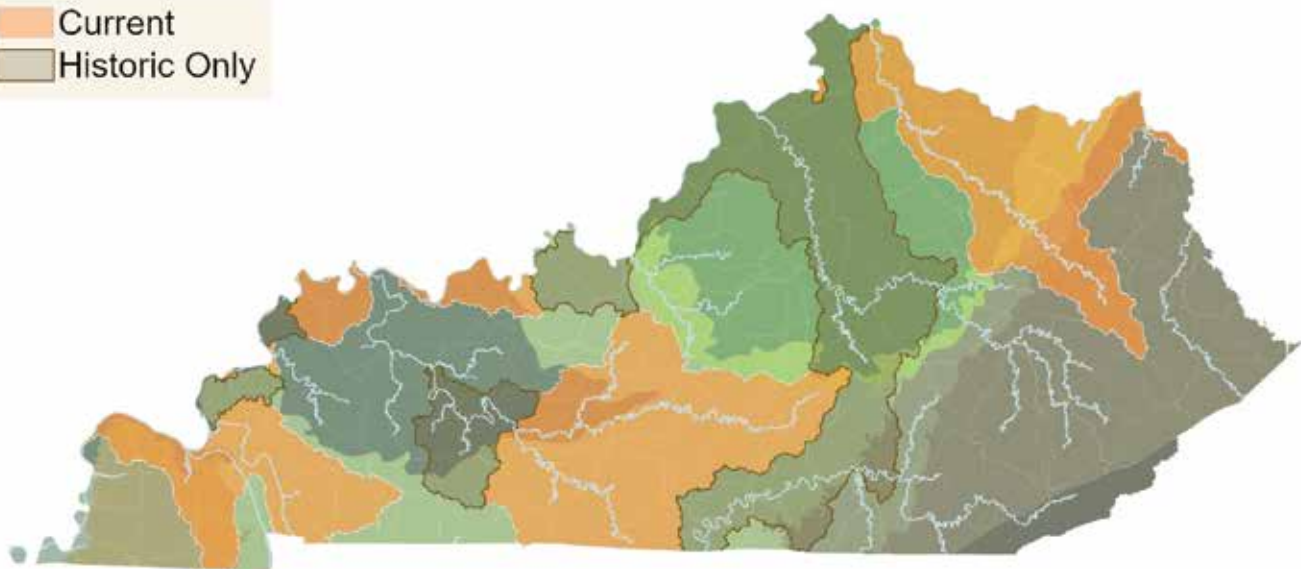


Photo: Monte McGregor



CLUBSHELL

(*Pleurobema clava*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G1G2

S Rank: S1









Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Awareness and Communications  
- Conservation Payments  
- External Capacity Building  
- Species Management  

Needs

Survey: Collect baseline species information

Survey: Monitoring

Research: Genetic testing

Conservation Goal

Monitor at least two populations with at least one area every three to six years with quantitative sampling. Augment existing low population areas if needed.

Habitat Associations

Current Watersheds: Licking, Rough, Upper Green

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, minnows.

Range Map

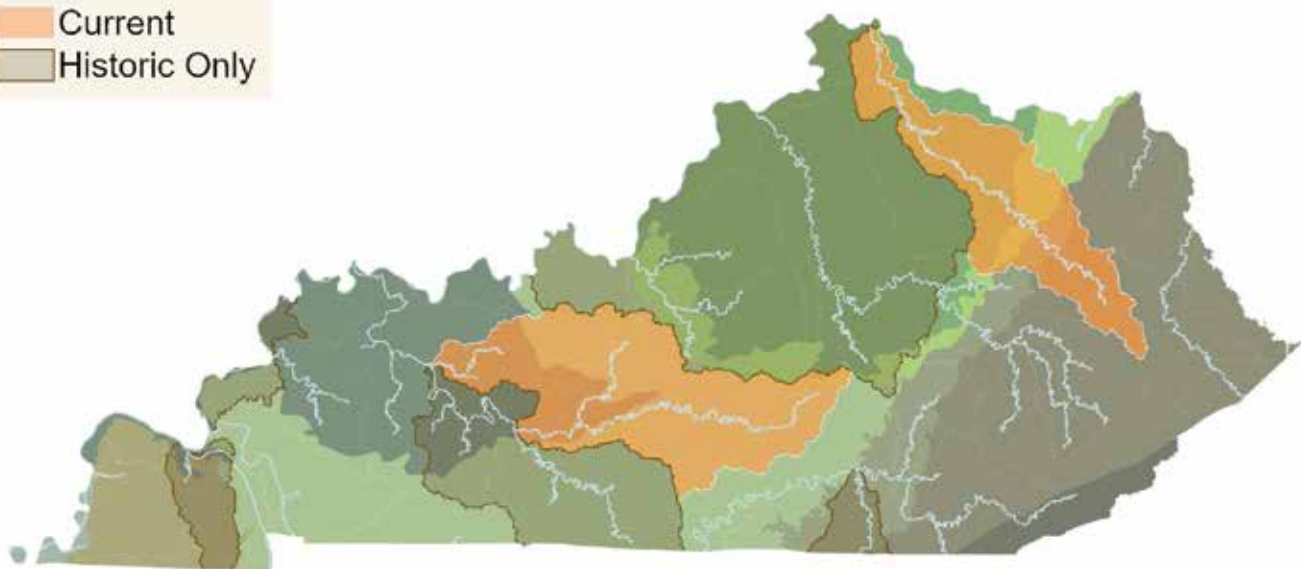


Photo: Monte McGregor



OHIO PIGTOE

(*Pleurobema cordatum*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4




S Rank: S4

Federal Status: N/A







IUCN Red List: NT - Near threatened

The Ohio Pigtoe has declined over the last 100 years due to dams that impede fish host migration.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Awareness and Communications  
- Conservation Payments  
- External Capacity Building  

Needs

Survey: Collect baseline species information

Survey: Monitoring

Survey: Status Surveys

Research: Life History Studies

Research: Propagation and Culture

Conservation Goal

Monitor at least two populations with at least one area every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed.

Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Green, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Licking, Upper Cumberland-Lake Cumberland, Upper Green, Upper Mississippi-Cape Girardeau

Stream Type: Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, minnows.

Range Map

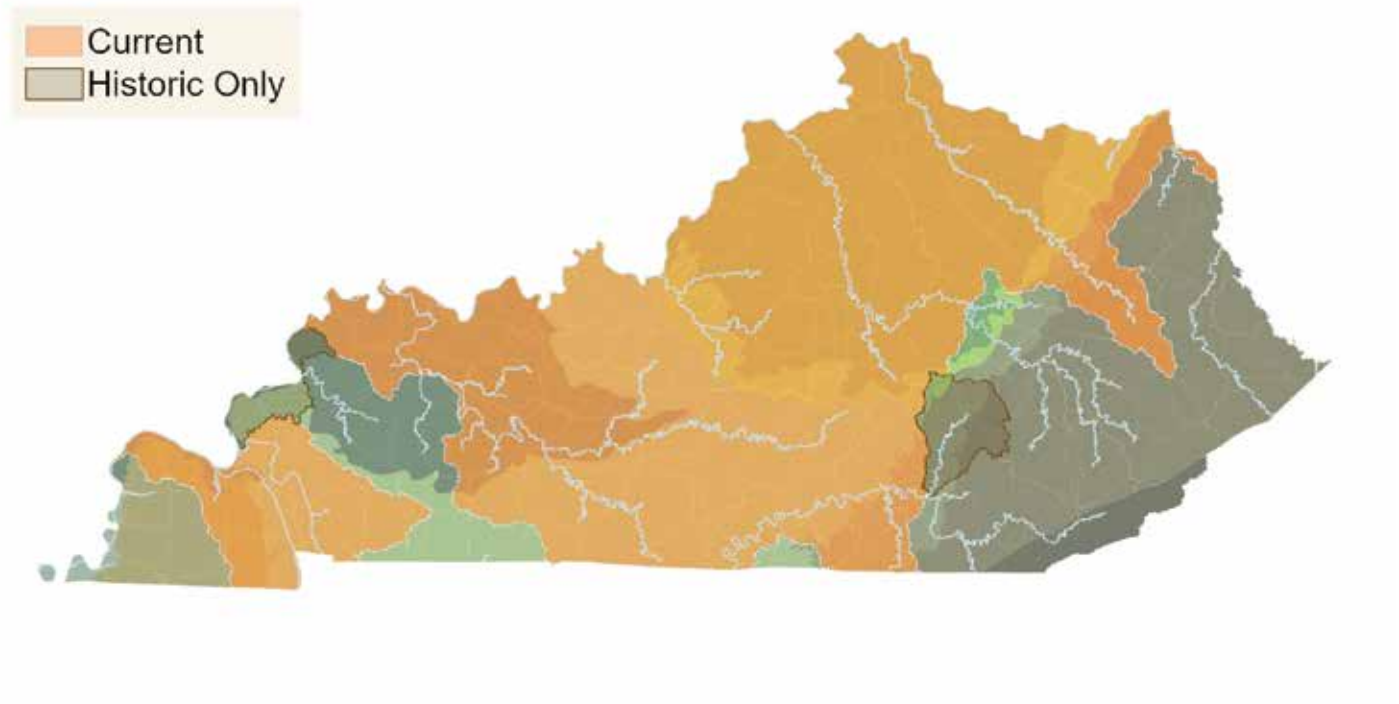


Photo: Monte McGregor



TENNESSEE CLUBSHELL

(*Pleurobema oviforme*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S1

Federal Status: Not Listed

IUCN Red List: VU - Vulnerable

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods. Develop culture and propagation methods. Establish an ARK population in captivity at KDFWR hatcheries.




Habitat Associations

Current Watersheds: Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, minnows.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration 

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Genetic Testing

Research: Propagation and Culture

Range Map

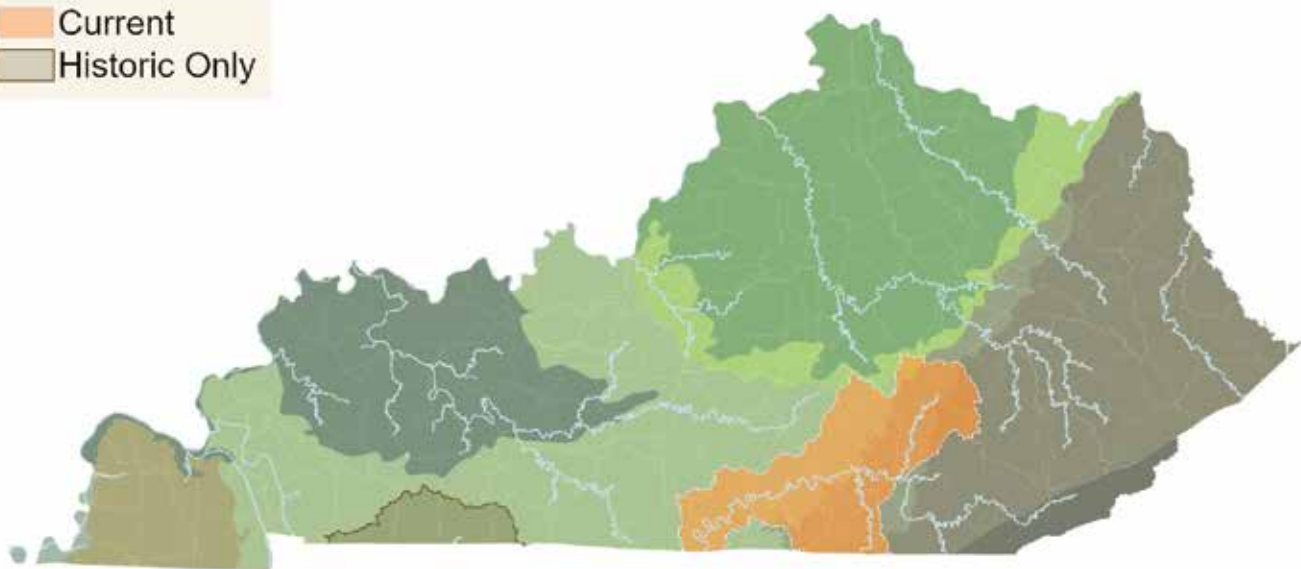


Photo: Monte McGregor



ROUGH PIGTOE

(*Pleurobema plenum*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed. Establish an ARK population in captivity at KDFWR hatcheries.




Habitat Associations

Current Watersheds: Barren, Licking, Middle Green, Upper Green







Stream Type: Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, minnows.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  

Needs

Survey: Collect baseline species information

Survey: Monitoring

Research: Life History Studies

Research: Propagation and Culture

Range Map

Current
Historic Only

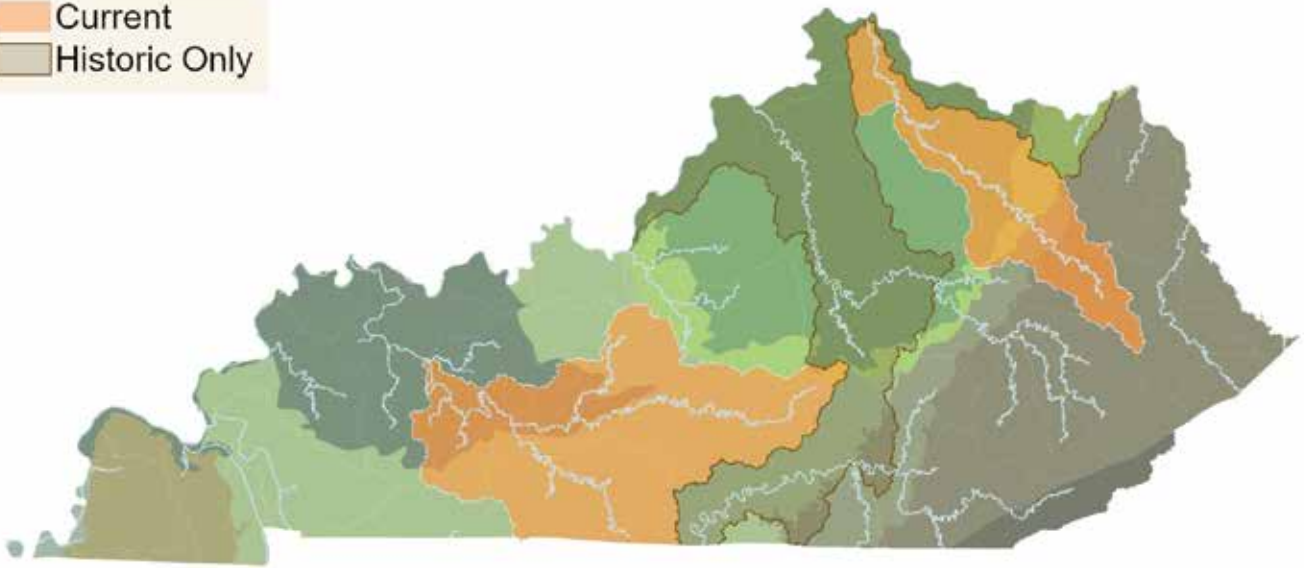


Photo: Monte McGregor



PYRAMID PIGTOE

(*Pleurobema rubrum*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S1

Federal Status: N/A

IUCN Red List: NT - Near threatened

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed. Establish an ARK population in captivity at KDFWR hatcheries. Verify species taxonomy with genetics or other methods




Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Highland-Pigeon, Licking, Lower Green, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Middle Green, Middle Ohio-Laughery, Upper Green







Stream Type: Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, minnows.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  

Needs

Survey: Collect baseline species information

Survey: Monitoring

Research: Genetic Testing

Research: Propagation and Culture

Range Map

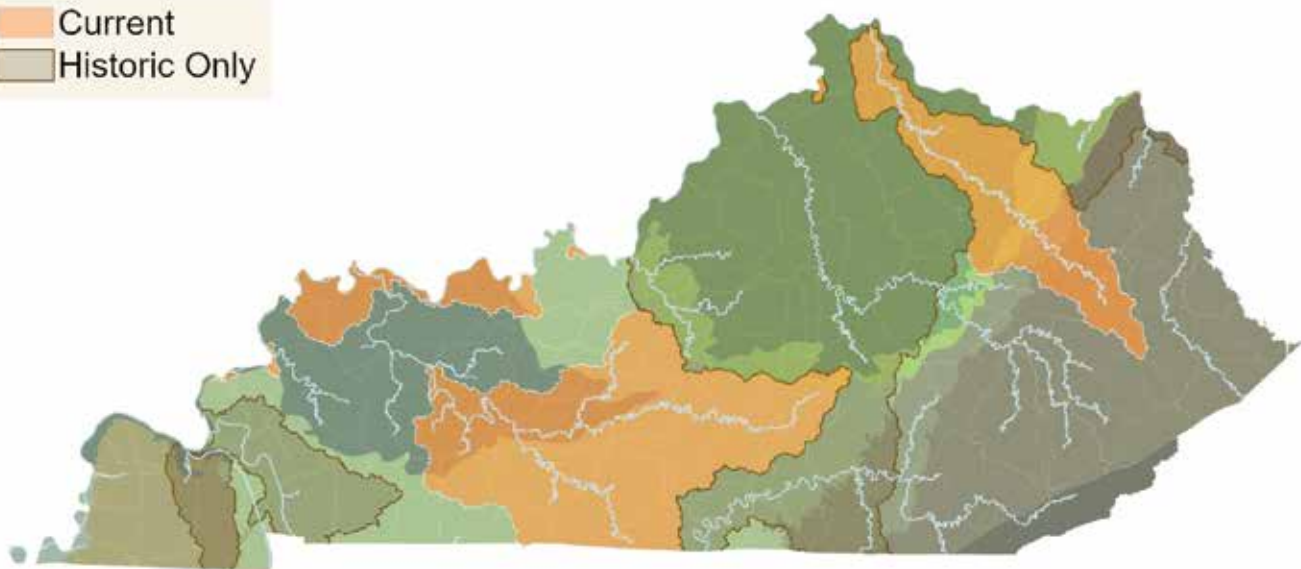


Photo: Monte McGregor



SHARP HORNSNAIL

(*Pleurocera acuta*)

Conservation Profile

Priority Group: Data Deficient

KNP Info


G Rank: G5

S Rank: SU

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

 Other Ecosystem Modifications

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Highland-Pigeon, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Kentucky, Lower Ohio-Bay, Lower Tennessee, Middle Green, North Fork Kentucky, Obey, Ohio Brush-Whiteoak, Pond, Red, Rolling Fork, Rough, Salt, South Fork Kentucky, South Fork Licking, Tradewater, Upper Cumberland, Upper Green, Upper Kentucky

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

Range Map

Data Insufficient
to Generate
Range Map

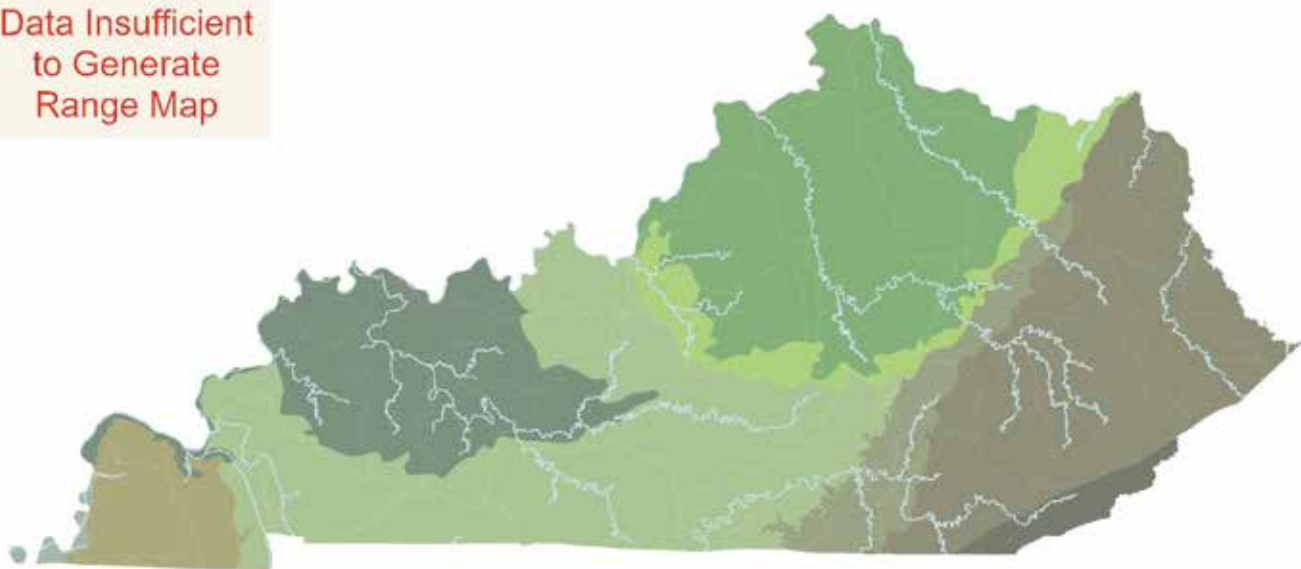


Photo: Monte McGregor



RUGGED HORNSNAIL

(*Pleurocera alveare*)

Conservation Profile

Priority Group: Data Deficient

KNP Info



G Rank: G3

S Rank: S3S4

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership development

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Middle Green, Red, Rough, Upper Green

Stream Type: Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

Range Map

Data Insufficient
to Generate
Range Map

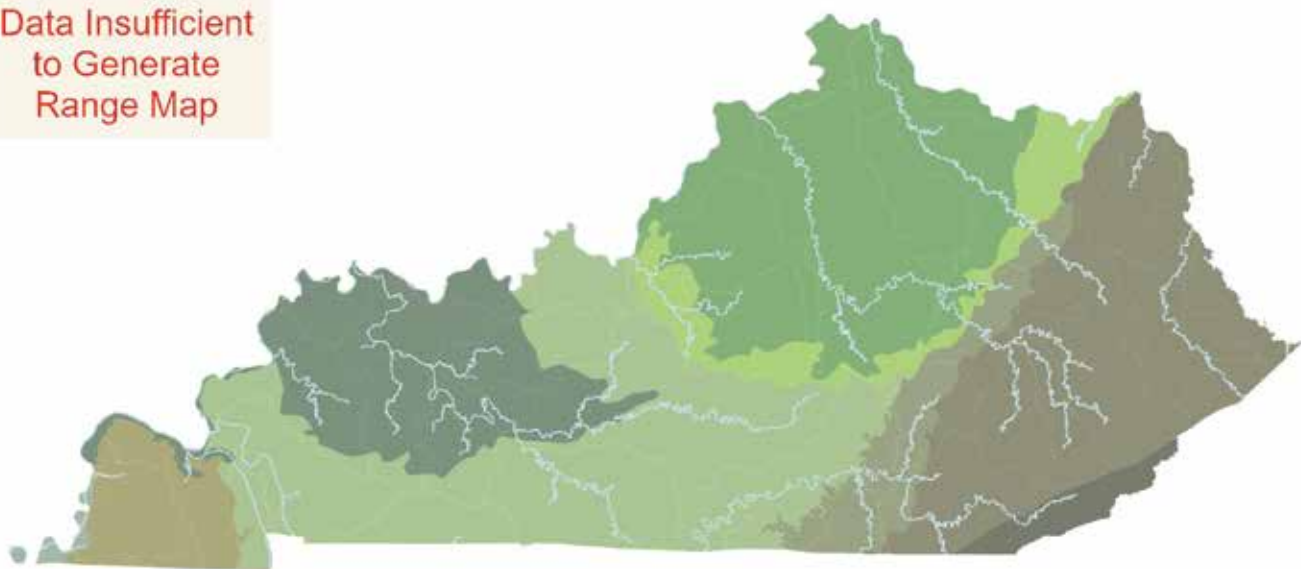


Photo: Monte McGregor



SILTY HORNSNAIL

(*Pleurocera canaliculata*)

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Management: Economic and Other Incentives

Management: Education and Awareness

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Sandy, Little Scioto-Tygarts, Lower Cumberland, Lower Kentucky, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Red, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Kentucky, South Fork Licking, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky

Stream Type: Warm-Low Gradient-Small River,
Warm-Confined-Medium River, Warm-Confined-
Large River

Typically found in flowing waters of medium to large
rivers in main channels over firm sand, gravel, and
mud substrates.

Range Map

Data Insufficient
to Generate
Range Map

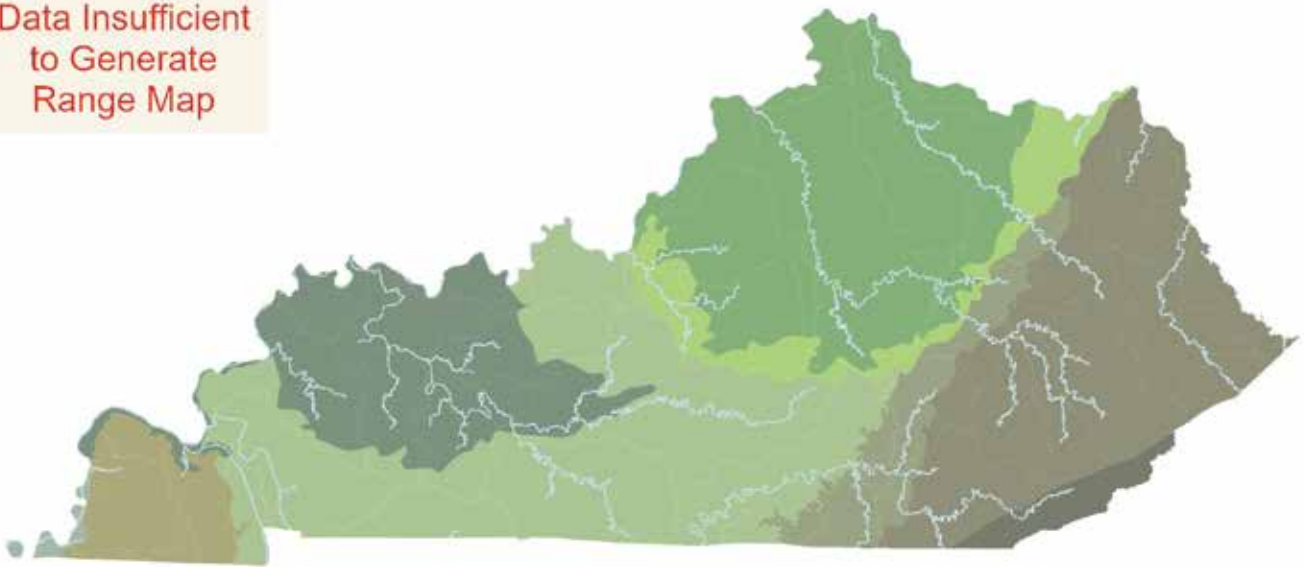


Photo: Monte McGregor



SHORTSPIRE HORNSNAIL

(*Pleurocera curta*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G2

S Rank: S2

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

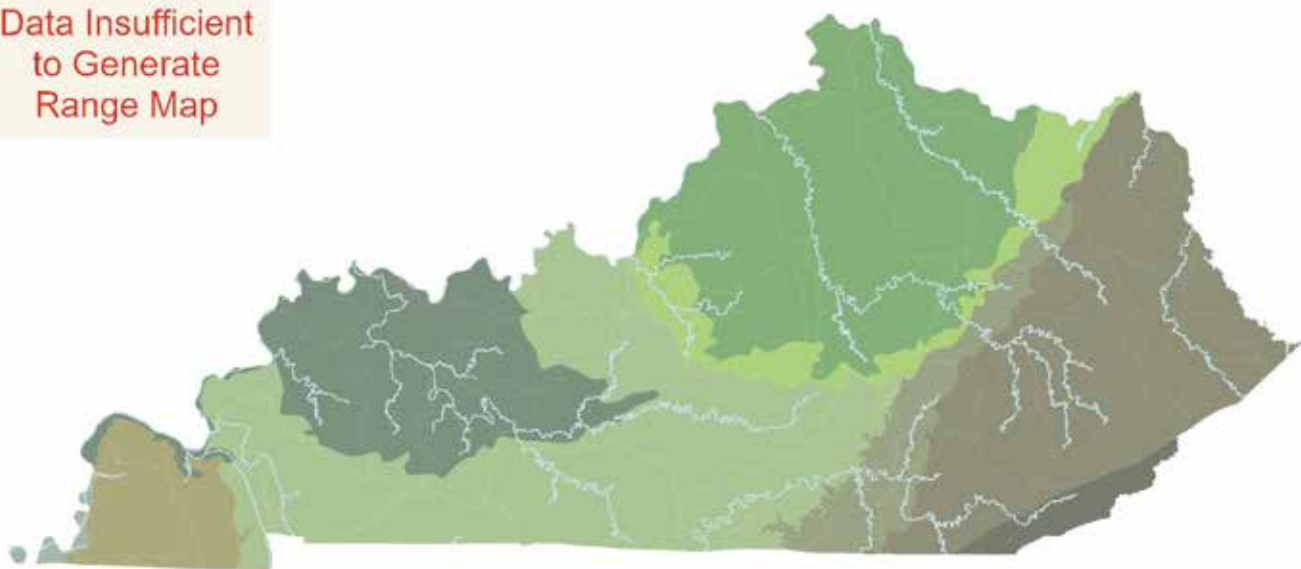
Current Watersheds: Kentucky Lake, Lower Tennessee, Red, Rockcastle, Upper Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

Range Map

Data Insufficient
to Generate
Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3

S Rank: SNR

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Physiographic Regions: Interior Plateau

Stream Type: Warm-Low Gradient-Small River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

TELESCOPE HORNSNAIL

(Pleurocera walkeri)

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Range Map

Data Insufficient
to Generate
Range Map

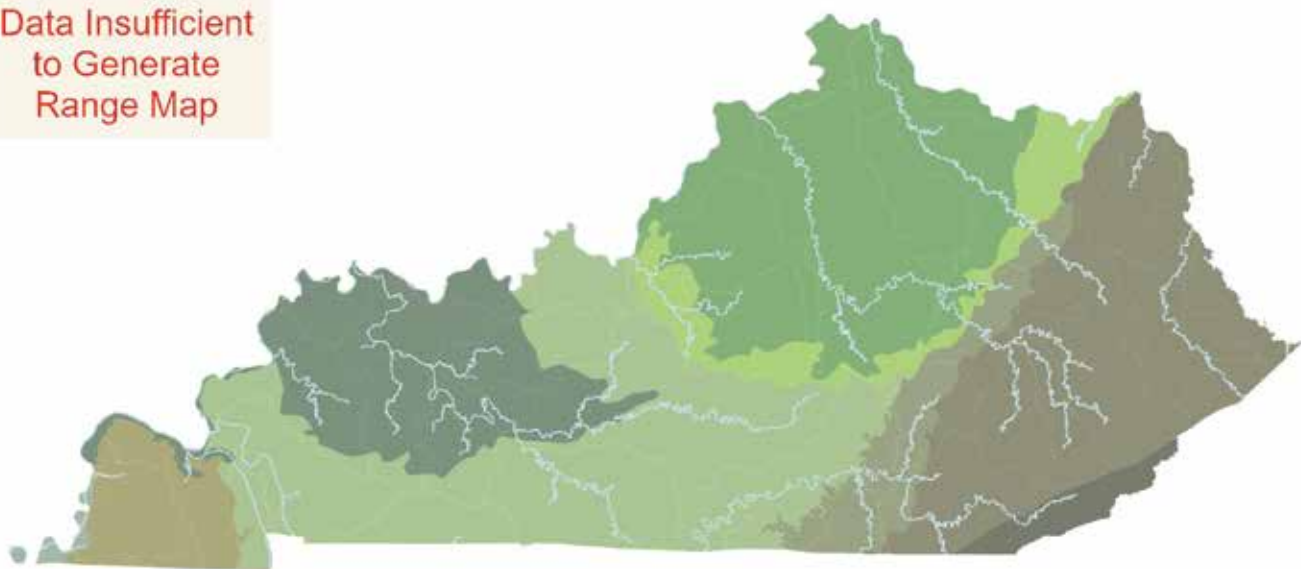





Photo: Monte McGregor



SLABSIDE PEARLY MUSSEL

(Pleuonaia dolabelloides)

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration 

Needs

Survey: Status Surveys

Research: Propagation and Culture

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G2

S Rank: SX

Federal Status: Endangered

IUCN Red List: EN - Endangered

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Develop culture and propagation methods. Establish an ARK population in captivity at KDFWR hatcheries.

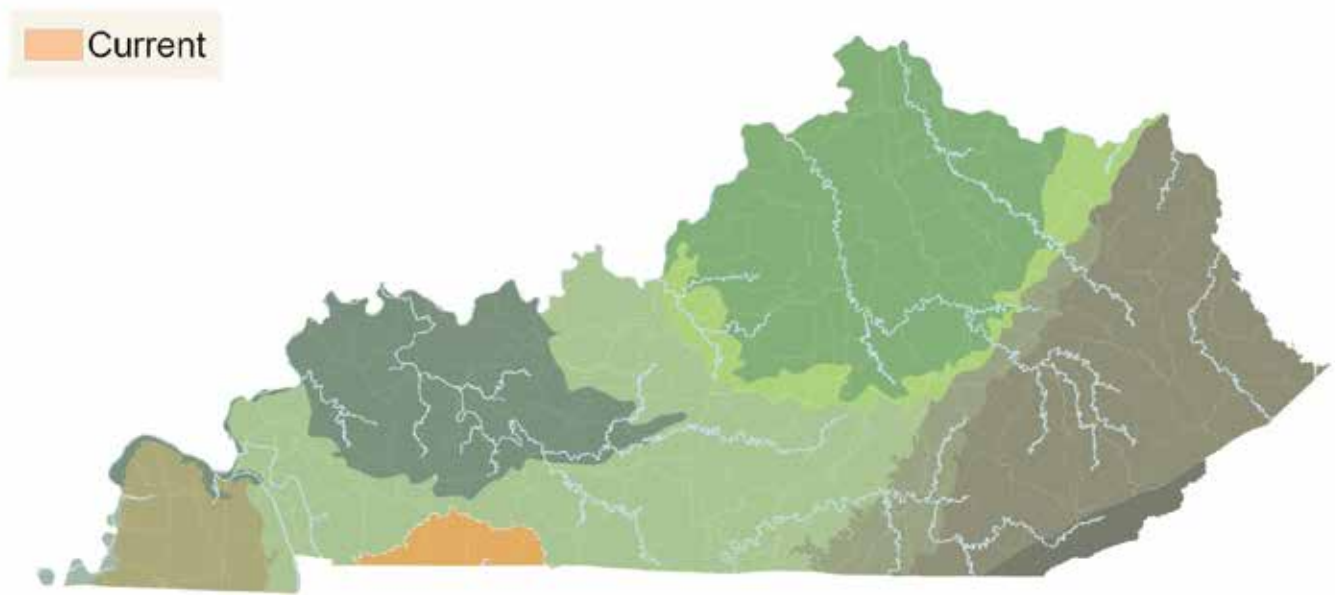
Habitat Associations

Current Watersheds: Red

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, minnows.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

BROWN WALKER

(Pomatiopsis cincinnatiensis)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Licking, Little Scioto-Tygarts, Silver-Little Kentucky, South Fork Licking, Upper Green

Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

Range Map

Data Insufficient
to Generate
Range Map

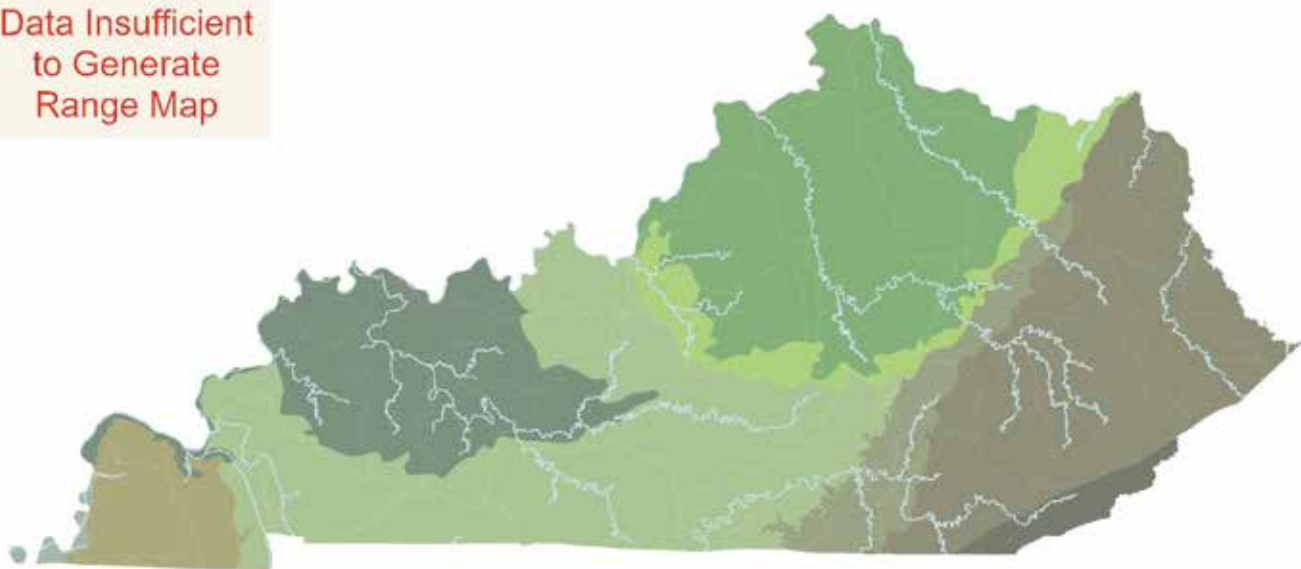


Photo: Monte McCrea



FAT POCKETBOOK

(*Potamilus capax*)

Conservation Profile

Priority Group: High

KNP Info



G Rank: G2

S Rank: S2




Federal Status: Endangered

IUCN Red List: VU - Vulnerable

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications

Conservation Actions

-  Conservation Payments
-  Education and Awareness
-  External Capacity Building

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Propagation and Culture

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Develop culture and propagation methods. Establish an ARK population in captivity at KDFWR hatcheries.

Habitat Associations

Current Watersheds: Highland-Pigeon, Lower Cumberland, Lower Green, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Saline, Silver-Little Kentucky, Tradewater, Upper Mississippi-Cape Girardeau

Stream Type: Warm-Confined-Large River

Typically found in slack waters of large rivers within side channels over sand, mud and organic debris substrates. Habitat is associated with its host fish, the freshwater drum.

Range Map

Current

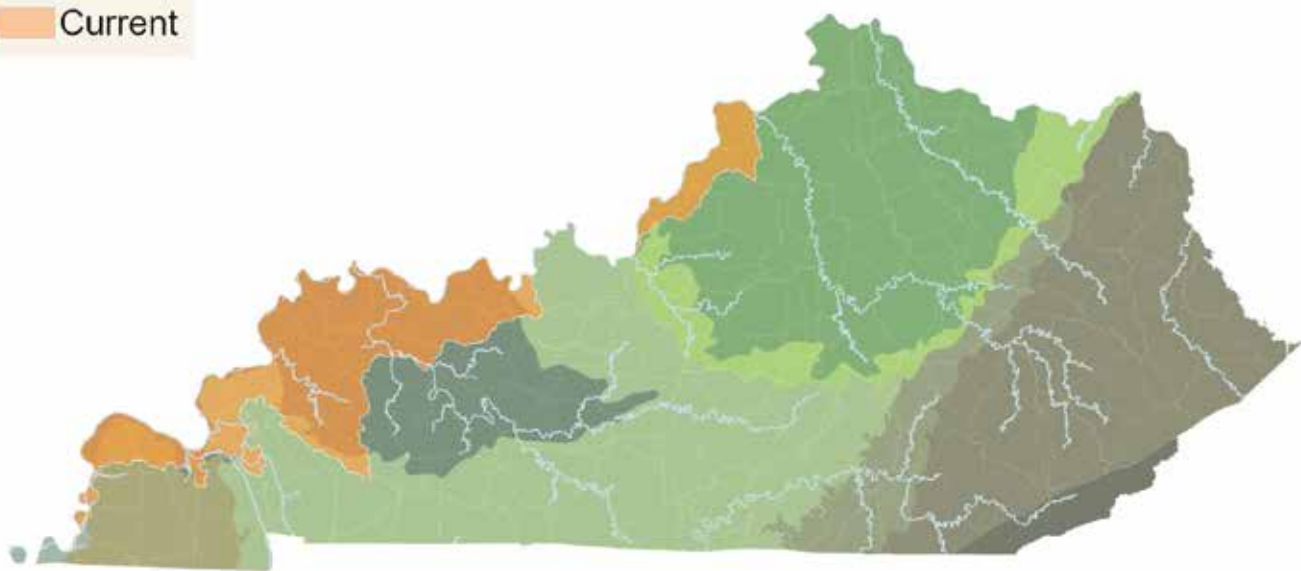


Photo: Monte McGregor



Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Develop culture and propagation methods.

Habitat Associations



Current Watersheds: Bayou De Chien-Mayfield, Kentucky Lake, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, Obion, Upper Mississippi-Cape Girardeau

Stream Type: Warm-Confined-Large River







BLEUFER

(Potamilus purpuratus)

Threats

-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  

Needs

Survey: Monitoring

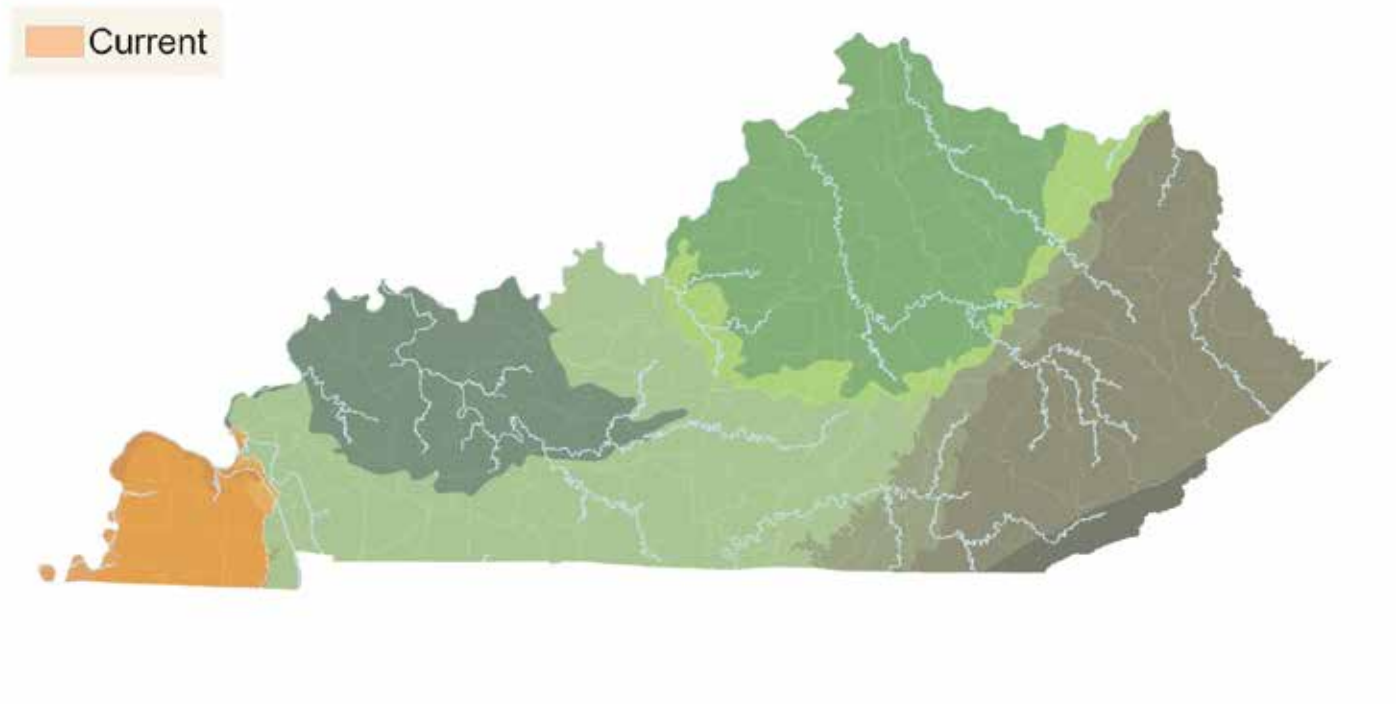
Survey: Status Surveys

Research: Life History Studies

Research: Propagation and Culture

Typically found in slack waters of medium to large rivers within side channels over sand, mud and organic debris substrates. Habitat is associated with its host fish, the freshwater drum.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNR

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Lower Kentucky, Lower Tennessee, North Fork Kentucky, Ohio Brush-Whiteoak, Rockcastle, Upper Green

Stream Type: None

Typically found in slack waters or pool habitat of medium to large streams over sand, mud and organic debris substrates.

SHARP SPRITE

(Promenetus exacuus)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Range Map

Data Insufficient
to Generate
Range Map

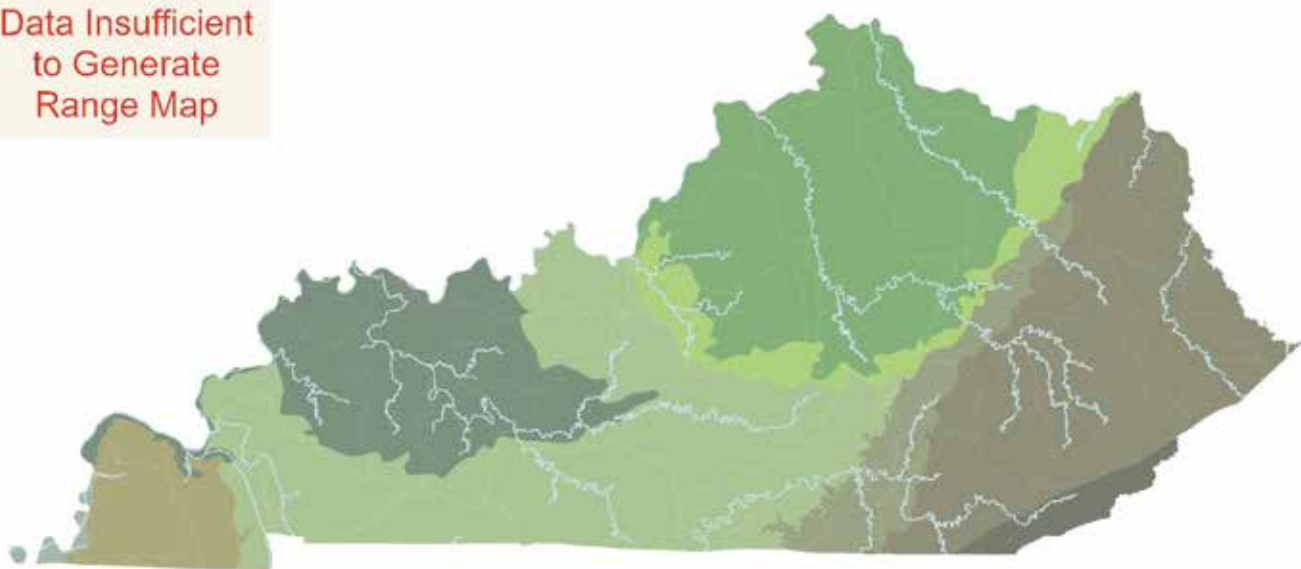


Photo: Monte McGregor



FLUTED KIDNEYSHELL

(*Ptychobranhus subtentus*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G2

S Rank: S1









Federal Status: Endangered

IUCN Red List: NT - Near threatened

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building  
- Species Management  

Needs

Survey: Status Surveys

Research: Augmentation and Reintroduction

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Augment existing low population areas if needed. Establish an ARK population in captivity at KDFWR hatcheries. Verify species taxonomy with genetics or other methods

Habitat Associations

Current Watersheds: Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland

Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of small to medium rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, darters.

Range Map

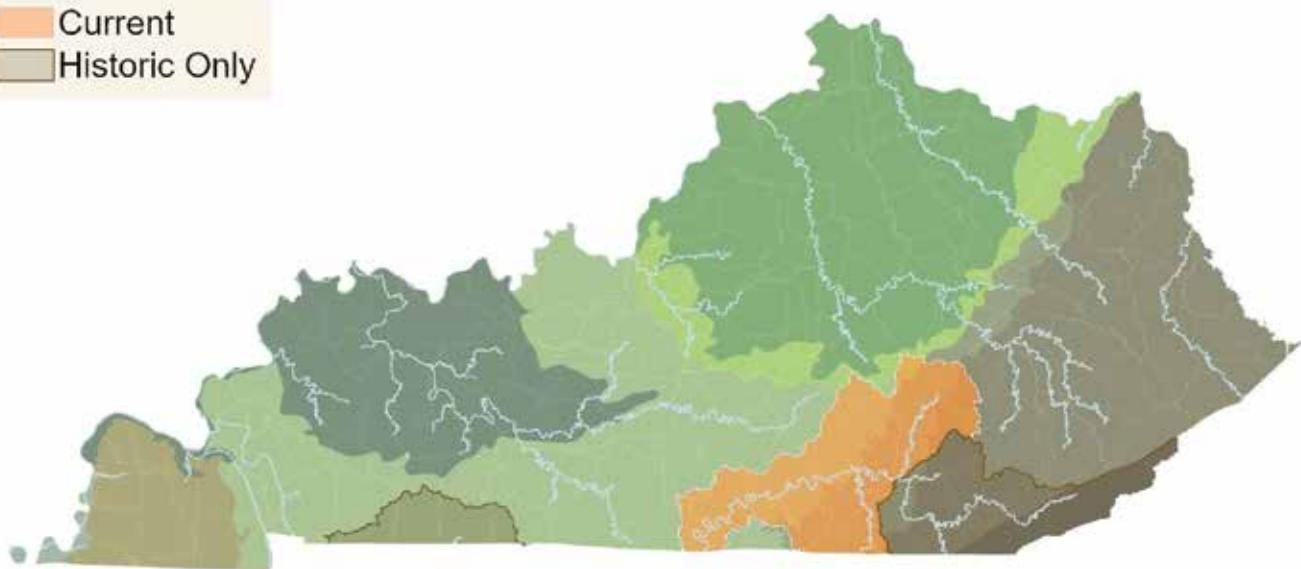




Photo: Monte McGregor






WINGED MAPLELEAF

(*Quadrula fragosa*)

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications

Conservation Actions

- Awareness and Communications 
- Conservation Payments 
- External Capacity Building 

Needs

Survey: Collect baseline species information

Research: Augmentation and Reintroduction

Research: Propagation and Culture

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G1

S Rank: SX

Federal Status: Endangered

IUCN Red List: CR - Critically endangered

Conservation Goal

Reintroduce the species into historic habitat from cultured juveniles or translocated adults. Monitor once established at least one area. Develop propagation and culture techniques. Establish an ARK population in captivity at KDFWR hatcheries.

Habitat Associations

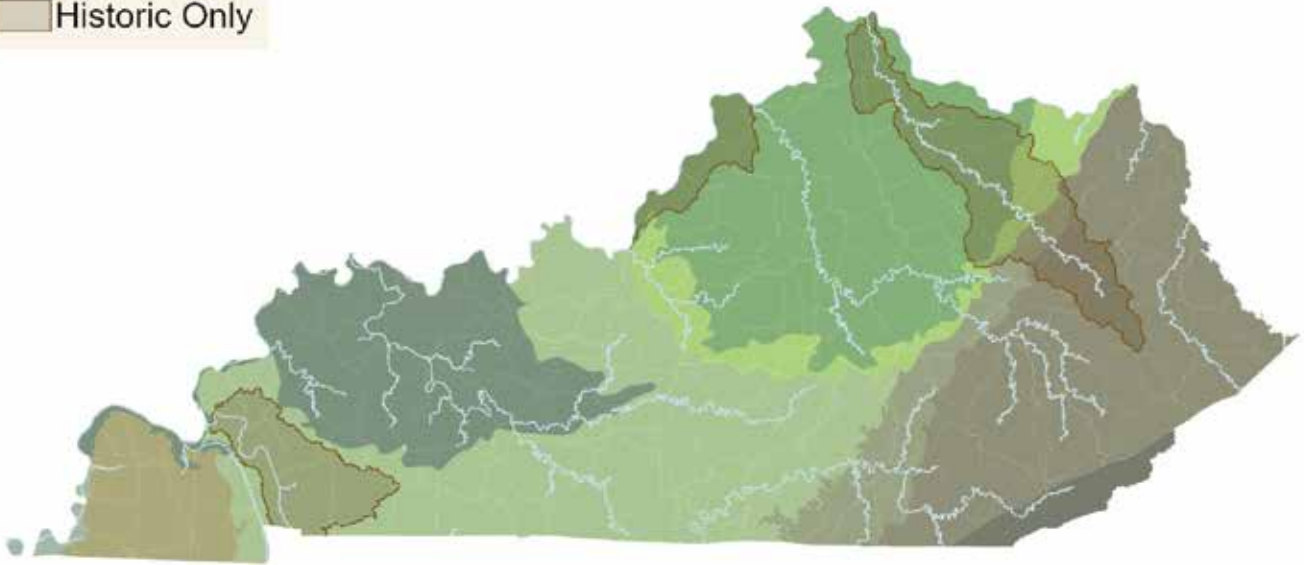
Current Watersheds: Unknown

Stream Type: Warm-Confined-Medium River,
Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates. Habitat is associated with its host fishes, catfishes.

Range Map

Historic Only





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Not Listed

IUCN Red List: VU - Vulnerable

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Upper Green, Upper Kentucky

Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

DOMED ANCYLID

(Rhodacme elatior)

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

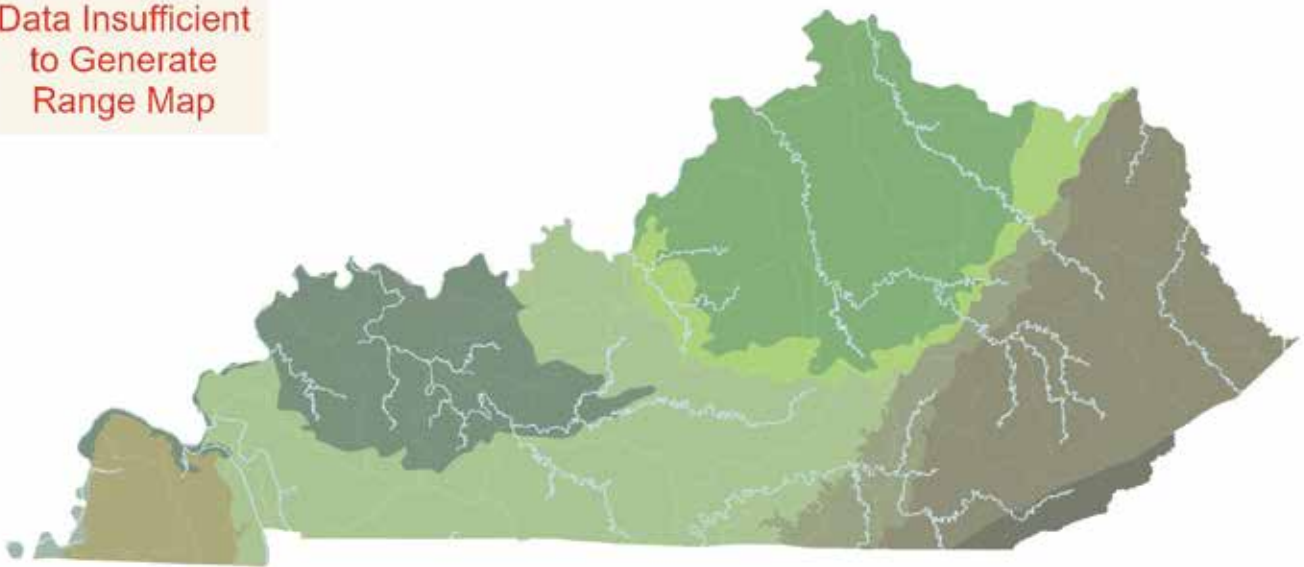
Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Range Map

Data Insufficient
to Generate
Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G2G3

S Rank: SNR

Federal Status: N/A

IUCN Red List: DD - Data deficient

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Licking, Lower Kentucky, Red, Rockcastle, Rough, Upper Green

Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

KNOBBY ANCYLID

(*Rhodacme hinkleyi*)

Threats

 Dams and Water Management/Use

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Range Map

Data Insufficient
to Generate
Range Map

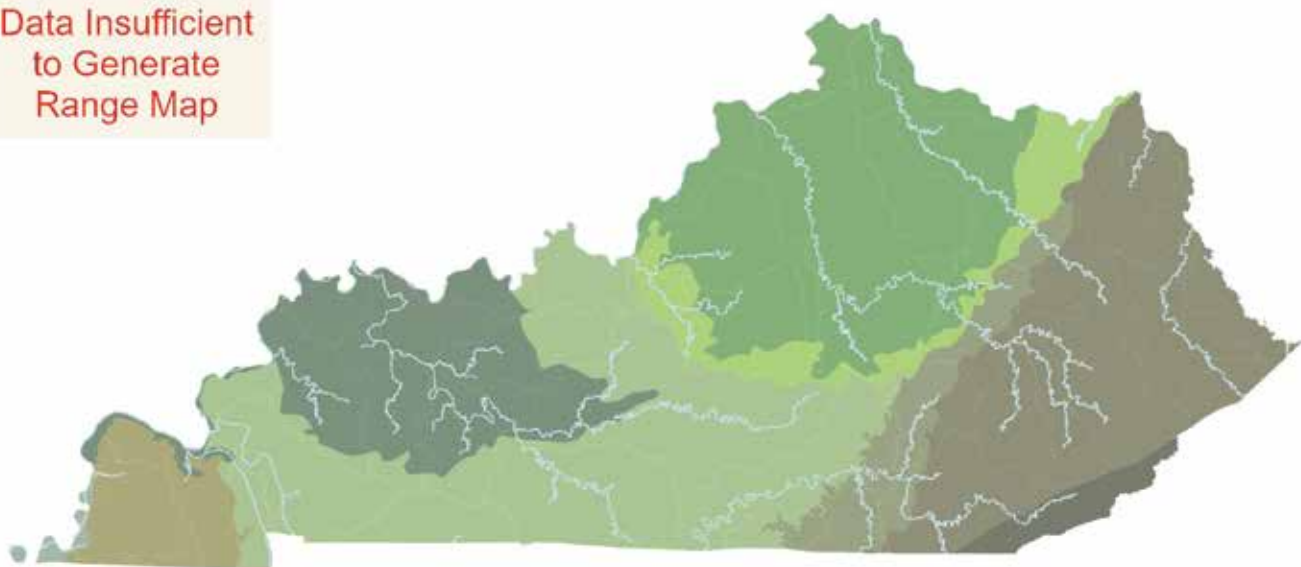




Photo: Monte McGregor



PONDMUSSEL

(*Sagittunio subrostratus*)

Threats

-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- Habitat and Natural Process Restoration 

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S4S5

Federal Status: N/A

IUCN Red List: N/A

The Pondmussel has limited habitat in Coastal Plain area of Kentucky.

Needs

Survey: Status Surveys

Research: Life History Studies

Research: Propagation and Culture

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Develop culture and propagation methods. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Lower Ohio-Bay, Lower Tennessee

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in slack water or pool habitat of medium to large streams over sand, mud, and organic debris substrates. Habitat is associated with its host fishes, sunfishes and black basses.

Range Map

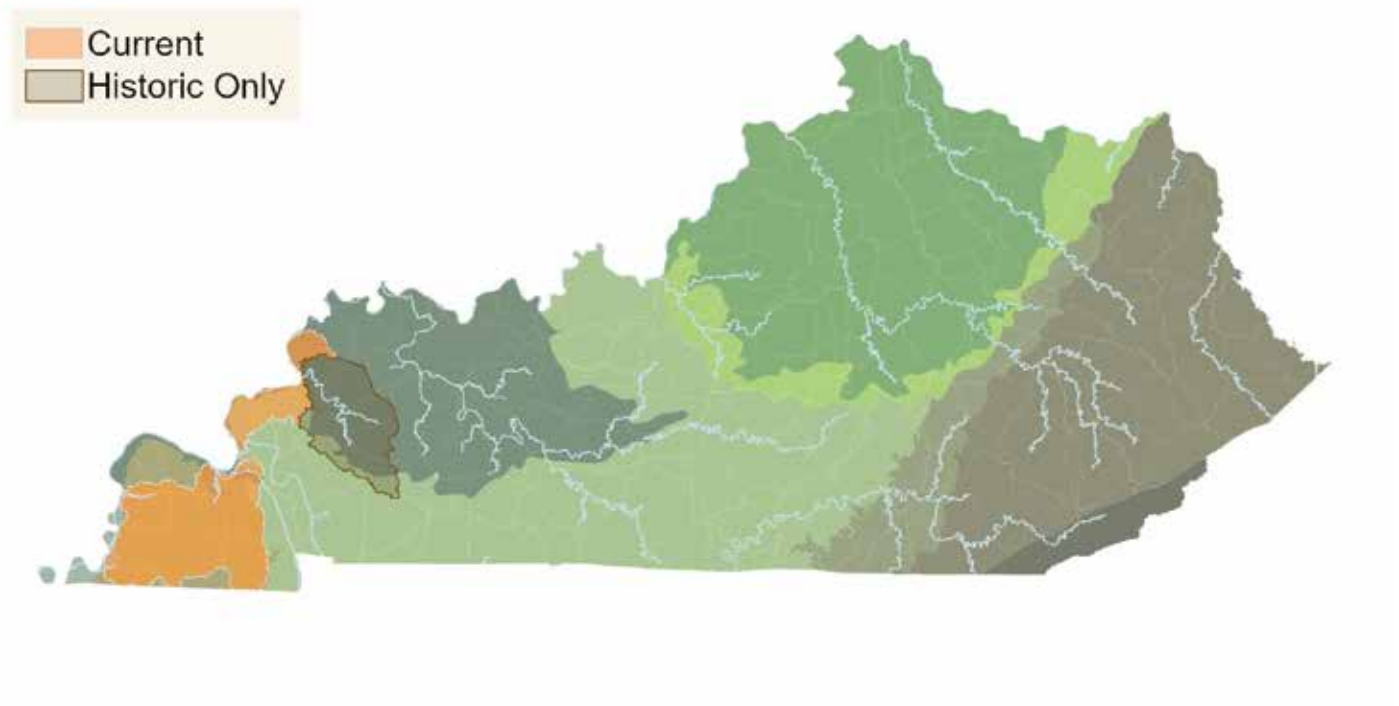


Photo: Monte McGregor



SALAMANDER MUSSEL

(*Simpsonaias ambigua*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G3

S Rank: S2S3









Federal Status: Not Listed

IUCN Red List: VU - Vulnerable

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Conservation Payments  
- Education and Awareness  
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Species Management  

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Augmentation and Reintroduction

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Develop culture and propagation methods. Augment existing low population areas if needed. Establish an ARK population in captivity at KDFWR hatcheries.

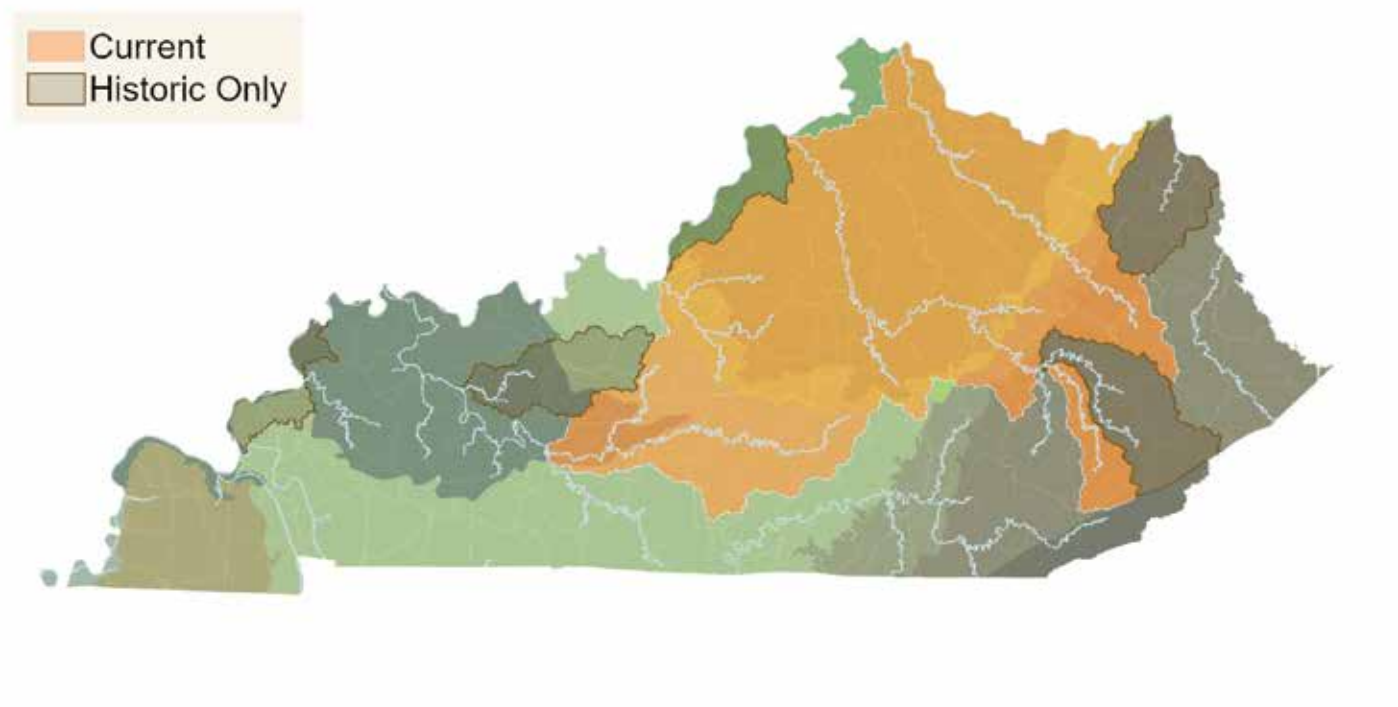
Habitat Associations

Current Watersheds: Licking, Lower Kentucky, Middle Fork Kentucky, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Rolling Fork, Salt, South Fork Licking, Upper Green, Upper Kentucky

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of medium to large rivers over firm sand, mud, and gravel substrates under large rocks. Habitat is associated with its host, the mudpuppy.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Salt

Stream Type: Warm-Low Gradient-Small River,
Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

OHIO PEBBLESNAIL

(Somatogyrus integra)

Threats

Unknown

Conservation Actions

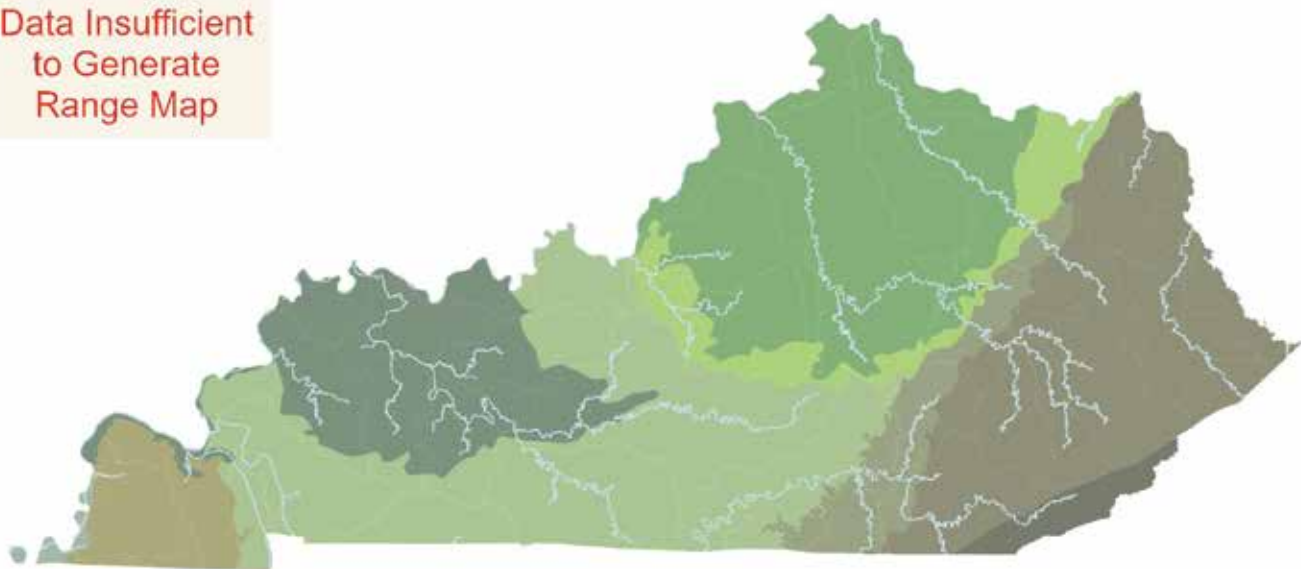
Unknown

Needs

Survey: Status Surveys

Range Map

Data Insufficient
to Generate
Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G1Q

S Rank: SNR

Federal Status: N/A

IUCN Red List: DD - Data deficient

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Licking, Lower Ohio-Little Pigeon

Stream Type: Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of medium to large rivers in main channels over firm sand, gravel, and mud substrates.

A FRESHWATER SNAIL

(Somatogyrus trothis)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Range Map

Data Insufficient
to Generate
Range Map

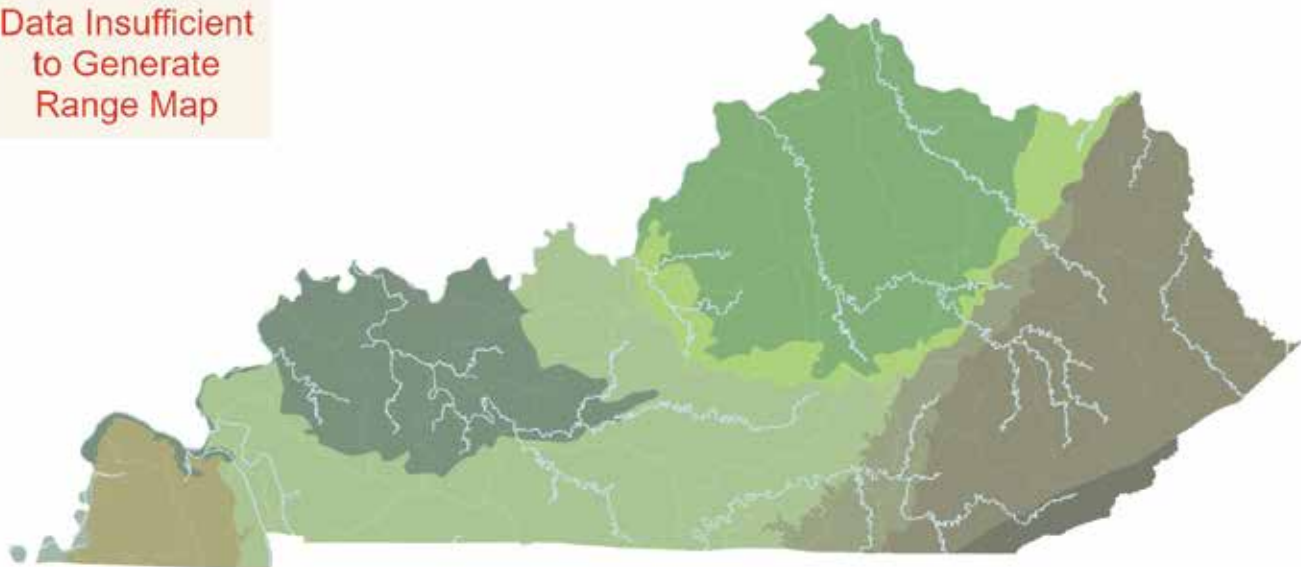


Photo: University of Michigan Museum



STRIATED FINGERNAILCLAM

(*Sphaerium striatinum*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SU

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Status Surveys

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Barren, Licking, Little Sandy, Little Scioto-Tygarts, Lower Cumberland, Lower Kentucky, Lower Levisa, Lower Tennessee, Powell, Red, Rockcastle, Rolling Fork, Salt, Silver-Little Kentucky, South Fork Licking, Upper Cumberland

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Moderately Confined-Large River

Typically found in flowing waters of medium to large rivers in main channels over firm sand and gravel substrates.

Range Map

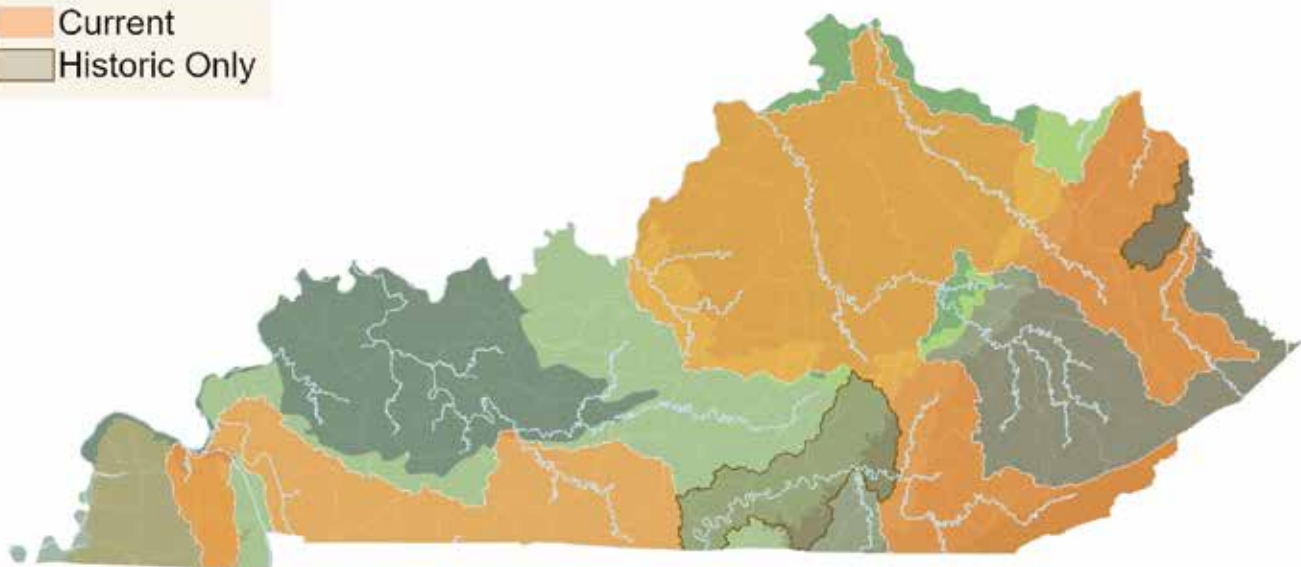





Photo: Monte McGregor











RABBITSFOOT

(*Theliderma cylindrica*)

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Awareness and Communications  
- Conservation Payments  
- External Capacity Building  
- Species Management  

Needs

Survey: Collect baseline species information

Survey: Monitoring

Research: Life History Studies

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3G4

S Rank: S2

Federal Status: Threatened

IUCN Red List: NT - Near threatened

Conservation Goal

Monitor at least two populations with at least one area every three to six years with quantitative sampling. Establish an ARK population in captivity at KDFWR hatcheries. Reintroduce the species into historic habitat from cultured juveniles or translocated adults.

Habitat Associations

Current Watersheds: Barren, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon,

Lower Tennessee, Middle Ohio-Laughery, Red,
Rolling Fork, Rough, South Fork Kentucky, Upper
Green, Upper Mississippi-Cape Girardeau

Stream Type: Warm-Confined-Medium River,
Warm-Confined-Large River

Typically found in flowing waters of medium to large
rivers on channel edges over firm sand and mud
substrates. Habitat is associated with its host fishes,
minnows.

Range Map

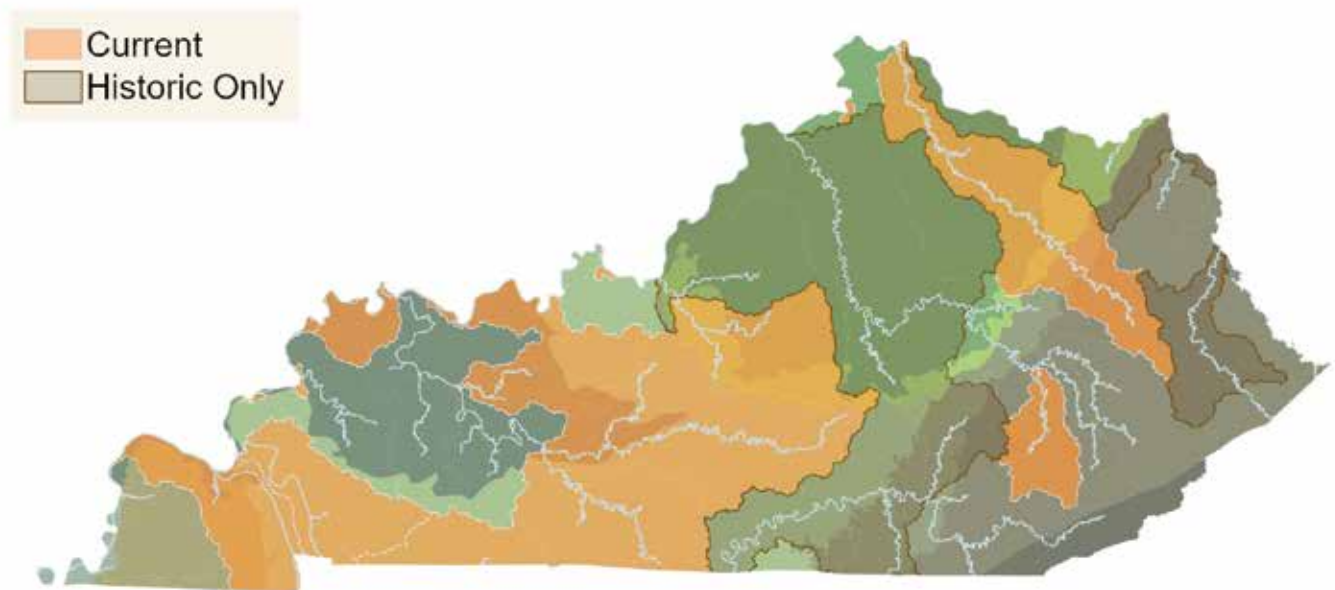





Photo: Monte McGregor









PURPLE LILLIPUT

(*Toxolasma lividum*)

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Awareness and Communications  
- Conservation Payments  
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Species Management  

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Monitor at least one population every three to six years with quantitative sampling. Augment existing low population areas if needed.

Habitat Associations

Current Watersheds: Licking, Lower Cumberland, Lower Tennessee, Rockcastle, Rolling Fork, Salt, South Fork Cumberland, Upper Cumberland-Lake Cumberland, Upper Green

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of small to medium sized streams and rivers over firm sand, mud, and gravel substrates. Habitat is associated with its host fishes, sunfishes.

Range Map

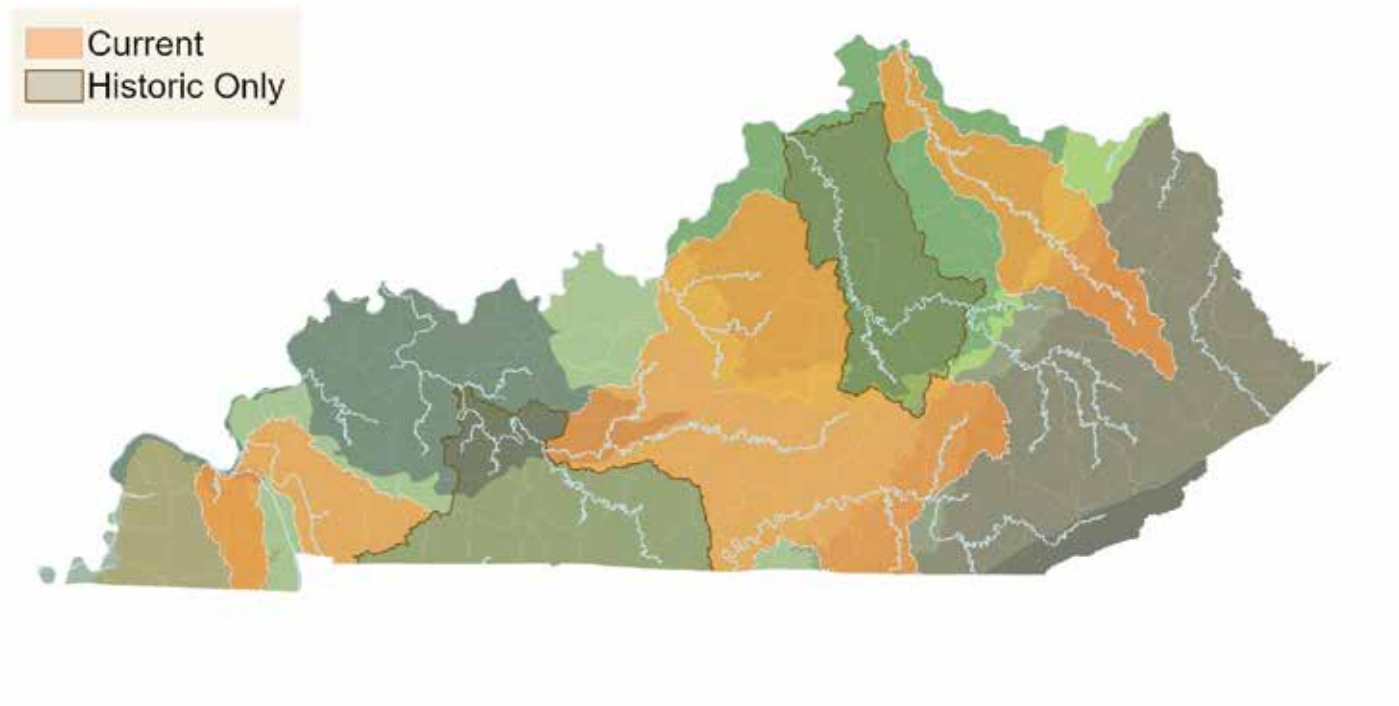





Photo: Monte McGregor



TEXAS LILLIPUT

(*Toxolasma texasiense*)

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Conservation Payments  
- Education and Awareness  
- Habitat and Natural Process Restoration 

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Life History Studies

Research: Propagation and Culture

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Develop culture and propagation methods. Verify species taxonomy with genetics or other methods.

Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Tennessee, Obion, Tradewater

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in slack water or pool habitat of small to medium streams over sand, mud and organic debris substrates. Habitat is associated with its host fishes, sunfishes.

Range Map

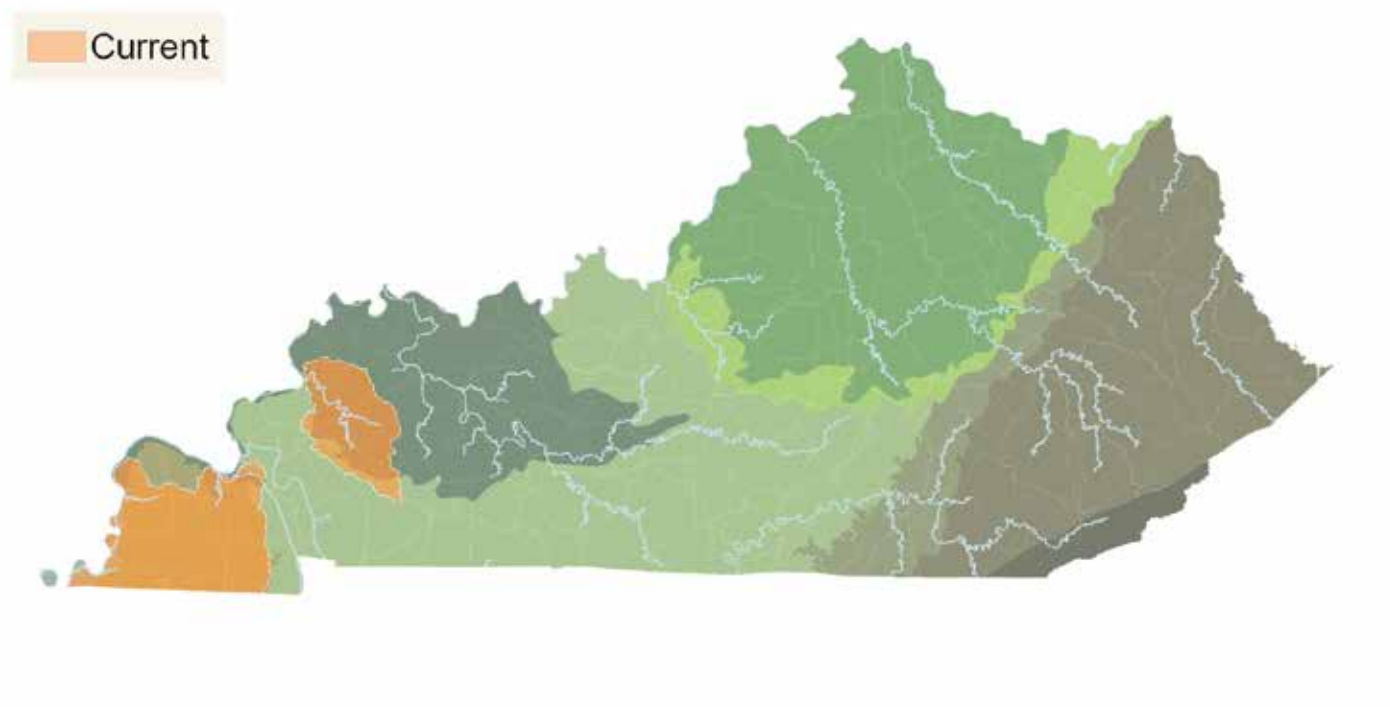


Photo: Monte McGregor



GULF MAPLELEAF

(*Tritogonia nobilis*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Develop culture and propagation methods. Verify species taxonomy with genetics or other methods.




Habitat Associations

Current Watersheds: Bayou De Chien-Mayfield, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, Upper Mississippi-Cape Girardeau

Stream Type: Warm-Confined-Medium River, Warm-Confined-Large River

Typically found in flowing waters of large rivers in main channels over firm sand, gravel, and mud substrates. Habitat is associated with its host fishes, catfishes.

Threats

-  Dams and Water Management/Use
-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Genetic Testing

Research: Propagation and Culture

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Range Map

Current

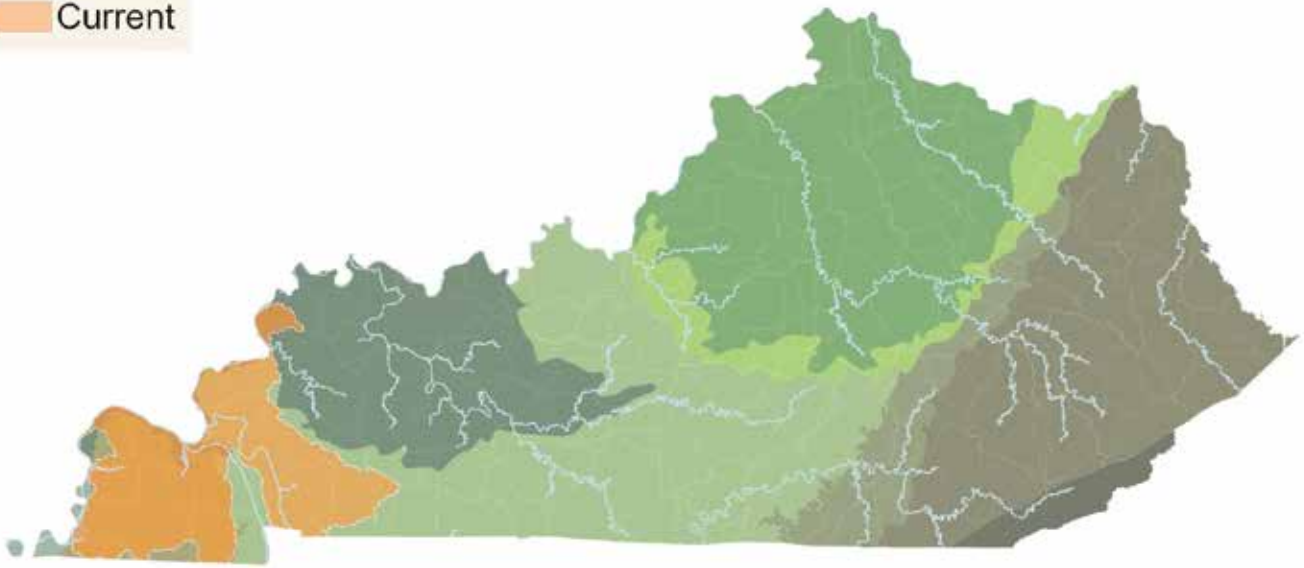



Photo: Monte McGregor



PONDHORN

(*Unio merus tetralasmus*)

Threats

 Other Ecosystem Modifications

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Life History Studies

Management: Economic and Other Incentives

Management: Education and Awareness

Management: Partnership Development

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4S5

Federal Status: N/A

IUCN Red List: LC - Least concern

Limited information exists regarding the Pondhorn's distribution in Western Kentucky.

Conservation Goal

Survey for new areas with qualitative methods to establish long-term monitoring sites. Develop culture and propagation methods.

Habitat Associations

Current Watersheds: Bayou De Chein-Mayfield, Highland-Pigeon, Lower Cumberland, Lower Green, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Obion, Rough, Tradewater, Upper Mississippi-Cape Girardeau

Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

Typically found in slack water or pool habitat of small to medium streams and ponds, lakes, or wetlands in mud and organic debris substrates. Habitat is associated with its host fishes, golden shiners.

Range Map

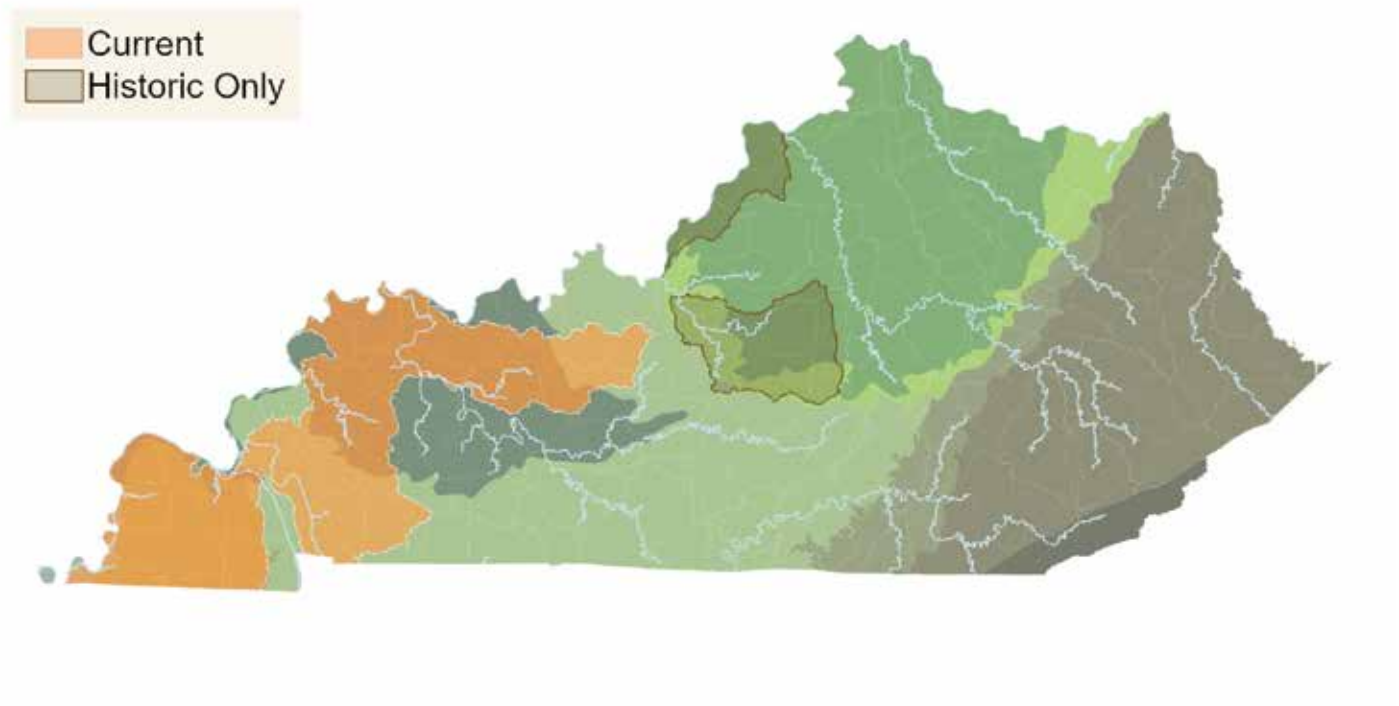


Photo: Monte McGregor



CUMBERLAND BEAN

(*Venustaconcha troostensis*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: GNR

S Rank: S1

Federal Status: Endangered

IUCN Red List: N/A

Conservation Goal

Monitor at least two populations with at least one area every three to six years with quantitative sampling. Augment existing low population areas if needed. Establish an ARK population in captivity at KDFWR hatcheries.



Habitat Associations

Current Watersheds: Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland











Stream Type: Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River

Typically found in flowing waters of small streams over firm sand and gravel substrates. Habitat is associated with its host fishes, darters.

Threats

-  Other Ecosystem Modifications
-  Pollution

Conservation Actions

- Alliance and Partnership Development  
- Awareness and Communications  
- Conservation Payments  
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Species Management  

Needs

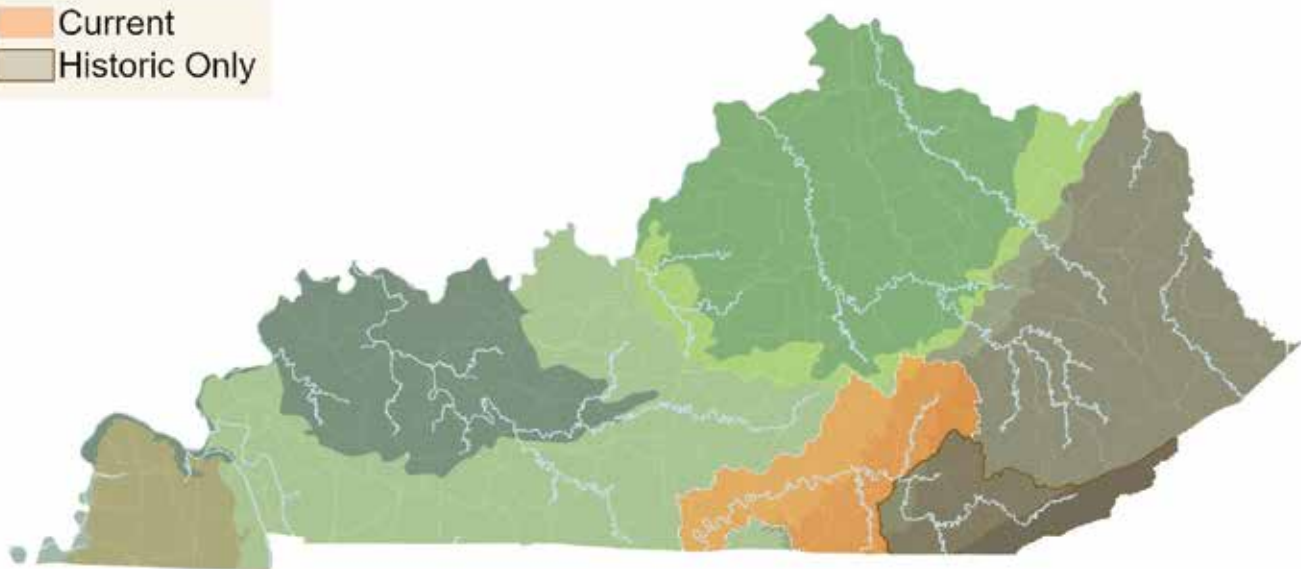
Survey: Collect baseline species information

Survey: Monitoring

Survey: Status Surveys

Research: Augmentation and Reintroduction

Range Map



INSECTS AND SPRINGTAILS

Introduction

This revision introduces insects as SGCN for the first time in Kentucky SWAP history. This timely addition comes amid rising global concern for the health of invertebrate populations, including pollinators, and will allow Kentucky to be proactive in the conservation of these vital species. The list of insect SGCN should not be considered exhaustive – the overwhelming majority of insects occurring in the state are too poorly understood to warrant inclusion at present, but many will undoubtedly appear in future iterations of this plan.

This initial listing of insect SGCN is intended to provide coverage of taxonomic groups known to contain rare species in need of conservation measures and is reflective of the available expertise in Kentucky. The list includes 34 aquatic insects (14 dragonflies and damselflies, 11 caddisflies, 7 stoneflies, 2 mayflies), 19 cave-obligate species (17 beetles and 2 springtails), 20 butterflies and moths, 2 leafhoppers, and one bumble bee. Native bees are critically understudied in Kentucky, but it is likely that the alarming population declines observed throughout the world have also occurred here. It is our hope that native bee inventory and monitoring in the state will expand and provide the necessary information to include additional species in future plan revisions.

The range maps shown for each insect SGCN display county-level presence and were created using the best available data. As such, a species may occur in a county even if its presence is not indicated by the range map. Species presence was considered historical for a county when the most recent record occurred more than 20 years ago, but there exists a chance for rediscovery. Species were considered extirpated when extensive surveys failed to detect the species over a long period of time, when habitat was irreparably destroyed, or when other factors made rediscovery unlikely.

The most common threats to Kentucky's insect SGCN involve the destruction or degradation of habitat. Over 80% of insect SGCN were assigned the threat category Natural System Modifications, which includes fire suppression, improper mowing, stream channelization, and other mechanisms of anthropogenic habitat alteration. In Kentucky, many rare invertebrates rely on correspondingly rare habitats including barrens and prairie remnants. Others live in waterways that may be modified for power generation, flood control, or agricultural use. Even when habitat is not destroyed outright, it may become unsuitable or even lethal – about 55% of insect SGCN were assigned the Pollution threat category.

Pesticides, fertilizers, and other forms of nonpoint source pollution may cause direct mortality in insect populations.

We proposed conservation actions to address the habitat-related threats affecting SGCN. The action category Land/Water Management was assigned to over 60% of SGCN, many of them aquatic insects. For these

OVER
80%

of insect SGCN were assigned the threat category Natural System Modifications.



A blacklight is used to illuminate a white substrate, attracting moths for easy viewing.
Photo: Shelby Fulton, OKNP



A bucket light trap set beside Boone Creek.
Photo: Mike Floyd, USFWS

species, habitat management actions may include the restoration of channelized or unstable stream reaches where SGCN are known to occur and collaboration with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollution on private property.

Proposed actions also highlight the need for collaboration with government agencies, land developers, and private landowners; nearly 75% of SGCN were assigned the action category External Capacity Building and/or Education and Awareness. External Capacity Building actions focus on developing partnerships and providing guidance, including best management practices, to encourage land use practices that support imperiled insects. Education and Awareness actions include the development and distribution of outreach materials designed to call attention to native insects, the threats facing them, and conservation measures that can be taken at any level of land stewardship.

All 76 insect SGCN were assigned at least one Need. These include the collection of baseline species information, regular population monitoring, and targeted efforts to locate additional populations. Prioritizing SGCN Needs will allow for more specific Conservation Actions to be proposed for SGCN in future editions of the Plan.



Vegetation monitoring for blooming plant availability during fall. Photo: Michaela Rogers

Sources:

Covell, C. 1999. The Butterflies and Moths (Lepidoptera) of Kentucky. Kentucky State Nature Preserves Commission, Technical Series 6, Frankfort, KY.

Floyd, M. A., Moulton, J. K., Schuster, G. A., Parker, C. R., and Robinson, J. 2012. An annotated checklist of the caddisflies (Insecta: Trichoptera) of Kentucky. *Journal of the Kentucky Academy of Science*, 73: 4-40.

Schweitzer, D. F., Minno, M. C., and Wagner, D. L. 2011. Rare, Declining, and Poorly Known Butterflies and Moths (Lepidoptera) of Forests and Woodlands in the Eastern United States.

Tarter, D. C., Adkins, D. A., and Covell Jr, C. V. 1984. A checklist of the stoneflies (Plecoptera) of Kentucky. *Entomological News*, 95: 113-116.

Rattlesnake Master Borer Moth

The rattlesnake master borer moth (*Papaipema eryngii*) populates high quality remnant prairies, and is known from limited grassland, savanna, barren, glade, and woodland openings (USFWS 2019). Its sole host plant, rattlesnake master (*Eryngium yuccifolium*), is required for larvae to consume and develop, and for eggs to overwinter on.

In 2016, Kentucky was granted a Competitive State Wildlife Grant (C-SWG) to address declines associated with rattlesnake master borer moth populations. The grant enabled targeted management and restoration practices on high-priority prairies, glades, and barrens identified in Kentucky's SWAP to improve and increase habitat for the species. This project involved collaboration with statewide partners including the Kentucky Department of Fish and Wildlife Resources, the Office of Kentucky Nature Preserves, The Nature Conservancy, Roundstone Native Seed, and the Kentucky Prescribed Fire Council.

Project objectives included the formation of strike teams made up of aforementioned partners to restore and enhance known and potential rattlesnake master borer moth habitat. Strike teams focused on the implementation of prescribed fire, invasive species removal, removal of undesirable woody species, and understory (as well as select overstory) thinning. Intensive population monitoring was established to determine host plant abundance and evaluate the moth's response to prescribed fire. Monitoring protocols consisted of 1) stem counts of rattlesnake master and 2) counts of rattlesnake master plants exhibiting larval feeding sign by the rattlesnake master borer moth.



A rattlesnake master stem containing a rattlesnake master borer moth caterpillar. The stem displays characteristic signs of the caterpillar's presence, including a bore hole and rust-colored frass.

Photo: Shelby Fulton



A rattlesnake master borer moth caterpillar appears to dive headfirst into a rattlesnake master stem, boring into the plant. A previous bore hole (containing the rust-colored frass associated with the species) can be seen above the caterpillar. Photo: Shelby Fulton

Two nature preserves with known occurrences of rattlesnake master borer moth were given high priority for management activities and were monitored from 2017 through 2019 by surveyors systematically walking each property and recording the location of plants with moth larvae feeding signs. Additionally, two Wildlife Management Area sites totaling 265 acres were targeted for prairie restoration to positively impact over 50 secondary SGCN by maintaining and restoring grassland habitat in focal areas. Restoration activities included clearing overgrown, poor-quality habitat and planting native warm-season grasses and forbs on 30 acres.

Stem counts of rattlesnake master increased by 443% at the primary rattlesnake master borer moth management site and 127% at the secondary management site across three years of monitoring. The presence of larval feeding sign remained constant at the two sites, with the average rate of larval occurrence at approximately 1% and 0.1% at the two management sites, respectively. The extensive monitoring that took place during this large-scale partnership project fundamentally changed the way fire is implemented at rattlesnake master borer moth sites in Kentucky. Due to the species' positive response to prescribed fire, sites can be managed more efficiently and with confidence that populations of the moth are not being harmed. The potential for conducting fall burns is now recognized. This allows for a greater window of time in which effective grassland management can take place and for long-term control of woody plant species.



OKNP biologists mark rattlesnake master plants, checking each stem for signs indicating the presence of rattlesnake master borer moth caterpillars.

Photo: KDFWR

**INSECTS AND SPRINGTAIL
PROFILE PAGES**





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in rivers inhabited by species.

Habitat Associations

Physiographic Regions: Bluegrass, Knobs

Stream Type: Other

Only found in large rivers within range.

RIVER STONE

(*Acroneuria covelli*)


Threats

 Natural System Modifications

 Pollution

Conservation Actions

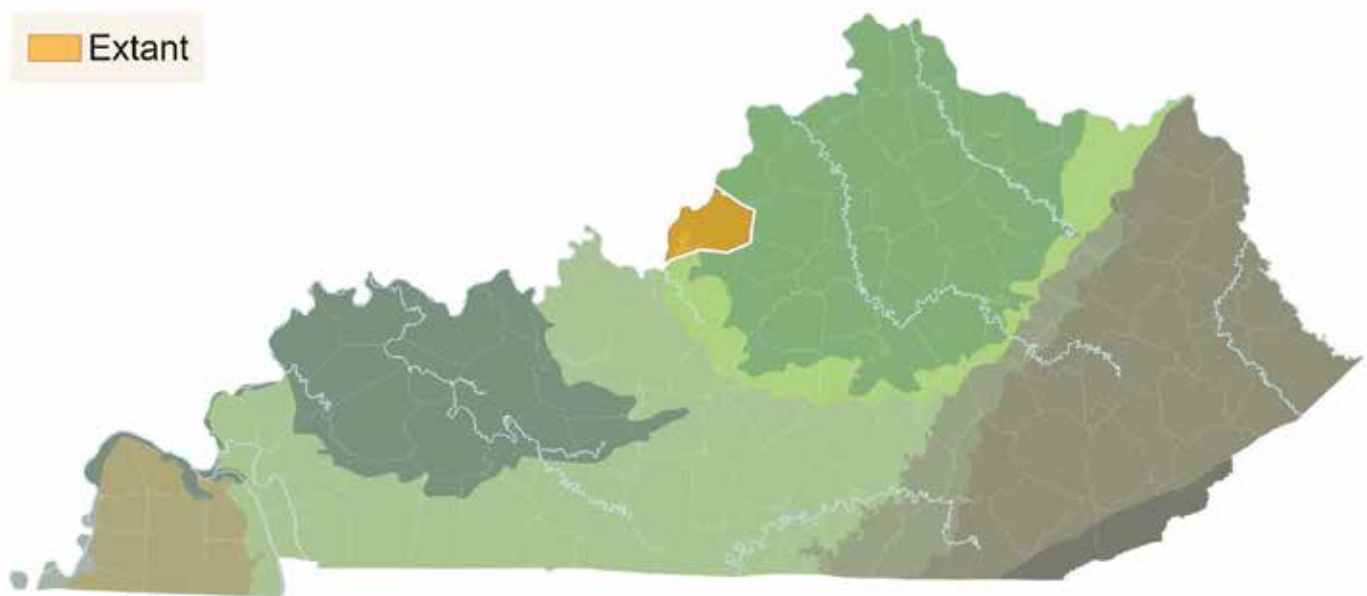
Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: GH

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine range and stability of extant population in Kentucky.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream

None

KENTUCKY STONE

(*Acroneuria hitchcocki*)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

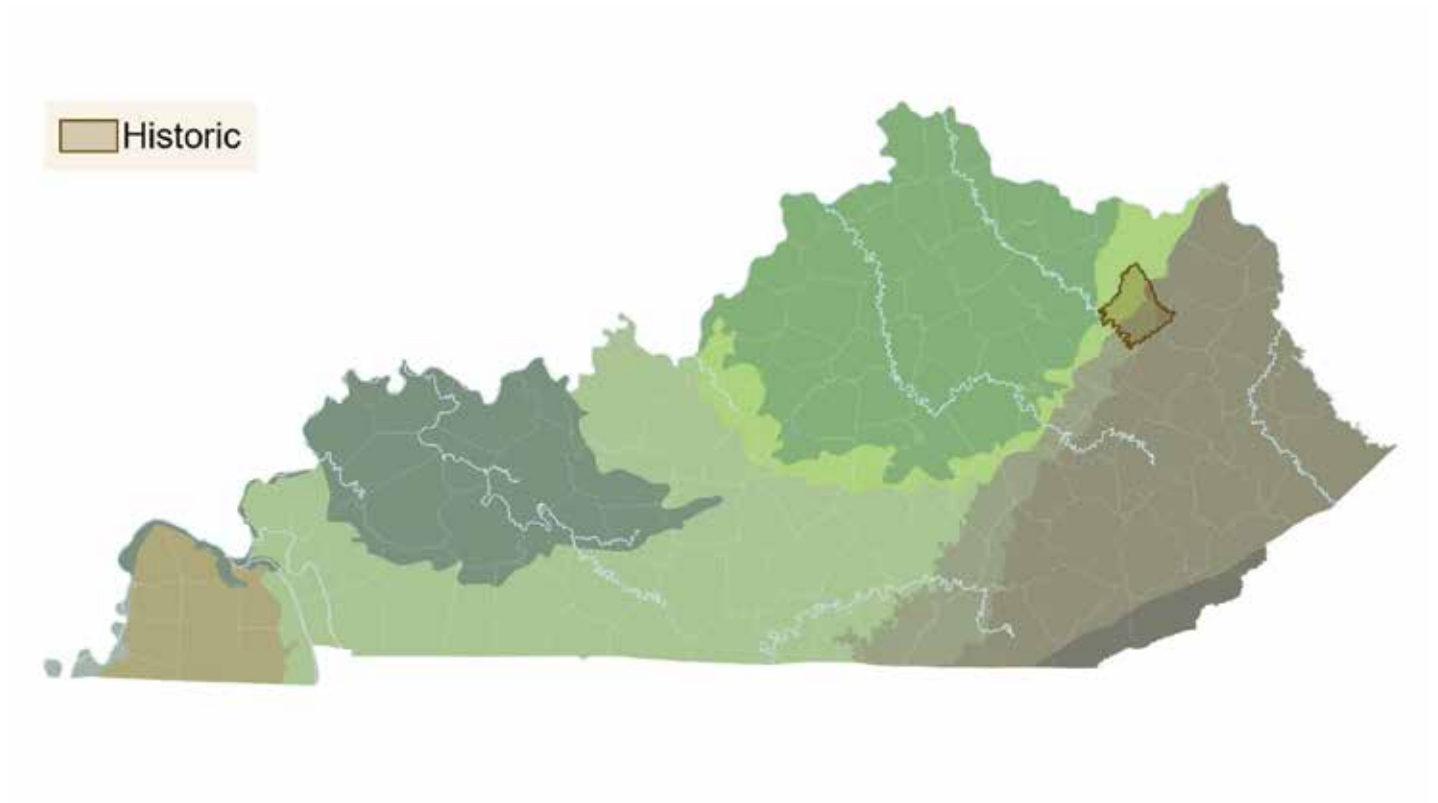
Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in known habitat.

Habitat Associations

Physiographic Regions: Bluegrass

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream

None

(*AGAPETUS GELBAE*)

Threats

 Pollution

Conservation Actions

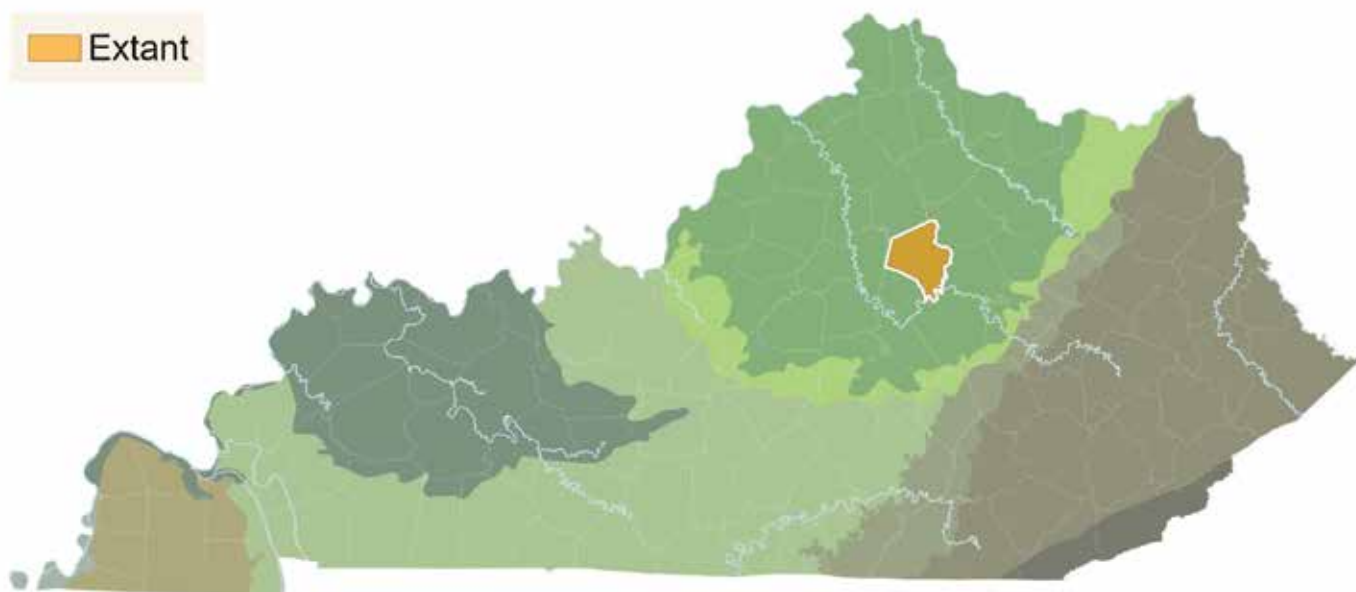
Awareness and Communications 

Habitat and Natural Process Restoration 

Needs

Survey: Locate additional populations

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: GNR

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in streams inhabited by species.

Habitat Associations



Physiographic Regions: Cumberland Mountains

Guilds: None




None

(*AGAPETUS* *KIRCHNERI*)

Threats

-  Natural System Modifications
-  Pollution

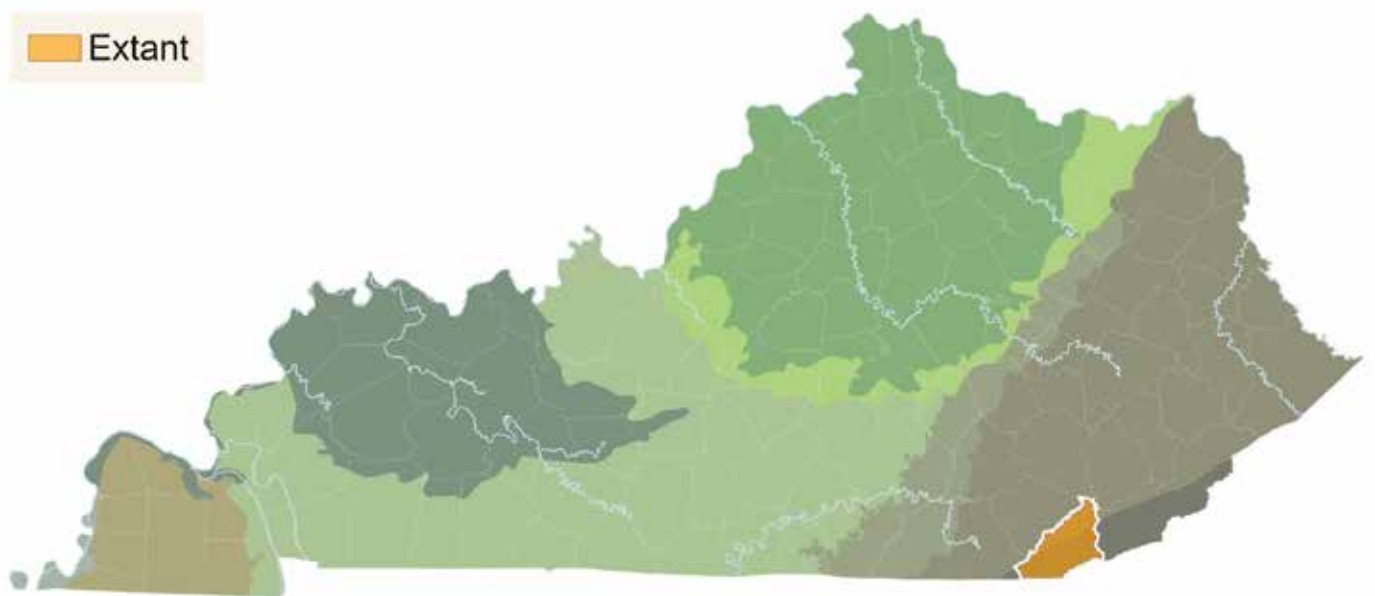
Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1G2

S Rank: S1S2

Federal Status: Not Listed

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in streams inhabited by species.

Habitat Associations

Physiographic Regions: Interior Plateau

Stream Type: Cool-Medium Gradient-Stream

Uses spring-fed streams in karst habitats.

KARST SNOWFLY

(*Allocapnia cunninghami*)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Survey: Monitoring of known populations

Range Map

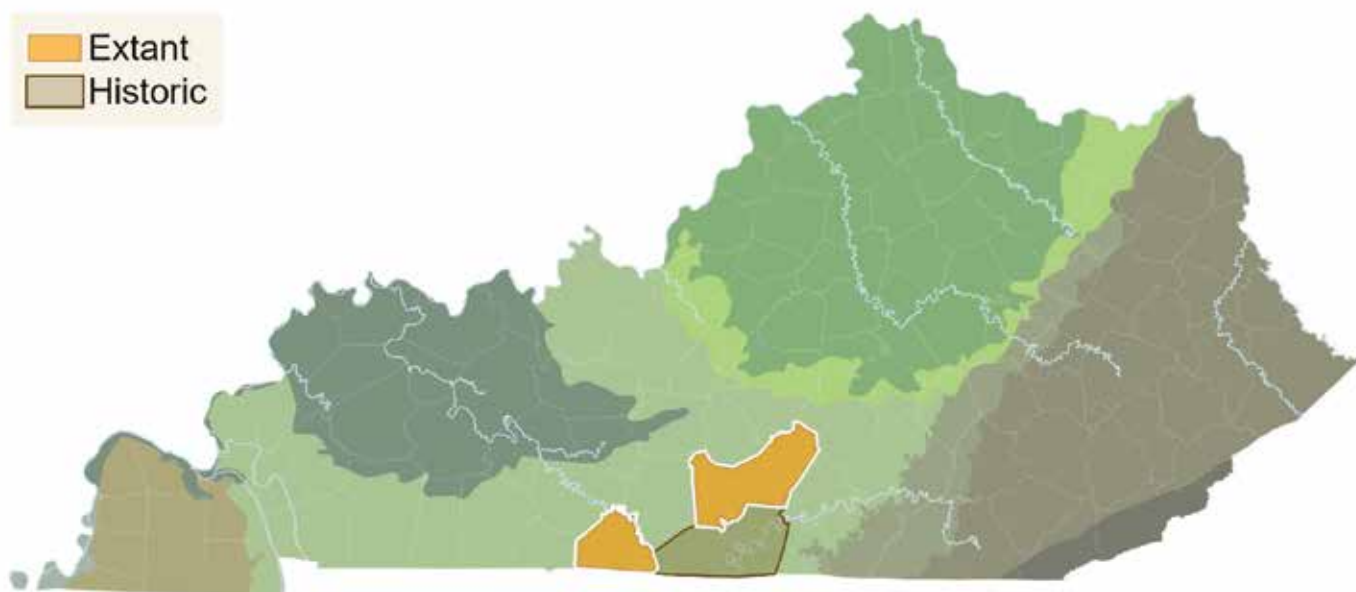


Photo: Ellis Lauder milk



EASTERN RED DAMSEL

(*Amphiagrion saucium*)

Conservation Profile

Priority Group: Moderate

KNP Info




G Rank: G5

S Rank: S1S2





Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Logging and Wood Harvesting
-  Natural System Modifications
-  Pollution

Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration 
- Land/Water Management 
- Resource and Habitat Protection 

Needs

Survey: Locate additional populations

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in rivers and riparian areas inhabited by species.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Mississippi Valley Loess Plain

Stream Type: Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cold-Low Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Other

Found in pond margins, spring-fed bogs, and seeps with algae and sphagnum.

Range Map

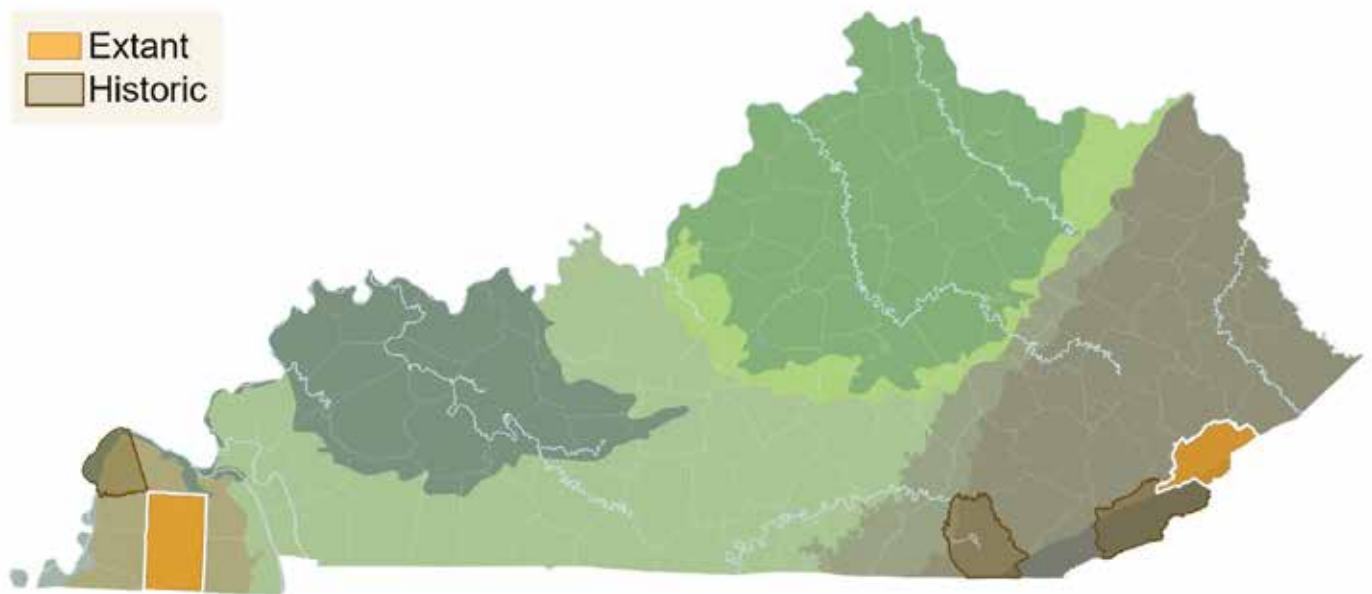


Photo: Ellis Lauder milk



BAYOU CLUBTAIL

(*Arigomphus maxwelli*)

Conservation Profile

Priority Group: High

KNP Info



G Rank: G5

S Rank: S1S2




Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Natural System Modifications
-  Pollution

Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in streams and riparian areas inhabited by species.

Habitat Associations

Physiographic Regions: Mississippi Valley Loess Plain

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Other

Burrower. Uses shallow ponds, slow flowing ditches, open or woodland edge streams and ponds.

Range Map

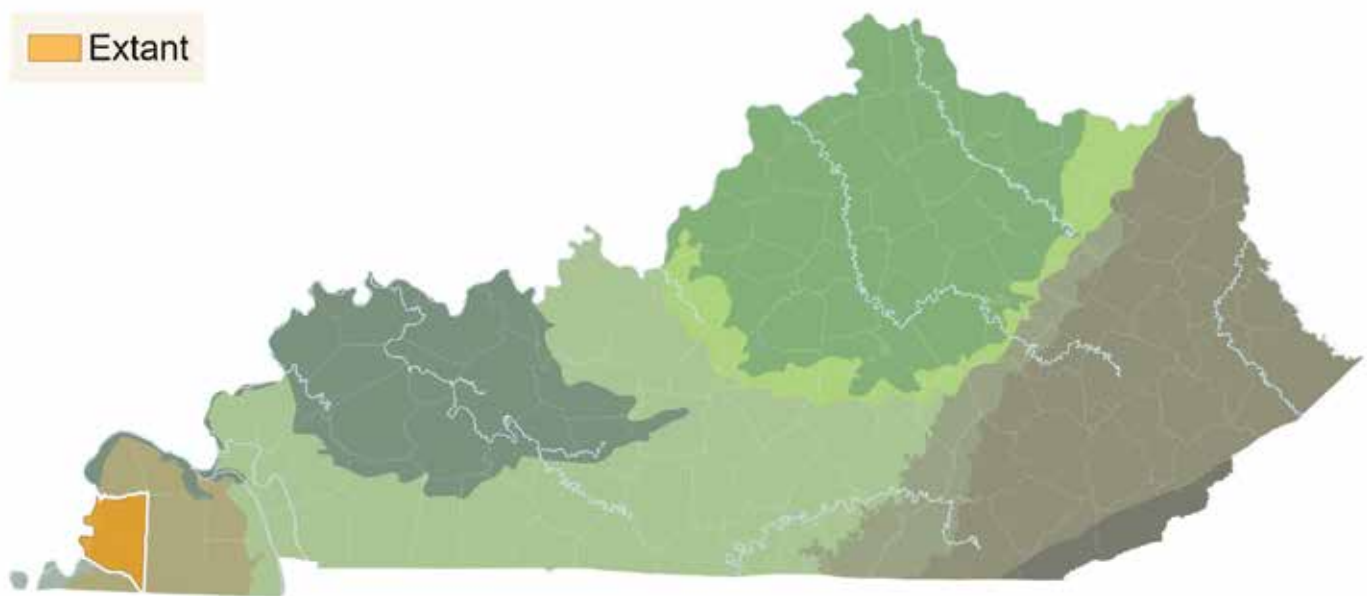


Photo: John Abrams



AMERICAN BUMBLEBEE

(*Bombus pensylvanicus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3G4

S Rank: S2S3

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Establish current population trend in Kentucky.
Increase native blooming plant availability throughout the state.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah

Nests on the surface of the ground among long grass and occasionally underground. Uses open field, farmland, prairie and grassland habitat.

Threats

-  Agricultural and Forestry Effluents
-  Agriculture and Aquaculture
-  Pathogens and Microbes
-  Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications   
- External Capacity Building 
- Habitat and Natural Process Restoration  
- Policies and Regulations 

Needs

Survey: Population trend monitoring

Range Map

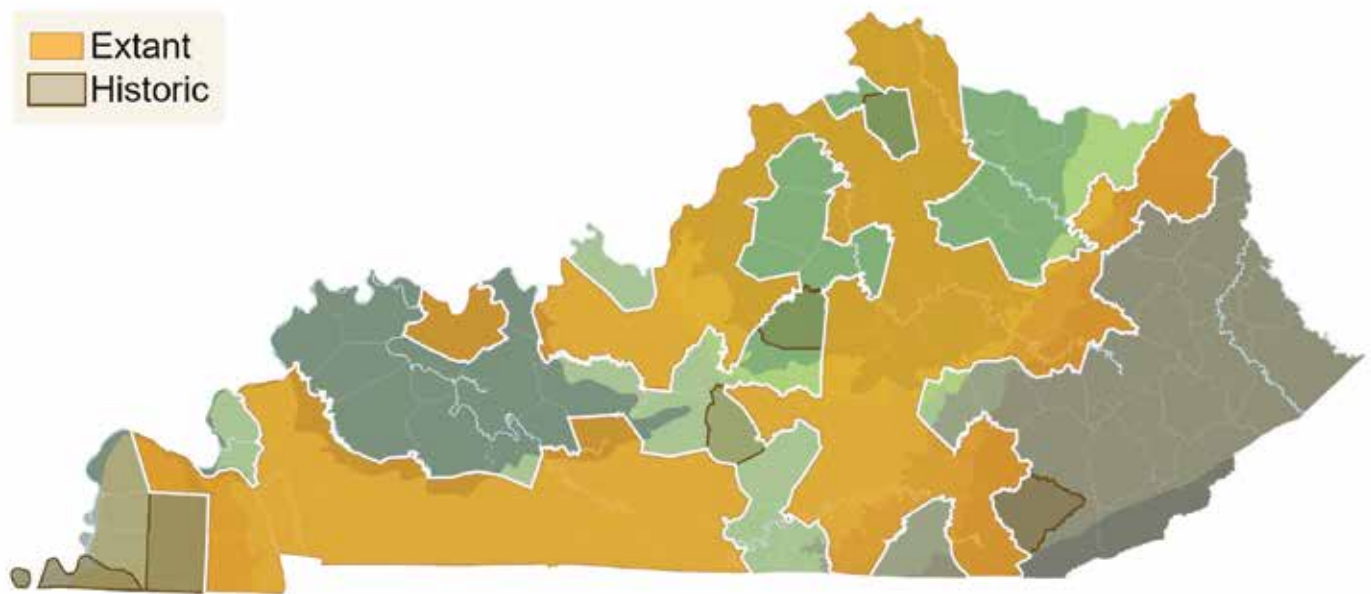


Photo: Ellis Lauder milk



NORTHERN METALMARK

(*Calephelis borealis*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Monitor known populations and work with partners to maintain occupied habitat.



Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass

Guilds: Grassland/Savannah

Requires *Packera obovata* as host plant.

Threats

-  Agriculture and Aquaculture
-  Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications  
- External Capacity Building 
- Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Research: Establish habitat requirements

Range Map

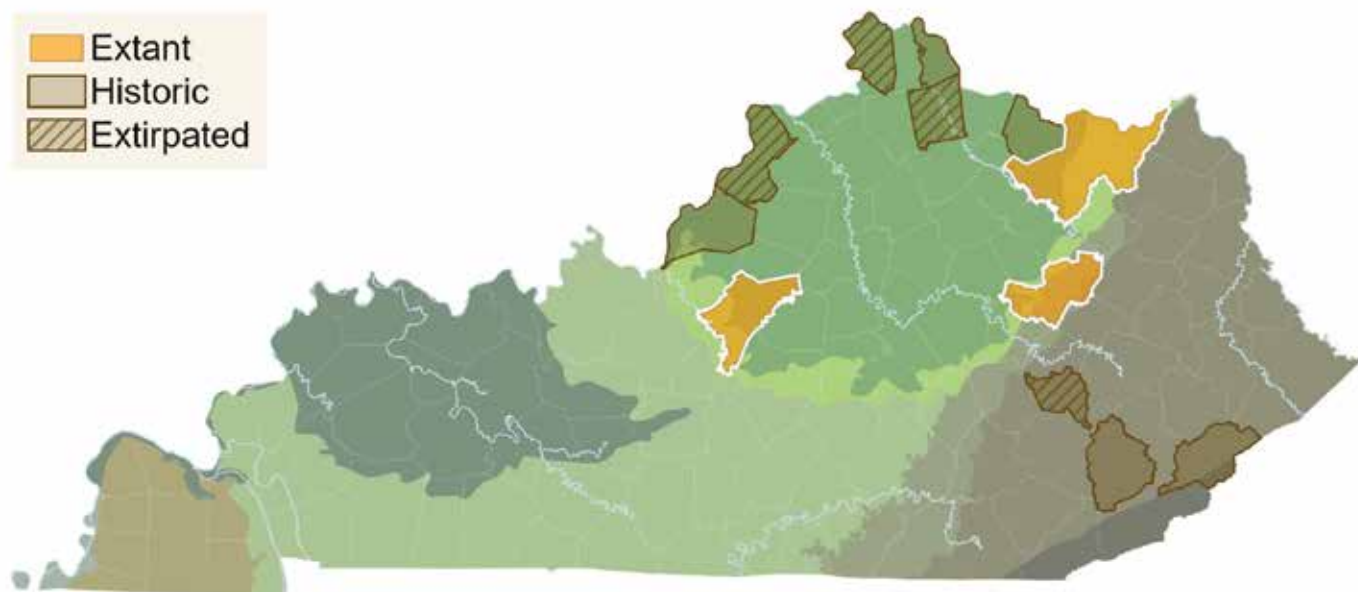


Photo: Ellis Lauder milk



SWAMP METALMARK

(*Calephelis muticum*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G3

S Rank: S1





Federal Status: N/A

IUCN Red List: N/A

Threats

-  Agriculture and Aquaculture
-  Fire and Fire Suppression
-  Residential and Commercial Development

Conservation Actions

- External Capacity Building 
- Resource and Habitat Protection   

Needs

Survey: Locate additional populations

Conservation Goal

Determine species status in Kentucky and work with partners to maintain and restore habitat.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills

Guilds: Grassland/Savannah, Open Wetland

Requires native thistles for host plant.

Range Map

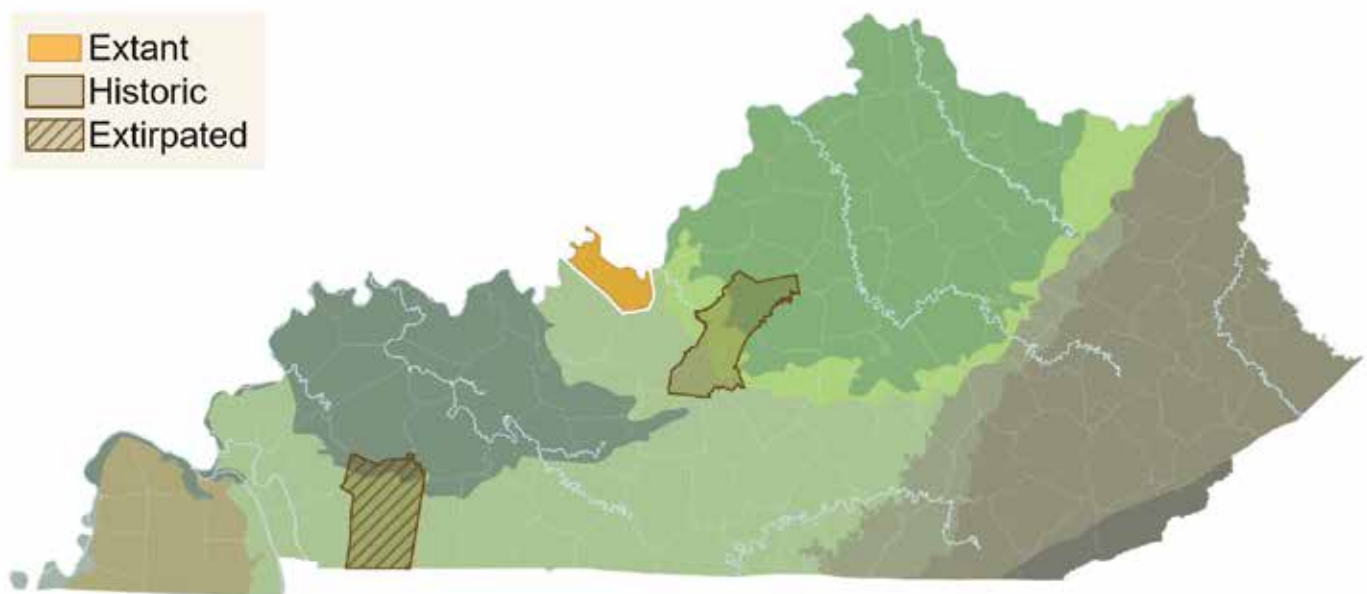


Photo: Loran Gibson



FROSTED ELFIN

(*Callophrys irus*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G2G3

S Rank: S1


Federal Status: Not Listed

IUCN Red List: N/A

Threats

-  Agriculture and Aquaculture
-  Fire and Fire Suppression
-  Residential and Commercial Development

Conservation Actions

- External Capacity Building 
- Habitat and Natural Process Restoration   
- Land/Water Management 

Needs

Survey: Population monitoring

Research: Explore population expansion

Conservation Goal

Maintain and restore high-quality pine barrens habitat and evaluate methods for preventing wildfire where the species occurs.

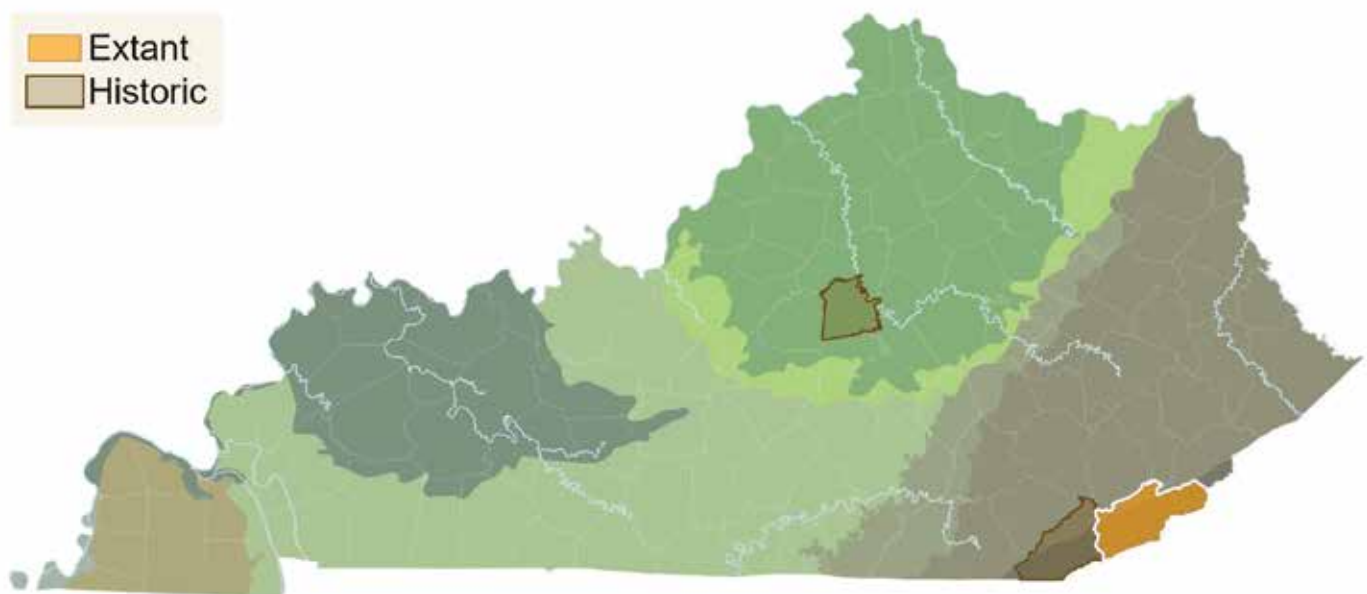
Habitat Associations

Physiographic Regions: Cumberland Mountains

Guilds: Grassland/Savannah

Host plant in Kentucky is *Baptisia tinctoria*.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S1S2

Federal Status: N/A

IUCN Red List: LC - Least concern

SPARKLING JEWELWING

(Calopteryx dimidiata)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in known habitat.

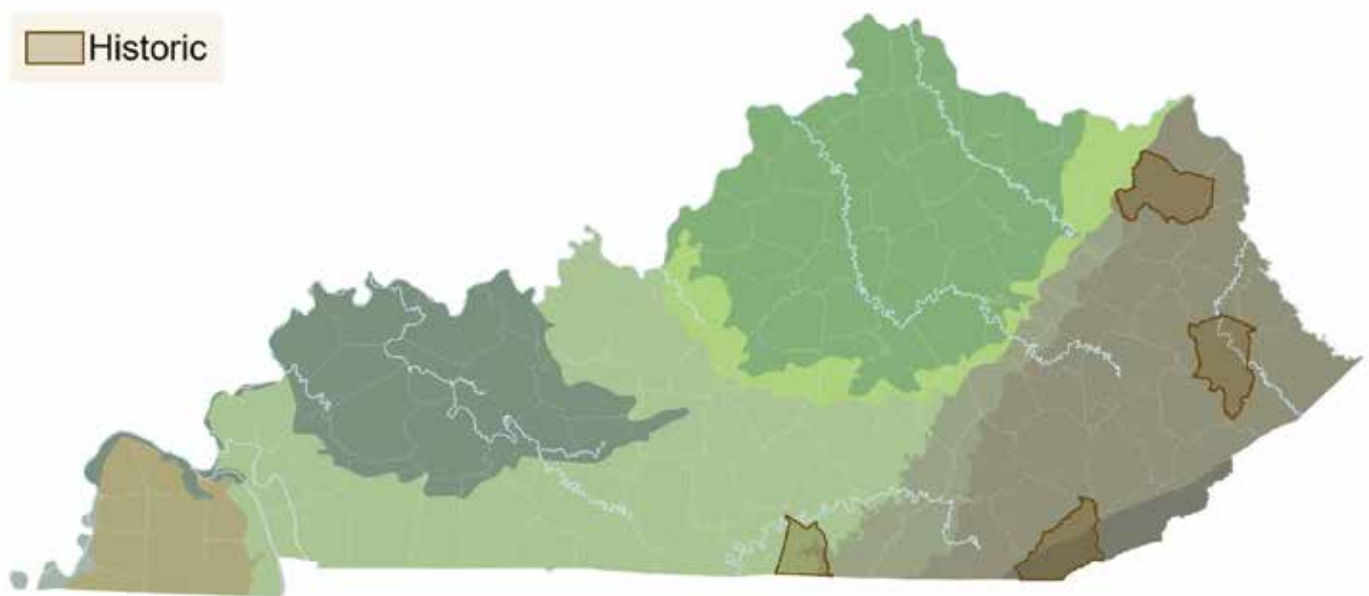
Habitat Associations

Physiographic Regions: Cumberland Plateau, Interior Plateau

Guilds: None

Uses open areas with few trees, vascular hydrophytes, cool and warm streams. Climbers. Associations with *Vallisneria americana* (wild celery).

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in known habitat.

Habitat Associations

Physiographic Regions: Interior Plateau, Mississippi Valley Loess Plain





Stream Type: Other

Vascular hydrophytes. Climbers. Uses open ponds and small lakes with emergent vegetation along the shore, occasionally in bogs, ditches, and streams with emergent vegetation.






DOUBLE-RINGED PENNANT

(*Celithemis verna*)

Threats

-  Agriculture and Aquaculture
-  Natural System Modifications
-  Pollution
-  Residential and Commercial Development

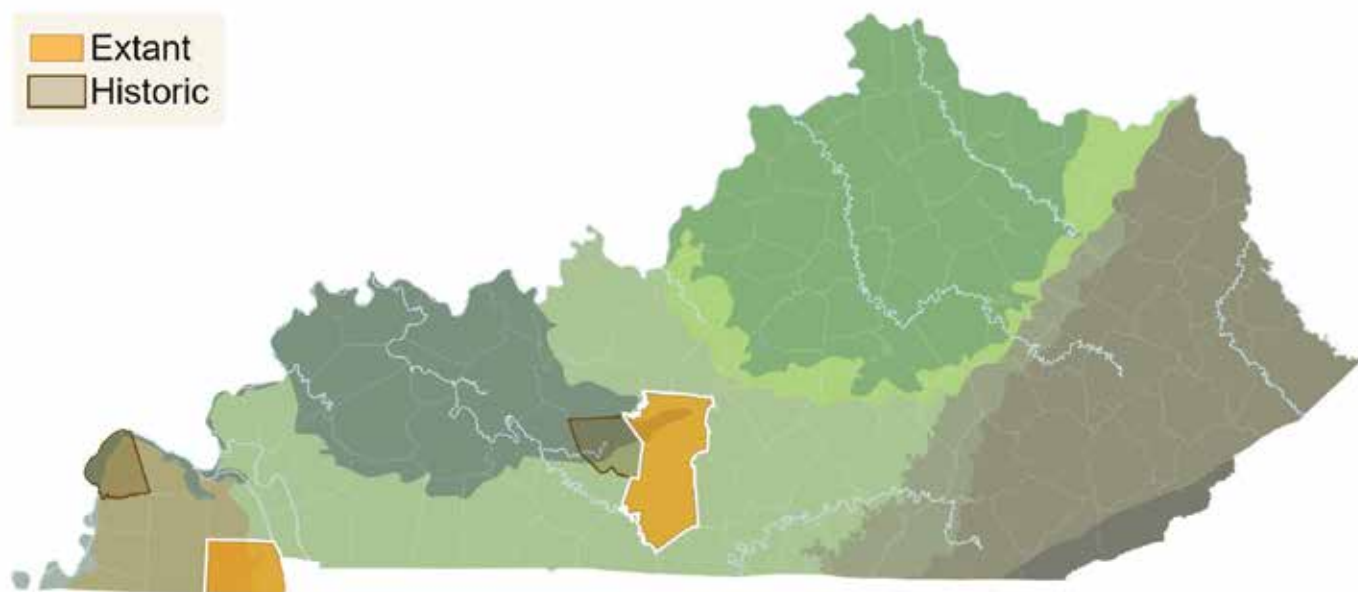
Conservation Actions

- Awareness and Communications 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Resource and Habitat Protection  

Needs

Survey: Locate additional populations

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Maintain and restore high-quality woodland edge habitat.

Habitat Associations

Physiographic Regions: Knobs, Interior Plateau




Guilds: Grassland/Savannah

Occurs along wooded openings and edges. Requires *Helianthus divaricatus* as a host plant.

GORGONE CHECKERSPOT

(*Chlosyne gorgone*)

Threats

-  Agriculture and Aquaculture
-  Fire and Fire Suppression
-  Residential and Commercial Development

Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications  
- External Capacity Building 
- Habitat and Natural Process Restoration  

Needs

Survey: Monitoring of known populations

Range Map

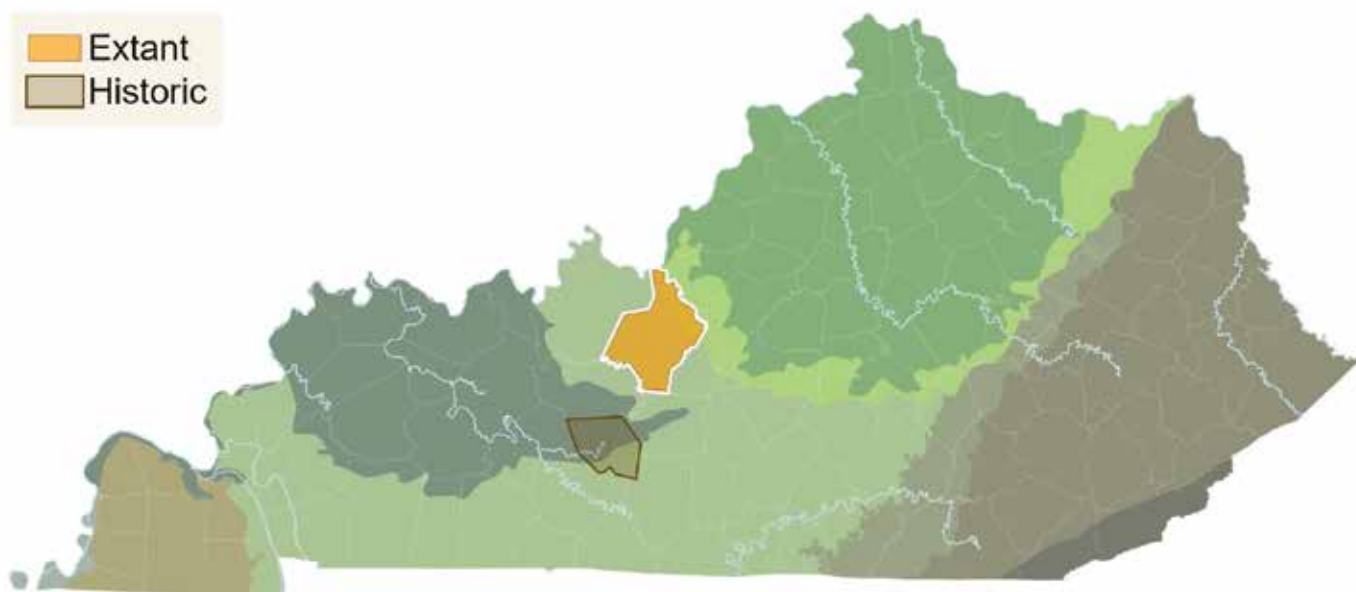


Photo: Michaela Rogers



MONARCH

(*Danaus plexippus plexippus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4T3

S Rank: S4

Federal Status: Candidate

IUCN Red List: EN - Endangered

Conservation Goal

Determine stability of breeding population in Kentucky. Increase native blooming plant and milkweed availability.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Mesic Forest, Xeric Forest, Open Wetland, Agriculture, Urban, Suburban, Scrub-Shrub/Early Successional Forest

Requires milkweed (*Asclepias* sp.) as larval host plant. Adults will persist in a variety of habitats where nectar resources are available; grasslands, prairies, meadows, urban gardens, roadsides, forest and agricultural edges.

Threats

- Agricultural and Forestry Effluents
- Annual and Perennial Nontimber Crops
- Pathogens and Microbes
- Residential and Commercial Development

Conservation Actions

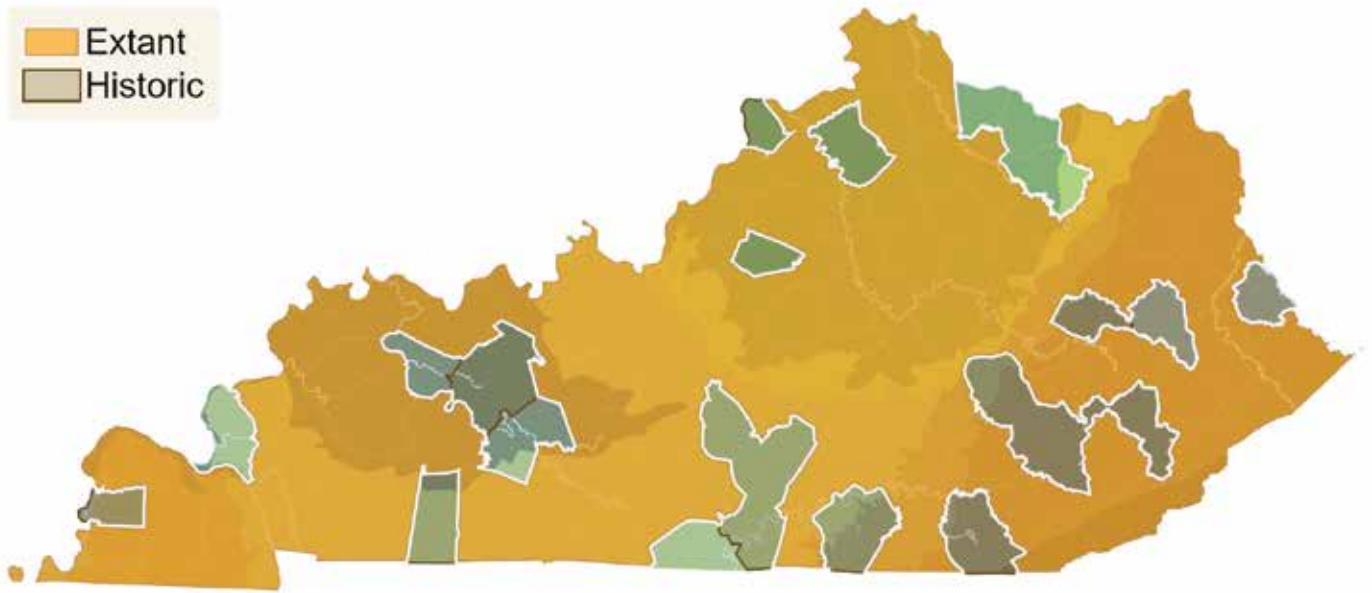
- Alliance and Partnership Development
- Awareness and Communications
- Conservation Payments
- External Capacity Building
- Habitat and Natural Process Restoration
- Policies and Regulations
- Training

Needs

Survey: Increase participation in national monarch monitoring initiatives

Research: Kentucky-specific habitat management research

Range Map



Presumed statewide



NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S1S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in riparian areas inhabited by species.

Habitat Associations

Physiographic Regions: Interior Plateau, Mississippi Valley Loess Plain

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Other

Uses swamps, lakes, ponds with dense vegetation, vegetated stream backwaters.

ATTENUATED BLUET

(Enallagma daeckii)


Threats

 Natural System Modifications

 Pollution

Conservation Actions

Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Range Map

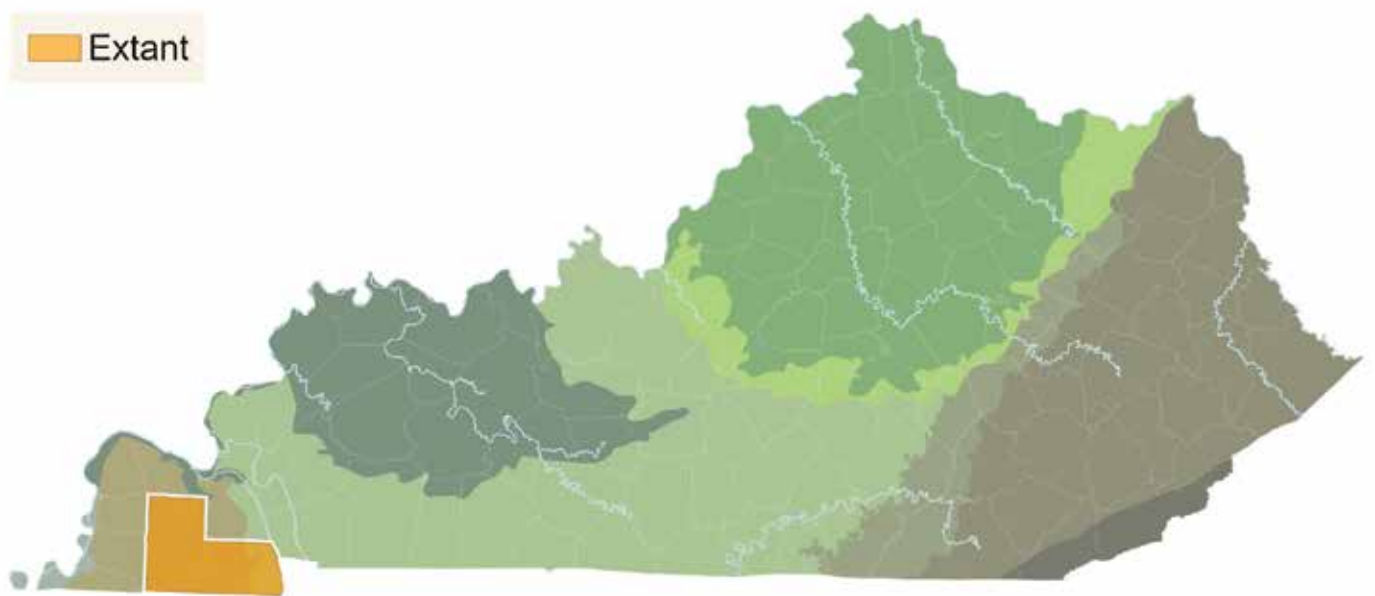
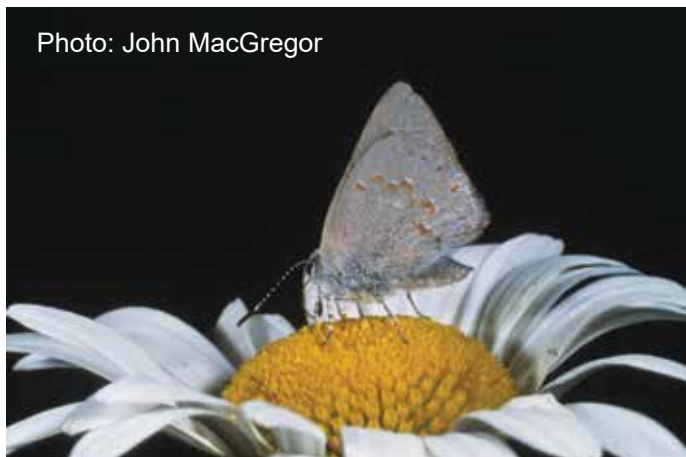


Photo: John MacGregor



EARLY HAIRSTREAK

(*Erora laeta*)

Conservation Profile

Priority Group: Highest

KNP Info



G Rank: G2G3

S Rank: S1



Federal Status: N/A

IUCN Red List: N/A

Threats

-  Logging and Wood Harvesting
-  Pathogens and Microbes

Conservation Actions

- Awareness and Communications 
- Resource and Habitat Protection 

Needs

Survey: Locate additional populations

Conservation Goal

Monitor known populations and promote forest management strategies compatible with species biology.

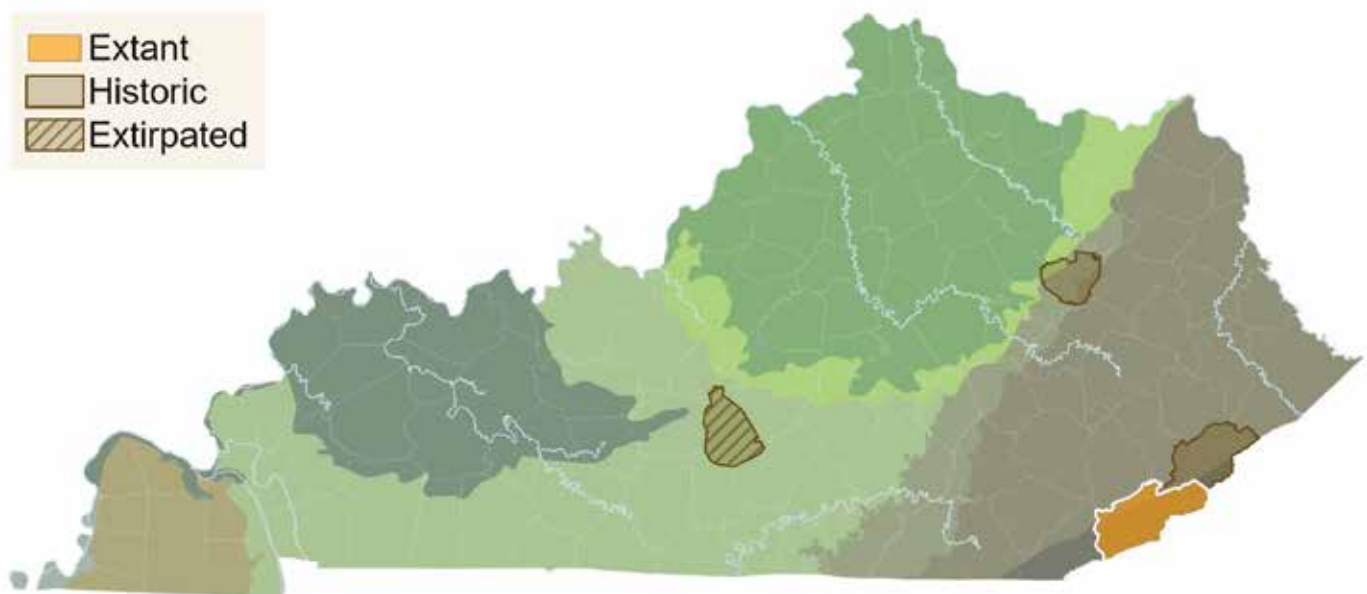
Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Interior Plateau

Guilds: Mesic Forest, Xeric Forest

Requires *Fagus grandifolia* as host plant.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S2S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Establish current population level in Kentucky.
Maintain and restore quality prairie and barrens habitat to preserve population.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills

Guilds: Grassland/Savannah

Uses glades, outcrops, and dry prairies, with canopy cover of scrubby oaks and pines. Feeds on the leaves of New Jersey tea (*Ceanothus americanus*).

MOTTLED DUSKYWING

(*Erynnis martialis*)

Threats



Agriculture and Aquaculture



Residential and Commercial Development

Conservation Actions

External Capacity Building

Habitat and Natural Process Restoration

Resource and Habitat Protection

Needs

Survey: Collect baseline species information

Range Map

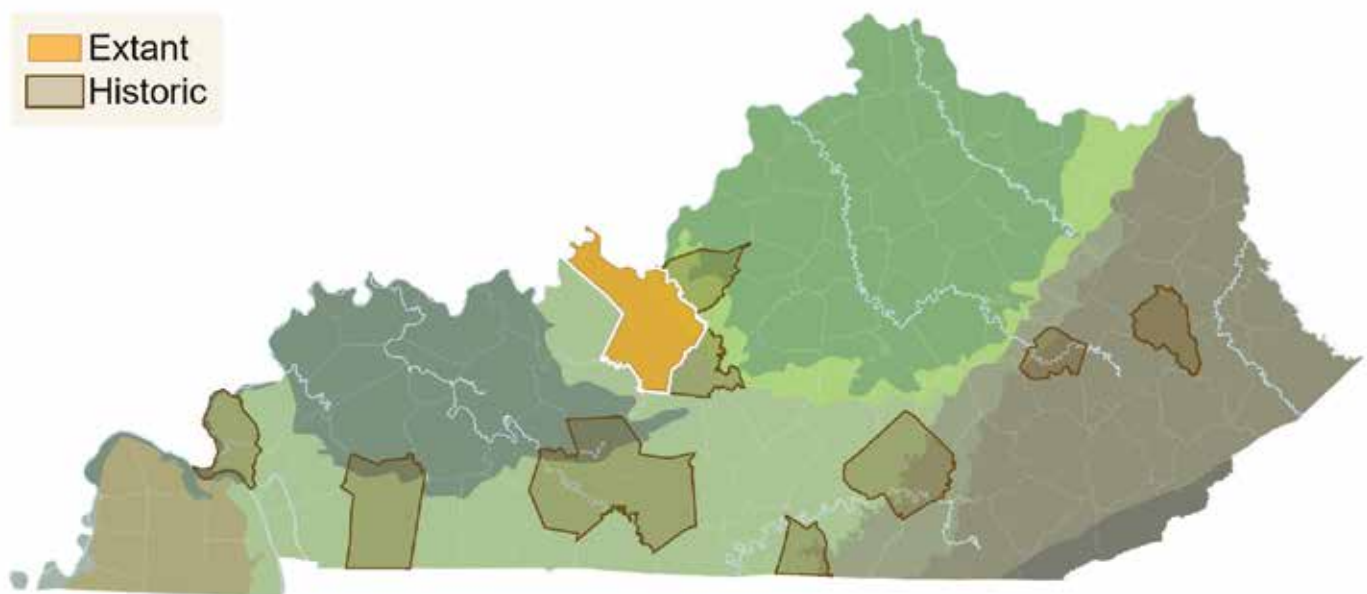


Photo: Ellis Laudermilk



DUKES' SKIPPER

(*Euphyes dukesi*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3G4

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Threats



Logging and Wood Harvesting



Other Ecosystem Modifications

Conservation Actions

Awareness and Communications



External Capacity Building



Resource and Habitat Protection



Needs

Survey: Collect baseline species information

Conservation Goal

Maintain current populations through wetland preservation.

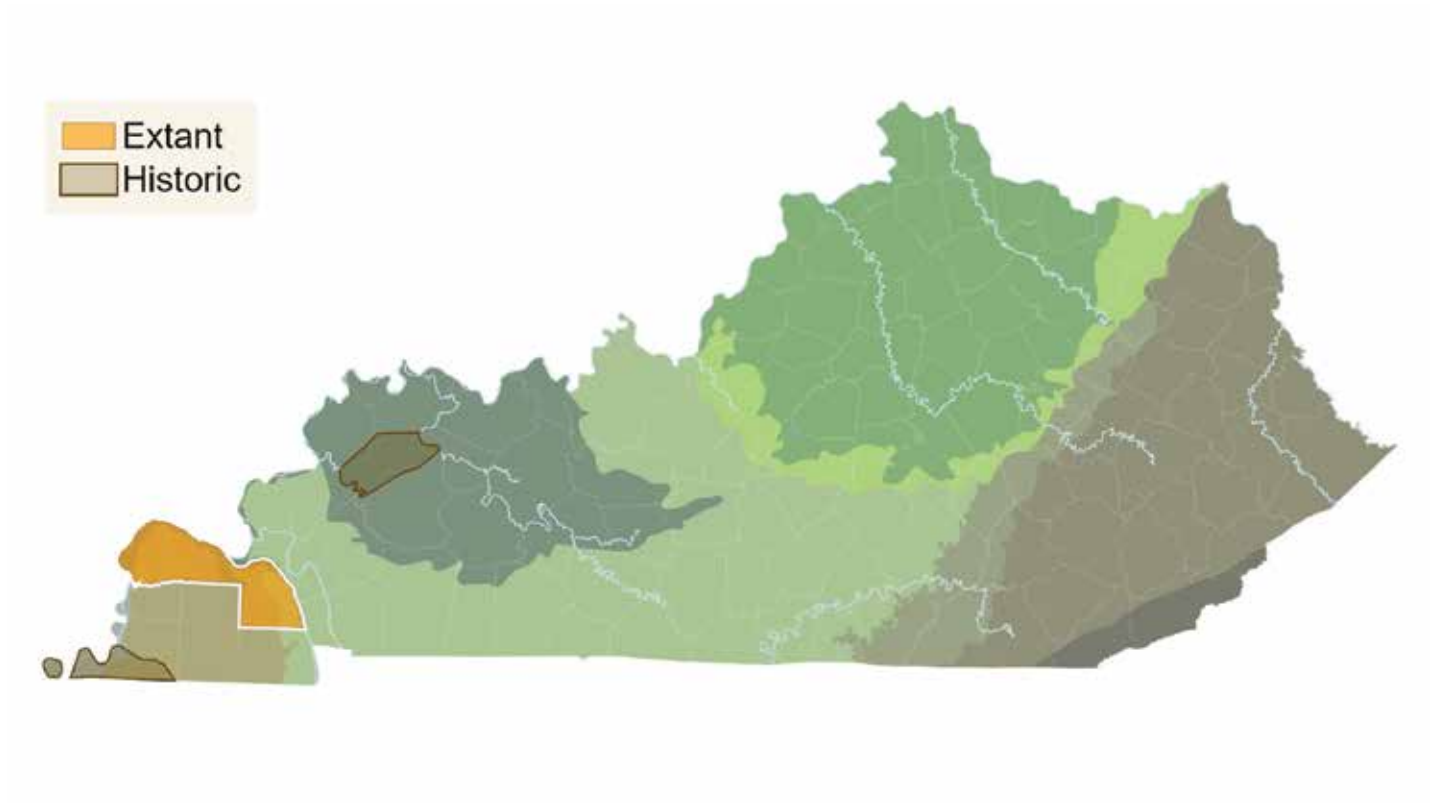
Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Grassland/Savannah

Uses sedge-dominated areas in hardwood and cypress. Eggs are laid on sedge host plant leaves (Cyperaceae).

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in rivers and streams.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills



Guilds: None

Burrower. Uses clear, sand and silt-bottomed rivers with rocks, silty and sluggish rivers, large streams, and medium to large rivers.




COCOA CLUBTAIL

(*Gomphurus hybridus*)

Threats

-  Natural System Modifications
-  Pollution

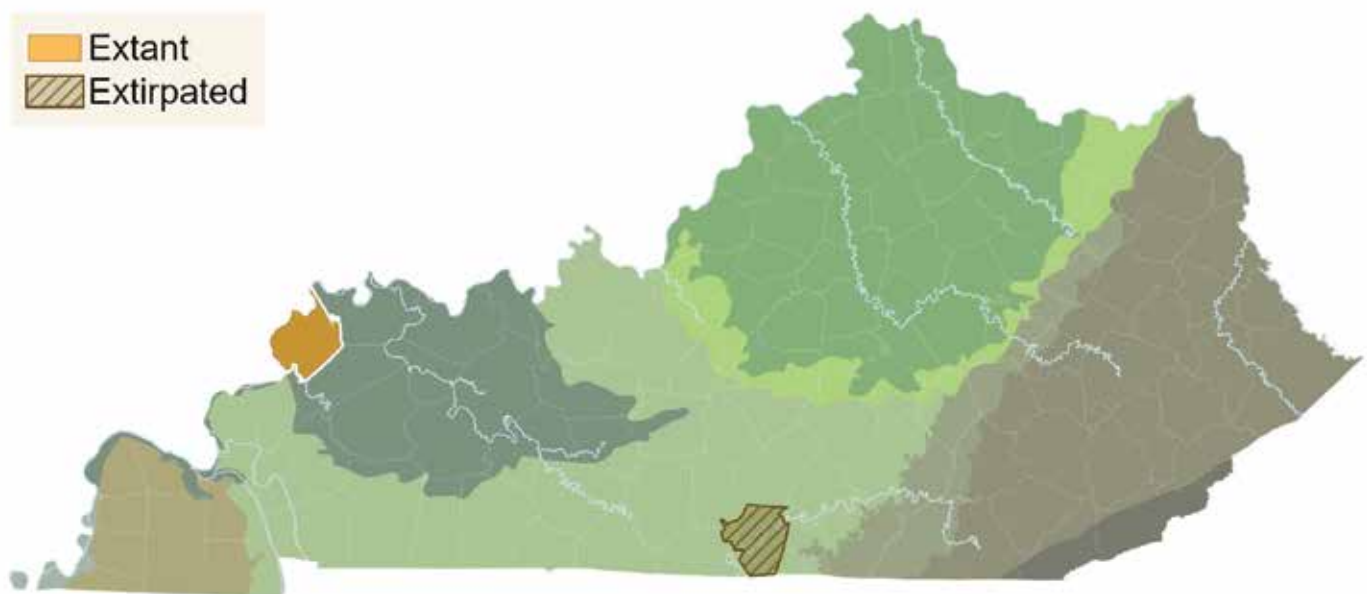
Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in streams inhabited by species.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Knobs

Stream Type: Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream

Known from intermittent streams.

SPLENDID STONE

(*Hansonoperla hokolessqua*)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

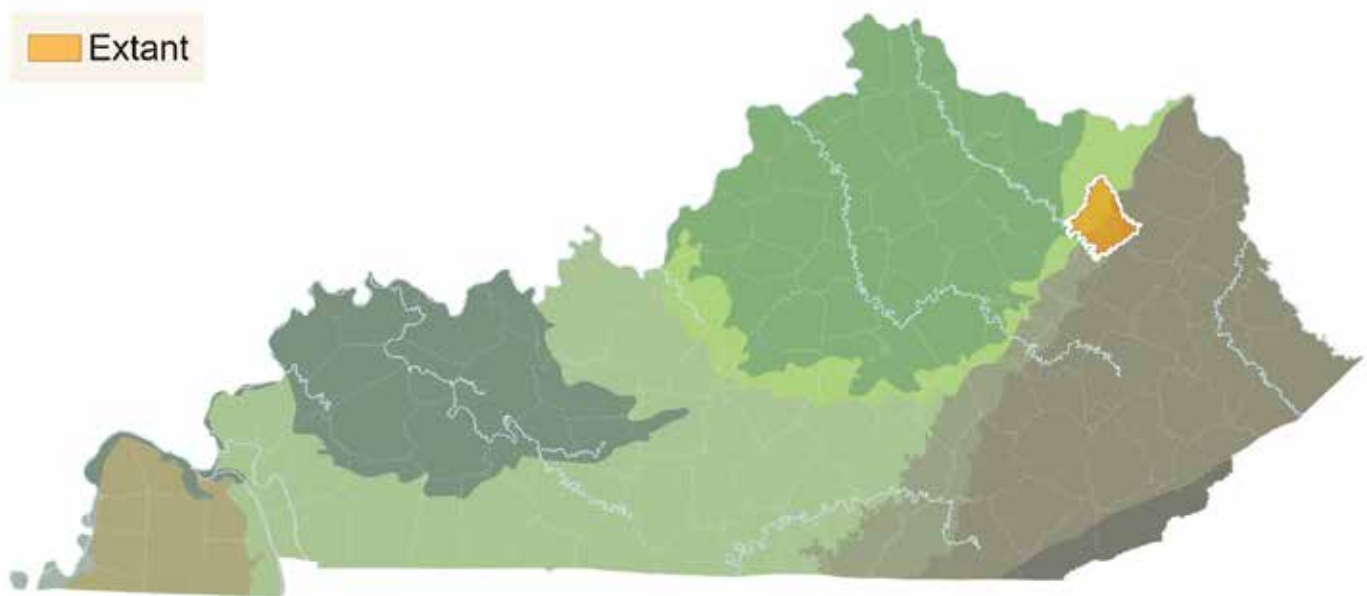
Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1G2

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in streams inhabited by species.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Interior Plateau



Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Other

None




A HYDROPTILID CADDISFLY

(Hydroptila coweetensis)

Threats

-  Natural System Modifications
-  Pollution

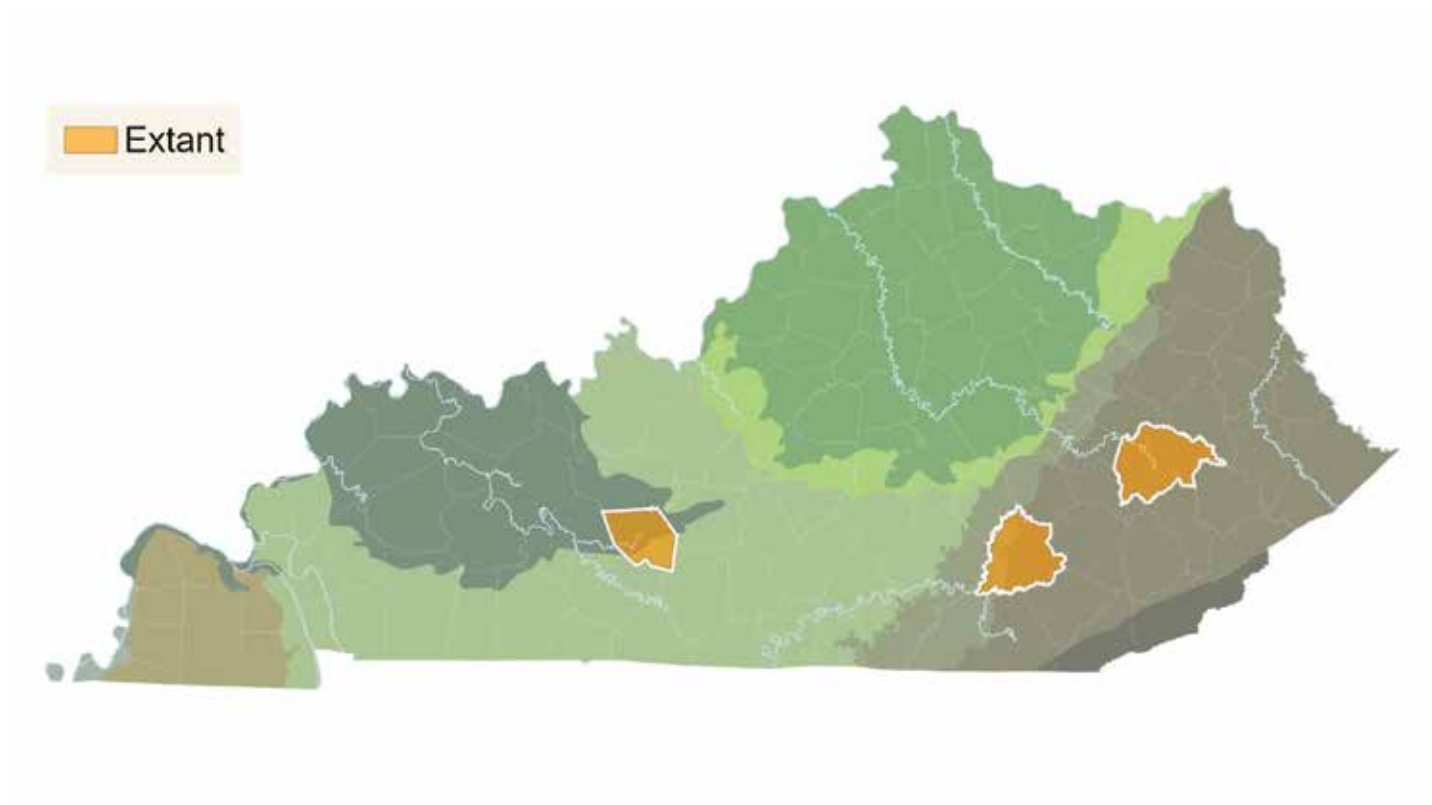
Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2

S Rank: S1S2

Federal Status: N/A

IUCN Red List: NE - Not evaluated

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in streams inhabited by species.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment



Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream

Uses small, clear, spring-fed streams.




KNOXVILLE HYDROPTILAN MICRO CADDISFLY

(Hydroptila decia)

Threats

-  Natural System Modifications
-  Pollution

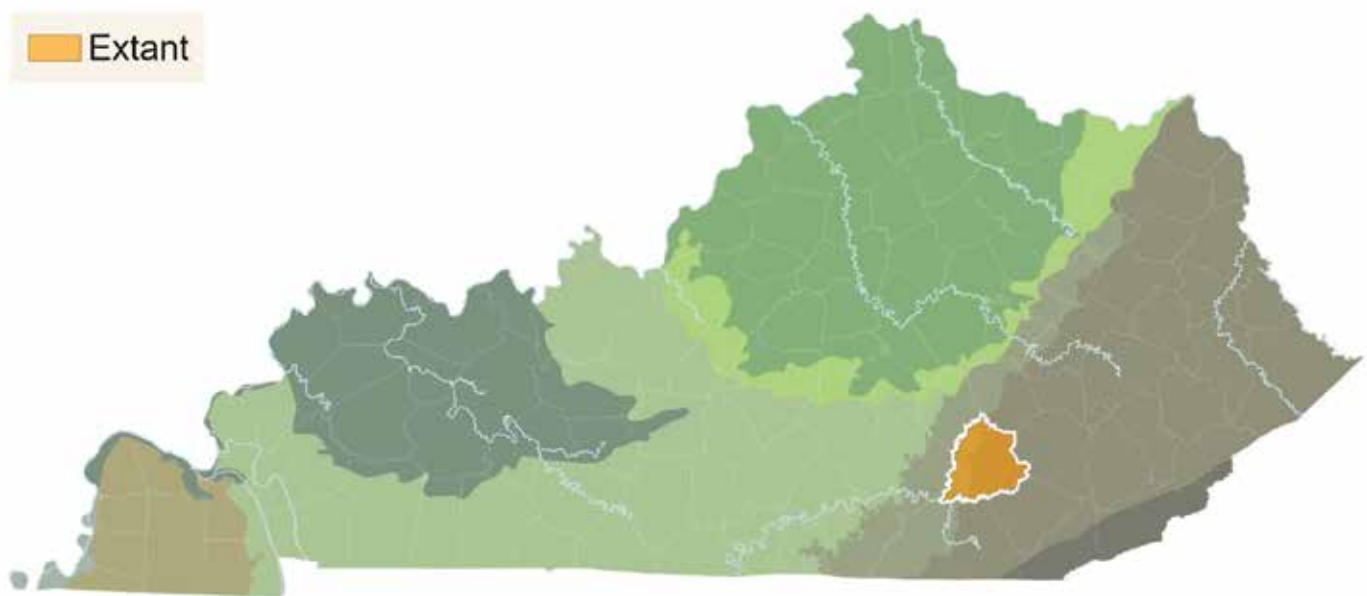
Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Kentucky endemic.

A HYDROPTILID CADDISFLY

(Hydroptila howelli)

Threats

 Natural System Modifications

 Pollution

Conservation Actions

Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in streams inhabited by species.

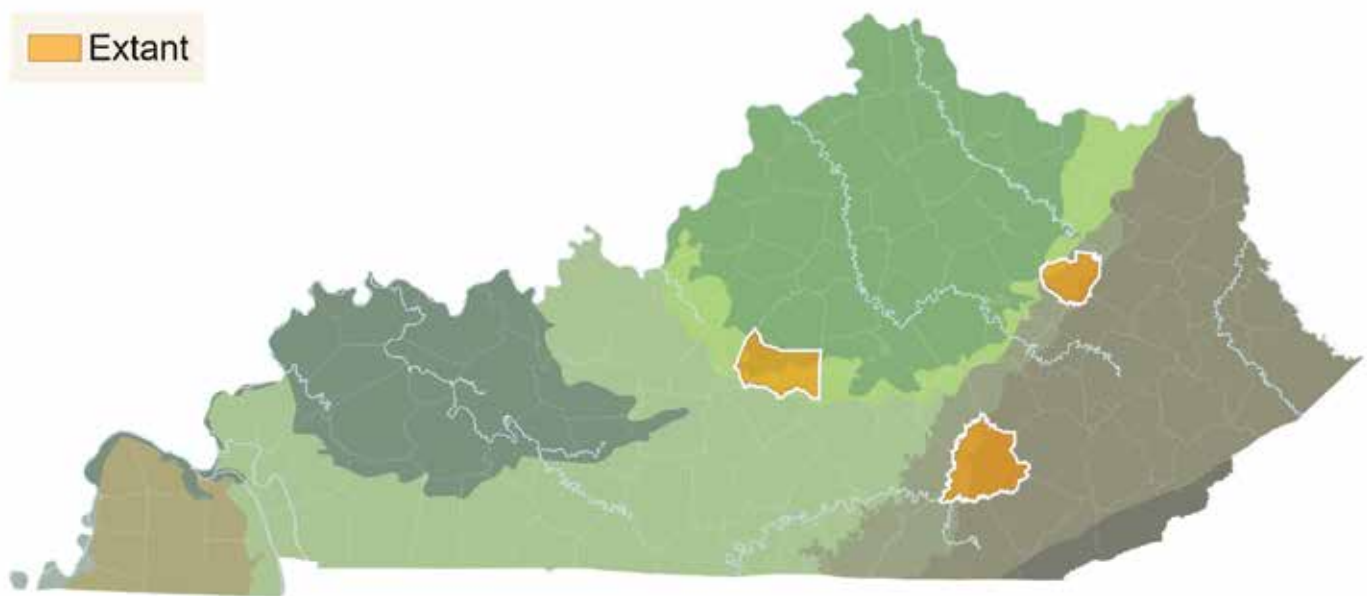
Habitat Associations

Physiographic Regions: Plateau Escarpment, Knobs, Interior Plateau

Stream Type: Cool-Medium Gradient-Stream

None

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1G2

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in streams inhabited by species.

Habitat Associations

Physiographic Regions: Knobs, Interior Plateau



Stream Type: Cool-Medium Gradient-Stream,
Other

None




A HYDROPTILID CADDISFLY

(Hydroptila kuehnei)

Threats

-  Natural System Modifications
-  Pollution

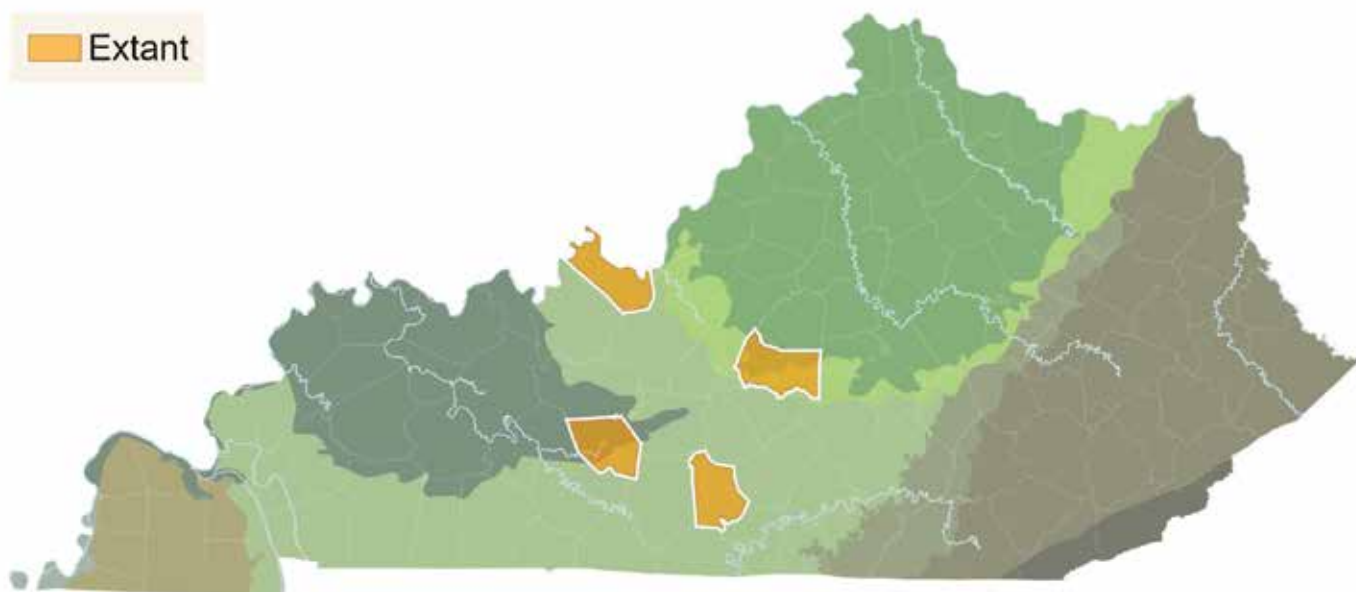
Conservation Actions

-  Awareness and Communications
-  Habitat and Natural Process Restoration
-  Site/Area Management

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G2G4

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Maintain and restore quality prairie and barrens habitat in Kentucky to preserve population. Collected baseline population data.

Habitat Associations

Physiographic Regions: Bluegrass




Guilds: Grassland/Savannah

Uses barrens and prairie remnants with *Orbexilum onobrychis*.

AN OLETHREUTINE MOTH

(Hystrichophora loricana)

Threats

-  Agriculture and Aquaculture
-  Fire and Fire Suppression
-  Residential and Commercial Development

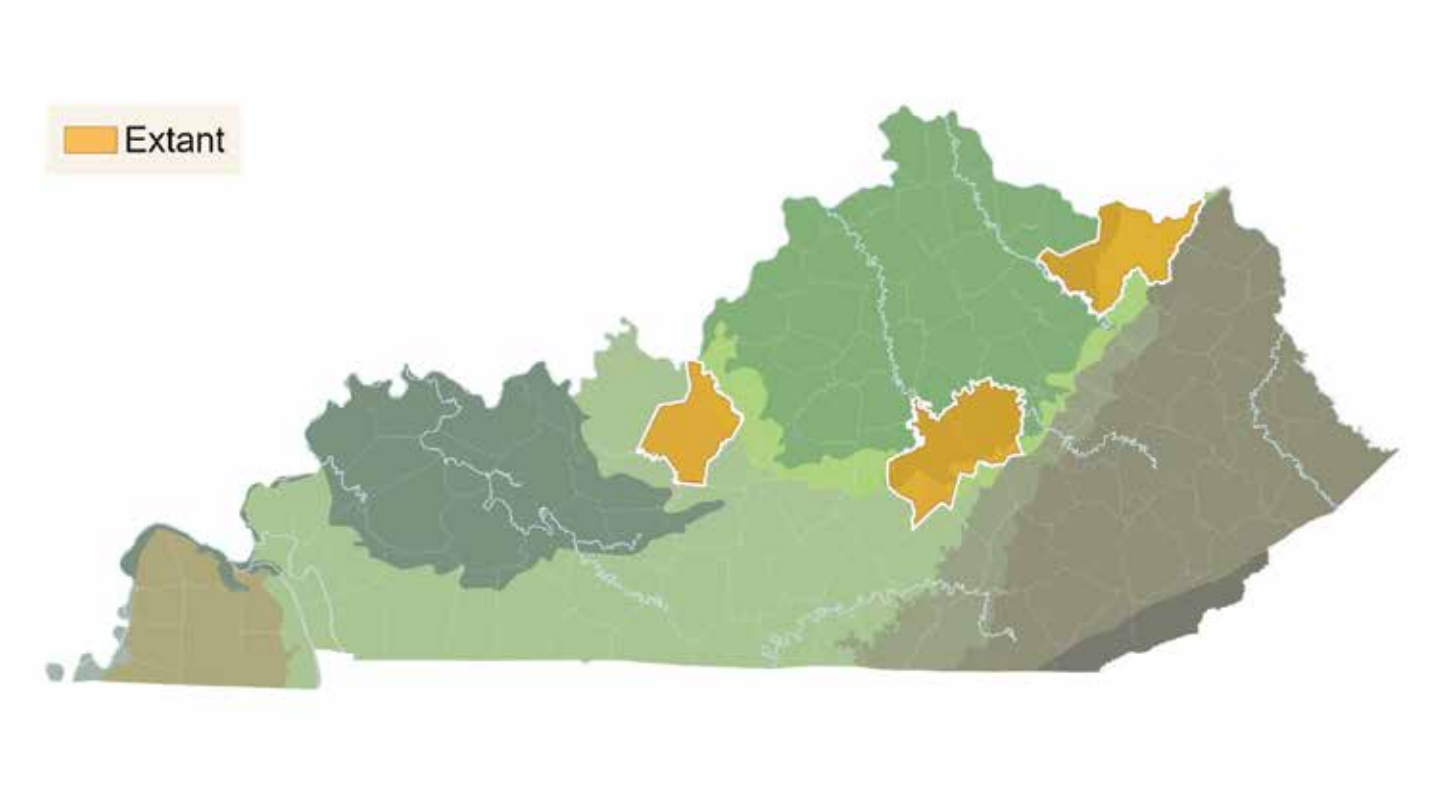
Conservation Actions

- External Capacity Building 
- Habitat and Natural Process Restoration   
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1G2Q

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Only Kentucky record is from Shillalah Creek, Cumberland Gap NHP.

A LEPIDOSTOMATID CADDISFLY

(*Lepidostoma etnieri*)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Research: Life history research

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in streams inhabited by species.

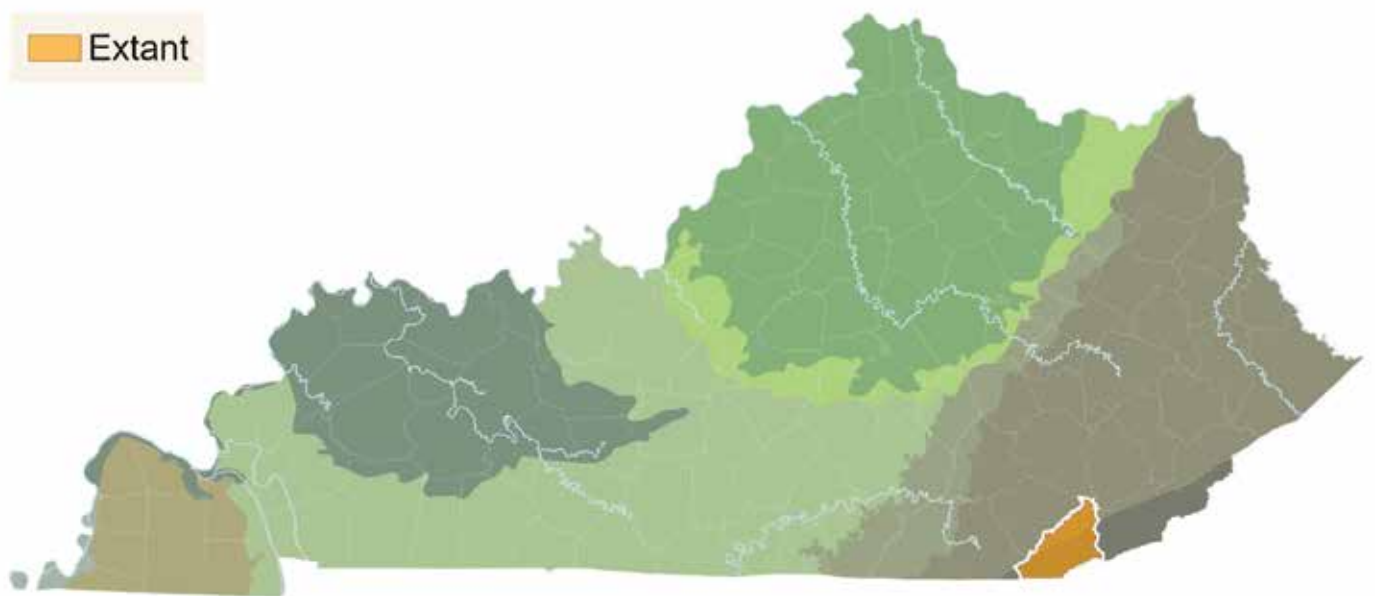
Habitat Associations

Physiographic Regions: Cumberland Mountains

Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream

None

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: GNR

S Rank: SNR

Federal Status: N/A

IUCN Red List: N/A

Possible Kentucky endemic.

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in springs and streams inhabited by species.

Habitat Associations

Physiographic Regions: Interior Plateau

Stream Type: Cold-Medium Gradient-Stream

Use Mississippian age limestone, springs. Requires annual flow for fall and autumn emergence.

KARST NEEDLEFLY

(*Leuctra schusteri*)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

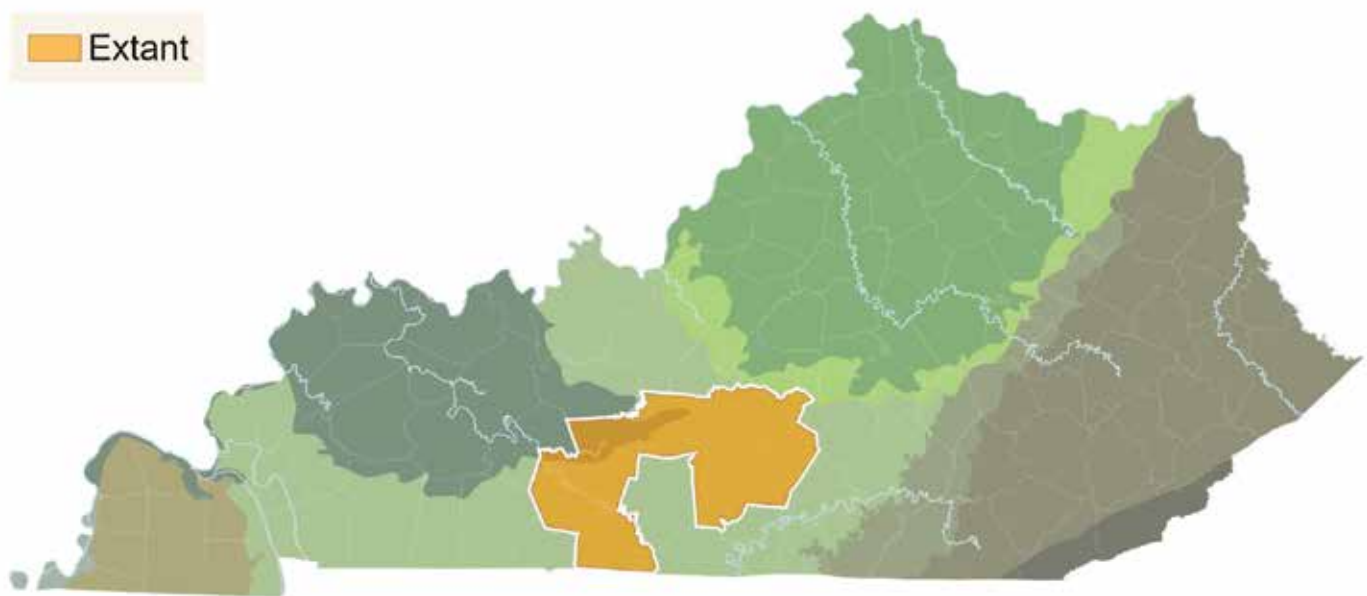
Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

A BURROWING MAYFLY

(Litobrancha recurvata)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Conservation Goal

Maintain existing populations in Kentucky.

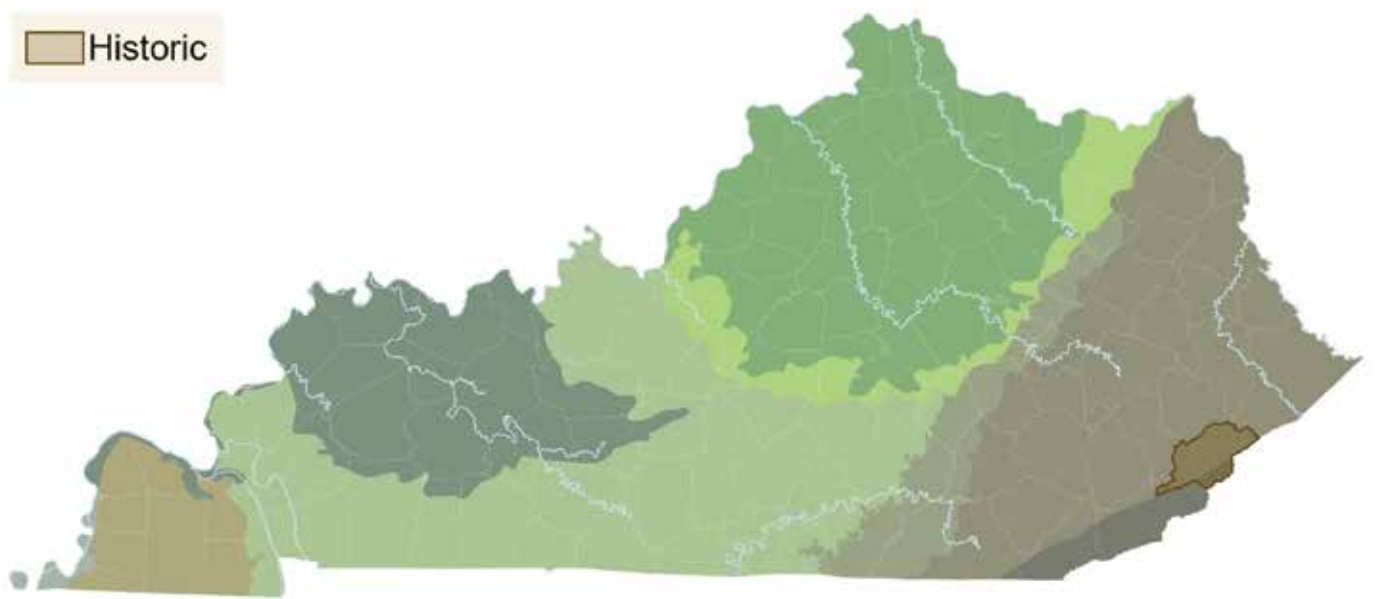
Habitat Associations

Physiographic Regions: Cumberland Mountains

Guilds: None

Found in depositional areas of small streams in relatively cool water. Nymph stage habituates small brooks and streams, burrowing in mixtures of silt and sand.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3G4

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine extent of range and population level in Kentucky. Preserve high-quality woodland habitat to maintain population.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Interior Plateau



Guilds: Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

Uses low- to mid-elevation oak and mixed hardwood forests.

A GEOMETRID MOTH

(Lytrosis permagnaria)

Threats

-  Logging and Wood Harvesting
-  Mining and Quarrying

Conservation Actions

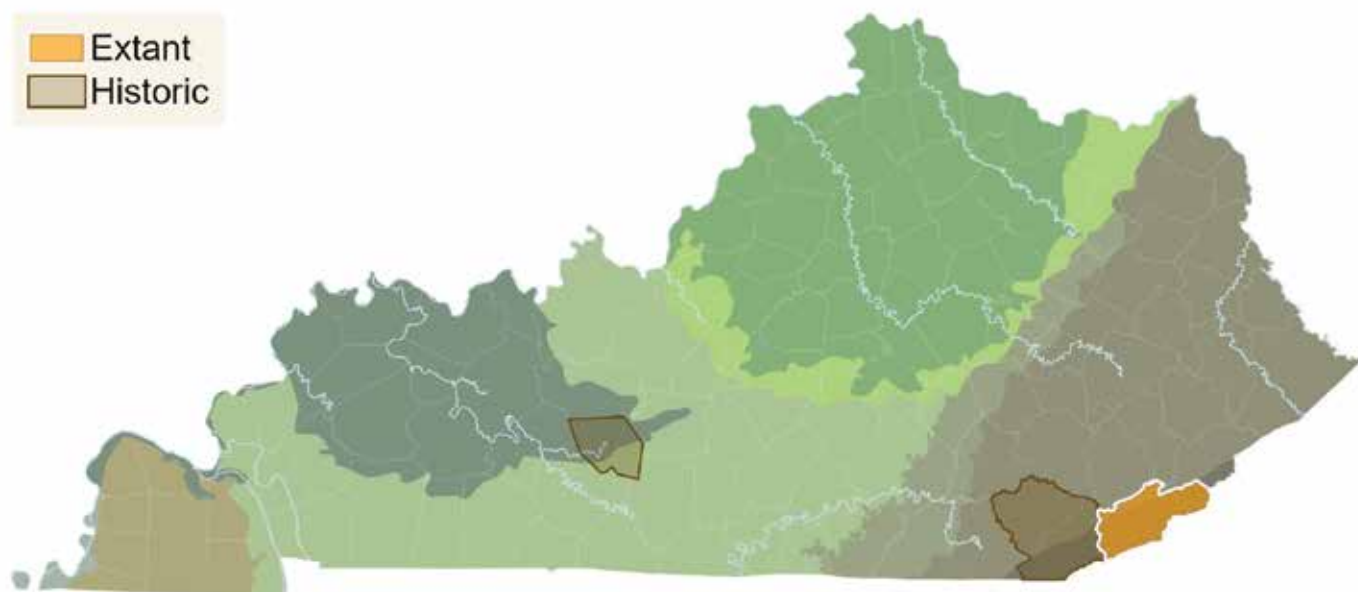
Unknown

Needs

Survey: Locate additional populations

Research: Life history research

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G4

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

A HEPTAGENIID MAYFLY

(Maccaffertium bednariki)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Conservation Goal

Maintain existing populations in Kentucky.

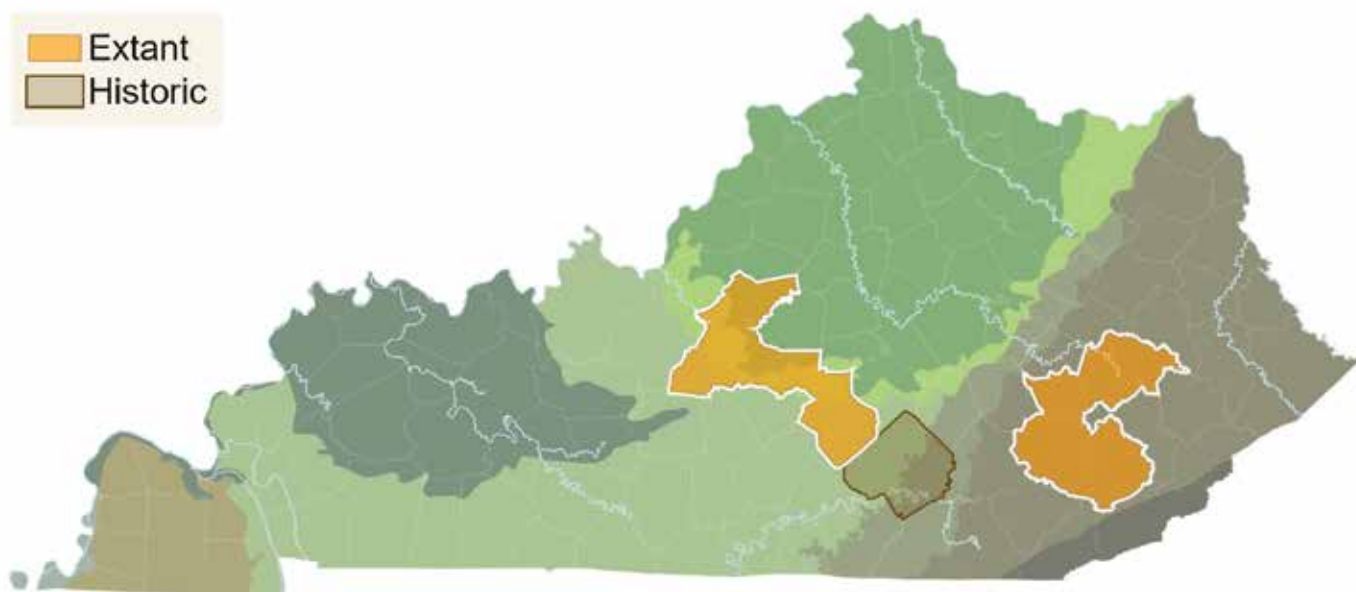
Habitat Associations

Physiographic Regions: Cumberland Plateau, Knobs, Interior Plateau

Stream Type: Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream

Found in higher order streams, and in rivers.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in rock shelters inhabited by species.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment




Guilds: None

Semi-terrestrial species. Lives on ceiling of wet sandstone rock houses, vertical rock cliffs.







BOTTLE CAP CADDISFLY

(Manophylax butleri)

Threats

-  Logging and Wood Harvesting
-  Pollution
-  Recreational Activities

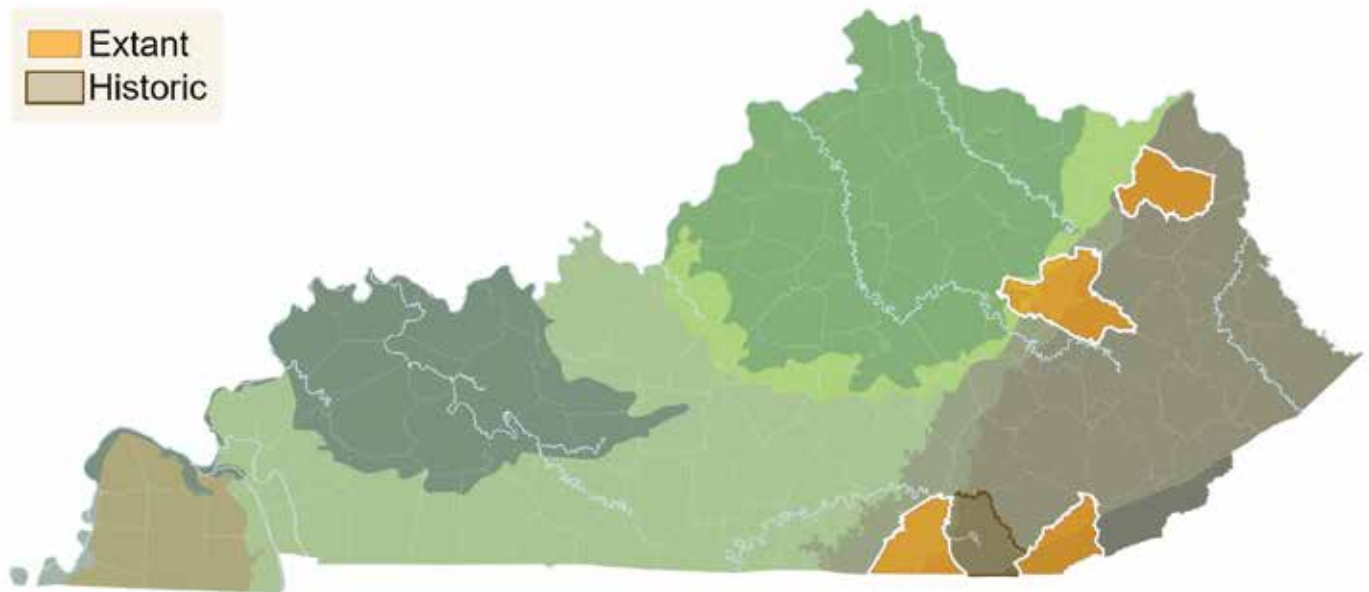
Conservation Actions

- Awareness and Communications 
- Conservation Payments 
- Land/Water Management 
- Resource and Habitat Protection   

Needs

Survey: Locate additional populations

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: GNR

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Maintain and restore quality prairie and barrens habitat in Kentucky to increase population. Collected baseline population data.

Habitat Associations

Physiographic Regions: Interior Plateau




Guilds: Grassland/Savannah

Requires *Helianthus mollis*/ashy sunflower as food source.

HELIANTHUS LEAFHOPPER

(*Mesamia straminea*)

Threats

-  Agriculture and Aquaculture
-  Fire and Fire Suppression
-  Residential and Commercial Development

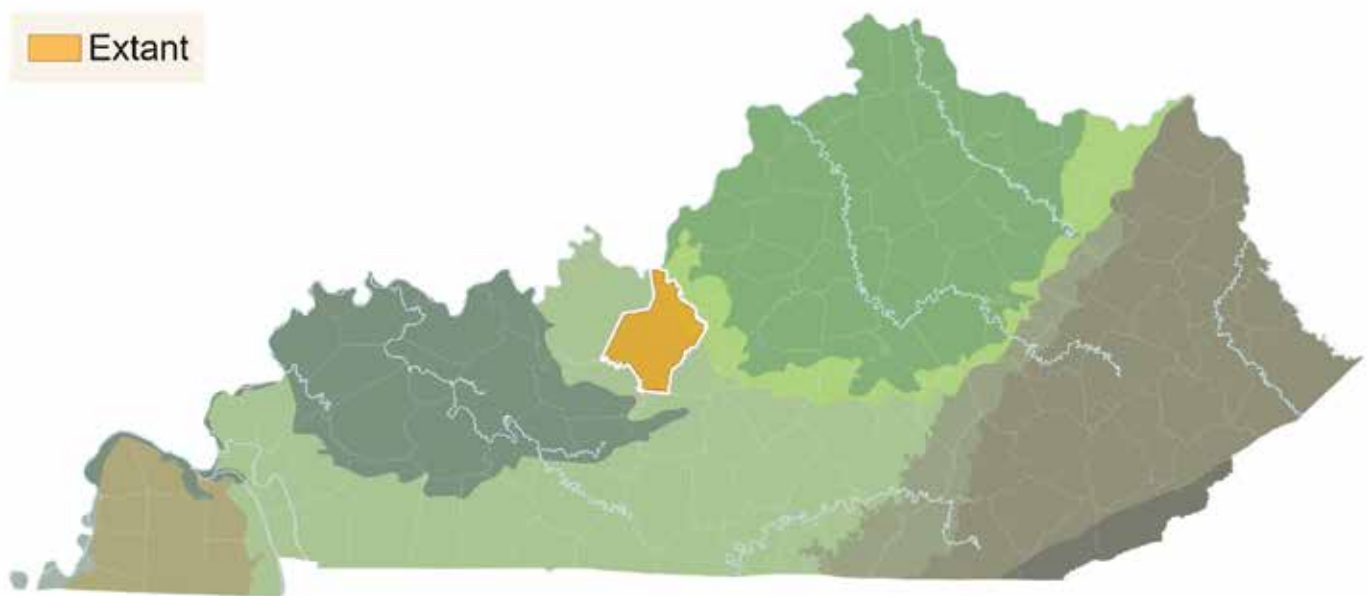
Conservation Actions

- External Capacity Building 
- Habitat and Natural Process Restoration   
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in riparian areas inhabited by species.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Knobs, Interior Plateau



Stream Type: Other

Vascular hydrophytes, sphagnum bogs, sedge meadows and seeps, boggy ponds, calcareous fens. Climbers and sprawlers.




ELFIN SKIMMER

(*Nannothemis bella*)

Threats

-  Natural System Modifications
-  Pollution

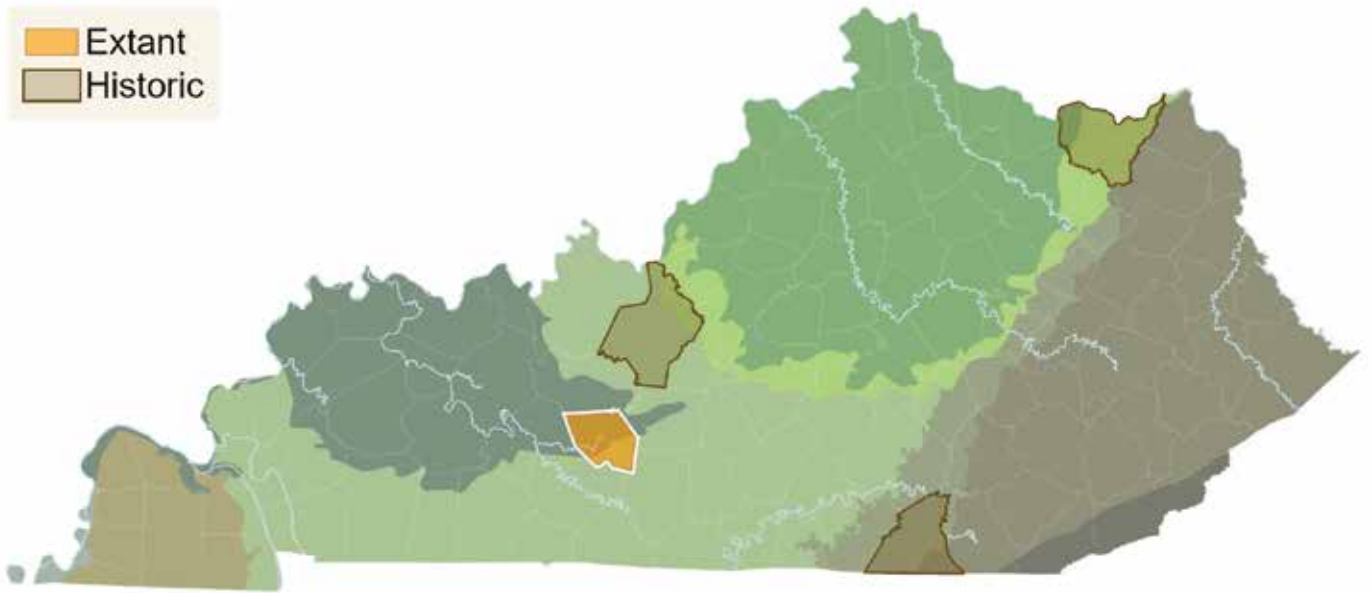
Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

SPHAGNUM SPRITE

(*Nehalennia gracilis*)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in riparian areas inhabited by species.

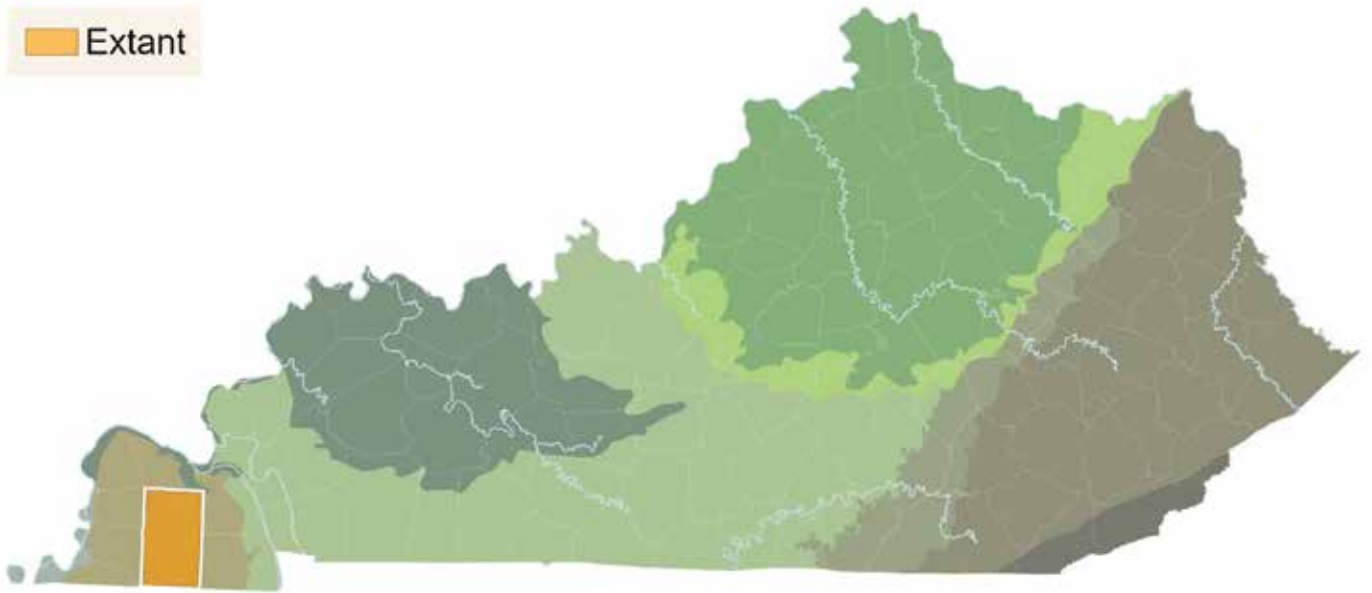
Habitat Associations

Physiographic Regions: Mississippi Valley Loess Plain

Stream Type: Other

Uses sphagnum bogs or other dense vegetation, pond and lake margins, vascular hydrophytes. Climbers.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in riparian areas inhabited by species.

Habitat Associations

Physiographic Regions: Interior Plateau, Mississippi Valley Loess Plain

Stream Type: Other

Throughout ponds and in pond margins, lakes with dense vegetation. Climbers, requires vegetation.

SOUTHERN SPRITE

(Nehalennia integricollis)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

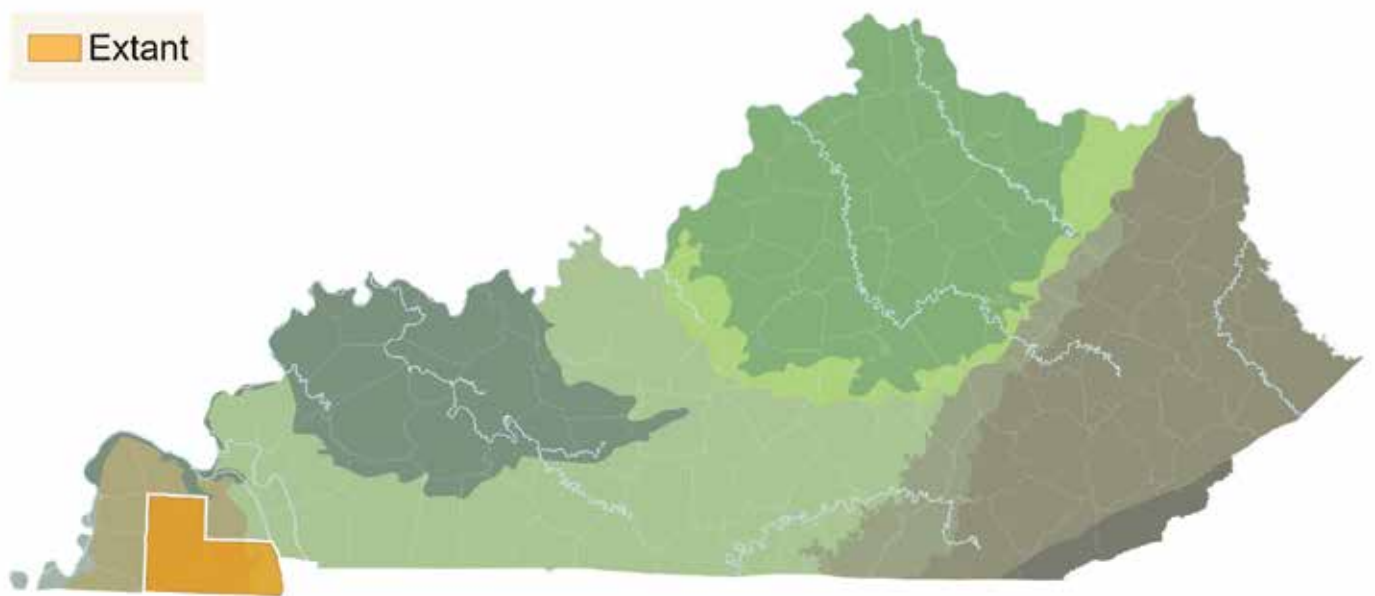
Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in riparian areas inhabited by species.

Habitat Associations

Physiographic Regions: Bluegrass

Stream Type: Other

Uses sedgy lake and pond shores, sedge meadows, bogs and fens, floating vegetation. Climbers.

SEDGE SPRITE

(*Nehalennia irene*)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

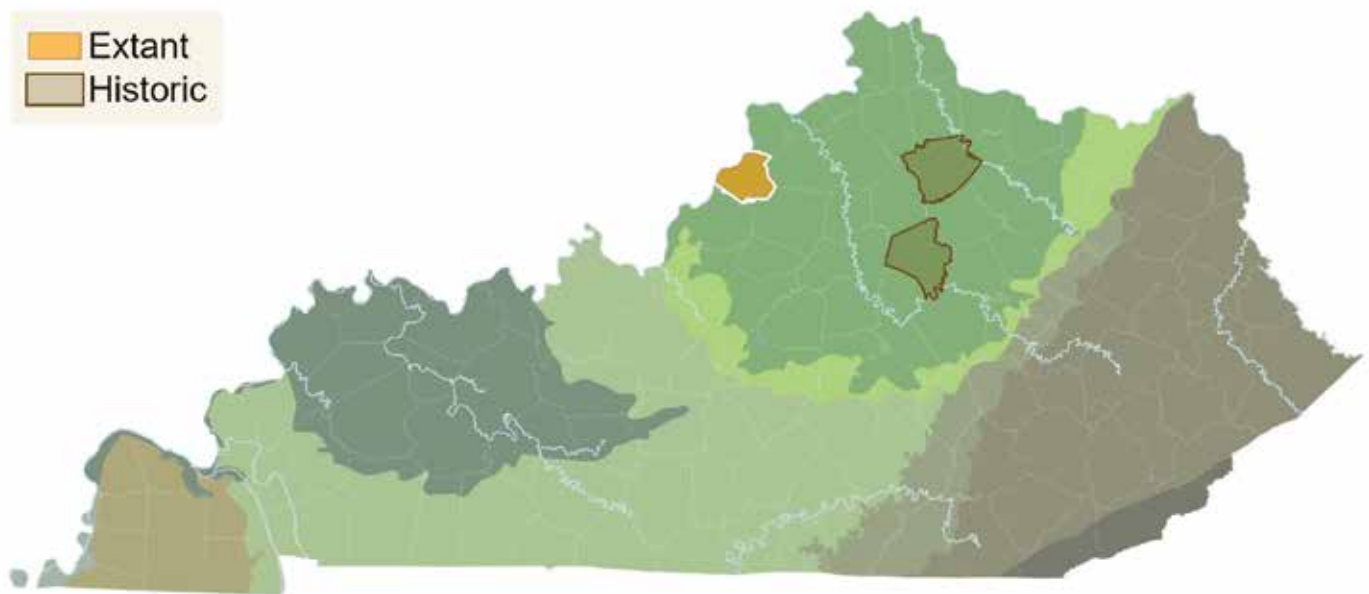
Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: GNR

S Rank: S1S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in streams inhabited by species.

Habitat Associations

Physiographic Regions: Interior Plateau

Stream Type: Cool-Medium Gradient-Stream

Uses spring or spring-fed habitats.

(*NEOPHYLAX LEWISAE*)

Threats

 Natural System Modifications

 Pollution

Conservation Actions

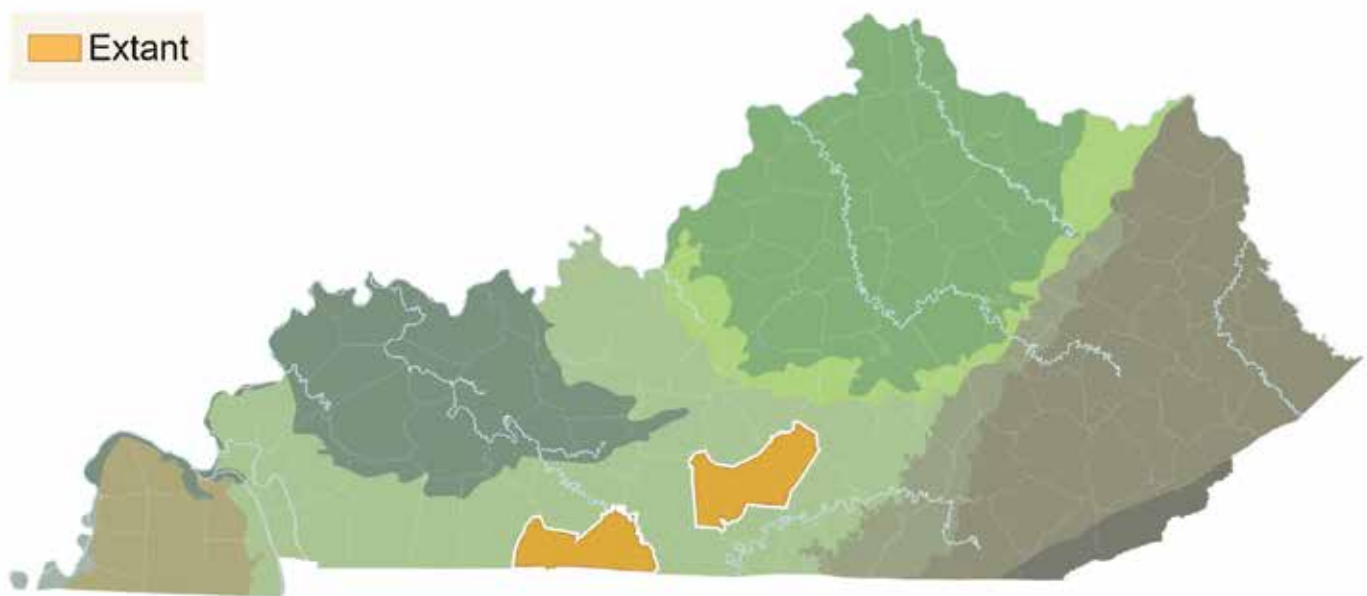
Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S1S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in rivers and streams.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment


Stream Type: Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cold-Low Gradient-Stream

Uses rocky rivers with shallow riffles and mud bottom, low gradients with fine sand, medium gradients with small gravel, medium to large rivers.

PYGMY SNAKETAIL

(Ophiogomphus howei)

Threats

 Dams and Water Management/Use

 Pollution

Conservation Actions

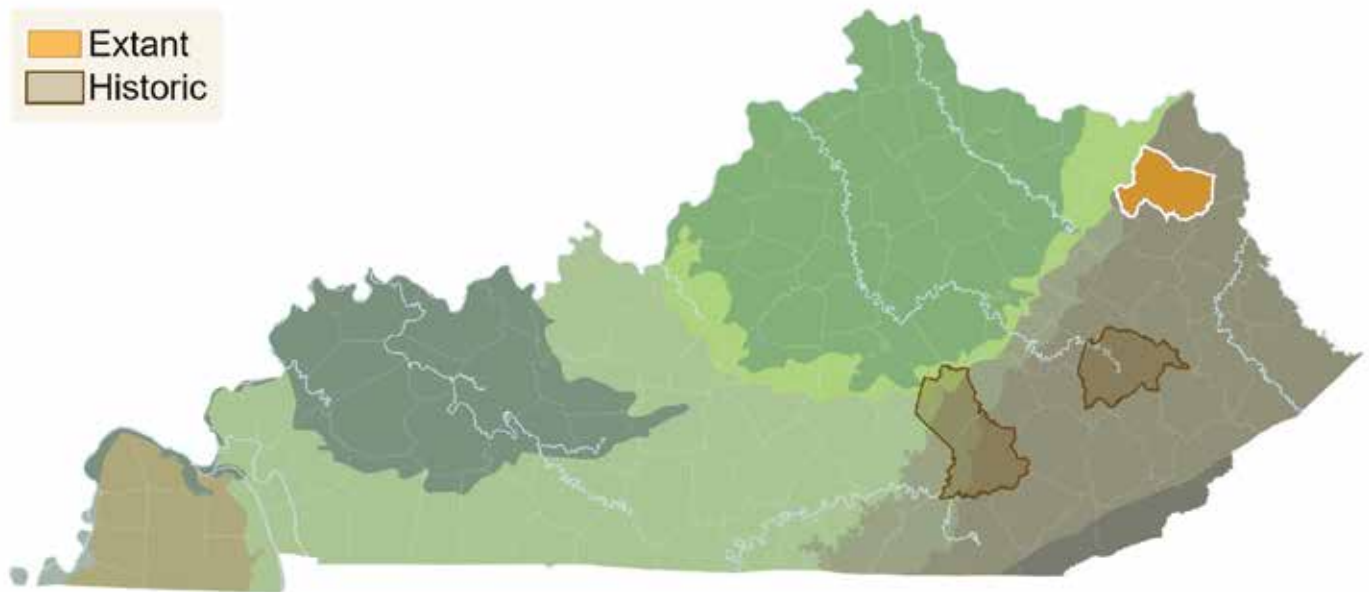
Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in rivers and streams.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Interior Plateau

Stream Type: Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River

Burrower. Uses small rocky streams and rivers, medium to high gradients, strong currents, moderate rapids, cold water.

MAINE SNAKETAIL

(Ophiogomphus mainensis)


Threats

 Natural System Modifications

 Pollution

Conservation Actions

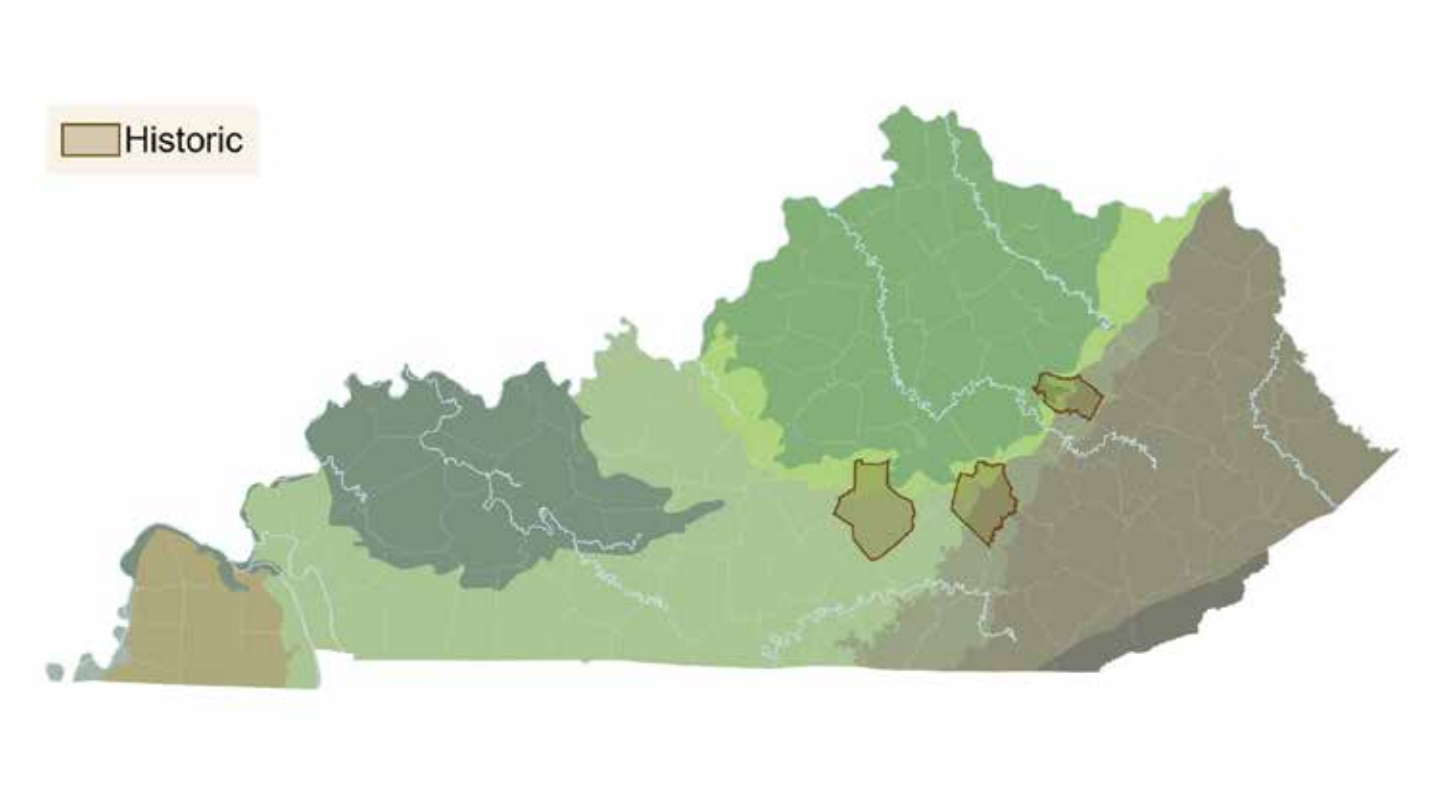
Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Maintain and restore quality prairie and barrens habitat in Kentucky.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau

Guilds: Grassland/Savannah

Requires *Liatris* species as host plant.

BLAZING STAR STEM BORER

(*Papaipema beeriana*)

Threats



Agriculture and Aquaculture





Fire and Fire Suppression




Residential and Commercial Development

Conservation Actions

External Capacity Building 

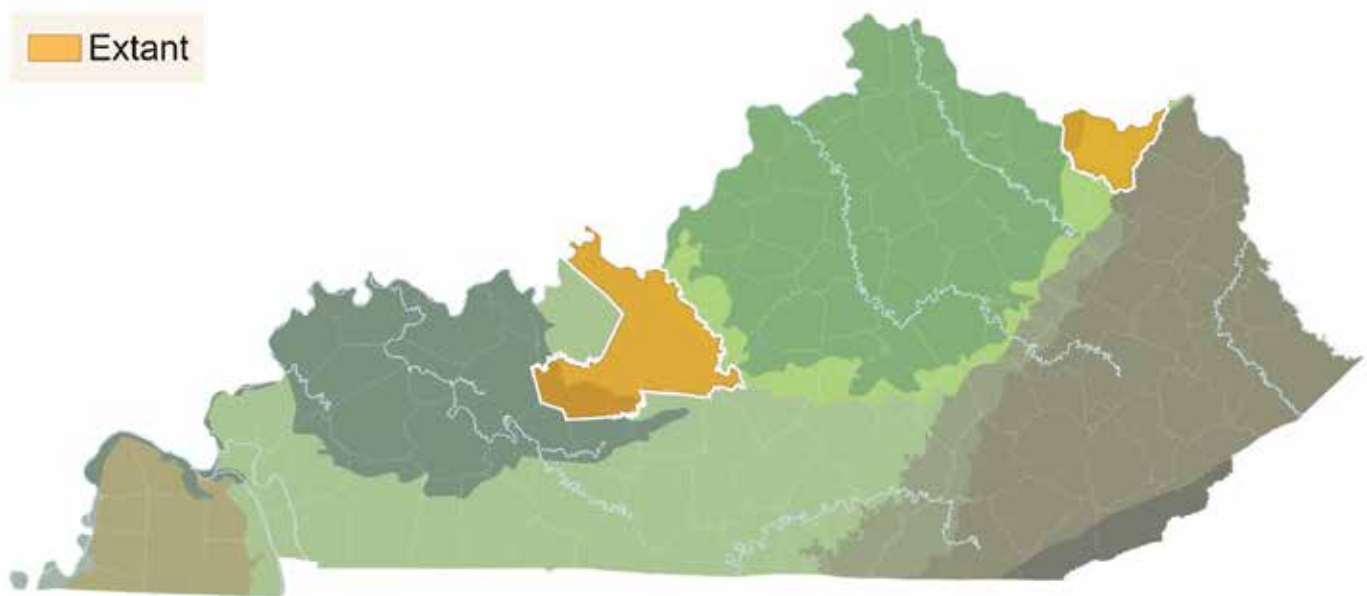
Habitat and Natural Process Restoration 

Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Continue population monitoring and habitat enhancement measures in species' preservation area.

Habitat Associations

Physiographic Regions: Interior Plateau






Guilds: Grassland/Savannah

Host plant is *Eryngium yuccifolium*.


RATTLESNAKE- MASTER BORER MOTH

(*Papaipema eryngii*)





Threats

-  Agricultural and Forestry Effluents
-  Agriculture and Aquaculture
-  Fire and Fire Suppression
-  Hunting and Collecting Terrestrial Animals
-  Residential and Commercial Development

Conservation Actions

External Capacity Building 

Habitat and Natural Process Restoration    

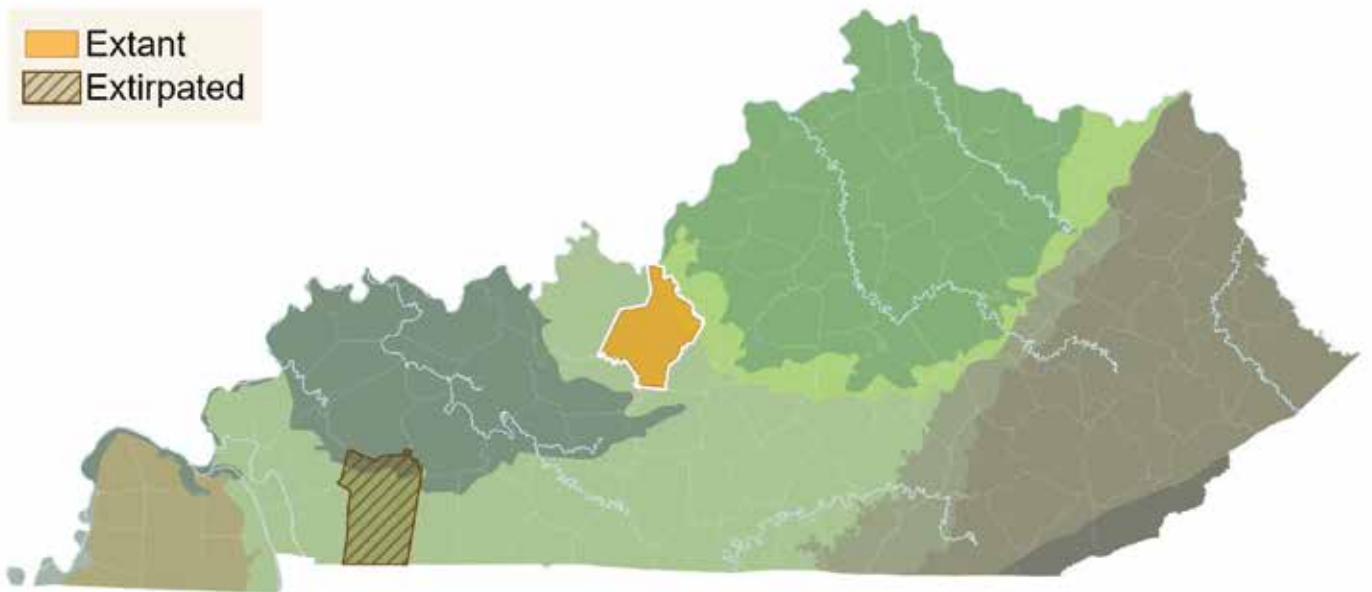
Site/Area Management    

Needs

Survey: Annual population monitoring

Research: Life history research

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4G5

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine extent of range and population level in Kentucky. Preserve high-quality woodland habitat to maintain population.

Habitat Associations

Physiographic Regions: Interior Plateau




Guilds: Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

Uses *Aquilegia* as host plant.



COLUMBINE BORER MOTH

(*Papaipema leucostigma*)

Threats

-  Agricultural and Forestry Effluents
-  Logging and Wood Harvesting
-  Residential and Commercial Development

Conservation Actions

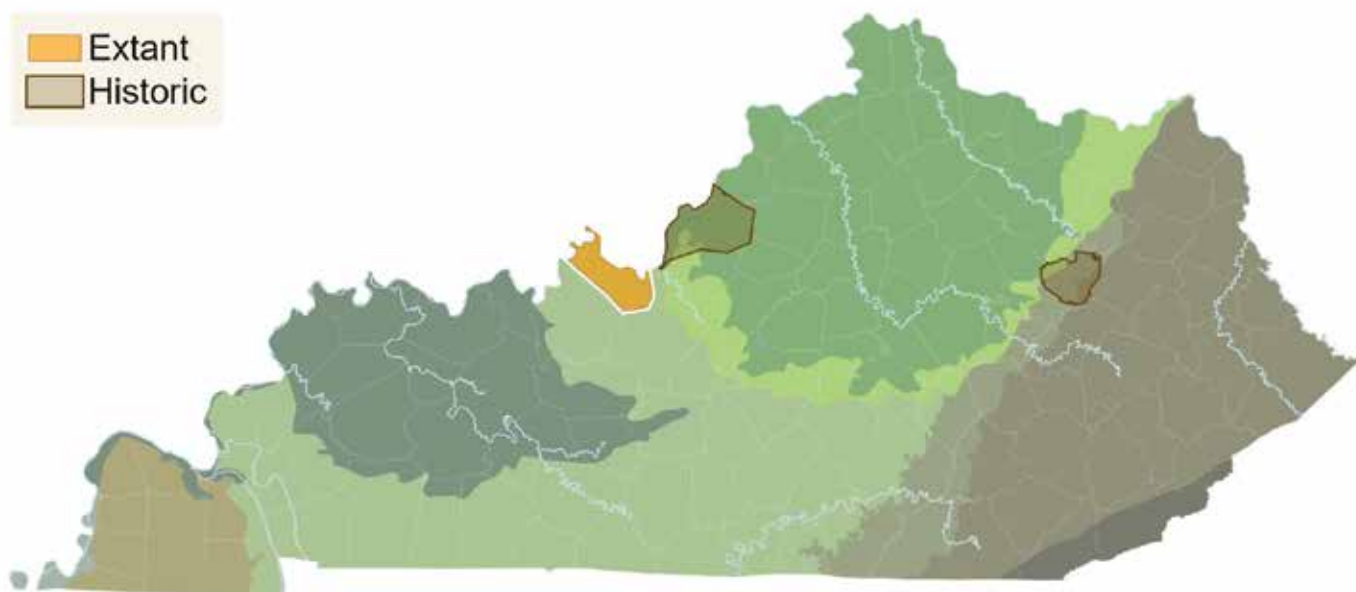
- Awareness and Communications 
- External Capacity Building 

Needs

Survey: Locate additional populations

Research: Life History Research

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3G4

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Maintain and restore quality prairie and barrens habitat in Kentucky.

Habitat Associations

Physiographic Regions: Plateau Escarpment





Guilds: Grassland/Savannah

Requires Silphium species as the host plant.





SILPHIUM BORER MOTH

(*Papaipema silphii*)

Threats

-  Agricultural and Forestry Effluents
-  Agriculture and Aquaculture
-  Fire and Fire Suppression
-  Residential and Commercial Development

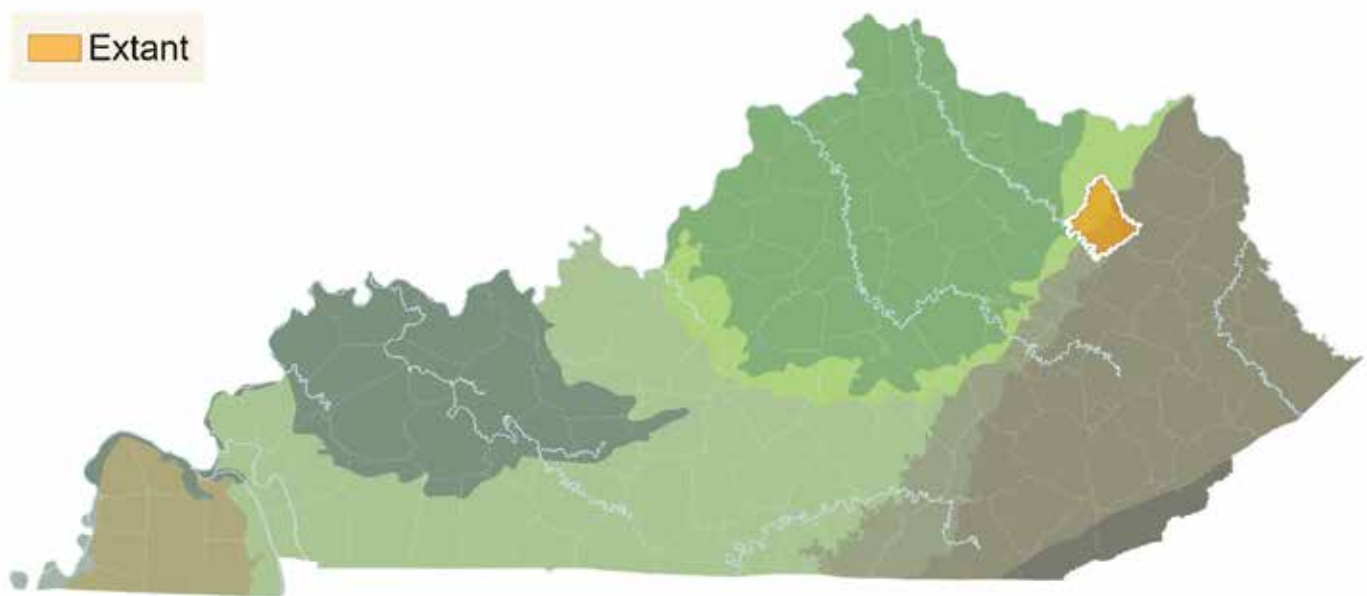
Conservation Actions

- External Capacity Building 
- Habitat and Natural Process Restoration   
- Resource and Habitat Protection    

Needs

Survey: Monitoring of known populations

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G1G2

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Publish formal description of species. Establish current population level in Kentucky.

Habitat Associations

Physiographic Regions: Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Lake/Pond, River/Streams, Floodplain/Sandbar

Requires *Arundinaria gigantea* as host plant.

RARE CANE BORER MOTH

(*Papaipema* sp. 5)

Threats

- Agricultural and Forestry Effluents
- Agriculture and Aquaculture
- Fire and Fire Suppression
- Residential and Commercial Development

Conservation Actions

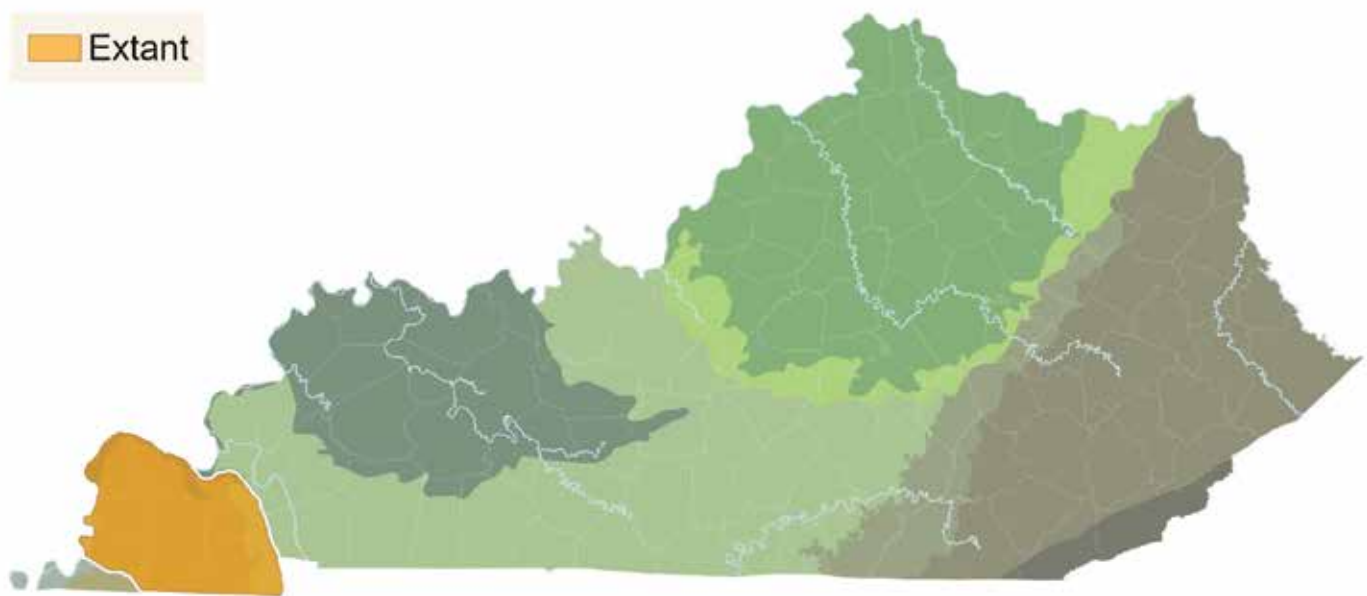
- External Capacity Building
- Resource and Habitat Protection

Needs

Survey: Monitoring of known populations

Research: Formally describe species

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine hydrologic habitat needs and maintain current populations through wetland preservation.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain


Guilds: Forested Wetland

Uses Osmunda as host plant.


OSMUNDA BORER MOTH


(Papaipema speciosissima)

Threats

 Other Ecosystem Modifications

Conservation Actions

External Capacity Building 

Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Research: Investigate specific hydrology of occupied habitat

Range Map

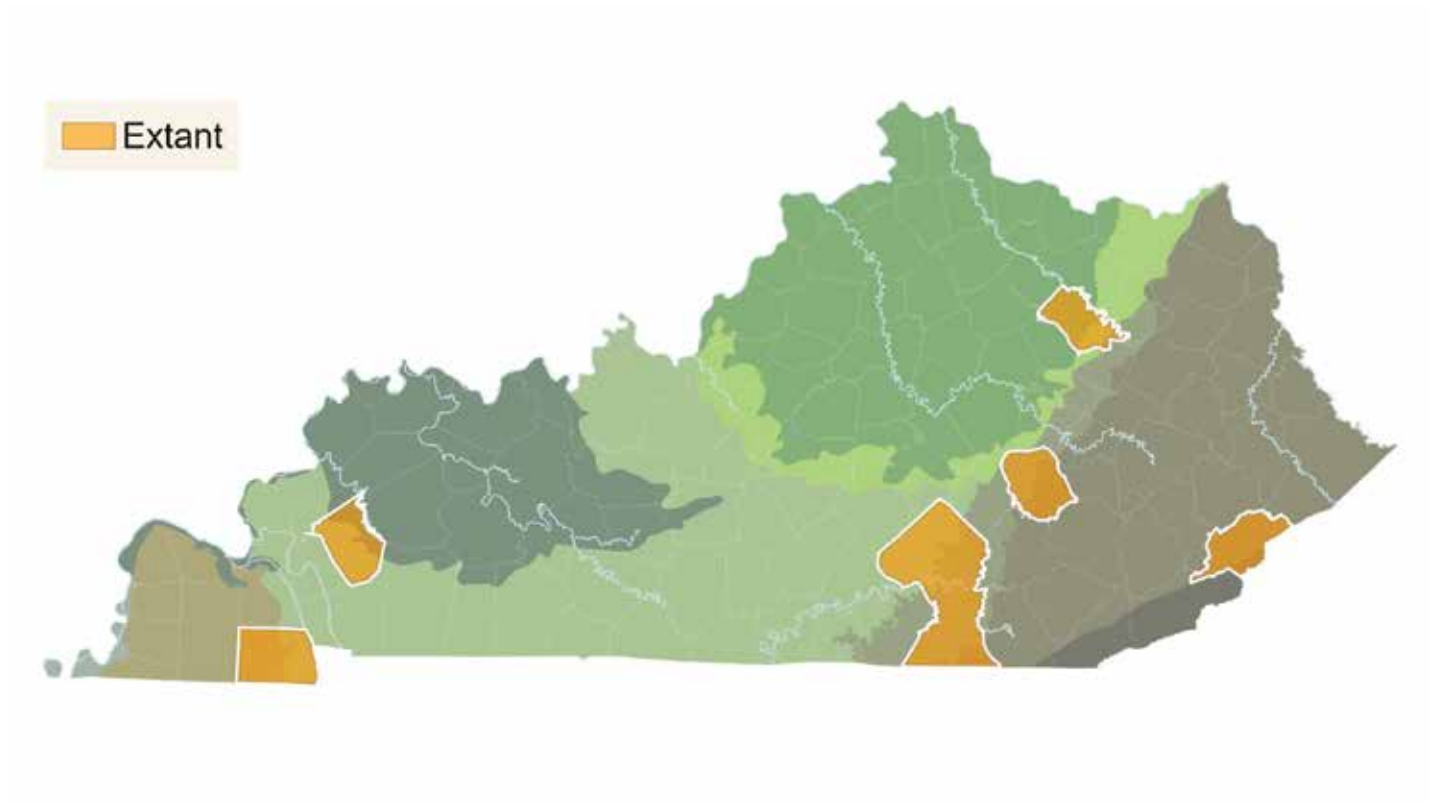




Photo: Ellis Lauder milk




BROAD-WINGED SKIPPER

(*Poanes viator*)

Threats

-  Natural System Modifications
-  Other Ecosystem Modifications

Conservation Actions

- Alliance and Partnership Development 
- External Capacity Building 
- Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Maintain current populations through wetland preservation.

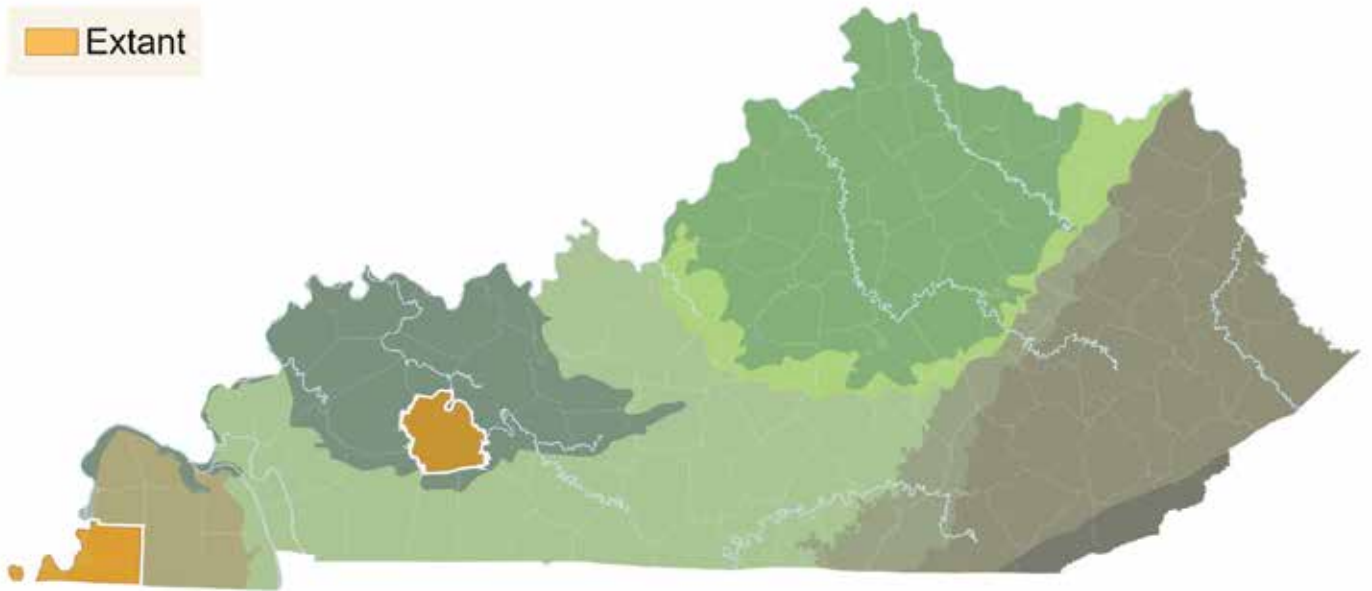
Habitat Associations

Physiographic Regions: Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland

Requires *Zizaniopsis miliacea* as host plant.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1G3

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in streams inhabited by species.

Habitat Associations

Physiographic Regions: Knobs, Interior Plateau

Stream Type: Cool-Medium Gradient-Stream

None

A POLYCENTROPODID CADDISFLY

(Polycentropus neiswanderi)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

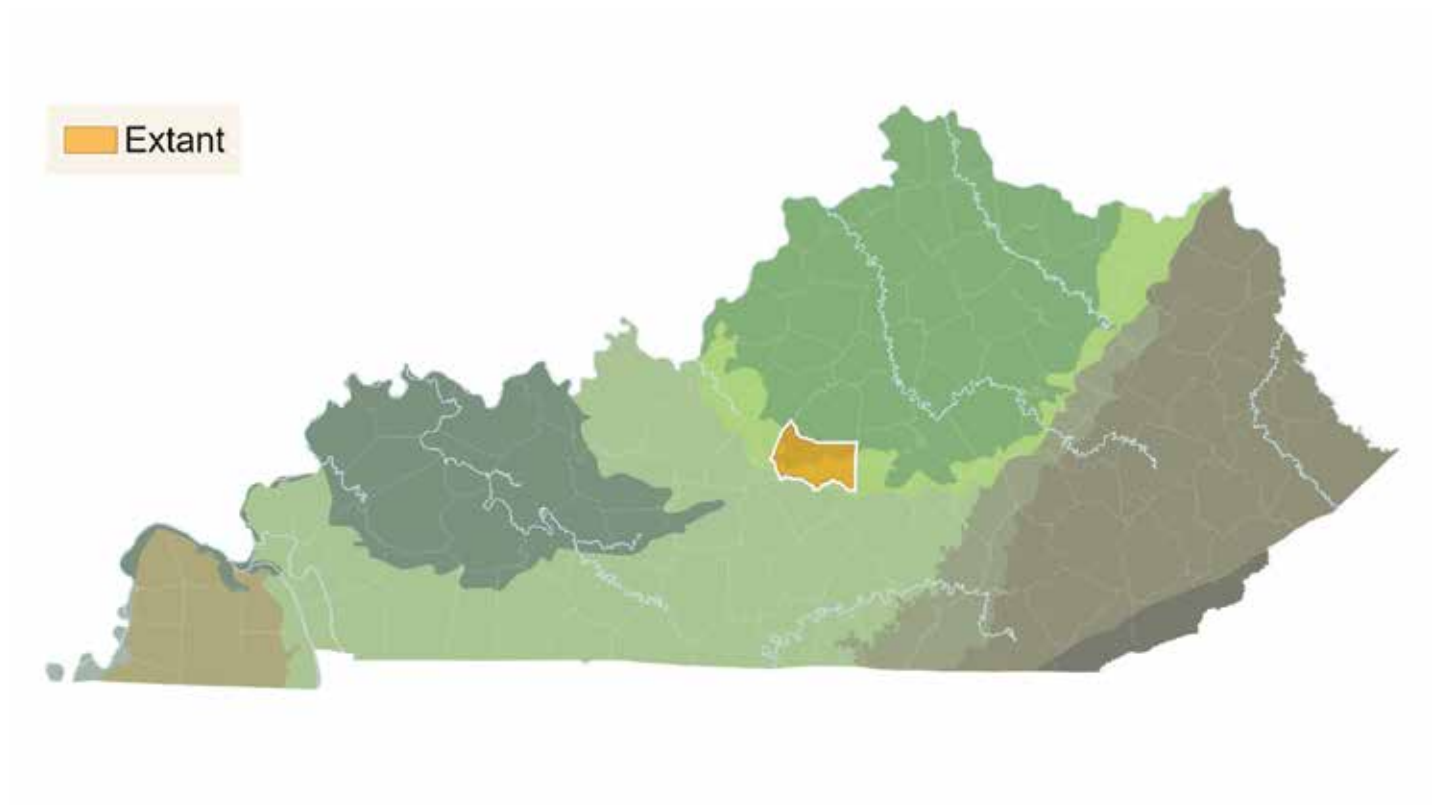
Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: GNR

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Maintain and restore quality prairie and barrens habitat in Kentucky to increase population. Collected baseline population data.

Habitat Associations

Physiographic Regions: Interior Plateau




Guilds: Grassland/Savannah

Known from prairie and barren habitat.

A CICADELLID LEAFHOPPER

(*Prairiana kansana*)

Threats

-  Agriculture and Aquaculture
-  Fire and Fire Suppression
-  Residential and Commercial Development

Conservation Actions

- External Capacity Building 
- Habitat and Natural Process Restoration   
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Range Map

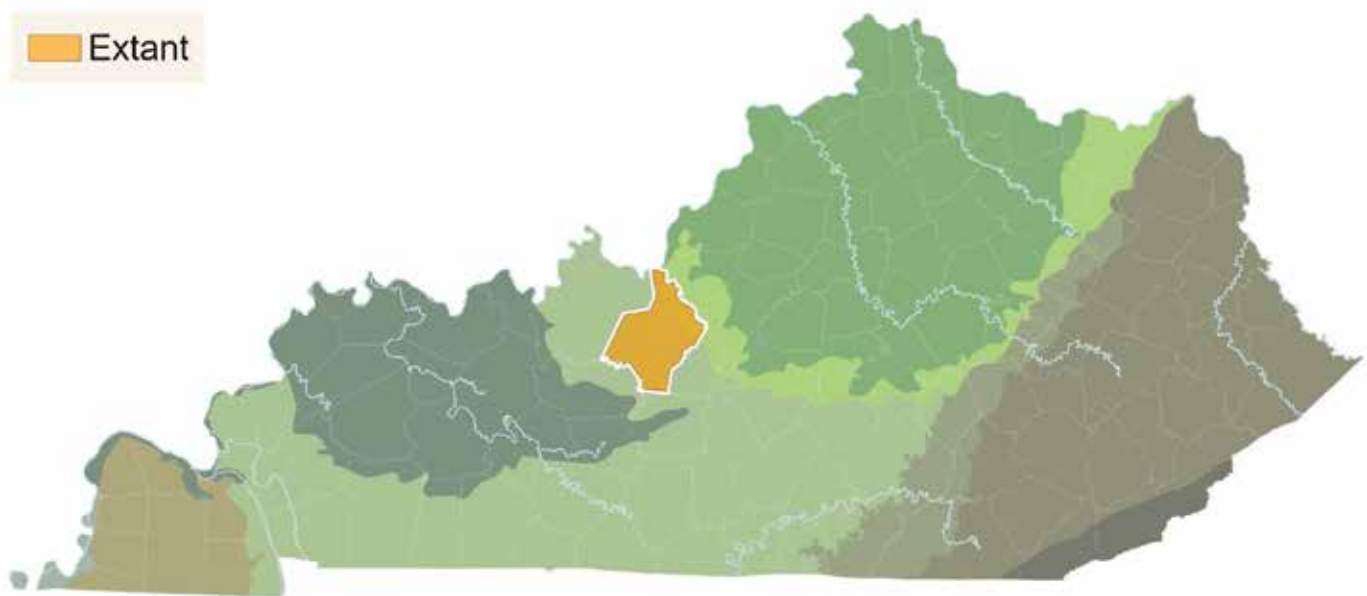


Photo: Field Museum



CLIFTON CAVE BEETLE

(*Pseudanophthalmus caecus*)

Threats

 Natural System Modifications

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Research: Research feasibility of creating new entrance

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

Conservation Goal

Determine feasibility of re-creating entrance to cave to allow survey access.

Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Cave/Karst

Uses subterranean systems in Woodford County.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A



IUCN Red List: N/A

Endemic to Kentucky

LIMESTONE CAVE BEETLE

(Pseudanophthalmus calcareus)

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

Unknown

Needs

Survey: Regular population monitoring

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

Habitat Associations

Physiographic Regions: Cumberland Plateau

Guilds: Cave/Karst

Uses subterranean systems in Whitley County.

Range Map

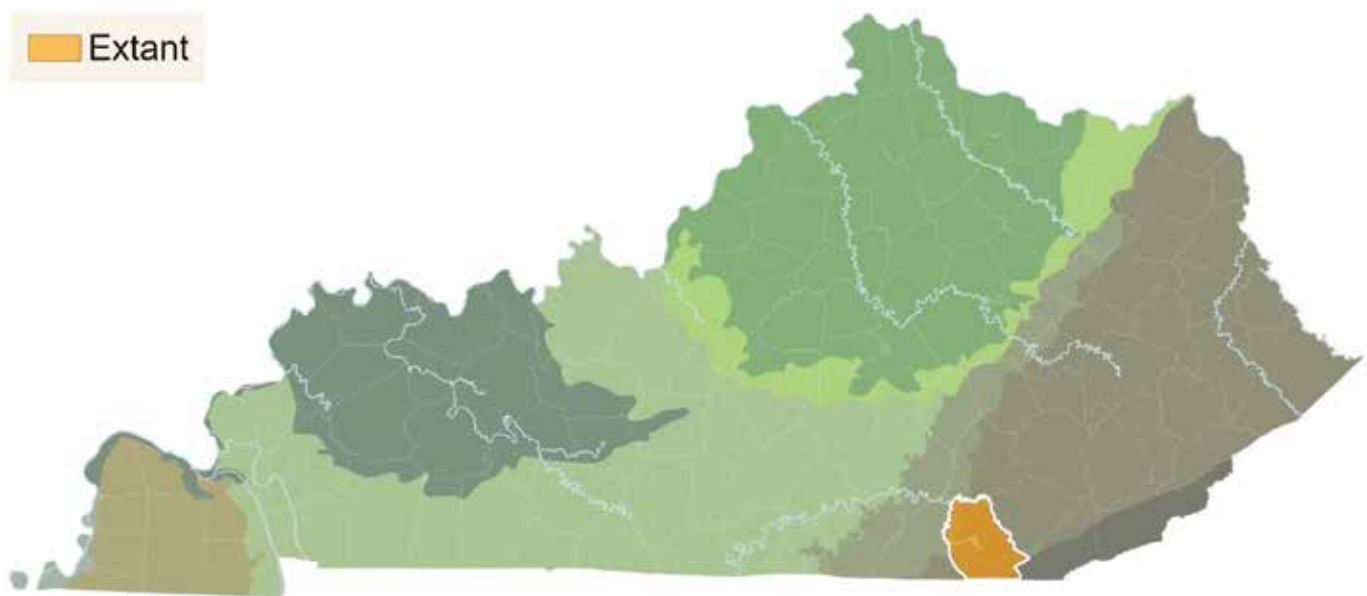


Photo: Field Museum



LESSER ADAMS CAVE BEETLE

(*Pseudanophthalmus catoryctos*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1



S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

Unknown

Needs

Survey: Regular population monitoring

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Cave/Karst

Uses subterranean systems in Madison County.

Range Map

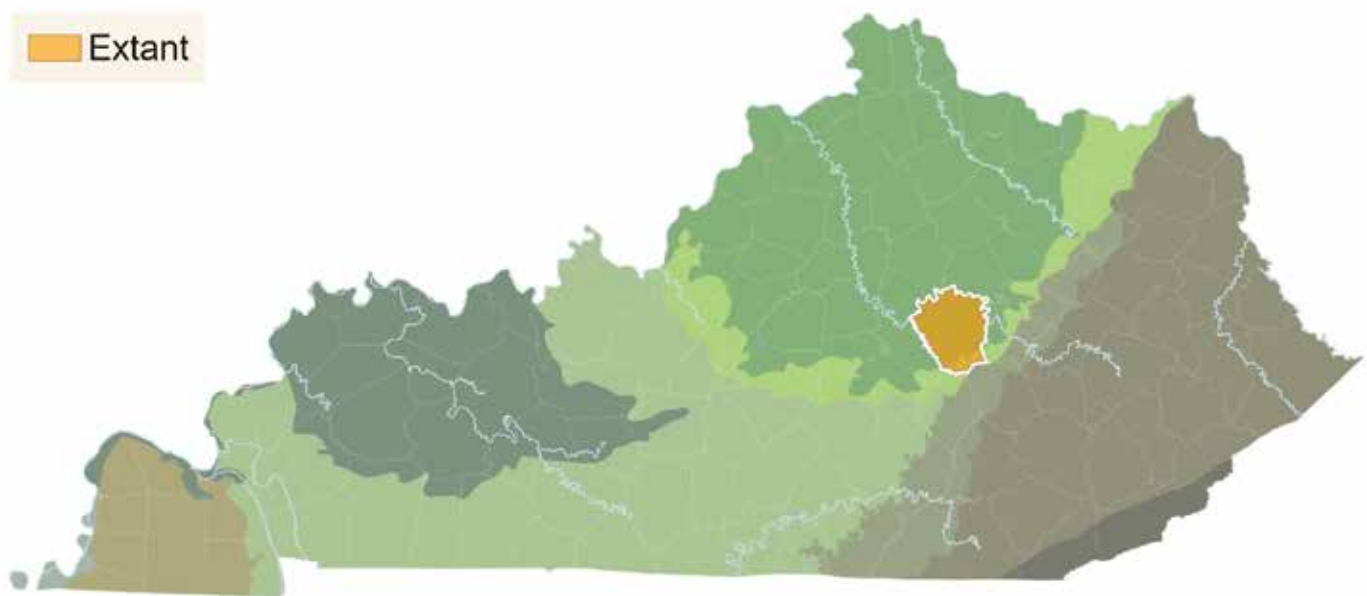




Photo: Field Museum



A CAVE OBLIGATE BEETLE

(*Pseudanophthalmus cnephusus*)

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

- Site/Area Protection  

Needs

Survey: Status surveys

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1G2

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

Habitat Associations

Physiographic Regions: Knobs

Guilds: Cave/Karst

Uses subterranean systems in Larue County.

Range Map

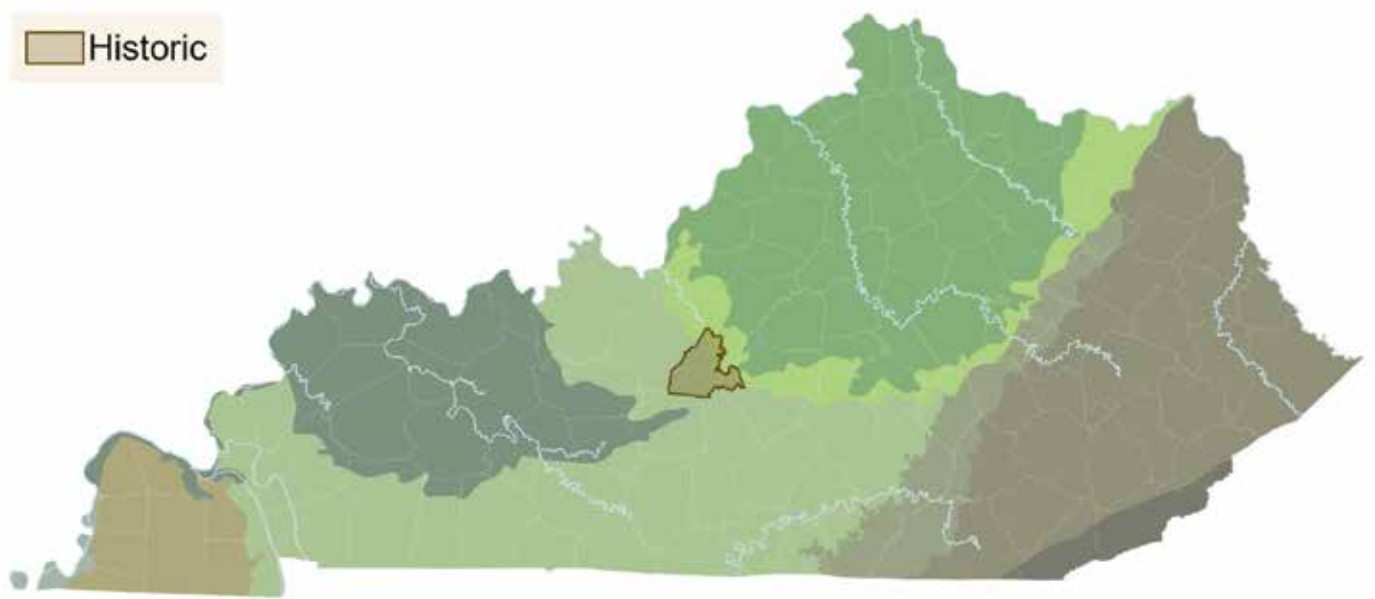




Photo: Field Museum





HIDDEN CAVE BEETLE

(*Pseudanophthalmus conditus*)

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

Site/Area Protection  

Needs

Survey: Status surveys

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1G2

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

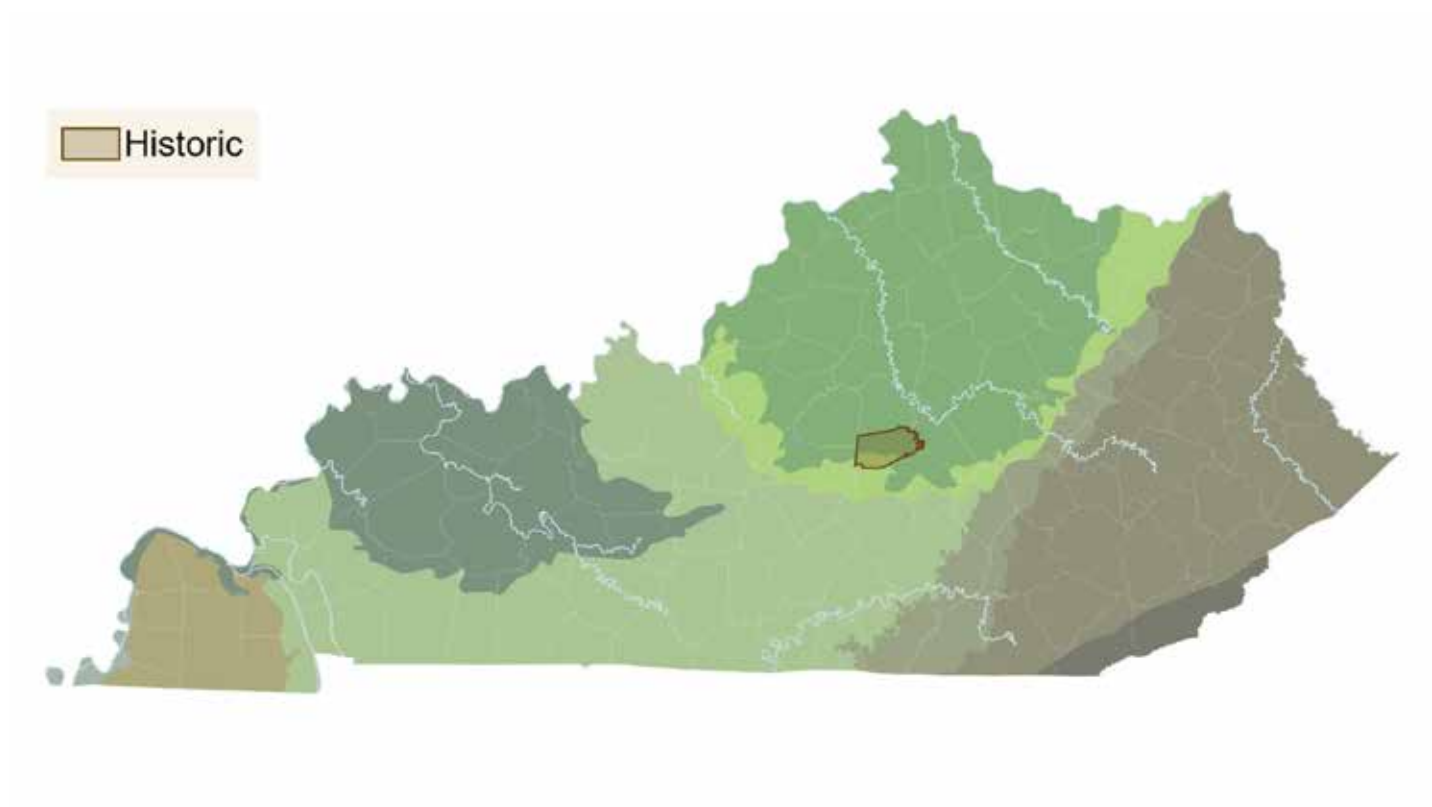
Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Cave/Karst

Uses subterranean systems in Boyle County.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

Habitat Associations

Physiographic Regions: Cumberland Plateau



Guilds: Cave/Karst

Uses subterranean systems in Bell County.

ICEBOX CAVE BEETLE

(Pseudanophthalmus frigidus)

Threats

-  Natural System Modifications
-  Recreational Activities

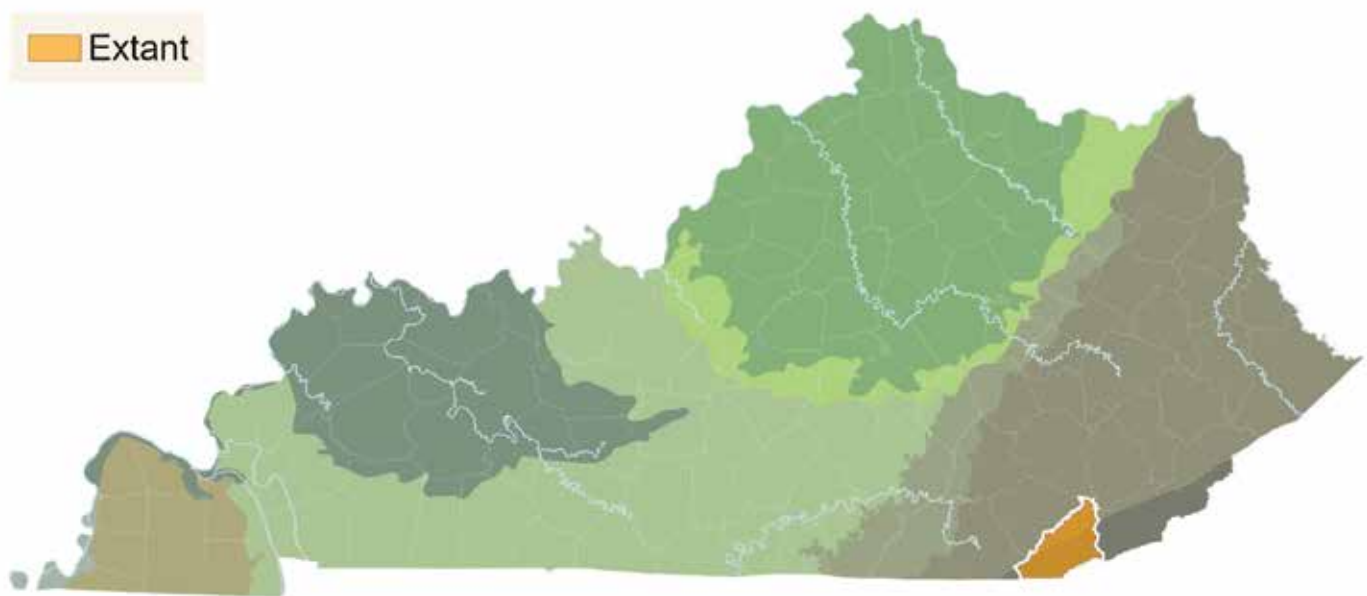
Conservation Actions

Unknown

Needs

Survey: Regular population monitoring

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A



IUCN Red List: N/A

Endemic to Kentucky



ROUND-HEADED CAVE BEETLE

(Pseudanophthalmus globiceps)

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

Site/Area Protection  

Needs

Survey: Regular population monitoring

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

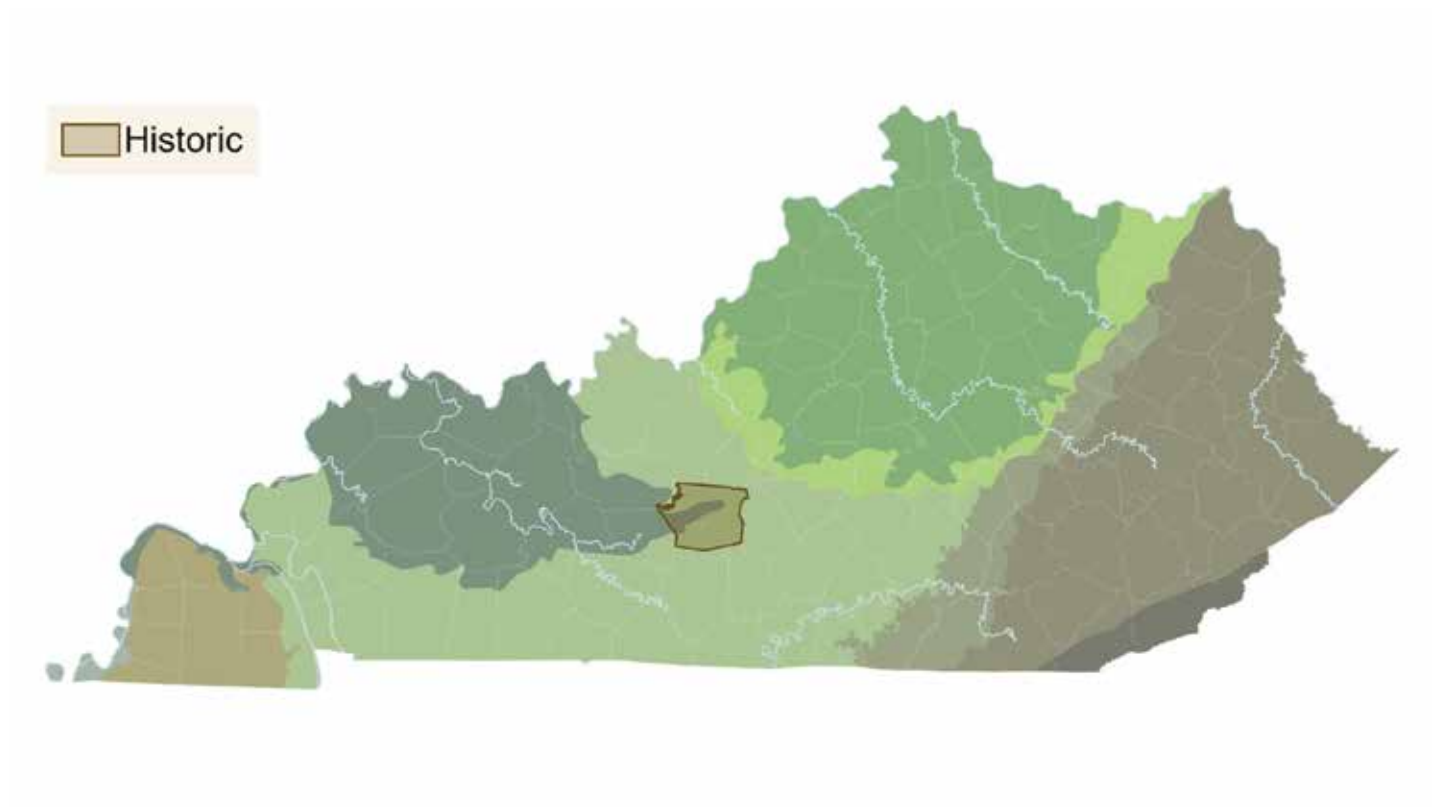
Habitat Associations

Physiographic Regions: Interior River Valley And Hills

Guilds: Cave/Karst

Uses subterranean systems in Hart County.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S2S3

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

Habitat Associations

Physiographic Regions: Bluegrass



Guilds: Cave/Karst

Uses subterranean systems in Fayette and Scott Counties.



GARMAN'S CAVE BEETLE

(Pseudanophthalmus horni)

Threats

-  Natural System Modifications
-  Recreational Activities

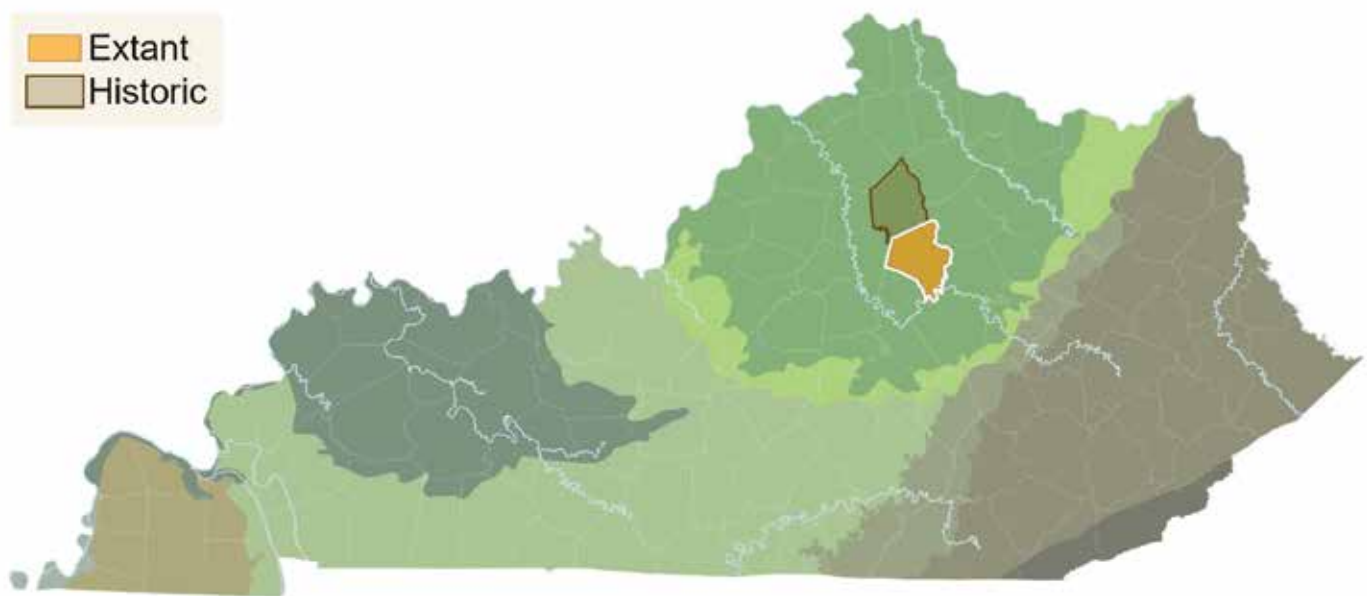
Conservation Actions

Site/Area Protection  

Needs

Survey: Status surveys

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A


Endemic to Kentucky

ASHCAMP CAVE BEETLE

(*Pseudanophthalmus hypolithos*)

Threats

 Natural System Modifications

 Recreational Activities

Conservation Actions

Site/Area Protection  

Needs

Survey: Regular population monitoring

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

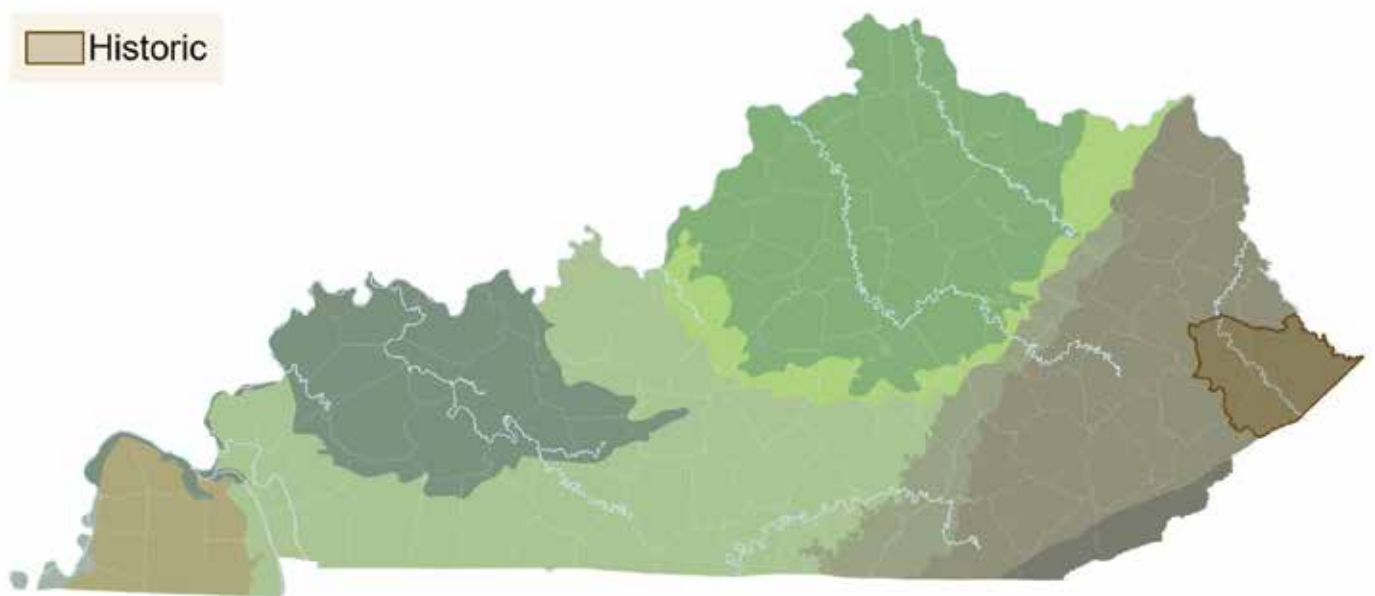
Habitat Associations

Physiographic Regions: Cumberland Plateau

Guilds: Cave/Karst

Uses subterranean systems in Pike and Floyd Counties.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1G2

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior
River Valley And Hills



Guilds: Cave/Karst

Uses subterranean systems in Edmonson County.

SURPRISING CAVE BEETLE

(Pseudanophthalmus inexpectatus)

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

Site/Area Protection  

Needs

Survey: Status surveys

Range Map

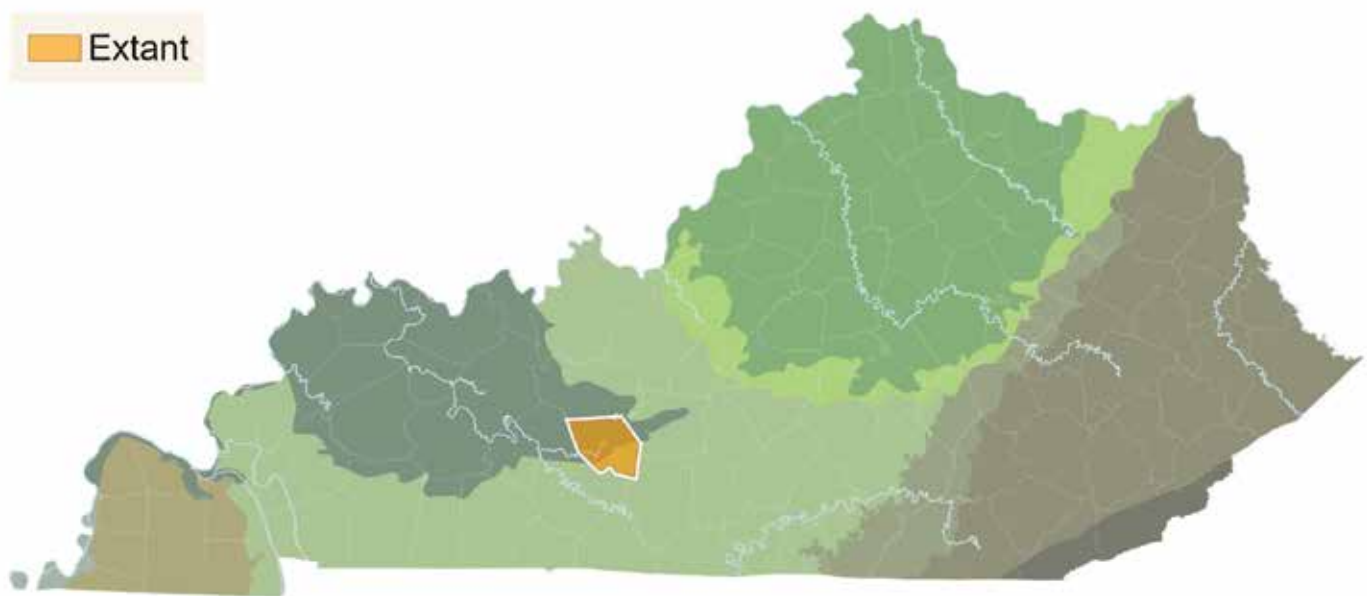


Photo: Field Museum



BEAVER CAVE BEETLE

(*Pseudanophthalmus major*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1



S Rank: S1

Federal Status: N/A


IUCN Red List: N/A

Endemic to Kentucky

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

Site/Area Protection  

Needs

Survey: Regular population monitoring

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Cave/Karst

Uses subterranean systems in Harrison County.

Range Map

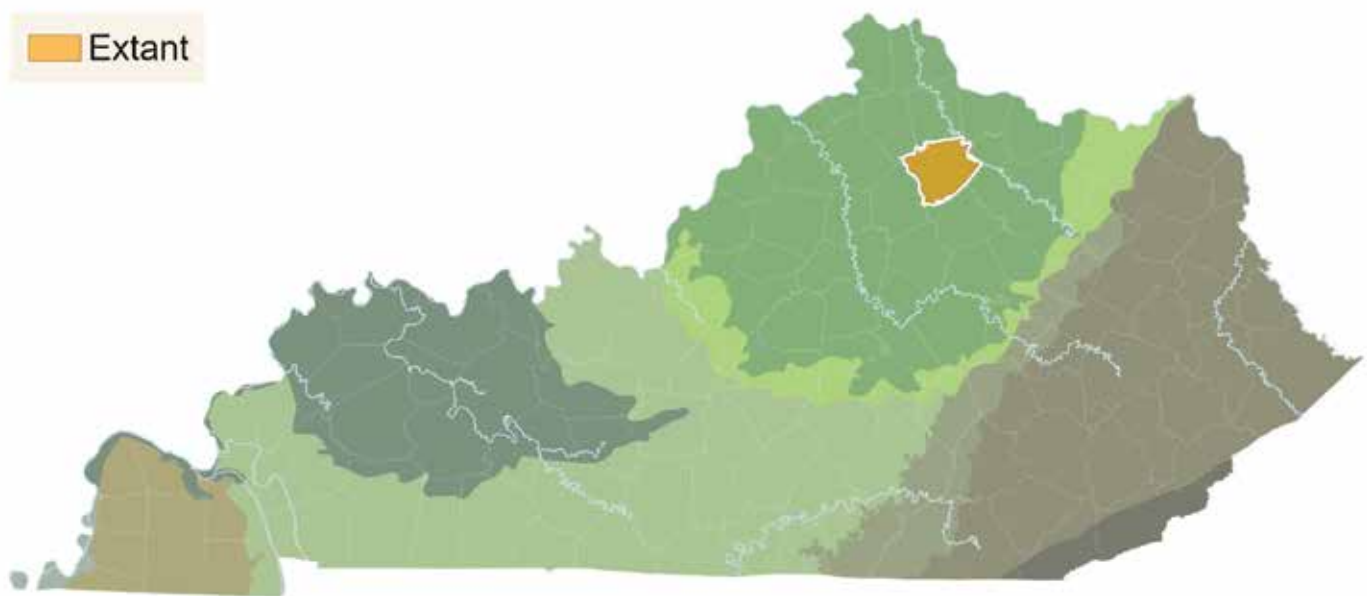




Photo: Monte McGregor



GREATER ADAMS CAVE BEETLE

(*Pseudanophthalmus pholeter*)

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

Unknown

Needs

Survey: Regular population monitoring

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

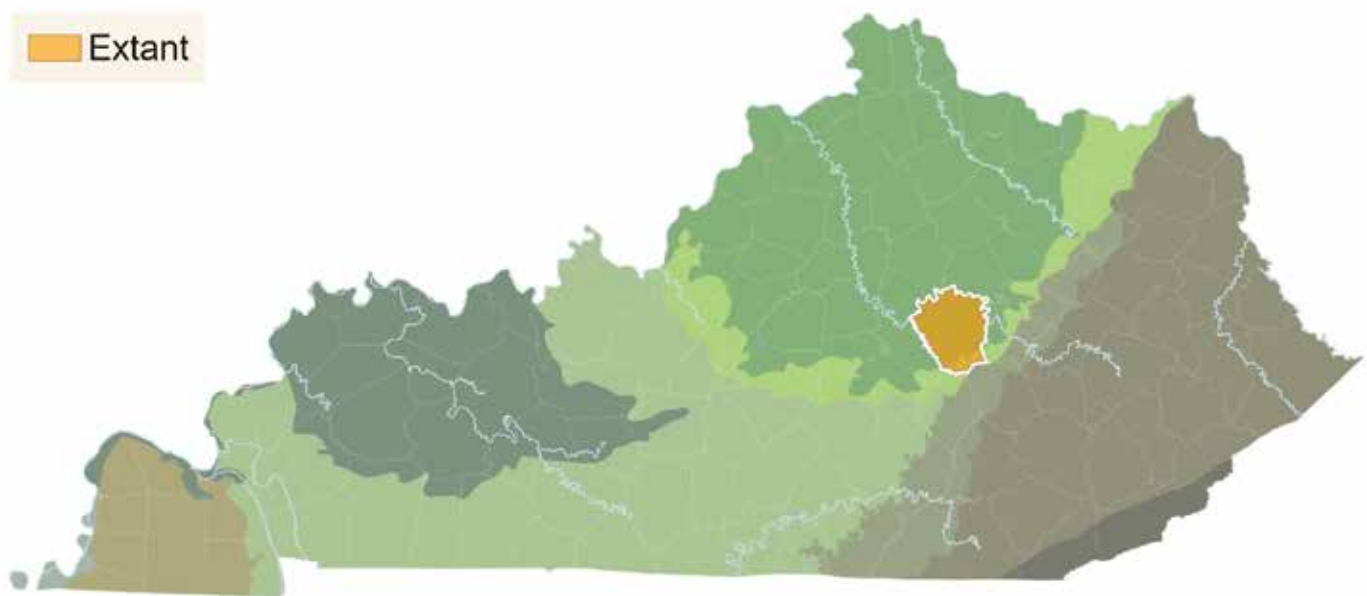
Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Cave/Karst

Uses subterranean systems in Madison County.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3T3

S Rank: S1S2

Federal Status: N/A



IUCN Red List: N/A

Endemic to Kentucky



A CAVE OBLIGATE BEETLE

(Pseudanophthalmus pubescens intrepidus)

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

Site/Area Protection  

Needs

Survey: Regular population monitoring

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Cave/Karst

Uses subterranean systems in Barren and Allen Counties.

Range Map

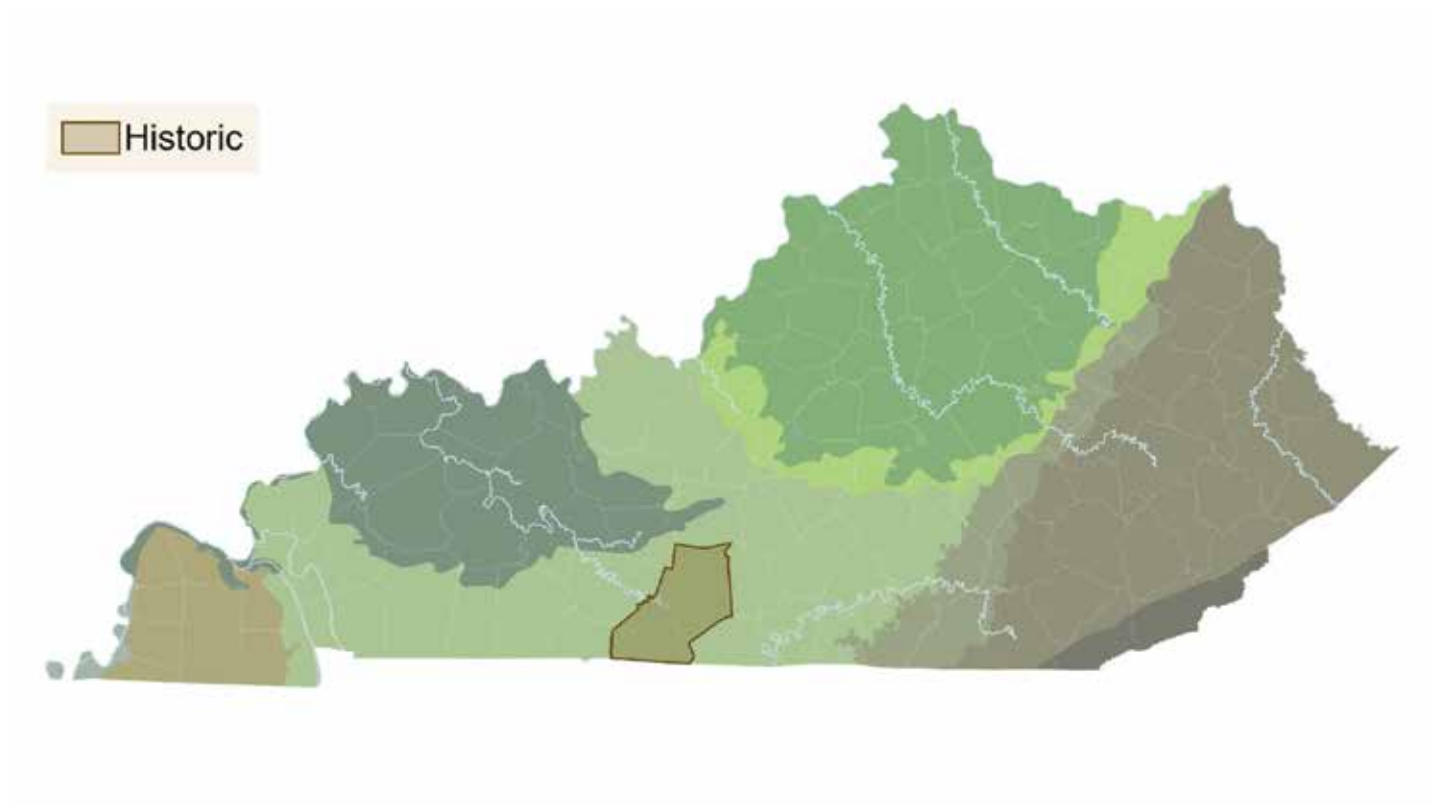




Photo: Field Museum



OLD WELL CAVE BEETLE

(*Pseudanophthalmus puteanus*)

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

- Site/Area Protection  

Needs

Survey: Status surveys

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1G2

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Cave/Karst

Uses subterranean systems in Boyle and Mercer Counties.

Range Map

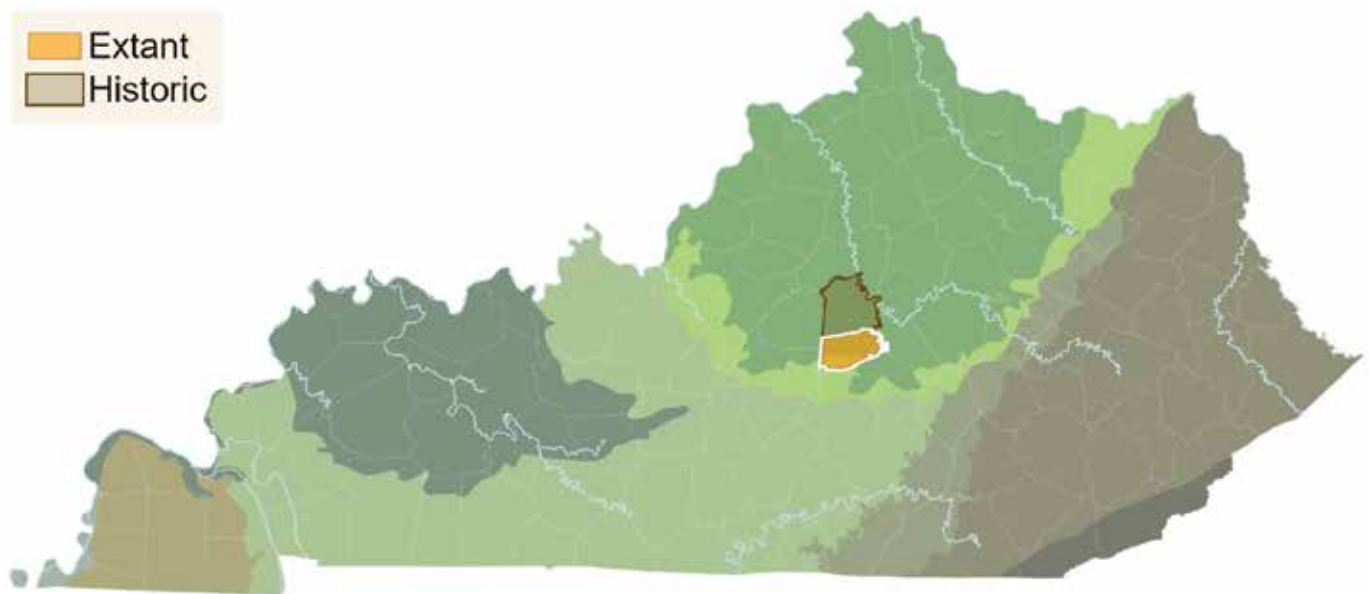


Photo: Ellis Lauder milk



ROGERS' CAVE BEETLE

(*Pseudanophthalmus rogersae*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1



S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

Unknown

Needs

Survey: Regular population monitoring

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

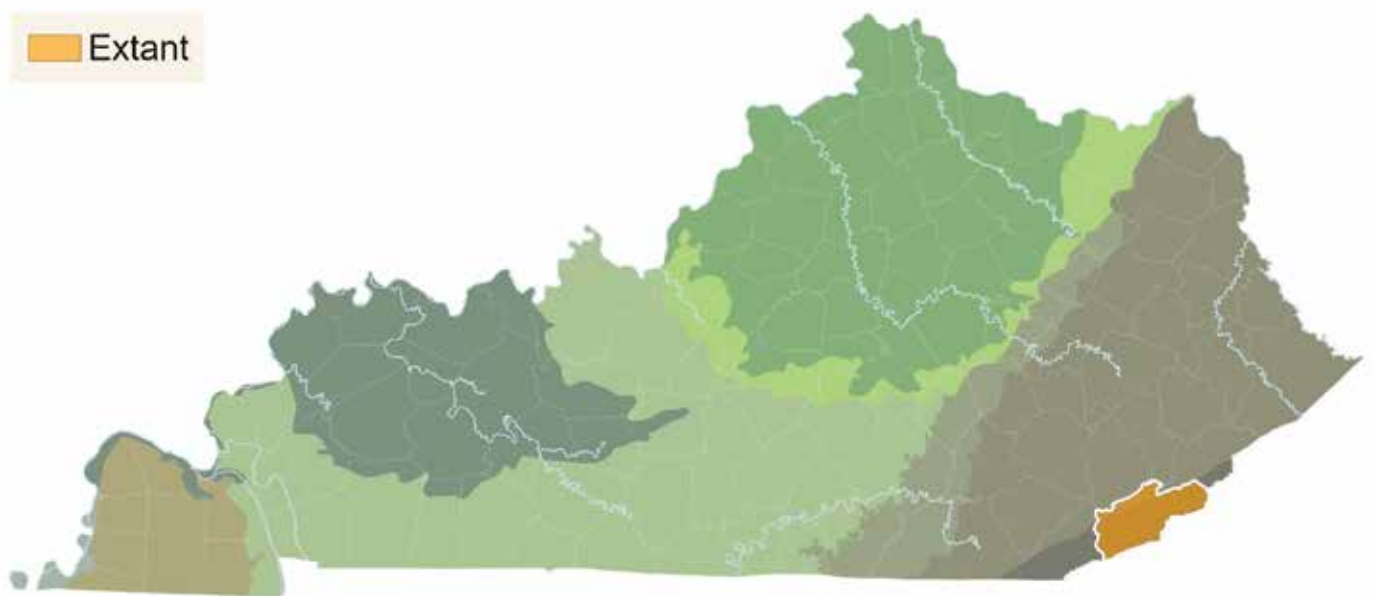
Habitat Associations

Physiographic Regions: Cumberland Mountains

Guilds: Cave/Karst

Uses subterranean systems in Harlan County.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A



IUCN Red List: N/A

Endemic to Kentucky

SCHOLARLY CAVE BEETLE

(Pseudanophthalmus scholasticus)

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

Unknown

Needs

Survey: Regular population monitoring

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

Habitat Associations

Physiographic Regions: Cumberland Mountains

Guilds: Cave/Karst

Uses subterranean systems in Harlan County.

Range Map

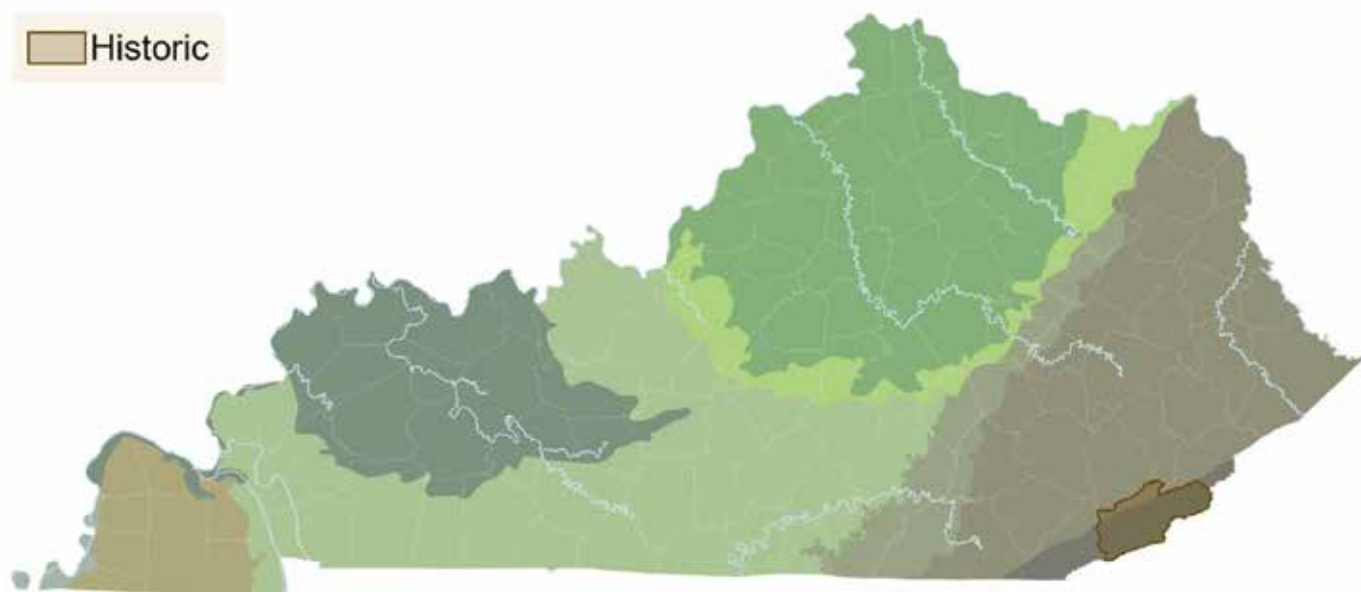


Photo: Field Museum



LOUISVILLE CAVE BEETLE

(*Pseudanophthalmus troglodytes*)

Threats

- 🏠 Commercial and Industrial Areas
- 🚶 Recreational Activities

Conservation Actions

Site/Area Protection 🚶 🏠

Needs

Survey: Regular population monitoring

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

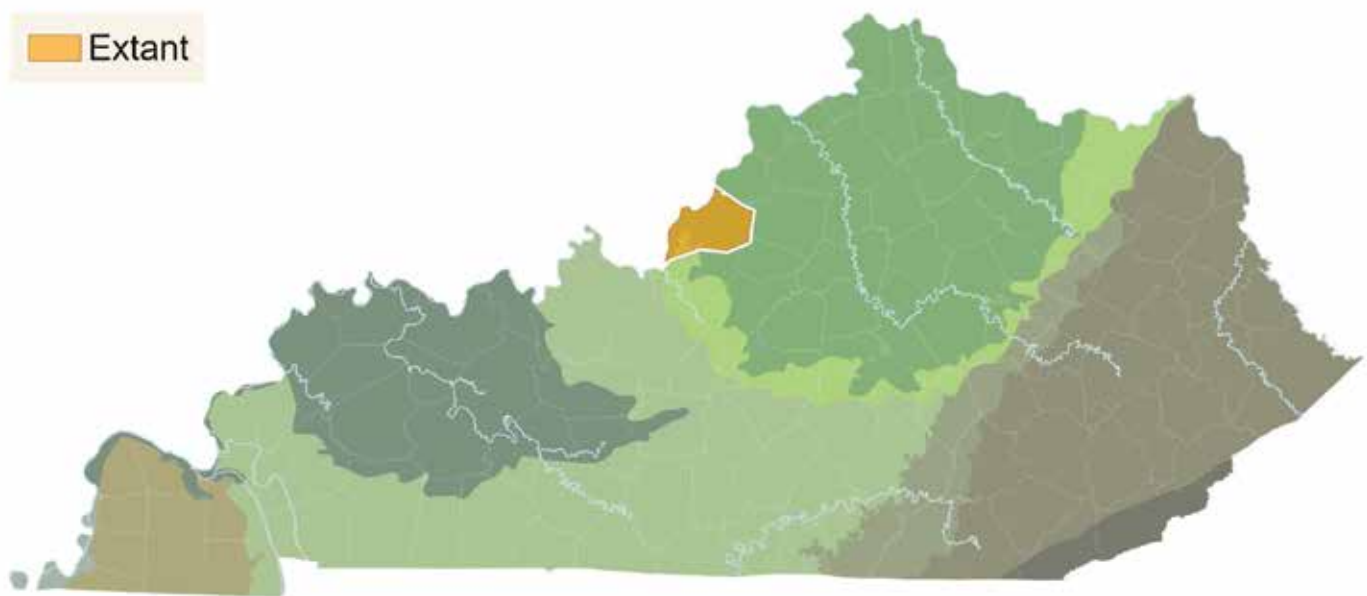
Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Cave/Karst

Uses subterranean systems in Jefferson County.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1S2

Federal Status: N/A



IUCN Red List: N/A

Endemic to Kentucky

A CAVE OBLIGATE SPRINGTAIL

(Pseudosinella espanita)

Threats

-  Natural System Modifications
-  Recreational Activities

Conservation Actions

Unknown

Needs

Survey: Regular population monitoring

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

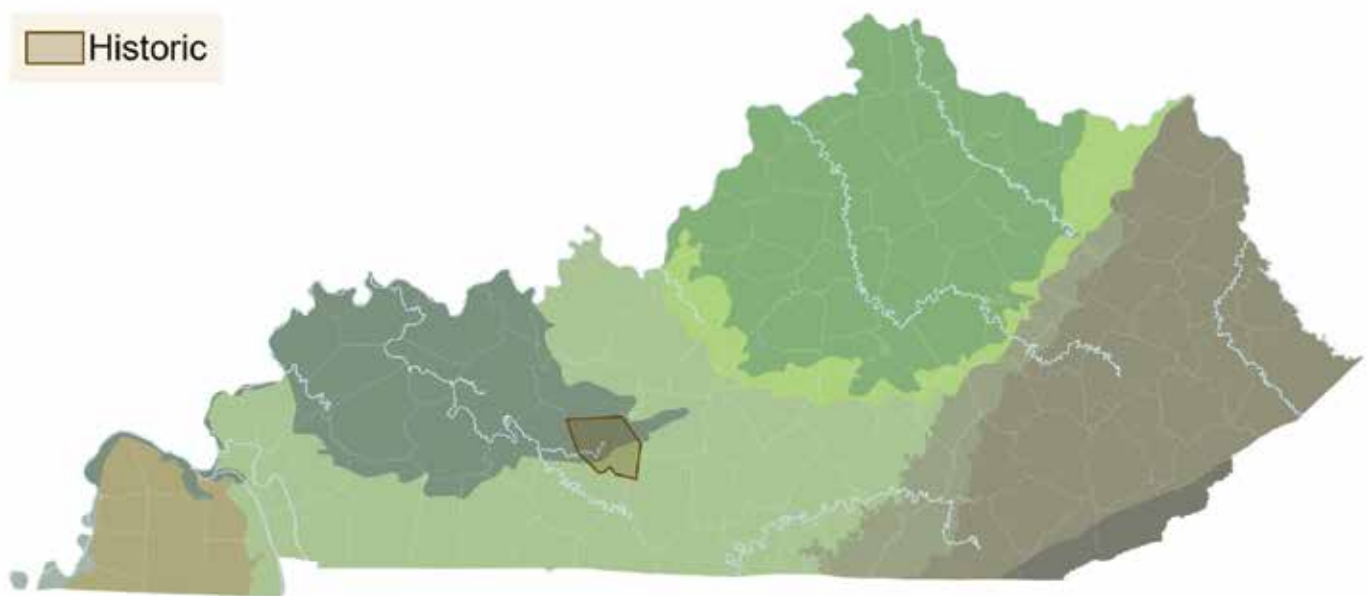
Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Cave/Karst

Uses subterranean systems in Edmonson County.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S1S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine stability of extant populations. Evaluate and address sources of ecological disturbance in streams inhabited by species.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau

Stream Type: Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream

Small order streams.

VERMONT SALLFLY

(*Rasvena terna*)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

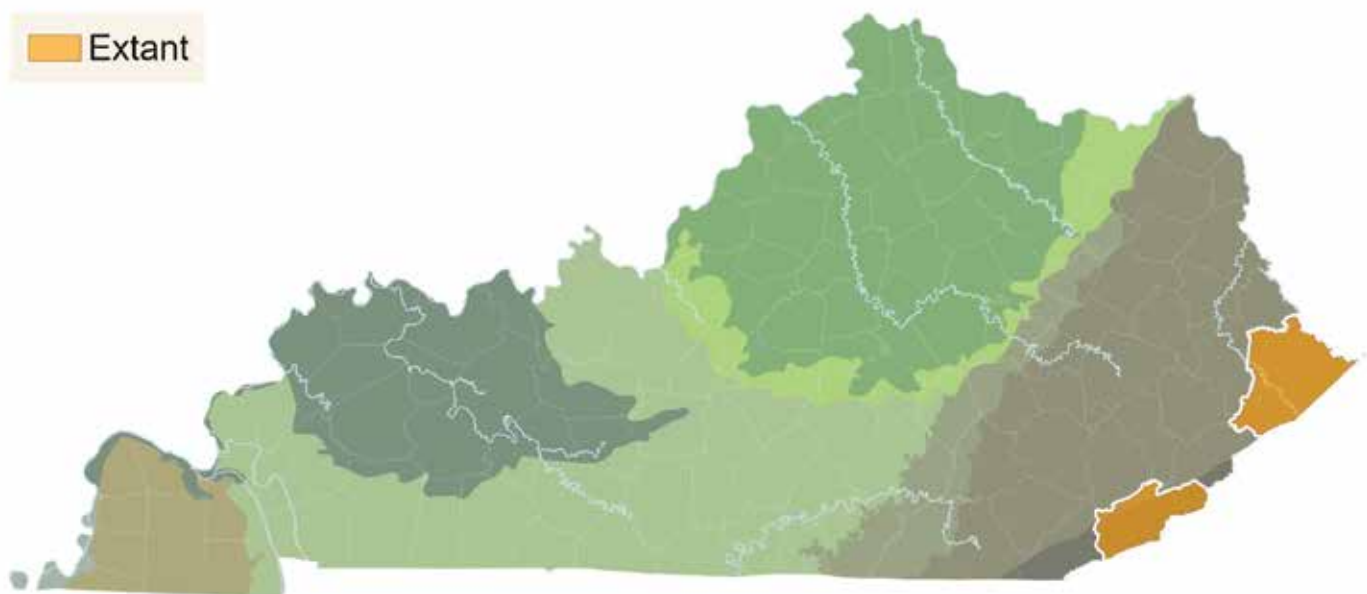
Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: SH

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in known habitat.

Habitat Associations

Physiographic Regions: Cumberland Plateau

Stream Type: Cool-Medium Gradient-Stream

None

A RHYACOPHILID CADDISFLY

(Rhyacophila appalachia)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Research: Life history research

Range Map

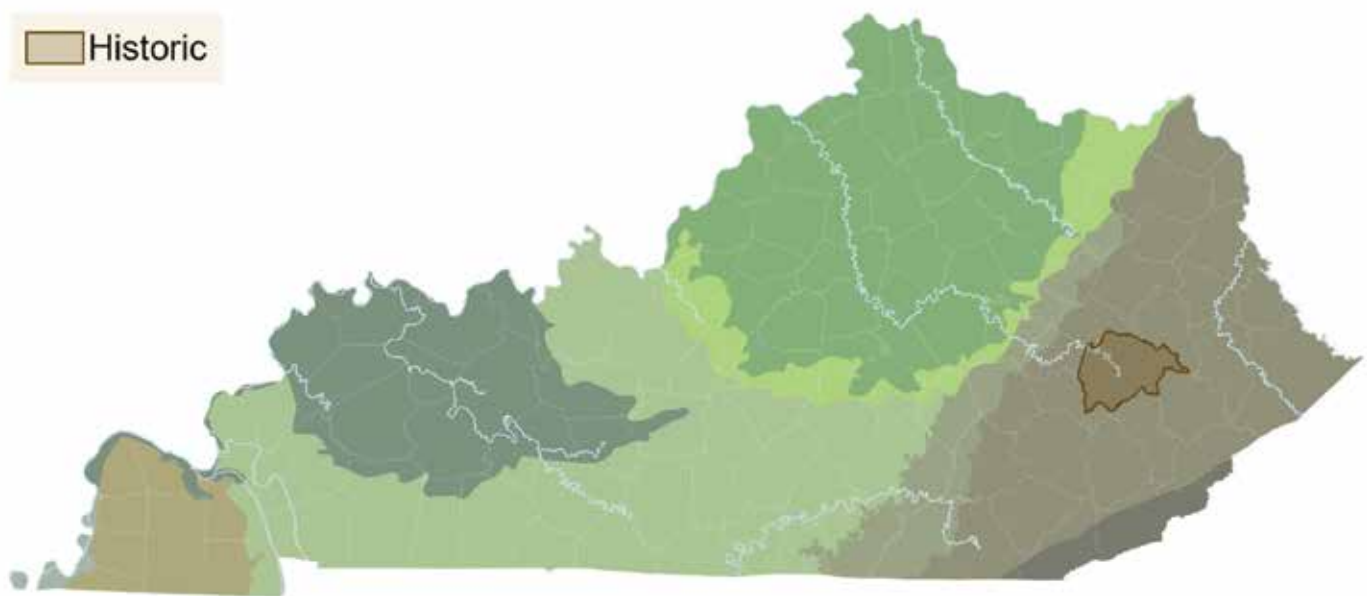


Photo: Ellis Laudermilk



NORTHERN OAK HAIRSTREAK

(*Satyrium favonius ontario*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4G5T4

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Monitor known populations and promote the management, enhancement, and protection of high-quality savanna and barrens habitats.




Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain





Guilds: Grassland/Savannah, Mesic Forest, Xeric Forest

Uses oak woodlands and edges. Primarily a canopy-level species, larval stage requires *Quercus* as host plant.

Threats

-  Agricultural and Forestry Effluents
-  Agriculture and Aquaculture
-  Residential and Commercial Development

Conservation Actions

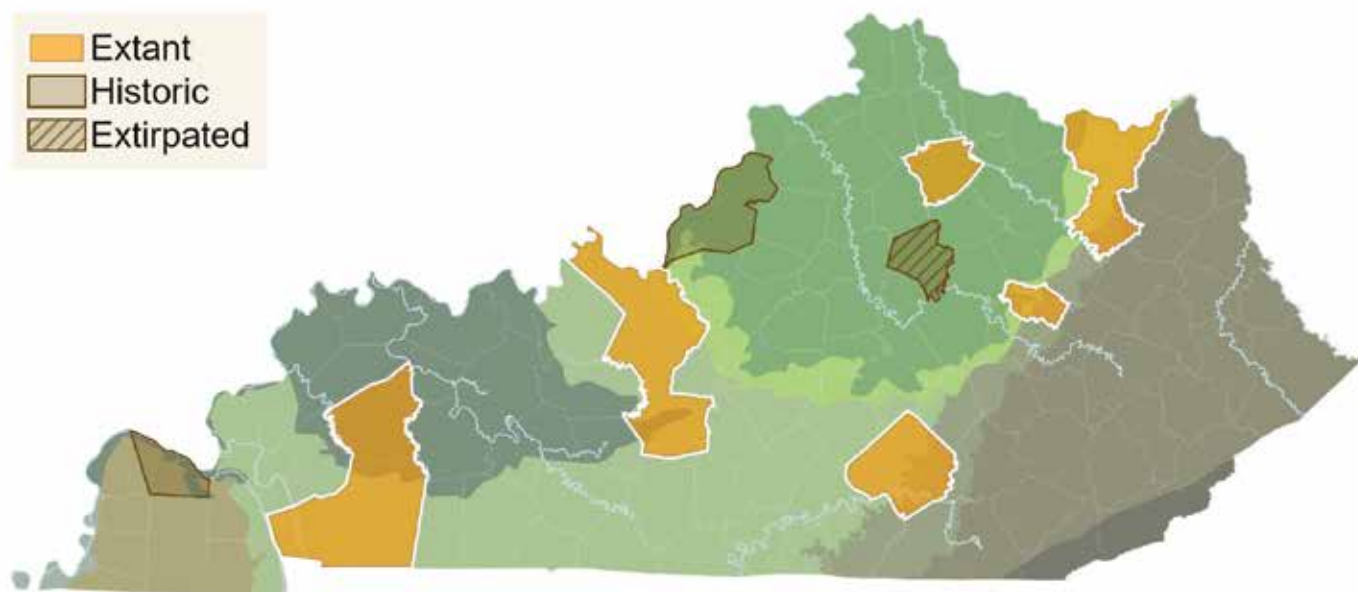
- External Capacity Building 
- Policies and Regulations 
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Management: Create recommendations for habitat management

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Endemic to Kentucky

KARST FORESTFLY

(*Soyedina calcarea*)



Threats

 Natural System Modifications

 Pollution

Conservation Actions

Awareness and Communications 

Habitat and Natural Process Restoration  

Needs

Survey: Collect baseline species information

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in known habitat.

Habitat Associations

Physiographic Regions: Interior Plateau

Stream Type: Cold-Medium Gradient-Stream,
Cool-Medium Gradient-Stream

Known from two localities, one of which is an unnamed spring run, tributary of the Green River. Likely only in Mammoth Cave Region.

Range Map

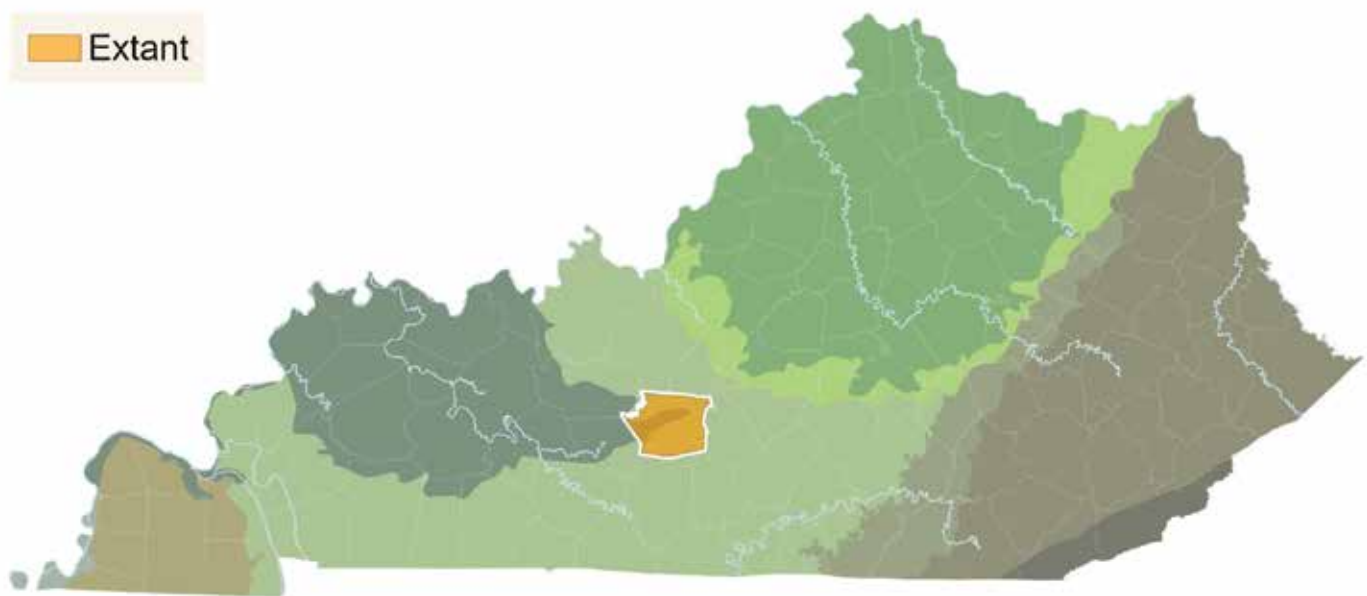


Photo: Ellis Laudermilk



DIANA FRITILLARY

(*Speyeria diana*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G2G3

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Monitor extant populations and increase native blooming plant availability in forest edges and openings.



Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs

Guilds: Grassland/Savannah, Mesic Forest, Scrub-Shrub/Early Successional Forest

Species requires *Viola* species as host plant.

Threats

-  Agricultural and Forestry Effluents
-  Logging and Wood Harvesting
-  Mining and Quarrying
-  Residential and Commercial Development

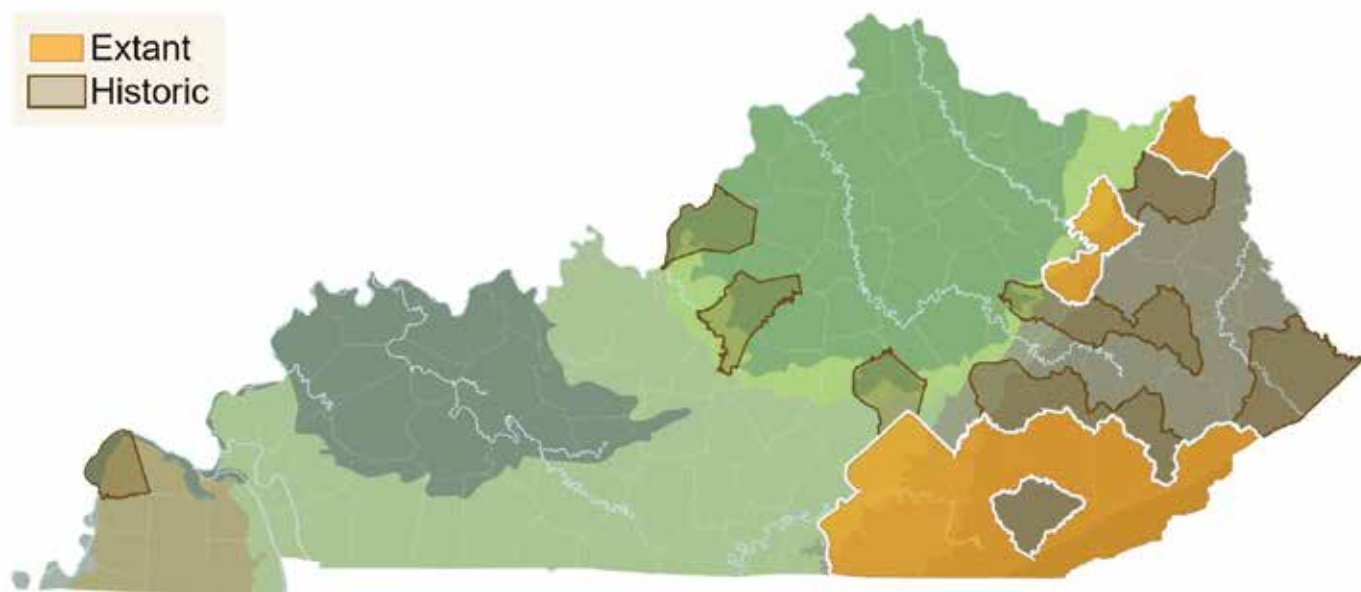
Conservation Actions

- Alliance and Partnership Development 
- Awareness and Communications 
- External Capacity Building 
- Habitat and Natural Process Restoration 

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in rivers inhabited by species.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills



Stream Type: Cool-Confined-Large River, Warm-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River, Other

Large, slow flowing rivers, moderate current, gravel or sandy substrate. Burrower.




ELUSIVE CLUBTAIL

(Stylurus notatus)

Threats

-  Natural System Modifications
-  Pollution

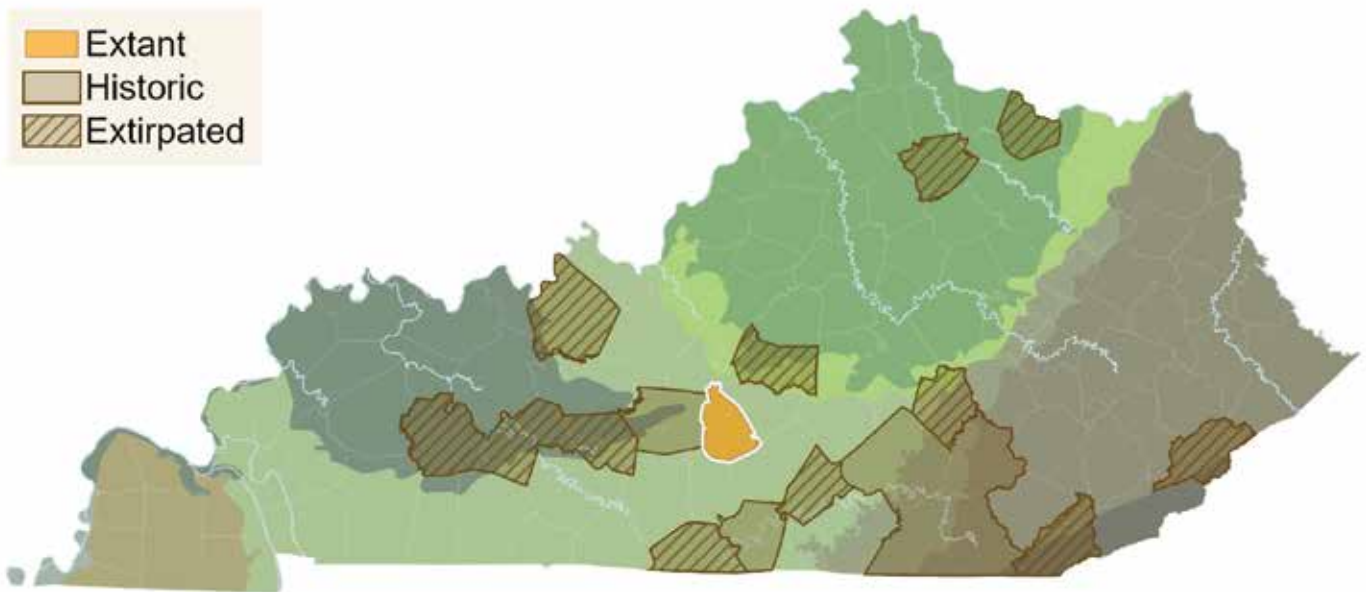
Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5

S Rank: S1S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Determine extent of range and population level in Kentucky. Evaluate and address sources of ecological disturbance in rivers and streams.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Plateau Escarpment, Knobs, Interior Plateau



Stream Type: Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Other

Burrower. Uses rivers and streams with sand or sand and cobble bottoms and moderate currents, streams with intermittent rapids with sandy and murky bottoms, small rivers.




ZEBRA CLUBTAIL

(Stylurus scudderi)

Threats

-  Natural System Modifications
-  Pollution

Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration  

Needs

Survey: Locate additional populations

Range Map

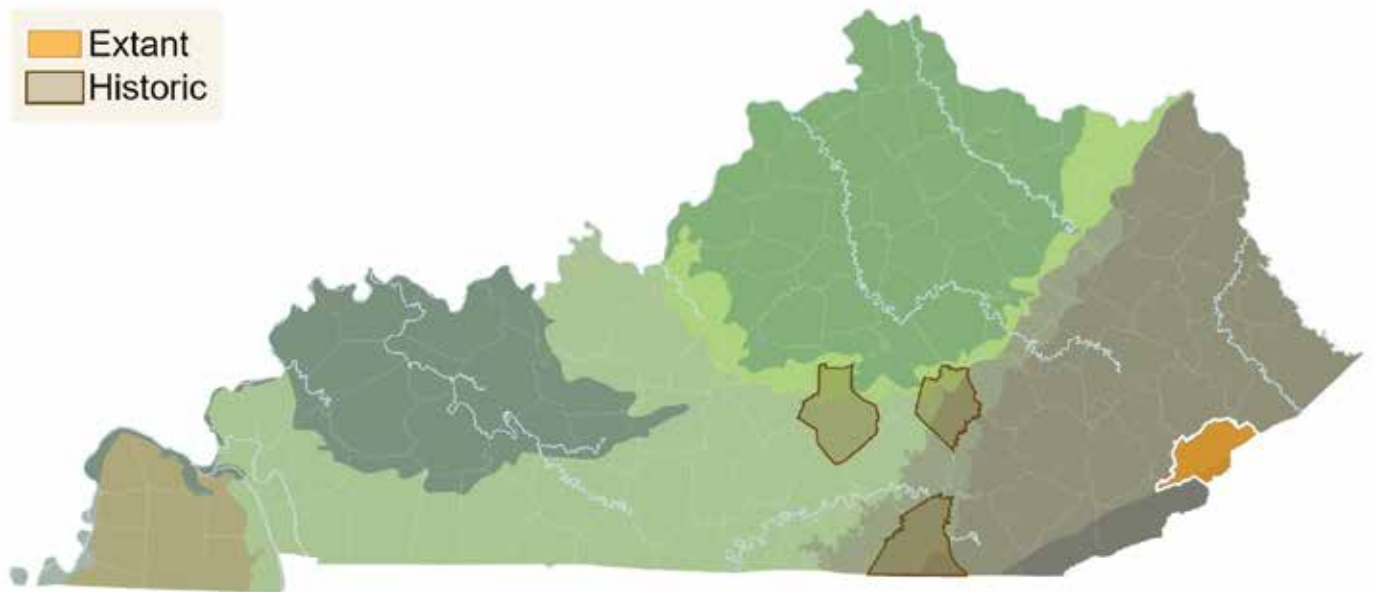


Photo: Ellis Lauder milk



GOLD-BANDED SKIPPER

(*Telegonus cellus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Establish current population trend in Kentucky.
Preserve high-quality woodland habitat.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs

Guilds: Grassland/Savannah, Scrub-Shrub/Early Successional Forest

Requires host plant *Phaseolus polystachios*.

Threats

- 🏠 Residential and Commercial Development
- 🏭 Wood and Pulp Plantations

Conservation Actions

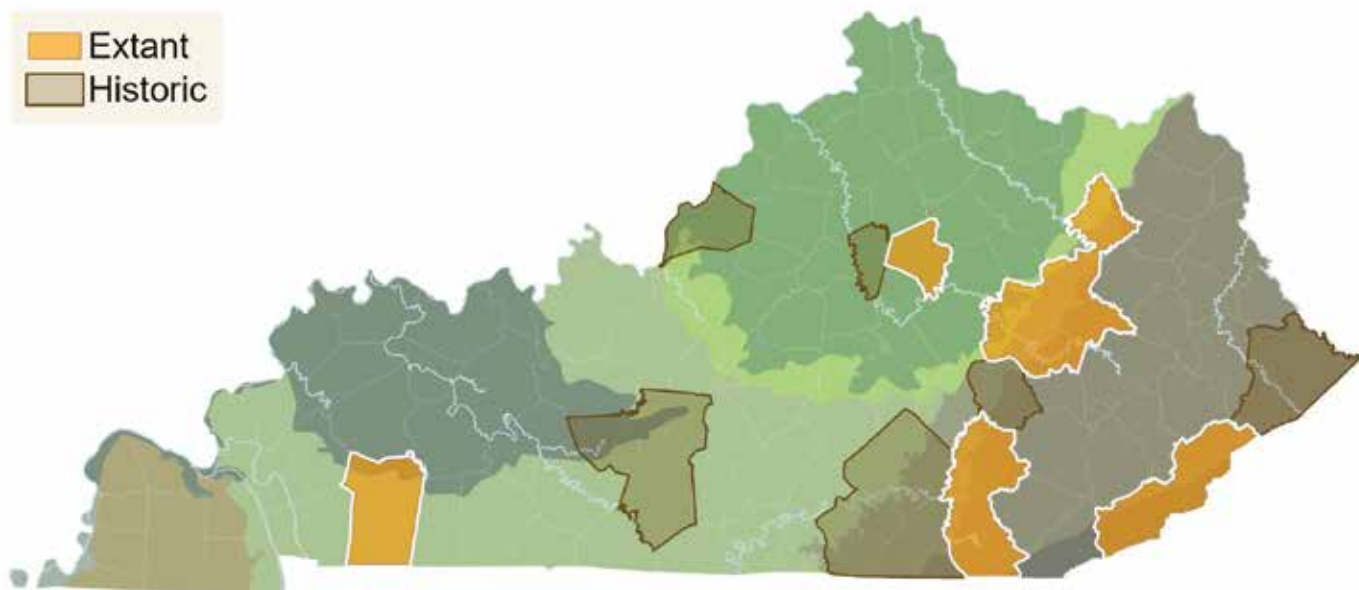
- 🤝 Alliance and Partnership Development 🏠
- 🏠 External Capacity Building 🏠
- 🏭 Resource and Habitat Protection 🏭

Needs

Survey: Collect baseline species information

Research: Research regional differences

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Establish current population level in Kentucky.
Evaluate and address sources of disturbance.

Habitat Associations

Physiographic Regions: Interior Plateau



Guilds: Cave/Karst

Uses subterranean systems in Livingston County.

A CAVE OBLIGATE SPRINGTAIL

(*Tomocerus missus*)

Threats

-  Natural System Modifications
-  Recreational Activities

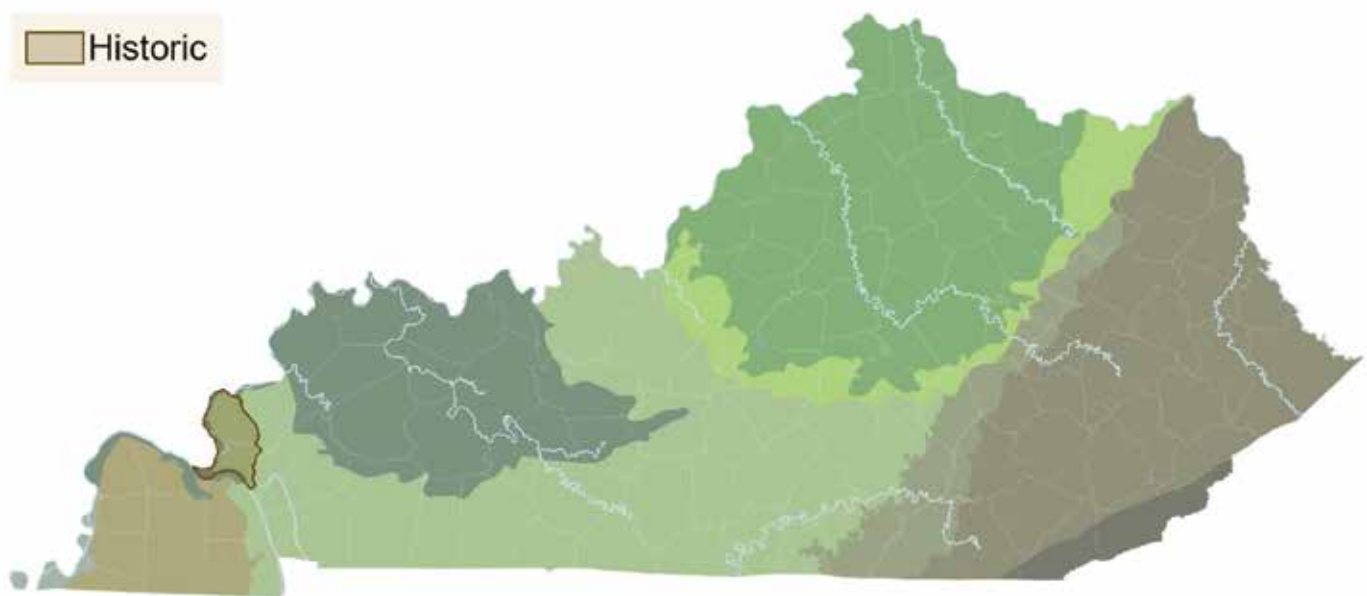
Conservation Actions

Site/Area Protection  

Needs

Survey: Status surveys

Range Map



MAMMALS

Introduction

Mammal diversity in Kentucky has been described to varying extents. In their book on Mammals of Kentucky (1974), Barbour and Davis discussed 64 species of mammals in their compilation of data on Kentucky's mammals. The Handbook of Mammals of the south-central states (1994) listed 67 species for Kentucky but included several species that have been extirpated for decades (e.g., gray and red wolf, fisher, mountain lion, and American bison) or species they had no records for but assumed should be present (e.g., rock vole and porcupine). Since then, new state records of some mammals (e.g. nine-banded armadillo, rock shrew, common porcupine and American badger) have been reported from Kentucky. Three introduced species, nutria, feral pigs and fallow deer, have been reported from Kentucky.

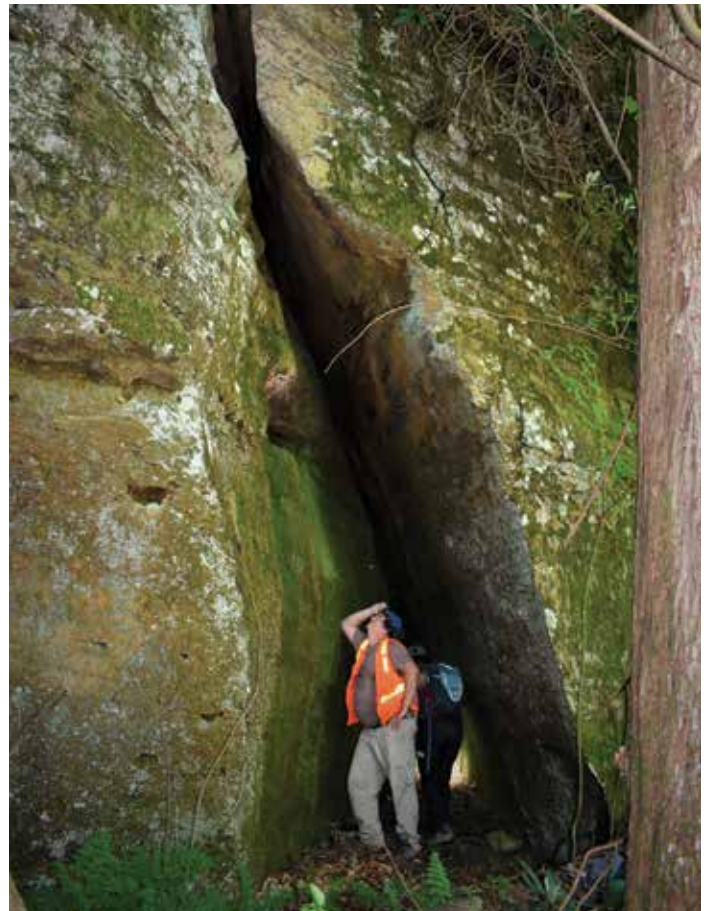
For the 2023 State Wildlife Action Plan, 80 taxa were evaluated for inclusion as Species of Greatest Conservation Need. For many species, particularly game species and federally protected species, data were available to assess population trends in the state. For other species, primarily small mammals, these data were lacking; resulting in their inclusion as Data Deficient SGCN. Some extirpated species, including the red wolf, American bison, and eastern cougar, were not considered for inclusion as SGCN due to the low probability that sustainable populations could be managed in Kentucky.

As a part of the 2013 revision, 16 mammals were included as Species of Greatest Conservation Need. Two of those species (American black bear and evening bat) were removed from the 2023 SGCN list. The American black bear population in Kentucky has increased significantly since the 2013 SWAP revision, with records now reported from 72 counties, a 60% increase since 2013 SWAP revision. The evening bat has also experienced significant increases in range and abundance since the 2013 revisions, with records now reported from 58 counties, a 26% increase since 2013 SWAP revision. Reported observations of Evening bats also increased by 177% over the past decade when compared to all observations of the species from the prior 120 years.

The 2023 Wildlife Action Plan (Plan) includes 31 mammal SGCN that were selected by a team of professionals and scholars with expert knowledge of Kentucky's crustacean fauna. Four species of bats found in Kentucky are listed under the federal Endangered Species Act (ESA) as endangered (Indiana bat, gray bat, northern long-eared bat, and Virginia big-eared bat). Two additional bat species, the little brown bat and tricolor bat,

are likely to be listed under the ESA in the next few years. Thirteen mammal species were designated "data deficient" because they lack sufficient distributional data and basic life history information to make an informed conservation status assessment.

Kentucky offers a diversity of habitat types across the state, along with numerous topographies, soils, and water sources (i.e., streams, rivers, ponds, sloughs, lakes, and reservoirs). For example, elevations range from 1,262 m in the rugged mountains of southeastern Kentucky to 78 m in the Mississippi River floodplains of western Kentucky, with extremely variable types of topography and thousands of kilometers of streams in between. Highly diverse plant communities occur throughout the state in accordance with each ecoregion because of changes in soil properties, soil moisture, and slope characteristics. The variability in habitat types throughout Kentucky supports an interesting diversity of mammals, a diversity that encompasses mammal communities typical of the region as well as species typically found elsewhere. As



Bat biologists surveying for Virginia Big-Eared Bat maternity roosts. Photo: KDFWR

examples, several animals (e.g., Rafinesque's big-eared bat, cotton mouse, and swamp rabbit) reach their northern limits in or just north of Kentucky, others are typical of western states (e.g., prairie vole and coyote), northern states (e.g., meadow jumping mouse and cinereus shrew), or even the Appalachian Mountains (e.g., Appalachian cottontail and rock shrew).

One mammal SGCN is considered endemic to Kentucky. The Kentucky red-backed vole, a subspecies of the Southern red-backed vole, has a current known distribution of portions of eastern Kentucky.

Threats to mammals identified by the taxa team include Biological Resource Use, Human Disturbance, Invasive and Other Problematic Species and Genes, Agriculture, Energy Production and Mining, Residential and Commercial Development, Transportation and Service Corridors, Climate Change, and Pollution. The greatest threats to mammals include logging, recreational activities (i.e. cave entry/vandalism at priority hibernacula and maternity sites for bats), and disease (i.e. White Nose Syndrome and the potential for Rabbit Hemorrhagic Disease). White Nose Syndrome has caused significant population declines for some bat species in Kentucky, particularly the little brown bat, northern long-eared bat, and tricolor bat. Less information is available for other diseases, such as raccoon roundworm in Allegheny woodrats and Rabbit Hemorrhagic Disease in swamp rabbits and Appalachian cottontails.

The conservation actions proposed to counteract threats to mammal SGCN include: Land Protection, Land Management, Education and Awareness, and External Capacity Building. Given the varied needs of the multitude of species and their habitats, effective implementation of conservation actions will require forming alliances and partnerships with government agencies, nonprofits, universities, businesses, and communities. This includes incorporating the SWAP into local development plans. For most bat species, protection and proper management of critical hibernacula and maternity sites is crucial for species conservation. This includes fee simple acquisition of these sites or acquisition of conservation easements that allow for proper site management and access for research/monitoring efforts. For many small mammal species, protection and management of rare habitat types (i.e. wetlands, talus slopes, and high quality mesic forests) will be required for management in the future.

For most mammal SGCN, additional work is needed to determine population status, life history, and habitat requirements. While a state-wide small mammal survey was conducted by KDFWR was vital in determining species ranges throughout Kentucky, information on population trends is lacking. Several data deficient mammals (particularly long-tailed weasels, least weasels, and spotted skunks) are known mostly from anecdotal field observations. Focused studies on those species



High quality mesic woods habitat in southeastern Kentucky. Areas of mature forest, with talus and dense native understory are vital for several small mammal SGCN. Photo: KDFWR



Baited remote/trail camera stations can be utilized to collect vital information on SWAP species distribution, including difficult to catch species like the spotted skunk. Photo: James Kiser

may determine that populations are stable enough to be removed from future SGCN lists. Regional studies have indicated a decline in muskrat populations throughout the southeast which precipitated the species listing as a data deficient SGCN. Population surveys utilizing citizen science may inform occupancy models to study population trends in the future as funding allows. With the advance in remote camera surveys, the opportunity to combine camera surveys with citizen science to collect additional survey information on many mesocarnivores is evident. A coordinated effort, with standardized methodology and a central data repository, led by KDFWR would provide beneficial information on many data deficient mammal SGCN.

Sources:

Barbour, Roger William. *Mammals of Kentucky*. Vol. 5. University Press of Kentucky, 1974.

Choate, Jerry R., J. Knox Jones Jr, and Clyde Jones. *Handbook of mammals of the south-central states*. LSU Press, 1994.

Whitaker, John O., and William J. Hamilton. *Mammals of the eastern United States*. Cornell University Press, 2019

CASE STUDY

Utilization of partnerships and multiple funding sources to manage an endangered species, the Virginia big-eared bat

The Virginia big-eared bat is likely the rarest mammal species in Kentucky. Current population estimates based on hibernacula censuses indicate that less than 4,000 individuals reside in Kentucky. Most Virginia big-eared bats hibernate in one Kentucky cave which contains over 80% of the State's population. In the summer, smaller maternity colonies are formed across a 13-county area in eastern Kentucky. Maternity colonies, ranging in size from a dozen adult bats to upwards of 500 adult females are often found in remote areas free of human disturbance. As a result of their cryptic roosting behavior, only 25% of Kentucky's wintering population could be located on the landscape during the maternity season. Conservation efforts, including land acquisition, creation of management buffers, cave gating, etc. require the locations of maternity sites to be identified.

Initially funded via a short-term Section 6 grant, Kentucky Department of Fish and Wildlife Resources (KDFWR) biologists, in conjunction with the Daniel Boone National Forest, Kentucky Natural Lands Trust, and U.S. Fish and Wildlife Service, undertook an effort to locate additional maternity sites for the species. Field efforts to identify previously unknown maternity roosts included cliff line surveys, eDNA collection and analysis, acoustic monitoring, and bat capturing via harp trap. As a result, two new maternity sites were confirmed for the species.

Upon conclusion of the Sec. 6 grant, additional field work was conducted utilizing State Wildlife Grant (SWG) funding. This resulted in the identification of an additional one confirmed and two suspected (pending further investigation) maternity roosts. As a result, nearly 60% of the wintering female population of Virginia big-eared bats can be accounted for during the maternity season.

On-site bat surveys, typically involving the use of harp traps, and conducted using SWG funding indicate local



Typical sandstone crevice maternity roost for Virginia big eared bats. Photo: Zack Couch



Bat friendly cave gate installed at Virginia big-eared bat maternity site. Photo: Zack Couch

migration patterns for the species. Using uniquely colored bat bands, attached to the forearms of captured bats, KDFWR biologists have been able to make connections between maternity sites and hibernacula. This data allows resource managers to better understand movement patterns of the species during the spring and fall migration.

The second largest Virginia big-eared bat maternity site in Kentucky was discovered and has been monitored annually as a part of this project. The site, a small limestone cave, was experiencing sporadic intrusion and vandalism. Utilizing SWG funding, along with funds from Kentucky Wild and the Kentucky Natural Lands Trust, a bat friendly gate was erected to minimize disturbance at the roost.

This SWG funded project highlights how a variety of partnerships and long-term project funding from a variety of sources are needed to produce impactful results. If additional, more robust and sustained, funding were made available, projects of this magnitude could be more readily undertaken so as to properly manage SGCN.



Virginia big-eared bat with colored bat band.
Photo: Josh Young, East Kentucky Power

MAMMAL PROFILE PAGES



Photo: John MacGregor



RAFINESQUE'S BIG-EARED BAT

(*Corynorhinus rafinesquii*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G3G4

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Protect summer and winter roosts via acquisition and management. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.




Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Cave/Karst, Cliff/Rockshelter, Forested Wetland, Mesic Forest, Xeric Forest

Summer colonies establish most often in hollow trees or buildings in wooded areas, but many utilize caves year-round in Kentucky. Winter hibernacula are typically caves or rockshelters.

Threats

-  Housing and Urban Areas
-  Logging and Wood Harvesting
-  Recreational Activities

Conservation Actions

- Awareness and Communications 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Site/Area Protection   
- Training 

Needs

Survey: Collect baseline species information

Range Map

Current

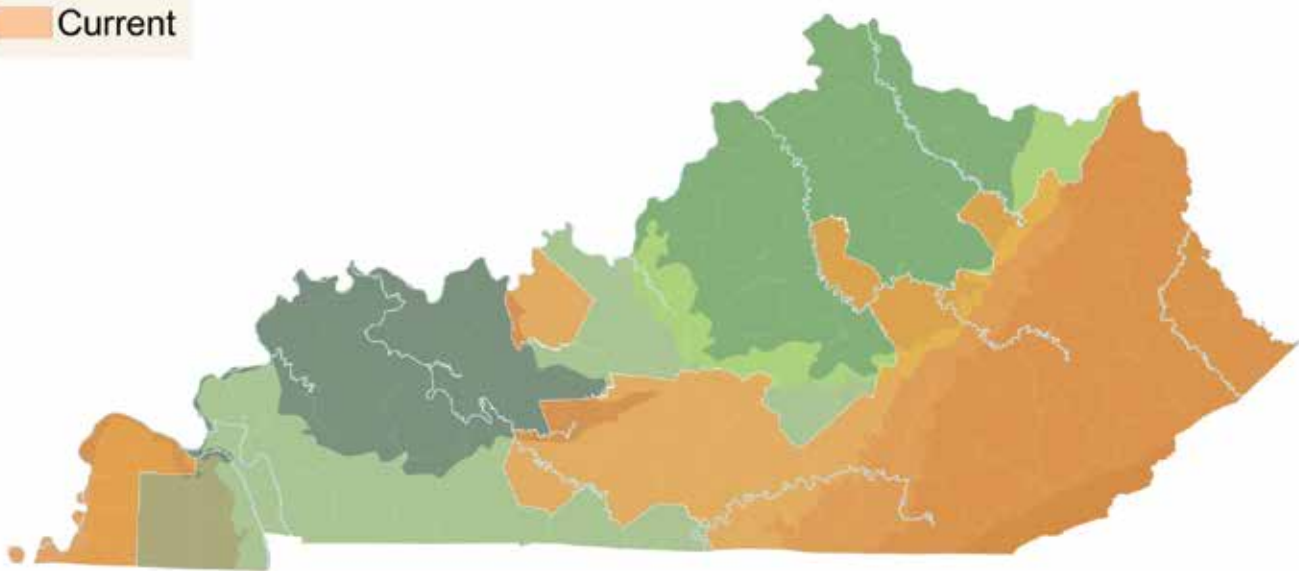


Photo: John MacGregor



VIRGINIA BIG-EARED BAT

(*Corynorhinus townsendii virginianus*)

Conservation Profile

Priority Group: Highest

KNP Info

G Rank: G4T4

S Rank: S1

Federal Status: Endangered

IUCN Red List: N/A

Conservation Goal

Protect summer and winter roosts via acquisition and management. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.




Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Knobs

Guilds: Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest

Maternity sites can be found in limestone caves or sandstone shelters. South facing slopes seem important for sandstone sites.

Threats

-  Housing and Urban Areas
-  Logging and Wood Harvesting
-  Recreational Activities

Conservation Actions

- Awareness and Communications 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Site/Area Protection   
- Training 

Needs

Survey: Collect baseline species information

Range Map

Current

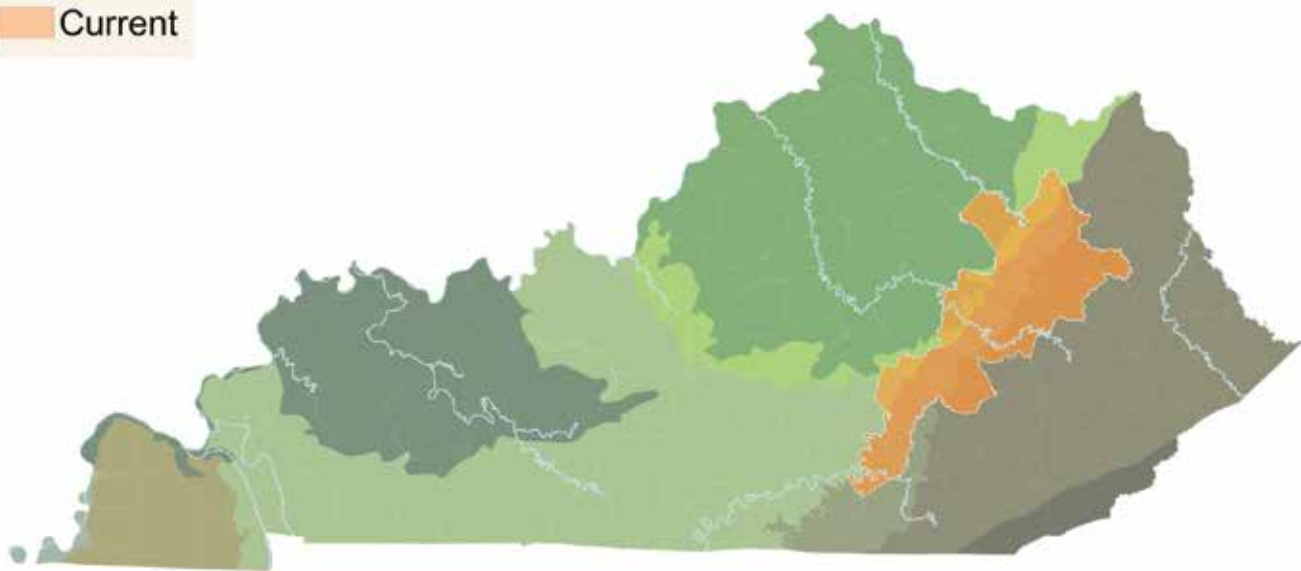


Photo: John MacGregor



SILVER-HAIRED BAT

(*Lasionycteris noctivagans*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3G4

S Rank: S4S5M

Federal Status: N/A

IUCN Red List: LC - Least concern

This species is not well studied in Kentucky, as the time of year when it typically occurs here (outside of summer) coincides with a time when very little bat survey work is conducted. More work is needed to determine to what extent the species occurs in Kentucky and to what degree management of the species is required (if any).

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest

Inhabits wooded or semi-wooded areas and occupies tree holes in the summer. Hibernacula have been observed in cliff crevices, hollow trees, caves, and mines.

Range Map

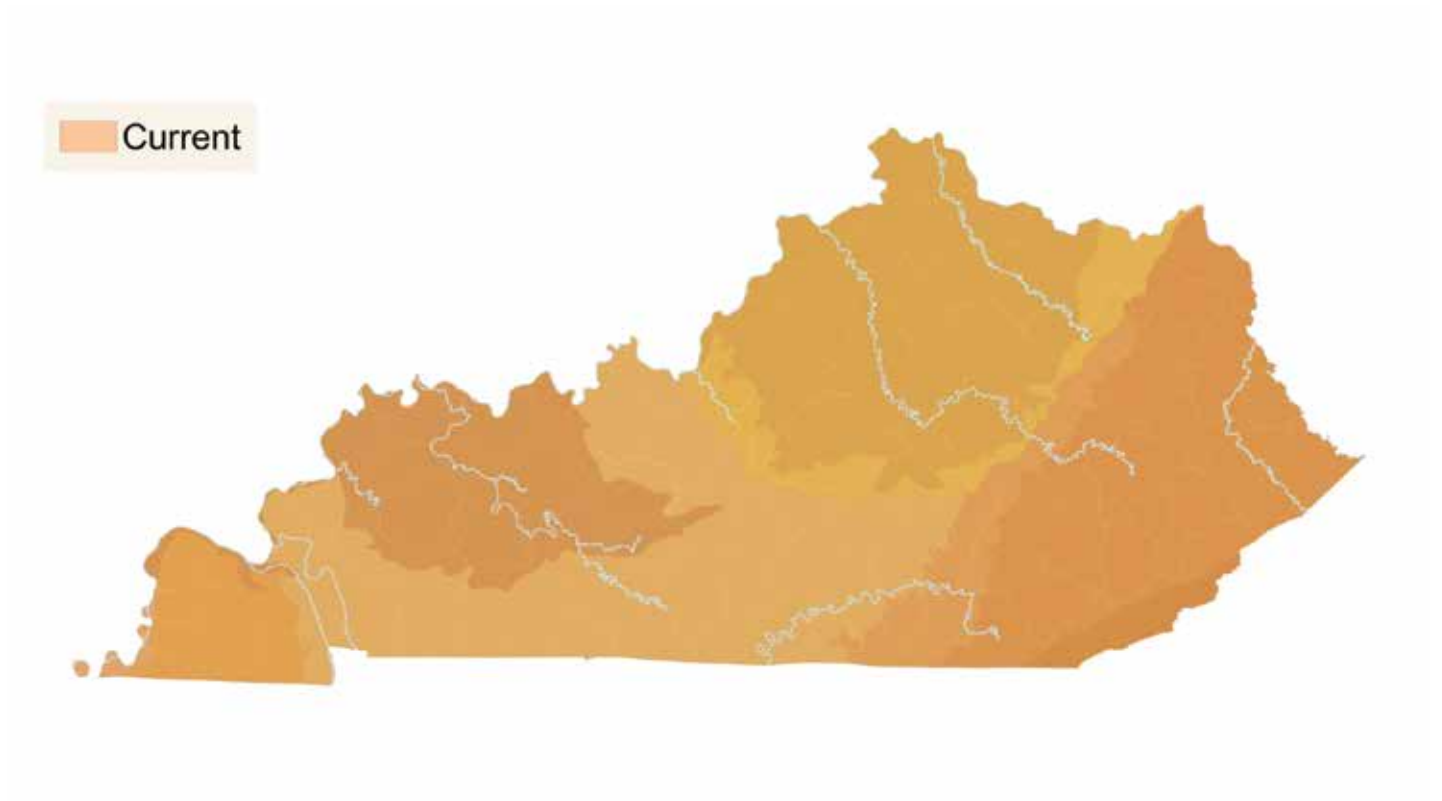


Photo: James Kiser



SEMINOLE BAT

(*Lasiurus seminolus*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

Very few Seminole Bat records have been reported in Kentucky. Most are from the far western portion of the state, although some records from as far north and east as Fort Knox have been reported recently. Additional information on the species range and abundance in Kentucky is needed, including targeted surveys in areas of likely occupied habitat.

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Knobs, Interior Plateau, Interior River Valley And Hills

Guilds: Mesic Forest, Xeric Forest

Summer roosts often associated with mature pines.

Range Map

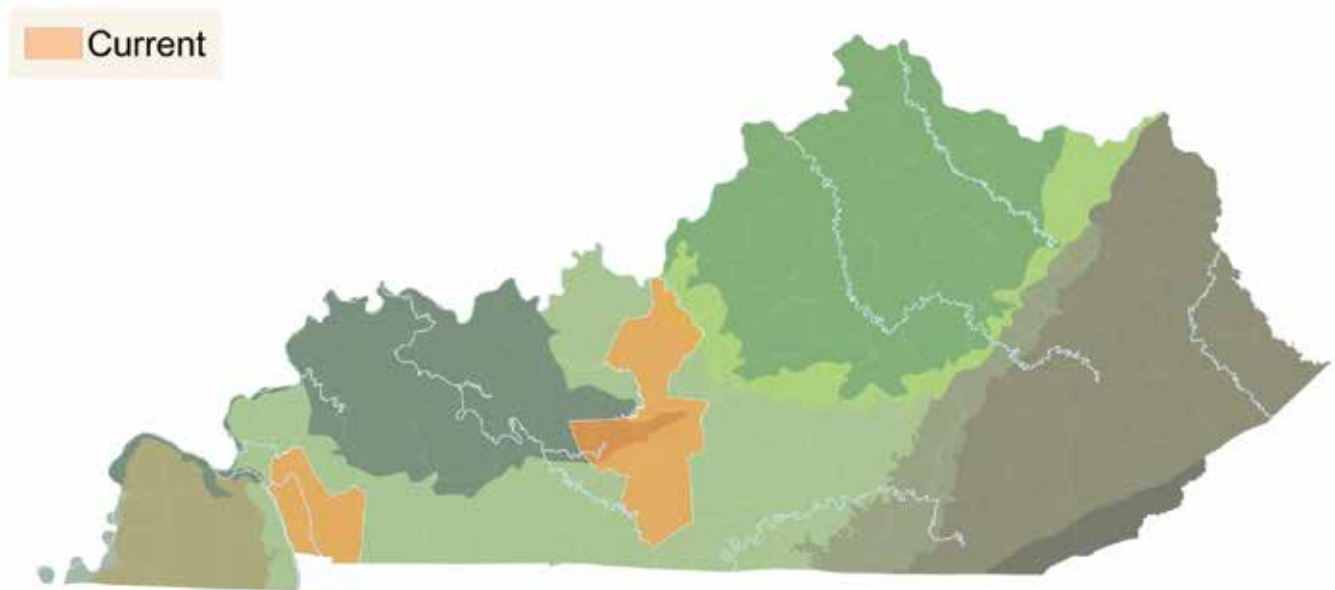


Photo: Tom Koerner, USFWS Digital Library



LONG-TAILED WEASEL

(*Mustela frenata*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Very little data exists for the species. Additional survey work is required to assess Long-tailed Weasel status in Kentucky.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

None

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills

Guilds: Forested Wetland, Mesic Forest, Open Wetland, Scrub-Shrub/Early Successional Forest

With a widespread range, it may occupy a variety of habitats within the state.

Range Map

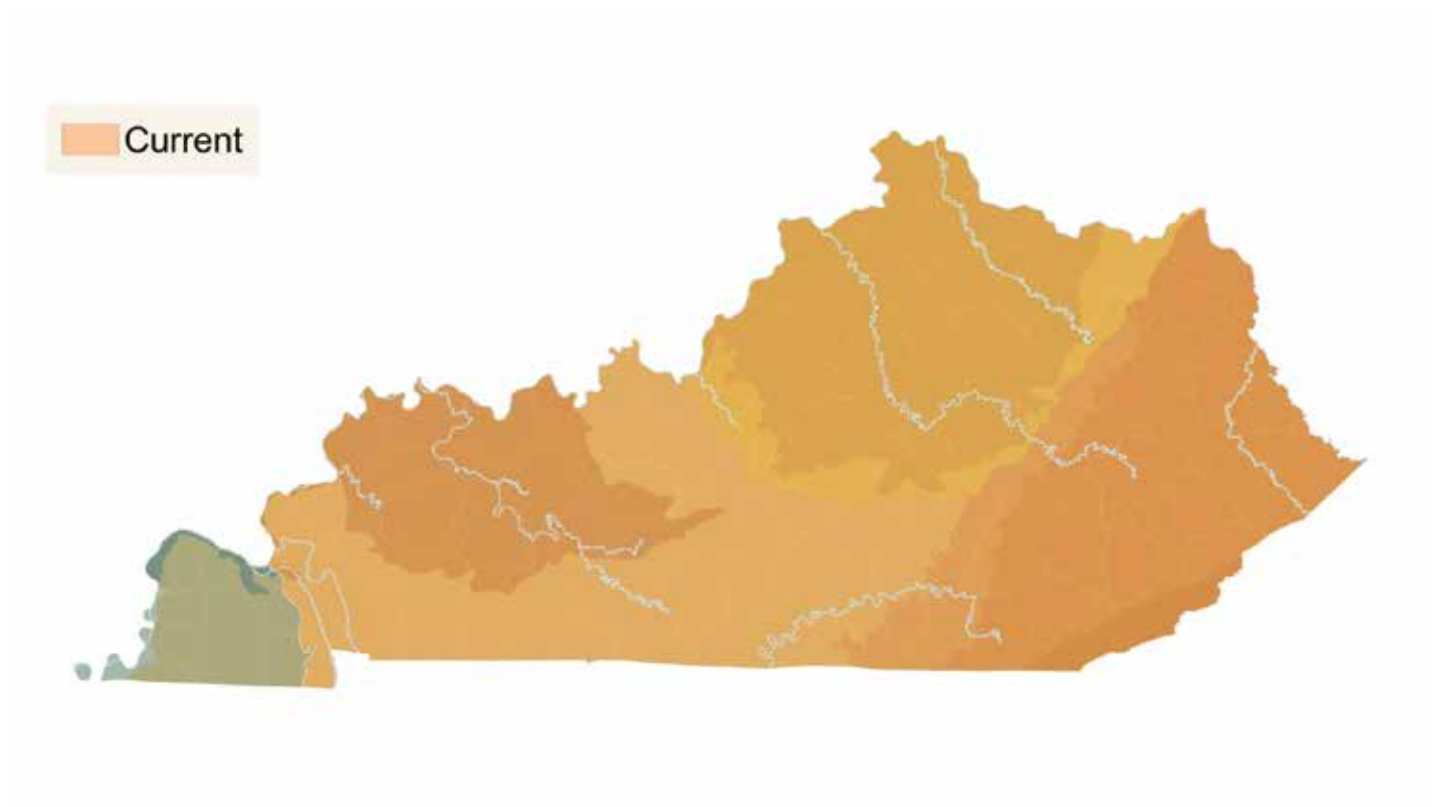


Photo: John MacGregor



LEAST WEASEL

(*Mustela nivalis*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S2S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Least Weasels are difficult to survey for and most records are anecdotal. Surveys are needed to determine species status in Kentucky.

Threats

🚫 Invasive Non-native/Alien species

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs

Guilds: Forested Wetland, Grassland/Savannah, Mesic Forest, Agriculture

Primary habitat is mixed grasslands, hedgerows, and pond edges of agricultural lands. Nests are constructed in sheltered places, including in nests and burrows of prey species.

Range Map

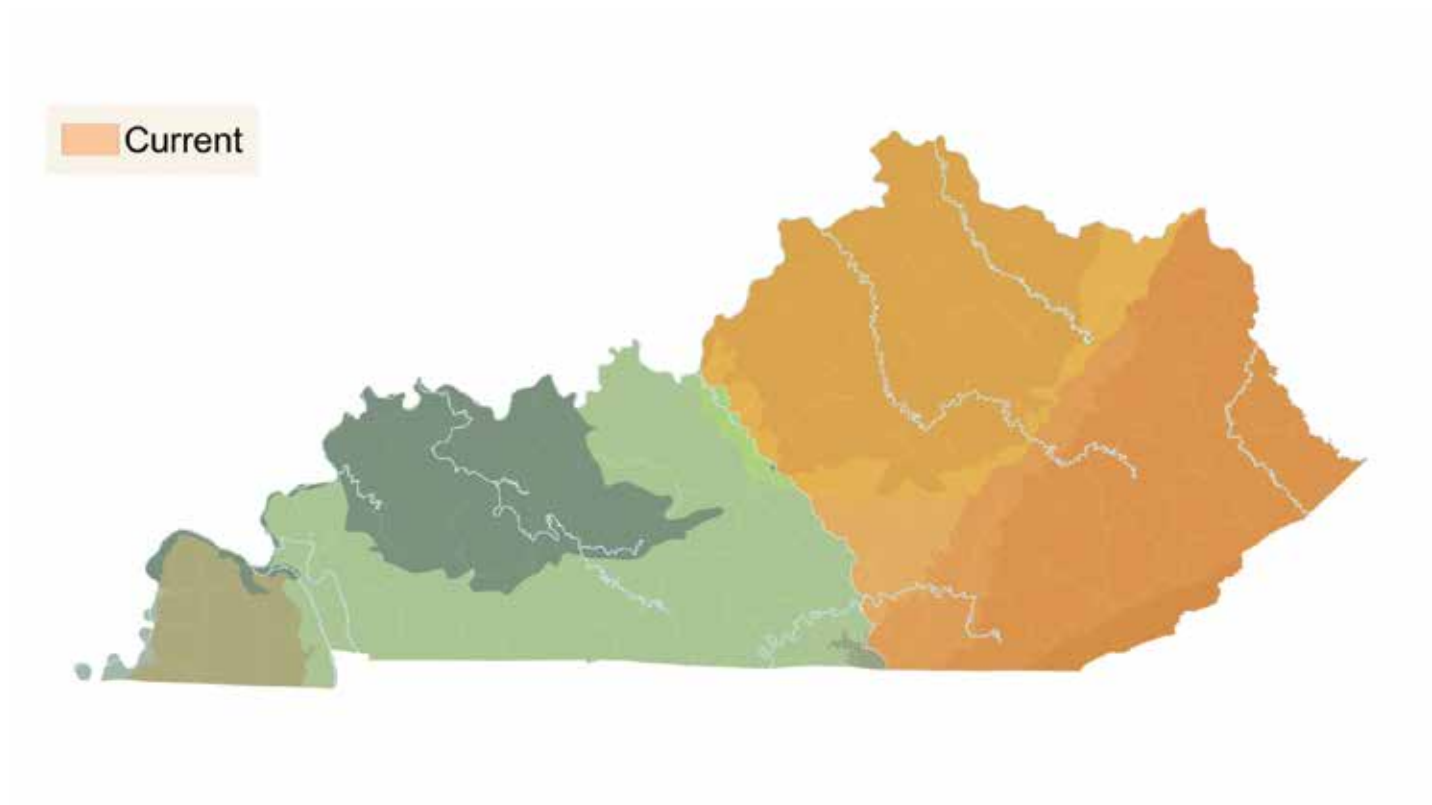


Photo: John MacGregor



KENTUCKY RED-BACKED VOLE

(*Myodes gapperi maurus*)

Conservation Profile

Priority Group: Highest

KNP Info


G Rank: G5T3T4

S Rank: S3

Federal Status: N/A


IUCN Red List: N/A

Threats

 Logging and Wood Harvesting

Conservation Actions

Habitat and Natural Process Restoration 

Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Conservation Goal

Increase habitat management on public and private lands. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau

Guilds: Forested Wetland, Mesic Forest

Uses cool, damp areas in coniferous, deciduous, and mixed forests. Moss-covered logs and rocks are ideal habitat. Can be found in boulder crevices, sphagnum marshes, and rock-strewn streams. Nests are made with grasses and dead leaves and are found between boulders or beneath stumps and logs.

Range Map

Current

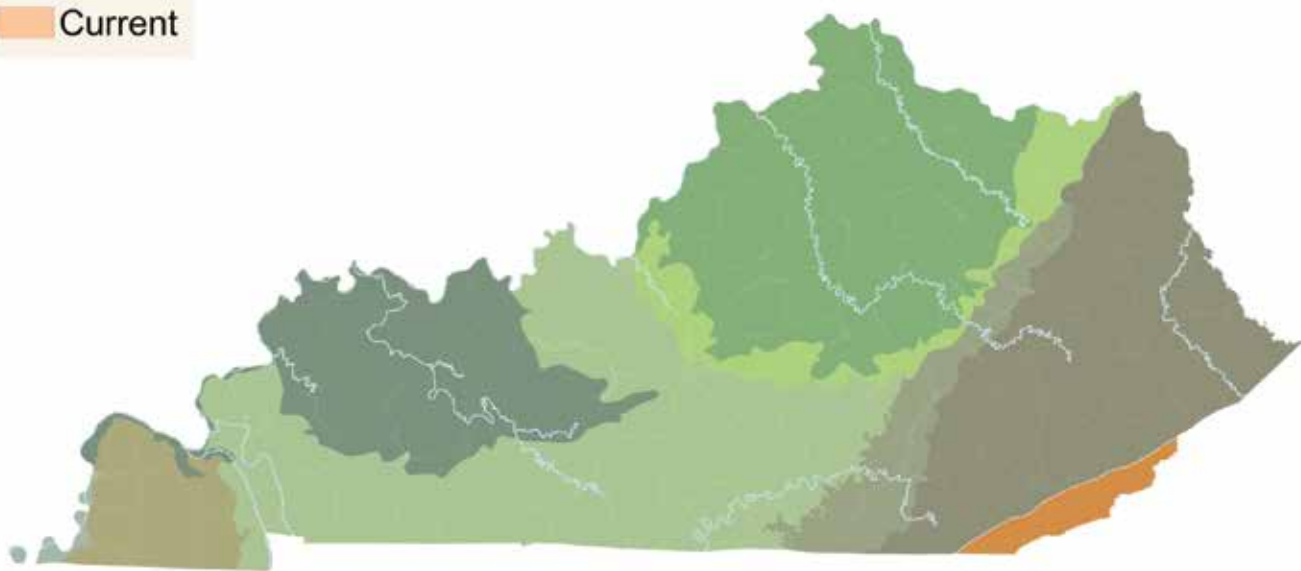


Photo: John MacGregor



SOUTHEASTERN MYOTIS

(*Myotis austroriparius*)

Conservation Profile

Priority Group: High

KNP Info


G Rank: G4

S Rank: S3

Federal Status: N/A


IUCN Red List: LC - Least concern

Threats

 Annual and Perennial Nontimber Crops

Conservation Actions

Habitat and Natural Process Restoration 

Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Conservation Goal

Protect and restore wetland habitats in the western range of the species. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Cave/Karst, Forested Wetland, Mesic Forest, Open Wetland

Clusters in caves, buildings, or other protected sites like hollow trees. Nursery sites may be in buildings where caves are lacking. Larger winter clusters form to hibernate in caves.

Range Map

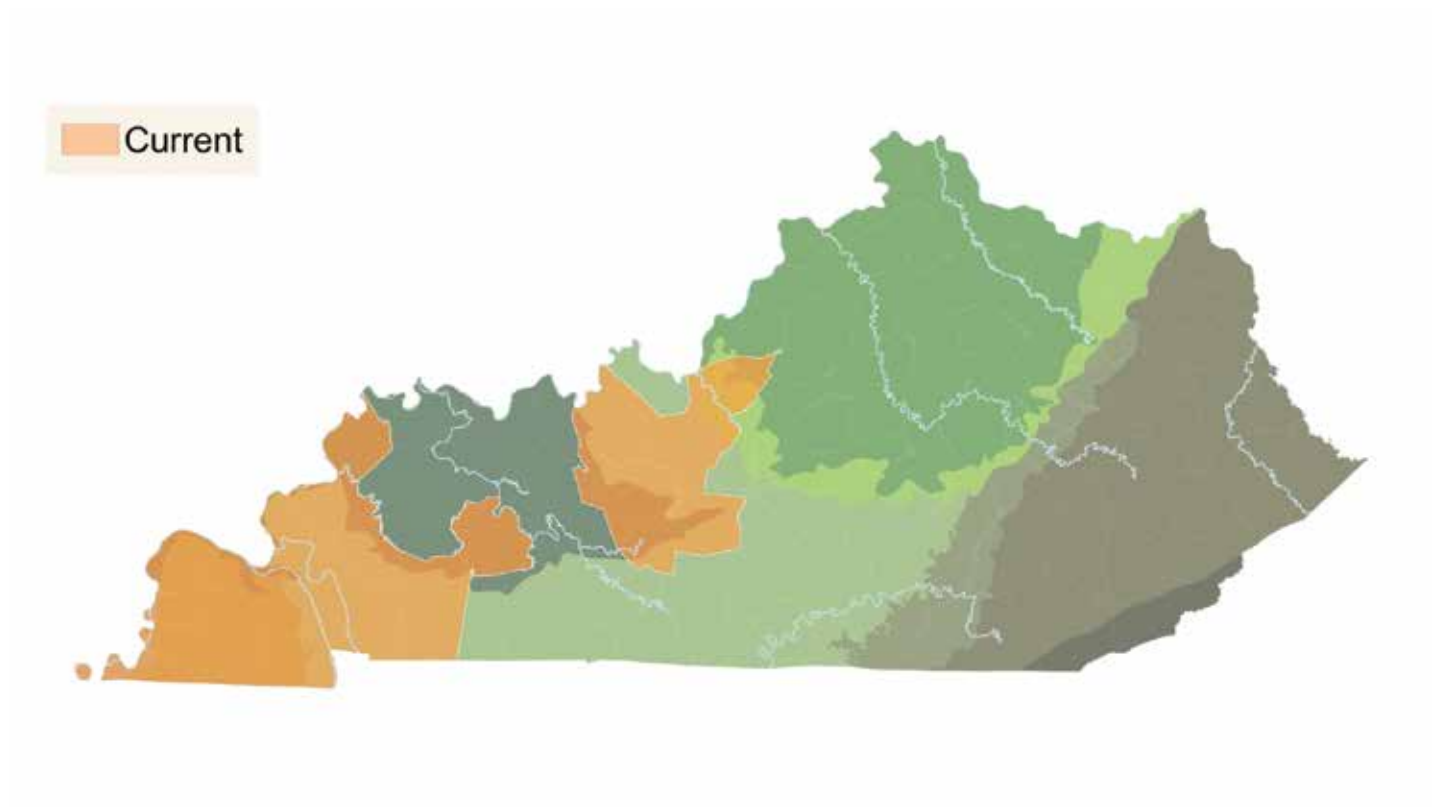


Photo: John MacGregor



GRAY MYOTIS

(*Myotis grisescens*)

Conservation Profile

Priority Group: High

KNP Info


G Rank: G3G4

S Rank: S2

Federal Status: Endangered

IUCN Red List: VU - Vulnerable

Threats

 Recreational Activities

Conservation Actions

Site/Area Protection 

Needs

Survey: Collect baseline species information

Conservation Goal

Protect summer and winter roosts via acquisition and management. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Cave/Karst, River/Streams

Hibernacula and maternity sites are both in caves, and bats are strongly tied to specific caves in summer and winter. Maternity colonies typically form in warm caves near large bodies of water. Will also use bridges as roosts.

Range Map

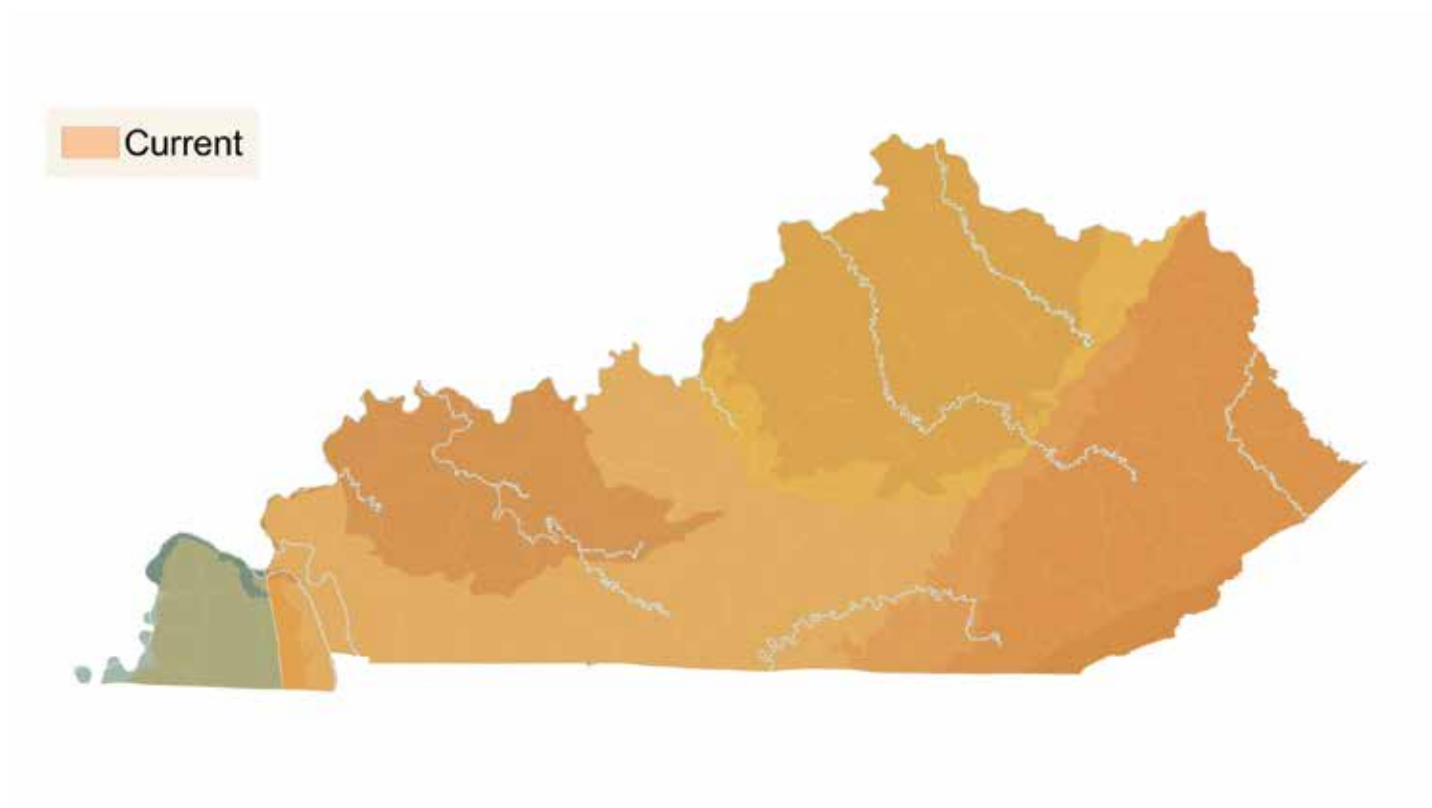


Photo: John MacGregor



EASTERN SMALL-FOOTED MYOTIS

(*Myotis leibii*)

Conservation Profile

Priority Group: High

KNP Info


G Rank: G4

S Rank: S2


Federal Status: N/A

IUCN Red List: EN - Endangered

Threats

 Recreational Activities

Conservation Actions

Awareness and Communications 

Site/Area Protection 

Needs

Survey: Collect baseline species information

Conservation Goal

Protect summer and winter roosts via acquisition and management. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills

Guilds: Cave/Karst, Cliff/Rockshelter

Usually occurs in mountainous regions. Most commonly found in caves and mines, some bats may roost on the ground under rocks and boulders. Uses caves or mines for hibernation in winter.

Range Map

Current

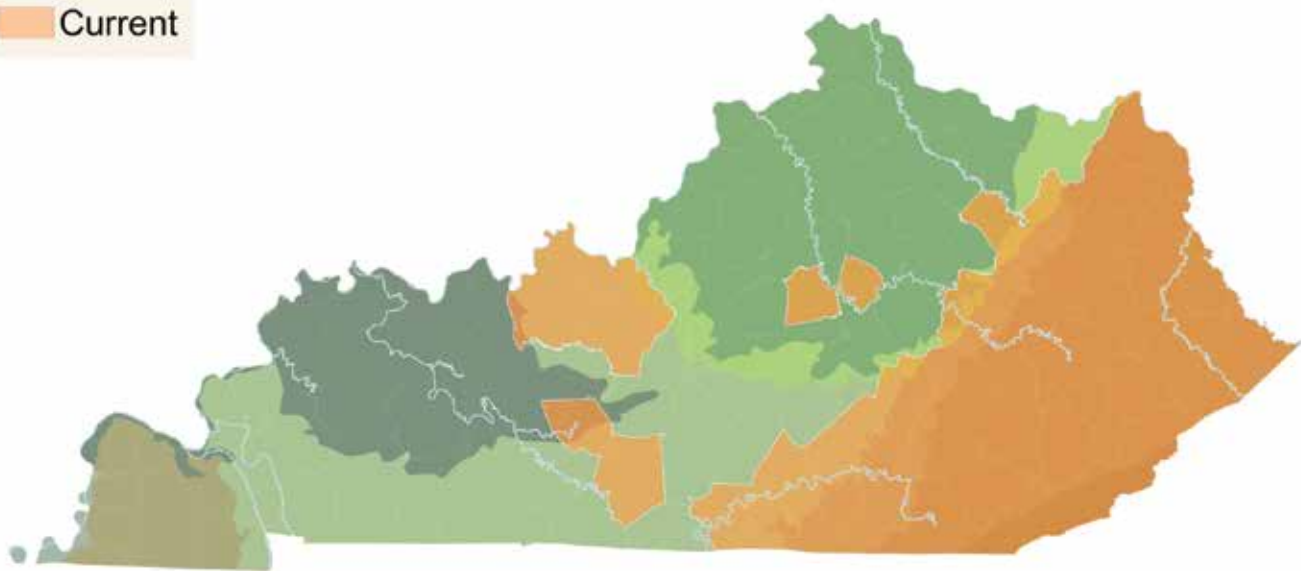


Photo: John MacGregor



LITTLE BROWN BAT

(*Myotis lucifugus*)

Conservation Profile

Priority Group: Moderate

KNP Info




G Rank: G3G4

S Rank: S2




Federal Status: Not Listed

IUCN Red List: EN - Endangered

Threats

-  Logging and Wood Harvesting
-  Pathogens and Microbes
-  Recreational Activities

Conservation Actions

-  Education and Awareness
-  Land/Water Management
-  Site/Area Protection

Needs

Survey: Collect baseline species information

Conservation Goal

Protect summer and winter roosts via acquisition and management. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Cave/Karst, Cliff/Rockshelter, Forested Wetland, Mesic Forest, Xeric Forest, Agriculture, Urban, Suburban

Occurs in most habitats; commonly found around farms, towns, and villages. Summer maternity colonies may form in buildings and other structures, and occasionally hollow trees. Day roosts consist of nursery colonies formed by females and nursing young and individual sites of males. Night roosts are

occupied by a greater number of bats in confined spaces. Winter hibernacula are typically caves or mines.

Range Map

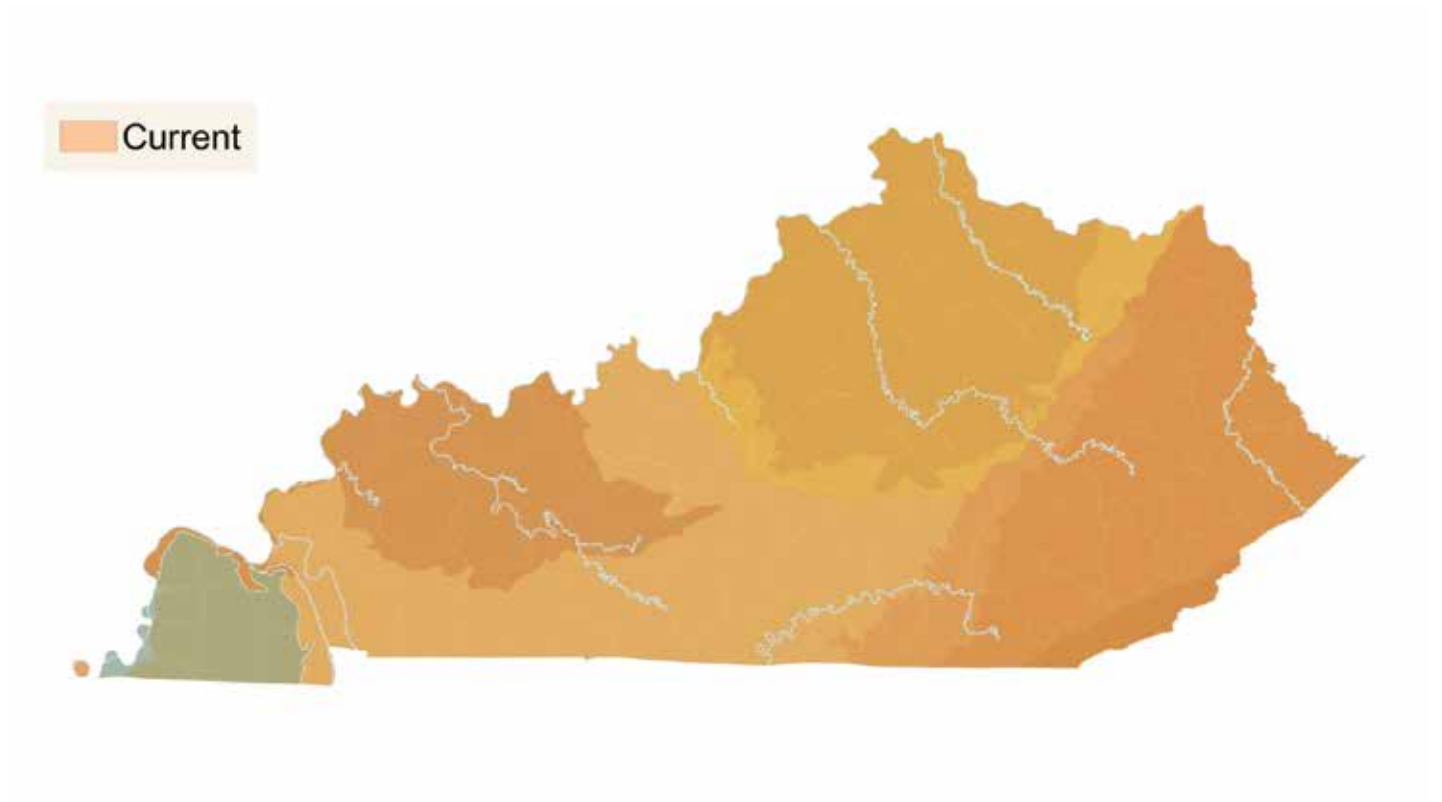


Photo: John MacGregor



NORTHERN LONG-EARED BAT

(*Myotis septentrionalis*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G2G3

S Rank: S1



Federal Status: Endangered

IUCN Red List: NT - Near threatened

Threats

-  Logging and Wood Harvesting
-  Pathogens and Microbes
-  Recreational Activities

Conservation Actions

- Habitat and Natural Process Restoration 
- Training 

Needs

Survey: Collect baseline species information

Conservation Goal

Increase habitat management on public and private lands. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

Usually solitary or gathered in small groups under loose bark or in tree hollows. Maternity colonies form in small numbers, many found in artificial roosts in the shade. Hibernacula is often in caves or mines and shared with other bat species.

Range Map

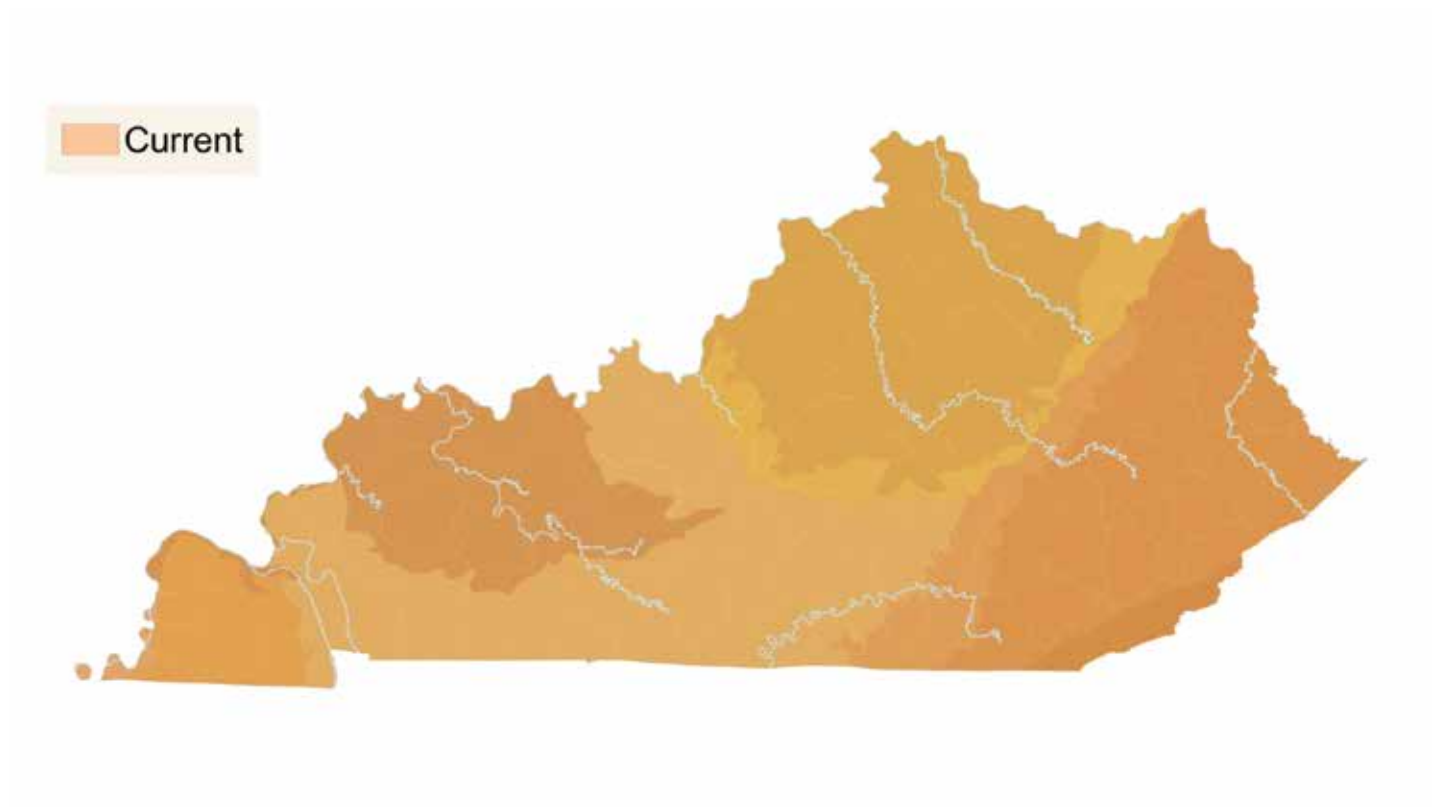


Photo: John MacGregor



INDIANA BAT

(*Myotis sodalis*)

Conservation Profile

Priority Group: High

KNP Info




G Rank: G2

S Rank: S1S2




Federal Status: Endangered

IUCN Red List: NT - Near threatened

Threats

-  Logging and Wood Harvesting
-  Pathogens and Microbes
-  Recreational Activities

Conservation Actions

-  Education and Awareness
-  Land/Water Management
-  Site/Area Protection

Needs

Survey: Collect baseline species information

Conservation Goal

Protect summer and winter roosts via acquisition and management. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Cave/Karst, Cliff/Rockshelter, Forested Wetland, Mesic Forest, Xeric Forest

Gathers in small colonies in the summer, usually under loose tree bark in semi-wooded areas, in upland and bottomland forests, or even completely in the open. Winter hibernacula is restricted to a few caves with very specific conditions.

Range Map

Current

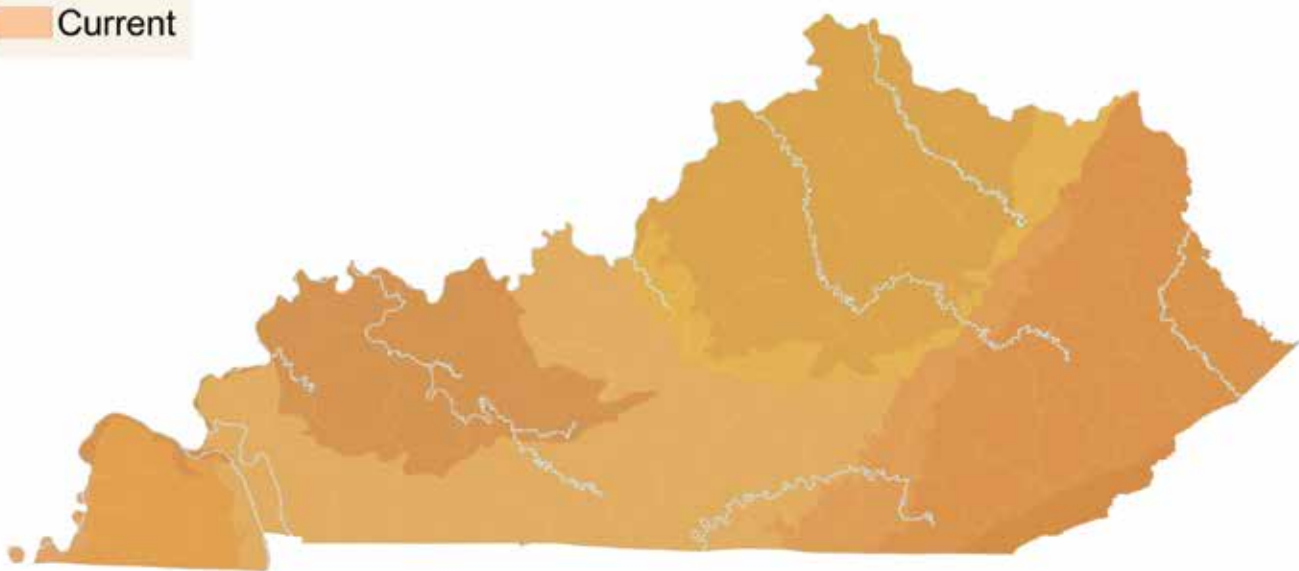


Photo: John MacGregor



ALLEGHENY WOODRAT

(*Neotoma magister*)

Conservation Profile

Priority Group: High

KNP Info



G Rank: G3G4

S Rank: S3S4



Federal Status: N/A

IUCN Red List: NT - Near threatened

Threats

-  Invasive and Other Problematic Species and Genes
-  Logging and Wood Harvesting

Conservation Actions

- Habitat and Natural Process Restoration 
- Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Conservation Goal

Increase habitat management on public and private lands. Develop and implement disease monitoring protocols for raccoon roundworm. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills

Guilds: Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest

Uses rocky cliffs, caves, and fissures or tumbled boulders on the side of mountains, some utilize buildings. Nests in fissures, behind rocks, or on a rock shelf or on the floor level of a cave. Nests may be around trees and logs, or high in trees in the event of high water.

Range Map

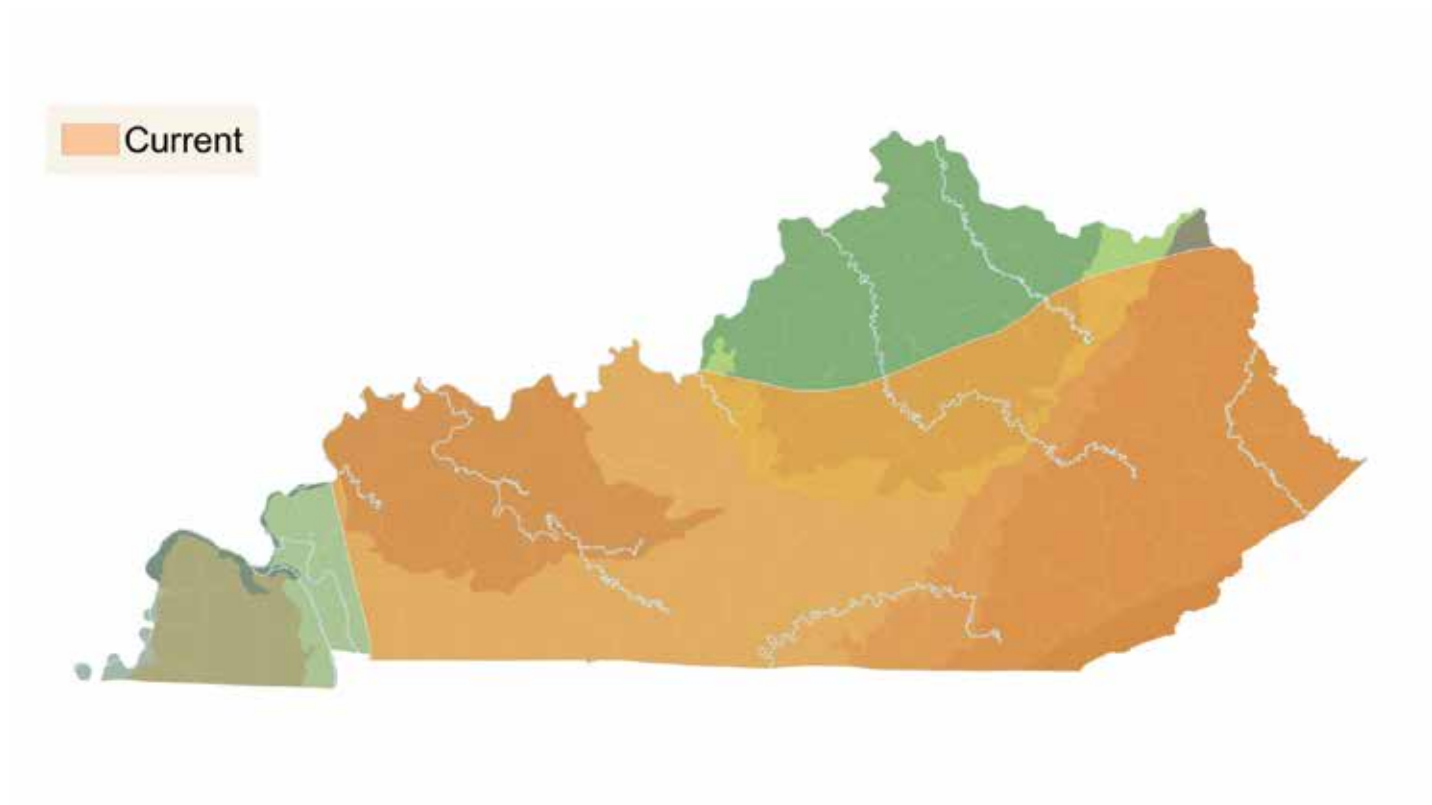


Photo: Tom Koerner, USFWS Digital Library



MUSKRAT

(*Ondatra zibethicus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5




S Rank: S5

Federal Status: N/A

IUCN Red List: LC - Least concern

Recent surveys throughout the Southeast indicate that Muskrats could be experiencing rangewide population declines. Recent publications indicate a decline in the Southeast and additional survey work is needed to determine if Kentucky populations are stable.

Threats

-  Annual and Perennial Nontimber Crops
-  Mining and Quarrying
-  Storms and Flooding

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond, River/Streams

Uses marshes with abundant emergent vegetation, streams, and wooded swamps. Lodges and feeding shelters are built in water with cattails or other dominant water plants. Without plants, dens are dug into stream banks below water level.

Range Map

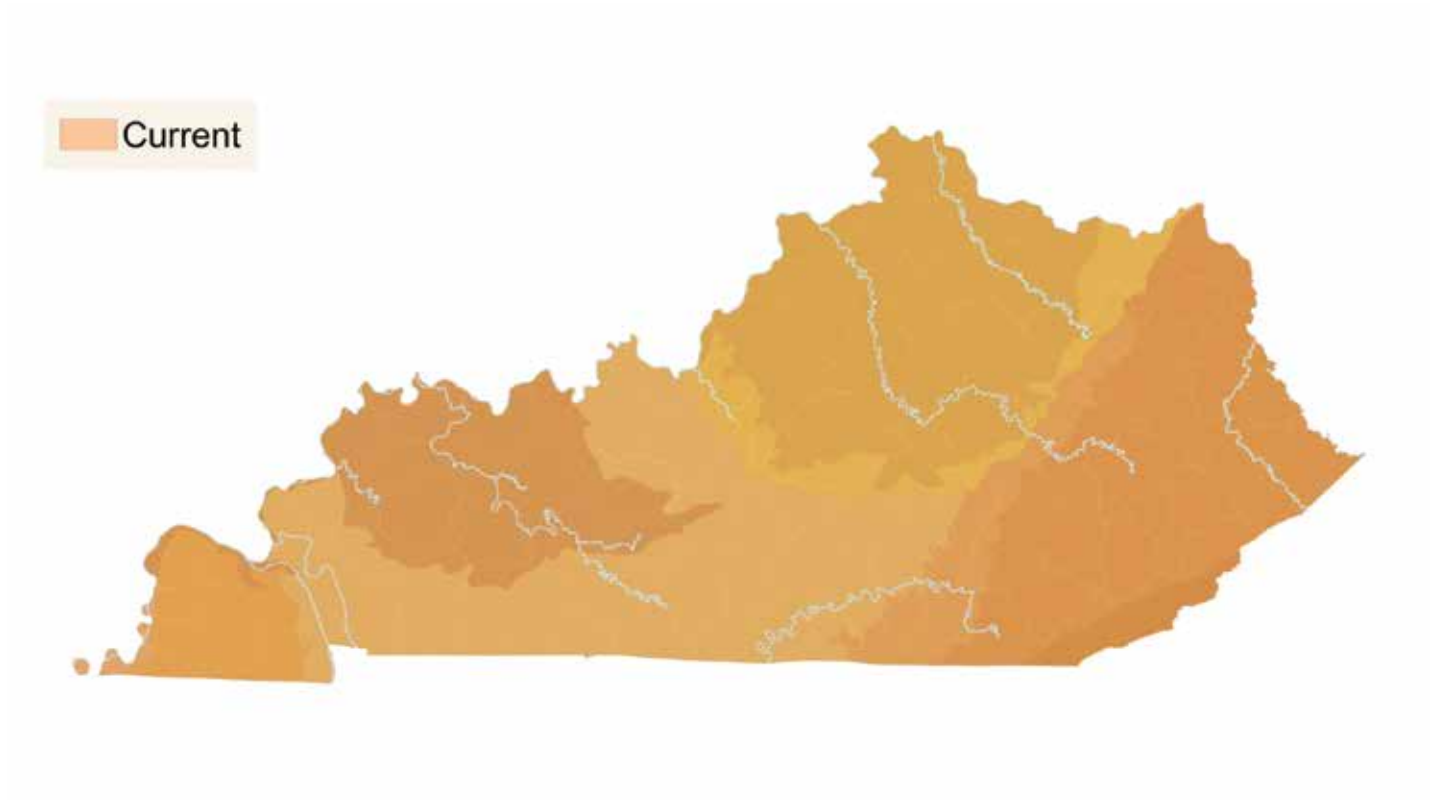


Photo: John MacGregor



MARSH RICE RAT

(*Oryzomys palustris*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Very little data exists for the species. Additional survey work is required to assess Marsh Rice rat status in Kentucky.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Open Wetland, Floodplain/Sandbar

This species can be found where there is sufficient grass and sedge cover, and amphibious behavior allows a preference for wet meadows and marshes.

Range Map

Current

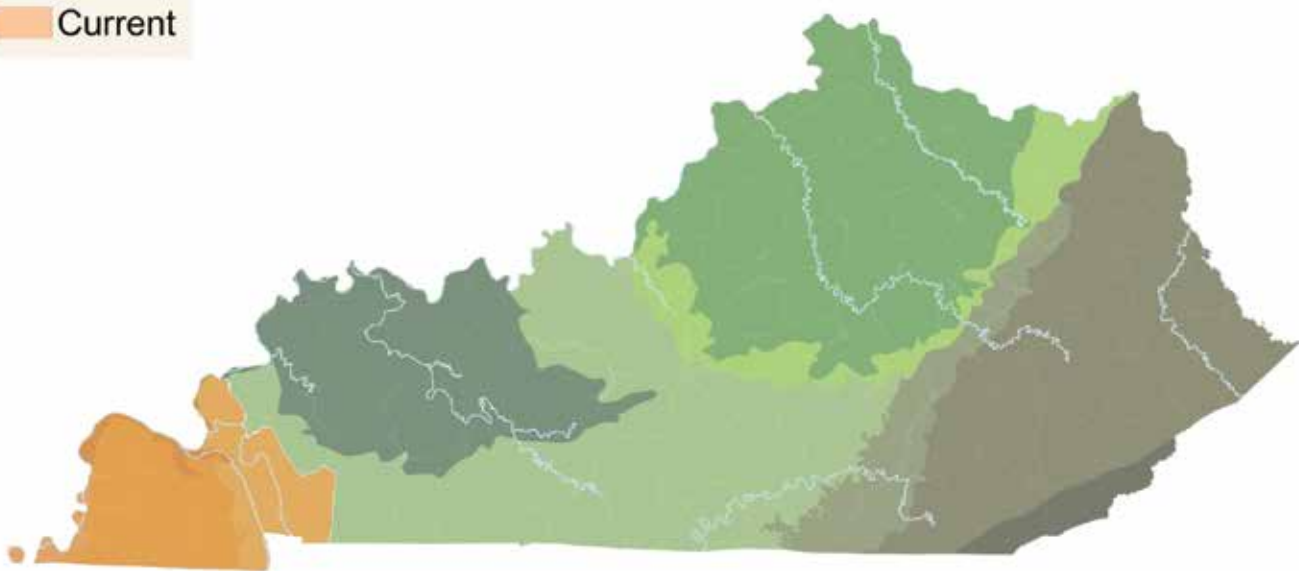


Photo: John MacGregor



HAIRY-TAILED MOLE

(*Parascalops breweri*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Very little data exists for the species. Additional survey work is required to assess Hairy-tailed Mole status in Kentucky.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass

Guilds: Mesic Forest, Agriculture, Scrub-Shrub/Early Successional Forest

Constrained to the Appalachians, it can be found from shrubby pasture land to wooded forests. It prefers well-drained soil and avoids wet or hard clay soils.

Range Map

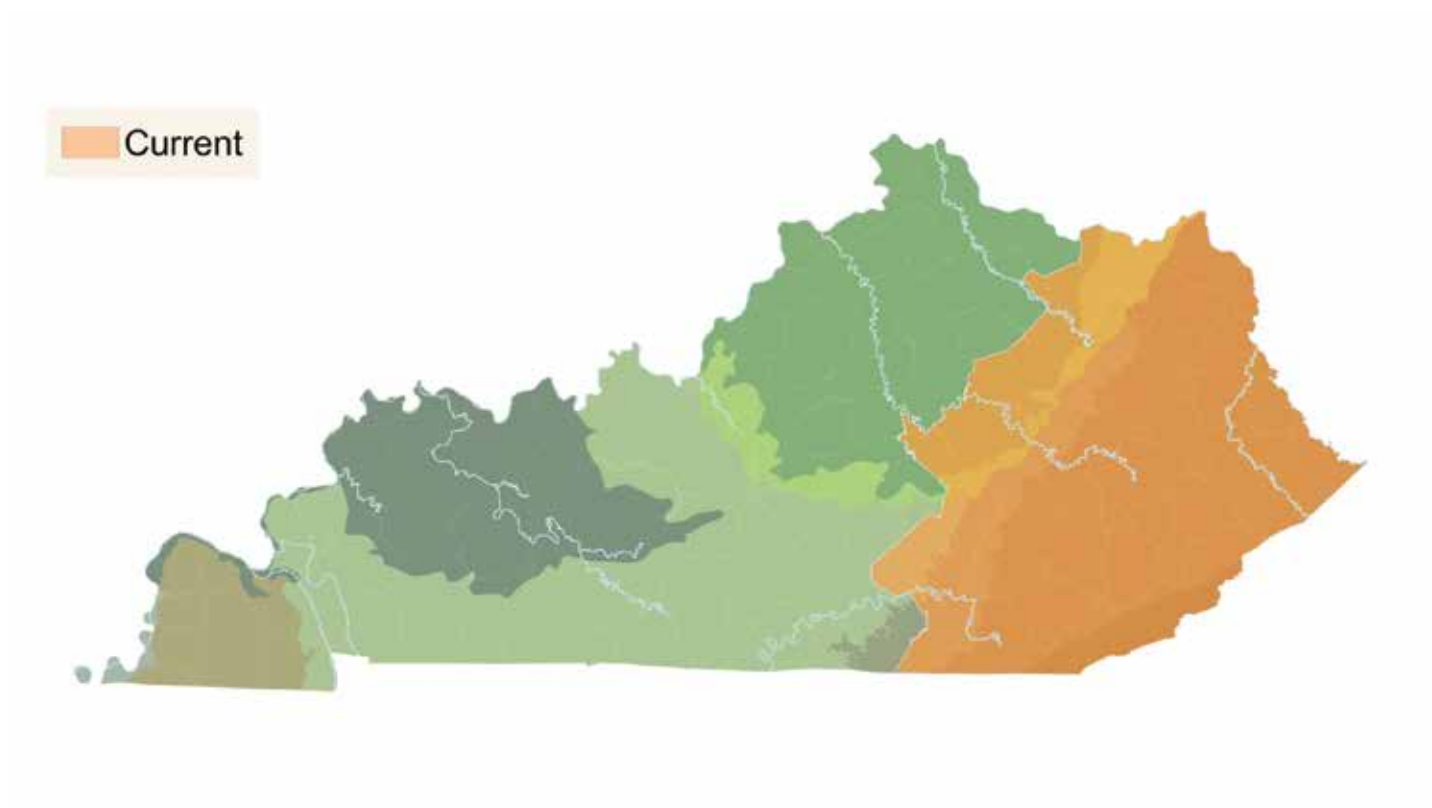




Photo: John MacGregor



TRICOLORED BAT

(*Perimyotis subflavus*)

Threats

-  Pathogens and Microbes
-  Recreational Activities

Conservation Actions

Site/Area Protection  

Needs

Survey: Collect baseline species information

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G3G4

S Rank: S2

Federal Status: Not Listed

IUCN Red List: VU - Vulnerable

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River

Valley And Hills, Mississippi Alluvial Plain, Mississippi
Valley Loess Plain

Guilds: Cave/Karst, Cliff/Rockshelter, Forested
Wetland, Mesic Forest, Xeric Forest

Maternity colonies are small, forming in hollow trees and some in buildings and caves during the summer. Males are likely solitary, roosting in crevices, caves, mines, and other sheltered places. Hibernation typically occurs in caves or mines near the summer roosts. Prefers to roost in dead leaf clusters of live trees rather than hollows, utilizing hollows only after their spring emergence until trees leaf out.

Range Map

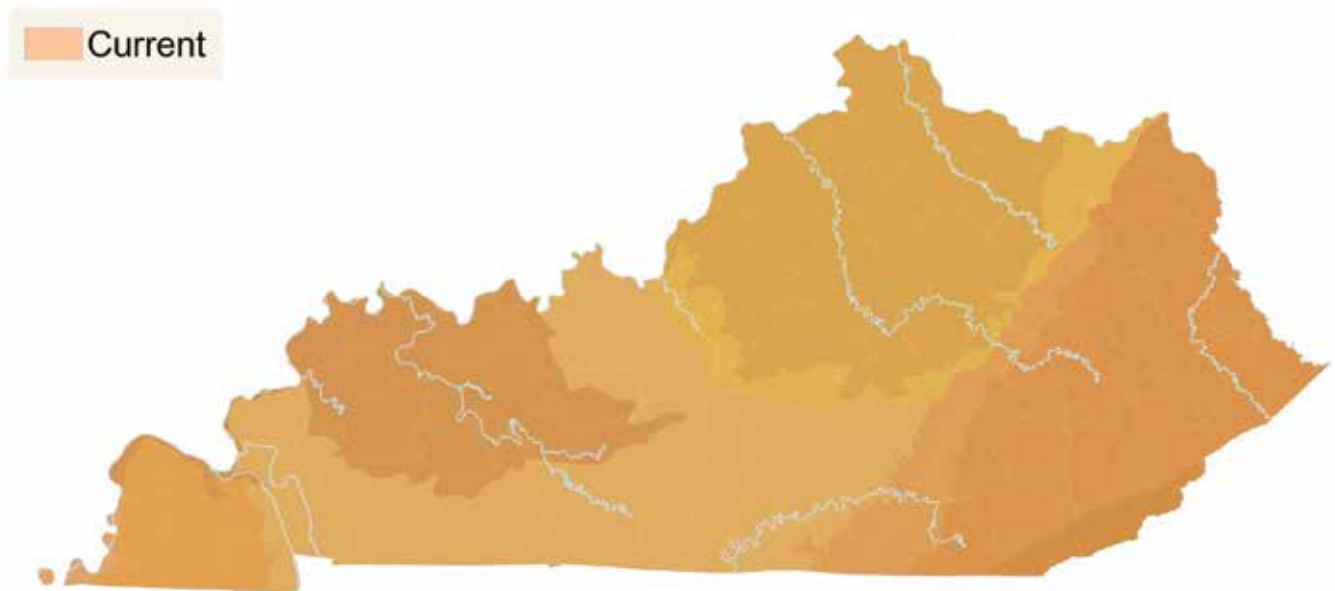


Photo: John MacGregor



COTTON MOUSE

(*Peromyscus gossypinus*)

Conservation Profile

Priority Group: Moderate

KNP Info


G Rank: G5

S Rank: S2

Federal Status: N/A


IUCN Red List: LC - Least concern

Threats

 Annual and Perennial Nontimber Crops

Conservation Actions

Habitat and Natural Process Restoration 

Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Conservation Goal

Protect and restore wetland habitats throughout range of the species. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest, Open Wetland, Floodplain/Sandbar, Scrub-Shrub/Early Successional Forest

Prime habitat is bottomland hardwood forest and swamps, but occupies a variety of habitats. Occurs in the dense underbrush in the lowest and wettest parts of overflowed lands. Nests are often located off the ground, as well as in or under logs, stumps, or brush piles.

Range Map

Current

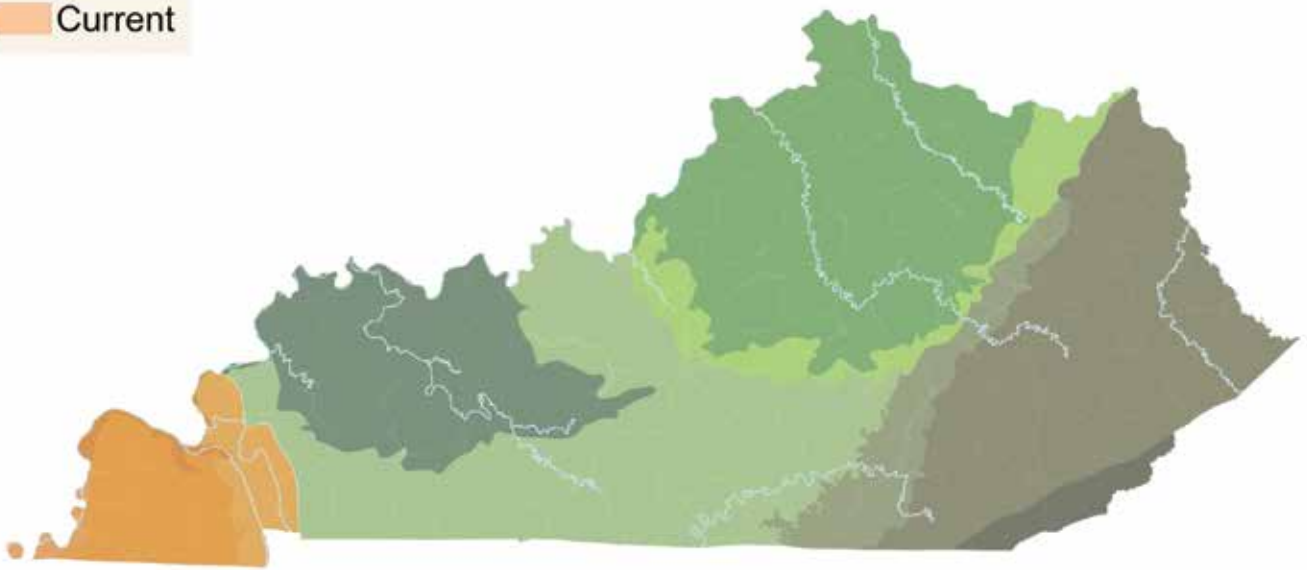


Photo: John MacGregor



CLOUDLAND DEER MOUSE

(*Peromyscus maniculatus nubiterrae*)

Conservation Profile

Priority Group: High

KNP Info


G Rank: G5TNR

S Rank: S3S4

Federal Status: N/A


IUCN Red List: N/A

Threats

 Logging and Wood Harvesting

Conservation Actions

Habitat and Natural Process Restoration 

Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau

Guilds: Mesic Forest

May be found in mixed woods.

Range Map

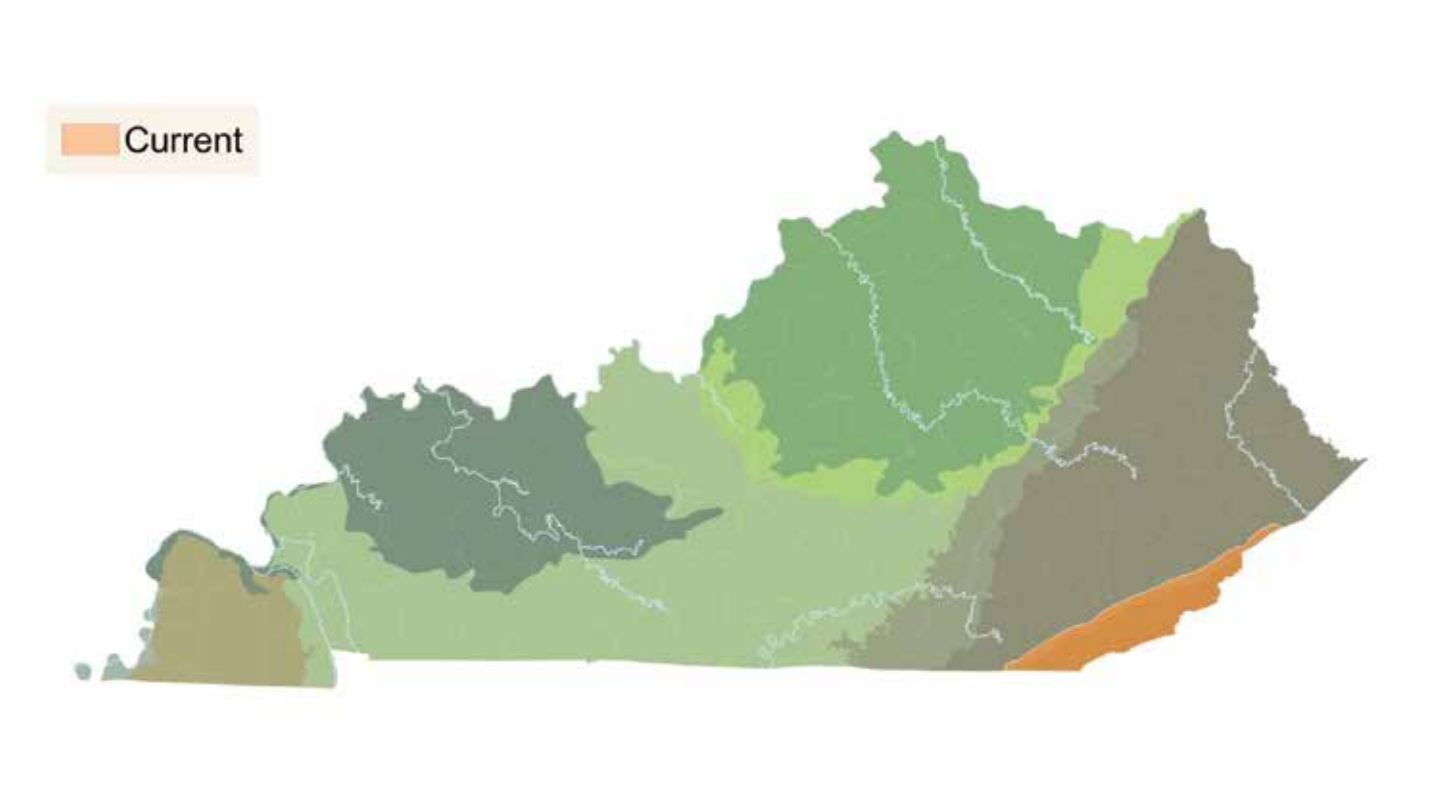


Photo: John MacGregor



CINEREUS SHREW

(*Sorex cinereus*)

Conservation Profile

Priority Group: Moderate

KNP Info






G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Threats

-  Annual and Perennial Nontimber Crops
-  Logging and Wood Harvesting
-  Mining and Quarrying
-  Renewable Energy
-  Roads and Railroads

Conservation Actions

- External Capacity Building  
- Habitat and Natural Process Restoration    
- Resource and Habitat Protection    
- Species Management  

Needs

Survey: Collect baseline species information

Conservation Goal

Protect and restore wetland habitats in the western range of the species. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

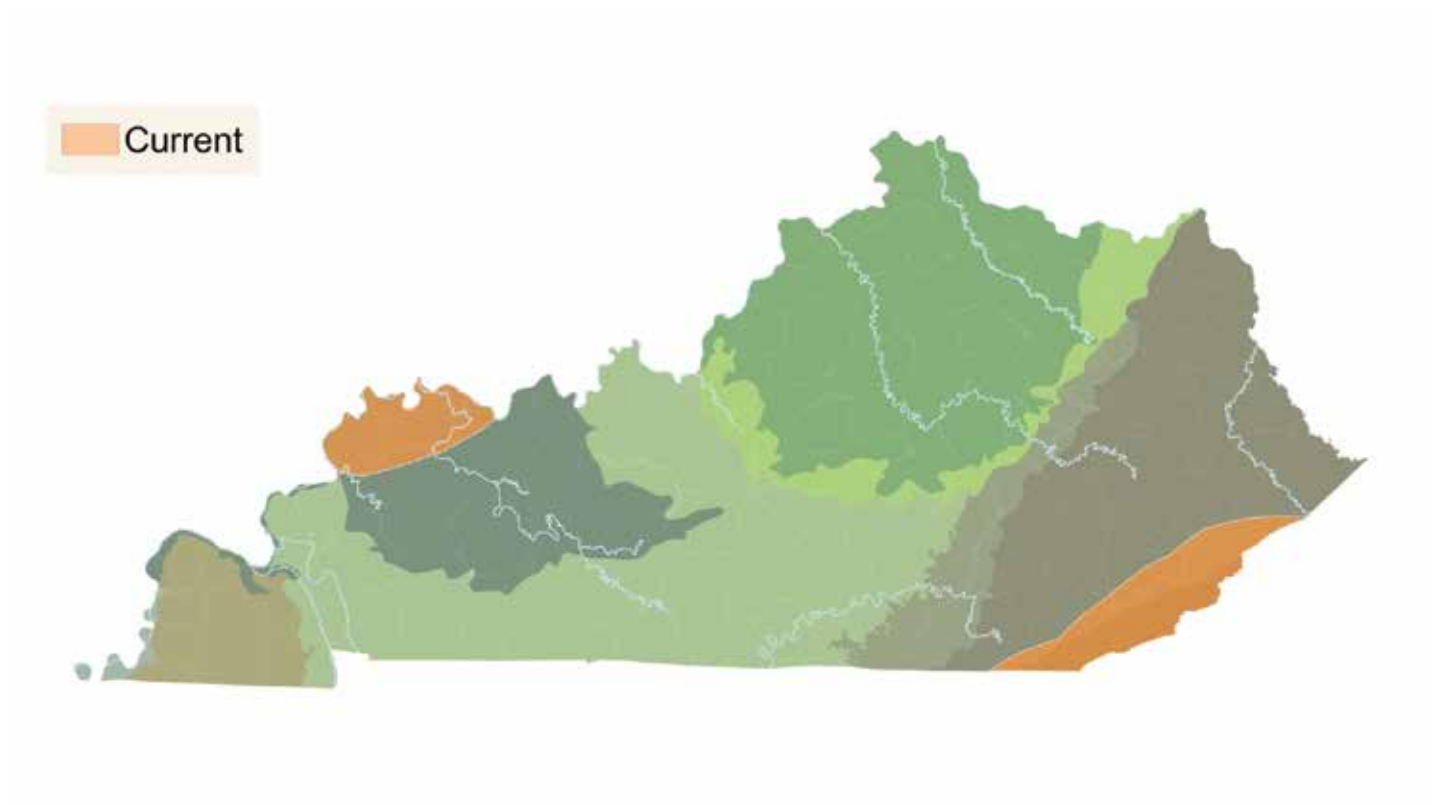
Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Interior Plateau, Interior River Valley And Hills

Guilds: Forested Wetland, Grassland/Savannah, Mesic Forest

Uses a variety of habitats including high mountain slopes, moist grass fields, marshes, moss-carpeted spruce forests, hardwood forests, swamps, and bogs. Often particularly abundant in habitats with moss carpets.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4T3T4

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect high elevation habitat throughout the range of the species. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau



Guilds: Cliff/Rockshelter, Mesic Forest

Restricted to upland areas, rocks and boulders, talus slopes, and along mountain streams.







LONG-TAILED SHREW

(Sorex dispar blitchi)

Threats

-  Climate Change and Severe Weather
-  Logging and Wood Harvesting

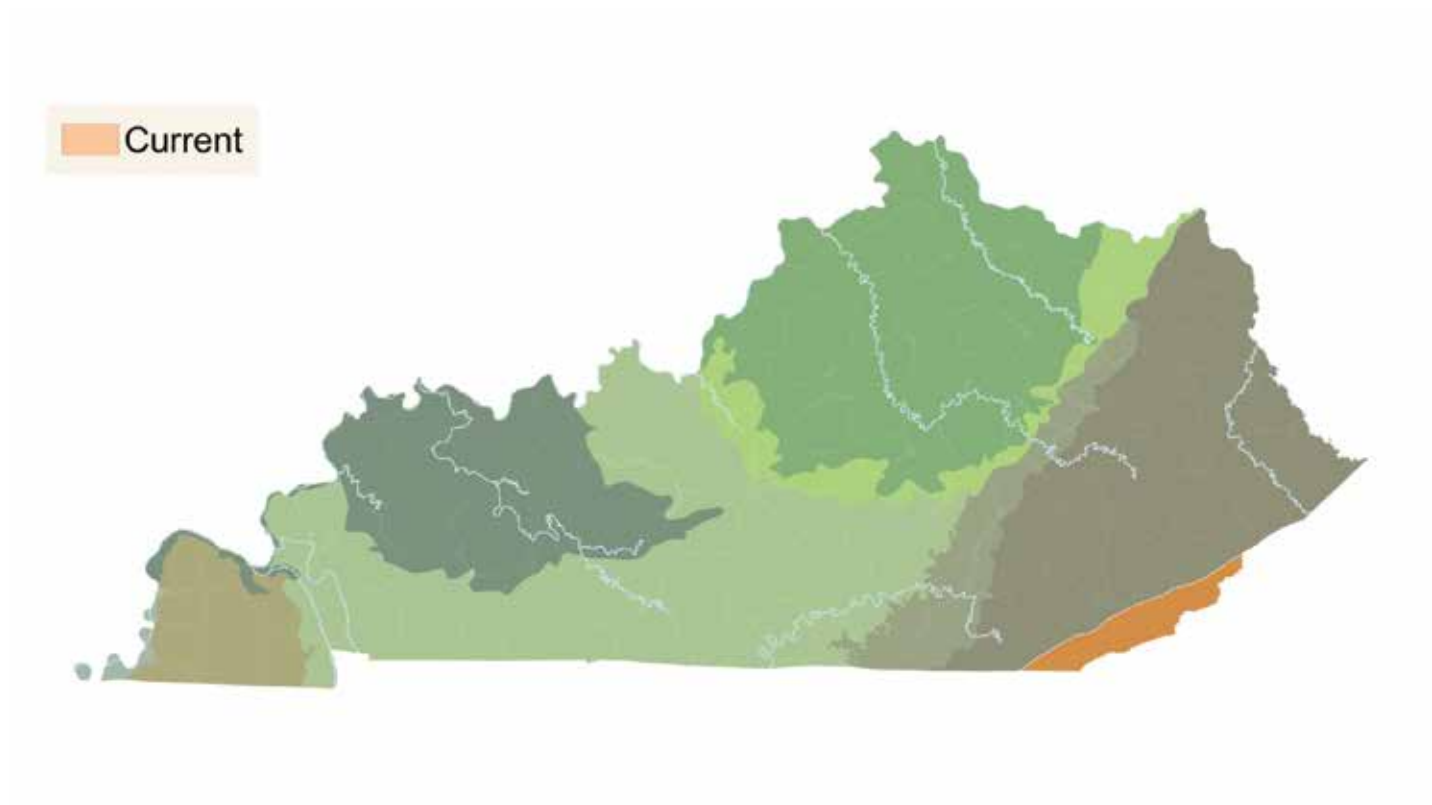
Conservation Actions

- Habitat and Natural Process Restoration  
- Resource and Habitat Protection  
- Site/Area Protection  

Needs

Survey: Collect baseline species information

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S5

Federal Status: N/A

IUCN Red List: LC - Least concern

Very little data exists for the species. Additional survey work is required to assess Smoky Shrew status in Kentucky.

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau

Guilds: Forested Wetland, Mesic Forest, Floodplain/Sandbar

Although it has been collected in a variety of habitats, this species' habitat of choice is shady, damp woods with an abundance of woody debris for cover. It seldom occupies dry woods.

SMOKY SHREW

(Sorex fumeus)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Range Map

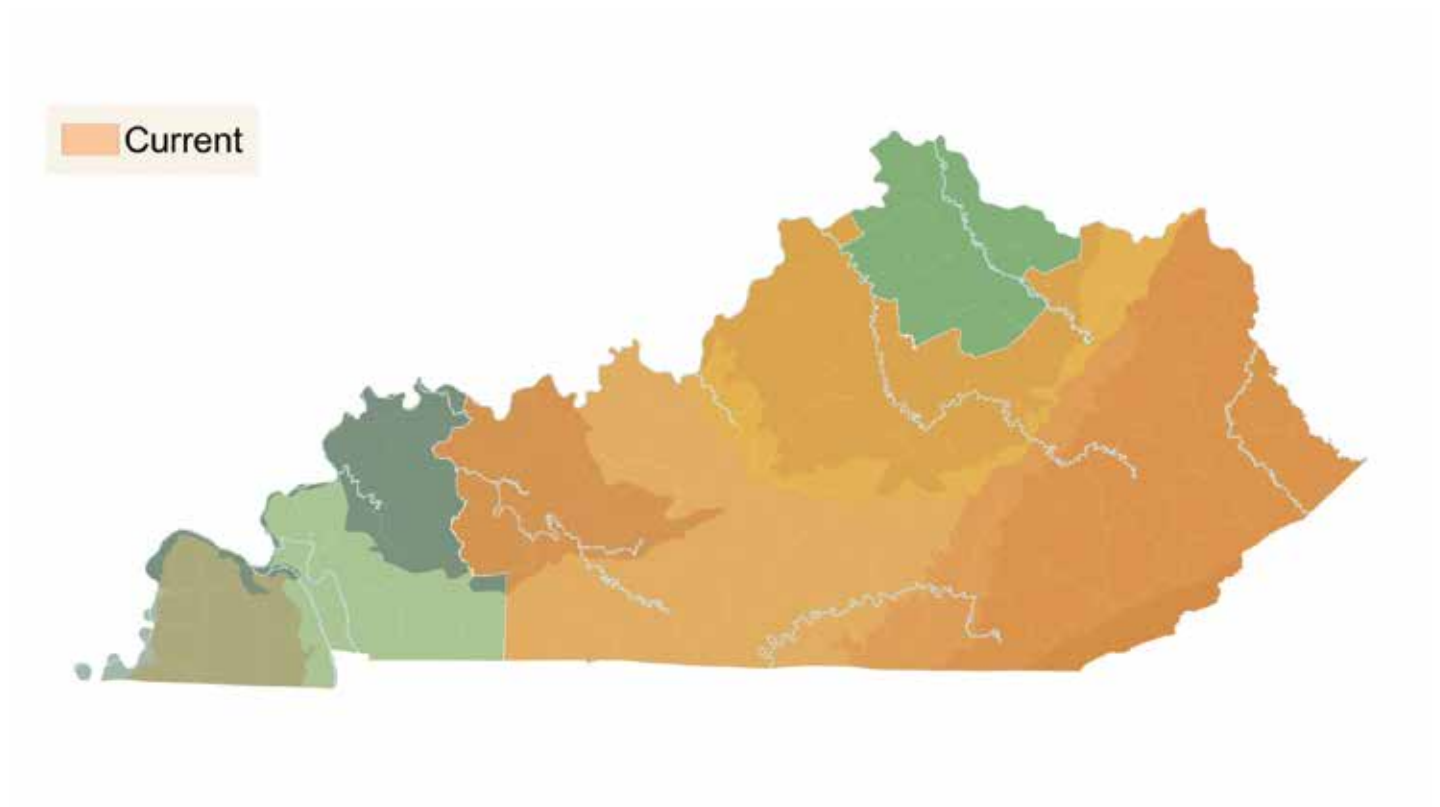


Photo: John MacGregor



PYGMY SHREW

(Sorex hoyi)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4

Federal Status: N/A

IUCN Red List: N/A

Very little data exists for the species. Additional survey work is required to assess Pygmy Shrew status in Kentucky.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

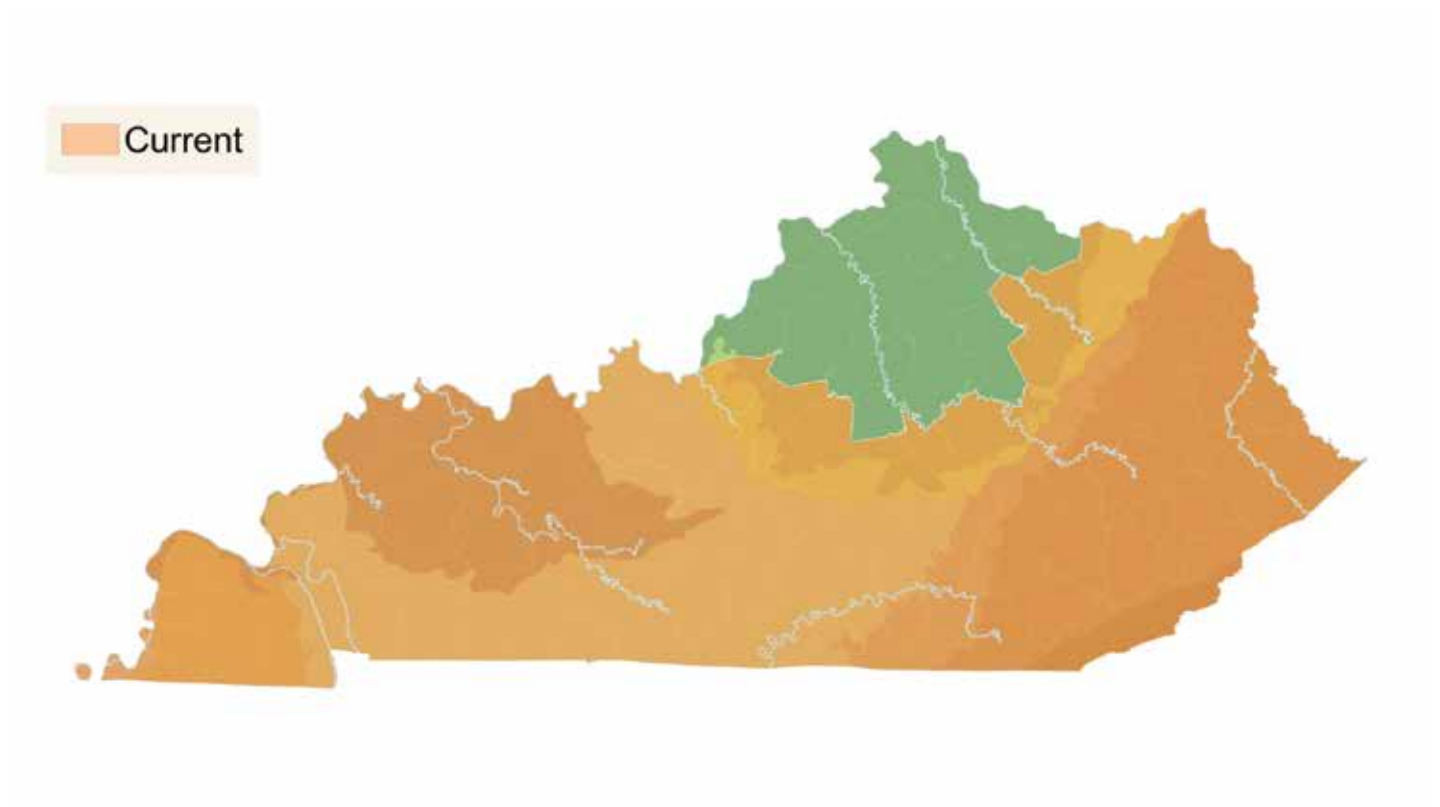
Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Grassland/Savannah, Mesic Forest, Open Wetland

Found in numerous habitat types in the southern Appalachians, it may have a preference for denser canopies and substrates composed of woody debris.

Range Map





NO IMAGE AVAILABLE

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Very little data exists for the species. Additional survey work is required to assess Southeastern Shrew status in Kentucky.

SOUTHEASTERN SHREW

(Sorex longirostris)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest, Floodplain/Sandbar

Species has a preference for wet habitats like swamps, marshes, and proximity to streams and rivers.

Range Map

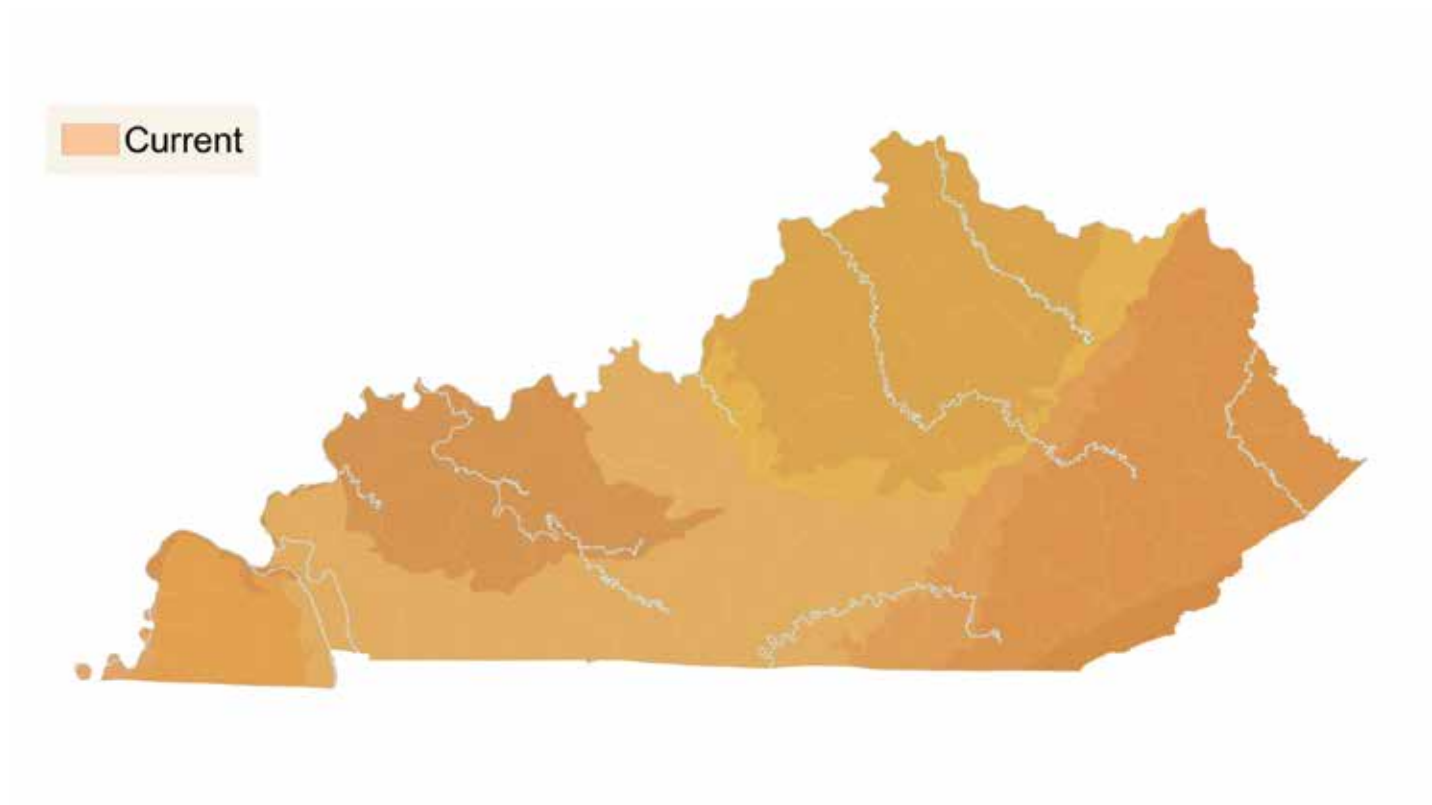


Photo: John MacGregor



EASTERN SPOTTED SKUNK

(*Spilogale putorius*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G4

S Rank: S2S3

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Increase habitat management on public and private lands. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.




Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs


Guilds: Cliff/Rockshelter, Mesic Forest

Inhabits rock piles, rock slides, crevices in cliffs, weedy cultivated fields and woodlots. Common in the vicinity of farms, and avoids heavy woods and wetlands. Dens can be in crevices, buildings, hollow logs, and often burrows of other animals.

Threats

-  Hunting and Collecting Terrestrial Animals
-  Logging and Wood Harvesting
-  Roads and Railroads

Conservation Actions

- Education and Awareness 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Resource and Habitat Protection  

Needs

Survey: Collect baseline species information

Research: Radio telemetry survey

Range Map

Current

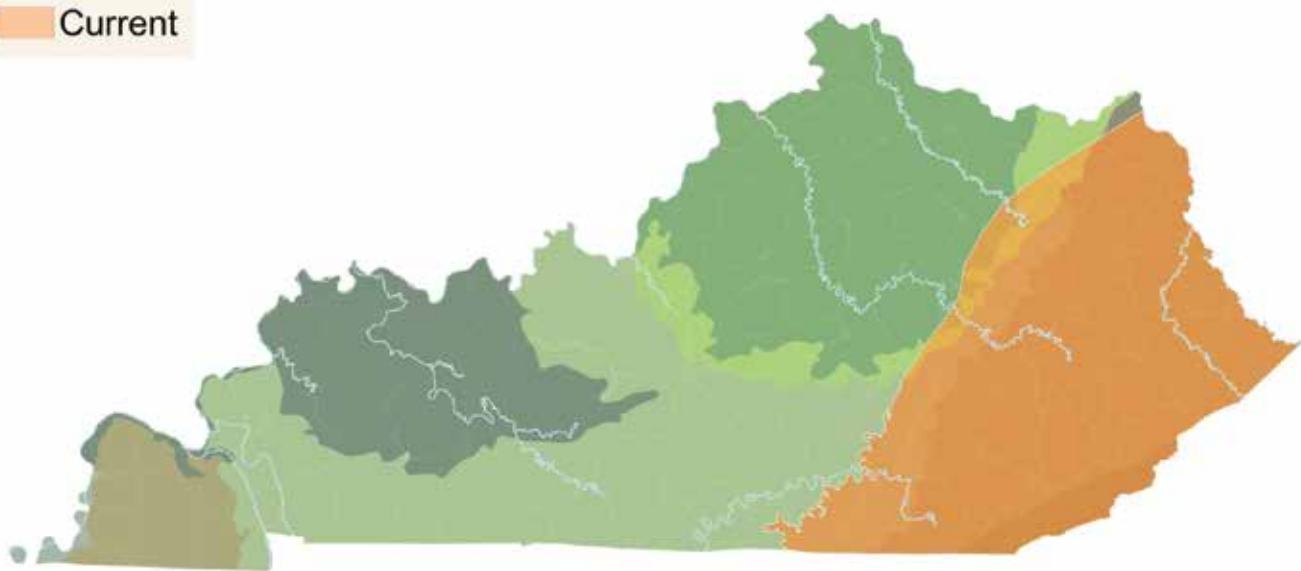


Photo: Missouri Department of Conservation



SWAMP RABBIT

(*Sylvilagus aquaticus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G5



S Rank: S3S4

Federal Status: N/A




IUCN Red List: LC - Least concern

With the recent discovery of Rabbit Hemorrhagic Disease (RHD) in domestic rabbits in Kentucky, and the rapid spread of the disease throughout the U.S., the Swamp rabbit is included as SGCN given the possibility of RHD impacting native populations.

Threats

-  Annual and Perennial Nontimber Crops
-  Pathogens and Microbes

Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration 
- Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Conservation Goal

Protect and restore wetland habitats throughout the species. Develop and implement disease monitoring protocols for Rabbit Hemorrhagic Disease.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Grassland/Savannah, Open Wetland, Scrub-Shrub/Early Successional Forest

Uses wet bottomlands, river swamps, and canebrakes. Higher ground is utilized during flood periods. Hollow trees and logs, holes in the ground, and thickets are used as cover.

Range Map

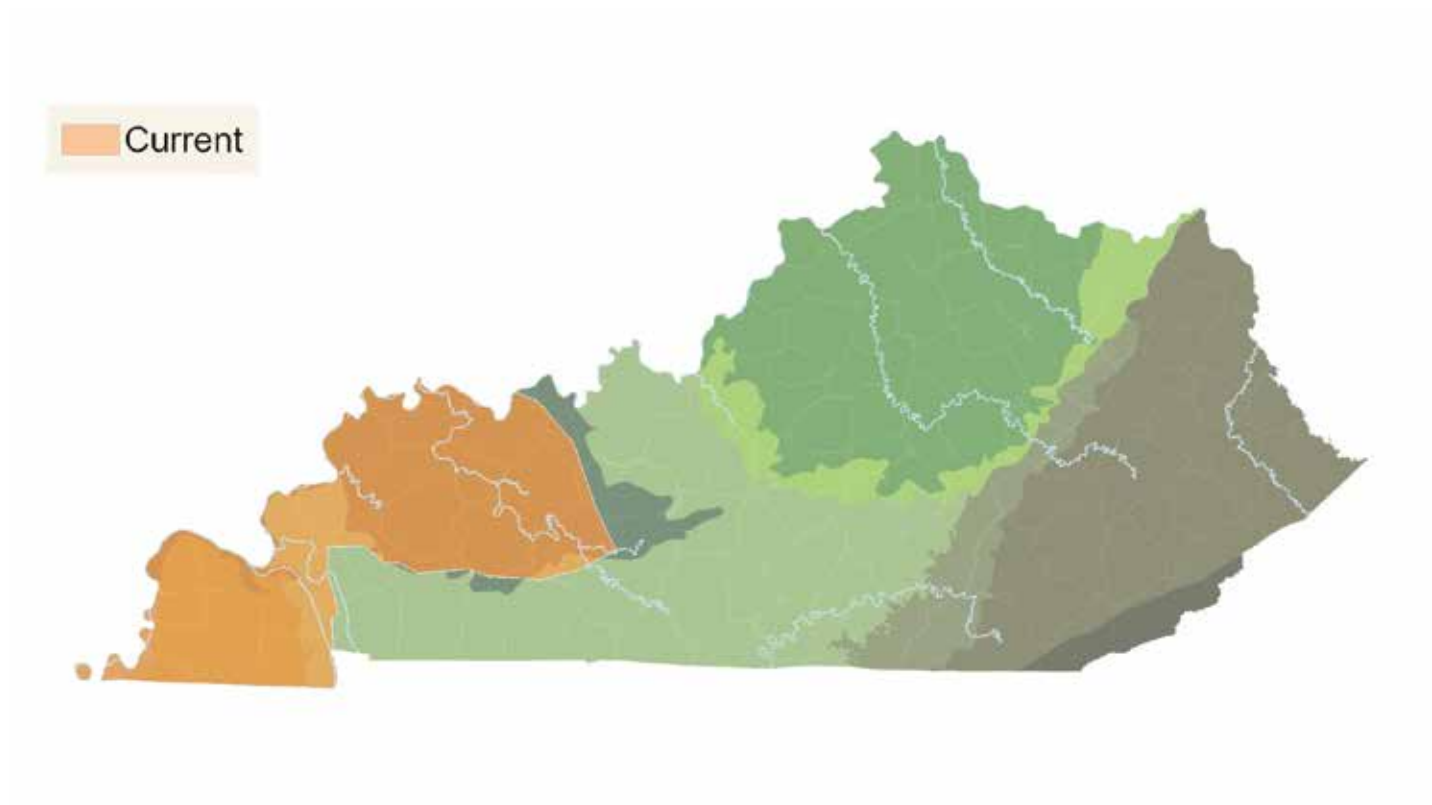


Photo: James Kiser



APPALACHIAN COTTONTAIL

(*Sylvilagus obscurus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4

S Rank: S4?

Federal Status: N/A

IUCN Red List: NT - Near threatened

With the recent discovery of Rabbit Hemorrhagic Disease (RHD) in domestic rabbits in Kentucky, and the rapid spread of the disease throughout the U.S., the Appalachian cottontail is included as SGCN given the possibility of RHD impacting native populations.

Threats

🦠 Pathogens and Microbes

Conservation Actions

Awareness and Communications 🦋

Needs

Survey: Collect baseline species information

Conservation Goal

Develop and implement disease monitoring protocols for Rabbit Hemorrhagic Disease.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau

Guilds: Mesic Forest

Associated with dense cover of heaths, particularly *Vaccinium* and *Kalmia*, and with conifers in higher elevations. Inhabits brushy and shrubby areas, and wooded areas, preferring thick wooded cover.

Range Map

Current

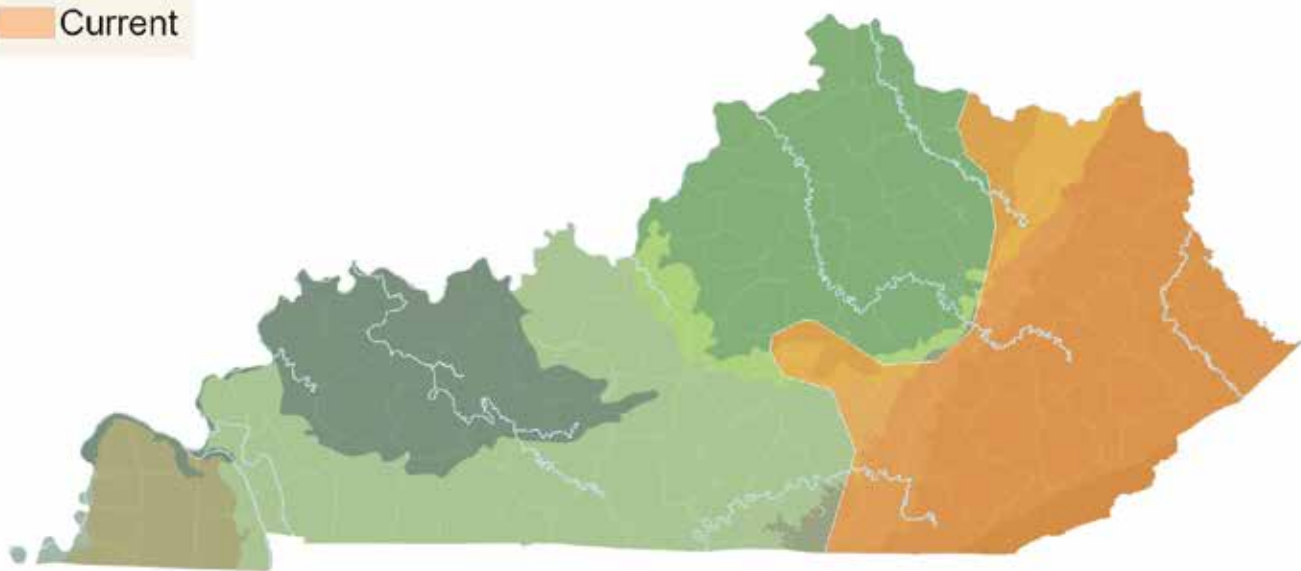


Photo: John MacGregor



SOUTHERN BOG LEMMING

(Synaptomys cooperi)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Very little data exists for the species. Additional survey work is required to assess Southern Bog lemming status in Kentucky.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills

Guilds: Grassland/Savannah, Mesic Forest, Open Wetland, Scrub-Shrub/Early Successional Forest

Found in a great variety of habitats, a chief requirement of the species may be presence of succulent sedges and grasses.

Range Map

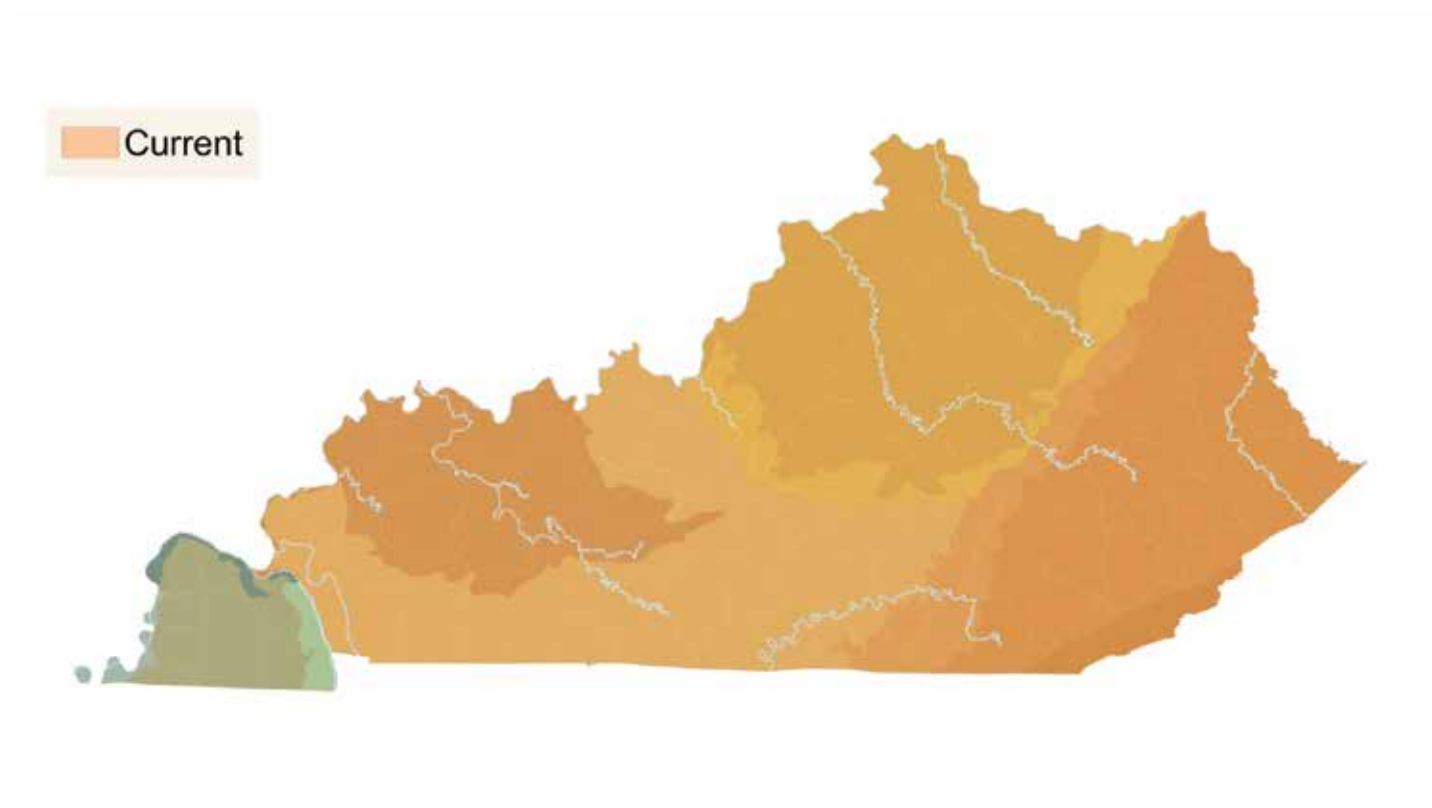


Photo: James Kiser



AMERICAN BADGER

(*Taxidea taxus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: SNA

Federal Status: N/A

IUCN Red List: LC - Least concern

Very little data exists for the species. Additional survey work is required to assess American Badger status in Kentucky. Recent records from Warren and Daviess Counties may indicate an expansion of the species into portions of Kentucky.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills

Guilds: Grassland/Savannah, Agriculture

Within Kentucky, this species likely has a preference for open prairie and rolling farmland.

Range Map

Data Insufficient
to Generate
Range Map

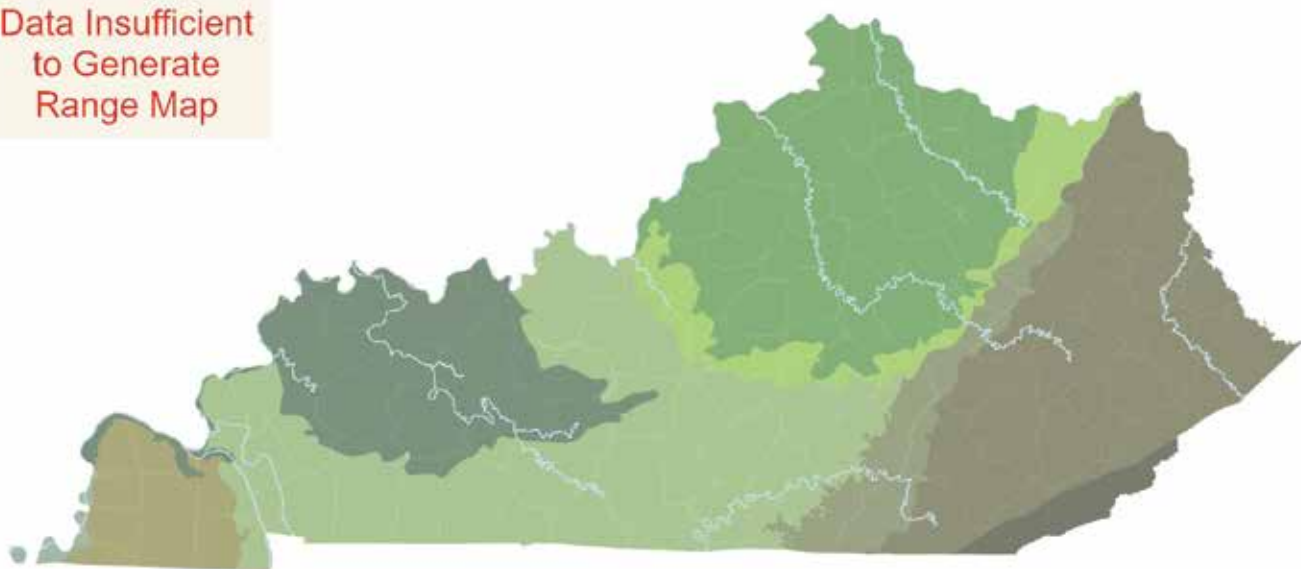


Photo: Katherine Whittemore, USFWS Digital Library



GRAY FOX

(*Urocyon cinereoargenteus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S4

Federal Status: N/A

IUCN Red List: LC - Least concern

Recent surveys throughout the Southeast indicate that Gray Fox could be experiencing rangewide population declines. Recent publications indicate a decline in the Southeast and additional survey work is needed to determine if Kentucky populations are stable.

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Goal

Conduct baseline surveys to assess population trends, obtain life history information, and refine habitat needs.

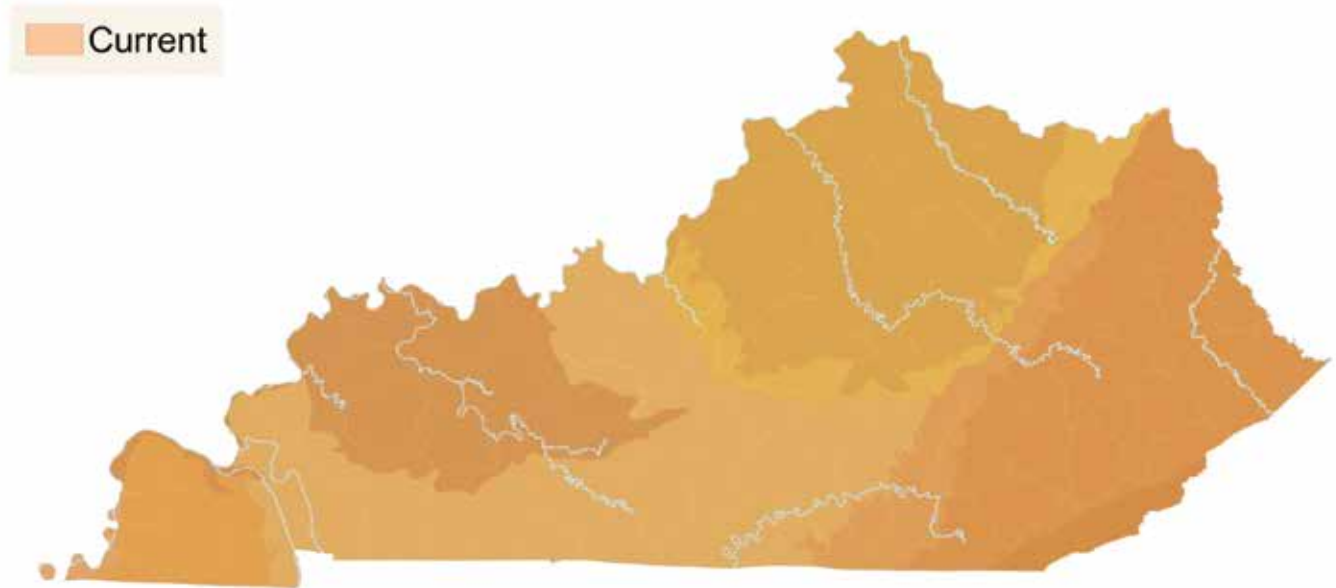
Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest, Scrub-Shrub/Early Successional Forest

Typically associated with deciduous forests in eastern North America, also found in in swamps and pine woods. Avoids farmlands. Dens may be in hollow trees/logs, burrows in the grounds on brushy hillsides instead of open fields.

Range Map



PLANTS

General Plant Statistics

There are 3,026 vascular plants documented in the state: approximately 73% (2,207 species) are native plants and 27% (817 species) are non-native. Vascular plants include the clubmosses, horsetails, ferns, gymnosperms (including conifers), and angiosperms (flowering plants). Non-native plants include naturalized non-native weeds, as well as more disruptive invasive plants that have the ability to alter ecosystems. Additionally, Kentucky has 585 species of bryophytes: non-vascular plants include mosses, hornworts, and liverworts. In 2022, conservation and rarity assessments were conducted for both vascular and non-vascular plants, but currently only vascular plants are considered for inclusion in the SWAP.



Kentucky ladyslipper (*Cypripedium kentuckiense*), a state endangered priority tier 1 SGCN species, occurs in eastern Kentucky in high quality riparian forests. Photo: Tara Littlefield

Natural Communities and Botanical Hotspots

Kentucky occurs on portions of the Appalachian Plateau, Interior Low Plateaus, and Coastal Plain Physiographic Provinces south of the Last Glacial Maximum. This diverse physiography and lack of glaciation allows multiple floristic influences to overlap, yielding a plethora of plant life. Kentucky contains several exceptional botanical hotspots from east to west like the high elevations of the Cumberland Mountains, the sandstone gorges of the Plateau Escarpment, the Kentucky River Palisades in the inner bluegrass, the shaley slopes of the Knobs, grasslands of the Interior Plateau, and swamps in far western Kentucky. There are over 80 natural communities described by the

Office of Kentucky Nature Preserves (OKNP), half of which are threatened or endangered. The state listed communities, along with high quality examples of common community types, have become increasingly rare.

Rare Plants Statistics

Approximately 20% of Kentucky's native flora is of conservation concern and is designated as endangered, threatened, or rare, of which 63 taxa are considered globally rare (G1, G2, or G3). Most plants of conservation concern found in Kentucky are "edge of range" species that may possess unique genetic makeup, but many regionally and narrowly endemic plant species occur here as well. Kentucky's areas of endemism occur mainly in the dolomite glades of the Bluegrass, various habitats of the Cumberland Plateau, woodlands of the eastern Knobs, and limestone glades of the Pennyroyal Plain, though biologists are always seeking undiscovered hotspots.

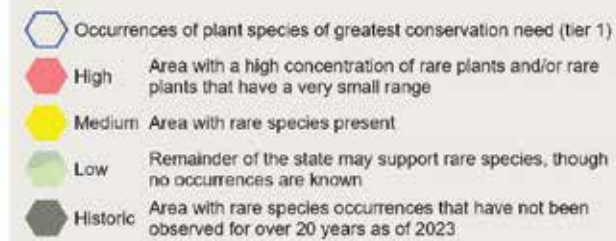


Braun's rockcress (*Borodinia perstellata*) is a federally threatened priority tier 1 SGCN plant that occurs in calcareous mesic forests. Despite it being associated with a more common habitat, it has only been found in forests surrounding Frankfort. Photo: Tara Littlefield

Currently, OKNP tracks 197 state endangered vascular plants and 128 state threatened vascular plants, along with detailed information on an additional 234 vascular plants of conservation concern, including 80 special concern, 88 watch list, 49 historic, and 18 extirpated. Kentucky is home to 10 federally listed plants, with an additional 4 species that have been recovered and removed from federal listing over the past decade.

Plant rarity hotspots

Rarity-weighted richness index



To assess rare plants in Kentucky, a rarity hotspot analysis was conducted using extant rare plant species occurrences (post-2002 records as of May 2023) in the Kentucky Natural Heritage Database. Rarity hotspots are areas with rare species present that have been ranked based on the number and individual rarity of each species present. The methodology for this analysis is based on a rarity-weight richness index developed by NatureServe. The occurrences of SGCN (Tier 1) are highlighted on the plant rarity hotspots map. Map: Nour Salam

Threats

Rare and declining plants face many threats, including widespread habitat alteration and destruction, invasive species, changes in disturbance regimes, excessive herbivory, and over-harvesting. Unfortunately, threats are seldom isolated and co-occurrence of threats amplifies the effect on biodiversity. Many rare plants associated with grassland and wetland communities have become threatened or endangered in Kentucky as a direct result of habitat loss caused by residential and commercial development, agriculture, fossil fuel extraction, quarrying, and logging. Less than 1% of the grasslands, savannas, woodlands, and pre-settlement forests that covered Kentucky 200 years ago occur here today, and over 80% of Kentucky's original wetland acreage has been altered or destroyed. Even common native plants have also seen drastic declines due to these same threats. Furthermore, such threats are the common driver of why certain natural community types have become endangered, and why quality remnants of more common communities are becoming increasingly rare.

Our remaining natural landscapes are most threatened by invasive species. Invasive species can be broadly categorized as plants that invade bottomlands

(*Achyranthes*, *Phragmites*), plants that invade forests (*Lonicera* spp, *Rosa multiflora*, *Ligustrum* spp., *Elaeagnus* spp., *Microstegium*), plants that invade grasslands (*Lolium arundinaceum*, *Sorghum halepense*, *Lespedeza cuneata*, *Bromus* spp.), and fungi or animals that cause mortality in canopy trees of forested ecosystems (HWA, EAB, chestnut blight,). Grasslands also face a threat from certain woody native species that can behave like invasive plants by spreading aggressively, outcompeting native species, and ultimately shading out a site.

Treatment of invasive or native species encroaching on natural areas is very important, but it is also labor and cost intensive. Even public agencies with resources to treat invasive species struggle to manage the workload on public lands, so effectively managing any of Kentucky's 94% privately-owned lands is a significant challenge. Mismanagement of land can also pose a threat: natural remnants containing rare plants can persist along transportation and utility right-of-ways, but aggressive broadcast application of herbicide and improperly timed mowing schedules can decimate rare plant populations and leave the damaged habitat more vulnerable to invasive species. To complicate matters, many of these invasive plants are still sold by the horticultural industry in seed mixes and as live plants to landowners and construction

companies,. A concerted effort by land management agencies, the industry and the public is needed to prevent the sale of these invasive plants.

Severe weather events as a result of climate change can also impact rare plants through changes in timing, duration, frequency, and intensity. Drought, flooding, erosion, extreme temperatures, and extreme winds can threaten both rare plant populations and their associated habitats. Plants face additional threats from herbivory. While moderate levels of herbivory can be beneficial for plants in open habitat communities that were historically maintained by American bison (*Bison bison*), excessive browsing by white tail deer (*Odocoileus virginianus*) can cause significant declines to rare forest plants such as orchids, trilliums, and clovers, among many others. Other natural threats include plant pathogens and the potential for hybridization with related native or non-native species.



The newly discovered and described Kentucky clover (*Trifolium kentuckiense*) is a state endangered, priority Tier 1 endemic species that associated with limestone woodland forests and animal trails in the inner Bluegrass Region. It is threatened by invasive plants and habitat destruction. Protection of sites, translocation of plants into managed areas, and surveying for new populations are priority actions to conserve this species. Photo: Tara Littlefield

Outdoor recreation can help expose the public to Kentucky's natural beauty, although this too can threaten rare flora. Without properly designed trails, barriers, and informational signage, rare plants growing directly along hiking paths, campsites, fishing areas, OHV trails, and rock climbing areas are subject to inadvertent trampling and erosion. Last, while not as impactful as other direct threats, illegal harvesting and poaching of rare plants for the medicinal, horticulture, and culinary trades has been documented for several state listed plants.

Actions and Needs

To prevent further the decline of rare, threatened, and endangered plants in Kentucky, in situ and ex situ conservation strategies were developed for species of greatest need (SGCN) plants, such as general habitat management, direct species conservation, alliance and partnership development, and education and outreach. Since over half of SGCN plant populations occur on private lands, it is imperative to work directly with private landowners on species and habitat conservation, or protect sites through acquisition and integration into a managed conservation lands system. SGCN plants that do not occur on any public lands, such as Royal catchfly (*Silene regia*) or Kentucky clover (*Trifolium kentuckiense*), would be prioritized for site and species protection due to the higher probability of extirpation. Creating protected corridors through watersheds and/or connecting fragmented remnant habitats is important for maintaining landscape-scale ecosystem processes. It is also crucial for species' long term viability and adaptability, and can be key to providing suitable habitat for migration as the climate changes.



Royal catchfly (*Silene regia*) is a state endangered priority tier 1 SGCN plant that is a fire adapted tallgrass prairie species that is only known from just a few roadside remnant prairies. Site protection, translocations, working with the transportation department and management of tallgrass prairie habitat is key to conserving this iconic prairie species. Photo: Tara Littlefield

Management of natural communities by restoring or mimicking natural processes is also needed to recover SGCN plants. In some grasslands, this can be accomplished with prescribed fires and woody removal to approximate historical fire frequency and grazing megafauna, while woody removal in wetlands can emulate American beaver (*Castor canadensis*) activity. In larger blocks of natural lands, collaboration with natural ecosystem engineers such as beavers, elk (*Cervus canadensis*), American black bear (*Ursus americanus*) and

other predators is needed to maintain habitats. Targeted removal of invasive or otherwise problematic species should also be prioritized.

Single-species management of SGCN plants involves both in situ and ex situ conservation, from targeted management of rare plant habitats, to seed collection and propagation. Introductions, reintroductions, and augmentations (collectively termed “translocation”) of SGCN plants on managed lands within the species’ natural range are needed to increase protected populations. Since local seed sources for restoration of rare plants and overall community diversity are limited, collaborating with conservation horticultural partners is key. These partners possess the expertise and equipment needed to assist with seed banking for restoration projects, seed storage as a “conservation insurance policy,” and plant propagation.

More broadly, partnership development with government agencies, nonprofits, businesses, community scientists, and the general public can increase collaborative projects that are dedicated to the conservation of SGCN plants. Organizations like OKNP, Kentucky Plant Conservation Alliance, and Kentucky Native Plant Society can serve an important role in building momentum on such projects, while the SGCN plant list and State Wildlife Action Plan can help inform planning and implementation. Education and outreach (or awareness and communications) for natural resource professionals, landowners, and other partners is also needed, and can be accomplished with expert-lead workshops and trainings.

While conducting these actions to reduce threats and recover populations of SGCN plants, additional needs for surveys and research were identified. For certain species, unsurveyed suitable habitat exists on both private and public lands, and field surveys to locate undocumented populations should be a priority. Periodic status surveys like those conducted for federally listed plants are also needed for Tier 1 (globally rare) SGCN plants, along with Tier 2 and 3, which would provide updated data every 2-5 years to better assess population trends and species viability. Research needs include more studies on life histories and species ecologies, and more genetic research to inform translocation and seed collection strategies and to answer questions about genetic diversity and species adaptability. For most SGCN plants and rare communities, best management practices have not yet been defined. Much research is needed to develop these best practices to recover rare plants and natural communities, evaluate management effectiveness, and assess rare species trends.

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White Fringeless Orchid (*Platanthera integrilabia*): Recovery is possible!

White fringeless orchid (*Platanthera integrilabia*, WFO) is a globally rare orchid that grows in wetland habitats in six southeastern states: Alabama, Georgia, Kentucky, Mississippi, South Carolina, and Tennessee. It is a shallow-rooted, long-lived perennial that requires continuously wet soil. It has a symbiotic relationship with mycorrhizal fungi that is required for seedling germination. Flowers are primarily pollinated by swallowtail butterflies in late July to August, and seeds set in October. In Kentucky, populations are restricted to the Cumberland Plateau and Mountains regions in natural communities classified as Cumberland Plateau Acid Seeps and Cumberland Mountain Streamside Bogs. These communities range from forested seeps dominated by white oak (*Quercus alba*), blackgum (*Nyssa sylvatica*), American holly (*Ilex opaca*), cinnamon fern (*Osmundastrum cinnamomeum*) and royal fern (*Osmunda spectabilis*), to open seeps under power lines or along mountain streams dominated by ferns, graminoids, and forbs. Habitats for WFO range in size from 0.5 to 2.5 acres. These wetlands were historically kept open due to fires, animal browsing or trampling, and large tree tip overs that created forest openings and improved hydrologic conditions. Most sites exist in historically fire- dependent landscapes of pine-oak woodlands and savannas, with which they share a connected landscape ecology. This state-endangered orchid was listed as federally threatened in 2016 due to population declines and extirpations following wetland degradation and habitat destruction.

Over the past 25 years, federal and state funds have been allocated for the conservation of this fascinating



White fringeless orchid (*Platanthera integrilabia*) is a federally threatened orchid that grows in wetlands in eastern Kentucky. Photo: Tara Littlefield, OKNP.



Prescribed fire can be used to manage white fringeless orchid habitat and the adjacent barrens/ woodland community. Fire serves to reduce midstory in woodlands adjacent to the seeps, reduce evapotranspiration, and improve wetland conditions. Photo: Tara Littlefield, OKNP.



White fringeless orchid grows in headwater seep and streamside bog habitat in Eastern Kentucky. Habitats are dominated by ferns, graminoids and forbs and can vary from more closed to open canopy habitat. Photo: Tara Littlefield, OKNP.

orchid. Secured funding allowed for annual monitoring of populations, protection of private populations through land acquisition, development and implementation of wetland-targeted management plans to improve habitat, and research on the associated mycorrhizal symbiont, pollinators, and life history. In 1998, funds provided through the Heritage Land Conservation Fund allowed the Office of Kentucky Nature Preserves to secure one of the largest known populations on private land and permanently protect it as a state nature preserve. Collaborations with the University of Kentucky on habitat and hydrological restoration expanded knowledge on optimal management for these unique wetland habitats. By reducing the basal area and creating canopy gaps, increased light was able to reach the seeps and resulted in increasing reproductive white fringeless orchid populations, improving the floristic quality and increasing the herbaceous layer. Installing debris dams within the canopy gaps and thinned seeps resulted in an increased water table and improved hydrologic conditions. These actions have proven successful in restoring the hydrology, enhancing orchid reproduction and germination, and increasing overall biodiversity; ultimately serving as a model for white fringeless orchid restoration across the southeastern United States.

Partnerships with U.S. Forest Service, U.S. Fish and Wildlife Service, the National Park Service, universities, state agencies, and non-profits further expanded conservation efforts. These partnerships utilized the same monitoring and management methods for most white fringeless orchid populations that occur on federal lands. Additionally, research into the associated fungal symbiont and pollinators has expanded our knowledge on broader ecological needs of the orchid, which may lead to successful translocations. The added insurance of seed banking, living collections, and translocations of white fringeless orchids will contribute to the recovery of this species. As a result of these collective efforts, the white fringeless orchid has a high recovery potential and through continued stewardship and monitoring may be removed from the federal list in the foreseeable future.



Restoration of the seeps and bogs consists of creating canopy gaps by removing trees, as well as creating debris dams packed with mud to improve wetland conditions. Photo: Tara Littlefield, OKNP.

2009



2019



Wetland habitat before and after management. The upper photo is pre-management, showing very closed habitat. The lower photo is showing a more open area post management, where the herbaceous layer increased and midstory is reduced. The WFO population increased dramatically after management. Photo: Tara Littlefield, OKNP.

PLANT PROFILE PAGES







Photo: Theo Witsel



OPEN-GROUND WHITLOW-GRASS

(*Abdra aprica*)

Threats

-  Annual and Perennial Nontimber Crops
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Roads and Railroads

Conservation Actions

- Education and Awareness    
- Ex Situ Conservation    
- Species Reintroduction    

Needs

Survey: Surveys for new populations

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: SH

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Rediscover extant populations of this globally rare plant in Kentucky and work with partners on conservation of this species and associated habitat.

Habitat Associations

Physiographic Regions: Interior Plateau, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah

This annual species grows in thin sandy soils on the edges of outcrops in barrens, glades and prairies. It was found historically found on a gravelly roadside

tertiary sandstone prairie/barrens remnant in
Kentucky in a habitat similar to a sandstone prairie
(S1/GNR) and/or sandstone barren (S1/G2G3).

Range Map

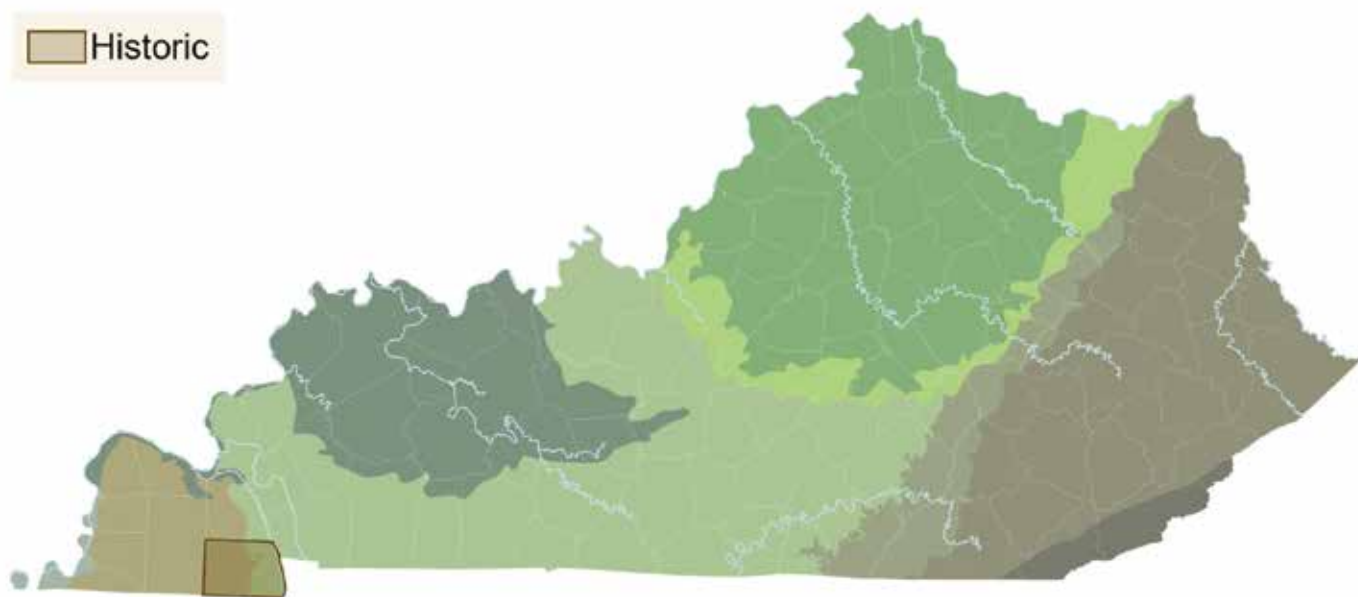


Photo: Tony Romano



APPALACHIAN BUGBANE

(*Actaea rubifolia*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare forest herb.








Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills

Guilds: Mesic Forest

This perennial species occurs in deep rich calcareous soils in high quality mature mesic limestone forests. It occurs in mature calcareous mesophytic forest (S5/GNR) communities in the western part of the state.

Threats

-  Annual and Perennial Nontimber Crops
-  Gathering Terrestrial Plants
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Storms and Flooding

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness    
- Ex Situ Conservation    
- Invasive/Problematic Species Control 
- Site/Area Management  
- Site/Area Protection    
- Species Reintroduction    

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Range Map

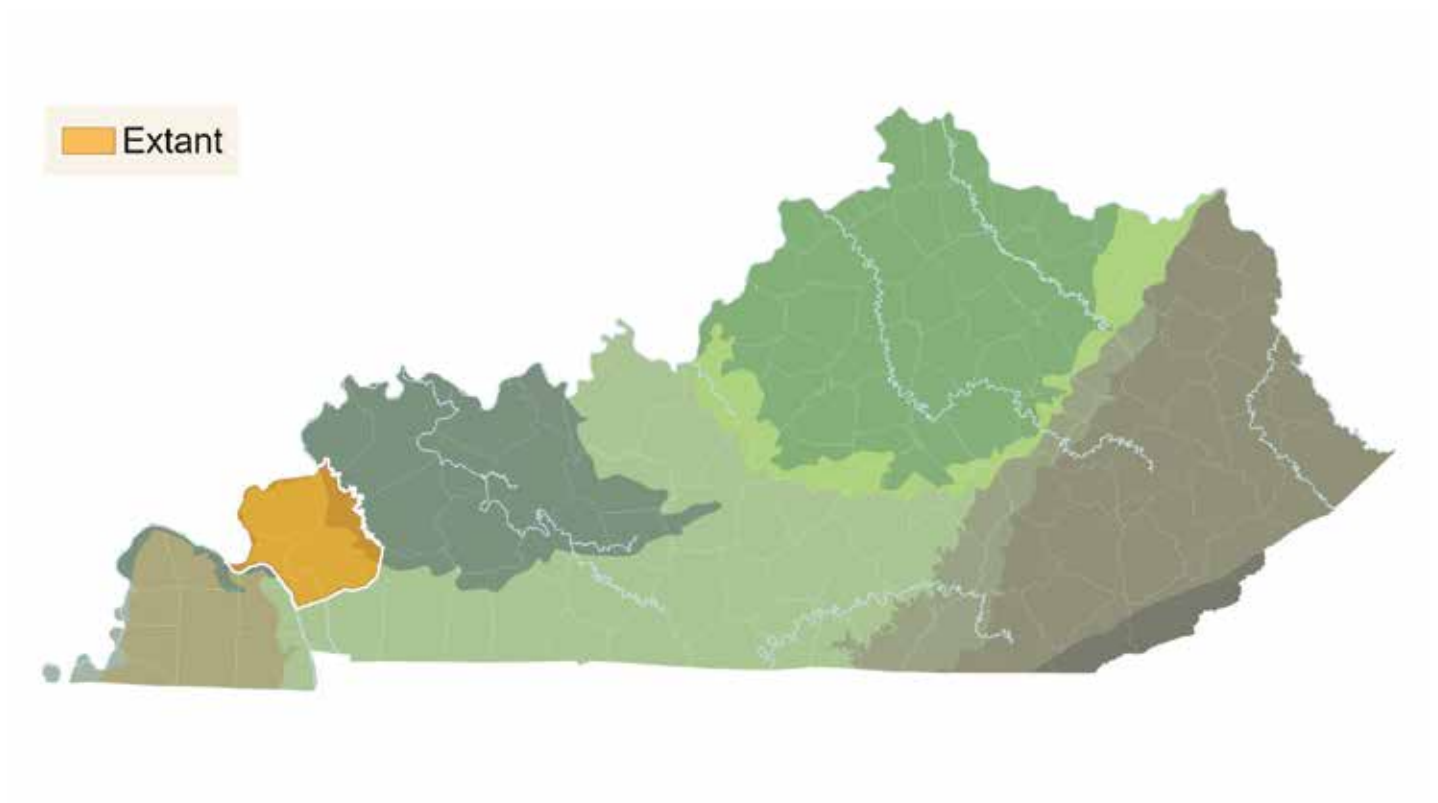








Photo: Tara Littlefield



EARLEAF FALSE FOXGLOVE

(*Agalinis auriculata*)

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Natural System Modifications

Conservation Actions

- Alliance and Partnership Development      
- Education and Awareness     
- Ex Situ Conservation     
- Invasive/Problematic Species Control 
- Site/Area Management 
- Species Reintroduction     

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore this globally rare prairie plant in Kentucky.

Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau

Guilds: Grassland/Savannah

This species is a hairy, annual herb that grows in open prairies and benefits greatly from prescribed fire. It is a hemiparasite, meaning that in addition to getting energy from photosynthesis, it is also

parasitic on some plants to obtain nutrients. Its seed has been shown to remain viable in the soil for many years and needs some level of disturbance to germinate. This species occurs in Limestone/dolomite prairie (S1/G2G3) and Bluegrass Cat Prairie (S1/G1) community types in Kentucky.

Range Map

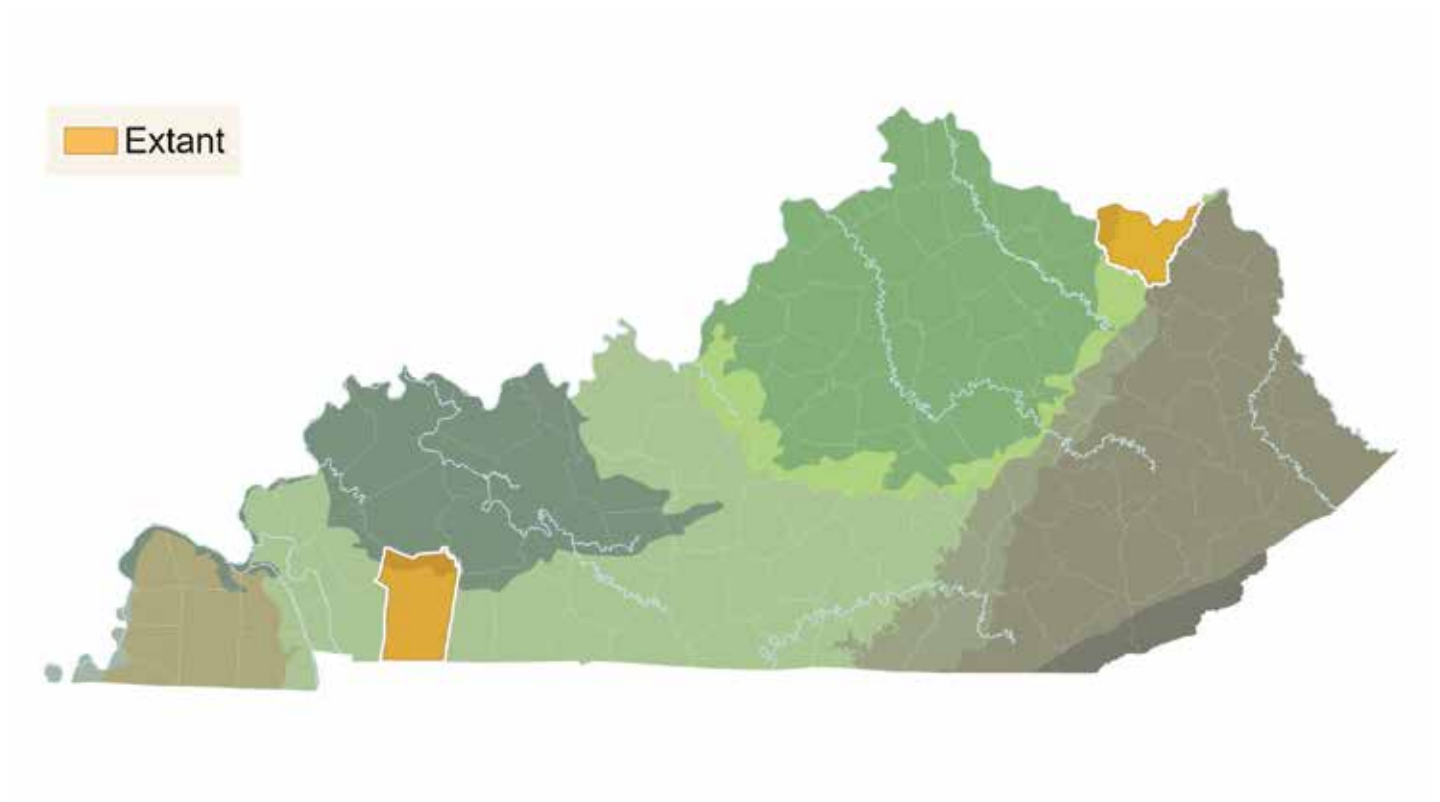


Photo: Theo Witsel



TEN-LOBED FALSE FOXGLOVE

(*Agalinis decemloba*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3G4

S Rank: S1

Federal Status: Not Listed

IUCN Red List: N/A

Conservation Goal









Protect existing populations, work with federal and state agencies as well as private landowners on population monitoring, management and recovery, survey additional habitat for undocumented populations, and increase ex situ conservation and translocations of this globally rare prairie species.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Guilds: Grassland/Savannah

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Roads and Railroads

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation     
- Land/Water Management   
- Land/Water Protection     
- Species Reintroduction      

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

This annual grows in open prairies and barrens. It is a hemiparasite, meaning that in addition to getting energy from photosynthesis, it is also parasitic on some plants to obtain nutrients. Its seed has been shown to remain viable in the soil for many years. It needs some level of disturbance to germinate and benefits greatly from fire. This species occurs in Cumberland Plateau shortleaf pine savanna (S2/G2) and Cumberland Plateau Clifftop Sandstone Barren (S1/G3) community types.

Range Map

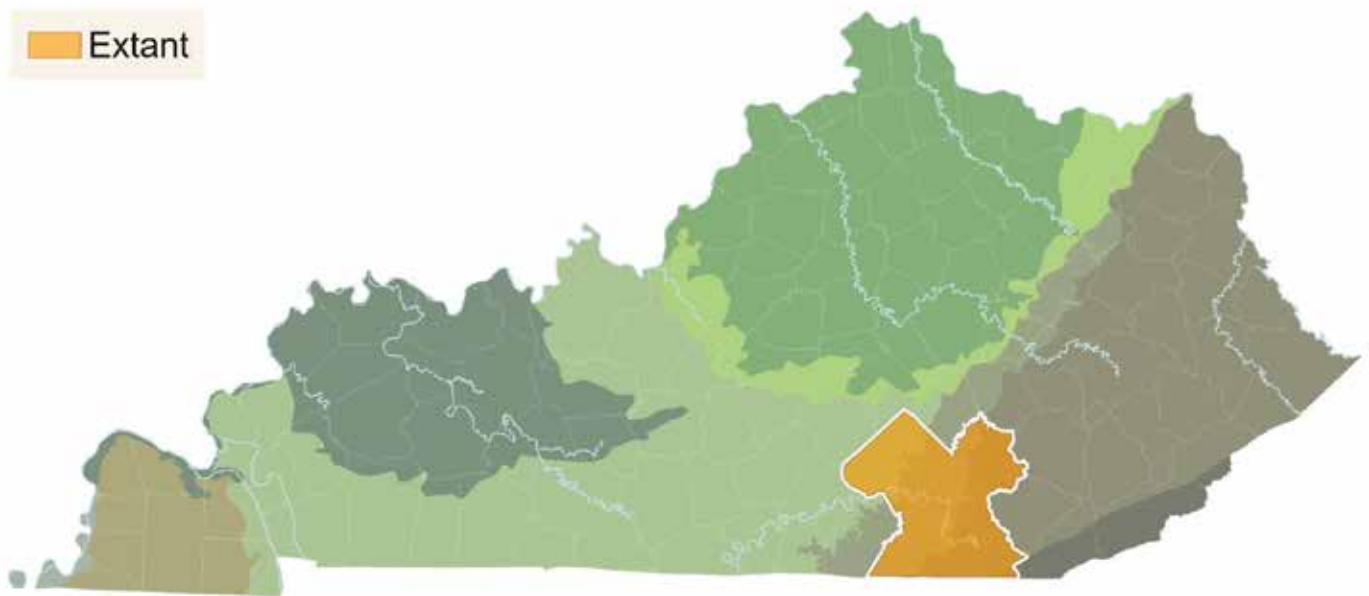


Photo: Julian Campbell



LUCY BRAUN'S WHITE SNAKEROOT

(*Ageratina lucy-brauniae*)

Threats

- Droughts
- Habitat Shifting and Alteration
- Invasive Non-native/Alien species
- Logging and Wood Harvesting
- Recreational Activities
- Tourism and Recreation Areas

Conservation Actions

- Alliance and Partnership Development
- Education and Awareness
- Ex Situ Conservation
- Invasive/Problematic Species Control
- Land/Water Management
- Land/Water Protection
- Species Reintroduction

Needs

Survey: Status Survey

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Conserve, monitor, manage and recover populations of this globally rare plant.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Guilds: Cliff/Rockshelter

This perennial species occurs at the dripline of dry to mesic/wet sandstone rockhouses. This species grows in sandstone rockshelters and the base of

sandstone clifflines from dry sandstone
cliff/outcrop/rockhouse (S5/GNR) to Cumberland
Plateau wet rockhouse (S3/G2) communities.

Range Map

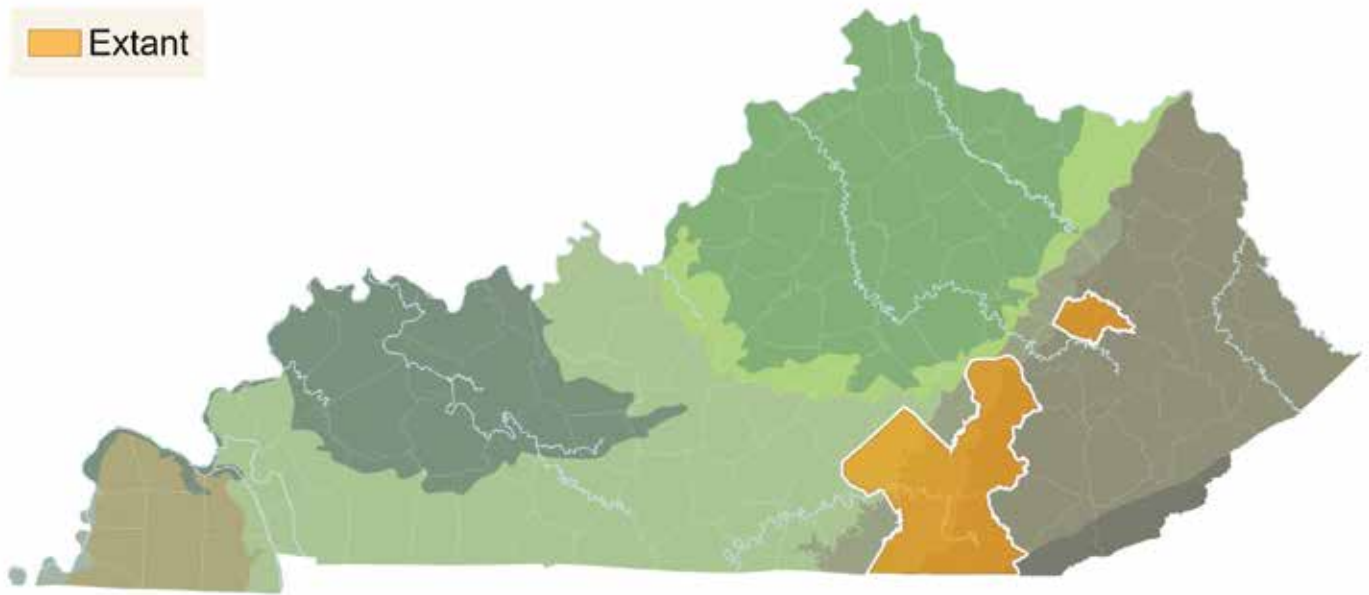


Photo: Marc Evans



PRICE'S POTATO-BEAN

(*Apios priceana*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: Threatened

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this federally threatened plant.

Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

This species occurs in sub-xeric limestone rocky slopes above streams in habitats similar to Calcareous sub-xeric forests (S5/GNR) communities. This species needs some level of disturbance in order to flower.

Threats

- Droughts
- Housing and Urban Areas
- Invasive Non-native/Alien species
- Livestock Farming and Ranching
- Natural System Modifications
- Recreational Activities
- Roads and Railroads

Conservation Actions

- Alliance and Partnership Development
- Education and Awareness
- Ex Situ Conservation
- Land/Water Management
- Site/Area Protection
- Species Reintroduction

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Range Map

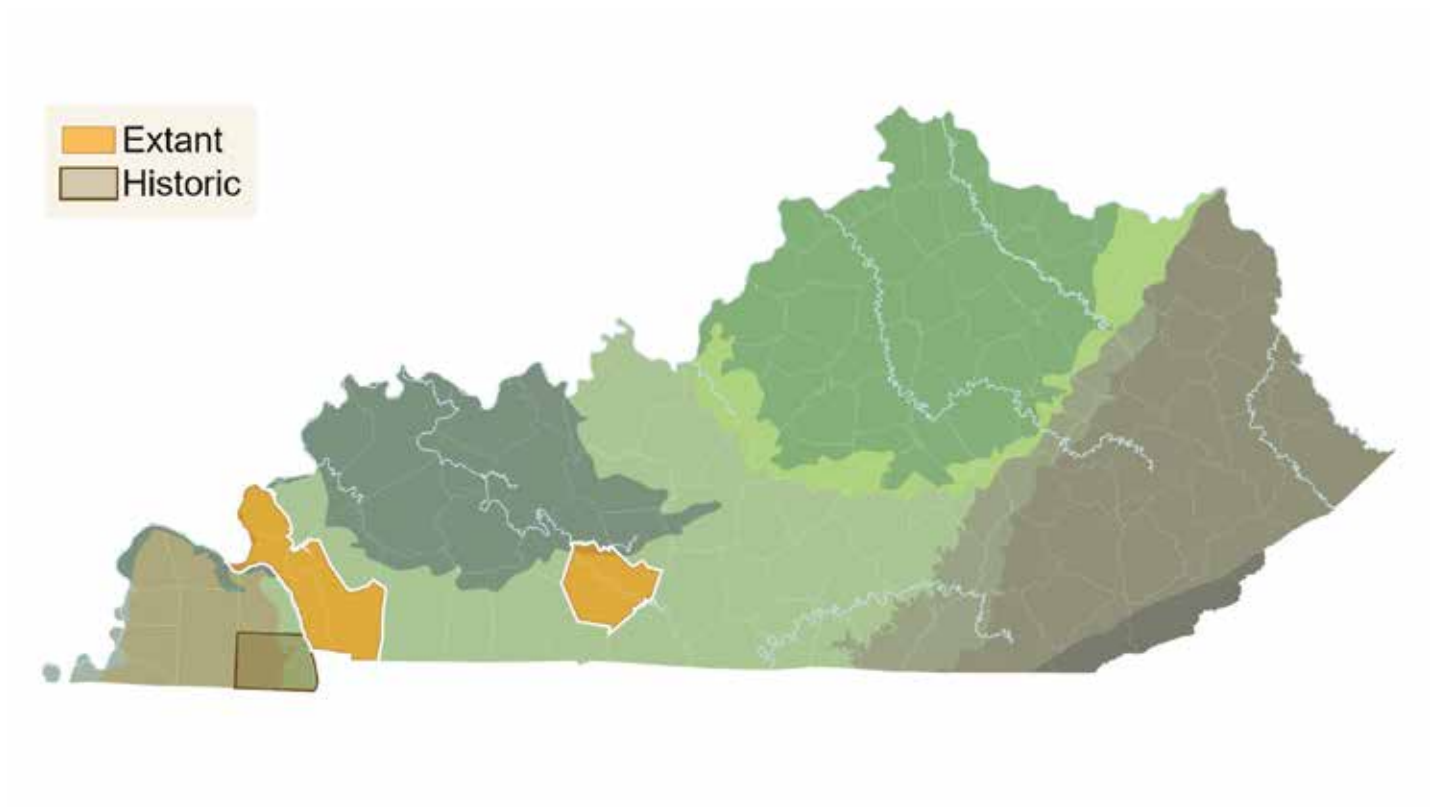






Photo: Claire Ciafre



SPREADING ROCKCRESS

(*Arabis patens*)

Threats

-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness    
- Ex Situ Conservation    
- Land/Water Management  
- Species Reintroduction    

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare plant.

Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Cliff/Rockshelter, Xeric Forest

This biennial grows on limestone outcrops and slopes in mature forests. It needs exposed mineral soil for the seeds to germinate. It grows in limestone outcrops, bluffs and slopes in the calcareous sub-xeric forest (S5/G5) community type.

Range Map

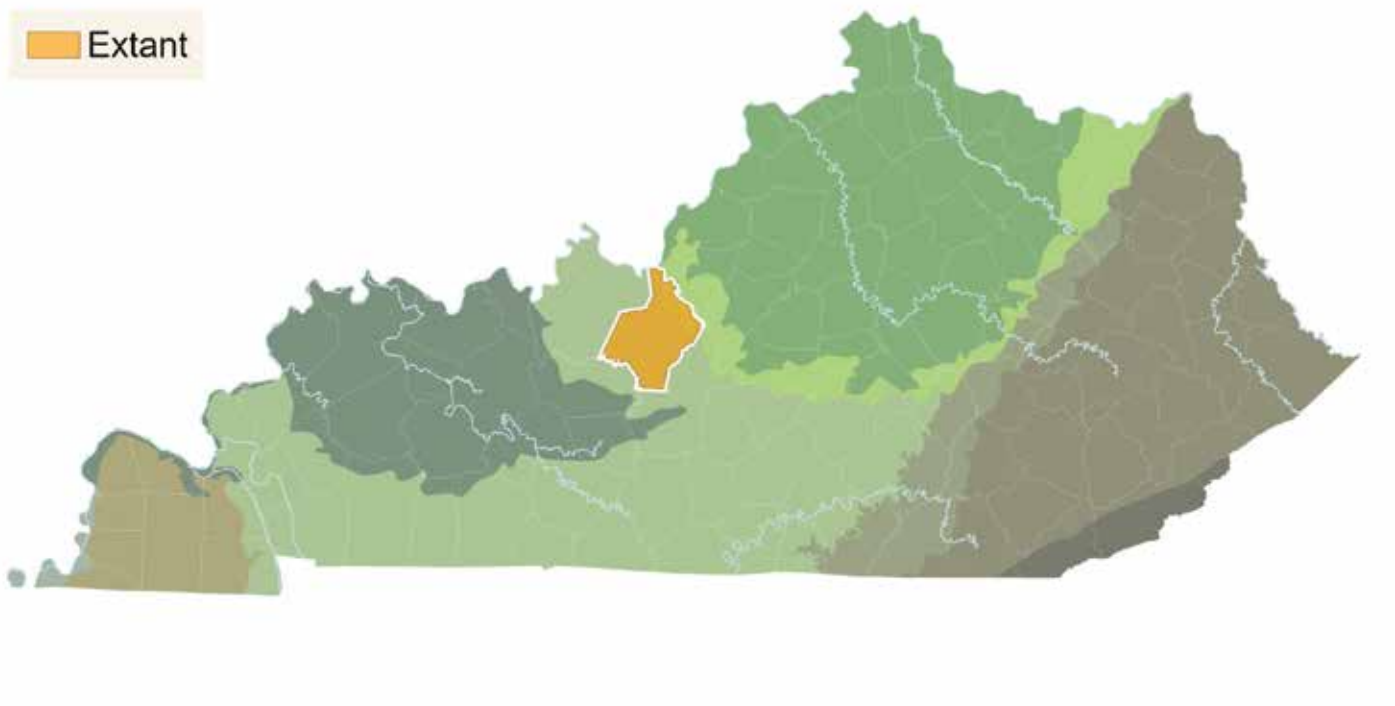


Photo: Julian Campbell



SPREADING FALSE FOXGLOVE

(*Aureolaria patula*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare forest plant.







Habitat Associations

Physiographic Regions: Plateau Escarpment, Interior Plateau

Guilds: Mesic Forest

This perennial plant grows in calcareous forests with rich soils and mature canopy. It is hemiparasitic, meaning that in addition to getting energy through photosynthesis, it gets nutrients and water by parasitizing other plants. This species has been documented parasitizing Sweet Gum (*Liquidambar styraciflua*), Red Bud (*Cercis canadensis*), Ironwood (*Carpinus caroliniana*), and Flowering Dogwood (*Cornus florida*). It species grows in the Calcareous mesophytic forest (S5/GNR) community type, in mature forested slopes along larger streams and rivers.

Threats

-  Dams and Water Management/Use
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Recreational Activities
-  Storms and Flooding

Conservation Actions

- Alliance and Partnership Development 
- Education and Awareness 
- Ex Situ Conservation 
- Land/Water Management 
- Land/Water Protection 
- Species Reintroduction 

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Range Map

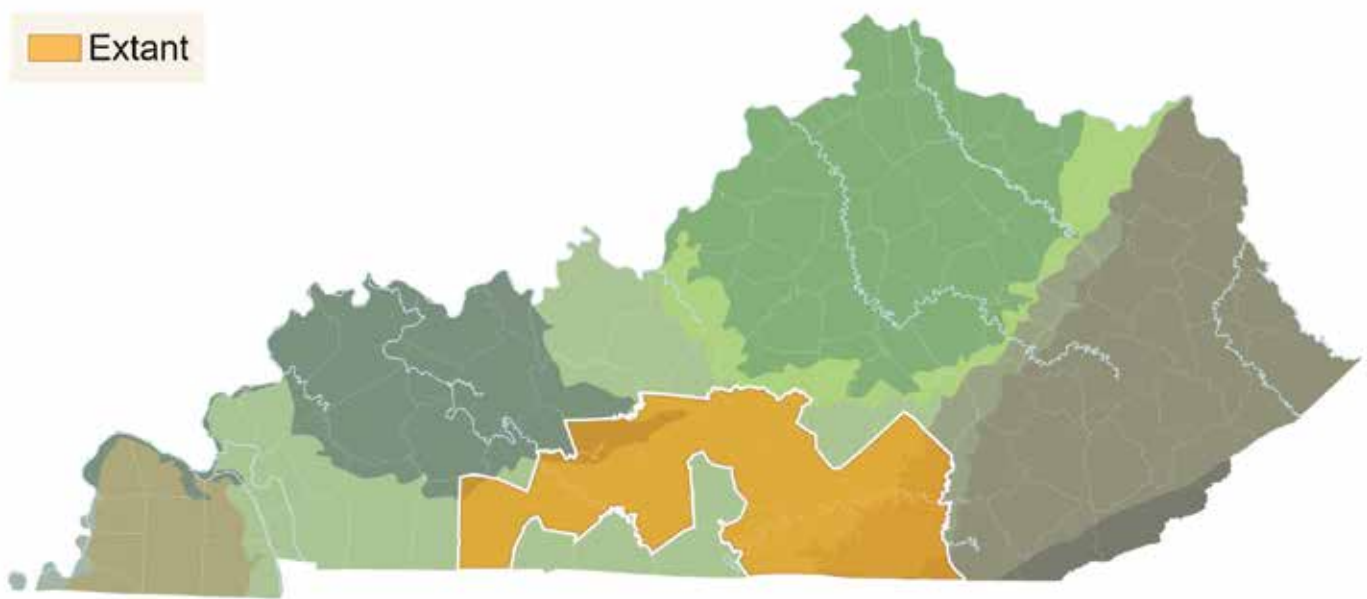









Photo: Tara Littlefield



EASTERN PRAIRIE BLUE WILD INDIGO

(*Baptisia aberrans*)

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Gathering Terrestrial Plants
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Natural System Modifications

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Habitat and Natural Process Restoration   
- Invasive/Problematic Species Control 
- Species Reintroduction     

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore this globally rare prairie plant in Kentucky.

Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Grassland/Savannah

This long lived perennial grows in open full sun calcareous prairies and needs some level of disturbance, by fire or mechanical, to persist. It occurs in high quality Limestone/dolomite prairie (S1/G2G3) communities.

Range Map

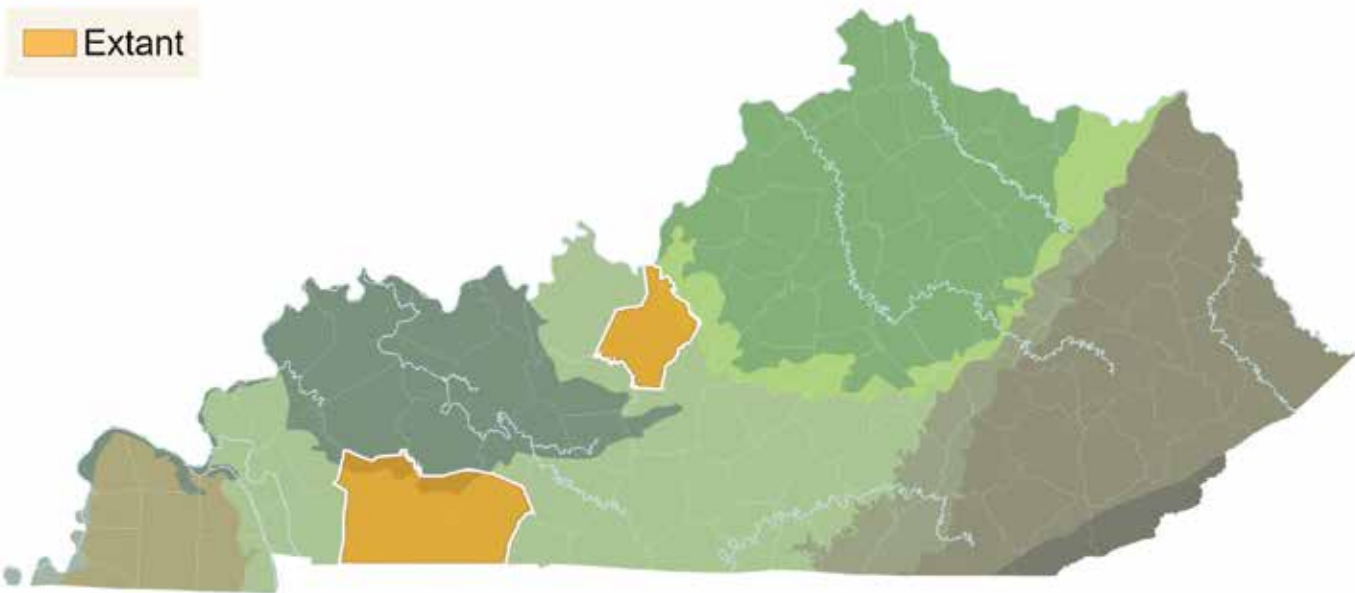


Photo: Dwayne Estes



AMERICAN BARBERRY

(*Berberis canadensis*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3G4

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Monitor and conserve existing populations and discover new populations of this globally rare shrub.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Guilds: Grassland/Savannah, Xeric Forest

This species grows in limestone woods, dry open woods often on limestone, shale or mafic rock. It occurs in xeric red cedar - oak forest/woodland (S5/GNR), and has been found on the shrubby zone of the backside of Cumberland Plateau Riverscours prairie (S1S2/GNR) habitat that has some calcareous influence.

Range Map

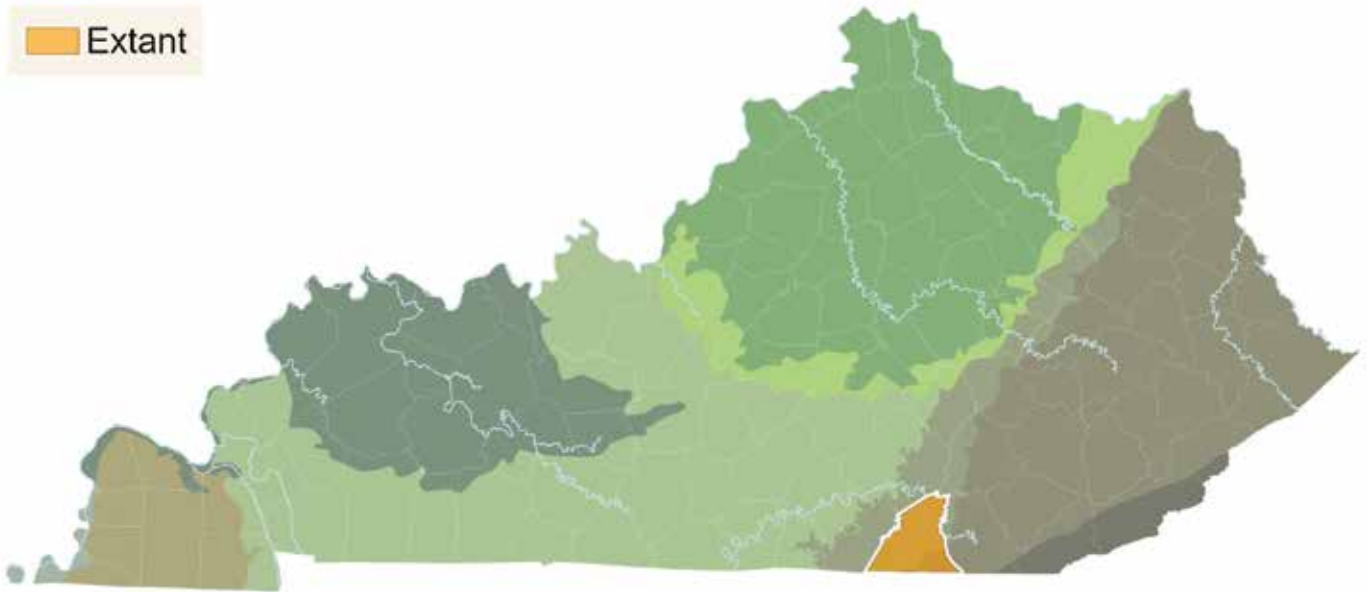


Photo: Tara Littlefield



BRAUN'S ROCKCRESS

(*Borodinia perstellata*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2

S Rank: S2

Federal Status: Endangered

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this federally endangered plant.






Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Mesic Forest, Xeric Forest

This long lived perennial mustard grows on exposed mineral soils on calcareous rocky slopes. It is often found at the base of large trees, along animal trails or limestone ledges above creeks. This species may have been historically associated with large migrating ungulates and seems to be associated with deer and small mammal trails in high quality calcareous forests.

Threats

-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Recreational Activities

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness    
- Ex Situ Conservation    
- Land/Water Management  
- Land/Water Protection    
- Species Reintroduction    

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Management: Develop critical habitat protection plan

Range Map

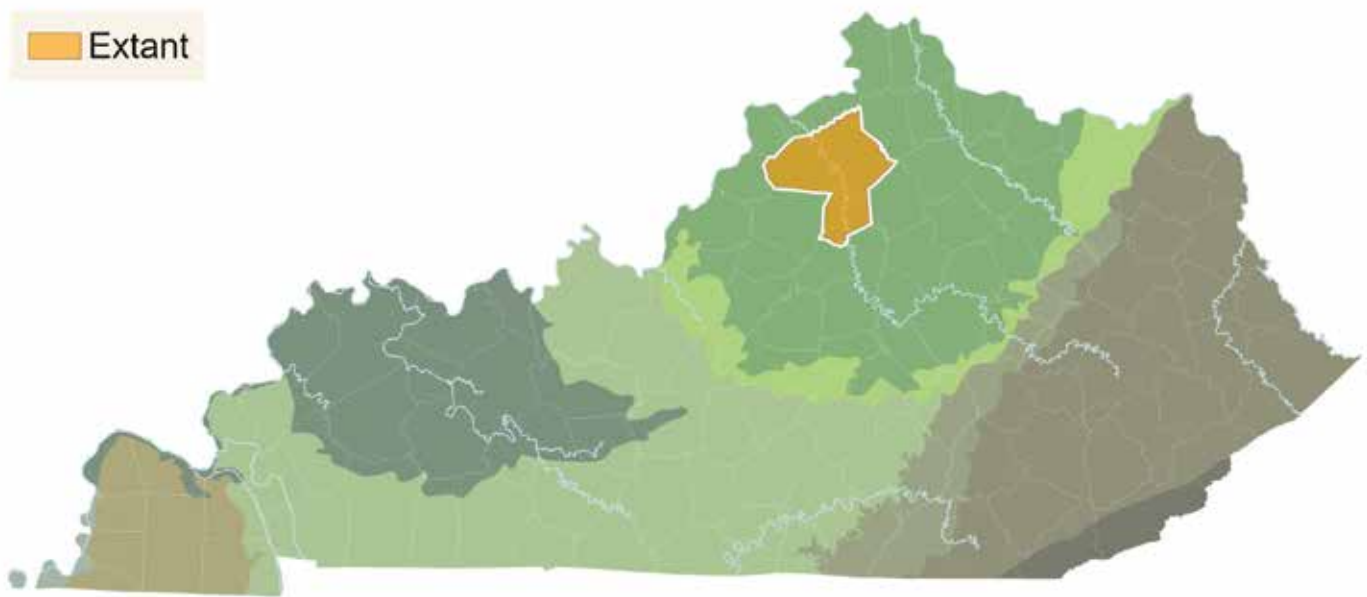








Photo: Dwayne Estes



CUMBERLAND SANDGRASS

(*Calamovilfa arcuata*)

Threats

-  Dams and Water Management/Use
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Recreational Activities
-  Storms and Flooding

Conservation Actions

- Alliance and Partnership Development   
- Education and Awareness  
- Ex Situ Conservation      
- Invasive/Problematic Species Control  
- Resource and Habitat Protection     
- Species Reintroduction      

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey, assess, conserve and restore this globally rare grass along river scour in Kentucky.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Guilds: Grassland/Savannah, River/Streams

This perennial grass grows in full sun areas along cobble and boulders bars with other grasses and forbs. It occurs in the Cumberland Plateau Riverscour prairie (S1S2/GNR) community.

Range Map

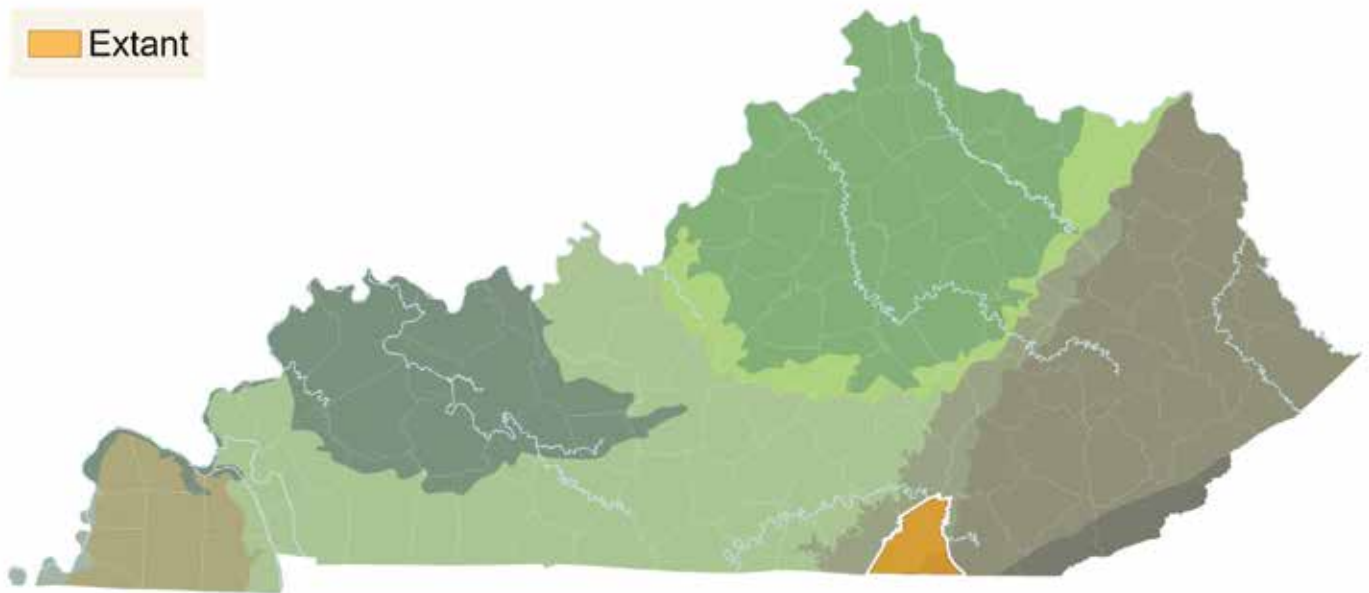


Photo: Tara Littlefield



EPIPHYTIC SEDGE

(*Carex decomposita*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3G4

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore this globally rare wetland plant in Kentucky.








Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland

This perennial obligate, wetland sedge grows in bottomland swamps, often at the base of bald cypress trees and other vegetation, but also on the edges of upland depression ponds and marshes. It grows in various wetland communities such as wet depression/sinkhole forest (S1S2/GNR), sinkhole/depression marsh (S1S2/G3G4), bottomland marsh (S1S2, GNR), bald-cypress - Water tupelo forest (S1/G3G5) and Buttonbush shrub swamp (S2S3/G3).

Threats

-  Annual and Perennial Nontimber Crops
-  Droughts
-  Habitat Shifting and Alteration
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Storms and Flooding

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness    
- Ex Situ Conservation    
- Land/Water Management  
- Land/Water Protection  
- Species Reintroduction    

Needs

Survey: Status surveys

Survey: Surveys for new populations

Research: Life history, ecology, genetic research

Research: Propagation and translocation research

Management: Develop and implement best management practices

Range Map

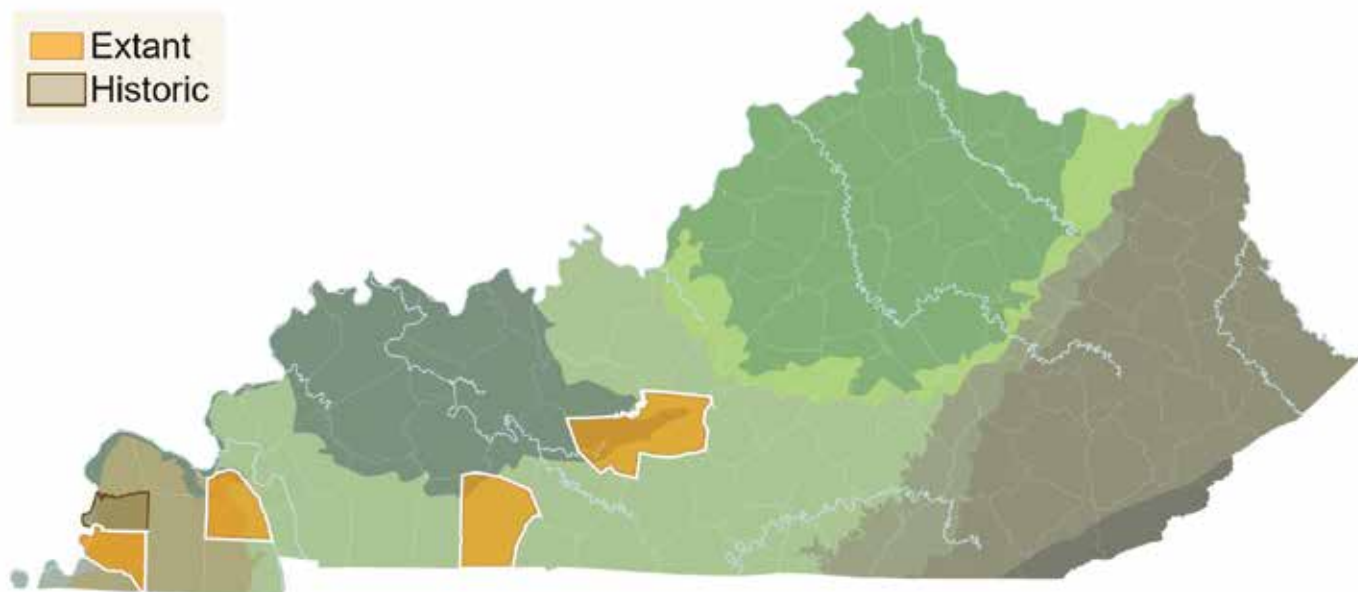









Photo: Tara Littlefield



JUNIPER SEDGE

(*Carex juniperorum*)

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Natural System Modifications

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation     
- Invasive/Problematic Species Control 
- Land/Water Management   
- Species Reintroduction     

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore this globally rare prairie plant in Kentucky.

Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Grassland/Savannah

This perennial sedge occurs in dry, shale and limestone sloped glades with a unique assemblage of plants. It needs full sun and some level of disturbance, from edaphic or fire, to persist. It occurs in the Bluegrass Cat Prairie (S1/G1) community type.

Range Map

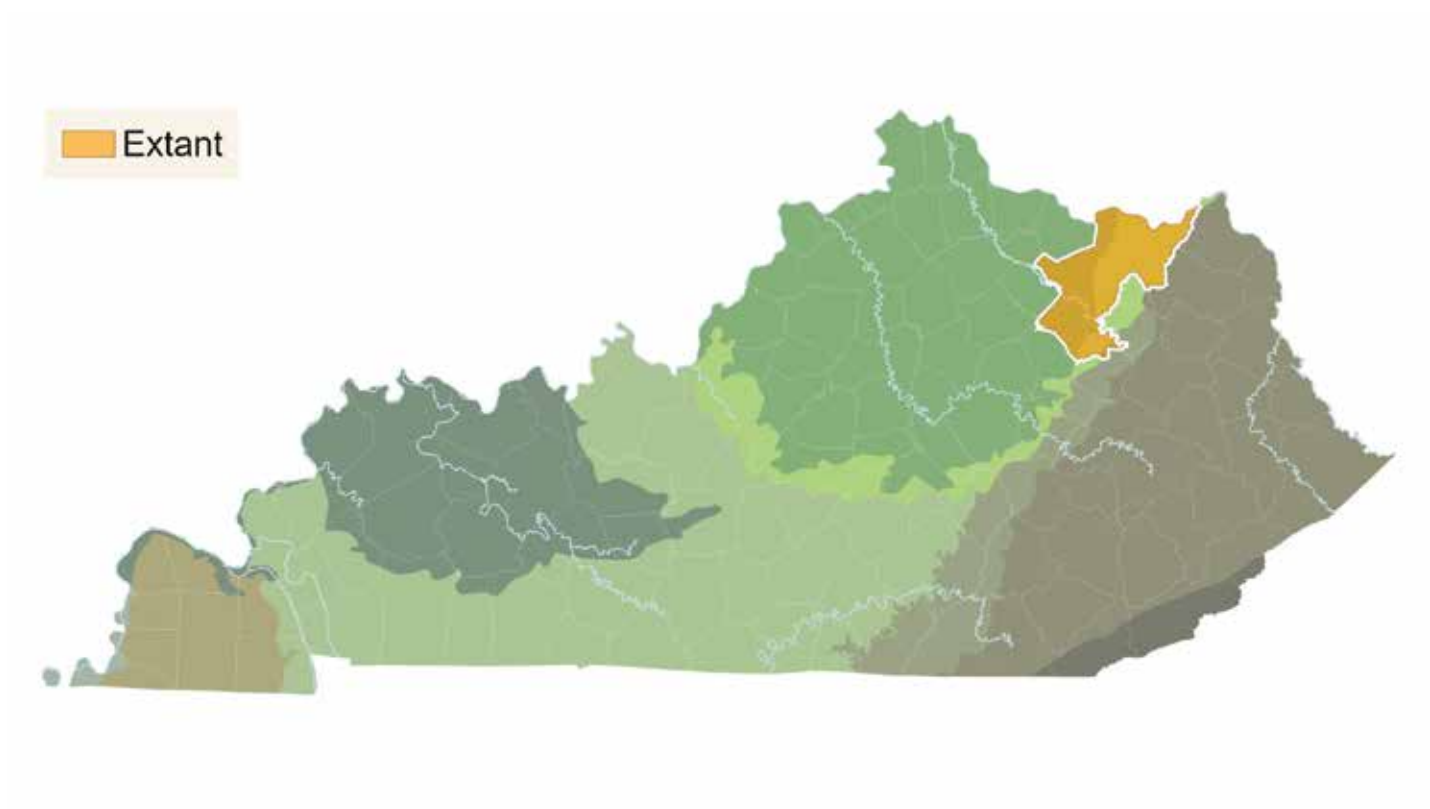








Photo: Alan Weakley



ROAN MOUNTAIN SEDGE

(*Carex roanensis*)

Threats

-  Energy Production and Mining
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Mining and Quarrying
-  Recreational Activities

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness    
- Ex Situ Conservation    
- Land/Water Management    
- Land/Water Protection    
- Species Reintroduction    

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare sedge.

Habitat Associations

Physiographic Regions: Cumberland Mountains

Guilds: Mesic Forest, Xeric Forest

This perennial sedge grows in open acidic soils in Kentucky's highest elevation mountains. It grows in higher elevation mountains in the Appalachian sub-xeric forest (S5/GNR) community type.

Range Map

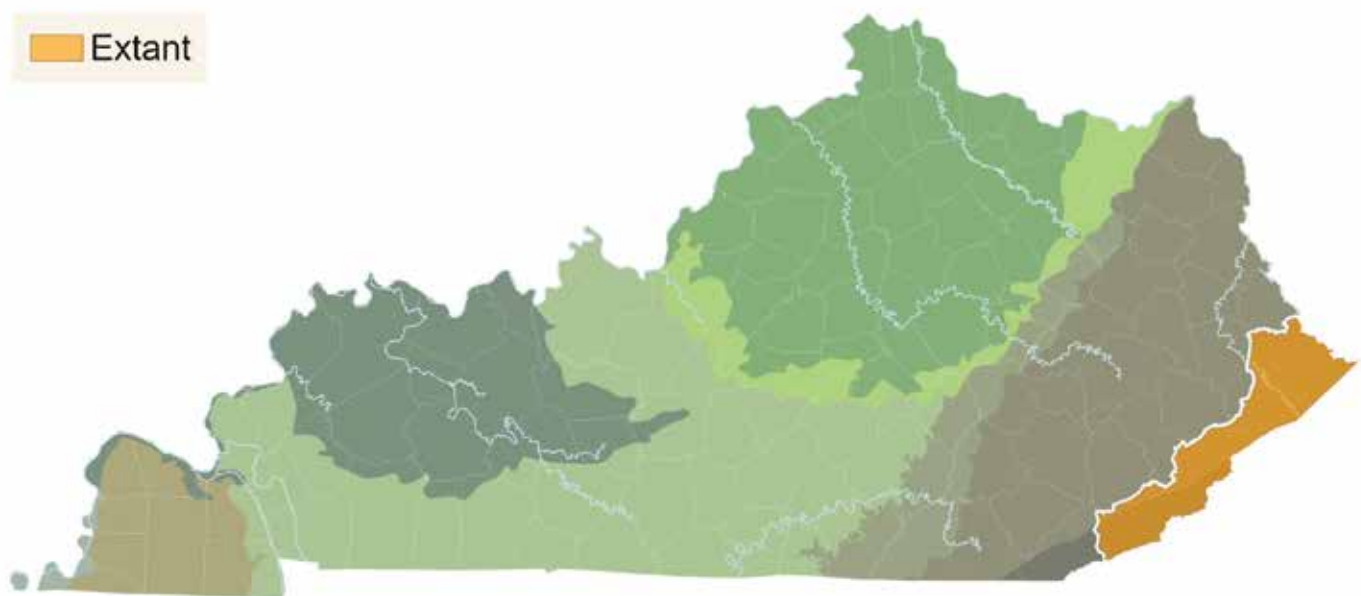


Photo: Theo Witsel



TIMID SEDGE

(*Carex timida*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2G4

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare forest plant.






Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Interior Plateau

Guilds: Mesic Forest, Xeric Forest

This perennial sedge grows in calcareous forests from dry to more mesic conditions. It has been noted to grow most abundantly in forests that have been grazed for many years. It occurs in sub-xeric to sub-mesic calcareous forests in habitats most similar to the calcareous sub-xeric forest (S5/GNR) and calcareous sub-xeric forest (S5/GNR) community types.

Threats

-  Annual and Perennial Nontimber Crops
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Natural System Modifications

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness     
- Ex Situ Conservation     
- Land/Water Management  
- Land/Water Protection    
- Species Reintroduction     

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Range Map

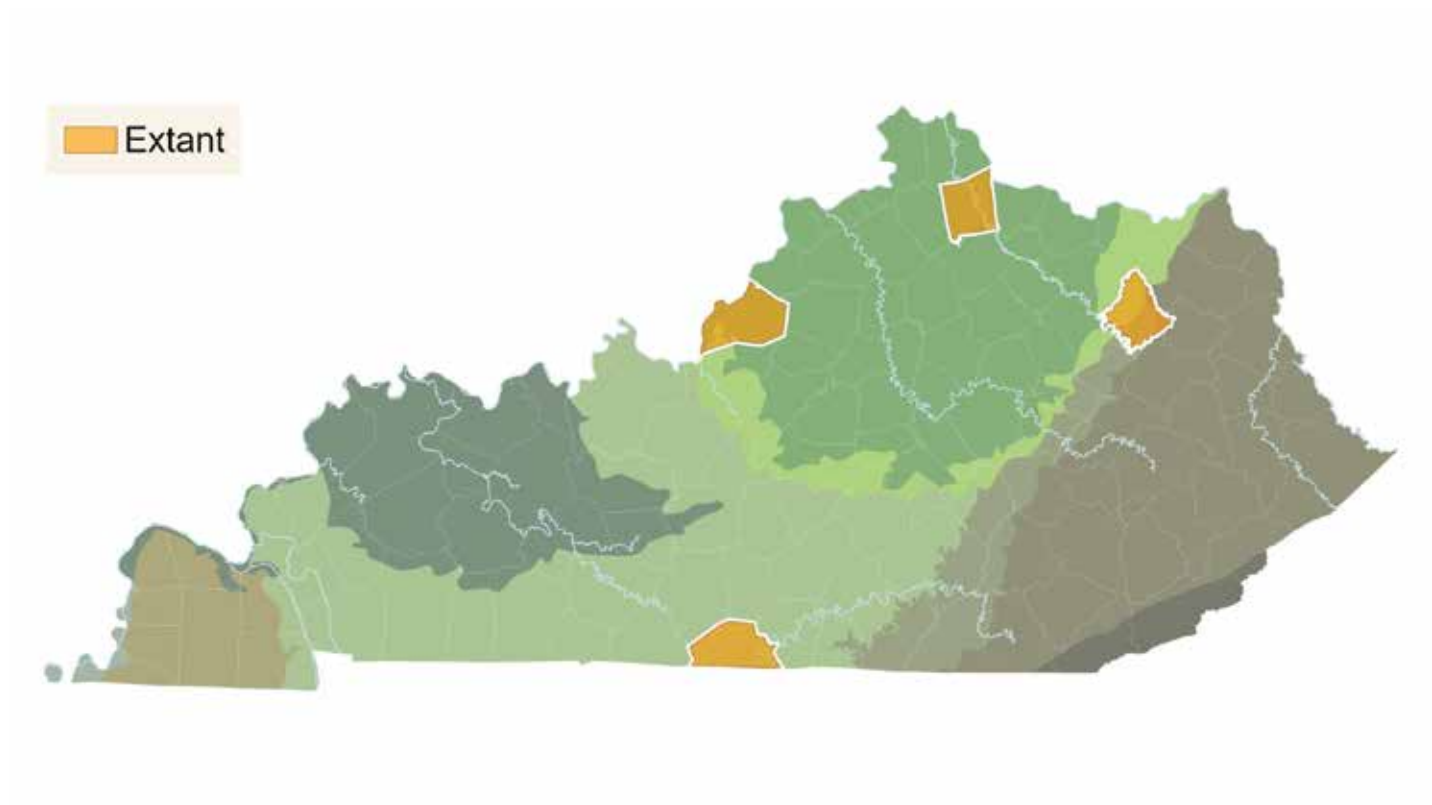


Photo: Theo Witsel



SAVORY

(*Clinopodium glabellum*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3Q

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Grassland/Savannah, Xeric Forest

Usually found in calcareous rocky woodlands; Xeric red cedar - oak forest/woodland (S5/GNR) and limestone prairie; Limestone/dolomite prairie (S1/G2G3).

Range Map

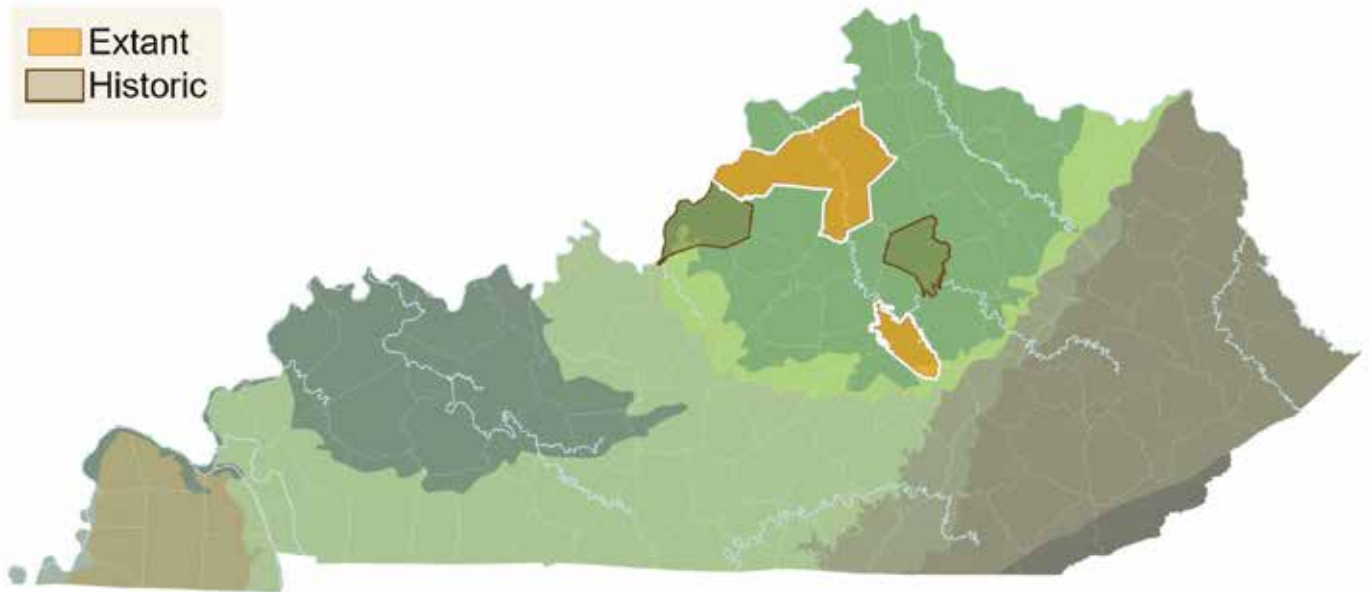


Photo: Tara Littlefield



WHORLED HORSE-BALM

(*Collinsonia verticillata*)

Threats

Unknown

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3G4

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

None

Habitat Associations

Physiographic Regions: Cumberland Mountains

Guilds: Mesic Forest

mesic to sub xeric slopes, White pine - mixed forest (S3/G4),

Range Map

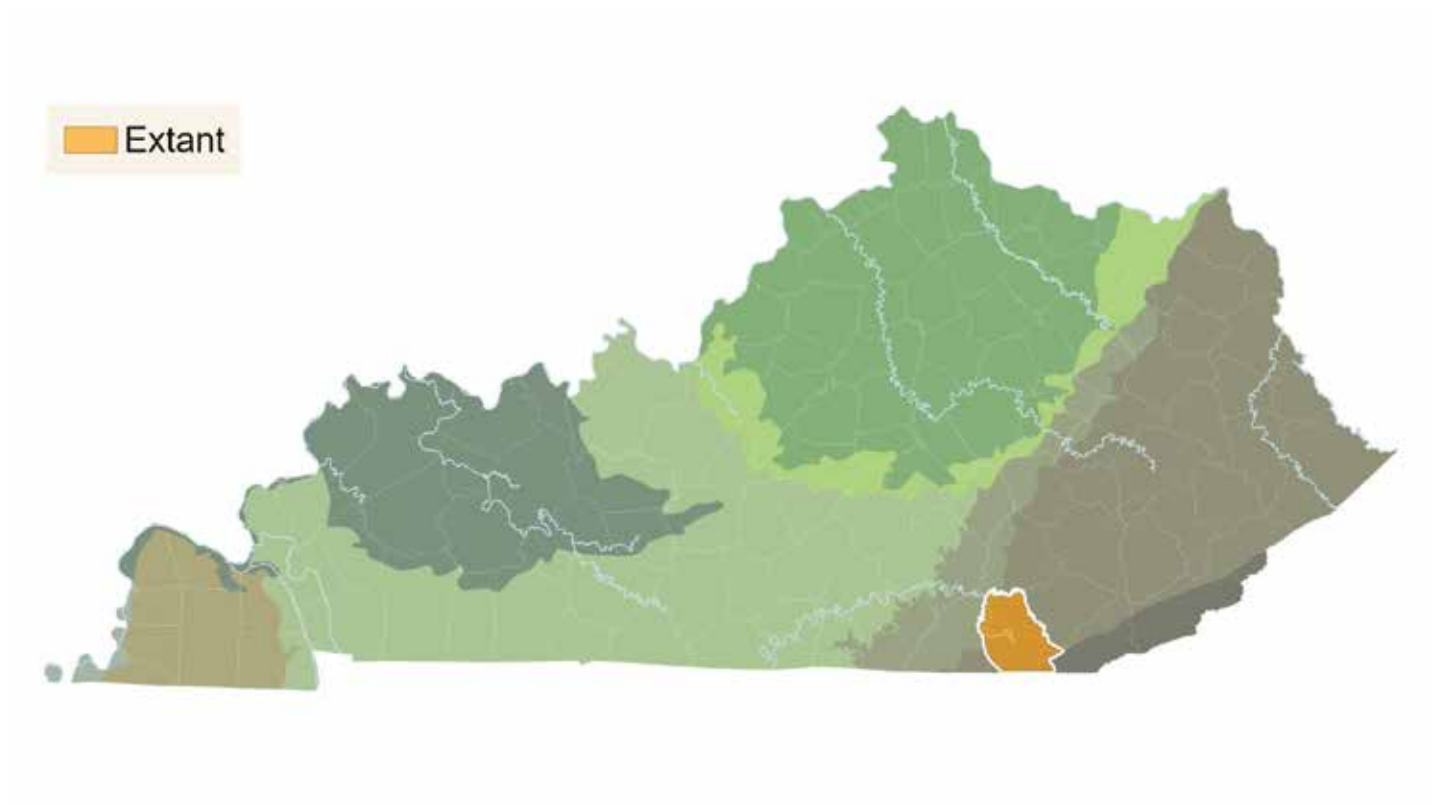









Photo: Marc Evans



CUMBERLAND ROSEMARY

(*Conradina verticillata*)

Threats

-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Invasive Non-native/Alien species
-  Natural System Modifications
-  Recreational Activities
-  Storms and Flooding
-  Tourism and Recreation Areas

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness     
- Ex Situ Conservation     
- Land/Water Management  
- Land/Water Protection     
- Species Reintroduction     

Needs

Survey: Status Surveys

Research: Life history, ecology, genetic research

Research: Translocation research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: Threatened

IUCN Red List: N/A

Conservation Goal

Survey, assess, conserve and restore this federally threatened shrub along Cumberland plateau river scour in Kentucky.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Guilds: Grassland/Savannah, River/Streams

Occurs in Appalachian sub-xeric forest (S5/GNR)
and Appalachian mesophytic forest (S4S5/GNR)
communities.

Range Map

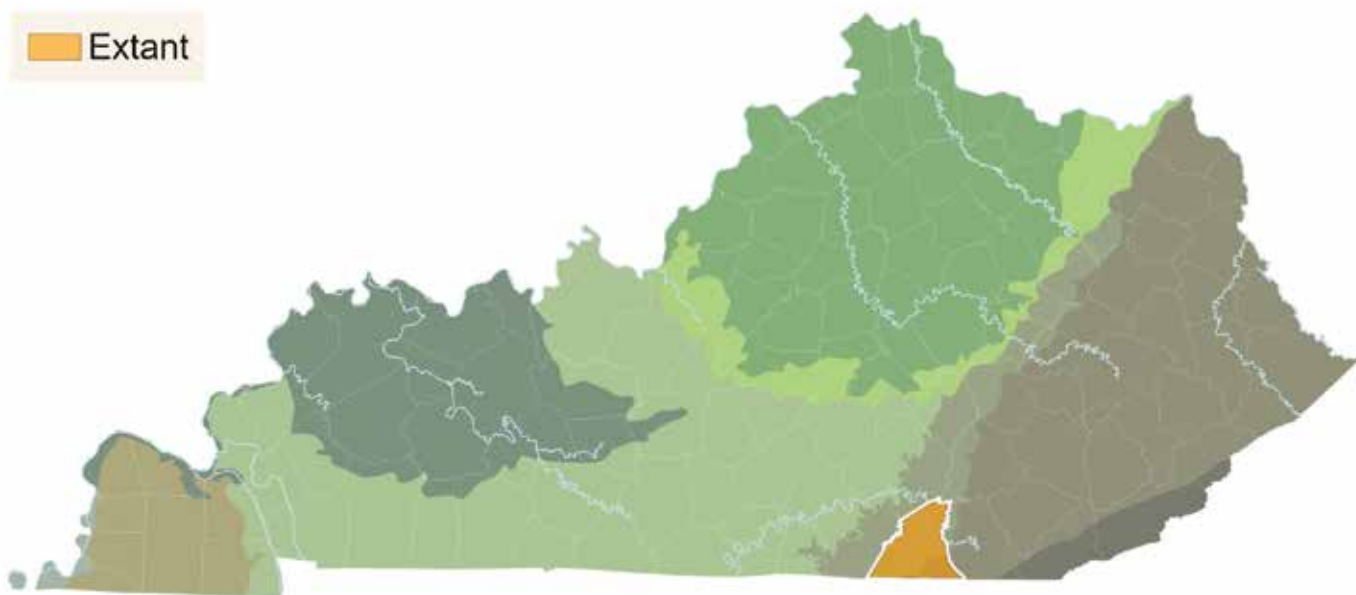











Photo: Tara Littlefield





































KENTUCKY LADY'S-SLIPPER

(*Cypripedium kentuckiense*)

Threats

-  Annual and Perennial Nontimber Crops
-  Dams and Water Management/Use
-  Gathering Terrestrial Plants
-  Habitat Shifting and Alteration
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Roads and Railroads
-  Storms and Flooding

Conservation Actions

- Alliance and Partnership Development     
-  Ex Situ Conservation      
- Land/Water Management     
- Land/Water Protection     
- Species Reintroduction      
- Training      

Needs

Survey: Status Survey

Survey: Surveys for new populations or habitat

Research: Life history, pollination and mycorrhizal research

Management: Site protection

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1S2

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Conservation Goal

Protect existing populations, work with federal and state agencies as well as private landowners on population monitoring, management and recovery, survey additional habitat for undocumented populations, and increase ex situ conservation and translocations of this globally rare forest species.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment

Guilds: Mesic Forest, Floodplain/Sandbar

This mycotrophic (symbiotic association with fungi) perennial species grows on terraces above larger rivers or along the riparian areas in scour zones of streams. Occasional disturbance from scouring events from rivers and streams helps maintain more open understory and shrub conditions and reduce competition. It prefers mature forests and is sensitive to canopy disturbance. It occurs in high quality riparian forest (S5, GNR) and small scour stream (S4, GNR) communities along large rivers and streams.

Range Map

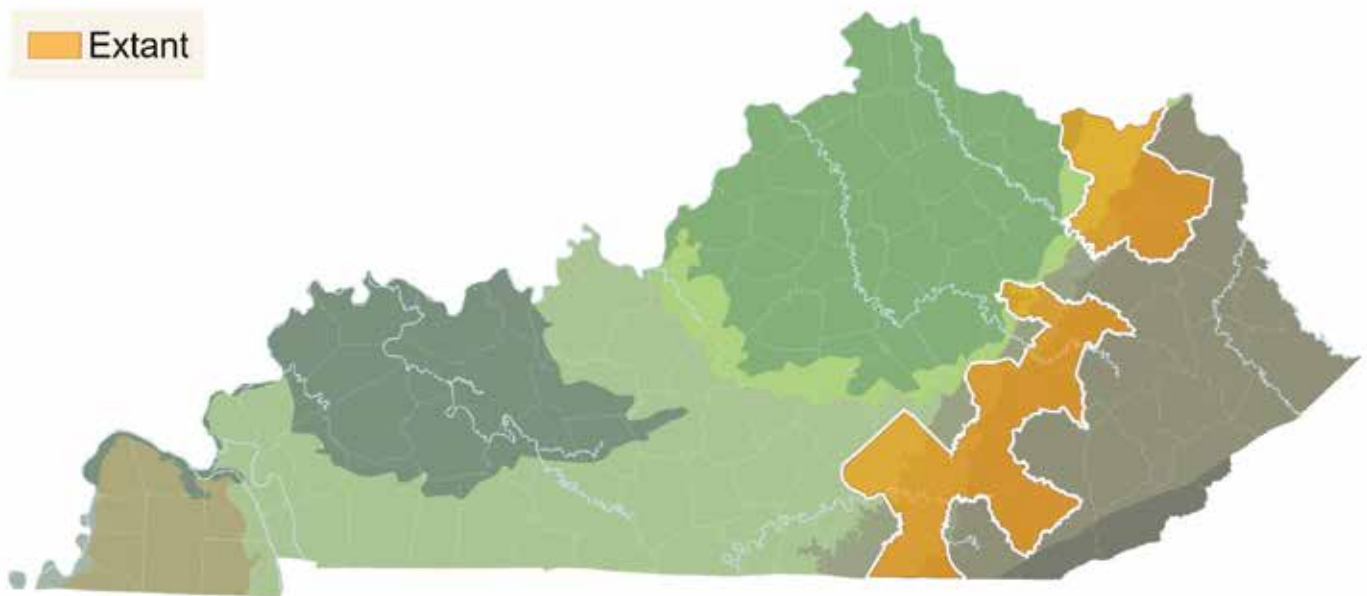




Photo: Devin Rodgers

CREAM TICK-TREFOIL

(*Desmodium ochroleucum*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect existing populations, work with federal and state agencies as well as private landowners on population monitoring, management and recovery, survey additional habitat for undocumented populations, and increase ex situ conservation and translocations of this globally rare species.







Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills

Guilds: Grassland/Savannah

This low growing perennial bean grows in rocky calcareous prairie soils. This species is restricted to high quality Limestone/dolomite prairie (S1/G2G3) and Limestone Slope Glade (S1, G2G3) communities.

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Natural System Modifications

Conservation Actions

- Alliance and Partnership Development   
- Education and Awareness     
- Ex Situ Conservation   
- Land/Water Management 
- Site/Area Protection   
- Species Reintroduction  

Needs

Survey: Status Surveys

Survey: Surveys for new population

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Range Map

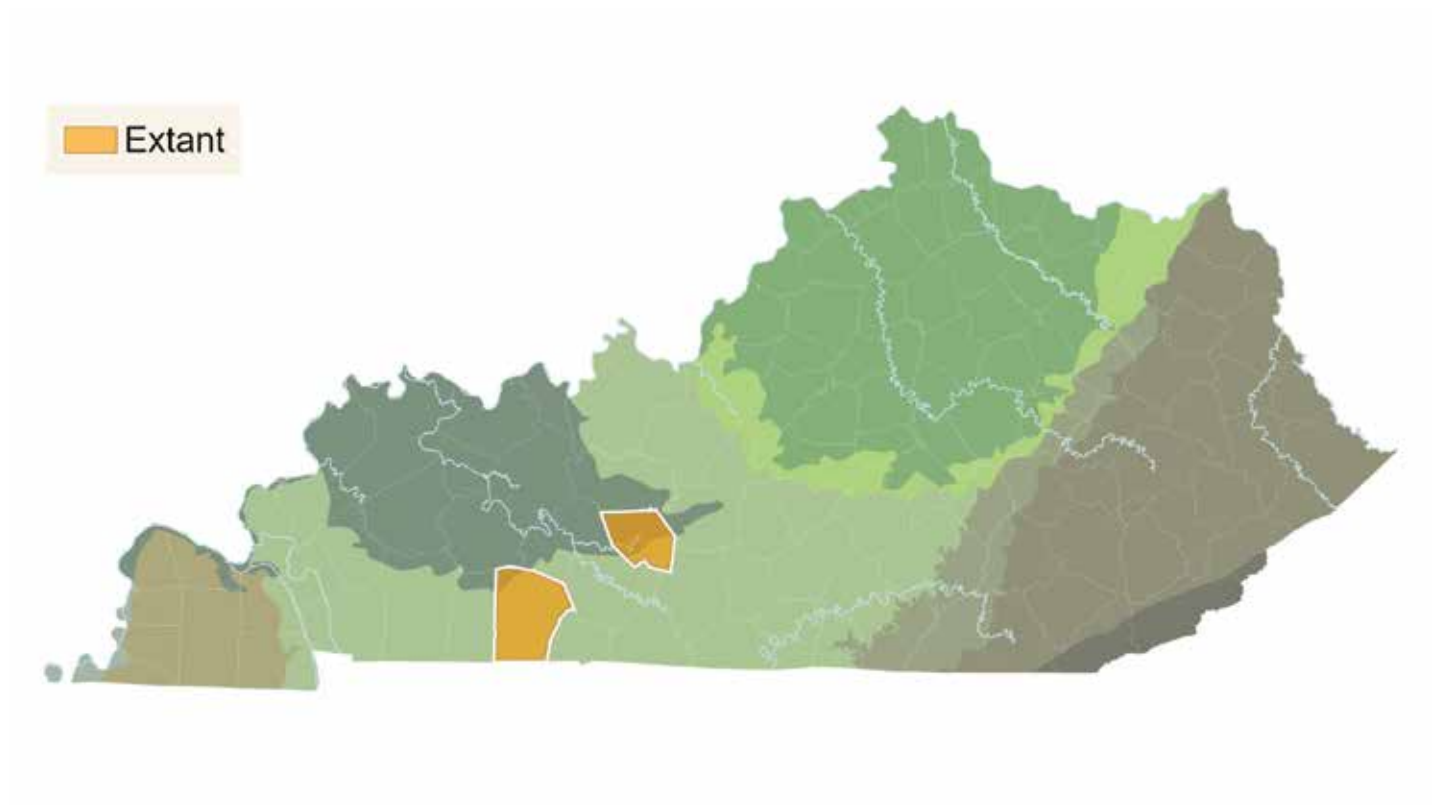


Photo: Mark Taylor



HARPER'S WILD FLEABANE

(*Eriogonum harperi*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G4T2

S Rank: SH

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Increase baseline surveys on private and public lands in the Interior Plateau in order to locate populations and begin conservation efforts. Network with regional partners for seed banking and translocation efforts to restore populations in the future.






Habitat Associations

Physiographic Regions: Interior Plateau








Guilds: Grassland/Savannah

This perennial member of the buckwheat family grows in high quality limestone rocky soils. It is restricted to high quality limestone/dolomite prairie (S1/G2G3) and Interior Low Plateau post oak barrens (S2/G2G3) communities.

Threats

-  Fire and Fire Suppression
-  Habitat Shifting and Alteration
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting

Conservation Actions

- Education and Awareness     
- Species Reintroduction     

Needs

Survey: Baseline surveys to locate populations

Range Map

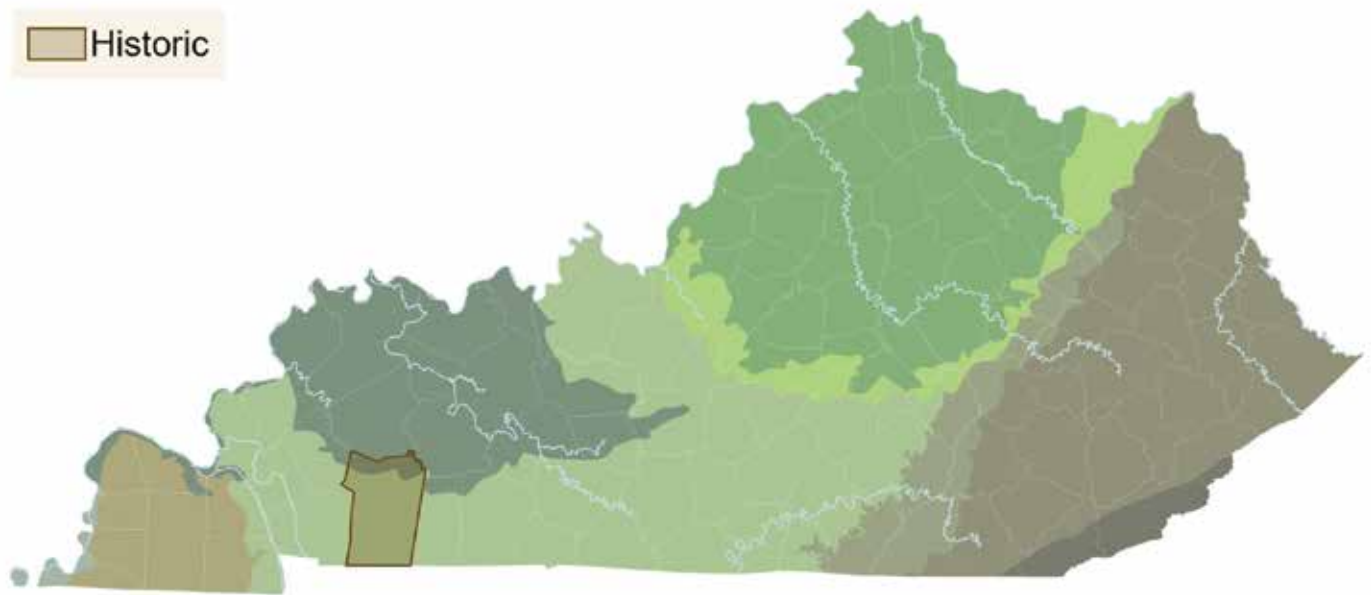








Photo: Tara Littlefield



ROCKCASTLE ASTER

(*Eurybia saxicastellii*)

Threats

-  Climate Change and Severe Weather
-  Dams and Water Management/Use
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Recreational Activities

Conservation Actions

- Alliance and Partnership Development  
- Education and Awareness    
- Ex Situ Conservation     
- Invasive/Problematic Species Control 
- Land/Water Protection     
- Species Reintroduction    

Needs

Survey: Status surveys

Research: Life history, ecology, genetic research

Management: Development and implementation of best management practices

Management: Invasive species management

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G1G2

S Rank: S2

Federal Status: Not Listed

IUCN Red List: N/A

Conservation Goal

Survey, assess, conserve and restore this globally rare plant along plateau river scour in Kentucky.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Guilds: Grassland/Savannah, River/Streams, Scrub-Shrub/Early Successional Forest

This perennial species occurs on the backside of cobble bars, in transition from open boulder-cobble bars to adjacent slope forest. It occurs in the state endangered and globally rare Cumberland Plateau Riverscours prairie (S1S2/GNR) community.

Range Map

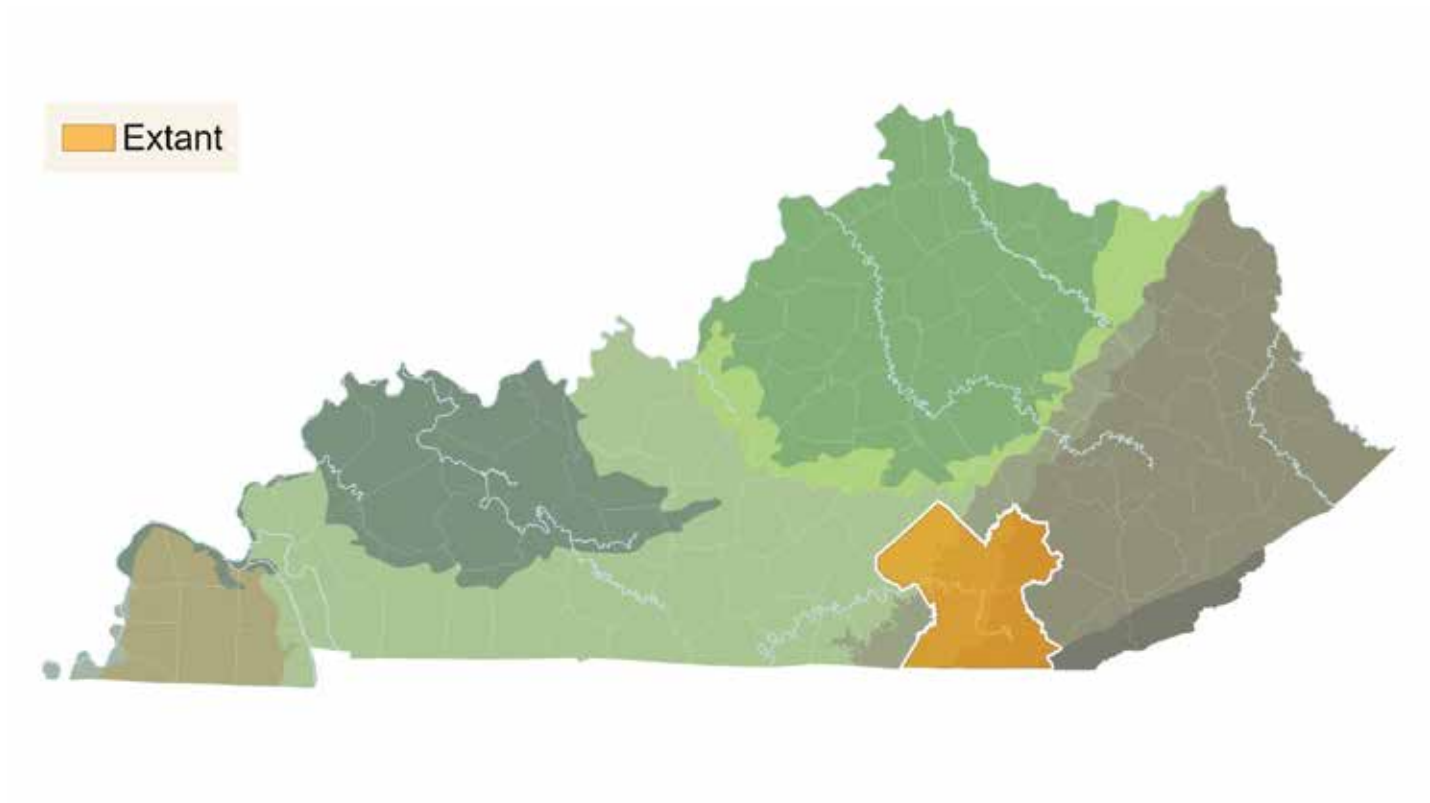








Photo: Keith Bradley



HARPER'S FIMBRY

(*Fimbristylis perpusilla*)

Threats

-  Annual and Perennial Nontimber Crops
-  Dams and Water Management/Use
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Storms and Flooding

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness   
- Ex Situ Conservation    
- Invasive/Problematic Species Control 
- Land/Water Protection    
- Species Reintroduction     

Needs

Survey: Status surveys

Survey: Surveys for new populations

Research: Life history, ecology, genetic research

Research: propagation and translocation research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2

S Rank: S1?

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey, assess, conserve and restore this globally rare plant in Kentucky.

Habitat Associations

Physiographic Regions: Interior Plateau, Mississippi Valley Loess Plain

Guilds: Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar

This annual wetland sedge grows along exposed lake and river shores on mud flats. It has been documented to have large population fluctuations tied to climate (precipitation and temperature). It occurs along Mud flat (S5, GNR) communities along lakeshores and large rivers.

Range Map

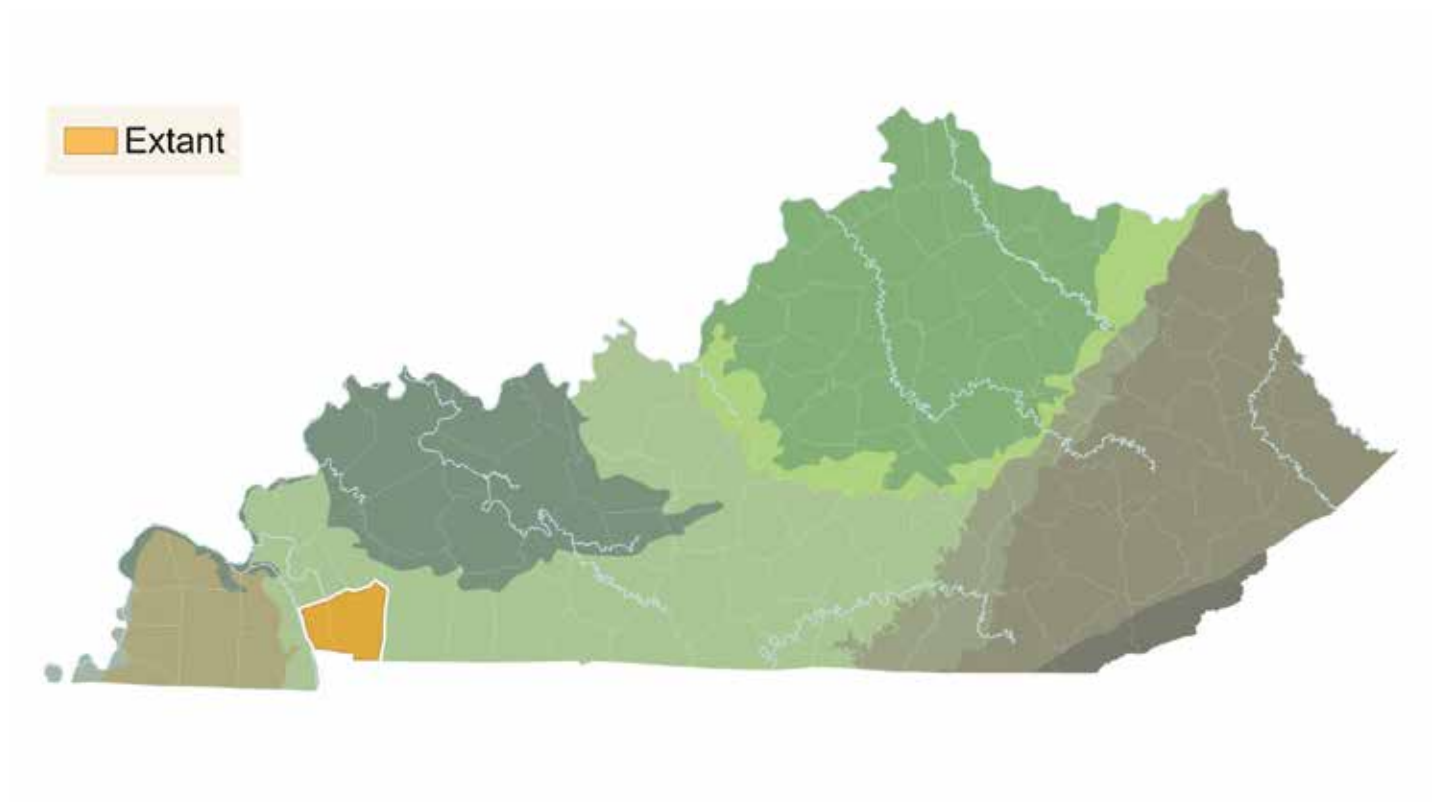


Photo: Tara Littlefield



ROSE MOCK-VERVAIN

(*Glandularia canadensis*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Work with partners on taxonomic research and descriptions; protect, manage and restore the remaining populations of this globally rare species.







Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Cliff/Rockshelter, Mesic Forest

This annual to short lived perennial tends to grow in the woodland edges of shale slopes and bluffs. It grows in calcareous shales south facing rocky forests/woodlands above large rivers and is most similar to xeric red cedar - oak forest/woodland (S5, GNR) and Calcareous sub-xeric forest (S5/GNR) community types.

Threats

-  Annual and Perennial Nontimber Crops
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Storms and Flooding

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation     
- Land/Water Protection     
- Species Reintroduction     

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Range Map

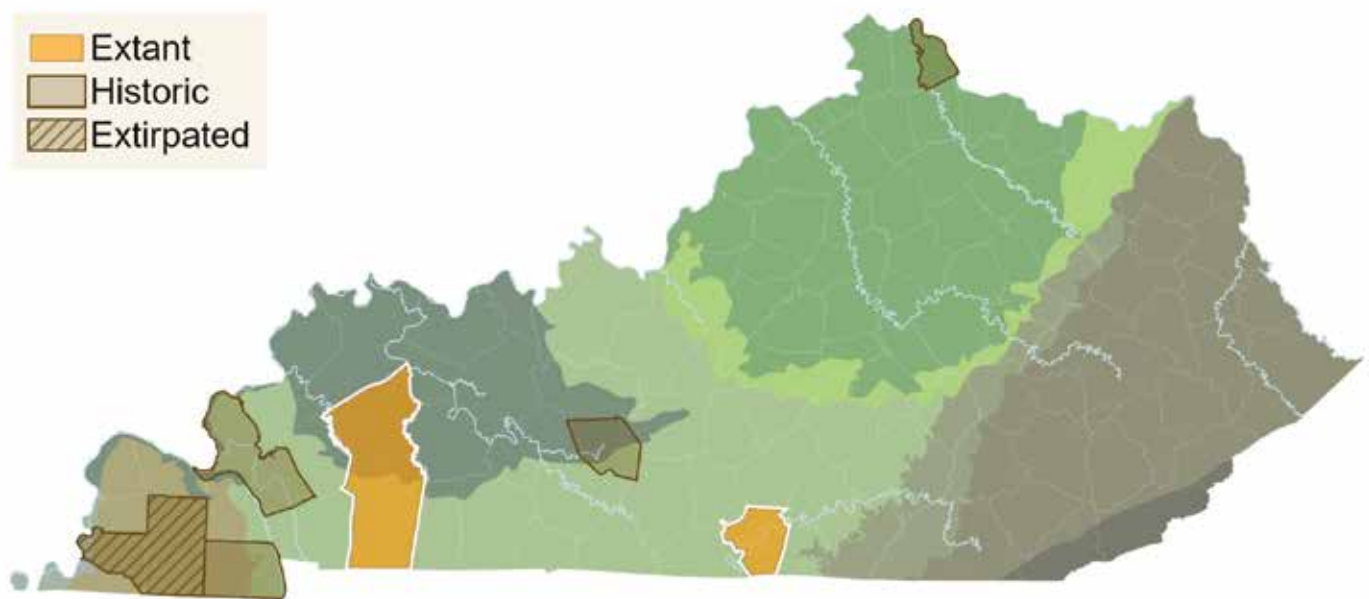


Photo: Tara Littlefield



QUARTERMAN'S HEDGE-HYSSOP

(*Gratiola quartermaniae*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare plant.








Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Grassland/Savannah, Open Wetland

This annual plant occurs in wet flat rock areas and depressions created by seeps/springs, precipitation, and historically in wallows/disturbance created by large migrating ungulates. It grows in wet, thin muddy areas and the habitat is controlled by edaphic conditions as well as hydrology and other disturbances. This species grows in wet limestone flat rock glade areas, and an undescribed wetland community that is a subtype under limestone flat rock glade (S1/G3). It may also have been associated with edges of upland depression ponds.

Threats

-  Annual and Perennial Nontimber Crops
-  Droughts
-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Natural System Modifications

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation    
- Land/Water Management  
- Site/Area Protection    
- Species Reintroduction     

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Range Map

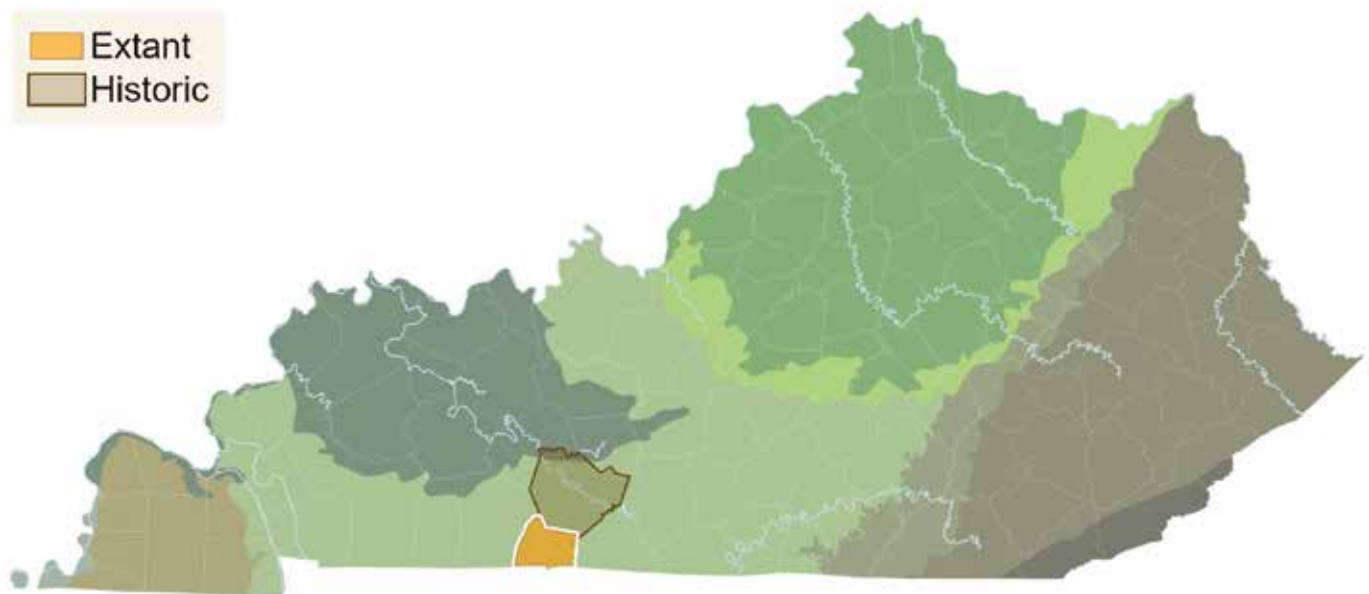









Photo: Nick Drozda
























EGGERT'S SUNFLOWER

(*Helianthus eggertii*)

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Roads and Railroads

Conservation Actions

- Alliance and Partnership Development     
-  Education and Awareness     
- Ex Situ Conservation  
- Land/Water Management  
- Land/Water Protection   
- Species Reintroduction   

Needs

Survey: Status Surveys

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Management: Management effects research

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S3

Federal Status: Delisted

IUCN Red List: N/A

Conservation Goal

Conserve, monitor, manage and recover populations of this globally rare sunflower.

Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Grassland/Savannah, Scrub-Shrub/Early Successional Forest

This perennial sunflower forms clonal patches and prefers edges and transition zones of open prairies and barrens. It grows in high quality Interior Low Plateau post oak barrens (S2/G2G3) communities.

Range Map

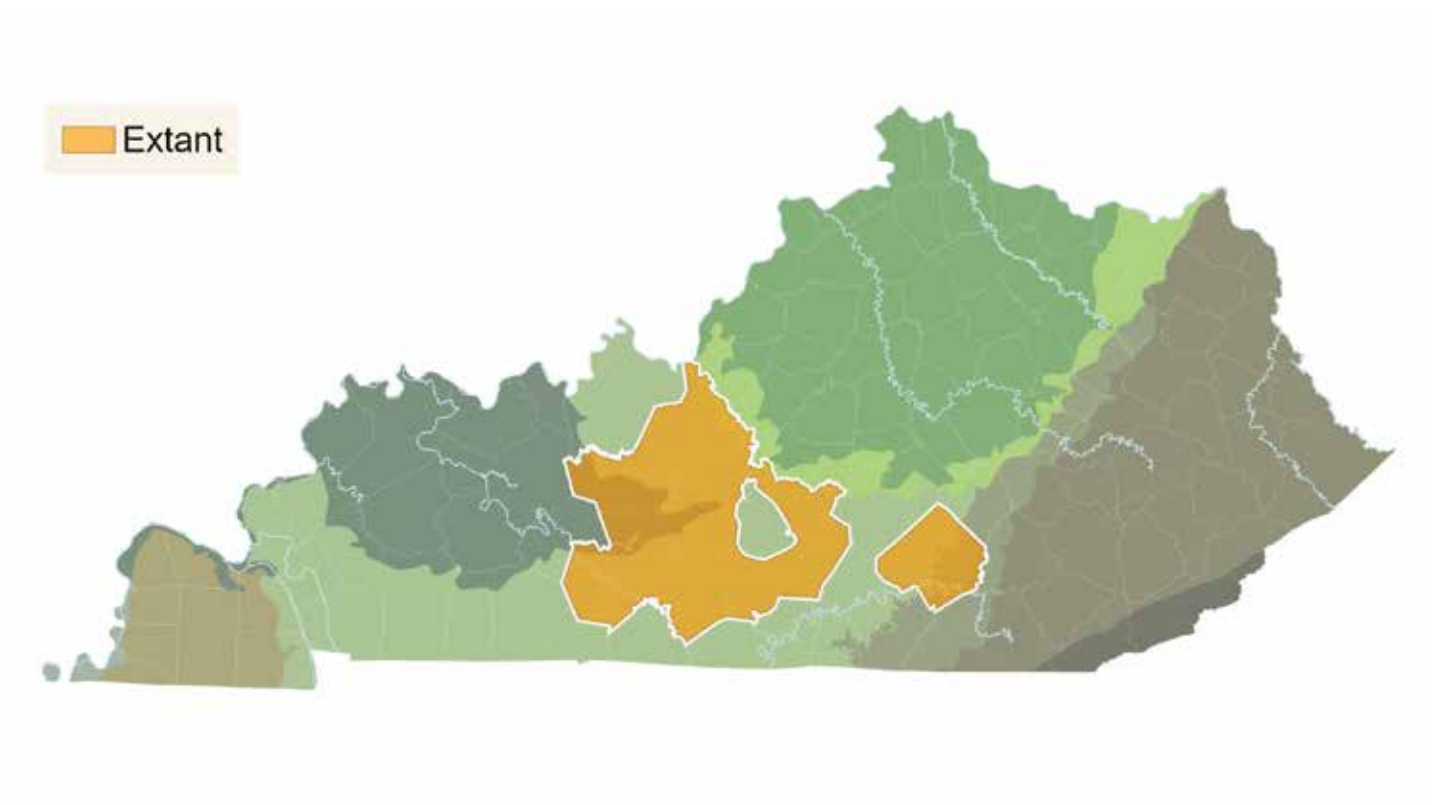








Photo: Tara Littlefield



SOUTHERN HEARTLEAF

(*Hexastylis contracta*)

Threats

-  Dams and Water Management/Use
-  Habitat Shifting and Alteration
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Recreational Activities

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness      
- Ex Situ Conservation      
- Land/Water Management      
- Land/Water Protection   
- Species Reintroduction      

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare forest plant.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Guilds: Mesic Forest

This perennial species grows along terraces and creek banks primarily in mature acidic hemlock mixed mesophytic forests. It is found in Appalachian mesophytic forest (S4S5/GNR) and Hemlock-mixed forest (S4S5/GNR) community types.

Range Map

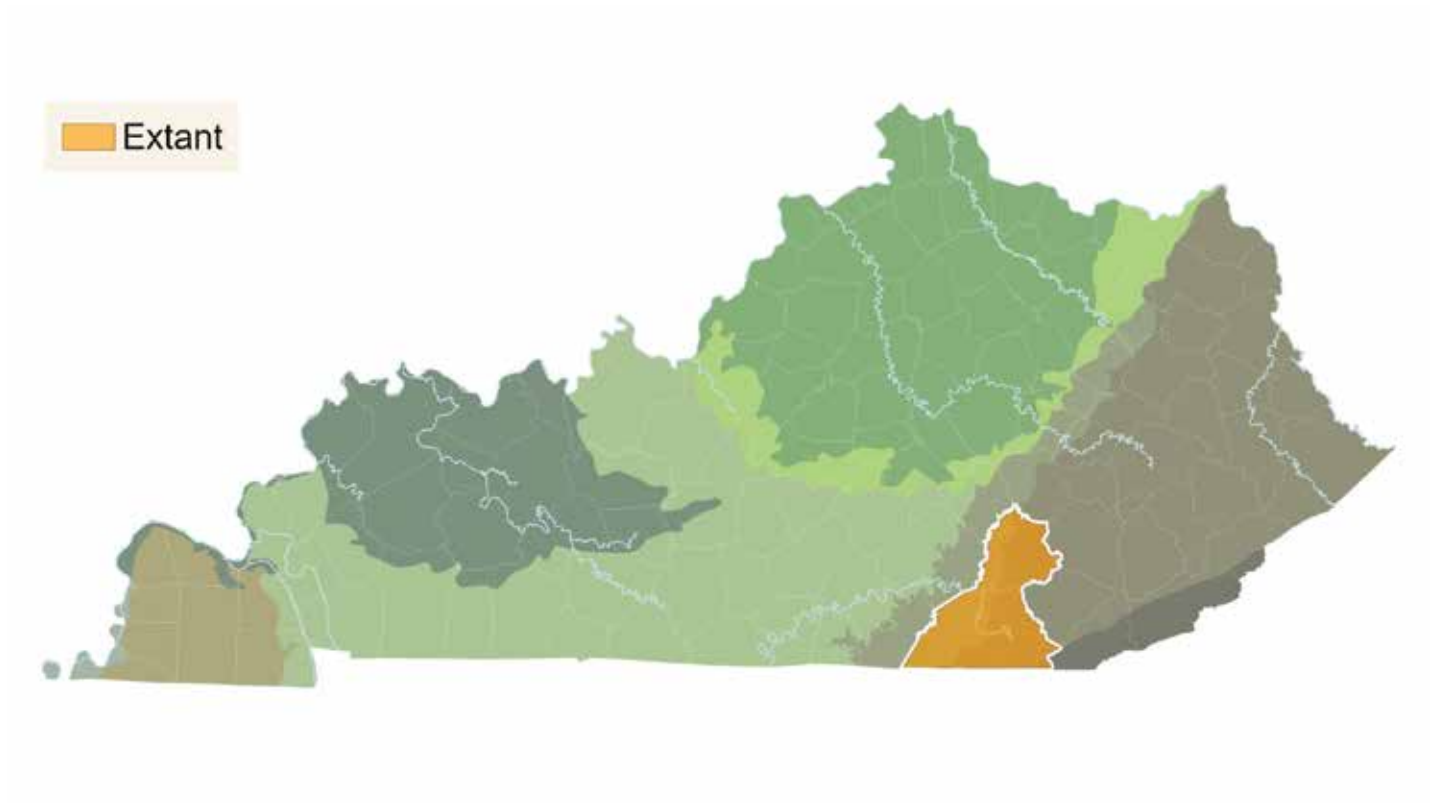




Photo: Tara Littlefield

KENTUCKY GLADECRESS

(*Leavenworthia exigua* var. *laciniata*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G4T1T2

S Rank: S1S2

Federal Status: Threatened

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this Kentucky endemic.








Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Grassland/Savannah

This annual species occurs on the outer edge of exposed dolomite glade outcrops in thin soils with little competing vegetation and also along disturbed animal trails within the dolomite glade habitat. It is thought to have had some association with historic megafauna such as bison. The species is restricted to high quality Outer bluegrass dolomite glade (S1/G1Q) communities.

Threats

-  Commercial and Industrial Areas
-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness    
- Ex Situ Conservation    
- Land/Water Management   
- Land/Water Protection     
- Species Reintroduction  

Needs

Survey: Status Surveys

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Range Map

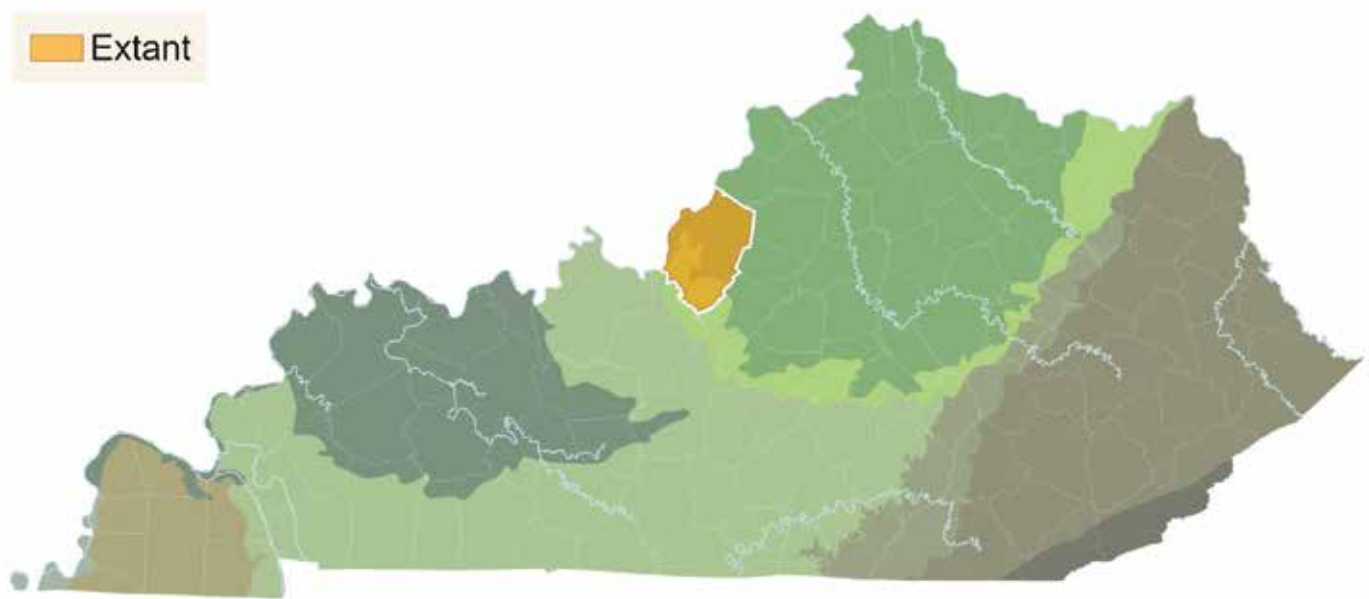


Photo: Tara Littlefield



BARBARA'S BUTTONS

(*Marshallia pulchra*)

Threats

- Climate Change and Severe Weather
- Dams and Water Management/Use
- Invasive Non-native/Alien species
- Recreational Activities
- Storms and Flooding
- Tourism and Recreation Areas

Conservation Actions

- Alliance and Partnership Development
- Education and Awareness
- Ex Situ Conservation
- Invasive/Problematic Species Control
- Land/Water Protection
- Species Reintroduction

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

To survey, assess, conserve and restore this globally rare plant along plateau river scour in Kentucky and region.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Guilds: Grassland/Savannah, River/Streams

This long-lived perennial species grows in full sun areas along cobble and boulders bars with other grasses and forbs and needs periodic disturbance

from the scouring of rivers. This species occurs in the state endangered and globally rare Cumberland Plateau Riverscour prairie (S1S2/GNR) community.

Range Map

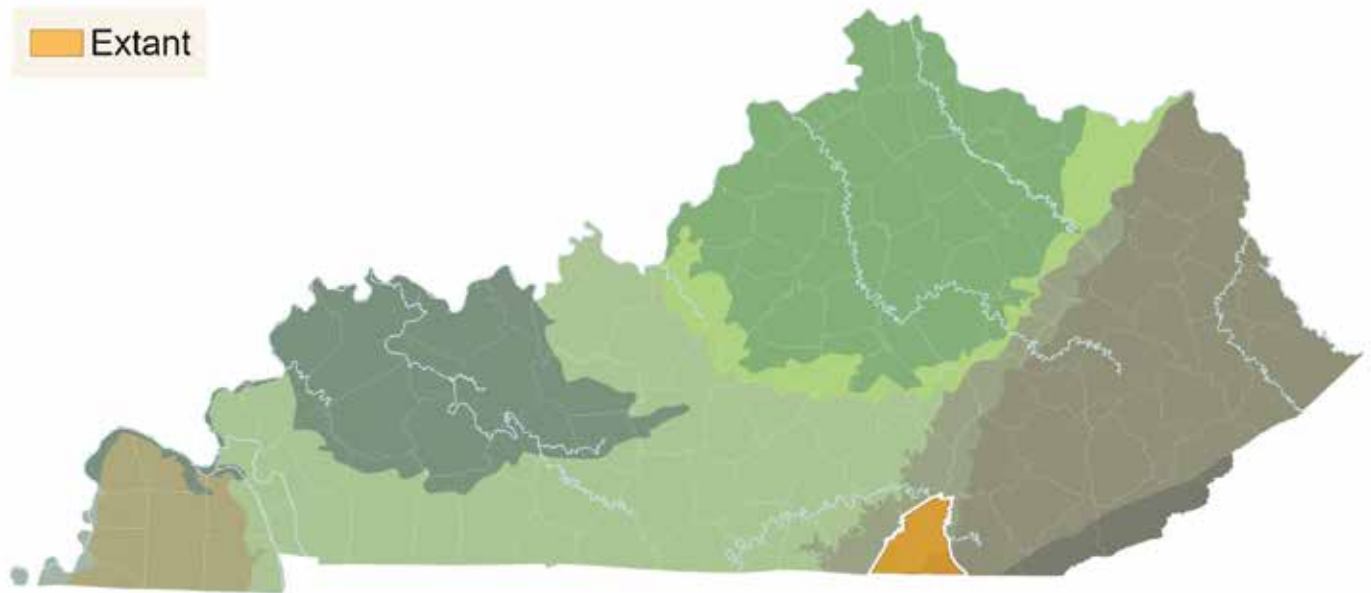
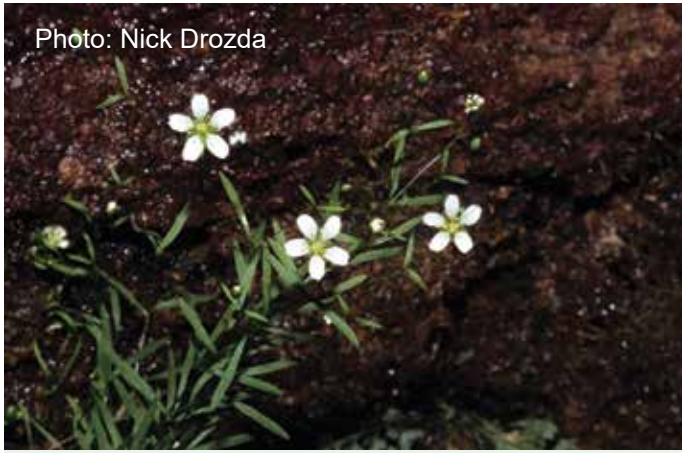


Photo: Nick Drozda



CUMBERLAND SANDWORT

(*Mononeuria cumberlandensis*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: Delisted

IUCN Red List: N/A

Conservation Goal

Conserve, monitor, manage and recover populations of this globally rare species.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Guilds: Cliff/Rockshelter

This annual species occurs at the dripline of dry to mesic/wet sandstone rockhouses. This species grows in sandstone rockshelters and the base of sandstone clifflines from dry sandstone cliff/outcrop/rockhouse (S5/GNR) to Cumberland Plateau wet rockhouse (S3/G2) communities.

Threats

- Droughts
- Habitat Shifting and Alteration
- Invasive Non-native/Alien species
- Logging and Wood Harvesting
- Recreational Activities
- Tourism and Recreation Areas

Conservation Actions

- Alliance and Partnership Development
- Education and Awareness
- Ex Situ Conservation
- Invasive/Problematic Species Control
- Land/Water Protection
- Species Reintroduction

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Translocation research

Management: Develop and implement best management practices

Range Map

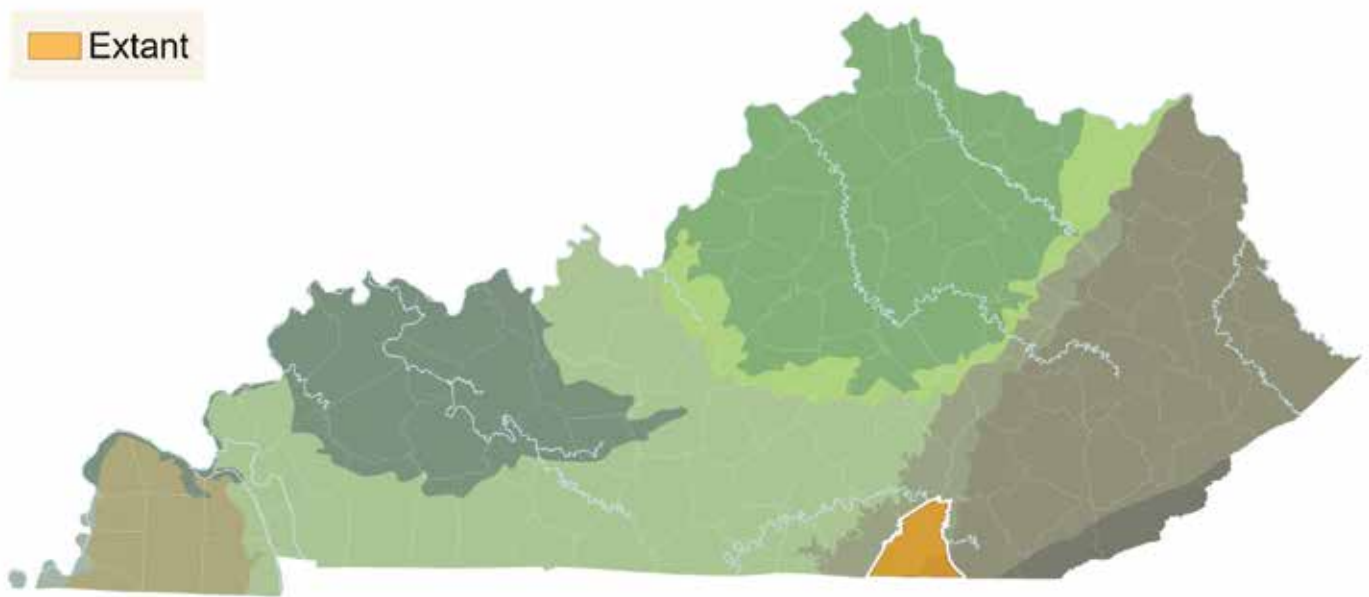


Photo: Tara Littlefield



SWEET PINESAP

(*Monotropsis odorata*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare plant.






Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment

Guilds: Xeric Forest

This small perennial plant grows in dry upland pine oak forests where it shares its dependence of mycorrhizal fungi with nearby upland oaks and is thought to benefit from occasional fire. It grows in upland Xeric Virginia pine forest/woodland (S5/GNR) and Appalachian sub-xeric forest (S5/GNR) communities.

Threats

-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Recreational Activities

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness    
- Ex Situ Conservation    
- Land/Water Management  

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Range Map

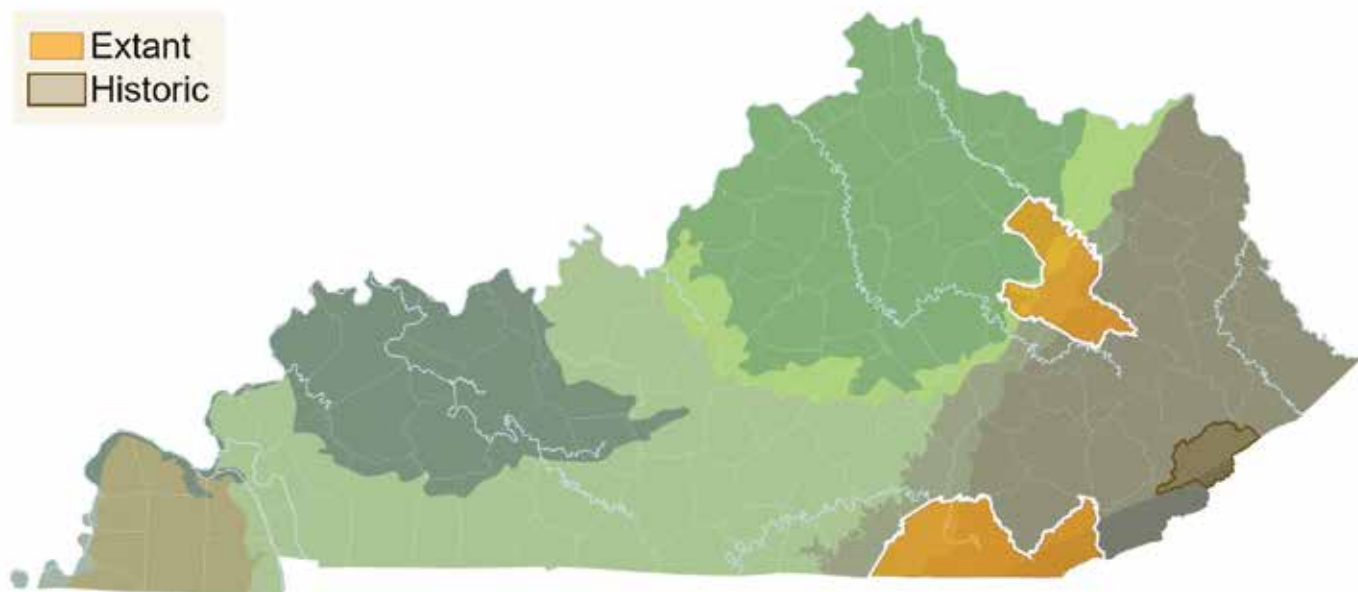








Photo: Devin Rodu



BARBED RATTLESNAKE-ROOT

(*Nabalus barbatus*)

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Natural System Modifications
-  Roads and Railroads

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation     
- Site/Area Protection  
- Species Management     
- Species Reintroduction   

Needs

Survey: Status Surveys

Survey: Surveys for new populations

Research: Life history and ecology research

Research: Management effects research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

To conserve the extant roadside population, increase ex situ conservation efforts, survey for new populations, work with partners to restore nearby suitable habitat, and introduce and recover this perennial forb in Kentucky and range wide.

Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Grassland/Savannah

This perennial species needs more full sun to flower but can persist in vegetative state within more closed barrens or forests. It occurs on calcareous to more neutral soils. It is restricted to high quality Limestone/dolomite prairie (S1/G2G3) and post oak barrens (S1/G2G3) communities.

Range Map

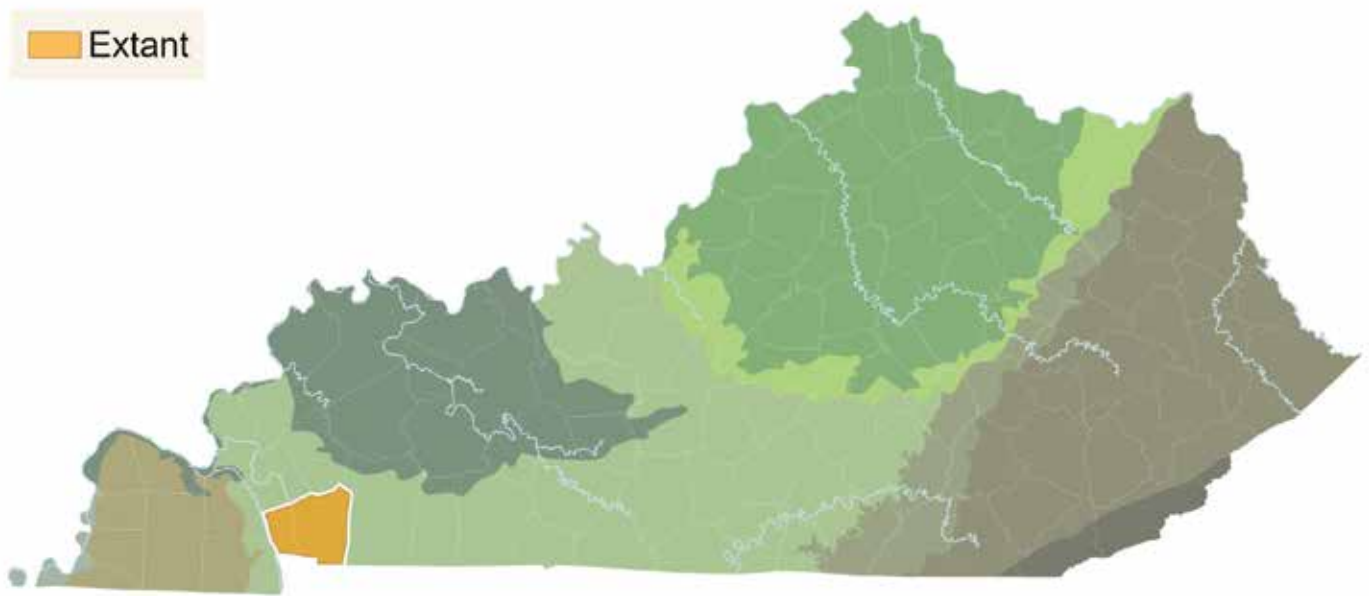








Photo: James Kiser



LARGE-LEAVED GRASS-OF-PARNASSUS

(*Parnassia grandifolia*)

Threats

-  Dams and Water Management/Use
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Recreational Activities

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness       
- Ex Situ Conservation      
- Land/Water Management 
- Species Reintroduction      

Needs

Survey: Status surveys

Survey: Surveys for new populations

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Work with partners on conservation and protection of this species and habitat as well as to discover new populations in the eastern highland rim.

Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Forested Wetland, Open Wetland

This is a perennial obligate wetland plant that grows in high quality forested to open calcareous seeps (S1/G1).

Range Map

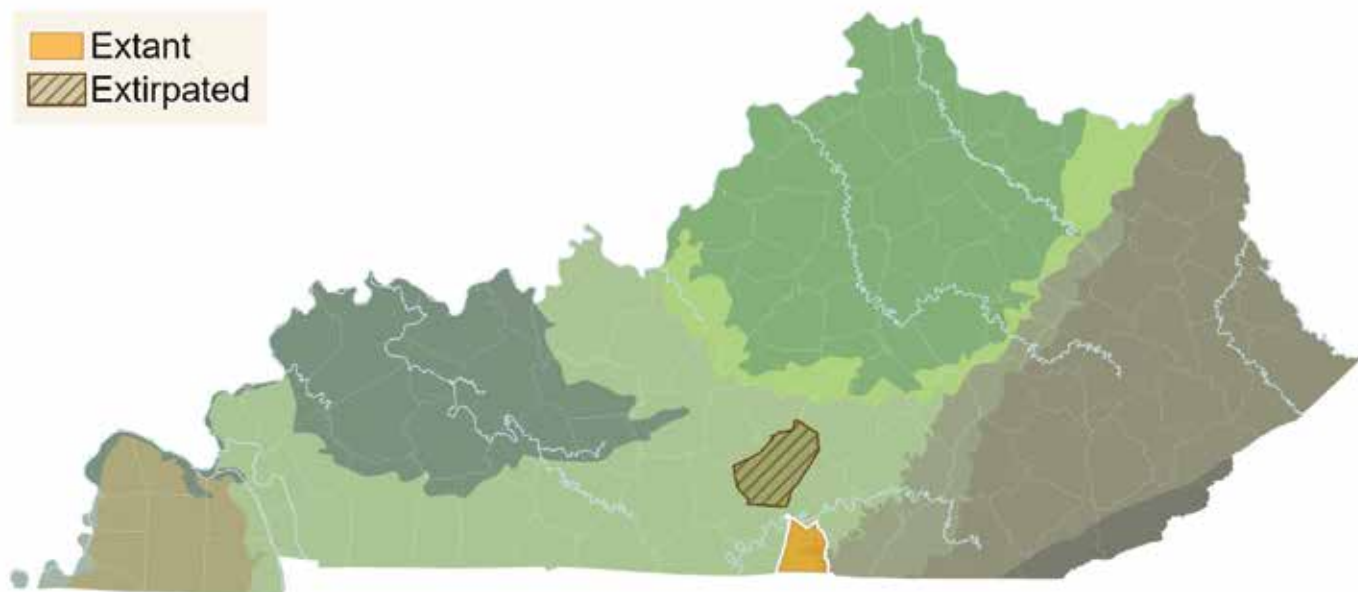


Photo: Tara Littlefield



CANBY'S MOUNTAIN-LOVER

(*Paxistima canbyi*)

Threats

- Droughts
- Habitat Shifting and Alteration
- Housing and Urban Areas
- Invasive Non-native/Alien species
- Logging and Wood Harvesting
- Temperature Extremes

Conservation Actions

- Alliance and Partnership Development
- Education and Awareness
- Ex Situ Conservation
- Land/Water Management
- Land/Water Protection
- Species Reintroduction

Needs

Survey: Surveys for new populations or habitat

Survey: Status Surveys

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2?

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, survey and restore populations of this globally rare species in Kentucky and throughout the range.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs

Guilds: Cliff/Rockshelter, Xeric Forest

This low growing shrub prefers south and southwest facing limestone rocky slopes, outcrops and cliff lines above rivers and larger creeks and may have

historically been associated with small mammals such as wood rats. It has low seed viability and forms clonal populations with little genetic diversity. This species occurs on Bluegrass rocky ledge (S2/G2); Eastern knobs rocky ledge (S2/G2) and Appalachian Northern White-cedar Cliff Woodland (S1/G2G3) communities.

Range Map

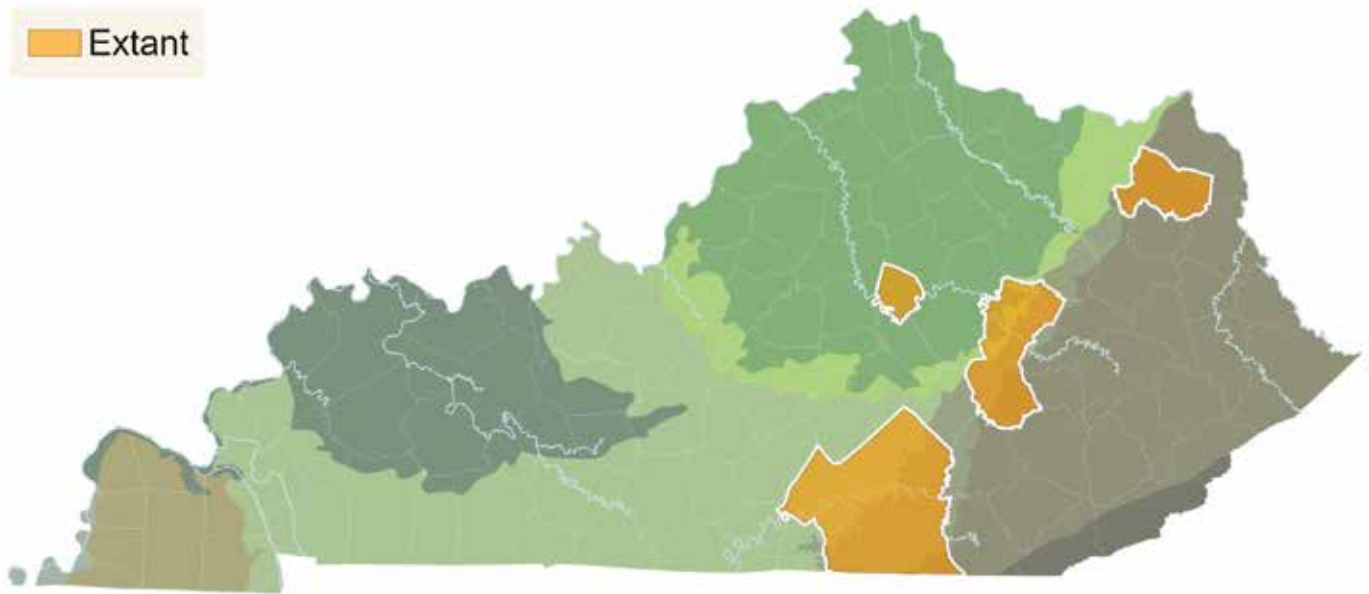


Photo: Tom Barnes

























LIMESTONE FAMEFLOWER

(*Phemeranthus calcaricus*)

Threats

-  Annual and Perennial Nontimber Crops
-  Droughts
-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Natural System Modifications
-  Problematic Native Species
-  Roads and Railroads

Conservation Actions

- Alliance and Partnership Development     
-  Education and Awareness      
- Ex Situ Conservation      
- Land/Water Management  
- Land/Water Protection    
- Species Reintroduction      

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare plant.

Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Grassland/Savannah

This small perennial succulent grows in extremely thin soils surrounding open rock glades outcrops. It is restricted to limestone flat rock glade (S1/G3) communities.

Range Map

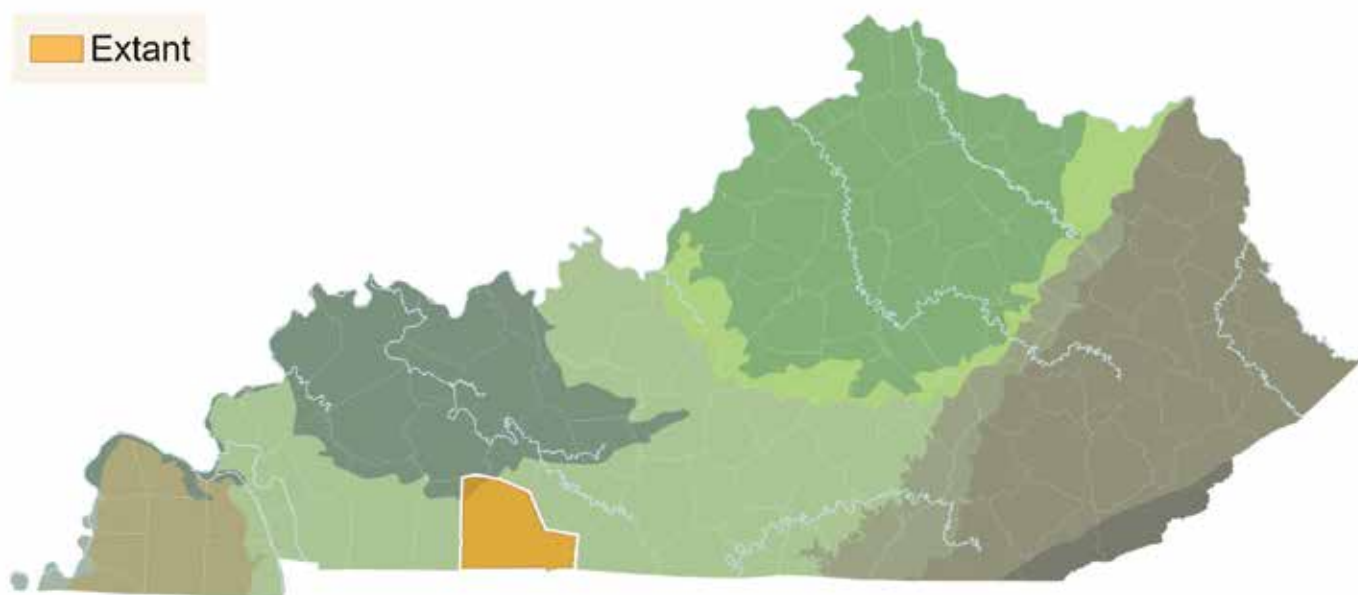


Photo: John MacGregor



GLOBE BLADDERPOD

(*Physaria globosa*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2

S Rank: S1

Federal Status: Endangered

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore populations of this federally endangered plant.






Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Xeric Forest

This biennial/short lived perennial grows in calcareous rocky forested woodland communities and exposed mineral soil or some type of disturbance to germinate. Plants often grow along animals trails and rocky soils. This species grows in

Threats

-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Recreational Activities

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness    
- Ex Situ Conservation   
- Invasive/Problematic Species Control 
- Land/Water Protection    
- Site/Area Management  
- Species Reintroduction   

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Management: Develop critical habitat protection plan

community types most similar to calcareous sub-xeric forest (S5/GNR) forests most often on south and southwest facing slopes.

Range Map

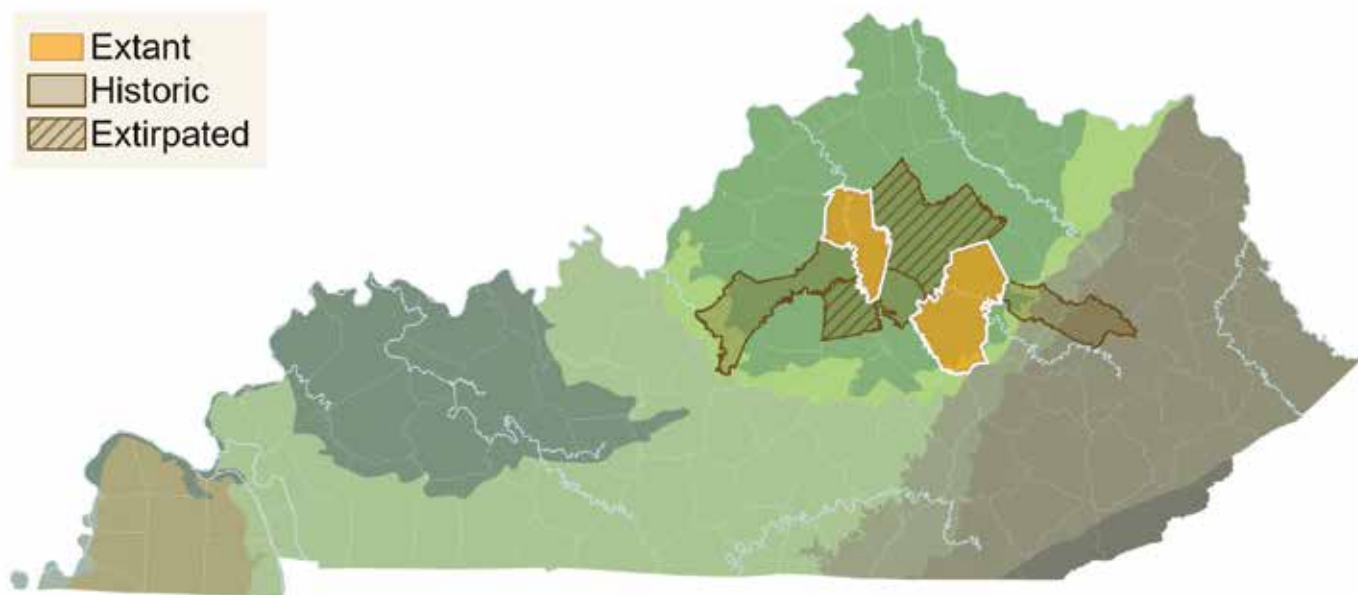


Photo: Tara Littlefield



WHITE FRINGELESS ORCHID

(*Platanthera integrilabia*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2G3

S Rank: S1

Federal Status: Threatened

IUCN Red List: NT - Near threatened

Conservation Goal

Work with the U. S. Forest Service, researchers, land managers, conservation horticulturalists, and private landowners to manage, monitor, research and protect all of the white fringeless orchid populations in Kentucky.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment

Guilds: Forested Wetland, Grassland/Savannah, Open Wetland

This species is a mycotrophic perennial obligate wetland species that grows in acidic seeps, bogs and seepage slopes from partial to more open canopy conditions. It is found in Cumberland Plateau forested acid seep (S1S2/G3) and Cumberland Mountains Streamside Bog (S1S2/G2) community types.

Threats

- Droughts
- Fire and Fire Suppression
- Gathering Terrestrial Plants
- Habitat Shifting and Alteration
- Housing and Urban Areas
- Invasive Non-native/Alien species
- Livestock Farming and Ranching
- Logging and Wood Harvesting
- Natural System Modifications
- Problematic Native Species

Conservation Actions

- Alliance and Partnership Development
- Ex Situ Conservation
- Habitat and Natural Process Restoration
- Land/Water Management
- Site/Area Protection
- Species Reintroduction

Needs

Survey: 5 year species status reviews

Survey: Annual monitoring

Survey: Surveys for new populations or habitat

Research: Management effects research

Research: Mycorrhizal symbiont research

Management: Manage seeps for woody encroachment and invasive species

Management: Prescribed fire in adjacent upland systems

Management: Restore wetlands/hydrologic conditions

Range Map

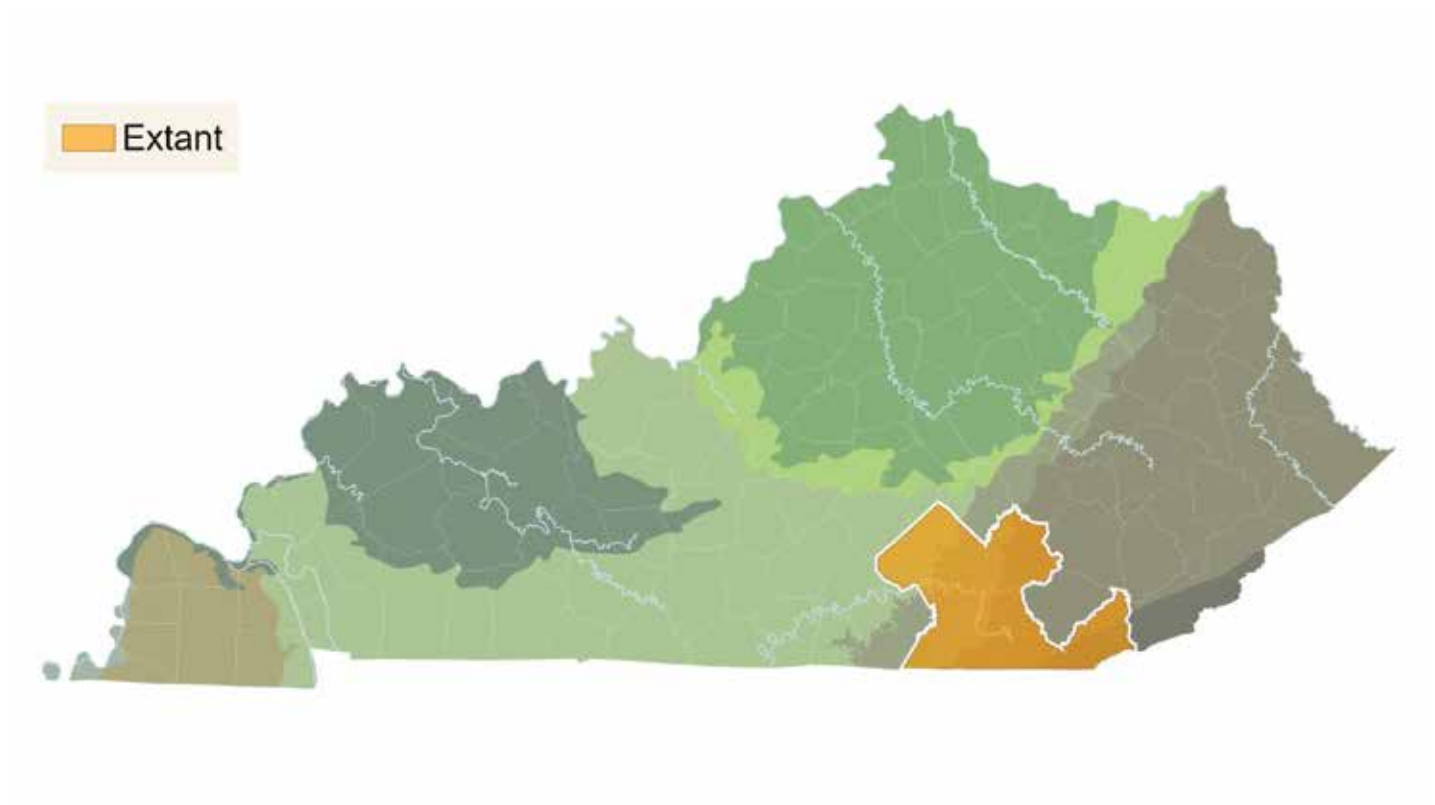
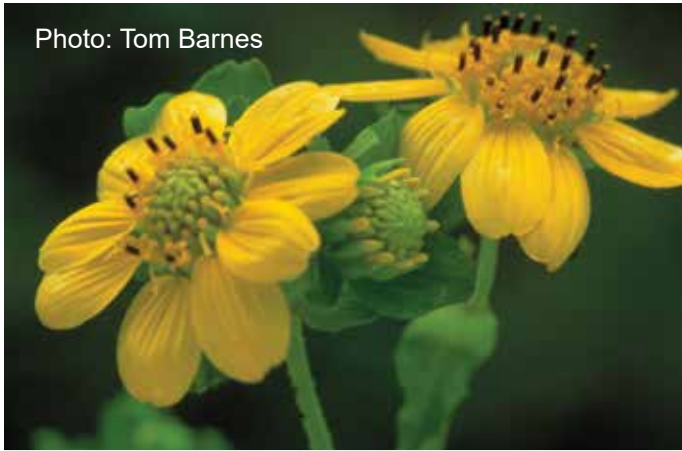


Photo: Tom Barnes



TENNESSEE LEAFCUP

(*Polymnia laevigata*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare forest herb.

Habitat Associations

Physiographic Regions: Mississippi Alluvial Plain

Guilds: Mesic Forest

This perennial species occurs in deep rich calcareous soils in high quality mature mesic limestone forests and bluffs. It occurs in mature calcareous mesophytic forest (S5/GNR) communities and bluffs in the far western part of the state.

Threats

- Annual and Perennial Nontimber Crops
- Housing and Urban Areas
- Invasive Non-native/Alien species
- Livestock Farming and Ranching
- Logging and Wood Harvesting
- Storms and Flooding

Conservation Actions

- Alliance and Partnership Development
- Education and Awareness
- Ex Situ Conservation
- Land/Water Management
- Land/Water Protection
- Species Reintroduction

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Range Map

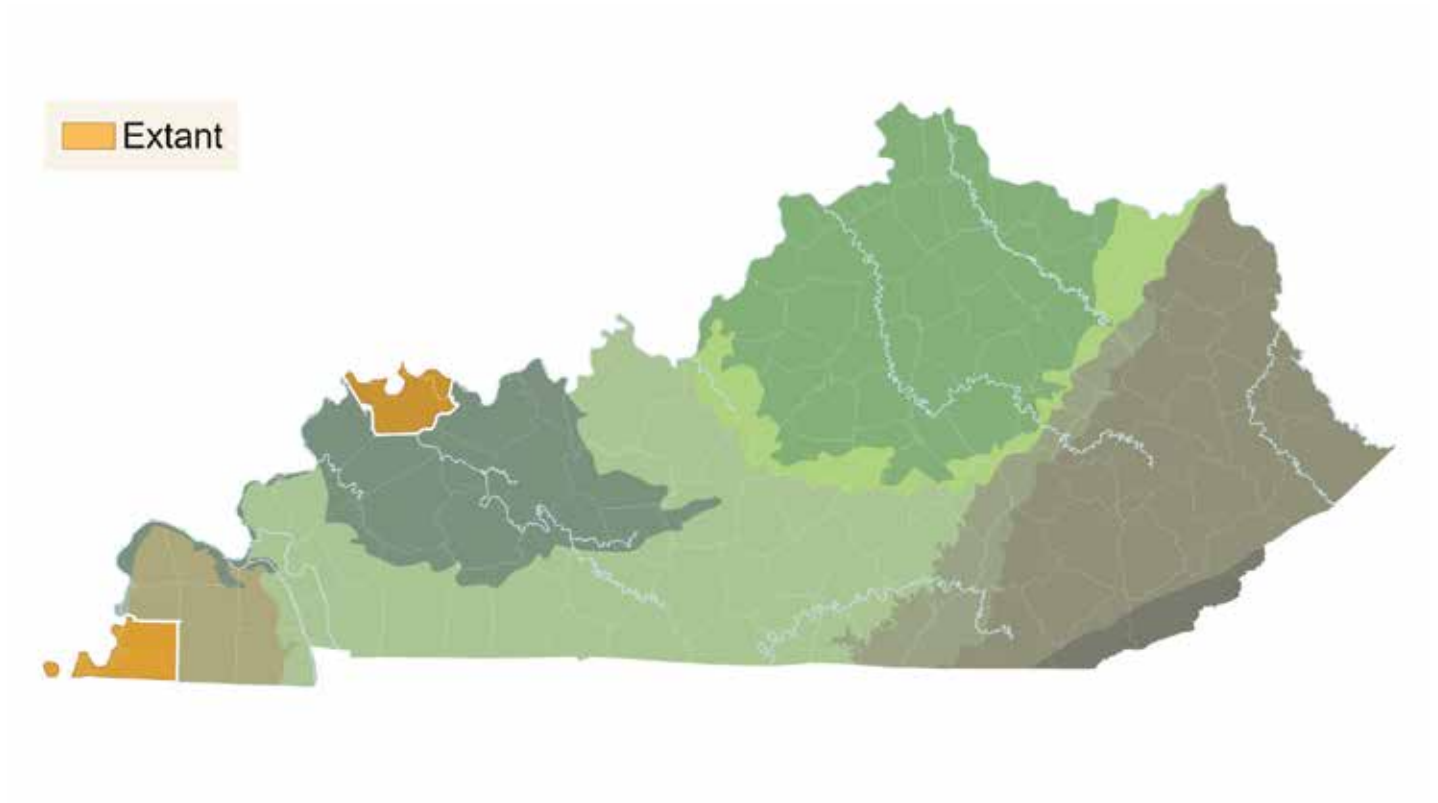


Photo: Devin Rodgers



TENNESSEE PONDWEED

(*Potamogeton tennesseensis*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, survey and restore populations of this aquatic Appalachian endemic species.






Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment














Stream Type: Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River

This species grows in clean, sediment free water of various depths, mostly on mud and sandy substrate. It occurs in high quality aquatic habitats in the Appalachian Region, from slow to fast moving streams and rivers.

Threats

-  Dams and Water Management/Use
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Pollution
-  Storms and Flooding

Conservation Actions

- Ex Situ Conservation    
- Land/Water Protection    
- Species Reintroduction     

Needs

Survey: Status Surveys

Survey: Surveys for new populations

Research: Life history, ecology and genetic studies

Management: Watershed management

Range Map

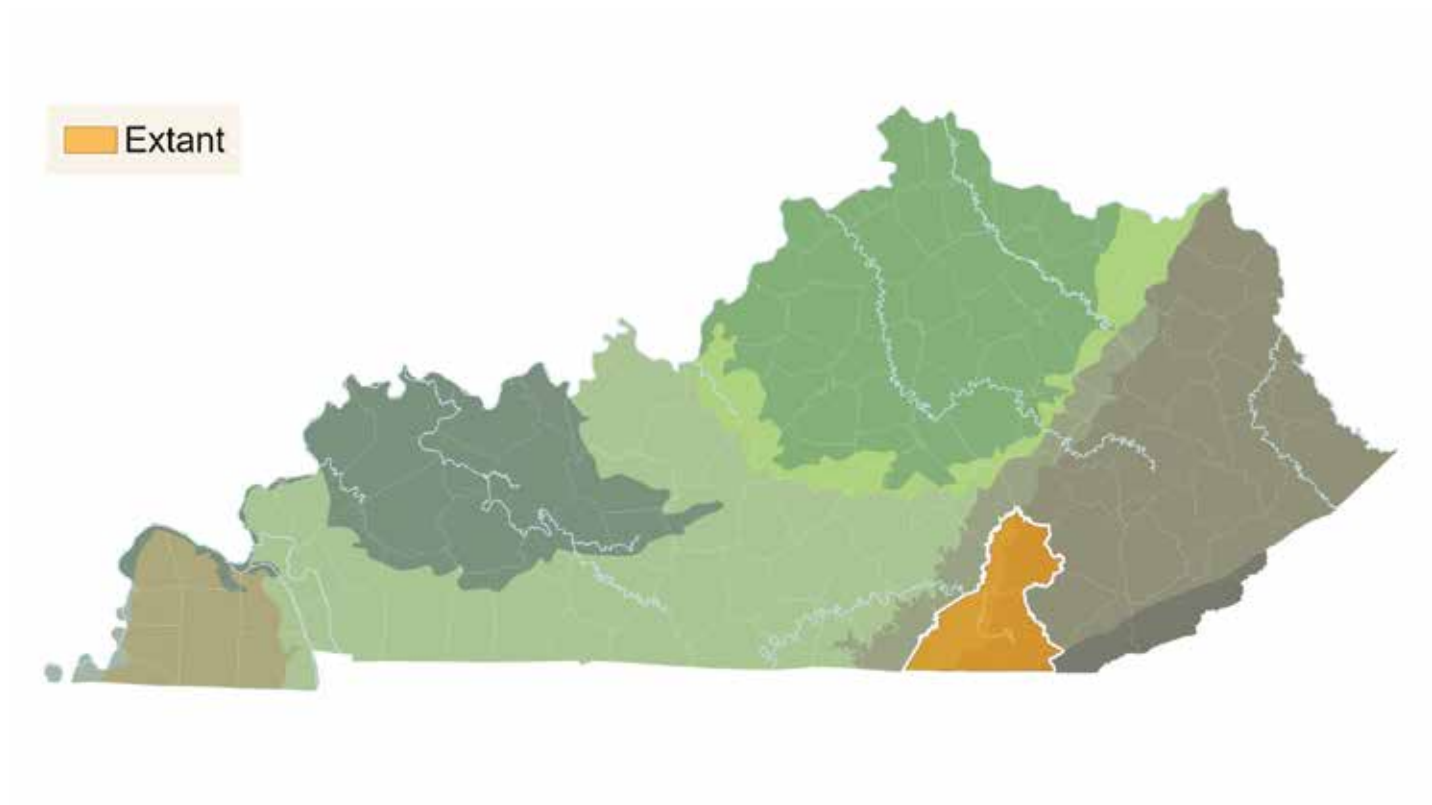


Photo: Tara Littlefield



FRENCH'S SHOOTING STAR

(*Primula frenchii*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3?

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare plant.






Habitat Associations

Physiographic Regions: Plateau Escarpment, Interior River Valley And Hills

Guilds: Cliff/Rockshelter

This perennial plant grows in in shaded sandy ledges underneath sandstone cliff lines as well as more defined sandstone rockhouses. It does not compete well with other vegetation and needs exposed open

Threats

-  Dams and Water Management/Use
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Recreational Activities

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation     
- Invasive/Problematic Species Control   
- Land/Water Protection     
- Species Reintroduction     

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

sand in order to seedlings to germinate. It grows on ledges below sandstone cliffs and sandstone rockhouses in the dry sandstone cliff/outcrop/rockhouse (S5/GNR) community type.

Range Map

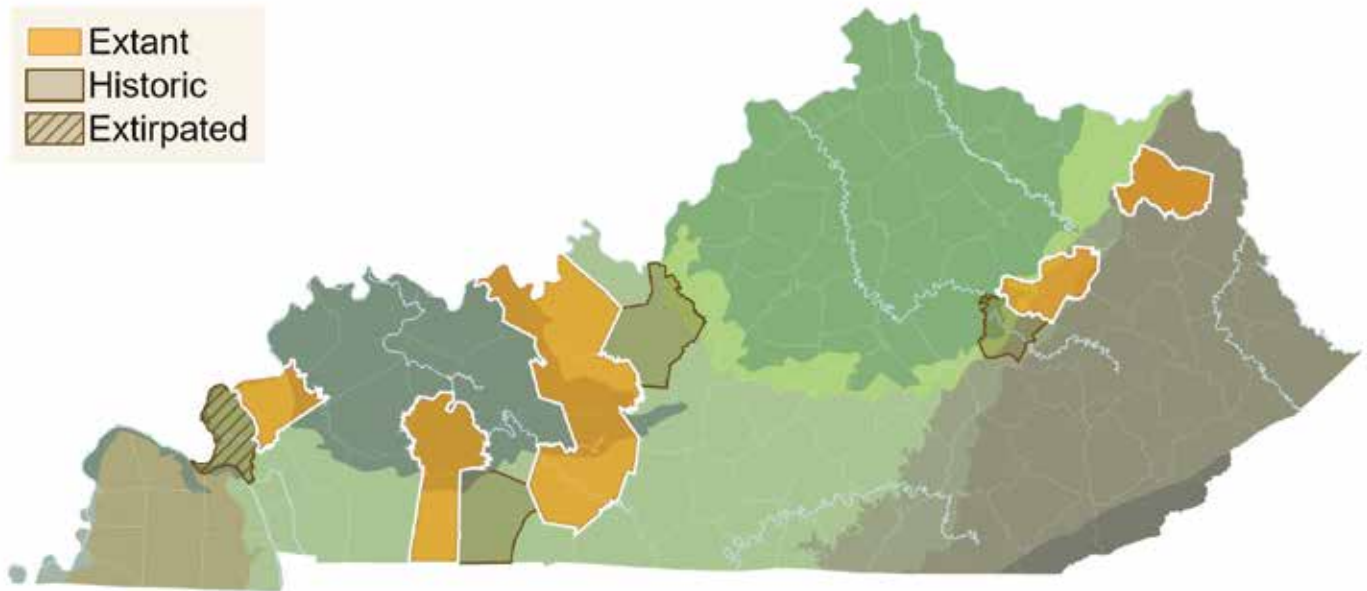




Photo: Drew Chaney, Center for Urban Habitats,
Piedmont Grasslands Assessment

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

To survey for additional populations, conduct status surveys of existing populations to assess trends, and work with partners to protect and conserve known populations of this globally rare mint.

Habitat Associations

Physiographic Regions: Interior Plateau








Guilds: Grassland/Savannah

This species grows in high quality Interior Low Plateau post oak barrens (S2/G2G3) and limestone/dolomite prairies (S1/G2G3) communities. Intact quality limestone barrens and prairies have declined greatly and are state threatened and globally rare.





















WHORLED MOUNTAIN-MINT

(*Pycnanthemum torreyi*)

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Roads and Railroads

Conservation Actions

- Alliance and Partnership Development     
-  Education and Awareness     
- Ex Situ Conservation  
- Land/Water Management  
- Land/Water Protection   
- Species Reintroduction   

Needs

Survey: Collect baseline species information

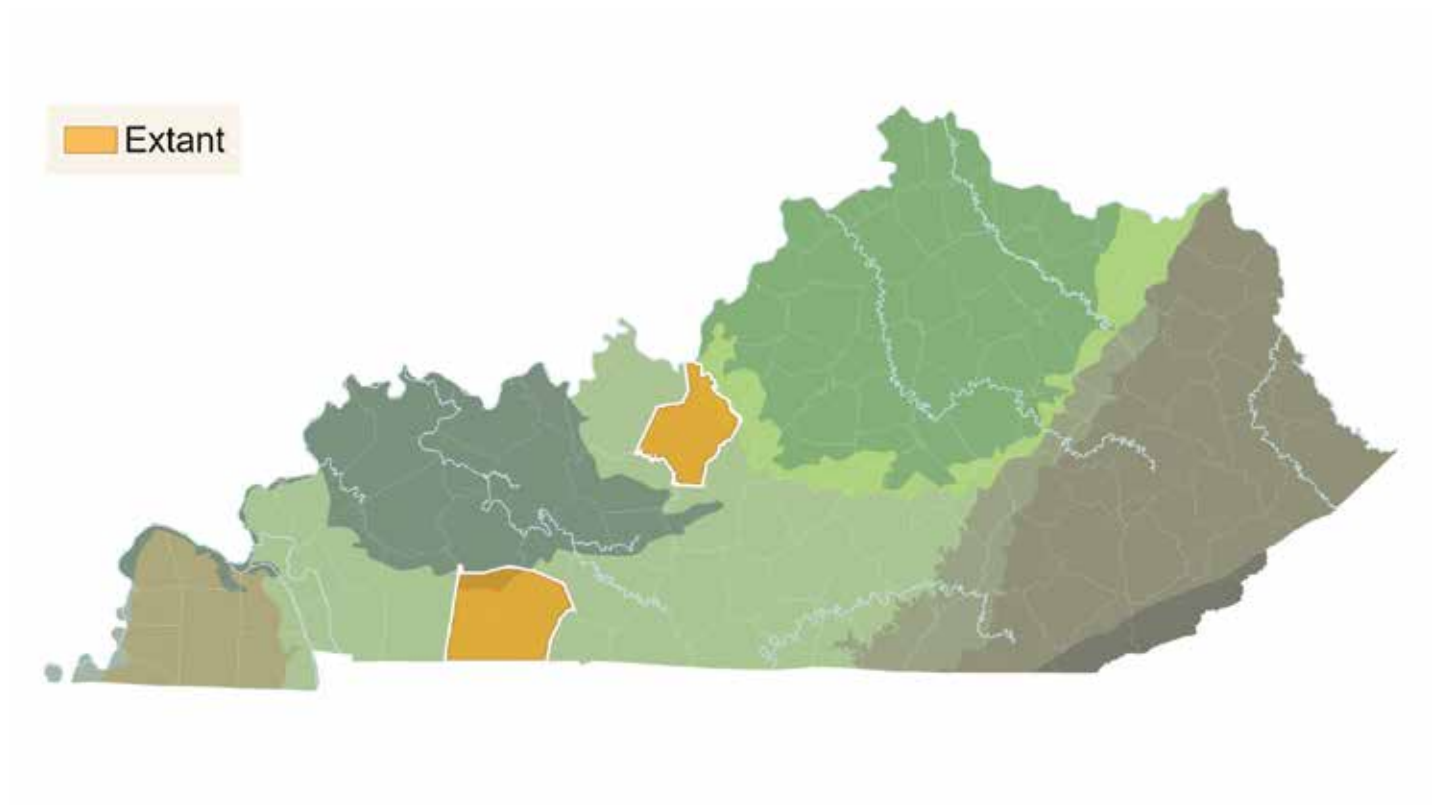
Survey: Status Surveys

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Management: Management effects research

Range Map





VIRGINIA MALLOW

(*Ripariosida hermaphrodita*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect existing populations, to work with private landowners on population monitoring, management and recovery, survey additional habitat for undocumented populations, and increase ex situ conservation and translocations of this globally rare plant.







Habitat Associations

Physiographic Regions: Cumberland Plateau, Bluegrass, Knobs





































Guilds: Scrub-Shrub/Early Successional Forest

None

Threats

-  Annual and Perennial Nontimber Crops
-  Dams and Water Management/Use
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development     
-  Ex Situ Conservation      
- Invasive/Problematic Species Control     
-  Land/Water Protection      
- Species Reintroduction      
- Training      

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Management: Site protection

Range Map

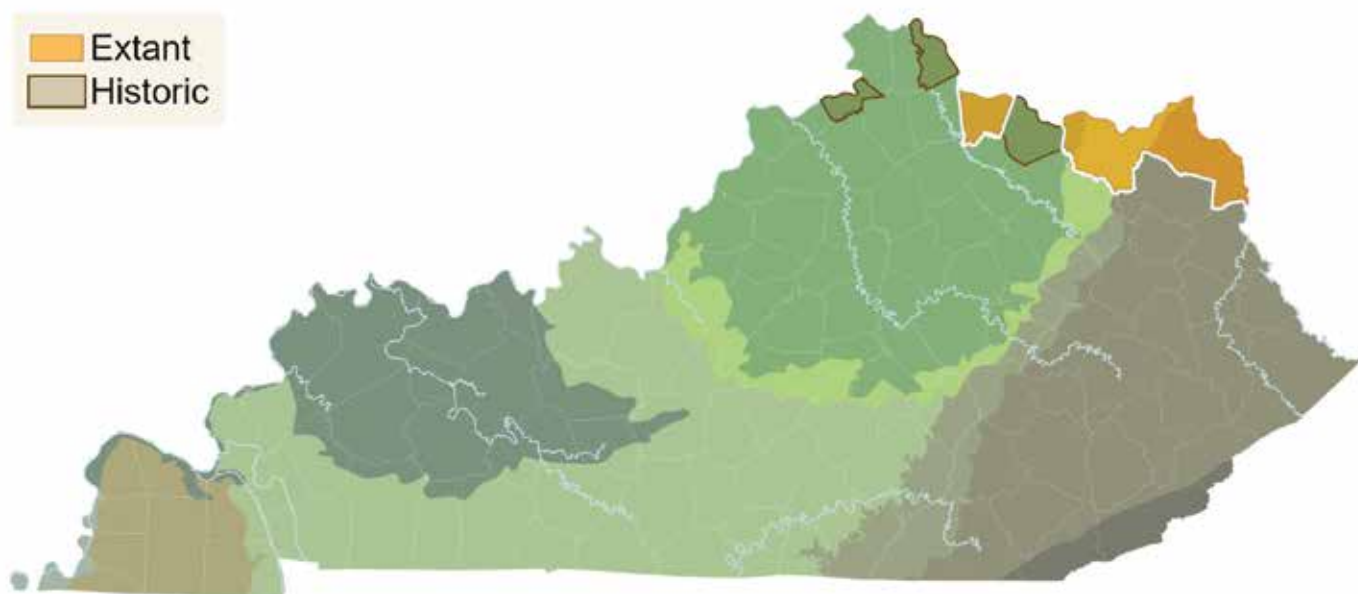






Photo: Tara Littlefield



WATER STITCHWORT

(*Sabulina fontinalis*)

Threats

-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness    
- Ex Situ Conservation    
- Invasive/Problematic Species Control 
- Land/Water Protection    
- Species Reintroduction    

Needs

Survey: Surveys for new populations or habitat

Survey: Status Surveys

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1S2

Federal Status: Not Listed

IUCN Red List: N/A

Conservation Goal

Protect, survey and restore populations of this globally rare species in Kentucky and throughout the range.

Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Forested Wetland

This annual species grows with little competition on permanently wet limestone seeps. This species occurs on communities similar to Calcareous seep (S1/G1) and Mesic - wet limestone cliff/outcrop (S5/GNR) communities.

Range Map

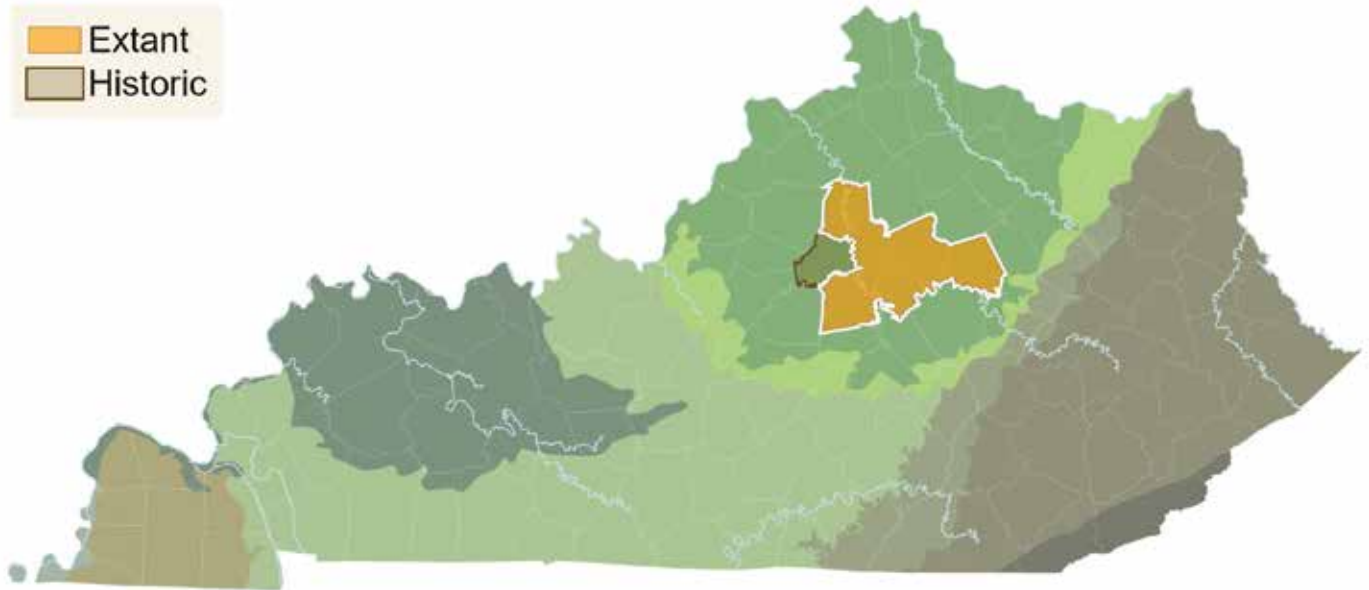


Photo: Eric Soehren



BAY STARVINE

(*Schisandra glabra*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey, assess, conserve and restore this globally rare vine in Kentucky.








Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment

Guilds: Mesic Forest

This long lived perennial trailing or twining woody vine grows in acidic forested slopes and ravines, often along creeks or wetlands on the edges of forests. The flowers have been shown to be thermogenic and are pollinated by flies and beetles. The species grows in acidic mesic forest slopes and edges along streams and wetlands, within the Appalachian mesophytic forest (S4S5/GNR) community type.

Threats

-  Annual and Perennial Nontimber Crops
-  Dams and Water Management/Use
-  Gathering Terrestrial Plants
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation     
- Land/Water Management    
- Species Reintroduction     

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Range Map

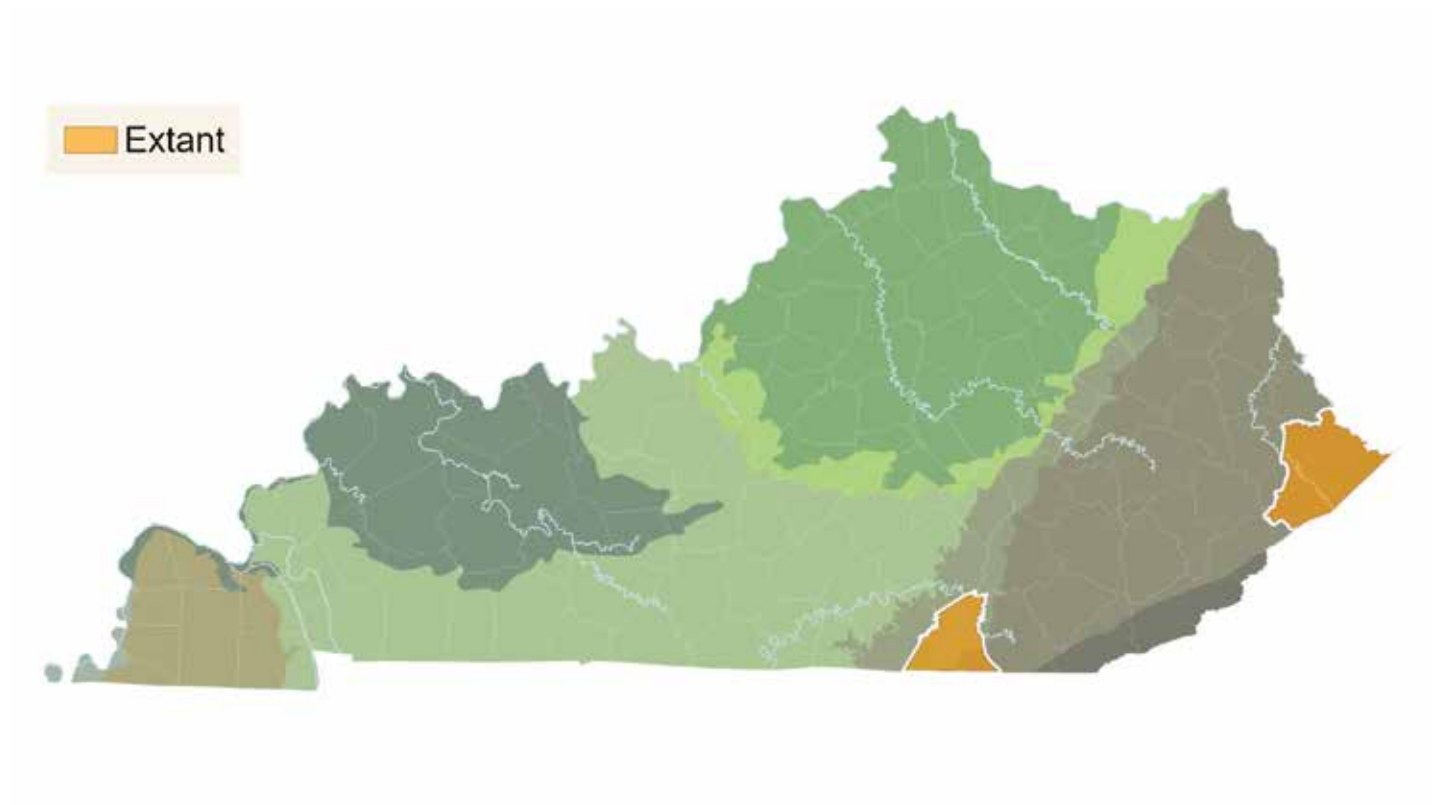


Photo: Devin Rodgers



HALL'S BULRUSH

(*Schoenoplectiella hallii*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore this globally rare wetland plant in Kentucky.









Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Open Wetland, Lake/Pond

This annual/short lived perennial, wetland graminoid flowers in the later summer and grows on the muddy edges of ponds and marshes. It has been documented to have large population fluctuations tied to climate (precipitation and temperature). It grows in Sinkhole/depression pond (S2/GNR) and Sinkhole/depression marsh (S2/G3G4) community types.

Threats

-  Annual and Perennial Nontimber Crops
-  Droughts
-  Habitat Shifting and Alteration
-  Housing and Urban Areas
-  Invasive and Other Problematic Species and Genes
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Storms and Flooding

Conservation Actions

- Alliance and Partnership Development   
- Education and Awareness  
- Ex Situ Conservation   
- Invasive/Problematic Species Control 
- Land/Water Protection  
- Species Reintroduction  

Needs

Survey: Status surveys

Survey: Surveys for new populations

Research: Life history, ecology, genetic research

Research: Propagation and translocation research

Management: Develop and implement best management practices

Range Map

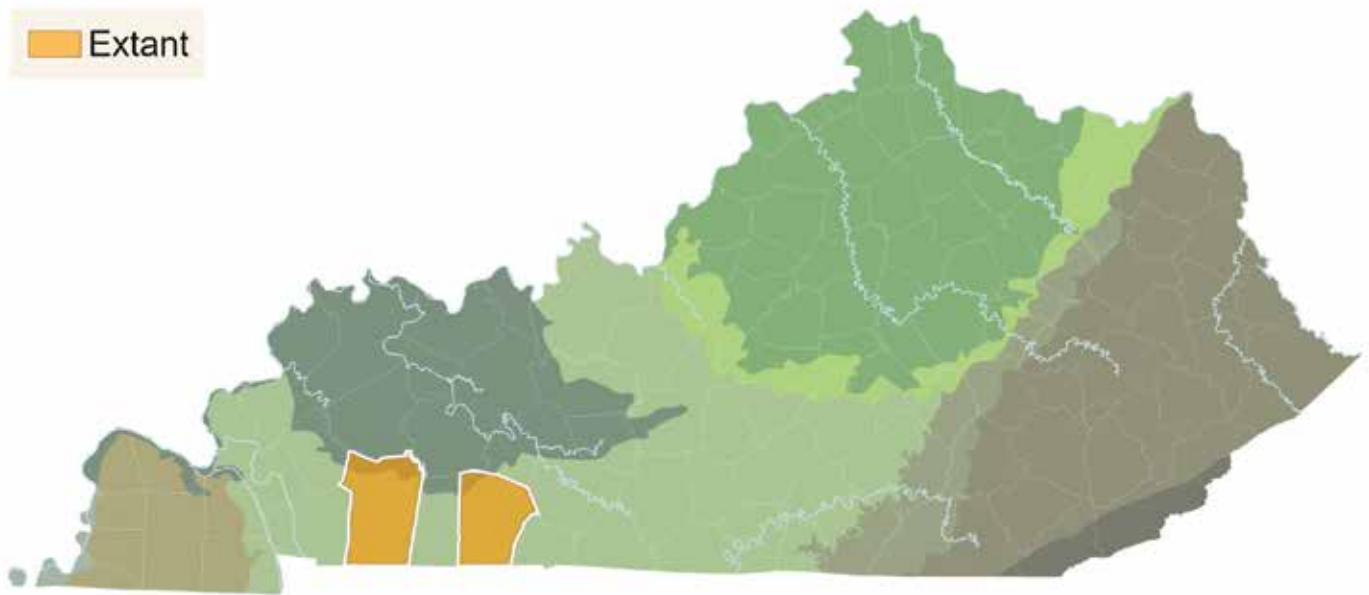








Photo: Bob Wernerehl



CHAFFSEED

(*Schwalbea americana*)

Threats

-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Roads and Railroads

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation     
- Land/Water Management     
- Site/Area Protection     
- Species Reintroduction     

Needs

Survey: Collect baseline species information

Survey: surveys for new populations

Research: translocation research

Management: Develop best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2

S Rank: SH

Federal Status: Endangered

IUCN Red List: N/A

Conservation Goal

Survey suitable habitat and locate extant populations, and work with partners on managing suitable habitat for future translocations of this federally listed species.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Guilds: Grassland/Savannah

This perennial, hemiparasitic herb grows in acidic open grasslands that require a high fire return interval in order to persist. This species does not

appear capable of long-term dormancy within the soil. It historically occurred in the Cumberland Plateau shortleaf pine savanna (S1/G2) and Cumberland Plateau Clifftop Sandstone Barren (S1/G3) communities in Kentucky.

Range Map

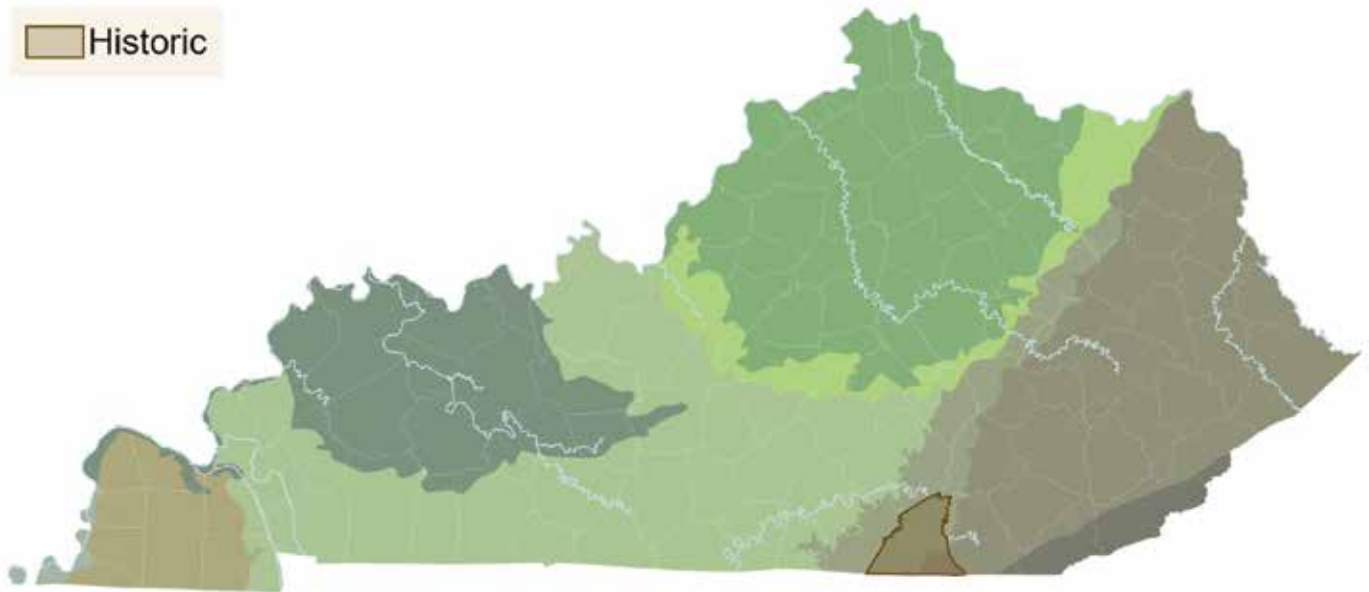


Photo: Ron Ciccerello



ROCK SKULLCAP

(*Scutellaria saxatilis*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3G4

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

To survey for additional populations, conduct status surveys of existing populations to assess trends, and work with partners to protect and conserve known populations of this globally rare mint.



Habitat Associations

Physiographic Regions: Cumberland Mountains, Plateau Escarpment

Guilds: Mesic Forest, Xeric Forest

This species grows on rocky talus slopes within intact Appalachian sub xeric (S5/GNR) to mesic forests (S4S5/GNR) in eastern Kentucky. While the forest types are relatively common in Kentucky, the presence of the micro community of rocky talus slopes within these communities is a limiting factor.

Threats

-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting

Conservation Actions

- Alliance and Partnership Development  
- Education and Awareness  
- Ex Situ Conservation  
- Invasive/Problematic Species Control 
- Site/Area Protection 
- Species Management 

Needs

Survey: Collect baseline species information

Survey: Status Surveys

Research: Life history, ecology and genetic research

Range Map

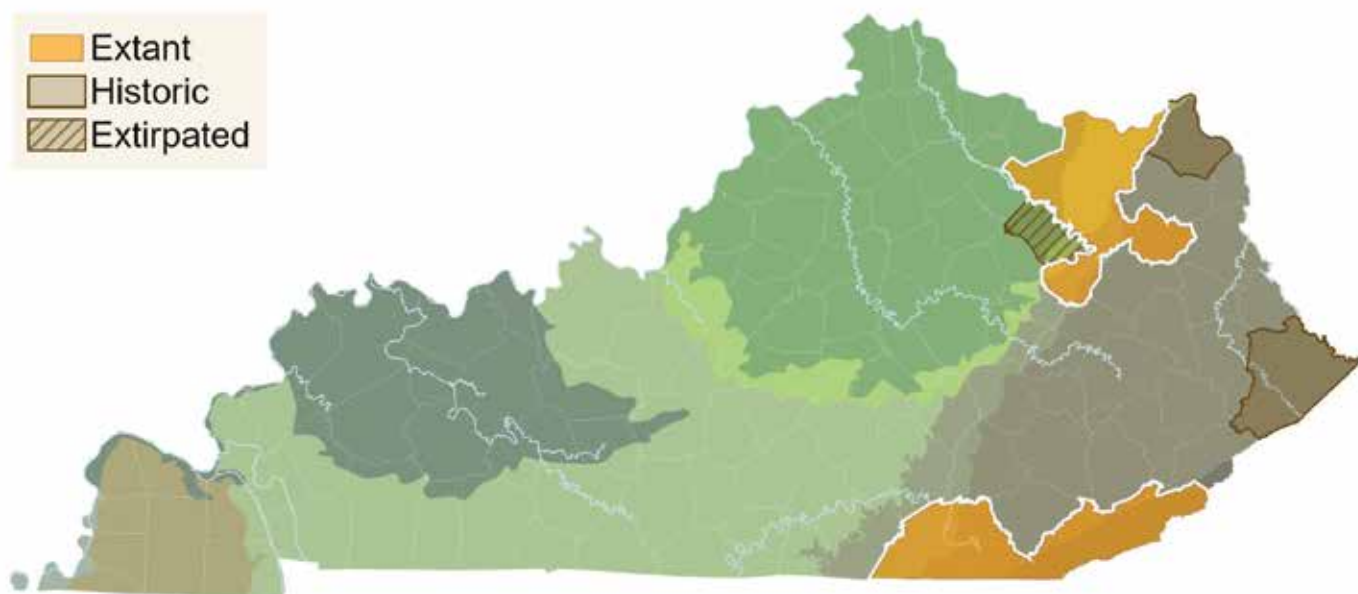








Photo: Aster Ayer



OVATE CATCHFLY

(*Silene ovata*)

Threats

-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Roads and Railroads

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness      
- Ex Situ Conservation      
- Land/Water Management   
- Land/Water Protection      
- Species Reintroduction      

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Translocation research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare plant.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Plateau Escarpment, Interior River Valley And Hills

Guilds: Cliff/Rockshelter, Xeric Forest

This perennial plant grows in thin calcareous soils, often on limestone outcrops in dry rocky limestone forests. It does not compete well with other vegetation and may be declining due to woody

encroachment and/or herbivory. This species is found in calcareous woodlands and outcrops, in habitats similar to Xeric red cedar - oak forest/woodland (S5, GNR) and calcareous subxeric forest (S5/GNR) communities.

Range Map

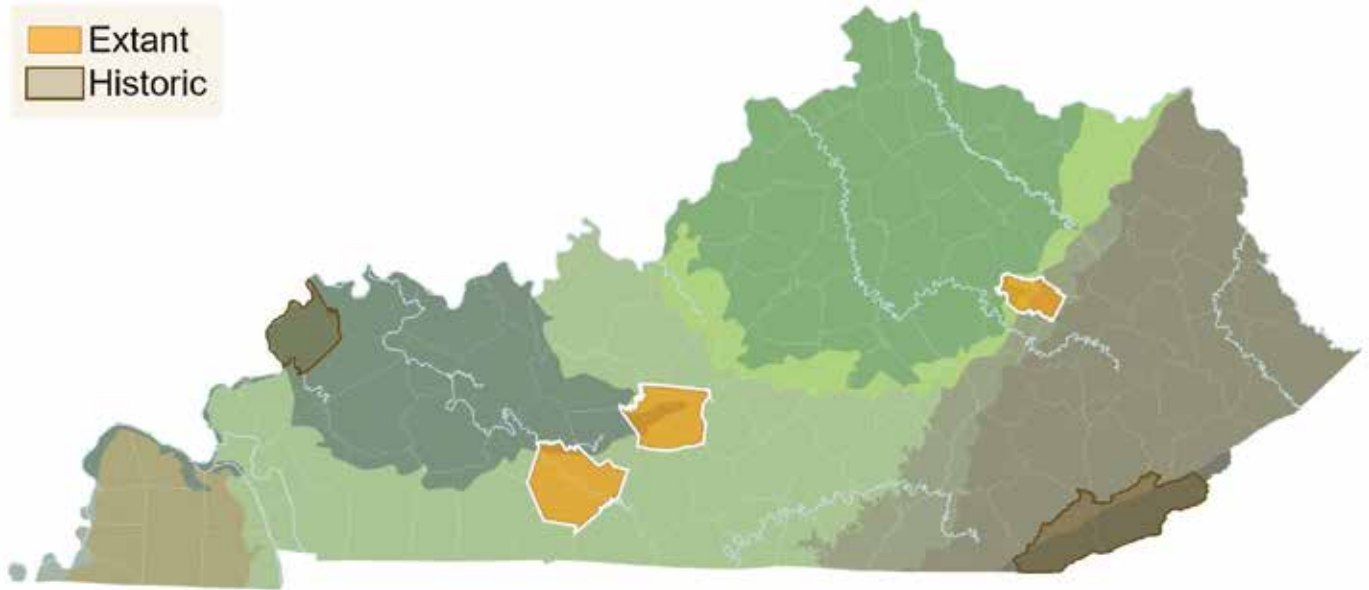








Photo: Tara Littlefield



ROYAL CATCHFLY

(*Silene regia*)

Threats

-  Annual and Perennial Nontimber Crops
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Natural System Modifications
-  Roads and Railroads

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation     
- Invasive/Problematic Species Control   
- Land/Water Protection   
- Species Reintroduction     

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Translocation research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect existing populations, work with federal and state agencies as well as private landowners on population monitoring, management and recovery, survey additional habitat for undocumented populations, and increase ex situ conservation and translocations of this globally rare prairie species.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills

Guilds: Grassland/Savannah

This showy perennial plant grows in open deep soils limestone prairies and prefers more mesic swales in open prairies and barrens. The seeds do not form a seed bank and needs some level of disturbance, such as fire, to germinate. This species is associated with the tallgrass prairie (S1/G1G2) community type and is pollinated by the ruby-throated hummingbird (*Archilochus colubris*).

Range Map

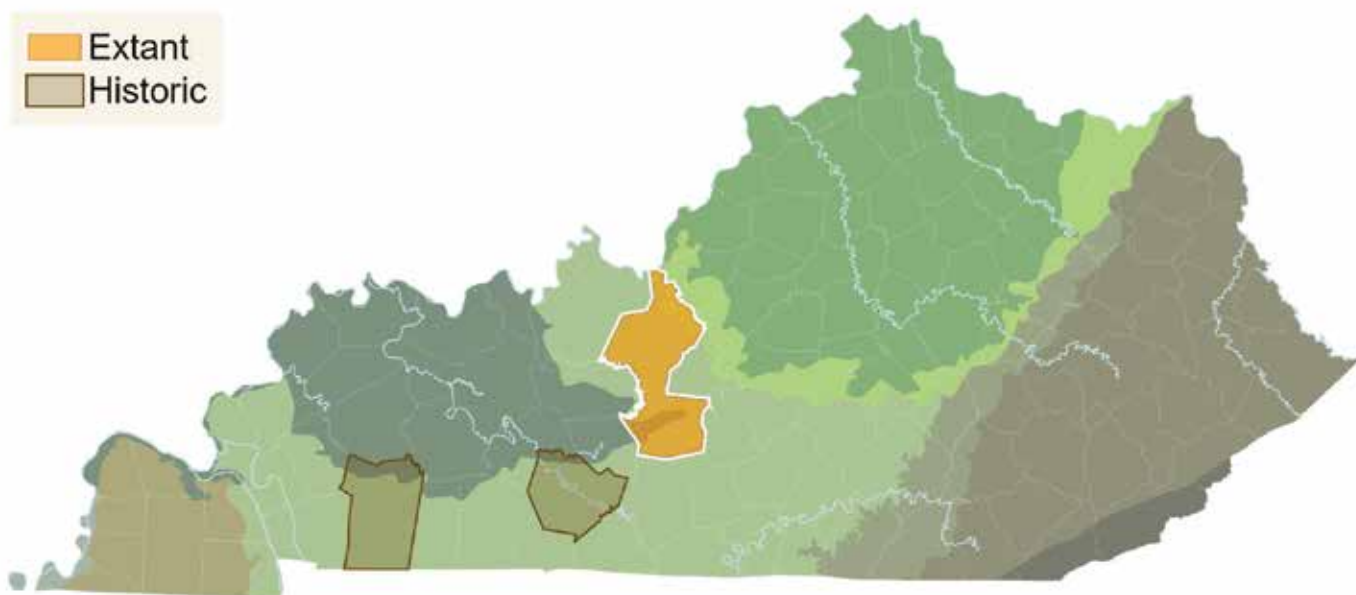


Photo: Tony Romano



APPALACHIAN ROSINWEED

(*Silphium wasiotense*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal







Protect existing populations, work with federal and state agencies as well as private landowners on population monitoring, management and recovery; survey additional habitat for undocumented populations, and increase ex situ conservation and translocations of this globally rare plant.

Habitat Associations

Physiographic Regions: Cumberland Plateau

Guilds: Xeric Forest, Scrub-Shrub/Early Successional Forest

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development     
-  Education and Awareness      
- Ex Situ Conservation      
- Land/Water Management     
- Land/Water Protection      
- Species Reintroduction      

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

This long lived perennial plant occurs mostly on roadsides and woodland edges. It grows in acidic rocky woodlands, and roadside edges for these forests in habitats most similar to Acidic sub-xeric forest (S5/GNR).

Range Map

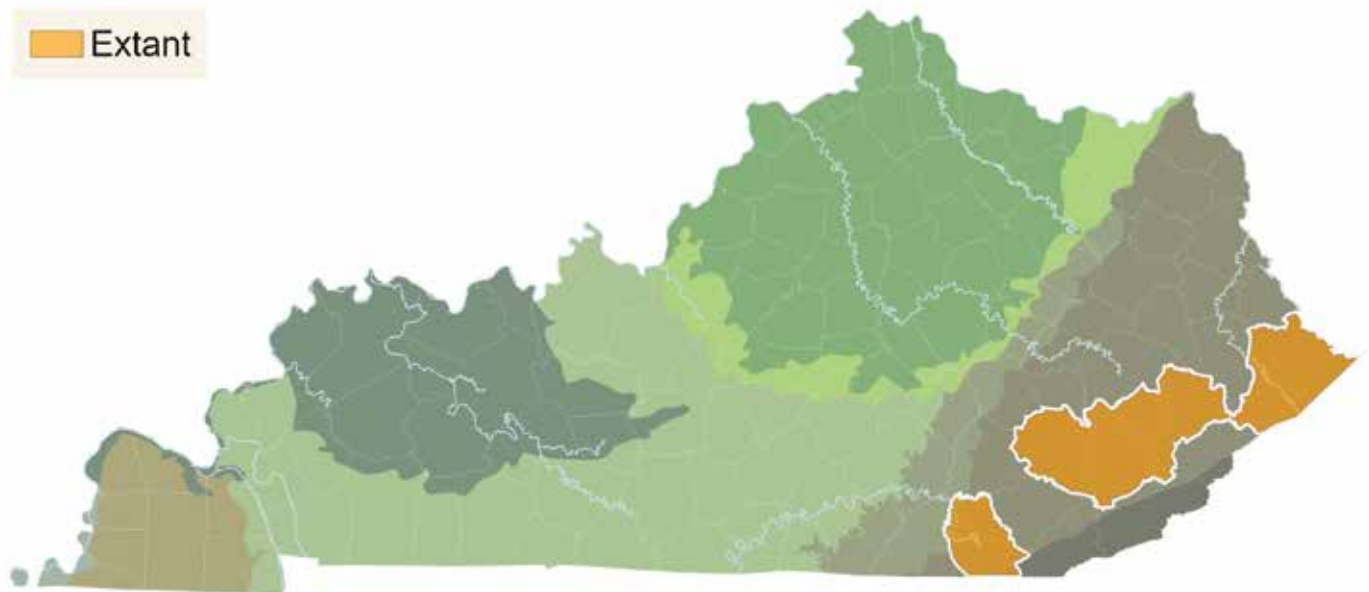


Photo: John MacGregor



WHITE-HAIRED GOLDENROD

(*Solidago albopilosa*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2

S Rank: S2

Federal Status: Delisted

IUCN Red List: N/A

Conservation Goal

Conserve, monitor, manage and recover populations of this globally rare Kentucky endemic.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Mississippi Alluvial Plain

Guilds: Cliff/Rockshelter

This long lived perennial goldenrod occurs at the dripline of dry to mesic/wet sandstone rockhouses. This species grows in sandstone rockshelters and the base of sandstone cliffines from dry sandstone cliff/outcrop/rockhouse (S5/GNR) to Cumberland Plateau wet rockhouse (S3/G2) communities.

Threats

- Droughts
- Habitat Shifting and Alteration
- Invasive Non-native/Alien species
- Logging and Wood Harvesting
- Pathogens and Microbes
- Recreational Activities
- Tourism and Recreation Areas

Conservation Actions

- Alliance and Partnership Development
- Education and Awareness
- Ex Situ Conservation
- Land/Water Management
- Land/Water Protection
- Species Reintroduction

Needs

Survey: Status surveys

Research: Genetic research

Management: Implement Adopt a rockhouse program

Management: Management effects research

Range Map

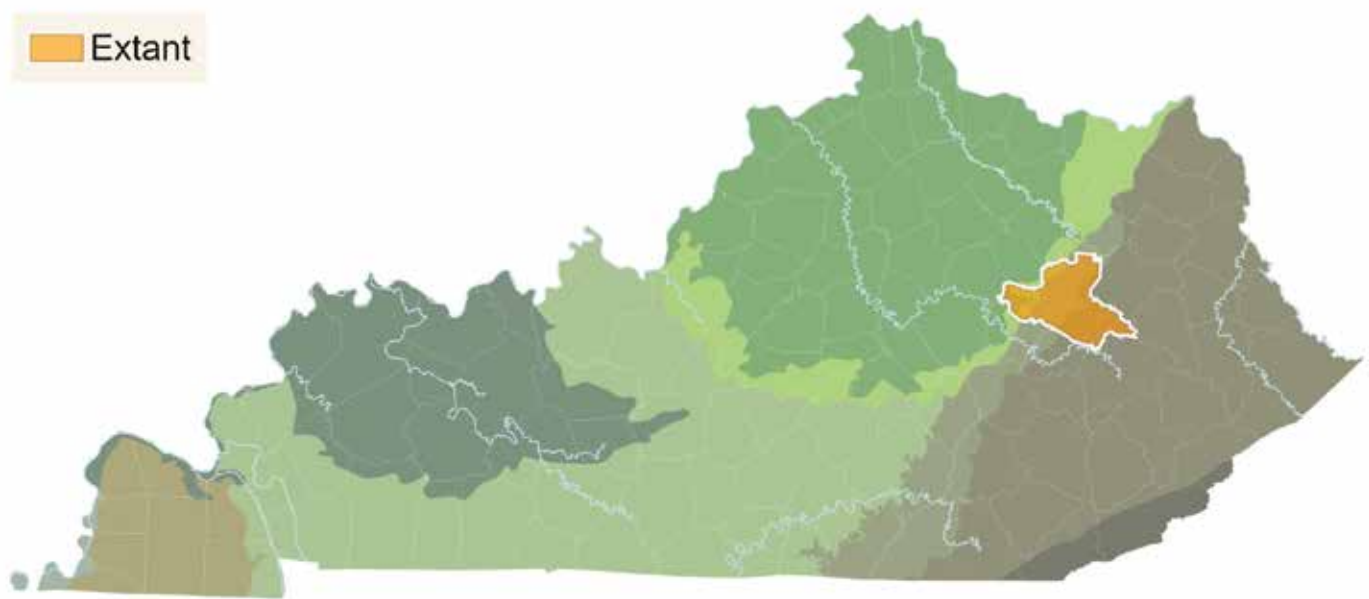


Photo: Tara Littlefield



SOUTHERN RACEMOSE GOLDENROD

(*Solidago arenicola*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2G3

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey, assess, conserve and restore this globally rare plant along Cumberland plateau river scour in Kentucky.








Habitat Associations

Physiographic Regions: Plateau Escarpment





























Guilds: Grassland/Savannah, River/Streams

This perennial goldenrod grows in full sun areas along cobble and boulders bars with other grasses and forbs and needs periodic disturbance from the

Threats

-  Dams and Water Management/Use
-  Invasive Non-native/Alien species
-  Natural System Modifications
-  Recreational Activities
-  Storms and Flooding
-  Temperature Extremes
-  Tourism and Recreation Areas

Conservation Actions

- Alliance and Partnership Development     
- Ex Situ Conservation     
- Land/Water Management   
- Land/Water Protection     
- Species Reintroduction     
- Training     

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology, genetic research

Management: Develop and implement best management practices

scouring of rivers in order to persist. It occurs in the state endangered and globally rare Cumberland Plateau Riverscour prairie (S1S2/GNR) community.

Range Map

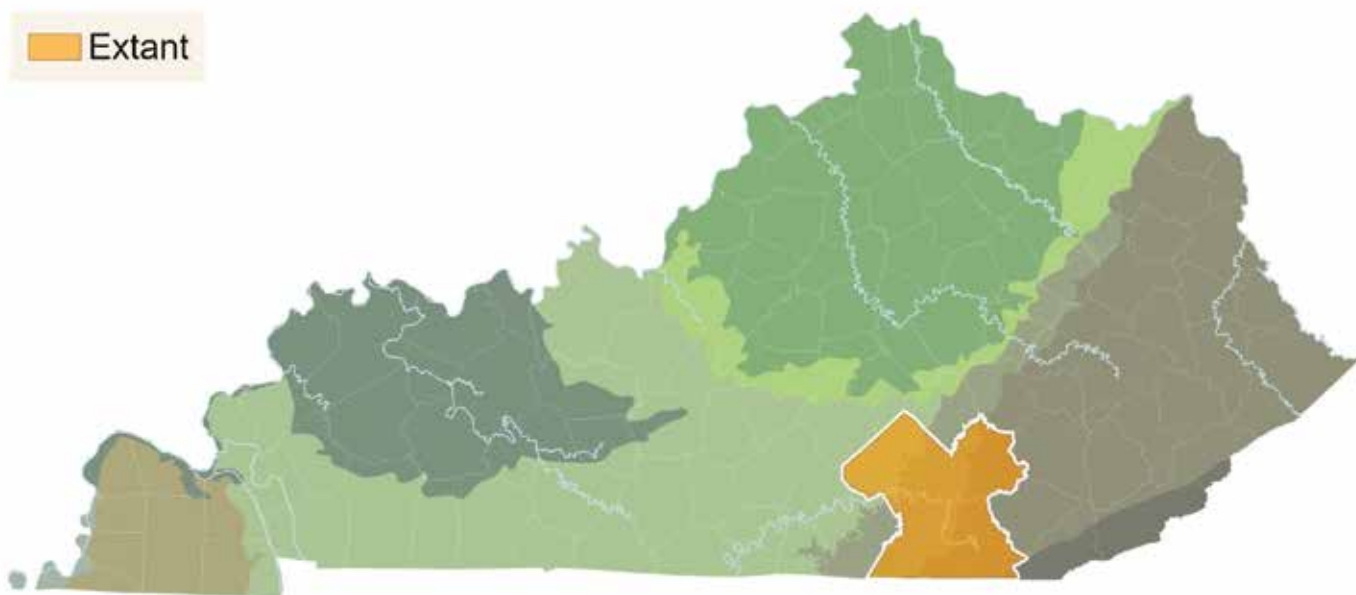








Photo: Devin Rodgers



GORGE GOLDENROD

(*Solidago faucibus*)

Threats

-  Annual and Perennial Nontimber Crops
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Storms and Flooding

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation     
- Land/Water Management  
- Land/Water Protection     
- Species Reintroduction     

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2G4

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey, assess, conserve and restore this globally rare forest goldenrod.

Habitat Associations

Physiographic Regions: Cumberland Plateau

Guilds: Mesic Forest

Grows in mesic Appalachian acidic forest at the base of slopes, Appalachian mesophytic forest (S4S5/GNR).

Needs

Survey: Status surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Range Map

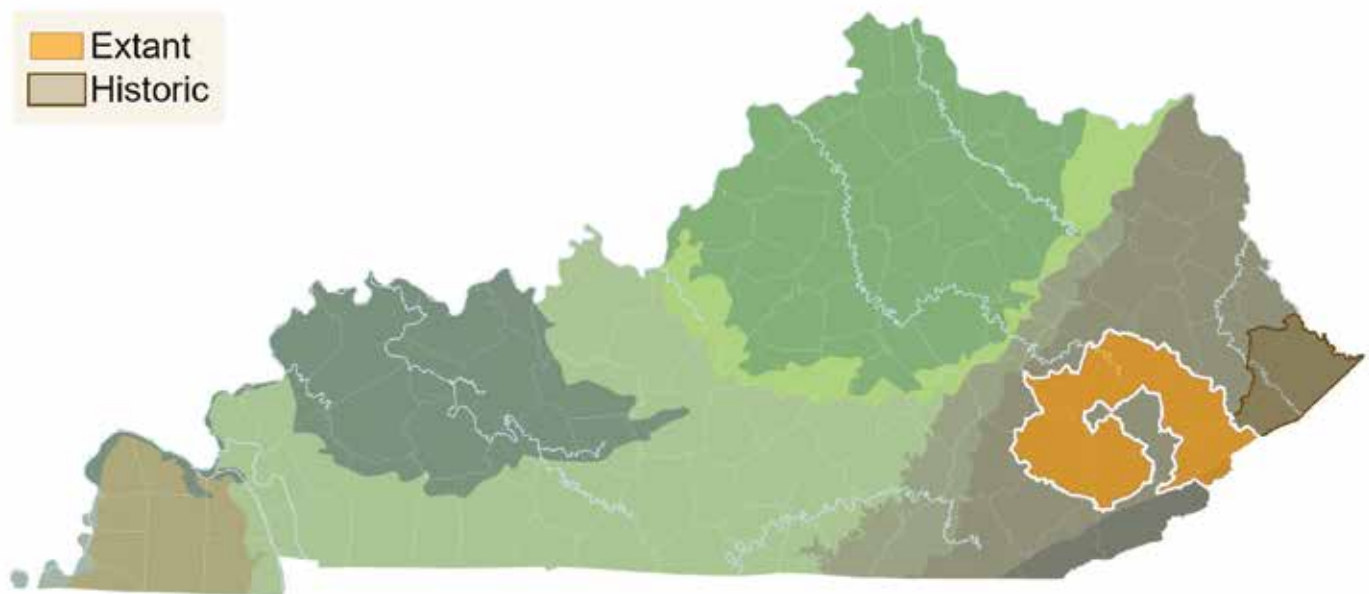


Photo: Tara Littlefield



SHORT'S GOLDENROD

(*Solidago shortii*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G1

S Rank: S1

Federal Status: Endangered

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this federally endangered goldenrod.

Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Grassland/Savannah

This long lived perennial goldenrod occurs in open grasslands is thought to be historically associated with migrating ungulates such as bison. This species occurs in Limestone/dolomite prairie (S1/G2G3) and Interior Low Plateau post oak barrens (S2/G2G3) communities, as well as the Interior Plateau Riverscours prairie (S2/GNR) community that is currently being described.

Threats

- Dams and Water Management/Use
- Fire and Fire Suppression
- Housing and Urban Areas
- Invasive Non-native/Alien species
- Livestock Farming and Ranching
- Logging and Wood Harvesting
- Natural System Modifications
- Roads and Railroads

Conservation Actions

- Alliance and Partnership Development
- Education and Awareness
- Ex Situ Conservation
- Land/Water Management
- Site/Area Protection
- Species Reintroduction

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Research: Management effects research

Management: Develop best management practices

Range Map

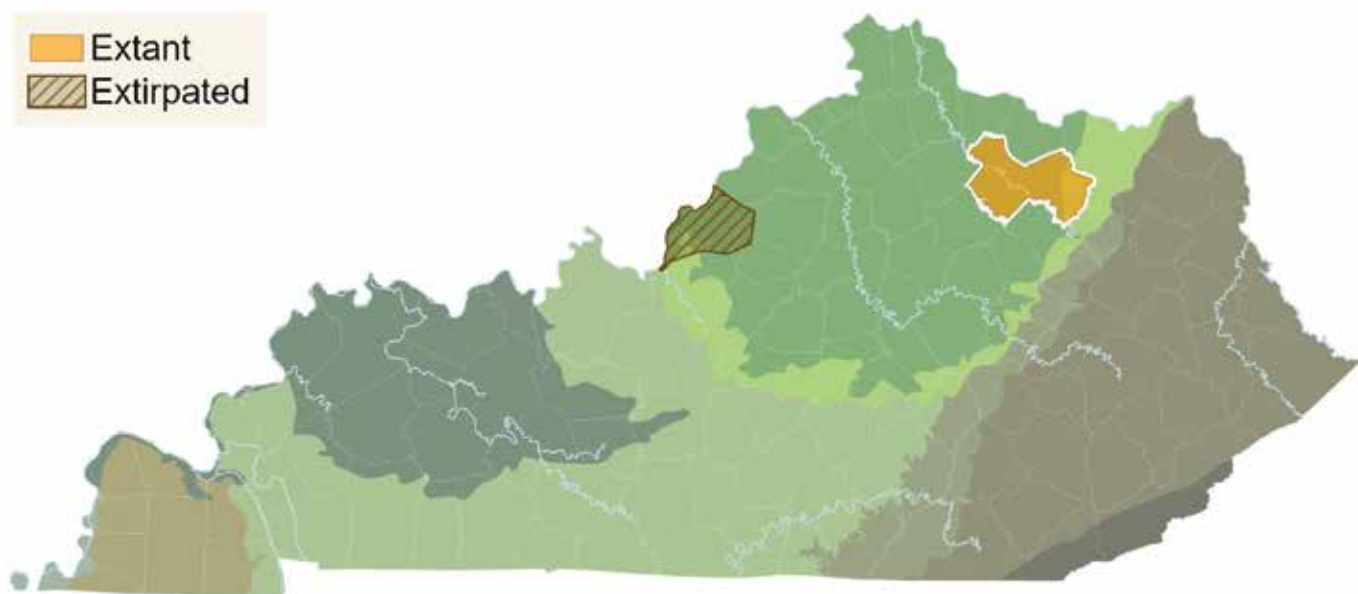









Photo: Tara Littlefield



VIRGINIA SPIRAEA

(*Spiraea virginiana*)

Threats

-  Dams and Water Management/Use
-  Invasive Non-native/Alien species
-  Natural System Modifications
-  Recreational Activities
-  Storms and Flooding
-  Temperature Extremes
-  Tourism and Recreation Areas

Conservation Actions

- Alliance and Partnership Development    
- Education and Awareness     
- Ex Situ Conservation     
- Land/Water Management 
- Land/Water Protection     
- Species Reintroduction    

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Translocation research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2?

S Rank: S1

Federal Status: Threatened

IUCN Red List: N/A

Conservation Goal

Survey, assess, conserve and restore this federally threatened shrub along Cumberland plateau river scour in Kentucky.

Habitat Associations

Physiographic Regions: Plateau Escarpment

Guilds: Grassland/Savannah, River/Streams

This long lived perennial shrub grows in full sun to partial shade areas along cobble and boulders bars with other grasses and forbs. It needs periodic disturbance from the scouring of rivers in order to

persist, has low seed viability and can form clonal patches. It occurs in the Cumberland Plateau Riverscour prairie (S1S2/GNR) community and is also found in an undescribed limestone riverscour community type in the Cumberland Plateau region.

Range Map

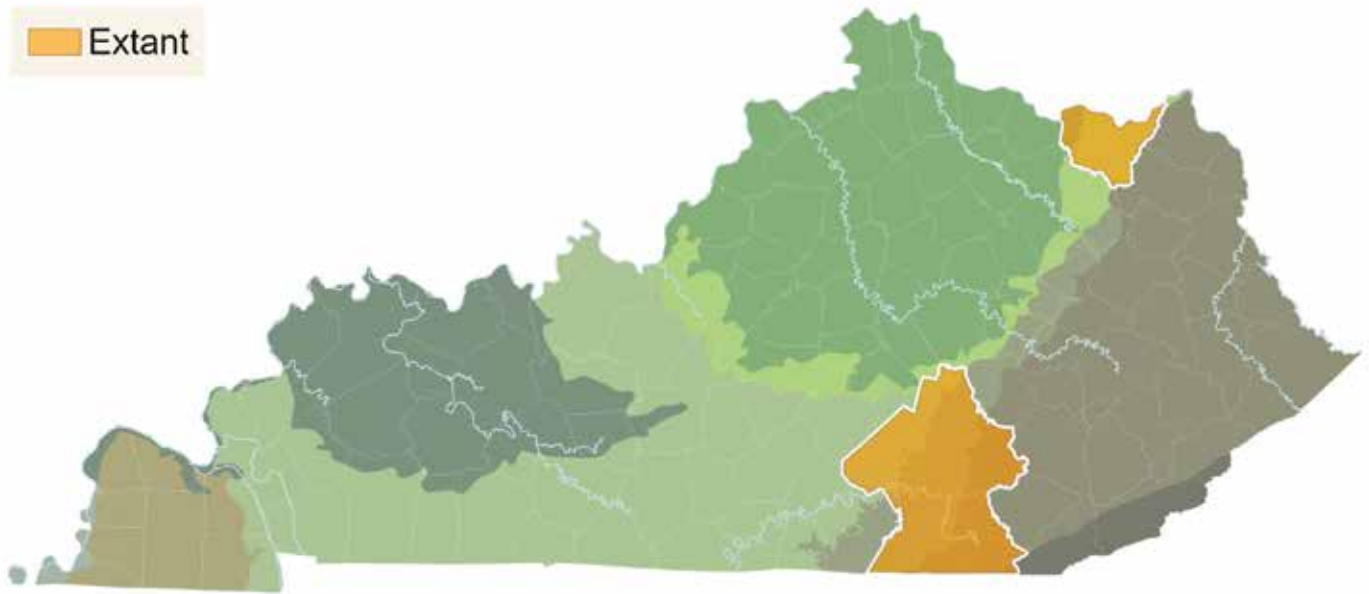


Photo: Tara Littlefield



CUTLEAF MEADOW-PARSNIP

(*Thaspium pinnatifidum*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G2G3

S Rank: S2S3

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Work with researchers on genetic studies and taxonomic descriptions; protect populations; work with federal and state agencies as well as private landowners on population monitoring, management and recovery; survey additional habitat for undocumented populations and increase ex situ conservation and translocations of this globally rare Kentucky endemic.







Habitat Associations

Physiographic Regions: Plateau Escarpment, Knobs





























Guilds: Xeric Forest

Biennial to short lived perennial that grows in rocky limestone woodlands. This species grows in habitats most similar to the Xeric red cedar - oak forest/woodland (S5, GNR) community type.

Threats

-  Fire and Fire Suppression
-  Habitat Shifting and Alteration
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Mining and Quarrying
-  Transportation and Service Corridors

Conservation Actions

- Alliance and Partnership Development     
- Ex Situ Conservation     
- Land/Water Management   
- Land/Water Protection     
- Species Reintroduction     
- Training     

Needs

Survey: Status Survey

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Site protection

Range Map

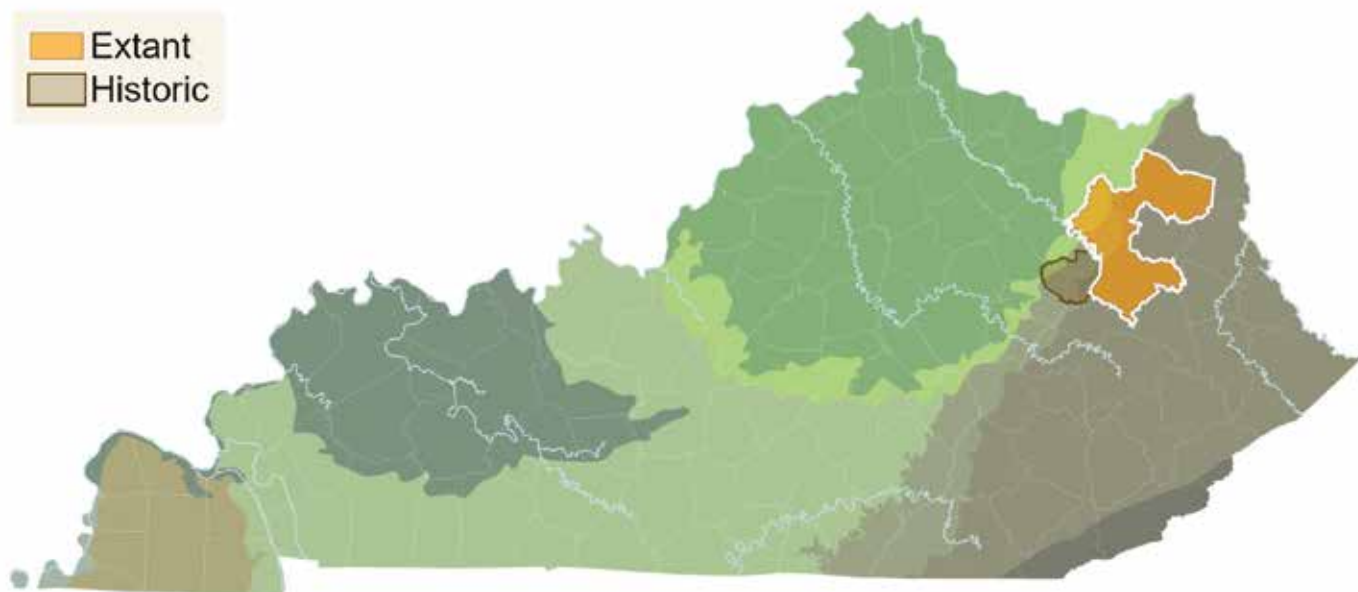






Photo: James Kiser




















SOFT-HAIRED THERMOPSIS

(*Thermopsis mollis*)

Threats

-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting

Conservation Actions

- Alliance and Partnership Development    
- Ex Situ Conservation    
- Land/Water Management  
- Species Reintroduction    
- Training    

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3G4

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare plant.

Habitat Associations

Physiographic Regions: Cumberland Plateau

Guilds: Xeric Forest

This perennial rhizomatous plant grows on trails and logging roads in acidic soils in Appalachian forests. It spreads through rhizomes and seems to need some level of disturbance to persist. It may have been

associated with large migrating ungulates in the past, or other disturbances such as tip up mounds. This species occurs along trails and logging roads in the Appalachian sub-xeric forest (S5/GNR) community type.

Range Map

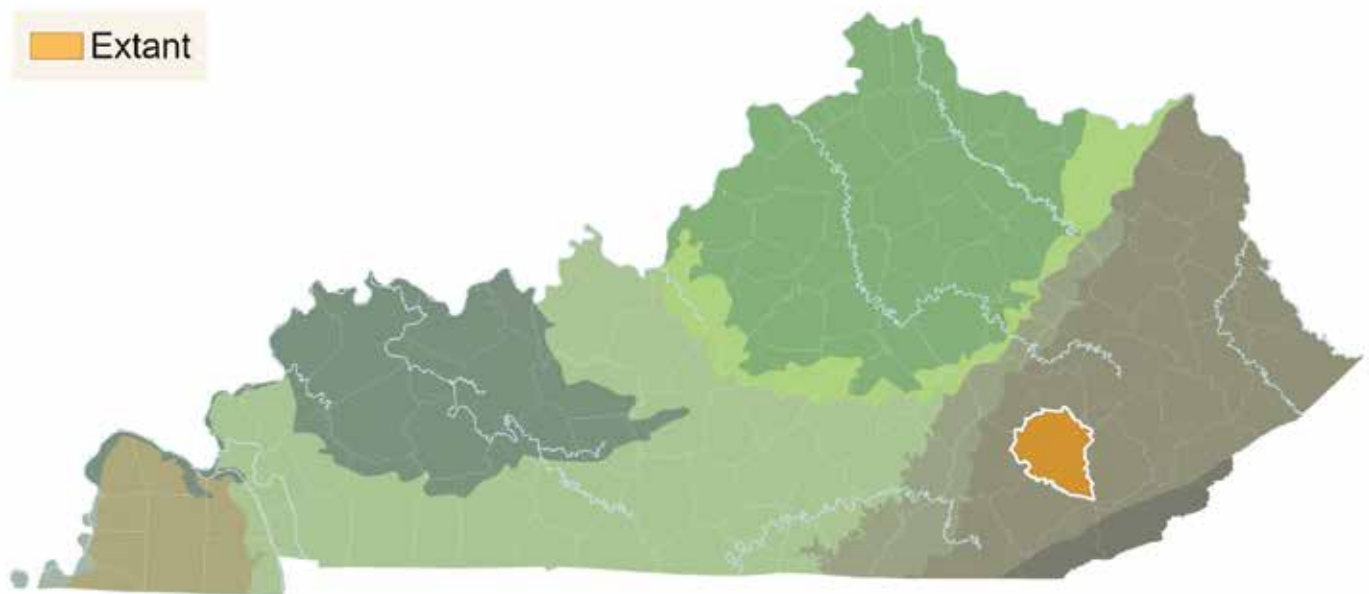


Photo: Tara Littlefield



KENTUCKY CLOVER

(*Trifolium kentuckiense*)

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G1

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect existing populations, work with federal and state agencies as well as private landowners on population monitoring, management and recovery, survey additional habitat for undocumented populations, and increase ex situ conservation and translocations of this globally rare Kentucky endemic.

Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Mesic Forest, Xeric Forest

This annual/biennial clover typically grows along animal trails on calcareous south to southwest facing slopes and seems to need some level of disturbance

Threats

- Droughts
- Habitat Shifting and Alteration
- Invasive Non-native/Alien species
- Logging and Wood Harvesting
- Natural System Modifications
- Utility and Service Lines

Conservation Actions

- Alliance and Partnership Development
- Education and Awareness
- Ex Situ Conservation
- Land/Water Protection
- Species Reintroduction

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Management: Site protection

to reduce competition and maintain habitat. It grows in a subtype of the Xeric red cedar - oak forest/woodland (S5/G5) community types.

Range Map

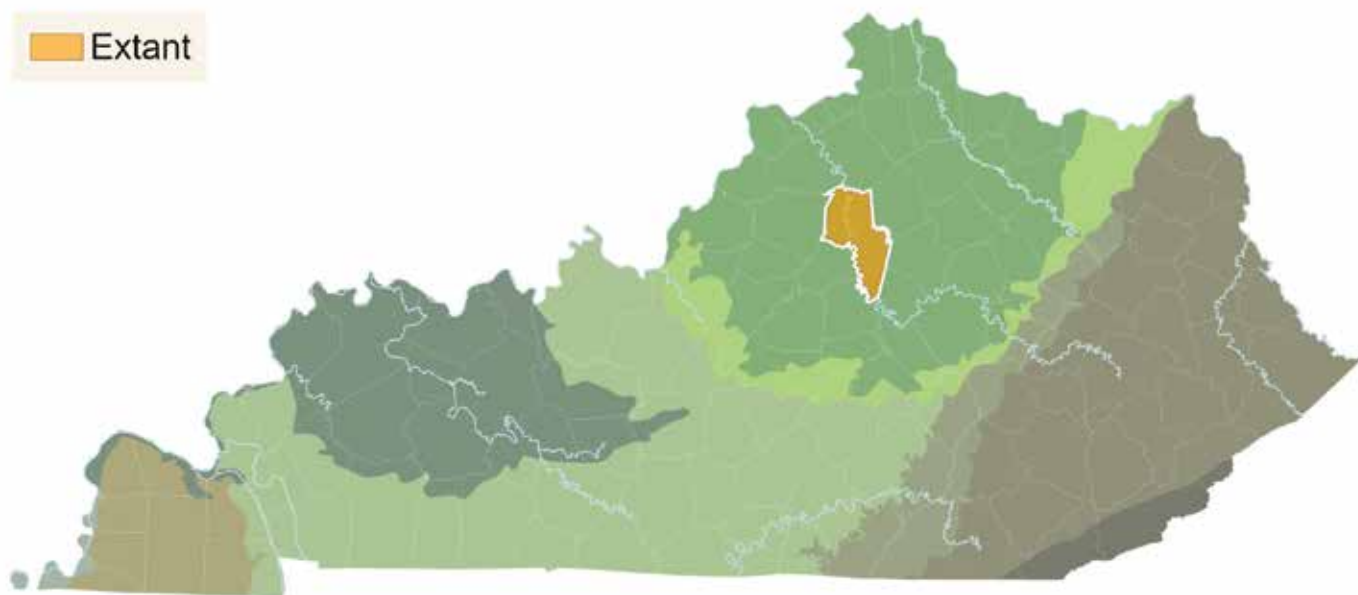










Photo: Tara Littlefield



BUFFALO CLOVER

(*Trifolium reflexum*)

Threats

-  Fire and Fire Suppression
-  Habitat Shifting and Alteration
-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Logging and Wood Harvesting
-  Natural System Modifications
-  Pathogens and Microbes
-  Storms and Flooding

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation     
- Land/Water Management  
- Land/Water Protection     
- Species Reintroduction     

Needs

Survey: Status Surveys

Survey: Surveys for new populations or habitat

Research: Life history, ecology and genetic research

Management: Develop and implement best management practices

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3G4

S Rank: S1S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Protect existing populations, work with federal and state agencies as well as private landowners on population monitoring, management and recovery, survey additional habitat for undocumented populations, and increase ex situ conservation and translocations of this globally rare plant.

Habitat Associations

Physiographic Regions: Interior Plateau, Mississippi Valley Loess Plain

Guilds: Cliff/Rockshelter, Mesic Forest, Xeric Forest

This annual/biennial clover typically grows along animals trails or recently burned forests and woodlands. This species forms a long term seed bank and needs some level of disturbance to germinate and grow. It grows in several different habitat types across Kentucky, including the western Kentucky xerohydric flatwoods (S1/G2G3), Acidic sub-xeric forest (S5/G5) and limestone sub-xeric forest (S5/G5) community types.

Range Map

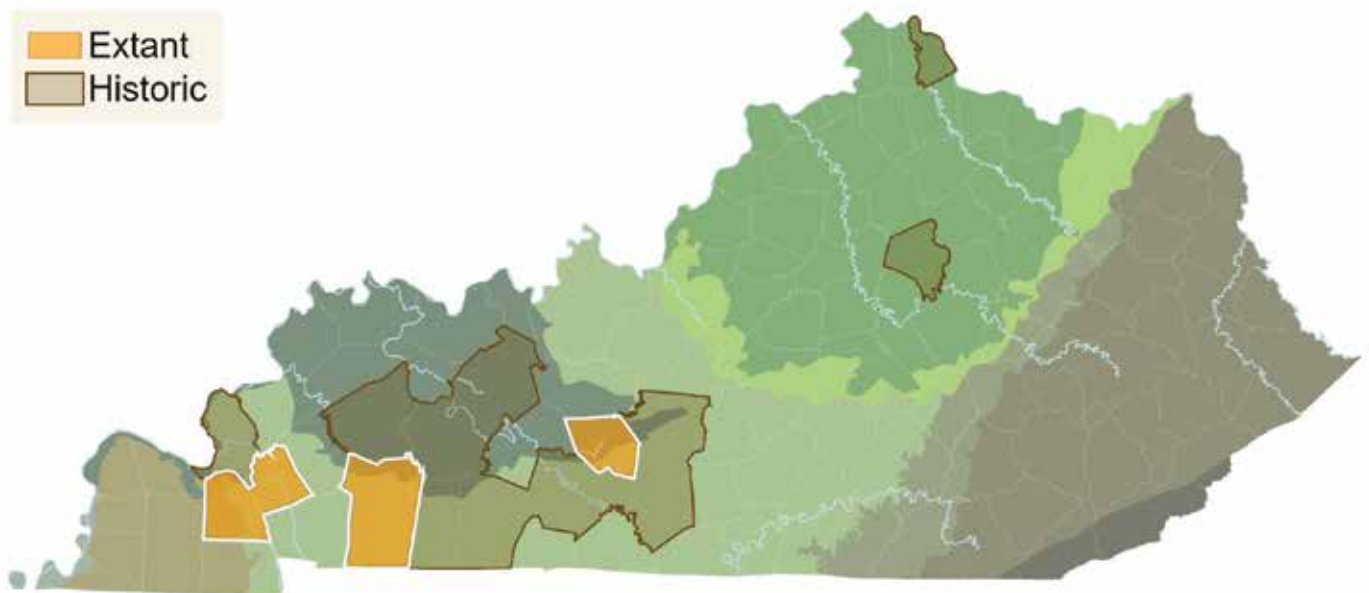







Photo: Tara Littlefield



RUNNING BUFFALO CLOVER

(*Trifolium stoloniferum*)

Threats

-  Housing and Urban Areas
-  Invasive Non-native/Alien species
-  Livestock Farming and Ranching
-  Logging and Wood Harvesting
-  Natural System Modifications

Conservation Actions

- Alliance and Partnership Development     
- Education and Awareness     
- Ex Situ Conservation     
- Land/Water Management     
- Site/Area Protection  
- Species Reintroduction     

Needs

Survey: Post delisting monitoring and status surveys

Research: Management effects research

Management: Develop cooperative management agreements with landowners

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S2S3

Federal Status: Delisted

IUCN Red List: N/A

Conservation Goal

Protect, manage and restore the remaining populations of this globally rare clover.

Habitat Associations

Physiographic Regions: Bluegrass

Guilds: Grassland/Savannah, Mesic Forest

This short lived perennial clover grows in filtered light and is thought to be historically associated with migrating ungulates such as bison. It grows along trails in riparian areas in calcareous mesic forests dominated by black walnut, shellbark hickory and

Ohio buckeye. It does not compete well with other vegetation and needs some level of disturbance to persist, such as trampling by animals, mowing, or scouring of vegetation by creek water. This species grows in calcareous mesic riparian forests that are common in the Bluegrass and is also associated with the Bluegrass mesophytic cane forest (S1/G1) and Bluegrass savanna (S1/G1) communities.

Range Map

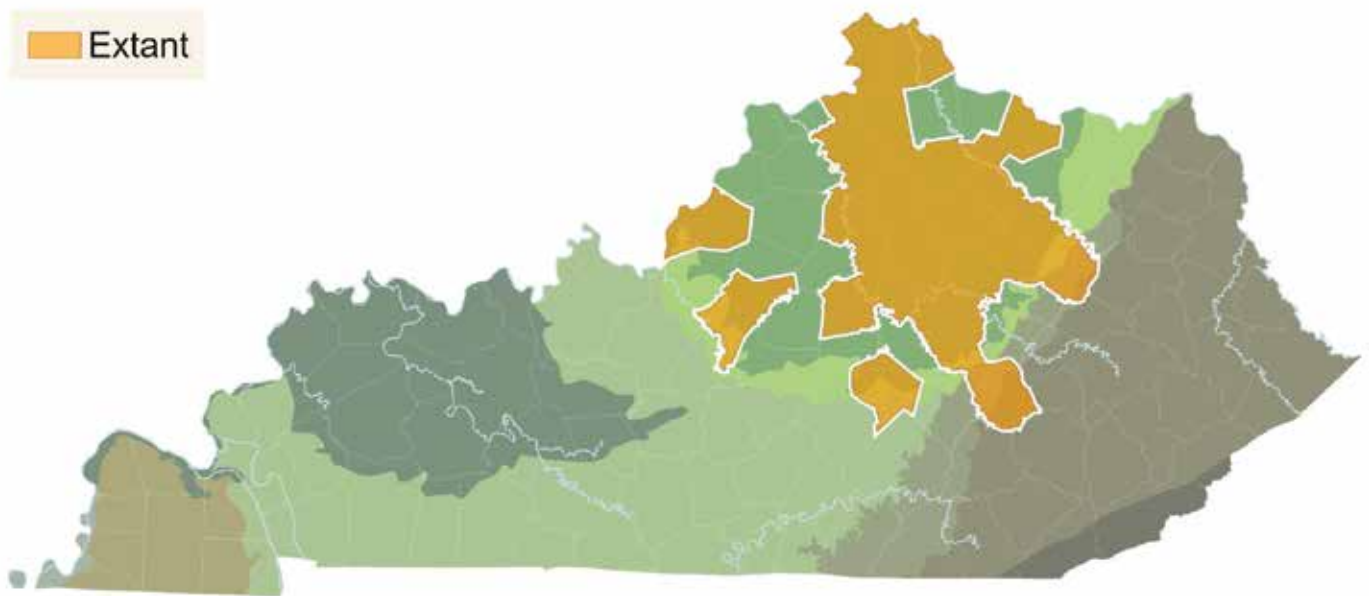










Photo: Tara Littlefield



SAND GRAPE

(*Vitis rupestris*)

Threats

-  Dams and Water Management/Use
-  Invasive and Other Problematic Species and Genes
-  Invasive Non-native/Alien species
-  Natural System Modifications
-  Recreational Activities
-  Storms and Flooding
-  Temperature Extremes
-  Tourism and Recreation Areas

Conservation Actions

- Alliance and Partnership Development      
- Education and Awareness     
- Ex Situ Conservation     
- Land/Water Management  
- Land/Water Protection     
- Species Reintroduction     

Conservation Profile

Priority Group: Plant

KNP Info

G Rank: G3

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Survey, assess, conserve and restore this globally rare plant along Cumberland plateau river scour in Kentucky.

Habitat Associations

Physiographic Regions: Plateau Escarpment, Interior Plateau

Guilds: Grassland/Savannah, River/Streams

This low growing perennial vine grows in full sun areas along cobble and boulders bars with other grasses and forbs. It needs periodic disturbance from

Needs

Survey: Status surveys

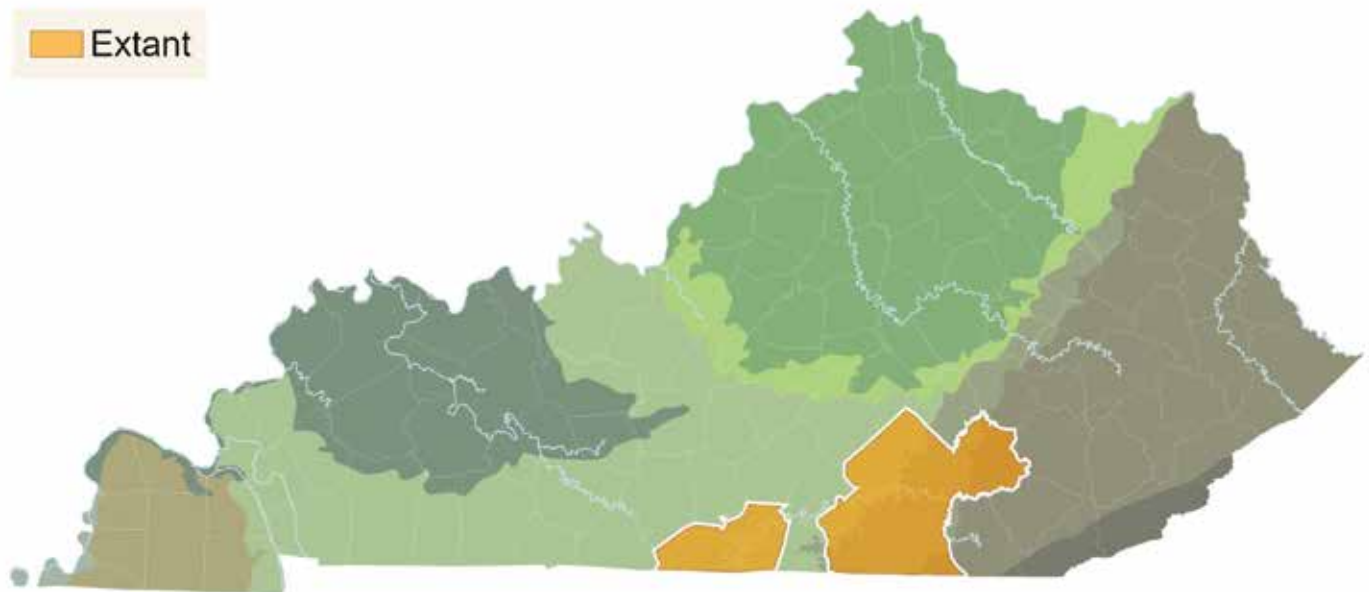
Survey: Surveys for new populations or habitat

Research: Life history, ecology, genetic research

Management: Develop and implement best management practices

the scouring of rivers in order to persist. It occurs in the Cumberland Plateau Riverscour prairie (S1S2/GNR) community and has also been documented on limestone river scour, an undescribed community type.

Range Map



REPTILES

Introduction

The total reptile fauna of Kentucky includes 57 species of lizards, snakes, and turtles; 55 are native and 2 others (Common Wall-lizard from Europe and Mediterranean Gecko from the American tropics) are established exotics that have been unintentionally introduced. None of Kentucky's reptiles are federally listed as Endangered or Threatened, and none are known to have been extirpated from the Commonwealth within historic times. However, 1 snake (Eastern Coachwhip), formerly believed by some authorities to be native to Kentucky, persisted for some time after being unintentionally introduced near Park City by a now-defunct roadside zoo (Kentucky Reptile Garden) but eventually disappeared from the area. Kentucky has no endemic or near-endemic reptiles.

Within the Order Squamata (lizards and snakes), Kentucky's 32 snakes are classified into 4 families and represent about 18% of the 179 described snake species in the U.S. Kentucky's 8 native lizards (in 4 families) and 2 exotic lizards (in 2 families) make up about 5% of the 200+ kinds of lizards known from the U.S. The 15 turtles (Order Testudines) that occur in Kentucky include 4 families and represent about 17% of the 88 turtle species that occur in the U.S.

Kentucky's first SWAP, completed in 2005, recognized 26 native reptiles (4 lizards, 16 snakes, and 6 turtles) as SGCN. The list included 17 reptiles then recognized as Endangered, Threatened, or Special Concern by the KSNPC as well as 9 additional species recognized by KDFWR as having conservation concerns. No changes were made to the reptile list during the 2013 SWAP revision.



Western Pygmy Rattlesnakes are difficult to survey for. Collecting baseline species information is a priority for this and other Data Deficient SGCN.

Photo: John MacGregor

KDFWR has compiled a large quantity of basic information relating to Kentucky's reptile fauna during the past two decades. When the original 2005 Plan was written, the available baseline information consisted of detailed distributional data for the 17 monitored reptiles from KSNPC, county-level species distribution maps for all reptiles, and a database populated by museum records and a handful of biologists' field note information that had been compiled by biologists at East Kentucky Power Cooperative in support of a to-be-completed Kentucky herp book. Since that time the State Herpetologist has worked closely with the KFWIS staff to compile and review a large set of reptile records covering all taxa from across the state. At the present time the total number of reviewed and reasonable or verified point records for both SGCN and non-SGCN reptiles is as follows:

Group	Total reviewed records	Total reviewed SGCN records
Lizards	11,058	728
Snakes	42,915	6,145
Turtles	15,486	704

The species list for the 2023 SWAP includes 25 SGCN reptiles chosen by a team of professional biologists and university professors (Herp Team) knowledgeable about Kentucky's herpetofauna. The list includes 18 reptiles currently recognized OKNP as Endangered (8), Threatened (4), or Special Concern (6) along with 6 additional reptiles known or believed to have undergone serious range reductions and/or population declines in Kentucky and 1 reptile (Timber Rattlesnake) with declining populations in numerous other states with its range. No new reptiles were added to the SGCN list in 2023 but 1 snake (Diamond-backed Watersnake) was dropped from consideration by the Herp Team.

The 4 SGCN lizards represent 50% of Kentucky's native lizard fauna (= 40% of the total lizard fauna since we now have 2 established exotics here), the 15 SGCN snakes make up 47% of the Kentucky snake fauna, and the 6 SGCN turtles comprise 40% of Kentucky's chelonian fauna. Also, 15 of the 25 SGCN reptiles have been designated as Data Deficient SGCN because we simply don't have enough information on their distribution, life history, and/or habitat requirements to be able to make informed assessments of their conservation status.

Kentucky distribution records for all SGCN reptiles are shown on the accompanying range maps. For some species both historic and current records have been combined, but for others the current range covers only those observations from 2003-present and historic range records include all observations or collections prior to 2003. For a few closely monitored and rapidly declining species the historic range includes all records prior to 2011. All range maps are based on carefully reviewed species records housed within the KFWIS, a comprehensive data set that includes all available records for Kentucky vertebrates along with selected invertebrates including crayfish and mussels. Record sources primarily include published records, specimen data from museums and university or agency collections, scientific and educational collecting permit reports submitted by researchers and consultants, and observations documented by biologists working for government agencies, academic institutions, and consulting firms.

A brief discussion of the Kentucky distributions of our 25 SGCN reptiles by group appears below.

SGCN Lizards

The 4 lizards listed as SGCN are widely but unevenly distributed across Kentucky. None occur in the Bluegrass Region or Mississippi Alluvial Plain, and they are found only sparingly in the Cumberland Mountains, Knobs, and Interior River Valleys and Hills. Most SGCN lizard occurrences are in the southern sections of the Cumberland Plateau and Plateau Escarpment, the northern and western extensions of the Interior Plateau, and throughout most of the Mississippi Valley Loess Plains. Only the Coal Skink occurs typically in forested habitat; Southeastern Five-lined Skinks, Eastern Slender glass Lizards, and Six-lined Racerunners require much more open conditions and are largely restricted to remnant prairies, limestone and sandstone glades, open gravelly slopes, and human-disturbed habitats such as abandoned gravel pits and quarries, powerline rights-of-way, old eroding highway cuts, and railroad beds.



Reptiles occur in a wide variety of habitats. In general, Kentucky's lizard species tend to prefer dry, open areas although some types of skinks, like this coal skink, can occur in mesic woodlands.

Photo: John MacGregor

SGCN Snakes

Kentucky's 15 SGCN snakes can essentially be divided into 2 separate subgroups based on basic habitat requirements and their general distribution patterns across the state.

The 8 snakes in the "lowland group" include 6 aquatic to semiaquatic species (Northern Cottonmouth, Western Mudsnake, Mississippi Green Watersnake, Copperbelly Watersnake, Broad-banded Watersnake, Western Ribbonsnake) essentially restricted to swamp forests, bayous, sloughs, and other wetland habitats in western Kentucky. These collectively inhabit just 4 physiographic regions – the Mississippi Alluvial Plain, Mississippi Valley Loess Plains, Interior River Valleys and Hills, and the western edge of the Interior Plateau. Also grouped here are



The Copperbelly Watersnake is found in and along wetlands, lakes, ponds, and sluggish streams.

Photo: John MacGregor

the Kirtland's Snake (generally a resident of low ground and very common in some sections of Louisville but sparsely distributed in the Bluegrass, Interior River Valleys and Hills, and Mississippi Valley Loess Plains) and the Eastern Ribbonsnake (a semiaquatic reptile that is still doing well in some western Kentucky wetlands but seems to have vanished from the natural sinkhole ponds of the Interior Plateau and the wetlands bordering the Licking River in the Knobs Region).

The 7 snakes in the "upland group" (Southeastern Crowned Snake, Scarletsnake, Scarlet Kingsnake, Cornsnake, Northern Pinesnake, Western Pygmy Rattlesnake, and Timber Rattlesnake) are largely to entirely absent from the Bluegrass, Mississippi Alluvial Plain, and Mississippi Valley Loess Plains but historically were widely distributed throughout much of the Interior Plateau, Interior River Valleys and Hills, Knobs, Plateau Escarpment, Cumberland Plateau, and Cumberland Mountains. At least 5 of these (Southeastern Crowned Snake, Scarletsnake, Scarlet Kingsnake, Northern Pinesnake, and Western Pygmy Rattlesnake) are in serious trouble in Kentucky

and several appear to be on the verge of disappearing from the state. The Timber Rattlesnake is by far the most widespread and apparently secure member of this group and was included as SGCN only because populations in the northeastern U.S. are declining rapidly due to Snake Fungal Disease. The Cornsnake is enigmatic in Kentucky – the population occurring in the west-central part of the state along the edge of the Interior Plateau is doing well while the population on the Plateau Escarpment in the Red River Gorge area is nearly gone.

SGCN Turtles

Kentucky's 6 SGCN turtles, all of which are aquatic, are primarily concentrated in the state's 11 westernmost counties. None of them occur in the Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, or Knobs physiographic regions except in rivers and lakes that often form regional boundaries. The Bluegrass Region harbors Smooth Softshells in a few spots in the Ohio River, a now-defunct colony of Eastern Mud Turtles at the edge of Louisville, and a single site at the mouth of a Kentucky River tributary where a subadult Alligator Snapping Turtle was recently photographed. The westernmost portion of the Interior Plateau has a rich SGCN turtle fauna associated with the Lower Cumberland River and Lower Tennessee River but further to the east and north harbors only a rapidly disappearing and widely dispersed population of Eastern Mud Turtles that once occupied some of the larger and more intact sinkhole pond wetland complexes. The Interior River Valleys and Hills support low numbers of Smooth Softshells, Mississippi Map Turtles, and Northern False Map Turtles in the Ohio River and Lower Green River, a few colonies of Eastern Mud Turtles in some of the remaining forested wetlands as-yet unimpacted by agriculture or the coal industry, and a few old records for Alligator Snapping Turtles. The Mississippi River and associated floodplain wetlands and several large streams (Obion Creek, Bayou du Chien, Terrapin Creek) within Mississippi Valley Loess Plains and Mississippi Alluvial Plain provide habitats for all of Kentucky's SGCN turtles.

SGCN reptiles on the periphery of their ranges that barely enter Kentucky include the Mississippi Green Watersnake, Broad-banded Watersnake, Western Pygmy Rattlesnake, and Southern Painted Turtle.

Threat Categories

Threat categories to SGCN reptiles identified by the taxa team include Invasive and other Problematic Species and Genes, Transportation and Service Corridors, Biological Resource Use, Agriculture and Aquaculture, Natural System Modifications, Climate Change and Severe Weather, Human Intrusion and Disturbance, Residential and Commercial Development, and Energy Production and Mining. Some specific threats identified within these categories are snake



Populations of Midland Smooth Softshell Turtles are thought to be in decline, especially on Ohio River, due to higher water levels that inundate sandbars and reduce nesting habitat. Photo: John MacGregor

fungal disease, habitat degradation caused by invasive plants, conversion of suitable upland or wetland habitat to cropland and pasture, road mortality, forest management issues, fire suppression, loss of open habitat due to natural forest regeneration, direct killing by humans (such as recreational shooting of basking turtles), mining, and residential and commercial development. These threats generally occur statewide but are more pervasive in some regions than others and are less problematic throughout the Bluegrass and across much of the southern part of the Interior Plateau where SGCN reptiles as a group are sparsely distributed or absent.

Conservation Actions

Conservation actions recommended by the Herp Team to counteract identified threats to SGCN reptiles include Land and Water Management, Land and Water Protection, Education and Awareness, and External Capacity Building. The habitat needs of Kentucky's 25 SGCN reptiles can include anything from large free-flowing rivers with clean sand substrate or permanent bald cypress swamps to dry open glades with rocky or gravelly soils, and it follows that the effective implementation of conservation actions will require the formation of partnerships and alliances with a variety of state and federal agencies, nonprofits, universities, businesses, and communities and should also include incorporating the needs of local SGCN reptile species into local development plans.

For Data Deficient SGCN reptiles there is a strong need to develop and implement field survey protocols that will allow us to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky as well as to assess taxonomic status and determine population trends.

Some specific conservation needs common across the SGCN reptile spectrum are summarized below:

Develop a way to utilize KFWIS to effectively track SWAP survey and monitoring activities including areas surveyed, techniques used, voucher photos or recordings made, survey dates and times, survey personnel, SWAP results both positive and negative, and other herp species encountered during surveys.

Develop a way to consistently obtain SWAP observations from other land management agencies including the National Park Service (Mammoth Cave NP, Big South Fork NRR, Cumberland Gap NHP, Abraham Lincoln's Boyhood Home at Knob Creek), US Fish & Wildlife Service (Frankfort Field Office personnel, Clarks River NWR), US Forest Service (Daniel Boone National Forest, Land Between The Lakes National Recreation Area), Department of Defense (Fort Knox, Fort Campbell), Office of Kentucky Nature Preserves, and Kentucky Department of Parks along with those who work in places like Bernheim Forest, Robinson Forest (UK), Lilley Cornett Woods (EKU), Maywoods (EKU), Boone County Parks, TNC, KNL, etc.

Develop a SWAP-funded nongame herp work/job component for all Wildlife Division field staff (including Wildlife Management area personnel) along with biologists and educators from the KDFWR Fisheries and Conservation Education Divisions that would include performing basic herpetological inventory work and SGCN monitoring on all state-owned and state-managed lands as well as looking at the effects of management activities on local populations of amphibians and reptiles.

Work with KFWIS staff to ensure that all museum and university collections holding amphibian and reptile specimens from Kentucky – and especially those located within the state – are aware of the value of maintaining updated specimen catalogs and periodically sending electronic data to KFWIS. This is extremely important because KDFWR is the one state agency charged with managing Kentucky's wildlife resources for its citizens and a major part of this includes keeping track of occurrence records for all wildlife.

Continue to solicit amphibian and reptile photos from the public for identification, and develop a way to catalog, store, and retrieve SGCN voucher photos and/or recordings.

Develop a way to sort, review, evaluate, and obtain accurate locality data for SGCN amphibian and reptile observations posted on citizen science natural history apps such as iNaturalist and HerpMapper.

Investigate the further use of eDNA to detect the presence of both aquatic and terrestrial SGCN.

Develop and employ specific management techniques (forest thinning, prescribed burning, log landing management, prairie and glade restoration, grassland and open land management, wetland protection and restoration, elimination of kudzu and other invasive exotic vegetation from abandoned gravel pits, quarries, and similar disturbed

sites, etc.) for SGCN reptiles.

Work to require consideration of SGCN amphibians and reptiles in environmental assessments for projects tied to the use of state or federal funding.

Work toward the establishment of a Kentucky natural history museum.

Work toward the designation of a regulation-backed state list of endangered and threatened species.

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The Pinesnake: Extremely rare or just rarely encountered?

The northern pine snake is a large black and white snake that can grow to over 6 feet in length. Although one of Kentucky's largest snake species, it is very secretive and not commonly encountered, and its habit of burrowing underground makes it extremely difficult to find. Pinesnakes in Kentucky are often associated with upland oak-dominated forested landscapes with loose sandy or gravelly soils and abundant rock cover. Within these areas they are most often found in close association with remnant prairies and glades, abandoned quarries and gravel pits, old fields, pastures, and dry open woodlands with scattered openings.

Unfortunately, most Pinesnakes that come to the attention of biologists are either found as road kills or were intentionally killed by a human startled by their defensive posture and loud hiss. They appear to be declining both range wide and in Kentucky primarily of natural succession, fire suppression, and land conversion for development or agriculture.

The status of the Pinesnake in Kentucky is currently unknown, but it is has likely been extirpated from most of its previous range. The species was first reported from Harlan County in 1925 and has since been documented from 11 counties. Since the early 1980s there have been records from only 6 counties, and over the past 12 years only a half-dozen Pinesnake observations have been reported (all from Calloway and Trigg counties). Most Kentucky Pinesnakes found were full-grown adults but one clutch of hatched eggs was discovered in 1984 in a cavity beneath a rock embedded in the bank in an abandoned Calloway County gravel pit and a hatchling was found in the same area a year later in mid-October.

Without an active habitat program to protect and sustain existing populations, it is likely that this species will soon be gone from Kentucky. It has been included as SGCN since Kentucky's first SWAP, and with little current data was categorized as a data deficient SGCN during this revision. Lack of funding has precluded much field work with this species, though this revised plan identifies specific needed actions for the species.

Most importantly, there is a need to develop and implement field survey protocols to collect data on Pinesnake distribution, occupancy trends, life history, and habitat needs in Kentucky. Once individuals are found, radiotracking would help document home range size and specific habitat use in the state. In addition, working with partners from the Kentucky Herpetological Society and the Louisville Zoo to establish a captive breeding program would be a desirable long-term project to produce and head start juvenile Pinesnakes with Kentucky ancestry for reintroduction into suitable habitat.



The Pinesnake is likely extirpated from most of its Kentucky range. There have been just three state observations since 2014. Photo: John MacGregor



Gravel pits, abandoned quarries, and similar man-made features provide important habitat for numerous SGCN reptiles including Pinesnakes, Southeastern Crowned Snakes, Western Pygmy Rattlesnakes, Scarletsnakes, Six-lined Racerunners, Coal Skinks, Southeastern Five-lined Skinks, and Slender Glass Lizards as well as many common reptiles – especially lizards. Sunny, open, well-drained gravelly slopes make excellent nesting sites for egg-laying reptiles. Photo: John MacGregor

REPTILE PROFILE PAGES

Photo: John MacGregor



NORTHERN COTTONMOUTH

(*Agkistrodon piscivorus*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Conservation Goal

Work with Kentucky Herpetological Society partners to monitor specific populations on a regular basis. Identify and protect upland hibernacula.







Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain




Guilds: Forested Wetland, Mesic Forest, Xeric Forest, Open Wetland, Lake/Pond, River/Streams

Generally requires high south or west facing wooded bluffs providing mammal burrows and/or other underground retreats for successful hibernation.

Threats

-  Annual and Perennial Nontimber Crops
-  Biological Resource Use
-  Mining and Quarrying
-  Pathogens and Microbes
-  Renewable Energy
-  Roads and Railroads

Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration 
- Resource and Habitat Protection 
- Site/Area Protection 

Needs

Survey: Collect baseline species information

Range Map

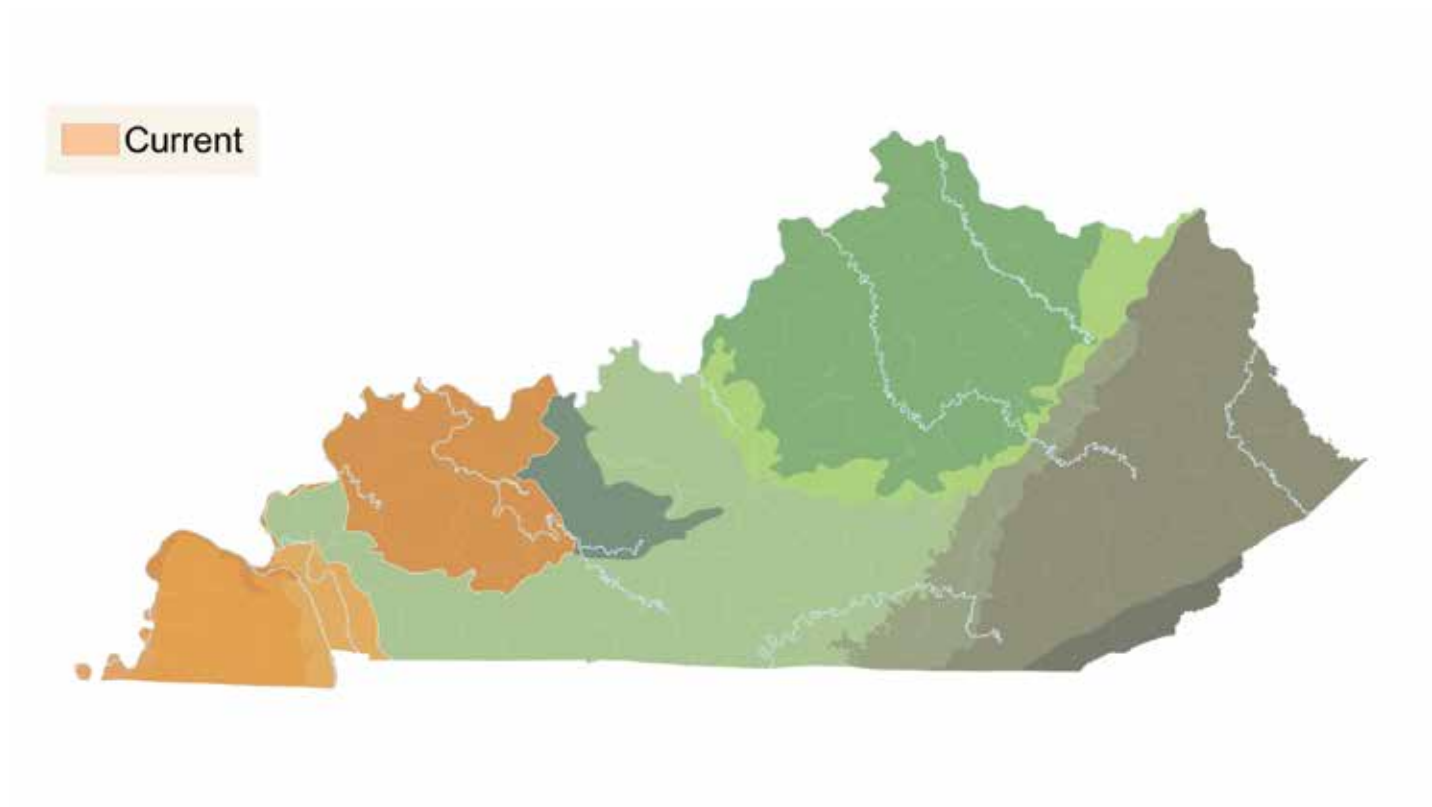


Photo: John MacGregor



MIDLAND SMOOTH SOFTSHELL

(*Apalone mutica mutica*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5T5

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Populations of Midland Smooth Softshell Turtles are thought to be in decline, especially on Ohio River, due to higher water levels that inundate sandbars and reduce nesting habitat. There have been only 6 county records since 2010. There has been very limited survey efforts as the species is difficult to survey for. They are highly aquatic and confined to large rivers with clean sandy bottoms and two large western Kentucky reservoirs.

Conservation Goal






Track nesting activity and protect nesting females from human disturbance on Mississippi River islands. Conduct spotting scope surveys to search for new sites and monitor populations.

Habitat Associations

Physiographic Regions: Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Stream Type: Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

Threats

-  Annual and Perennial Nontimber Crops
-  Other Ecosystem Modifications
-  Recreational Activities
-  Shipping Lanes
-  Storms and Flooding

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Protect turtle nesting areas

Management: Restore and maintain turtle nesting areas

Inhabits large rivers and streams where sand or mud is abundant. Also uses large oxbow lakes and reservoirs.

Range Map

Current

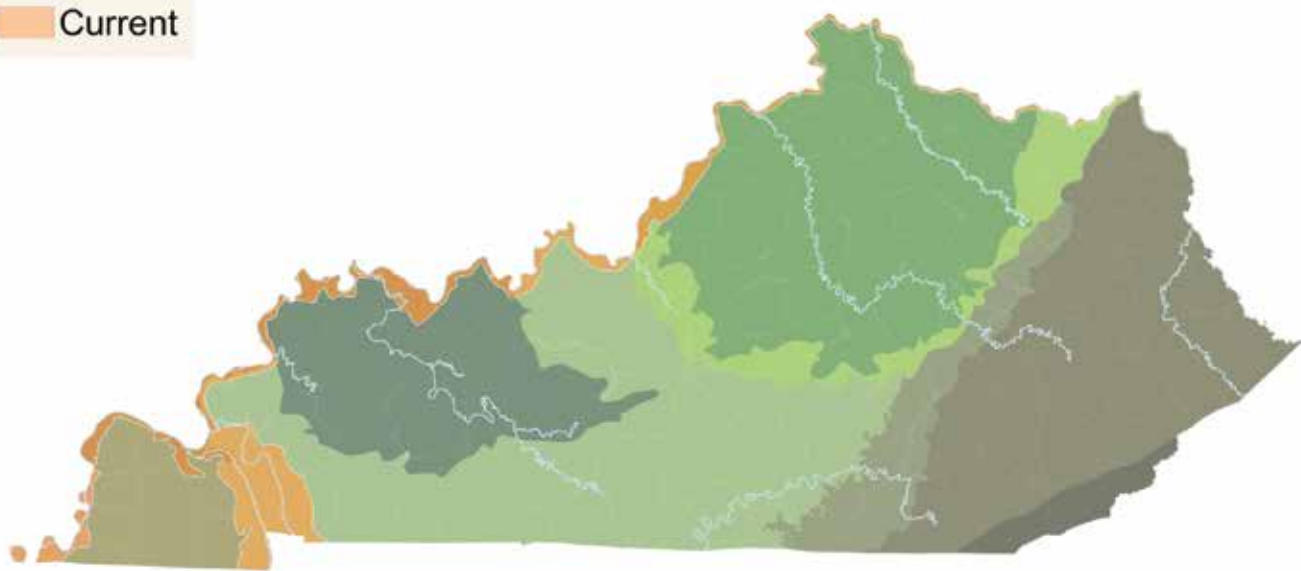


Photo: John MacGregor



SIX-LINED RACERUNNER

(*Aspidoscelis sexlineata*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Six-lined Racerunner are difficult to survey for. There has been limited survey effort and their current status is completely unknown. Open habitats where it seems to do best are being gradually eliminated by natural succession, encroachment by invasive exotic vegetation such as kudzu, reclamation of “waste areas” by well-meaning agencies and organizations, and fire suppression or lack of use of prescribed fire. It has been reported from only 7 counties since 2010.

Conservation Goal



Control invasive exotic vegetation invading glades, abandoned gravel pits, quarries, RR beds, and other open habitat suitable for Racerunners. Investigate use of timber management and/or prescribed fire to restore habitat. Use on-foot surveys and traps to search for new colonies at 5 sites each year.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Grassland/Savannah, Xeric Forest, Agriculture

Threats

-  Fire and Fire Suppression
-  Human Intrusions and Disturbance

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Prescribed fire management

Management: Protect warm season grasslands and special open habitats

Management: Restore and manage warm season grasslands and special open habitats

Uses glades, barrens, abandoned quarries and gravel pits, open roadsides, eroded areas, margins of ag fields and other open, sunny habitats.

Range Map

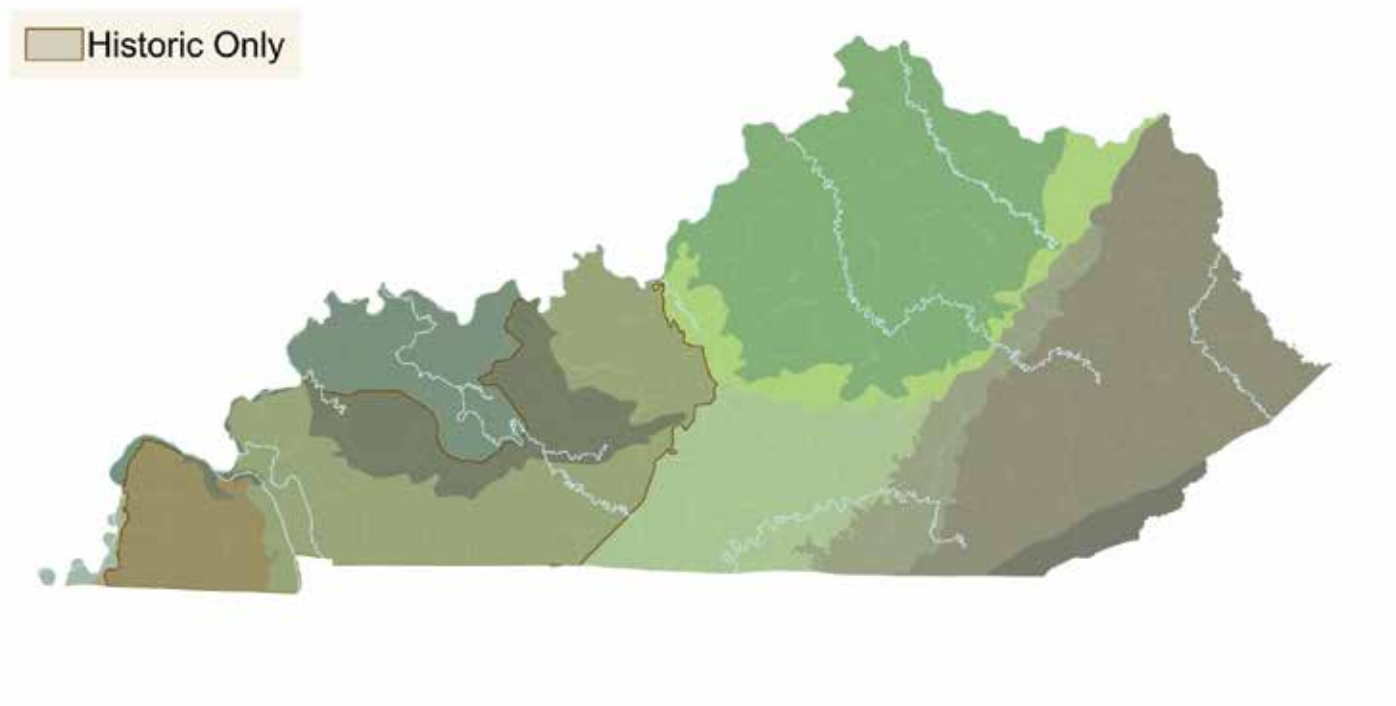


Photo: John MacGregor



SCARLETSNAKE

(*Cemophora coccinea*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Scarletsnakes are difficult to survey for. It is likely extirpated in most of Kentucky range but still occurs at Land Between the Lakes.

Conservation Goal

Develop and implement field survey protocols to collect data on distribution, life history, and habitat needs; at the present time we basically know nothing about how to find Scarletsnakes in Kentucky.




Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills

Guilds: Grassland/Savannah, Xeric Forest

Uses dry open woods, rocky glades, and barrens; mostly a burrower.

Threats

-  Biological Resource Use
-  Fire and Fire Suppression
-  Residential and Commercial Development

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Prescribed fire management

Management: Protect existing forested areas

Management: Protect warm season grasslands and special open habitats

Management: Raise awareness of the importance and diversity of snakes in Kentucky

Management: Restore and maintain sites with good forest cover

Management: Restore and manage warm season grasslands and special open habitats

Range Map

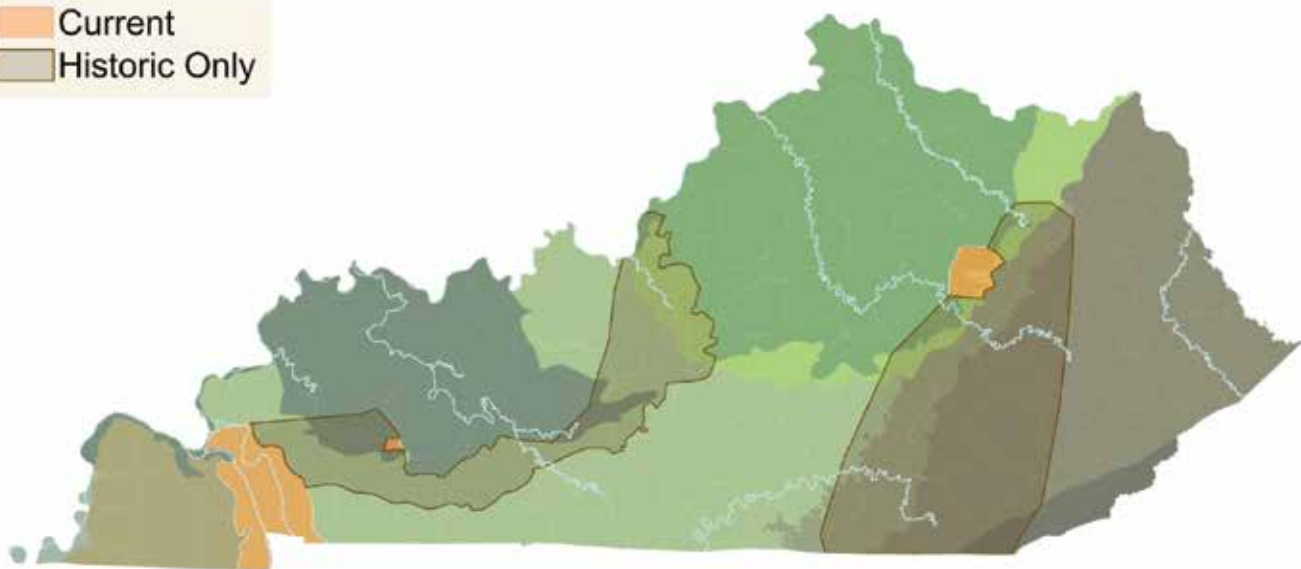


Photo: John MacGregor



SOUTHERN PAINTED TURTLE

(*Chrysemys dorsalis*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Southern Painted Turtles are likely threatened by hybridization with Painted Turtles.

Conservation Goal

Support molecular and/or other taxonomic work to determine actual range and document possible hybridization with *Chrysemys picta*. Conduct spotting scope and/or trapping surveys as appropriate.






Habitat Associations

Physiographic Regions: Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture, Suburban

Occupies bayous, sloughs, sluggish streams, and large ponds.

Threats

-  Annual and Perennial Nontimber Crops
-  Climate Change and Severe Weather
-  Invasive Non-native/Alien species
-  Problematic Native Species
-  Roads and Railroads

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Protect and restore natural stream channels, bayous, swamps, and wetlands

Management: Provide patches of open habitat adjacent to wetlands

Management: Restore and/or create wetland habitat

Management: Restore degraded wetland habitats

Range Map

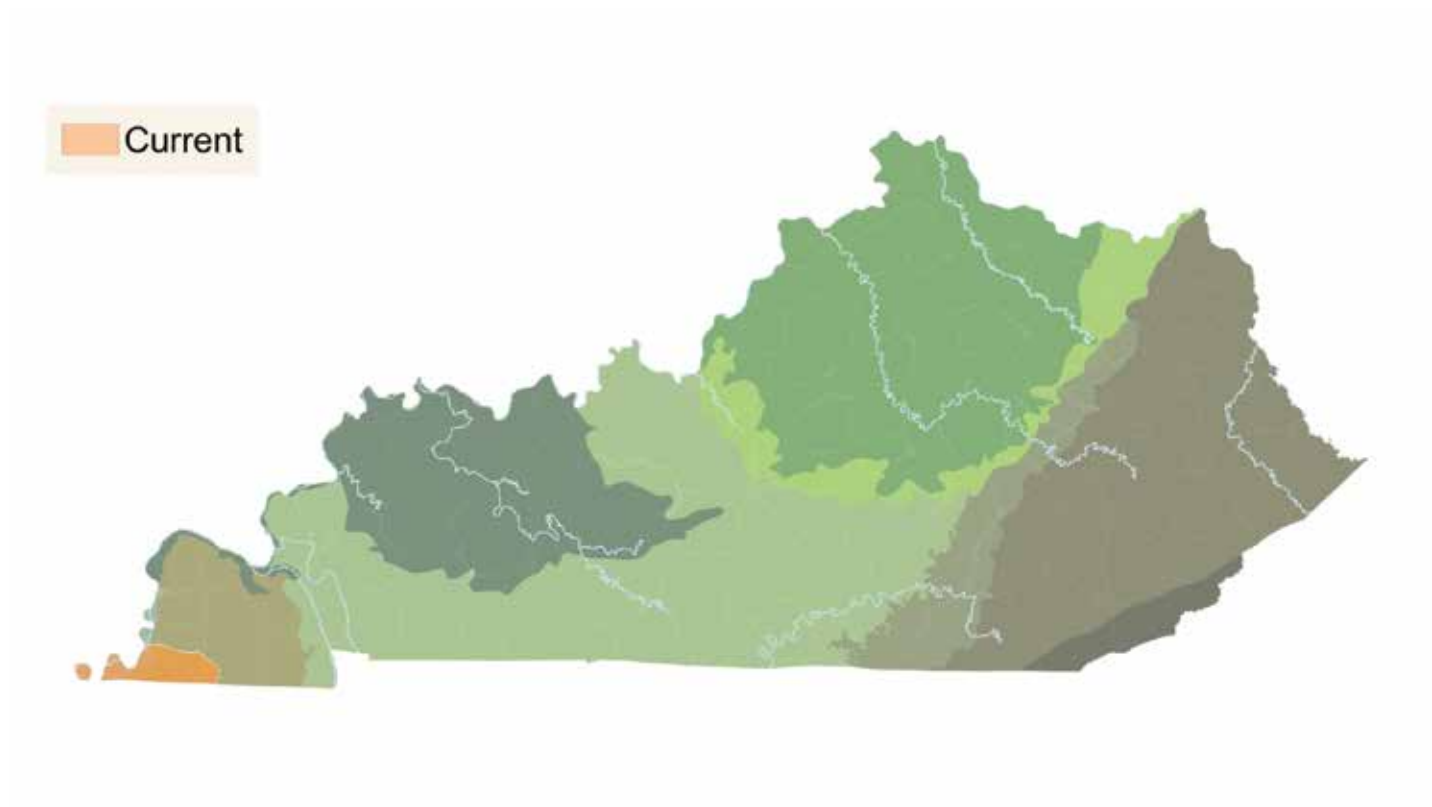


Photo: John MacGregor



KIRTLAND'S SNAKE

(*Clonophis kirtlandii*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G2

S Rank: S2

Federal Status: N/A

IUCN Red List: NT - Near threatened

Kirtland's Snake is difficult to survey for. It is likely extirpated in much of Kentucky range, but remains common in urban and suburban Louisville.

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs. Identify and protect important urban sites for these snakes in Jefferson County. Investigate the importance of crayfish burrows as hibernacula and general retreats. Develop and implement a public outreach program in Louisville.





Habitat Associations

Physiographic Regions: Bluegrass, Knobs, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Mesic Forest, Open Wetland, River/Streams, Floodplain/Sandbar, Urban, Suburban

In addition to natural wetland, also uses impacted areas including low-lying back yards, vacant lots, and waste areas.

Threats

-  Biological Resource Use
-  Pathogens and Microbes
-  Residential and Commercial Development
-  Roads and Railroads

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Create corridors and patches of unique disturbed habitat

Management: Protect and restore natural stream channels, bayous, swamps, and wetlands

Management: Protect unique disturbed sites

Management: Provide patches of open habitat adjacent to wetlands

Management: Raise awareness of the importance and diversity of snakes in Kentucky

Management: Restore degraded wetland habitats

Range Map

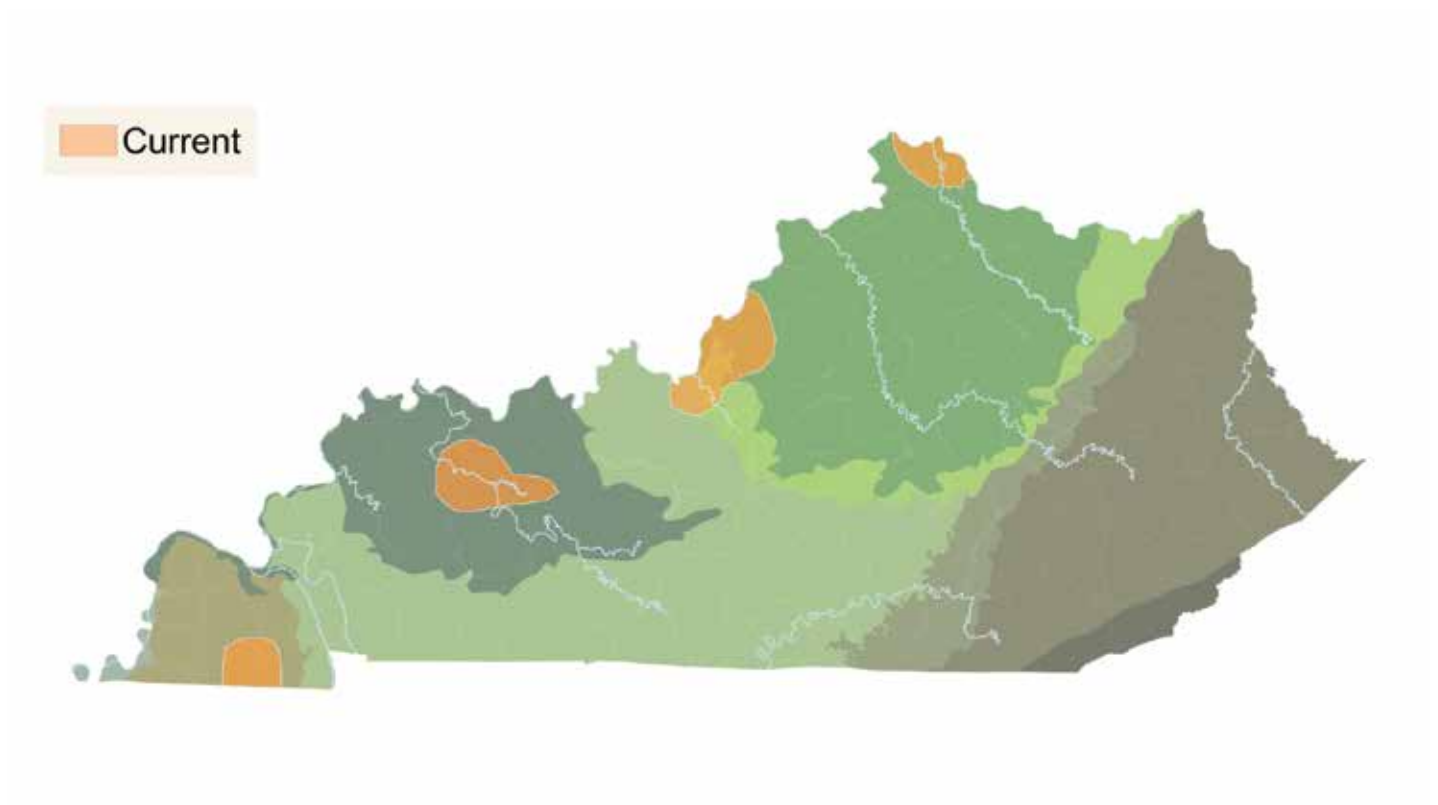


Photo: John MacGregor



TIMBER RATTLESNAKE

(*Crotalus horridus*)

Conservation Profile

Priority Group: Moderate

KNP Info

G Rank: G4







S Rank: S5

Federal Status: N/A






IUCN Red List: LC - Least concern

Timber Rattlesnake appear stable in most of their Kentucky range, though there is evidence of some local declines. Northern states report major declines for this species. Timber Rattlesnakes are susceptible to Snake Fungal Disease though many recover. They are also vulnerable to indiscriminate killing.

Threats

-  Biological Resource Use
-  Fire and Fire Suppression
-  Mining and Quarrying
-  Pathogens and Microbes
-  Recreational Activities
-  Roads and Railroads

Conservation Actions

- Awareness and Communications  
- Habitat and Natural Process Restoration  
- Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Conservation Goal

Work with Kentucky Herpetological Society partners to monitor specific populations on a regular basis.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Cliff/Rockshelter, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

Most common in mature upland forest; often associated with cliffs and boulder-strewn slopes. Also uses powerline cuts, old mine sites, and abandoned quarries for basking and/or birthing areas.

Range Map

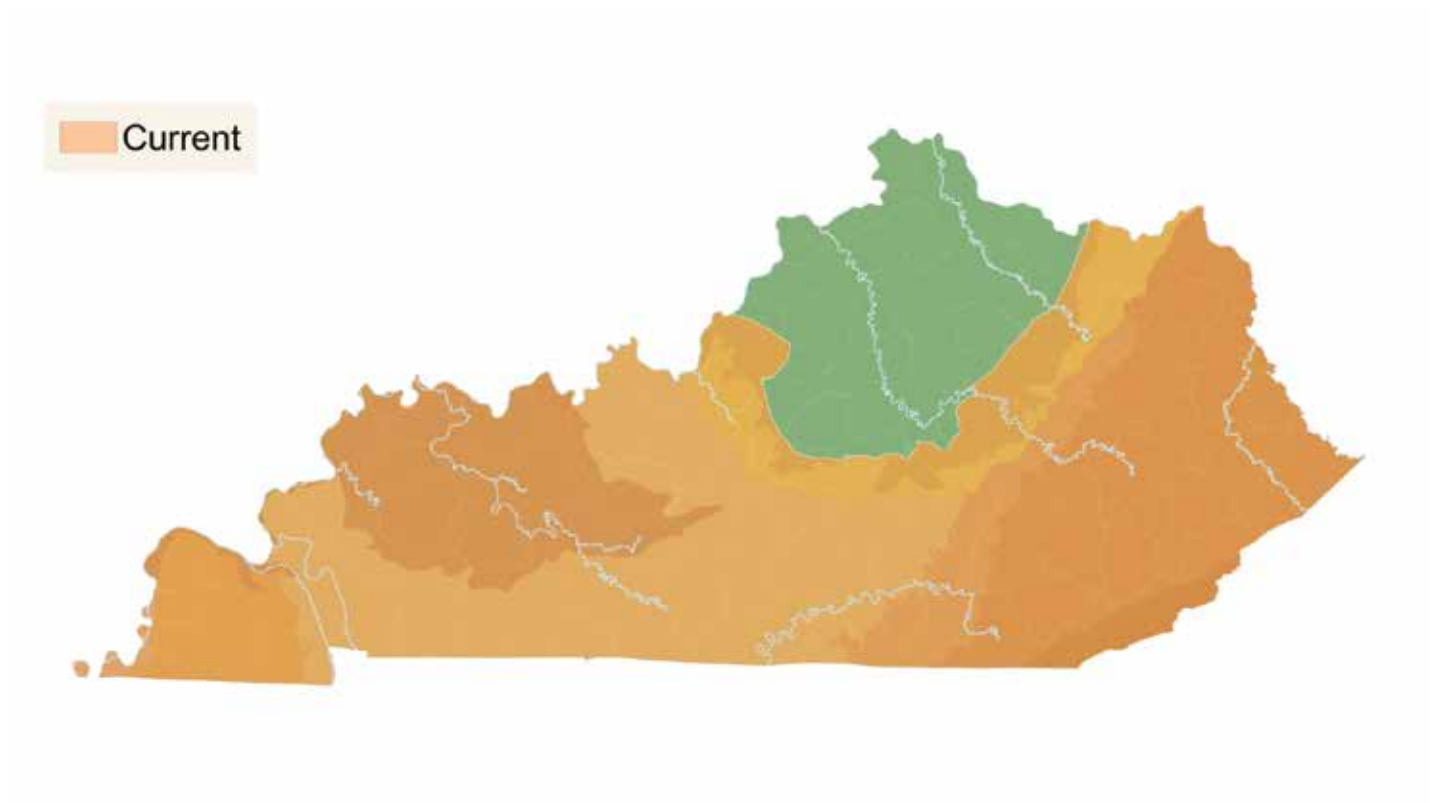


Photo: John MacGregor



WESTERN MUDSNAKE

(*Farancia abacura reinwardtii*)

Conservation Profile

Priority Group: High

KNP Info





G Rank: G5T5

S Rank: S3




Federal Status: N/A

IUCN Red List: N/A

Threats

-  Annual and Perennial Nontimber Crops
-  Biological Resource Use
-  Pathogens and Microbes
-  Roads and Railroads

Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration 
- Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Conservation Goal

Set up 10 potential nesting sites on Ballard WMA, Obion WMA, Doug Travis WMA, or Clarks River NWR by deploying partly-buried mounds of wood chips adjacent to wetlands. Work with Kentucky Herpetological Society partners to monitor specific populations on a regular basis.

Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland, River/Streams, Floodplain/Sandbar

Occurs primarily in forested wetlands including cypress swamps, sloughs, bayous, and sluggish waterways meandering through bottomland forests; nearly always found in or immediately adjacent to water.

Range Map

Current

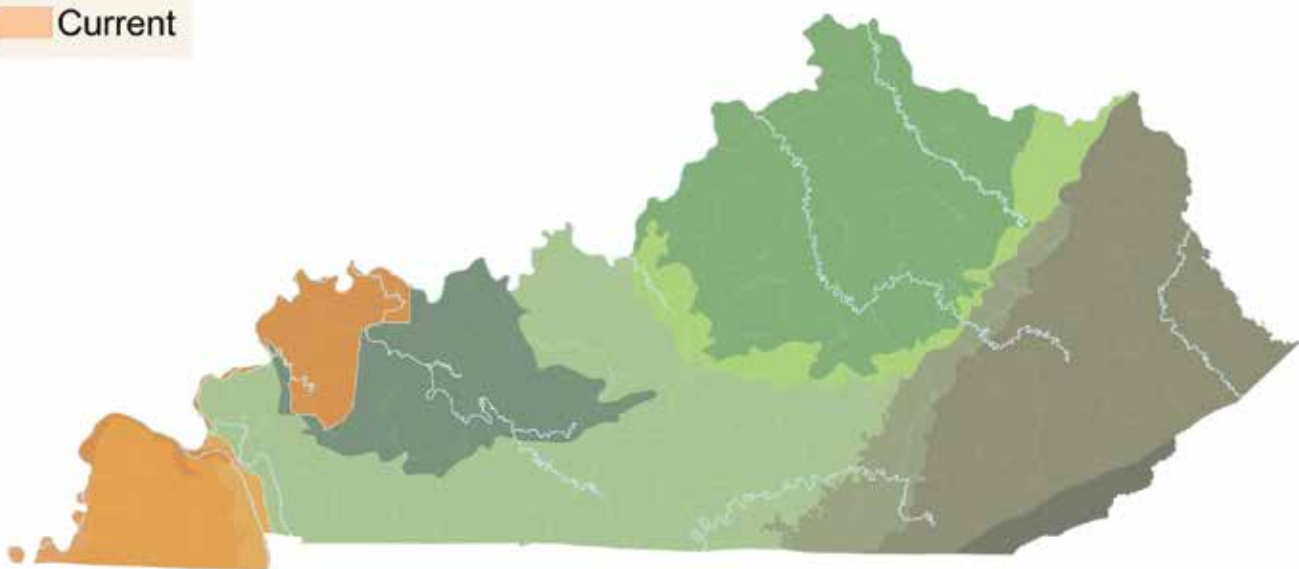


Photo: John MacGregor



MISSISSIPPI MAP TURTLE

(*Gratemys pseudogeographica kohnii*)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5T4

S Rank: S3S4

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs. Conduct spotting scope surveys to search for new sites and monitor populations.






Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain






Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

Found in embayments and backwater areas.

Threats

-  Annual and Perennial Nontimber Crops
-  Other Ecosystem Modifications
-  Recreational Activities
-  Shipping Lanes
-  Storms and Flooding

Conservation Actions

- Habitat and Natural Process Restoration  
- Land/Water Management  
- Resource and Habitat Protection 
- Site/Area Protection 

Needs

Survey: Collect baseline species information

Range Map

Current

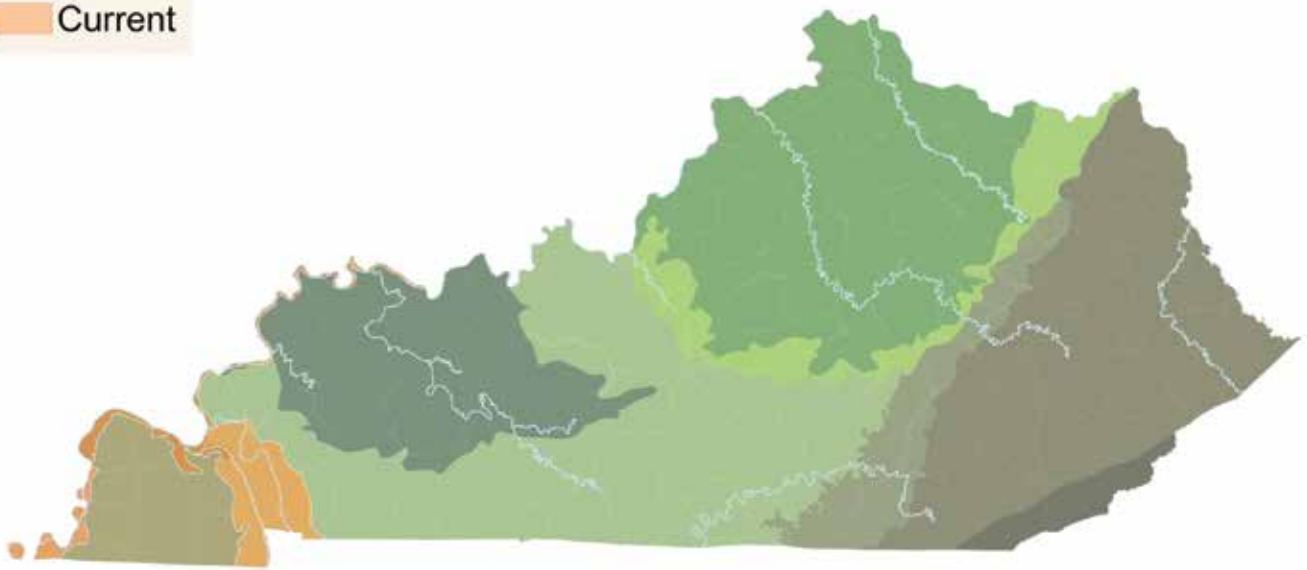


Photo: John MacGregor



NORTHERN FALSE MAP TURTLE

(*Gratemys pseudogeographica pseudogeographica*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5T5

S Rank: S3S4

Federal Status: N/A

IUCN Red List: N/A

Northern Map Turtle populations may be stable, but survey data is lacking.

Conservation Goal

Conduct baseline surveys to assess taxonomic status, population trends, obtain life history information, and refine habitat needs. Track nesting activity and protect nesting females from human disturbance on Mississippi River islands. Conduct spotting scope surveys to search for new sites and monitor populations.






Habitat Associations

Physiographic Regions: Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

Found mainly in embayments and backwater areas.

Threats

-  Annual and Perennial Nontimber Crops
-  Other Ecosystem Modifications
-  Recreational Activities
-  Shipping Lanes
-  Storms and Flooding

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Protect and restore natural stream channels, bayous, swamps, and wetlands

Management: Protect turtle nesting areas

Management: Restore and maintain turtle nesting areas

Management: Restore degraded wetland habitats

Range Map

Current

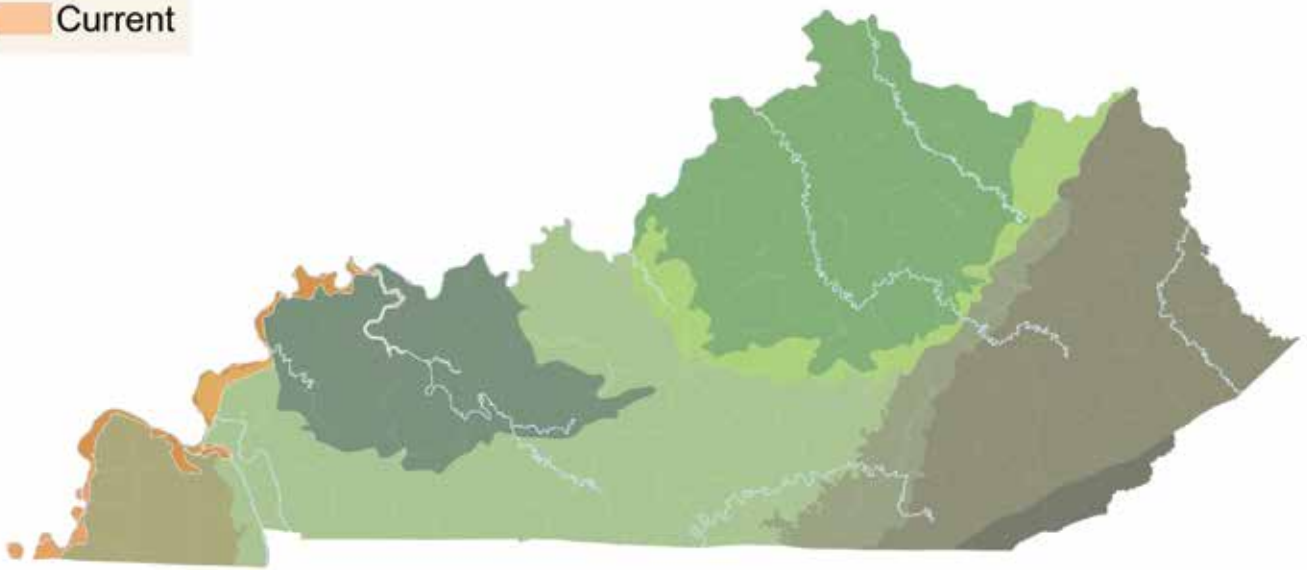


Photo: John MacGregor



EASTERN MUD TURTLE

(*Kinosternon subrubrum*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Eastern Mud Turtles are difficult to survey for. They are likely extirpated in much of their Kentucky range.

Conservation Goal

Develop and implement field survey protocols in the eastern part of the range (primarily in and around sinkhole ponds and wetland complexes) to collect data on distribution, life history, and habitat needs.






Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Cave/Karst, Forested Wetland, Mesic Forest, Open Wetland, Lake/Pond, River/Streams

Occurs mostly in sloughs, ditches, ponds, along sluggish streams, and in open and forested wetlands and in nearby mesic forests.

Threats

-  Annual and Perennial Nontimber Crops
-  Climate Change and Severe Weather
-  Invasive Non-native/Alien species
-  Problematic Native Species
-  Roads and Railroads

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Protect and restore natural stream channels, bayous, swamps, and wetlands

Management: Provide patches of open habitat adjacent to wetlands

Management: Restore and/or create wetland habitat

Management: Restore degraded wetland habitats

Range Map

Current

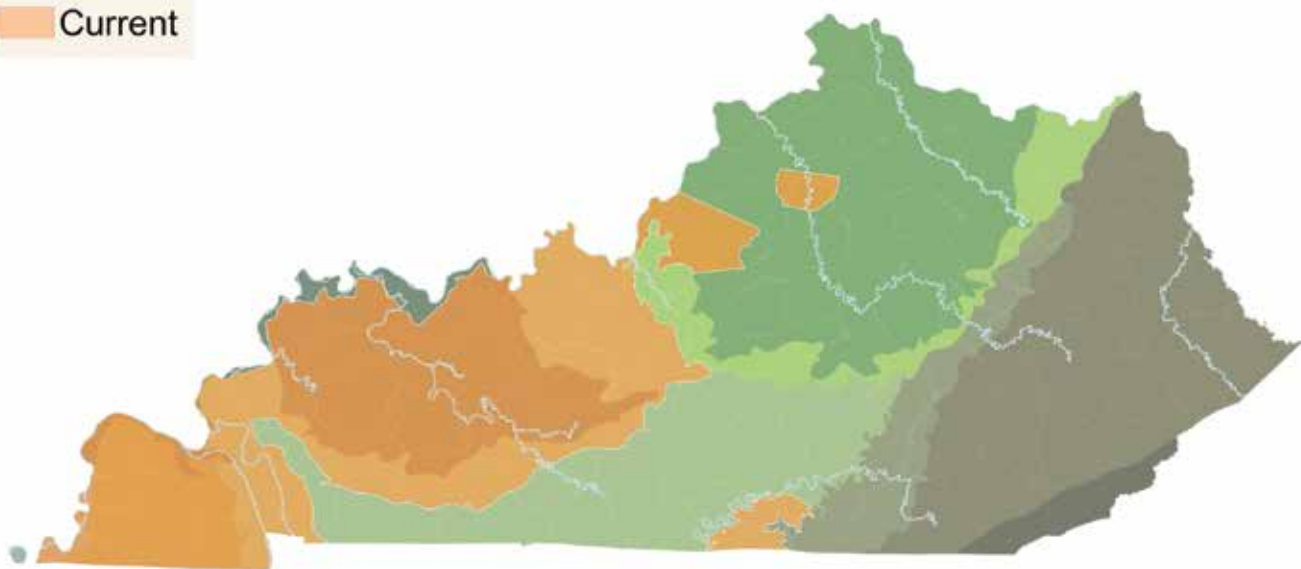


Photo: John MacGregor



SCARLET KINGSNAKE

(*Lampropeltis elapsoides*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5




S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Scarlet Kingsnake are difficult to survey for. It is likely extirpated from most of its Kentucky range but is apparently still fairly common at Land Between the Lakes.

Threats

-  Biological Resource Use
-  Fire and Fire Suppression
-  Residential and Commercial Development

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Prescribed fire management

Management: Protect existing forested areas

Management: Raise awareness of the importance and diversity of snakes in Kentucky

Management: Restore and maintain sites with good forest cover

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Continue to monitor LBL populations by road cruising and by deploying stacks of old roofing tin in dry upland forest.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Interior Plateau

Guilds: Xeric Forest

Upland, mixed-hardwood forest.

Range Map

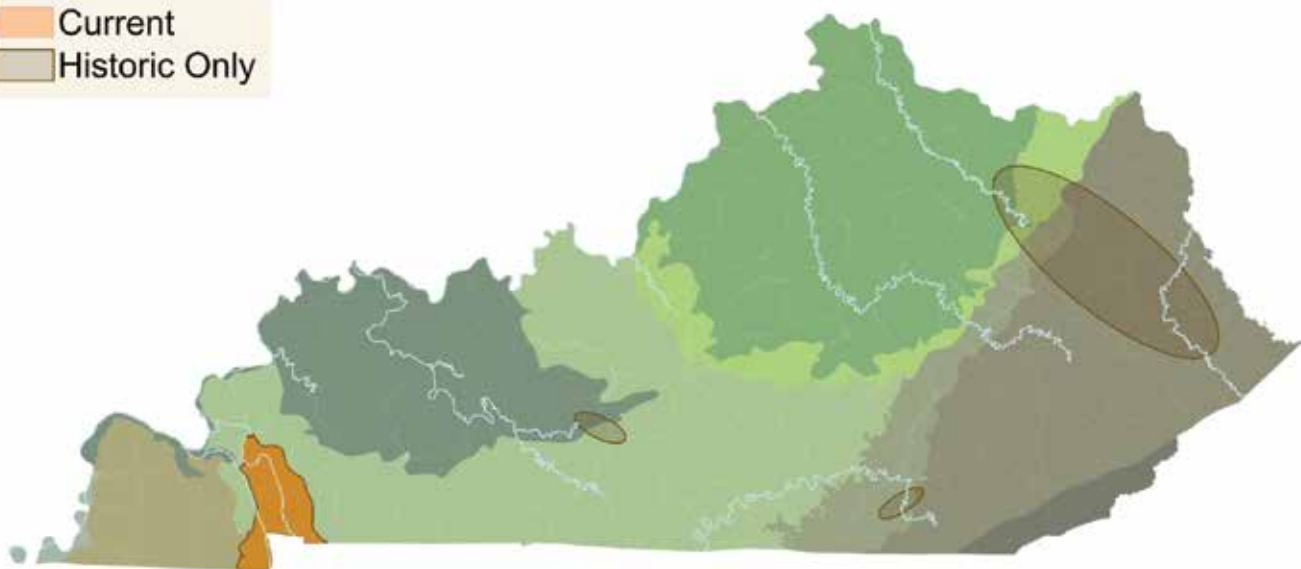


Photo: John MacGregor



ALLIGATOR SNAPPING TURTLE

(*Macrochelys temminckii*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G3

S Rank: S1

Federal Status: N/A

IUCN Red List: VU - Vulnerable

Alligator snapping turtles are extremely difficult to trap.

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Support development and use of eDNA protocols to determine presence and conduct follow-up surveys to document occurrences. Consider reintroduction from captive-bred and genetically appropriate breeding stock in the Jackson Purchase and LBL region once it has been established that no indigenous population is present in those waterways.





Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, River/Streams, Floodplain/Sandbar

Sloughs, slow-moving streams and rivers, large rivers, backwaters, reservoirs - may ascend into small streams.

Threats

-  Annual and Perennial Nontimber Crops
-  Climate Change and Severe Weather
-  Fishing and Harvesting Aquatic Resources
-  Recreational Activities

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Protect and restore natural stream channels, bayous, swamps, and wetlands

Management: Protect existing forested areas

Management: Protect turtle nesting areas

Management: Restore and maintain sites with good forest cover

Management: Restore and maintain turtle nesting areas

Management: Restore degraded wetland habitats

Range Map

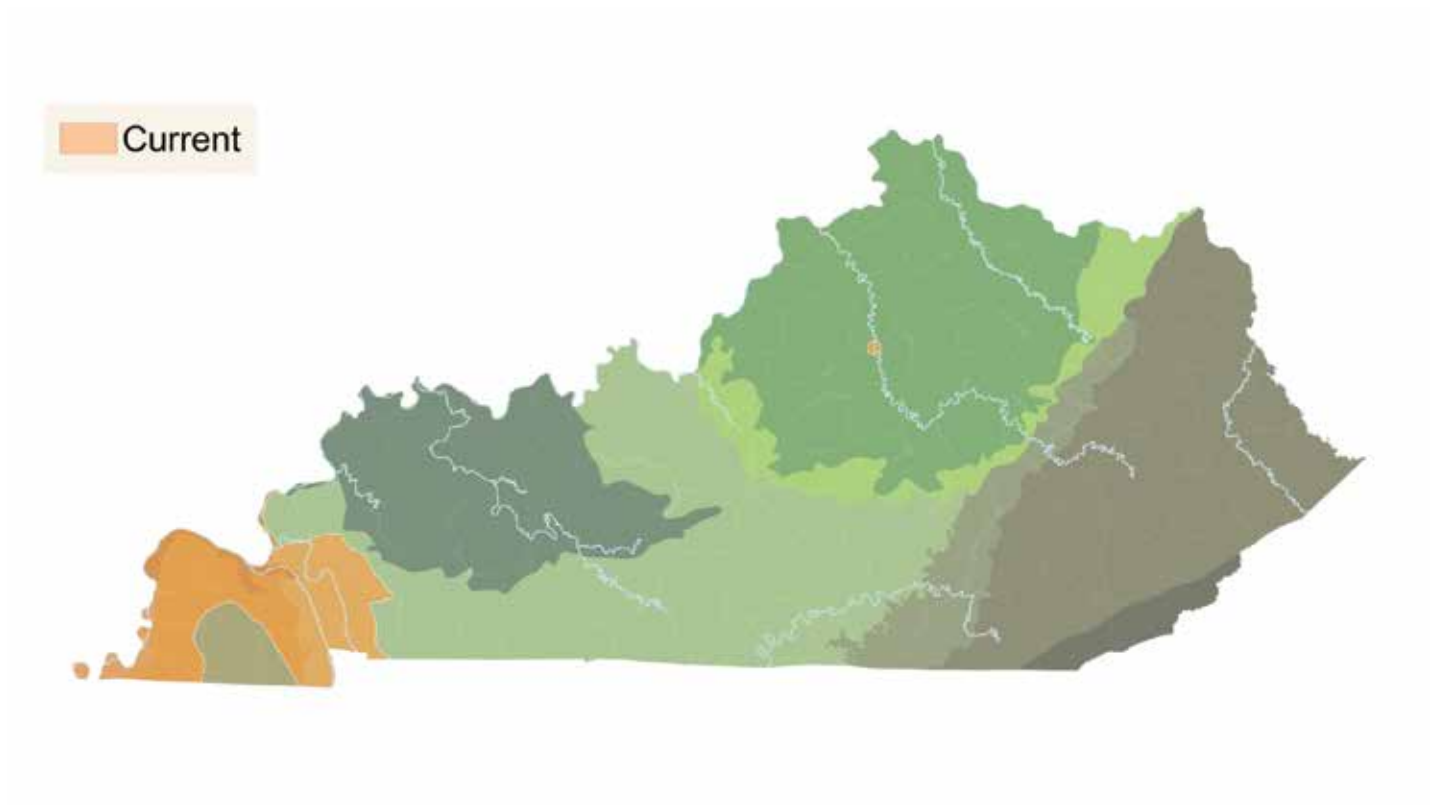


Photo: John MacGregor



MISSISSIPPI GREEN WATERSNAKE

(*Nerodia cyclopion*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Mississippi Green Watersnake have not been documented in Kentucky since 2012. Historically known from just 2 counties and 2 quadrangles, the current status in Kentucky is completely unknown.

Conservation Goal

Survey Reelfoot Lake NWR and Doug Travis WMA population by a combination of night surveys, basking surveys, minnow traps, and roofing tin arrays along the water's edge.






Habitat Associations

Physiographic Regions: Mississippi Alluvial Plain

Guilds: Forested Wetland, Open Wetland, River/Streams, Floodplain/Sandbar

Wetland habitat.

Threats

-  Annual and Perennial Nontimber Crops
-  Biological Resource Use
-  Pathogens and Microbes
-  Problematic Native Species
-  Roads and Railroads

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Protect and restore natural stream channels, bayous, swamps, and wetlands

Management: Raise awareness of the importance and diversity of snakes in Kentucky

Management: Restore degraded wetland habitats

Range Map

Current

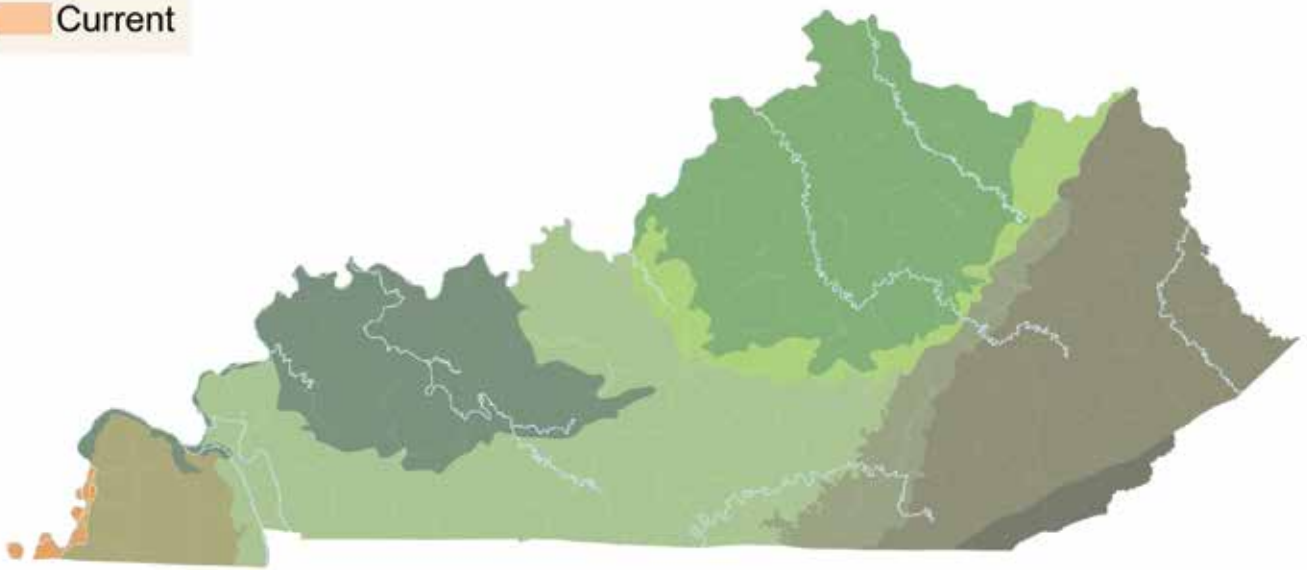


Photo: John MacGregor



COPPERBELLY WATERSNAKE

(Nerodia erythrogaster neglecta)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5T3

S Rank: S3

Federal Status: Threatened

IUCN Red List: N/A

Conservation Goal

Monitor continued presence at Sloughs WMA, Audubon State Park, Clear Creek, and other sites via basking surveys, coverboards, and road surveys.






Habitat Associations

Physiographic Regions: Bluegrass, Interior Plateau, Interior River Valley And Hills







Guilds: Forested Wetland, Mesic Forest, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

Found in and along wetlands, lakes, ponds, and sluggish streams.

Threats

-  Annual and Perennial Nontimber Crops
-  Biological Resource Use
-  Mining and Quarrying
-  Pathogens and Microbes
-  Roads and Railroads

Conservation Actions

- Awareness and Communications 
- Habitat and Natural Process Restoration  
- Resource and Habitat Protection  
- Site/Area Protection  

Needs

Survey: Collect baseline species information

Range Map

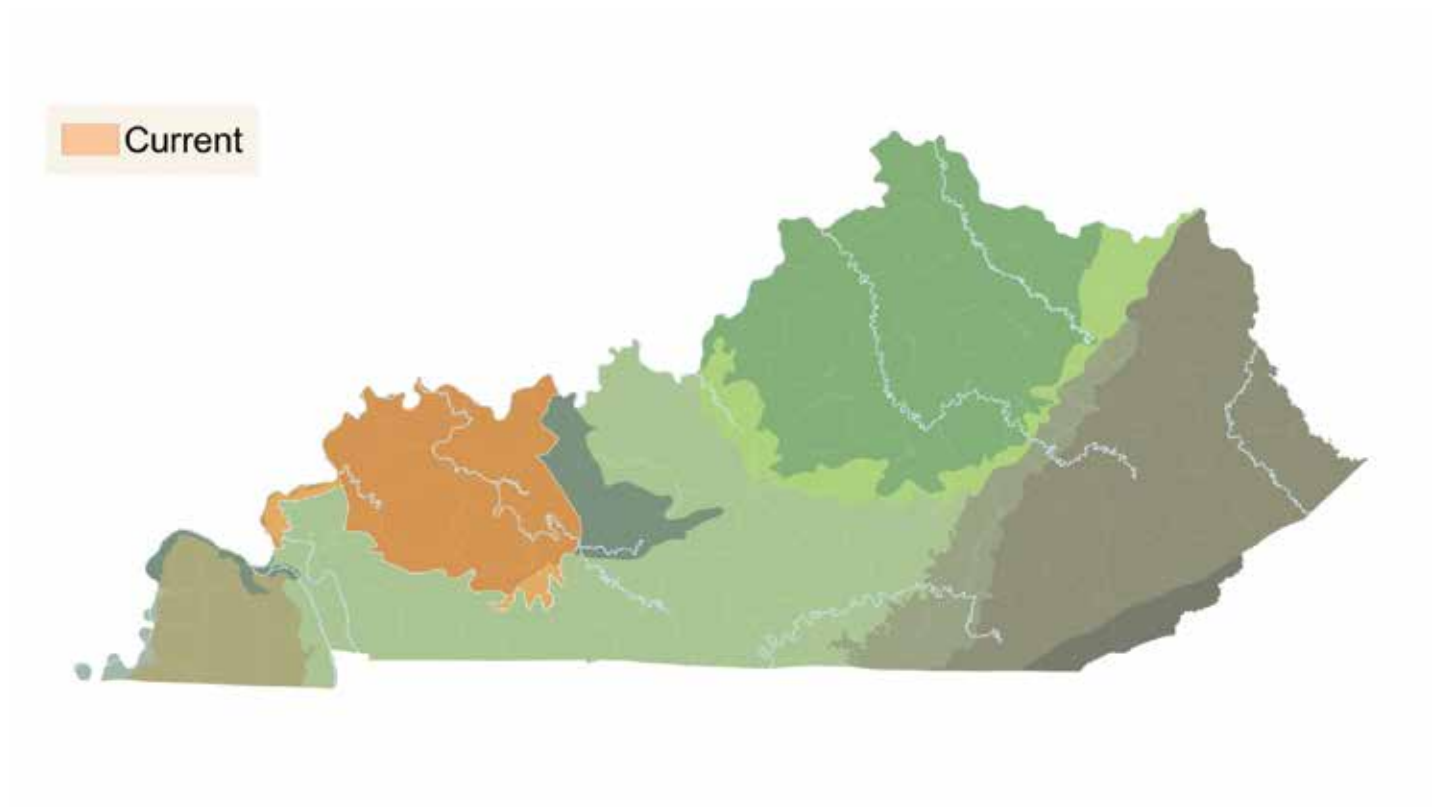


Photo: John MacGregor



BROAD-BANDED WATERSNAKE

(Nerodia fasciata confluens)

Conservation Profile

Priority Group: High

KNP Info

G Rank: G5T5

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Conservation Goal

Monitor Lower Hickman Bottoms population annually by combining night surveys, basking surveys, daytime searches for foraging adults at bridges and culverts, minnow traps, and coverboard arrays.






Habitat Associations

Physiographic Regions: Mississippi Alluvial Plain





Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Agriculture

Occurs in and along various wetland habitats including cypress swamps and flooded bottomland hardwood forests; also in sloughs, bayous, sluggish stream channels, seasonal shallow wetlands, and roadside ditches in both forested and open habitats.

Threats

-  Annual and Perennial Nontimber Crops
-  Biological Resource Use
-  Pathogens and Microbes
-  Problematic Native Species
-  Roads and Railroads

Conservation Actions

- Awareness and Communications 
- External Capacity Building 
- Habitat and Natural Process Restoration 
- Resource and Habitat Protection 

Needs

Survey: Collect baseline species information

Range Map

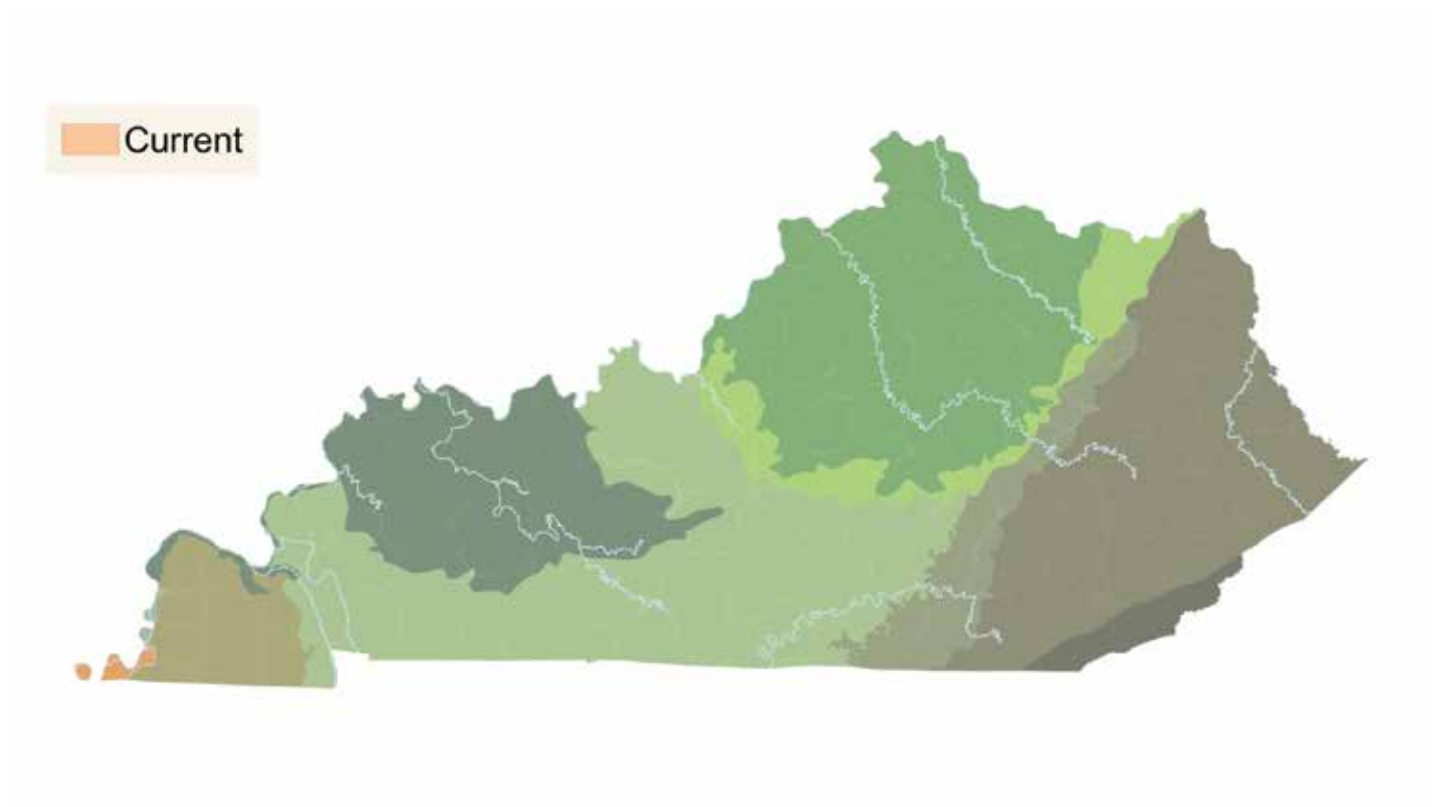


Photo: John MacGregor



EASTERN SLENDER GLASS LIZARD

(*Ophisaurus attenuatus longicaudus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5T5

S Rank: S2

Federal Status: N/A

IUCN Red List: N/A

Eastern Slender Glass Lizards are difficult to survey for. They are likely extirpated in much of their Kentucky range, but still occur along properly managed utility rights-of-way in McCreary and Whitley Counties.

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Support molecular work to compare the disjunct SE KY and Mammoth Cave area populations.




Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Interior Plateau

Guilds: Grassland/Savannah, Xeric Forest, Agriculture

Habitat includes pastures and old fields with patches of bare ground, powerline and railroad right-of-ways, and open upland forest.

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Invasive Non-native/Alien species

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Prescribed fire management

Management: Protect warm season grasslands and special open habitats

Management: Restore and manage warm season grasslands and special open habitats

Range Map

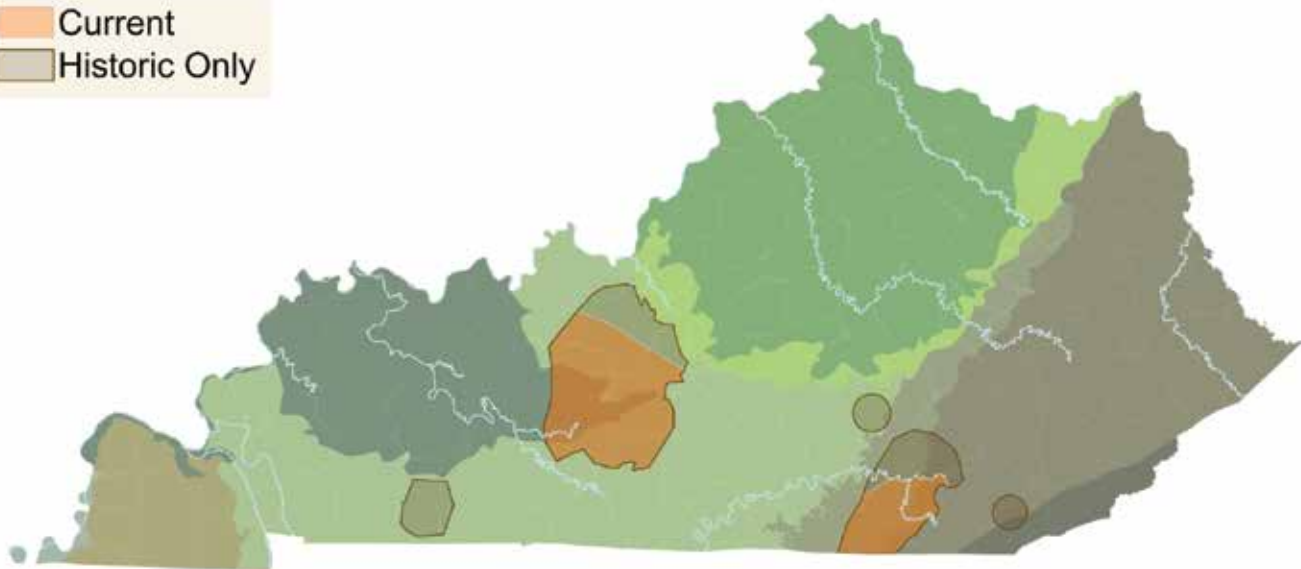


Photo: John MacGregor



RED CORNSNAKE

(*Pantherophis guttatus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Red Cornsnake are likely nearly extirpated from the eastern part of its Kentucky range.

Conservation Goal





Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Continue to monitor long-term coverboard study sites in the Mammoth Cave area. Support use of radiotracking to determine habitat use by snakes from the declining Red River Gorge population. Work with Kentucky Reptile Zoo to establish a captive breeding program for snakes from that area for restocking. Support molecular research to determine genetic relationships among the two isolated KY populations and snakes from the main range of the species. Support use of radiotracking to determine habitat use by snakes from the Mammoth Cave area population.

Habitat Associations

Physiographic Regions: Cumberland Plateau, Plateau Escarpment, Interior Plateau, Interior River Valley And Hills

Guilds: Grassland/Savannah, Mesic Forest, Xeric Forest, Agriculture

Threats

-  Biological Resource Use
-  Fire and Fire Suppression
-  Pathogens and Microbes
-  Roads and Railroads

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Protect warm season grasslands and special open habitats

Management: Raise awareness of the importance and diversity of snakes in Kentucky

Management: Restore and manage warm season grasslands and special open habitats

Mostly found in and around openings, remnant grasslands, glades, and prairie patches situated within matrix consisting primarily of upland forest but sometimes encountered in intact forests.

Range Map

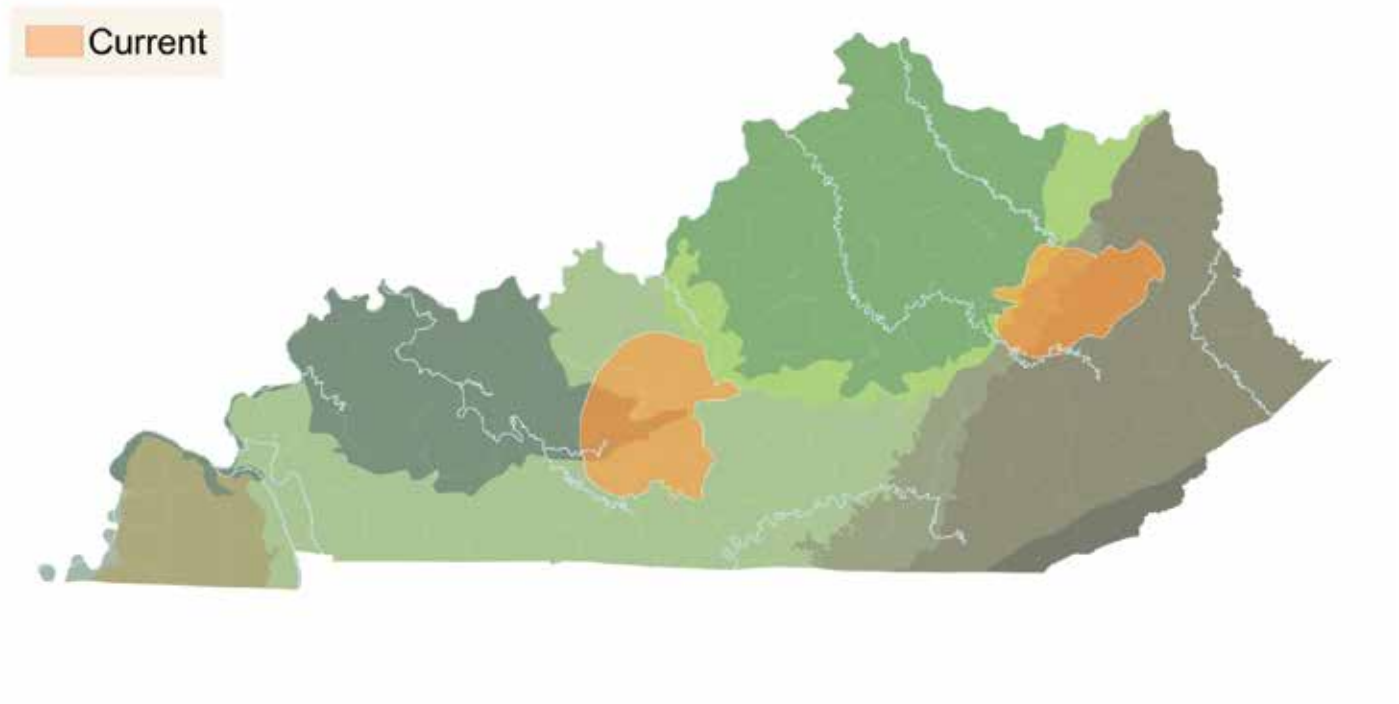


Photo: John MacGregor



NORTHERN PINESNAKE

(Pituophis melanoleucus melanoleucus)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G4T4

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Northern Pinesnake are difficult to survey for. It is likely extirpated from most of its Kentucky range. There have been just three state observations since 2014.

Conservation Goal

Work with partners from the Kentucky Herpetological Society and the Louisville Zoo to establish a captive breeding program to produce and head start juvenile Pinesnakes with Kentucky ancestry for reintroduction into suitable habitat. Support use of radiotracking to determine home range site and habitat use. Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.






Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Interior Plateau, Interior River Valley And Hills

Guilds: Grassland/Savannah, Xeric Forest, Scrub-Shrub/Early Successional Forest

Uses open understory woodlands, grasslands, old fields, savannahs - avoids wetlands and closed canopy forests.

Threats

-  Fire and Fire Suppression
-  Hunting and Collecting Terrestrial Animals
-  Invasive Non-native/Alien species
-  Pathogens and Microbes
-  Roads and Railroads

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Prescribed fire management

Management: Protect warm season grasslands and special open habitats

Management: Raise awareness of the importance and diversity of snakes in Kentucky

Management: Restore and manage warm season grasslands and special open habitats

Range Map

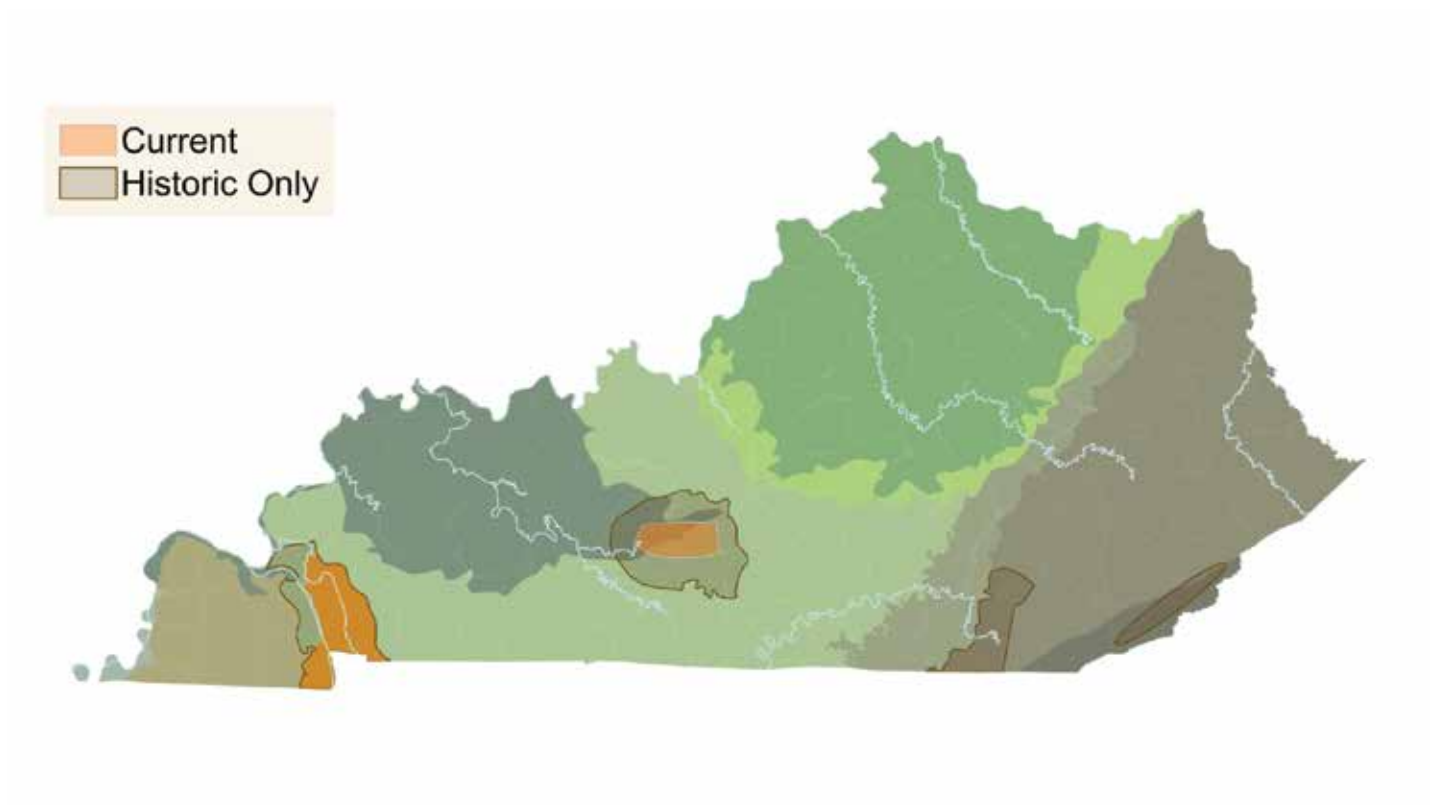


Photo: John MacGregor



COAL SKINK

(*Plestiodon anthracinus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5



S Rank: S1

Federal Status: N/A

IUCN Red List: LC - Least concern

Coal Skink are difficult to survey for. Half of the 22 county records are one-time observations/collections.

Threats

-  Fire and Fire Suppression
-  Residential and Commercial Development

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Prescribed fire management

Management: Protect warm season grasslands and special open habitats

Management: Restore and manage warm season grasslands and special open habitats

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Monitor population in SE Calloway County and work with OKNP to manage habitat and track continued occurrence at Blood River Seeps SNP.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Mesic Forest, Xeric Forest

Generally an open woodland and forest edge species; most often found in dry upland forest under rocks, woody debris, and loose pieces of roofing tin, old boards, or trash; occasionally found in mesic woodlands as well. Most Kentucky individuals were associated with woods roads, small woodland

clearings including log landings, powerline rights-of-way, and rock-strewn wooded hillsides, or (in west Kentucky) abandoned gravel pits.

Range Map

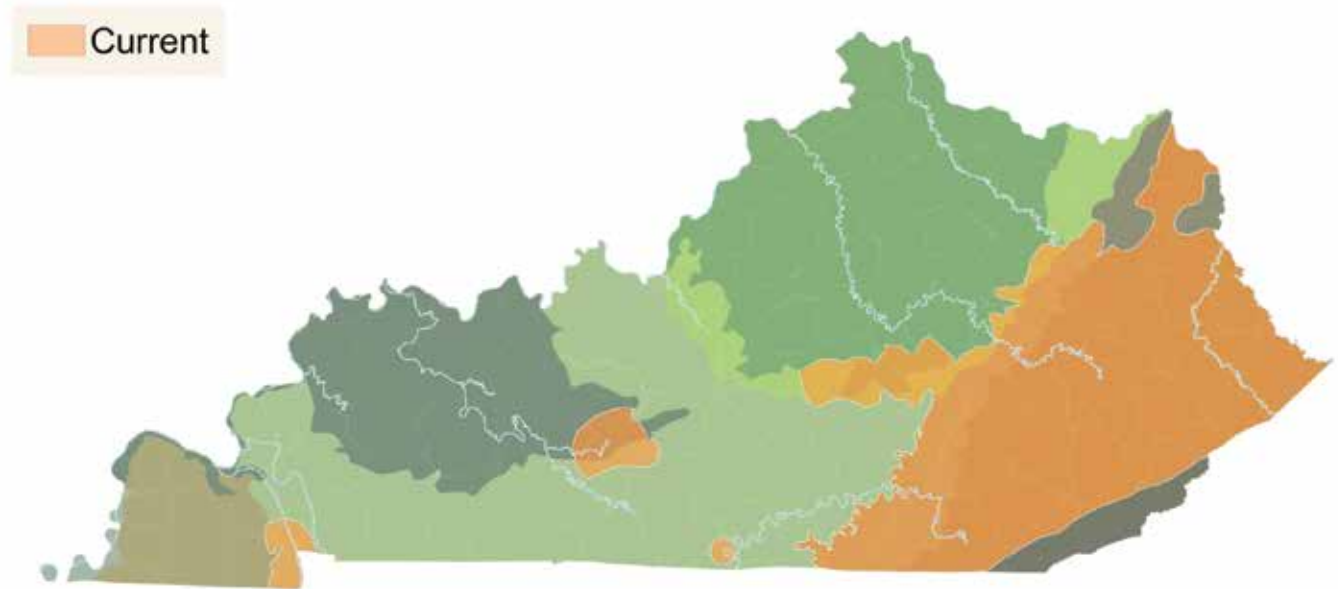




Photo: John MacGregor

SOUTHEASTERN FIVE-LINED SKINK

(*Plestiodon inexpectatus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5




S Rank: S2S3

Federal Status: N/A

IUCN Red List: LC - Least concern

Southeastern Five-lined Skink are difficult to survey for. They are likely extirpated in much of their Kentucky range, but still occur along properly managed utility rights-of-way in McCreary and Whitley Counties.

Threats

-  Annual and Perennial Nontimber Crops
-  Fire and Fire Suppression
-  Invasive Non-native/Alien species

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Prescribed fire management

Management: Protect warm season grasslands and special open habitats

Management: Restore and manage warm season grasslands and special open habitats

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Deploy coverboards at current and former sites at Duckrun (Whitley-McCreary Co), Park Mammoth (Edmonson Co), and LBL. Create nesting habitat by laying partly-buried boards and OSB at Duckrun.

Habitat Associations

Physiographic Regions: Cumberland Mountains, Plateau Escarpment, Interior Plateau

Guilds: Grassland/Savannah, Xeric Forest, Agriculture, Suburban

Occupies dry open woodlands and edges, powerline right-of-ways, roadsides, abandoned home sites, overgrazed fields, sunny trash dumps and other degraded habitats.

Range Map

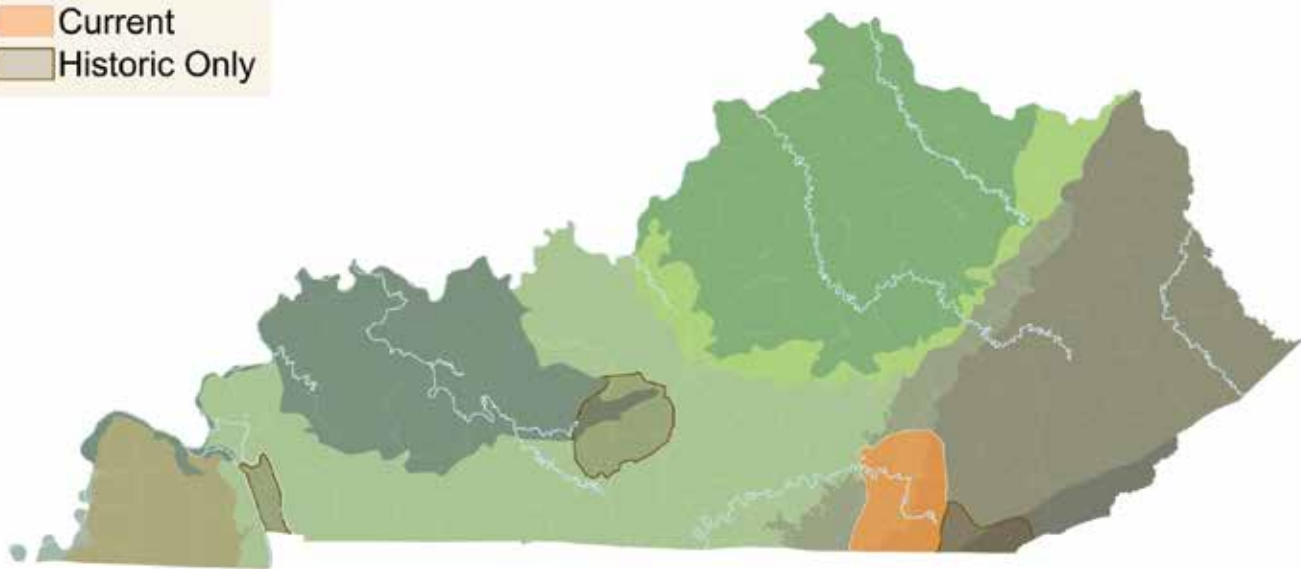


Photo: John MacGregor



WESTERN PYGMY RATTLESNAKE

(*Sistrurus miliarius streckeri*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5T5

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

Western Pygmy Rattlesnake are difficult to survey for. They are rare in Calloway County and likely extirpated from the Trigg County (Land Between the Lakes) portion of their Kentucky range.

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Habitat Associations

Physiographic Regions: Interior Plateau

Guilds: Grassland/Savannah, Mesic Forest, Xeric Forest, Agriculture

Uses a variety of habitat, including margins of agricultural fields and cemeteries, rocky upland woods, periphery of gravel pit/quarry and associated roadsides.

Threats



Biological Resource Use



Fire and Fire Suppression



Residential and Commercial Development

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Prescribed fire management

Management: Protect warm season grasslands and special open habitats

Management: Raise awareness of the importance and diversity of snakes in Kentucky

Management: Restore and manage warm season grasslands and special open habitats

Range Map

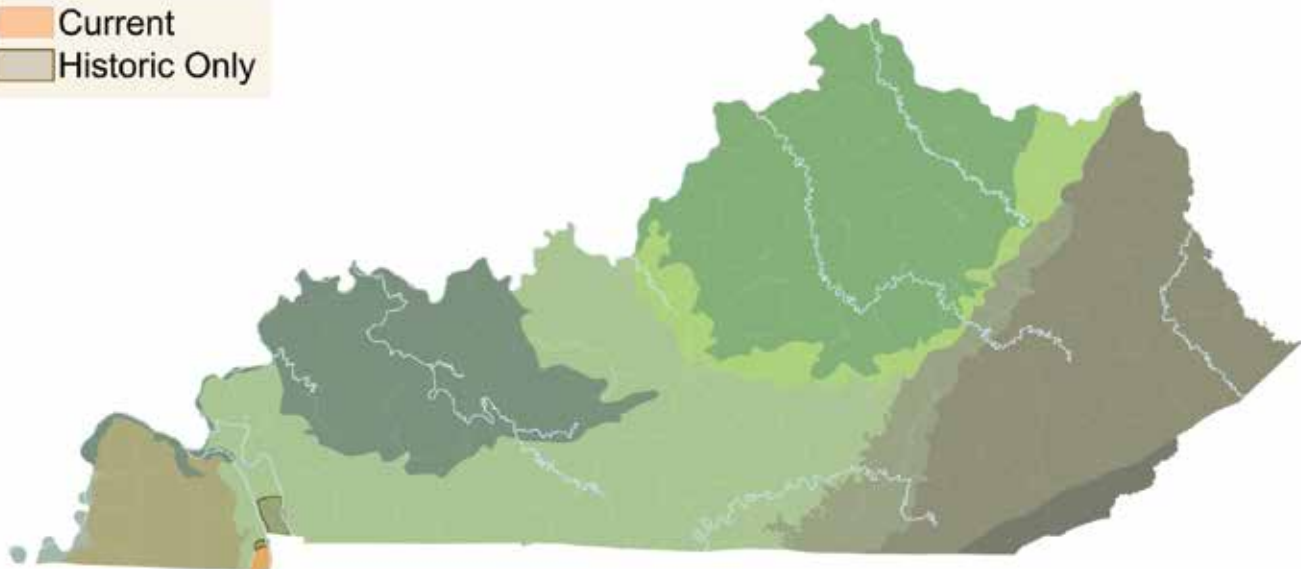


Photo: John MacGregor



SOUTHEASTERN CROWNED SNAKE

(*Tantilla coronata*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5

S Rank: S2

Federal Status: N/A

IUCN Red List: LC - Least concern

Southeastern Crowned Snake is difficult to survey for. It is likely extirpated from most of its Kentucky range, but still occurs at Land Bewteen the Lakes.

Conservation Goal

Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Develop innovative field techniques (screen funnel traps or pitfall buckets with drift fences, stacks of old roofing tin, coverboard arrays) to obtain updated distribution information. Set up and monitor plywood and OSB arrays in powerline cuts and open woodlands on LBL and KY Lake WMA.







Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain

Guilds: Cliff/Rockshelter, Grassland/Savannah, Xeric Forest, Scrub-Shrub/Early Successional Forest

Uses dry upland woods and adjacent open habitats including abandoned quarries and gravel pits, rocky and/or gravelly roadside slopes, powerline rights-of-

Threats

-  Biological Resource Use
-  Fire and Fire Suppression
-  Human Intrusions and Disturbance
-  Pathogens and Microbes
-  Residential and Commercial Development
-  Roads and Railroads

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Prescribed fire management

Management: Protect existing forested areas

Management: Protect warm season grasslands and special open habitats

Management: Raise awareness of the importance and diversity of snakes in Kentucky

Management: Restore and maintain sites with good forest cover

Management: Restore and manage warm season grasslands and special open habitats

way, small upland cemeteries in forested settings, abandoned farms and homesites, and rocky or gravelly woodlands.

Range Map

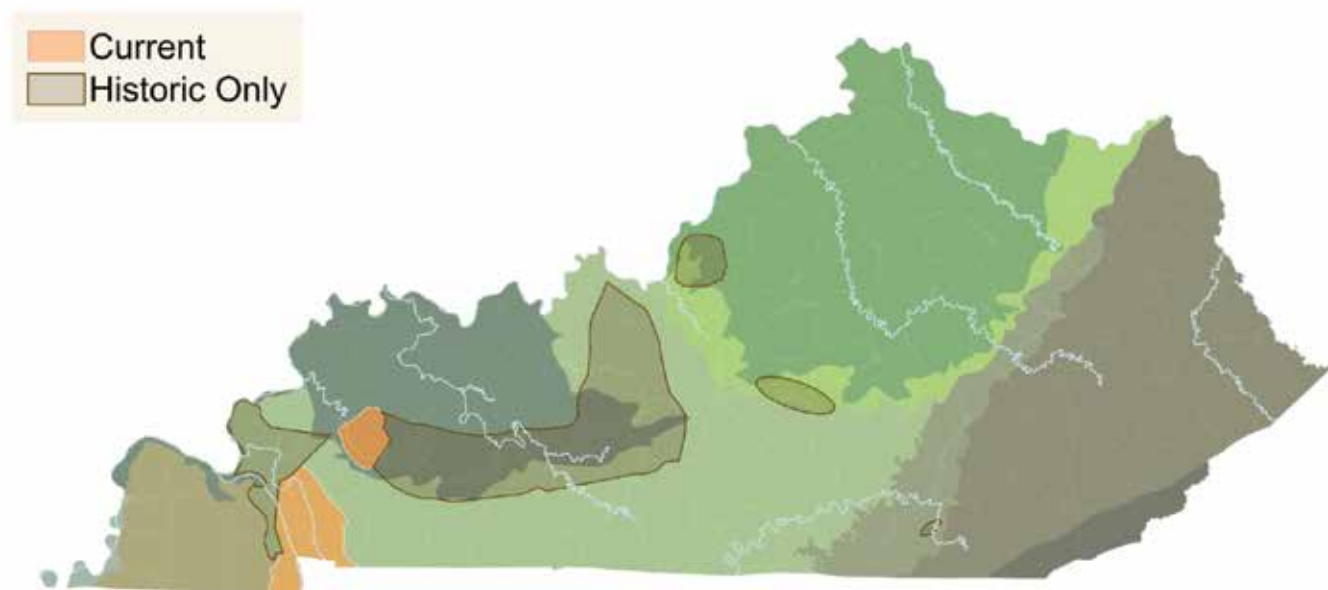


Photo: John MacGregor



WESTERN RIBBONSAKE

(*Thamnophis proximus proximus*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5T5

S Rank: S1

Federal Status: N/A

IUCN Red List: N/A

There is one substantial population of Western Ribbonsnake in Lower Hickman Bottoms of southwest Fulton County. That population shows no evidence of decline. Other observations of the snake are all from single specimens. The status of those populations is completely unknown.

Conservation Goal

Monitor the Lower Hickman Bottoms population. Gather additional data on the poorly-studied populations at Ballard WMA and Honker Lake and search for new sites on Doug Travis WMA.





Habitat Associations

Physiographic Regions: Interior River Valley And Hills, Mississippi Alluvial Plain

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams

Found in and along various wetland habitats including cypress swamps, flooded bottomland hardwood stands, sloughs, bayous, sluggish stream channels, seasonal shallow wetlands, and roadside ditches.

Threats

-  Annual and Perennial Nontimber Crops
-  Biological Resource Use
-  Pathogens and Microbes
-  Roads and Railroads

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Protect and restore natural stream channels, bayous, swamps, and wetlands

Management: Provide patches of open habitat adjacent to wetlands

Management: Raise awareness of the importance and diversity of snakes in Kentucky

Management: Restore and/or create wetland habitat

Management: Restore degraded wetland habitats

Range Map

Current

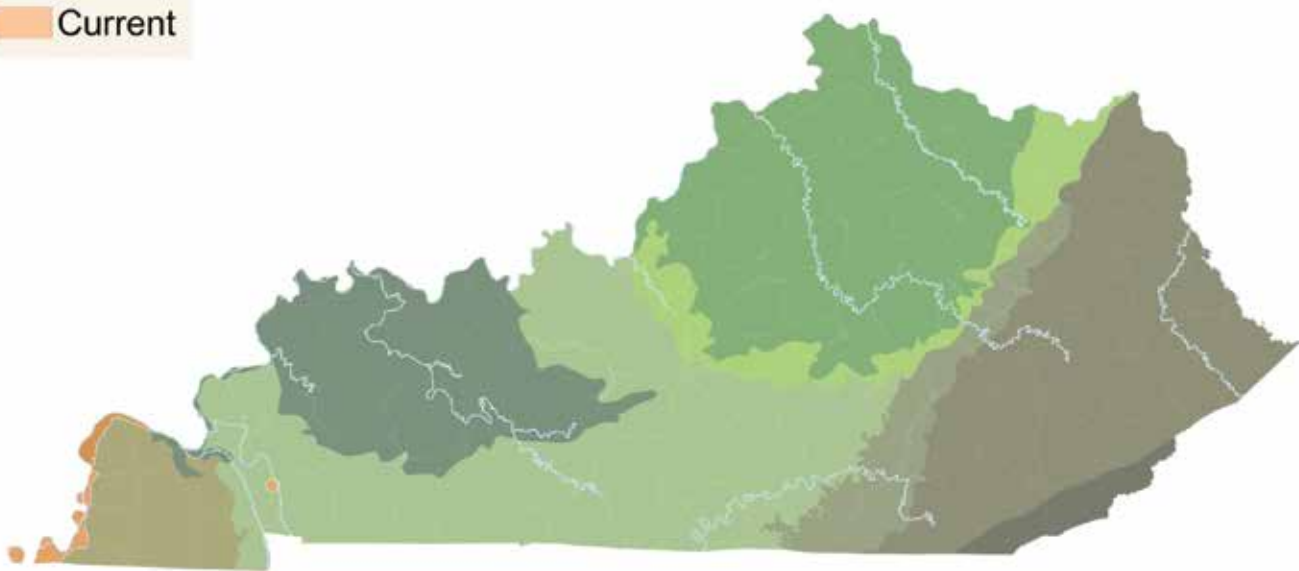


Photo: John MacGregor



EASTERN RIBBONSAKE

(*Thamnophis saurita saurita*)

Conservation Profile

Priority Group: Data Deficient

KNP Info

G Rank: G5T5

S Rank: S3

Federal Status: N/A

IUCN Red List: N/A

Eastern Ribbonsnake are difficult to survey for. There has been limited survey effort and the current species status is completely unknown. There are no known stable populations. Most records are single specimen observations reported from only 6 counties since 2010.

Conservation Goal

Survey sinkhole pond wetlands in the Pennyrite Region and riparian wetlands in the Cave Run Lake area to search for extant populations in eastern part of range.





Habitat Associations

Physiographic Regions: Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain

Guilds: Forested Wetland, Open Wetland, Lake/Pond, River/Streams

In western Kentucky, found in and along various wetland habitats including cypress swamps, flooded bottomland hardwood stands, sloughs, bayous, sluggish stream channels, seasonal shallow wetlands, and roadside ditches. In the eastern and

Threats

-  Annual and Perennial Nontimber Crops
-  Biological Resource Use
-  Pathogens and Microbes
-  Roads and Railroads

Conservation Actions

Unknown

Needs

Survey: Collect baseline species information

Management: Protect and restore natural stream channels, bayous, swamps, and wetlands

Management: Provide patches of open habitat adjacent to wetlands

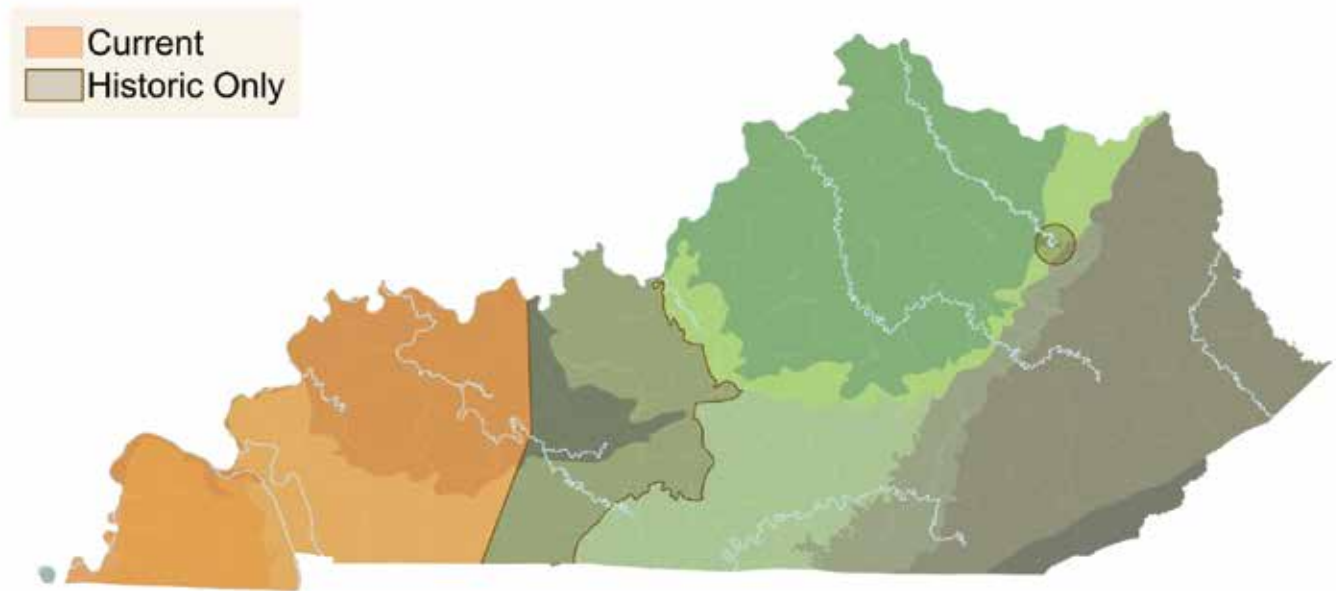
Management: Raise awareness of the importance and diversity of snakes in Kentucky

Management: Restore and/or create wetland habitat

Management: Restore degraded wetland habitats

southern portion of the Interior Plateau, occurs in small isolated colonies associated with shallow swamps and sinkhole ponds and is quite rare.

Range Map



APX 3.1 Approach for selecting Plant SGCN

There are 3,026 vascular plants documented in the state: approximately 73% (2,207 species) are native. Approximately 25% of Kentucky's native flora is of conservation concern and is designated as endangered, threatened, or rare, of which 63 taxa are considered globally rare (G1, G2, or G3). Most plants of conservation concern found in Kentucky are "edge of range" species that may possess unique genetic makeup due to inherent adaptability and history in range expansion and contraction, but many regionally and narrowly endemic plant species occur here as well. Kentucky's areas of endemism occur mainly in the dolomite glades of the Bluegrass, various habitats of the Cumberland Plateau, woodlands of the eastern Knobs, and limestone glades of the Pennyroyal Plain, though biologists are always seeking undiscovered hotspots.

The Office of Kentucky Nature Preserves (OKNP), in the Kentucky Energy and Environment Cabinet, is the listing authority for plants in Kentucky. The ability to legally list plants as threatened or endangered is derived from the Rare Plant Recognition Act of 1994. As a part of this act, OKNP is mandated to revise the list of threatened and endangered plants every four years, most recently in 2022. For this most recent effort, the Rare Plant Committee, a group of experts including OKNP botanists, reviewed conservation statuses and ranks for Kentucky's rare vascular plants. The two main sources of influence for the rare plant list were data and professional expertise from OKNP botanists along with partners across the state in academia, state and federal agencies, land trusts, and non-profits. The Kentucky Natural Heritage Database was the primary data source for conservation status assessments, but herbarium specimens, online plant atlases, and observational crowd-sourced databases were also consulted. This collective dataset was then analyzed using conservation rank assessment guidelines outlined in NatureServe's core methodology, a scientifically and empirically based method for rare species data collection and analysis. Measures of rarity, threats, and trends were used to calculate a conservation rank, to determine the status of each plant as endangered, threatened, conservative, or other.

Currently, OKNP tracks 197 state endangered vascular plants and 128 state threatened vascular plants, along with detailed information on an additional 234 vascular plants of conservation concern, including 80 special concern, 88 watch list, 49 historic, and 18 extirpated. Kentucky is home to 10 federally listed plants, with an additional 4 that have been recovered and removed from federal listing over the past decade. The majority of the 63 globally rare plants in Kentucky were also listed on the Southeast Regional Species of Greatest

Conservation Need (RSGCN) list recently developed in partnership with NatureServe, the Southeastern Plant Conservation Alliance (SE PCA), and the various southeastern states, including Kentucky.

The Rare Plant Committee selected a subset of plant species from the state's rare plant list (142 species, or roughly 30%) for further consideration in as SGCN.. These plants were selected due to a range of factors including global rarity, inclusion on the Southeast RSGCN, associations with rare natural communities, narrowness of range in the state, state ranking and population size, overall perceived species trends, degree of demonstrable threat, number of already protected occurrences, immediate ex situ and in situ needs, and importance of efforts in Kentucky to the overall status of the species. Due to the potential to locate extant populations with further inventories and surveys, select plants that are ranked "historic" were also included in the SGCN list. Historic species are those that have not been seen in the state in over 30 years but may be re-discovered in unsurveyed suitable habitat. When exhaustive surveys have been conducted and suitable habitat is limited, historic plants are then ranked as extirpated; extirpated plant species were not included in the SGCN list.

Many of Kentucky's federal and state listed plants are restricted to high quality remnant prairies, wetlands, barrens, and woodlands, and often these natural communities themselves are also listed as threatened or endangered. All of the SGCN plants have been categorized by habitat guilds, but because many of the plants are intimately tied to specific remnant natural communities, the SGCN plants are linked to their associated OKNP natural community type in the habitat portion of the species profiles. Kentucky's community classification was developed in partnership with NatureServe following national community classification standards and methodology of the United States National Vegetation Classification (USNVC).

The SGCN list was categorized into three levels of prioritization, Priority Tier 1-3. The addition of plants to the 2023 SWAP began with Priority Tier 1 plants, which includes 62 globally rare plants where conservation efforts could result in reducing extinction risks. Priority 2 and 3 plants may be added to the SWAP in subsequent updates and include select state listed endangered and threatened plants that would greatly benefit from focused conservation efforts as funding allows.

APX 3.2 Selected NatureServe Conservation Status Ranks and Definitions

Rank	Rank Title	Rank Definition
G1	Critically Imperiled	At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
G2	Imperiled	At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
G3	Vulnerable	At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
G4	Apparently Secure	At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
G5	Secure	At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
GX	Presumed Extinct	Not located despite intensive searches and virtually no likelihood of rediscovery.
GU	Unrankable	Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
GNR	Unranked	Global rank not yet assessed.
GNA	Not Applicable	A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities. A global conservation status rank may be not applicable for several reasons, related to its relevance as a conservation target. For species, typically the species is a hybrid without conservation value, or of domestic origin.
S1	Critically Imperiled	At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
S2	Imperiled	At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3	Vulnerable	At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4	Apparently Secure	At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5	Secure	At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.
SU	Unrankable	Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNR	Unranked	National or subnational conservation status not yet assessed.
SNA	Not Applicable	A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities (e.g., long distance aerial and aquatic migrants, hybrids without conservation value, and non-native species or ecosystems).

Selected NatureServe Conservation Status Ranks and Definitions

help.natureserve.org/biotics/Content/Record_Management/Element_Files/Element_Tracking/ETRACK_Definitions_of_Heritage_Conservation_Status_Ranks.htm

APX 3.3a Amphibian SGCN by Priority Group

Taxa Group	Scientific Name	Common Name	Priority Group
Amphibians	<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Data Deficient
Amphibians	<i>Ambystoma barbouri</i>	Streamside Salamander	High
Amphibians	<i>Ambystoma JJL</i>	Unisexual Ambystoma	Data Deficient
Amphibians	<i>Ambystoma talpoideum</i>	Mole Salamander	Moderate
Amphibians	<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Data Deficient
Amphibians	<i>Aneides aeneus</i>	Green Salamander	High
Amphibians	<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	Highest
Amphibians	<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Moderate
Amphibians	<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Moderate
Amphibians	<i>Desmognathus ochrophaeus</i>	Allegheny Mountain Dusky Salamander	Moderate
Amphibians	<i>Desmognathus welteri</i>	Black Mountain Salamander	Data Deficient
Amphibians	<i>Eurycea guttolineata</i>	Three-lined Salamander	High
Amphibians	<i>Hyla avivoca</i>	Bird-voiced Treefrog	High
Amphibians	<i>Hyla gratiosa</i>	Barking Treefrog	Data Deficient
Amphibians	<i>Hyla versicolor</i>	Gray Treefrog	Moderate
Amphibians	<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Data Deficient
Amphibians	<i>Lithobates blairi</i>	Plains Leopard Frog	Data Deficient
Amphibians	<i>Lithobates pipiens</i>	Northern Leopard Frog	Data Deficient
Amphibians	<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Moderate
Amphibians	<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Data Deficient
Amphibians	<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Data Deficient
Amphibians	<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Data Deficient
Amphibians	<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Data Deficient
Amphibians	<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Data Deficient
Amphibians	<i>Siren intermedia</i>	Lesser Siren	High

APX 3.3b Bird SGCN by Priority Group

Taxa Group	Scientific Name	Common Name	Priority Group
Birds	<i>Accipiter striatus</i>	Sharp-shinned Hawk	Moderate
Birds	<i>Actitis macularius</i>	Spotted Sandpiper	Moderate
Birds	<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Moderate
Birds	<i>Anas rubripes</i>	American Black Duck	Moderate
Birds	<i>Antrostomus carolinensis</i>	Chuck-will's-widow	High
Birds	<i>Antrostomus vociferus</i>	Whip-poor-will	Moderate
Birds	<i>Ardea alba</i>	Great Egret	Moderate
Birds	<i>Asio flammeus</i>	Short-eared Owl	Moderate
Birds	<i>Asio otus</i>	Long-eared Owl	Moderate
Birds	<i>Aythya affinis</i>	Lesser Scaup	Moderate
Birds	<i>Aythya marila</i>	Greater Scaup	Moderate
Birds	<i>Bartramia longicauda</i>	Upland Sandpiper	Moderate
Birds	<i>Bonasa umbellus</i>	Ruffed Grouse	Moderate
Birds	<i>Botaurus lentiginosus</i>	American Bittern	Moderate

Taxa Group	Scientific Name	Common Name	Priority Group
Birds	<i>Butorides virescens</i>	Green Heron	Moderate
Birds	<i>Calidris alba</i>	Sanderling	Moderate
Birds	<i>Calidris alpina</i>	Dunlin	Moderate
Birds	<i>Calidris himantopus</i>	Stilt Sandpiper	Moderate
Birds	<i>Calidris pusilla</i>	Semipalmated Sandpiper	Moderate
Birds	<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Moderate
Birds	<i>Cardellina canadensis</i>	Canada Warbler	Moderate
Birds	<i>Centronyx henslowii</i>	Henslow's Sparrow	High
Birds	<i>Charadrius melodus</i>	Piping Plover	Moderate
Birds	<i>Chlidonias niger</i>	Black Tern	Moderate
Birds	<i>Circus hudsonius</i>	Northern Harrier	Moderate
Birds	<i>Cistothorus stellaris</i>	Sedge Wren	Moderate
Birds	<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Moderate
Birds	<i>Colinus virginianus</i>	Northern Bobwhite	Moderate
Birds	<i>Corvus corax</i>	Common Raven	Moderate
Birds	<i>Cygnus buccinator</i>	Trumpeter Swan	Moderate
Birds	<i>Dolichonyx oryzivorus</i>	Bobolink	Moderate
Birds	<i>Dryobates borealis</i>	Red-cockaded Woodpecker	Moderate
Birds	<i>Empidonax minimus</i>	Least Flycatcher	Moderate
Birds	<i>Empidonax traillii</i>	Willow Flycatcher	Moderate
Birds	<i>Euphagus carolinus</i>	Rusty Blackbird	Moderate
Birds	<i>Falco peregrinus</i>	Peregrine Falcon	Moderate
Birds	<i>Falco sparverius</i>	American Kestrel	Moderate
Birds	<i>Gallinago delicata</i>	Wilson's Snipe	Moderate
Birds	<i>Gallinula galeata</i>	Common Gallinule	Data Deficient
Birds	<i>Geothlypis formosa</i>	Kentucky Warbler	Moderate
Birds	<i>Grus americana</i>	Whooping Crane	Moderate
Birds	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Moderate
Birds	<i>Hylocichla mustelina</i>	Wood Thrush	High
Birds	<i>Ixobrychus exilis</i>	Least Bittern	High
Birds	<i>Lanius ludovicianus</i>	Loggerhead Shrike	High
Birds	<i>Limnodromus griseus</i>	Short-billed Dowitcher	Moderate
Birds	<i>Limnithlypis swainsonii</i>	Swainson's Warbler	High
Birds	<i>Lophodytes cucullatus</i>	Hooded Merganser	Moderate
Birds	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Moderate
Birds	<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	High
Birds	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Moderate
Birds	<i>Pandion haliaetus</i>	Osprey	Moderate
Birds	<i>Parkesia motacilla</i>	Louisiana Waterthrush	Moderate
Birds	<i>Passerculus sandwichensis</i>	Savannah Sparrow	Moderate
Birds	<i>Peucaea aestivalis</i>	Bachman's Sparrow	Highest
Birds	<i>Phalaropus tricolor</i>	Wilson's Phalarope	Moderate
Birds	<i>Pluvialis dominica</i>	American Golden-plover	Moderate
Birds	<i>Pluvialis squatarola</i>	Black-bellied Plover	Moderate
Birds	<i>Podiceps auritus</i>	Horned Grebe	Moderate
Birds	<i>Podilymbus podiceps</i>	Pied-billed Grebe	Moderate
Birds	<i>Porzana carolina</i>	Sora	Moderate

Taxa Group	Scientific Name	Common Name	Priority Group
Birds	<i>Protonotaria citrea</i>	Prothonotary Warbler	High
Birds	<i>Rallus elegans</i>	King Rail	Moderate
Birds	<i>Rallus limicola</i>	Virginia Rail	Moderate
Birds	<i>Riparia riparia</i>	Bank Swallow	Moderate
Birds	<i>Scolopax minor</i>	American Woodcock	Moderate
Birds	<i>Setophaga cerulea</i>	Cerulean Warbler	High
Birds	<i>Setophaga discolor</i>	Prairie Warbler	Moderate
Birds	<i>Setophaga striata</i>	Blackpoll Warbler	Moderate
Birds	<i>Setophaga tigrina</i>	Cape May Warbler	Moderate
Birds	<i>Setophaga virens</i>	Black-throated Green Warbler	Moderate
Birds	<i>Spiza americana</i>	Dickcissel	Moderate
Birds	<i>Spizella pusilla</i>	Field Sparrow	Moderate
Birds	<i>Sternula antillarum athalassos</i>	Interior Least Tern	High
Birds	<i>Sturnella magna</i>	Eastern Meadowlark	High
Birds	<i>Thryomanes bewickii</i>	Bewick's Wren	Moderate
Birds	<i>Tringa flavipes</i>	Lesser Yellowlegs	Moderate
Birds	<i>Tringa solitaria</i>	Solitary Sandpiper	Moderate
Birds	<i>Tyto alba</i>	Barn Owl	Moderate
Birds	<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Moderate
Birds	<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Moderate
Birds	<i>Vireo bellii</i>	Bell's Vireo	Moderate

APX 3.3c Crustacean SGCN by Priority Group

Taxa Group	Scientific Name	Common Name	Priority Group
Crustaceans	<i>Barbicambarus cornutus</i>	Bottlebrush Crayfish	High
Crustaceans	<i>Caecidotea barri</i>	Clifton Cave Isopod	Data Deficient
Crustaceans	<i>Cambarellus puer</i>	Swamp Dwarf Crayfish	Data Deficient
Crustaceans	<i>Cambarellus shufeldtii</i>	Cajun Dwarf Crayfish	Data Deficient
Crustaceans	<i>Cambarus adustus</i>	Dusky Mudbug	Highest
Crustaceans	<i>Cambarus bartonii cavatus</i>	Appalachian Brook Crayfish	Data Deficient
Crustaceans	<i>Cambarus batchi</i>	Bluegrass Crayfish	High
Crustaceans	<i>Cambarus bouchardi</i>	Big South Fork Crayfish	Highest
Crustaceans	<i>Cambarus buntingi</i>	Longclaw Crayfish	Data Deficient
Crustaceans	<i>Cambarus callainus</i>	Big Sandy Crayfish	Highest
Crustaceans	<i>Cambarus deweesae</i>	Valley Flame Crayfish	Data Deficient
Crustaceans	<i>Cambarus dubius</i>	Upland Burrowing Crayfish	Data Deficient
Crustaceans	<i>Cambarus friaufi</i>	Hairy Crayfish	High
Crustaceans	<i>Cambarus graysoni</i>	Twospot Crayfish	Data Deficient
Crustaceans	<i>Cambarus guenteri</i>	Redbird Crayfish	High
Crustaceans	<i>Cambarus hatfieldi</i>	Tug Valley Crayfish	High
Crustaceans	<i>Cambarus hazardi</i>	Brawny Crayfish	High
Crustaceans	<i>Cambarus jezerinaci</i>	Spiny Scale Crayfish	Data Deficient

Taxa Group	Scientific Name	Common Name	Priority Group
Crustaceans	<i>Cambarus ortmanni</i>	Ortmann's Mudbug	Data Deficient
Crustaceans	<i>Cambarus parvoculus</i>	Mountain Midget Crayfish	Data Deficient
Crustaceans	<i>Cambarus rusticiformis</i>	Depression Crayfish	Data Deficient
Crustaceans	<i>Cambarus sciotensis</i>	Teays River Crayfish	Data Deficient
Crustaceans	<i>Cambarus striatus</i>	Ambiguous Crayfish	Data Deficient
Crustaceans	<i>Cambarus taylori</i>	Cutshin Crayfish	High
Crustaceans	<i>Creaserinus fodiens</i>	Digger Crayfish	Data Deficient
Crustaceans	<i>Faxonius bellator</i>	Screaming Eagle Crayfish	Data Deficient
Crustaceans	<i>Faxonius bisectus</i>	Crittenden Crayfish	Highest
Crustaceans	<i>Faxonius burri</i>	Blood River Crayfish	Highest
Crustaceans	<i>Faxonius elix</i>	Mowild Crayfish	Highest
Crustaceans	<i>Faxonius jeffersoni</i>	Louisville Crayfish	Highest
Crustaceans	<i>Faxonius kentuckiensis</i>	Kentucky Crayfish	High
Crustaceans	<i>Faxonius lancifer</i>	Shrimp Crayfish	Data Deficient
Crustaceans	<i>Faxonius margorectus</i>	Livingston Crayfish	Highest
Crustaceans	<i>Faxonius palmeri palmeri</i>	Gray-Speckled Crayfish	Data Deficient
Crustaceans	<i>Faxonius pardalotus</i>	Leopard Crayfish	Data Deficient
Crustaceans	<i>Faxonius rafinesquei</i>	Rough River Crayfish	High
Crustaceans	<i>Faxonius raymondi</i>	Norwood River Crayfish	Data Deficient
Crustaceans	<i>Faxonius ronaldi</i>	Mud River Crayfish	Data Deficient
Crustaceans	<i>Faxonius rusticus</i>	Rusty Crayfish	Data Deficient
Crustaceans	<i>Faxonius tricuspis</i>	Western Highland Crayfish	Data Deficient
Crustaceans	<i>Gammarus bousfieldi</i>	Bousfield's Amphipod	Data Deficient
Crustaceans	<i>Lacunicambarus chimera</i>	Crawzilla Crawdad	Data Deficient
Crustaceans	<i>Macrobrachium ohione</i>	Ohio Shrimp	Data Deficient
Crustaceans	<i>Orconectes barri</i>	Cumberland Plateau Cave Crayfish	Highest
Crustaceans	<i>Orconectes packardi</i>	Appalachian Cave Crayfish	Highest
Crustaceans	<i>Orconectes pellucidus</i>	Mammoth Cave Crayfish	High
Crustaceans	<i>Palaemonias ganteri</i>	Mammoth Cave Shrimp	Highest
Crustaceans	<i>Procambarus viaeviridis</i>	Vernal Crayfish	Data Deficient
Crustaceans	<i>Stygobromus vitreus</i>	An Amphipod	Data Deficient

APX 3.3d Fishes and Lamprey SGCN by Priority Group

Taxa Group	Scientific Name	Common Name	Priority Group
Fishes and Lampreys	<i>Acipenser fulvescens</i>	Lake Sturgeon	Moderate
Fishes and Lampreys	<i>Allohistium maydeni</i>	Redlips Darter	Highest
Fishes and Lampreys	<i>Alosa alabamae</i>	Alabama Shad	Highest
Fishes and Lampreys	<i>Amblyopsis spelaea</i>	Northern Cavefish	Highest
Fishes and Lampreys	<i>Ammocrypta clara</i>	Western Sand Darter	High
Fishes and Lampreys	<i>Anguilla rostrata</i>	American Eel	Data Deficient
Fishes and Lampreys	<i>Atractosteus spatula</i>	Alligator Gar	Moderate
Fishes and Lampreys	<i>Carpionodes velifer</i>	Highfin Carpsucker	Data Deficient

Taxa Group	Scientific Name	Common Name	Priority Group
Fishes and Lampreys	<i>Chrosomus cumberlandensis</i>	Blackside Dace	High
Fishes and Lampreys	<i>Clinostomus elongatus</i>	Redside Dace	High
Fishes and Lampreys	<i>Cycleptus elongatus</i>	Blue Sucker	Data Deficient
Fishes and Lampreys	<i>Cyprinella camura</i>	Bluntnose Shiner	Moderate
Fishes and Lampreys	<i>Cyprinella venusta</i>	Blacktail Shiner	Moderate
Fishes and Lampreys	<i>Erimystax insignis</i>	Blotched Chub	High
Fishes and Lampreys	<i>Erimystax x-punctatus</i>	Gravel Chub	Data Deficient
Fishes and Lampreys	<i>Erimyzon sucetta</i>	Lake Chubsucker	High
Fishes and Lampreys	<i>Esox niger</i>	Chain Pickerel	Moderate
Fishes and Lampreys	<i>Etheostoma barbouri</i>	Teardrop Darter	Highest
Fishes and Lampreys	<i>Etheostoma chienense</i>	Relict Darter	Highest
Fishes and Lampreys	<i>Etheostoma derivativum</i>	Stone Darter	Highest
Fishes and Lampreys	<i>Etheostoma fusiforme</i>	Swamp Darter	Moderate
Fishes and Lampreys	<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Highest
Fishes and Lampreys	<i>Etheostoma lynceum</i>	Brighteye Darter	Moderate
Fishes and Lampreys	<i>Etheostoma nebra</i>	Buck Darter	Highest
Fishes and Lampreys	<i>Etheostoma parvipinne</i>	Goldstripe Darter	High
Fishes and Lampreys	<i>Etheostoma proeliare</i>	Cypress Darter	High
Fishes and Lampreys	<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Highest
Fishes and Lampreys	<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Highest
Fishes and Lampreys	<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Highest
Fishes and Lampreys	<i>Etheostoma susanae</i>	Cumberland Darter	Highest
Fishes and Lampreys	<i>Etheostoma swaini</i>	Gulf Darter	Moderate
Fishes and Lampreys	<i>Etheostoma tecumsehi</i>	Shawnee Darter	Highest
Fishes and Lampreys	<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Data Deficient
Fishes and Lampreys	<i>Fundulus chrysotus</i>	Golden Topminnow	Moderate
Fishes and Lampreys	<i>Fundulus dispar</i>	Starhead Topminnow	High
Fishes and Lampreys	<i>Hemitremia flammea</i>	Flame Chub	Highest
Fishes and Lampreys	<i>Hybognathus hayi</i>	Cypress Minnow	High
Fishes and Lampreys	<i>Hybognathus placitus</i>	Plains Minnow	High
Fishes and Lampreys	<i>Hybopsis amnis</i>	Pallid Shiner	High
Fishes and Lampreys	<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	High
Fishes and Lampreys	<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	High
Fishes and Lampreys	<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	High
Fishes and Lampreys	<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	High
Fishes and Lampreys	<i>Ictiobus niger</i>	Black Buffalo	Data Deficient
Fishes and Lampreys	<i>Lepomis marginatus</i>	Dollar Sunfish	High
Fishes and Lampreys	<i>Lepomis miniatus</i>	Redspotted Sunfish	High
Fishes and Lampreys	<i>Lethenteron appendix</i>	American Brook Lamprey	High
Fishes and Lampreys	<i>Lota lota</i>	Burbot	Moderate
Fishes and Lampreys	<i>Macrhybopsis gelida</i>	Sturgeon Chub	Moderate
Fishes and Lampreys	<i>Macrhybopsis hyostoma</i>	Shoal Chub	Moderate
Fishes and Lampreys	<i>Macrhybopsis meeki</i>	Sicklefin Chub	Moderate
Fishes and Lampreys	<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Moderate
Fishes and Lampreys	<i>Nocomis biguttatus</i>	Hornyhead Chub	Data Deficient

Fishes and Lampreys	<i>Nothonotus maculatus</i>	Spotted Darter	Highest
Fishes and Lampreys	<i>Nothonotus microlepidus</i>	Smallscale Darter	Highest
Fishes and Lampreys	<i>Notropis albizonatus</i>	Palezone Shiner	Highest
Fishes and Lampreys	<i>Notropis buchanani</i>	Ghost Shiner	Data Deficient
Fishes and Lampreys	<i>Notropis dorsalis</i>	Bigmouth Shiner	Moderate
Fishes and Lampreys	<i>Notropis hudsonius</i>	Spottail Shiner	Data Deficient
Fishes and Lampreys	<i>Notropis maculatus</i>	Taillight Shiner	Moderate
Fishes and Lampreys	<i>Notropis shumardi</i>	Silverband Shiner	Data Deficient
Fishes and Lampreys	<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	High
Fishes and Lampreys	<i>Noturus exilis</i>	Slender Madtom	High
Fishes and Lampreys	<i>Noturus hildebrandi</i>	Least Madtom	High
Fishes and Lampreys	<i>Noturus phaeus</i>	Brown Madtom	High
Fishes and Lampreys	<i>Noturus stigmosus</i>	Northern Madtom	High
Fishes and Lampreys	<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Data Deficient
Fishes and Lampreys	<i>Percina macrocephala</i>	Longhead Darter	High
Fishes and Lampreys	<i>Percina squamata</i>	Olive Darter	Highest
Fishes and Lampreys	<i>Percopsis omiscomaycus</i>	Trout-perch	Moderate
Fishes and Lampreys	<i>Phenacobius uranops</i>	Stargazing Minnow	High
Fishes and Lampreys	<i>Platygobio gracilis</i>	Flathead Chub	Moderate
Fishes and Lampreys	<i>Polyodon spathula</i>	Paddlefish	Moderate
Fishes and Lampreys	<i>Scaphirhynchus albus</i>	Pallid Sturgeon	High
Fishes and Lampreys	<i>Thoburnia atripinnis</i>	Blackfin Sucker	Highest
Fishes and Lampreys	<i>Typhlichthys subterraneus</i>	Southern Cavefish	High
Fishes and Lampreys	<i>Umbra limi</i>	Central Mudminnow	High

APX 3.3e Freshwater Mussel and Snail SGCN by Priority Group

Taxa Group	Scientific Name	Common Name	Priority Group
Freshwater Mussels and Snails	<i>Actinonaias pectorosa</i>	Pheasantshell	High
Freshwater Mussels and Snails	<i>Alasmidonta atropurpurea</i>	Cumberland Elktoe	Highest
Freshwater Mussels and Snails	<i>Alasmidonta marginata</i>	Elktoe	High
Freshwater Mussels and Snails	<i>Alasmidonta viridis</i>	Slippershell Mussel	High
Freshwater Mussels and Snails	<i>Anodontoides denigrata</i>	Cumberland Papershell	Highest
Freshwater Mussels and Snails	<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	Highest
Freshwater Mussels and Snails	<i>Antroselates spiralis</i>	Shaggy Cavesnail	Data Deficient
Freshwater Mussels and Snails	<i>Callinina georgiana</i>	Banded Mysterysnail	Data Deficient
Freshwater Mussels and Snails	<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Data Deficient
Freshwater Mussels and Snails	<i>Cambarunio iris</i>	Rainbow	Data Deficient
Freshwater Mussels and Snails	<i>Cambarunio taeniatus</i>	Painted Creekshell	Moderate
Freshwater Mussels and Snails	<i>Cumberlandia monodonta</i>	Spectaclecase	High
Freshwater Mussels and Snails	<i>Cyprogenia stegaria</i>	Fanshell	High
Freshwater Mussels and Snails	<i>Dilatata sampsoni</i>	Sampson Sprite	Data Deficient
Freshwater Mussels and Snails	<i>Dromus dromas</i>	Dromedary Pearlymussel	High
Freshwater Mussels and Snails	<i>Elimia costifera</i>	Corded Elimia	Data Deficient
Freshwater Mussels and Snails	<i>Elimia curreyana</i>	Amber Elimia	Data Deficient
Freshwater Mussels and Snails	<i>Elimia ebenum</i>	Ebony Elimia	Data Deficient

Taxa Group	Scientific Name	Common Name	Priority Group
Freshwater Mussels and Snails	<i>Elimia edgariana</i>	Cumberland Elimia	Data Deficient
Freshwater Mussels and Snails	<i>Elimia laqueata</i>	Panel Elimia	Data Deficient
Freshwater Mussels and Snails	<i>Elimia livescens</i>	Liver Elimia	Data Deficient
Freshwater Mussels and Snails	<i>Elimia plicatastriata</i>	Carved Elimia	Data Deficient
Freshwater Mussels and Snails	<i>Ellipsaria lineolata</i>	Butterfly	High
Freshwater Mussels and Snails	<i>Elliptio crassidens</i>	Elephantear	High
Freshwater Mussels and Snails	<i>Epioblasma brevidens</i>	Cumberlandian Combshell	Highest
Freshwater Mussels and Snails	<i>Epioblasma capsaeformis</i>	Oyster Mussel	Highest
Freshwater Mussels and Snails	<i>Epioblasma obliquata</i>	Catspaw	Highest
Freshwater Mussels and Snails	<i>Epioblasma rangiana</i>	Northern Riffleshell	Highest
Freshwater Mussels and Snails	<i>Epioblasma triquetra</i>	Snuffbox	High
Freshwater Mussels and Snails	<i>Epioblasma walkeri</i>	Tan Riffleshell	Highest
Freshwater Mussels and Snails	<i>Eupera cubensis</i>	Mottled Fingernailclam	Data Deficient
Freshwater Mussels and Snails	<i>Ferrissia californica</i>	Fragile Ancyloid	Data Deficient
Freshwater Mussels and Snails	<i>Ferrissia rivularis</i>	Creeping Ancyloid	Data Deficient
Freshwater Mussels and Snails	<i>Fusconaia subrotunda</i>	Longsolid	High
Freshwater Mussels and Snails	<i>Gyraulus deflectus</i>	Flexed Gyro	Data Deficient
Freshwater Mussels and Snails	<i>Gyraulus parvus</i>	Ash Gyro	Data Deficient
Freshwater Mussels and Snails	<i>Hemistena lata</i>	Cracking Pearlymussel	Moderate
Freshwater Mussels and Snails	<i>Laevapex fuscus</i>	Dusky Ancyloid	Data Deficient
Freshwater Mussels and Snails	<i>Lampsilis abrupta</i>	Pink Mucket	High
Freshwater Mussels and Snails	<i>Lampsilis hydiana</i>	Louisiana Fatmucket	High
Freshwater Mussels and Snails	<i>Lampsilis ovata</i>	Pocketbook	High
Freshwater Mussels and Snails	<i>Lasmigona compressa</i>	Creek Heelsplitter	High
Freshwater Mussels and Snails	<i>Leaunio lienosus</i>	Little Spectaclecase	Moderate
Freshwater Mussels and Snails	<i>Leaunio ortmanni</i>	Kentucky Creekshell	Highest
Freshwater Mussels and Snails	<i>Leaunio pataecus</i>	Dwarf Rainbow	Highest
Freshwater Mussels and Snails	<i>Leaunio vanuxemensis</i>	Mountain Creekshell	Highest
Freshwater Mussels and Snails	<i>Leptodea leptodon</i>	Scaleshell	Moderate
Freshwater Mussels and Snails	<i>Leptoxis praerosa</i>	Onyx Rocksnail	Data Deficient
Freshwater Mussels and Snails	<i>Leptoxis trilineata</i>	Broad Mudalia	Data Deficient
Freshwater Mussels and Snails	<i>Ligumia recta</i>	Black Sandshell	High
Freshwater Mussels and Snails	<i>Lioplax sulculosa</i>	Furrowed Lioplax	Data Deficient
Freshwater Mussels and Snails	<i>Lithasia armigera</i>	Armored Rocksnail	Data Deficient
Freshwater Mussels and Snails	<i>Lithasia curta</i>	Knobby Rocksnail	Data Deficient
Freshwater Mussels and Snails	<i>Lithasia geniculata</i>	Ornate Rocksnail	Data Deficient
Freshwater Mussels and Snails	<i>Lithasia salebrosa</i>	Muddy Rocksnail	Data Deficient
Freshwater Mussels and Snails	<i>Lithasia verrucosa</i>	Varicose Rocksnail	Data Deficient
Freshwater Mussels and Snails	<i>Medionidus conradicus</i>	Cumberland Moccasinshell	Highest
Freshwater Mussels and Snails	<i>Obovaria olivaria</i>	Hickorynut	High
Freshwater Mussels and Snails	<i>Obovaria retusa</i>	Ring Pink	Highest
Freshwater Mussels and Snails	<i>Obovaria subrotunda</i>	Round Hickorynut	High
Freshwater Mussels and Snails	<i>Paetulunio fabalis</i>	Rayed Bean	Moderate
Freshwater Mussels and Snails	<i>Pegias fabula</i>	Littlewing Pearlymussel	Highest
Freshwater Mussels and Snails	<i>Physa pomilia</i>	Claiborne Physa	Data Deficient
Freshwater Mussels and Snails	<i>Physella globosa</i>	Globose Physa	Data Deficient
Freshwater Mussels and Snails	<i>Pisidium compressum</i>	Ridgedbeaked Peaclam	Data Deficient
Freshwater Mussels and Snails	<i>Planorbula armigera</i>	Thicklip Rams Horn	Data Deficient
Freshwater Mussels and Snails	<i>Plethobasus cicatricosus</i>	White Wartyback	Moderate

Taxa Group	Scientific Name	Common Name	Priority Group
Freshwater Mussels and Snails	<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	High
Freshwater Mussels and Snails	<i>Plethobasus cyphus</i>	Sheepnose	High
Freshwater Mussels and Snails	<i>Pleurobema clava</i>	Clubshell	High
Freshwater Mussels and Snails	<i>Pleurobema cordatum</i>	Ohio Pigtoe	High
Freshwater Mussels and Snails	<i>Pleurobema oviforme</i>	Tennessee Clubshell	Highest
Freshwater Mussels and Snails	<i>Pleurobema plenum</i>	Rough Pigtoe	Highest
Freshwater Mussels and Snails	<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Highest
Freshwater Mussels and Snails	<i>Pleurocera acuta</i>	Sharp Hornsnail	Data Deficient
Freshwater Mussels and Snails	<i>Pleurocera alveare</i>	Rugged Hornsnail	Data Deficient
Freshwater Mussels and Snails	<i>Pleurocera canaliculata</i>	Silty Hornsnail	Data Deficient
Freshwater Mussels and Snails	<i>Pleurocera curta</i>	Shortspire Hornsnail	Data Deficient
Freshwater Mussels and Snails	<i>Pleurocera walkeri</i>	Telescope Hornsnail	Data Deficient
Freshwater Mussels and Snails	<i>Pleuroaia dolabelloides</i>	Slabside Pearlymussel	Moderate
Freshwater Mussels and Snails	<i>Pomatiopsis cincinnatiensis</i>	Brown Walker	Data Deficient
Freshwater Mussels and Snails	<i>Potamilus capax</i>	Fat Pocketbook	High
Freshwater Mussels and Snails	<i>Potamilus purpuratus</i>	Bleufer	High
Freshwater Mussels and Snails	<i>Promenetus exacuus</i>	Sharp Sprite	Data Deficient
Freshwater Mussels and Snails	<i>Ptychobranhus subtentus</i>	Fluted Kidneyshell	High
Freshwater Mussels and Snails	<i>Quadrula fragosa</i>	Winged Mapleleaf	Moderate
Freshwater Mussels and Snails	<i>Rhodacme elatior</i>	Domed Ancyliid	Data Deficient
Freshwater Mussels and Snails	<i>Rhodacme hinkleyi</i>	Knobby Ancyliid	Data Deficient
Freshwater Mussels and Snails	<i>Sagittunio subrostratus</i>	Pondmussel	High
Freshwater Mussels and Snails	<i>Simpsonaias ambigua</i>	Salamander Mussel	High
Freshwater Mussels and Snails	<i>Somatogyrus integra</i>	Ohio Pebblesnail	Data Deficient
Freshwater Mussels and Snails	<i>Somatogyrus trothis</i>	A Freshwater Snail	Data Deficient
Freshwater Mussels and Snails	<i>Sphaerium striatinum</i>	Striated Fingernailclam	Data Deficient
Freshwater Mussels and Snails	<i>Theliderma cylindrica</i>	Rabbitsfoot	High
Freshwater Mussels and Snails	<i>Toxolasma lividum</i>	Purple Lilliput	High
Freshwater Mussels and Snails	<i>Toxolasma texasiense</i>	Texas Lilliput	High
Freshwater Mussels and Snails	<i>Tritogonia nobilis</i>	Gulf Mapleleaf	Data Deficient
Freshwater Mussels and Snails	<i>Uniomerus tetralasmus</i>	Pondhorn	Data Deficient
Freshwater Mussels and Snails	<i>Venustaconcha troostensis</i>	Cumberland Bean	Highest

APX 3.3f Insect and Springtail SGCN by Priority Group

Taxa Group	Scientific Name	Common Name	Priority Group
Insects and Springtails	<i>Acroneuria covelli</i>	River Stone	Highest
Insects and Springtails	<i>Acroneuria hitchcocki</i>	Kentucky Stone	Highest
Insects and Springtails	<i>Agapetus gelbae</i>		Moderate
Insects and Springtails	<i>Agapetus kirchneri</i>		Highest
Insects and Springtails	<i>Allocaupnia cunninghami</i>	Karst Snowfly	Highest
Insects and Springtails	<i>Amphiagrion saucium</i>	Eastern Red Damselfly	Moderate
Insects and Springtails	<i>Arigomphus maxwelli</i>	Bayou Clubtail	High
Insects and Springtails	<i>Bombus pensylvanicus</i>	American Bumble Bee	High
Insects and Springtails	<i>Calephelis borealis</i>	Northern Metalmark	High
Insects and Springtails	<i>Calephelis muticum</i>	Swamp Metalmark	High
Insects and Springtails	<i>Callophrys irus</i>	Frosted Elf	High
Insects and Springtails	<i>Calopteryx dimidiata</i>	Sparkling Jewelwing	High
Insects and Springtails	<i>Celithemis verna</i>	Double-ringed Pennant	High
Insects and Springtails	<i>Chlosyne gorgone</i>	Gorgone Checkerspot	Moderate

Taxa Group	Scientific Name	Common Name	Priority Group
Insects and Springtails	<i>Danaus plexippus plexippus</i>	Monarch	Moderate
Insects and Springtails	<i>Enallagma daeckii</i>	Attenuated Bluet	High
Insects and Springtails	<i>Erora laeta</i>	Early Hairstreak	Highest
Insects and Springtails	<i>Erynnis martialis</i>	Mottled Duskywing	High
Insects and Springtails	<i>Euphyes dukesi</i>	Dukes' Skipper	High
Insects and Springtails	<i>Gomphurus hybridus</i>	Cocoa Clubtail	High
Insects and Springtails	<i>Hansonoperla hokolesqua</i>	Splendid Stone	Highest
Insects and Springtails	<i>Hydroptila coweetensis</i>	A Hydroptilid Caddisfly	Highest
Insects and Springtails	<i>Hydroptila decia</i>	Knoxville Hydroptilan Micro Caddisfly	Highest
Insects and Springtails	<i>Hydroptila howelli</i>	A Hydroptilid Caddisfly	Highest
Insects and Springtails	<i>Hydroptila kuehnei</i>	A Hydroptilid Caddisfly	Highest
Insects and Springtails	<i>Hystriophora loricana</i>	An Olethreutine Moth	High
Insects and Springtails	<i>Lepidostoma etnieri</i>	A Lepidostomatid Caddisfly	Highest
Insects and Springtails	<i>Leuctra schusteri</i>	Karst Needelfly	High
Insects and Springtails	<i>Litobrancha recurvata</i>	A Burrowing Mayfly	Moderate
Insects and Springtails	<i>Lytrosis permagnaria</i>	A Geometrid Moth	High
Insects and Springtails	<i>Maccaffertium bednariki</i>	A Heptageniid Mayfly	Highest
Insects and Springtails	<i>Manophylax butleri</i>	Bottle Cap Caddisfly	Highest
Insects and Springtails	<i>Mesamia straminea</i>	Helianthus Leafhopper	High
Insects and Springtails	<i>Nannothemis bella</i>	Elfin Skimmer	High
Insects and Springtails	<i>Nehalennia gracilis</i>	Sphagnum Sprite	Moderate
Insects and Springtails	<i>Nehalennia integricollis</i>	Southern Sprite	High
Insects and Springtails	<i>Nehalennia irene</i>	Sedge Sprite	Moderate
Insects and Springtails	<i>Neophylax lewisae</i>		Highest
Insects and Springtails	<i>Ophiogomphus howei</i>	Pygmy Snaketail	High
Insects and Springtails	<i>Ophiogomphus mainensis</i>	Maine Snaketail	High
Insects and Springtails	<i>Papaipema beeriana</i>	Blazing Star Stem Borer	Highest
Insects and Springtails	<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth	Highest
Insects and Springtails	<i>Papaipema leucostigma</i>	Columbine Borer Moth	High
Insects and Springtails	<i>Papaipema silphii</i>	Silphium Borer Moth	High
Insects and Springtails	<i>Papaipema sp. 5</i>	Rare Cane Borer Moth	Moderate
Insects and Springtails	<i>Papaipema speciosissima</i>	Osmunda Borer Moth	High
Insects and Springtails	<i>Poanes viator</i>	Broad-winged Skipper	Moderate
Insects and Springtails	<i>Polycentropus neiswanderi</i>	A Polycentropodid Caddisfly	Highest
Insects and Springtails	<i>Prairiana kansana</i>	A Cicadellid Leafhopper	High
Insects and Springtails	<i>Pseudanophthalmus caecus</i>	Clifton Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus calcareus</i>	Limestone Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus catoryctos</i>	Lesser Adams Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus cnephosus</i>	A Cave Obligate Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus conditus</i>	Hidden Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus frigidus</i>	Icebox Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus globiceps</i>	Round-headed Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus horni</i>	Garman's Cave Beetle	High
Insects and Springtails	<i>Pseudanophthalmus hypolithos</i>	Ashcamp Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus inexpectatus</i>	Surprising Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus major</i>	Beaver Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus pholeter</i>	Greater Adams Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus pubescens intrepidus</i>	A Cave Obligate Beetle	High
Insects and Springtails	<i>Pseudanophthalmus puteanus</i>	Old Well Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus rogersae</i>	Rogers' Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus scholasticus</i>	Scholarly Cave Beetle	Highest
Insects and Springtails	<i>Pseudanophthalmus troglodytes</i>	Louisville Cave Beetle	Highest
Insects and Springtails	<i>Pseudosinella espanita</i>	A Cave Obligate Springtail	Highest
Insects and Springtails	<i>Rasvena terna</i>	Vermont Sailfly	High
Insects and Springtails	<i>Rhyacophila appalachia</i>	A Rhyacophilid Caddisfly	High
Insects and Springtails	<i>Satyrium favonius ontario</i>	Northern Oak Hairstreak	High
Insects and Springtails	<i>Soyedina calcarea</i>	Karst Forestfly	Highest
Insects and Springtails	<i>Speyeria diana</i>	Diana Fritillary	Highest
Insects and Springtails	<i>Stylurus notatus</i>	Elusive Clubtail	High

Taxa Group	Scientific Name	Common Name	Priority Group
Insects and Springtails	<i>Stylurus scudderii</i>	Zebra Clubtail	Moderate
Insects and Springtails	<i>Telegonus cellus</i>	Gold-banded Skipper	High
Insects and Springtails	<i>Tomocerus missus</i>	A Cave Obligate Springtail	High

APX 3.3g Mammal SGCN by Priority Group

Taxa Group	Scientific Name	Common Name	Priority Group
Mammals	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	High
Mammals	<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Highest
Mammals	<i>Lasionycteris noctivagans</i>	Silver-haired Bat	Data Deficient
Mammals	<i>Lasiurus seminolus</i>	Seminole Bat	Data Deficient
Mammals	<i>Mustela frenata</i>	Long-tailed Weasel	Data Deficient
Mammals	<i>Mustela nivalis</i>	Least Weasel	Data Deficient
Mammals	<i>Myodes gapperi maurus</i>	Kentucky Red-backed Vole	Highest
Mammals	<i>Myotis austroriparius</i>	Southeastern Myotis	High
Mammals	<i>Myotis grisescens</i>	Gray Myotis	High
Mammals	<i>Myotis leibii</i>	Eastern Small-footed Myotis	High
Mammals	<i>Myotis lucifugus</i>	Little Brown Bat	Moderate
Mammals	<i>Myotis septentrionalis</i>	Northern Long-Eared Bat	High
Mammals	<i>Myotis sodalis</i>	Indiana Bat	High
Mammals	<i>Neotoma magister</i>	Allegheny Woodrat	High
Mammals	<i>Ondatra zibethicus</i>	Muskrat	Data Deficient
Mammals	<i>Oryzomys palustris</i>	Marsh Rice Rat	Data Deficient
Mammals	<i>Parascalops breweri</i>	Hairy-tailed Mole	Data Deficient
Mammals	<i>Perimyotis subflavus</i>	Tricolored Bat	Moderate
Mammals	<i>Peromyscus gossypinus</i>	Cotton Mouse	Moderate
Mammals	<i>Peromyscus maniculatus nubiterrae</i>	Cloudland Deer Mouse	High
Mammals	<i>Sorex cinereus</i>	Cinereus Shrew	Moderate
Mammals	<i>Sorex dispar blitchi</i>	Long-tailed Shrew	High
Mammals	<i>Sorex fumeus</i>	Smoky Shrew	Data Deficient
Mammals	<i>Sorex hoyi</i>	Pygmy Shrew	Data Deficient
Mammals	<i>Sorex longirostris</i>	Southeastern Shrew	Data Deficient
Mammals	<i>Spilogale putorius</i>	Eastern Spotted Skunk	High
Mammals	<i>Sylvilagus aquaticus</i>	Swamp Rabbit	Moderate
Mammals	<i>Sylvilagus obscurus</i>	Appalachian Cottontail	Moderate
Mammals	<i>Synaptomys cooperi</i>	Southern Bog Lemming	Data Deficient
Mammals	<i>Taxidea taxus</i>	American Badger	Data Deficient

APX 3.3h Plant SGCN by Priority Group

Taxa Group	Scientific Name	Common Name	Priority Group
Plants	<i>Abdra aprica</i>	Open-ground Whitlow-grass	Plant
Plants	<i>Actaea rubifolia</i>	Appalachian Bugbane	Plant
Plants	<i>Agalinis auriculata</i>	Earleaf False Foxglove	Plant
Plants	<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Plant
Plants	<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Plant
Plants	<i>Apios priceana</i>	Price's Potato-bean	Plant
Plants	<i>Arabis patens</i>	Spreading Rockcress	Plant
Plants	<i>Aureolaria patula</i>	Spreading False Foxglove	Plant
Plants	<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Plant
Plants	<i>Berberis canadensis</i>	American Barberry	Plant
Plants	<i>Borodinia perstellata</i>	Braun's Rockcress	Plant
Plants	<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Plant
Plants	<i>Carex decomposita</i>	Epiphytic Sedge	Plant
Plants	<i>Carex juniperorum</i>	Juniper Sedge	Plant
Plants	<i>Carex roanensis</i>	Roan Mountain Sedge	Plant
Plants	<i>Carex timida</i>	Timid Sedge	Plant
Plants	<i>Clinopodium glabellum</i>	Savory	Plant
Plants	<i>Collinsonia verticillata</i>	Whorled Horse-balm	Plant
Plants	<i>Conradina verticillata</i>	Cumberland Rosemary	Plant
Plants	<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Plant
Plants	<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Plant
Plants	<i>Eriogonum harperi</i>	Harper's Wild Fleabane	Plant
Plants	<i>Eurybia saxicastellii</i>	Rockcastle Aster	Plant
Plants	<i>Fimbristylis perpusilla</i>	Harper's fimbry	Plant
Plants	<i>Glandularia canadensis</i>	Rose Mock-verbain	Plant
Plants	<i>Gratiola quartermanniae</i>	Quartermann's Hedge-hyssop	Plant
Plants	<i>Helianthus eggertii</i>	Eggert's Sunflower	Plant
Plants	<i>Hexastylis contracta</i>	Southern Heartleaf	Plant
Plants	<i>Leavenworthia exigua</i> var. <i>laciniata</i>	Kentucky Gladecress	Plant
Plants	<i>Marshallia pulchra</i>	Barbara's Buttons	Plant
Plants	<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Plant
Plants	<i>Monotropsis odorata</i>	Sweet Pinesap	Plant
Plants	<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Plant
Plants	<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Plant
Plants	<i>Paxistima canbyi</i>	Canby's Mountain-lover	Plant
Plants	<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Plant
Plants	<i>Physaria globosa</i>	Globe Bladderpod	Plant
Plants	<i>Platanthera integrilabia</i>	White Fringeless Orchid	Plant
Plants	<i>Polymnia laevigata</i>	Tennessee Leafcup	Plant
Plants	<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Plant
Plants	<i>Primula frenchii</i>	French's Shooting Star	Plant
Plants	<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Plant
Plants	<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Plant

Taxa Group	Scientific Name	Common Name	Priority Group
Plants	<i>Sabulina fontinalis</i>	Water Stitchwort	Plant
Plants	<i>Schisandra glabra</i>	Bay Starvine	Plant
Plants	<i>Schoenoplectiella hallii</i>	Hall's Bulrush	Plant
Plants	<i>Schwalbea americana</i>	Chaffseed	Plant
Plants	<i>Scutellaria saxatilis</i>	Rock Skullcap	Plant
Plants	<i>Silene ovata</i>	Ovate Catchfly	Plant
Plants	<i>Silene regia</i>	Royal Catchfly	Plant
Plants	<i>Silphium wasiotense</i>	Appalachian Rosinweed	Plant
Plants	<i>Solidago albopilosa</i>	White-haired Goldenrod	Plant
Plants	<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Plant
Plants	<i>Solidago faucibus</i>	Gorge Goldenrod	Plant
Plants	<i>Solidago shortii</i>	Short's Goldenrod	Plant
Plants	<i>Spiraea virginiana</i>	Virginia Spiraea	Plant
Plants	<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Plant
Plants	<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Plant
Plants	<i>Trifolium kentuckiense</i>	Kentucky Clover	Plant
Plants	<i>Trifolium reflexum</i>	Buffalo Clover	Plant
Plants	<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Plant
Plants	<i>Vitis rupestris</i>	Sand Grape	Plant

APX 3.3i Reptile SGCN by Priority Group

Taxa Group	Scientific Name	Common Name	Priority Group
Reptiles	<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	High
Reptiles	<i>Apalone mutica mutica</i>	Midland Smooth Softshell	Data Deficient
Reptiles	<i>Aspidozelis sexlineata</i>	Six-lined Racerunner	Data Deficient
Reptiles	<i>Cemophora coccinea</i>	Scarletsnake	Data Deficient
Reptiles	<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Data Deficient
Reptiles	<i>Clonophis kirtlandii</i>	Kirtland's Snake	Data Deficient
Reptiles	<i>Crotalus horridus</i>	Timber Rattlesnake	Moderate
Reptiles	<i>Farancia abacura reinwardtii</i>	Western Mudsnake	High
Reptiles	<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	High
Reptiles	<i>Graptemys pseudogeographica pseudogeographica</i>	Northern False Map Turtle	Data Deficient
Reptiles	<i>Kinosternon subrubrum</i>	Eastern Mud Turtle	Data Deficient
Reptiles	<i>Lampropeltis elapsoides</i>	Scarlet Kingsnake	Data Deficient
Reptiles	<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Data Deficient
Reptiles	<i>Nerodia cyclopion</i>	Mississippi Green Watersnake	Data Deficient
Reptiles	<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	High
Reptiles	<i>Nerodia fasciata confluens</i>	Broad-banded Watersnake	High
Reptiles	<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard	Data Deficient
Reptiles	<i>Pantherophis guttatus</i>	Red Cornsnake	Data Deficient
Reptiles	<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	Data Deficient
Reptiles	<i>Plestiodon anthracinus</i>	Coal Skink	Data Deficient
Reptiles	<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink	Data Deficient
Reptiles	<i>Sistrurus miliarius streckeri</i>	Western Pygmy Rattlesnake	Data Deficient
Reptiles	<i>Tantilla coronata</i>	Southeastern Crowned Snake	Data Deficient
Reptiles	<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	Data Deficient
Reptiles	<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Data Deficient

CHAPTER 4: SGCN DISTRIBUTION AND HABITATS

The spatial distribution of Species of Greatest Conservation Need (SGCN) in Kentucky at a broad scale is often determined by physiographic region or watershed. While some species have a known or historic range that encompasses the entirety of Kentucky, others are restricted by certain features of geology, climate, or physiography. For aquatic species, distribution is often the result of connectivity between stream systems; both current and ancient. At the local level, SGCN are constrained by the habitats they occupy and the availability of resources. As before, some SGCN can inhabit a variety of habitats, both natural and anthropogenic, while others require a very specific habitat with little tolerance for deviation.

When considering SGCN distribution and habitat needs, it's important to consider changes along not only a spatial scale, but also a temporal scale. While state wildlife action plans are implemented over a 10-year window, species distributions and habitat requirements are established over millennia. Kentucky's physiography and habitat availability are not static. Changes to the landscape and climate have occurred because of a variety of factors, operating at different scales, from glaciation to human development. These changes have impacted, and will continue to impact, distribution and habitat use by Kentucky's SGCN.

Several SGCN exhibit current distributions resulting from prior glaciation events in Kentucky. Distributions of some mammals, including the long-tailed shrew, have likely been impacted by glacial retreat during Pleistocene. With the receding of the Laurentide Ice Sheet, Kentucky climate and vegetation transitioned from Red Spruce/Northern White Cedar forests to Hemlock/Maple forests and ultimately to the Oak/Hickory Forest of present day. It is quite likely that the current distribution of the long-tailed shrew in the highest elevations mountains of Kentucky represents the last refugia for the species along the southern extent of its range.

Many aquatic species distributions have also been impacted by ancient glaciation and stream capture events. Resulting from the North American Glacial Maximum extending into portions of Kentucky, stream capture/piracy events allowed for dispersal of aquatic fauna between watersheds. Such events have been hypothesized as resulting in multiple faunal exchanges between fish taxa of the Kentucky and Upper Cumberland River drainages, including the Kentucky Arrow Darter and Cumberland Arrow Darter. Further links between stream capture events and crayfish distribution have been hypothesized as a possible explanation for the distribution and endemism often observed with many stream dwelling crayfishes.

More recently, anthropogenic impacts to habitat availability have impacted SGCN distributions. Populations of many aquatic species have been isolated or extirpated because of dam construction. Some reptile SGCN, like the Eastern Slender Glass Lizard and Southeastern Five-Lined Skink, have undergone range contractions as warm season grasslands have been displaced by agriculture use and development. Conversely, some SGCN seem to be able to tolerate and utilized anthropogenically altered landscapes, being readily observed in agricultural and developed settings.

Perhaps the starkest examples of anthropogenic impacts can be seen in the urban areas throughout the state. While the city of Louisville, at present, is the most urbanized portion of Kentucky, it once was dominated by large wetland complexes and rolling forests. Development of the land, and the desire to promote better living conditions and reduce disease, led to passage of state legislation to drain many of the wetlands and limit livestock. The Swamp and Swine Act, as it was often referred, allowed for much of the natural habitat in Jefferson County to be converted into its present form. Given the billions of dollars of infrastructure investment, reconversion of urban environments into natural communities is unlikely. However, these areas can play a role in providing habitat for many tolerant SGCN (including the Kirtland's Snake, Peregrine Falcon and MoWild Crayfish) and should not be overlooked when implementing conservation actions.

Kentucky's SGCN occupy a variety of habitats throughout Kentucky's many watersheds and physiographic regions. Focusing conservation actions in areas that contain multiple SGCN facing similar threats is important to considered and prioritized when possible. Further, ecosystem types that have been altered by humans, but still provide some level of utility to SGCN, should be targeted for habitat enhancement. For natural communities and ecosystems that represent the native landscape of pre-settlement Kentucky, protection via land acquisition provides the most pragmatic means to protecting intact SGCN habitat.

Kentucky's Natural Communities

The natural communities in Office of Kentucky Nature Preserve's (OKNP) classification system represent, to the best of our knowledge, the ecological communities that existed in Kentucky prior to European colonization. This classification system excludes anthropogenic communities that have been so intensely altered by humans that they no longer represent a truly natural community, such as mined areas, agricultural fields, tree plantations, wetland

mitigations, and “native grassland” plantings. Native plant assemblages are the foundation for this classification system, with additional influence from abiotic factors such as geography, geology, and hydrology, resulting in numerous narrowly defined natural communities.

While the SWAP guilds (as described below) also describe discrete ecological units, they are generally broader habitat categories and encompass both natural communities and highly disturbed anthropogenic communities. Therefore, a single SWAP guild may correspond to multiple natural community types and include anthropogenic communities that are not recognized or classified by OKNP. Appendix 4.1 provides a list of all natural communities that are currently recognized by OKNP, with their conservation ranks and the equivalent SWAP habitat guild.

The natural communities classified by OKNP are the product of decades of scientific collaboration by state and federal government, academia, and non-profit conservation organizations in Kentucky and the region. The Kentucky State Nature Preserves Commission (now OKNP) was established in 1976, and in the 1980s the state’s Natural Areas Inventory was initiated for the purpose of identifying sites to protect as State Nature Preserves.

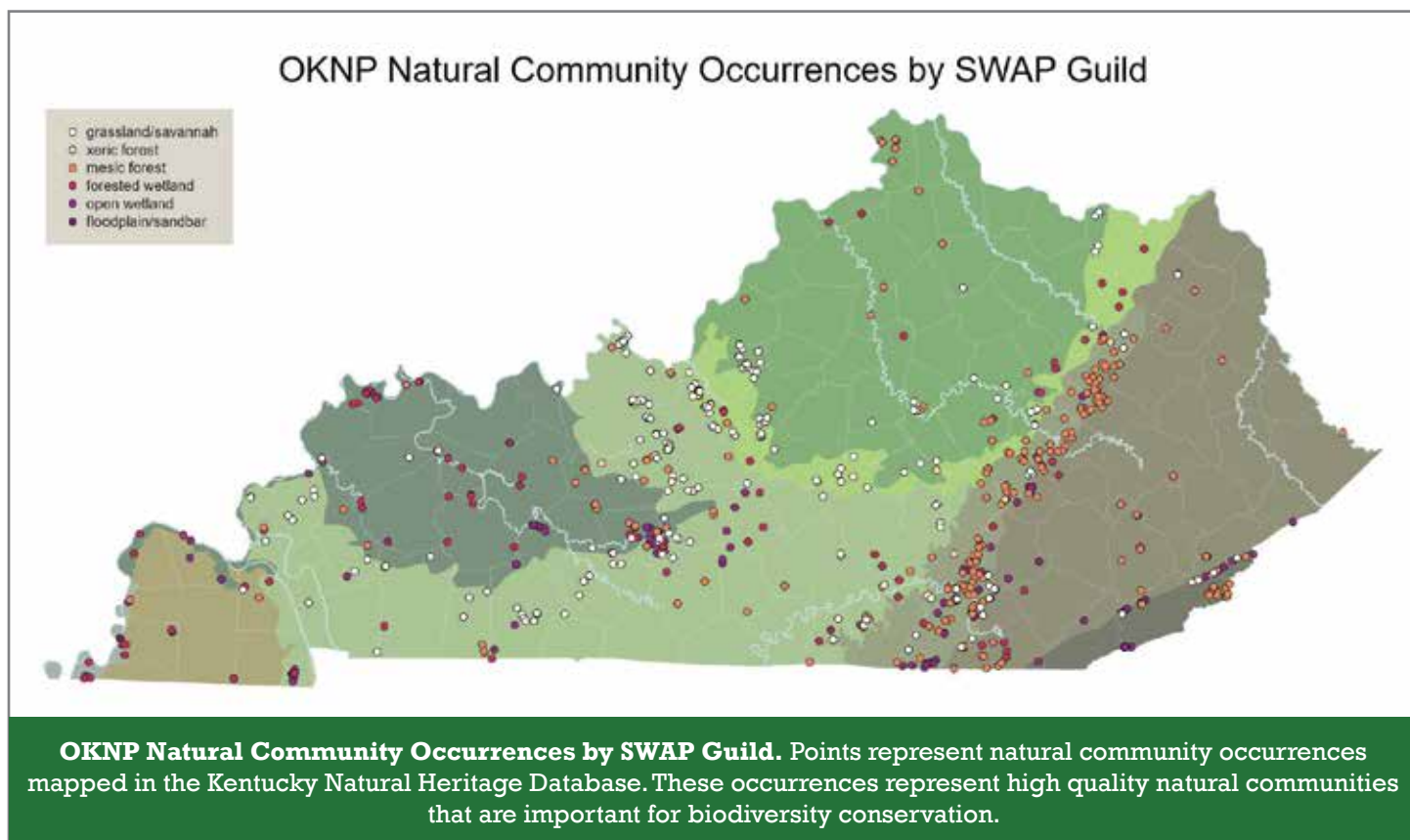
The process of identifying, surveying, and preserving natural areas created a need for common language about Kentucky’s ecosystems. OKNP ecologists drafted a working community classification for Kentucky using a variety of quantitative and qualitative data, similar to efforts in neighboring states. That classification has been routinely edited and amended over the years, and was

recently linked to NatureServe’s International Vegetation Classification, the most widely accepted international standard for natural community classification.

Development of the natural community classification also established conservation statuses of natural communities to distinguish those of highest conservation concern. All occurrences of rare natural communities are tracked, as well as high quality occurrences for all other natural community types, such as exceptional examples of old growth forests. OKNP currently recognize 80 natural communities in Kentucky. Of these, 36 are globally ranked as G1 or G2, equivalent to Critically Imperiled (5 or fewer known occurrences) and Imperiled (6 to 20 known occurrences). At the state level, 50 community types are listed as S1 and S2, equivalent to state endangered or threatened.

Natural communities fall into several major categories that are defined by dominant vegetation cover. Forests have closed or nearly closed tree canopy, while woodlands and savannahs have a partially open canopy with a dense herbaceous ground layer. Shrublands have little to no tree cover and a dominance of shrubs. Grasslands are open herbaceous communities with few trees. Cliffs are defined by their vertical rock substrate, and rockhouses are concave recessions in sandstone cliffs, and both have an herb-dominated ground layer.

Aside from dominant cover, differences in soil moisture, geology, hydrology, geography, and disturbance regimes are other important factors in community classification. In uplands, soil moisture categories include mesic (moist), sub-



xeric (semi-dry), or xeric (dry). Wetland soils are hydric, the degree to which varies depending on duration of inundation by water, but some fragipan soils are called xero-hydric for their tendency to be saturated for part of the year and dry for part of the year. Additionally, soil pH is an important classifier and is usually determined by the underlying geology.

Kentucky's waterways form endless miles of valleys and gorges as well as complex floodplains of wetlands. The dissected landscapes formed by down-cutting of streams and rivers create a matrix of habitats depending on type of slope and aspect. Stream flooding varies in timing, duration, and intensity, leading to a large spectrum of landforms such as sand bars, stream terraces, and depressional features called sloughs or oxbows. The extensive karst areas of the state have given rise to sinkhole ponds and depression marshes. Besides flooding and inundation, other disturbance factors that can shape maintain natural communities include drought, severe weather events, wildfire, and grazing.

In contrast, other natural communities depend on habitat stability. Mesophytic forests are characterized by large trees and an accumulation of woody debris that results in build-up of organic soil over long time intervals. These forests support many species intolerant of disturbance, such as salamanders, soil invertebrates, long-lived herbaceous perennials, and non-vascular plants that require moist and shady conditions.

Delineating SGCN Ranges in Kentucky

Upon conclusion of the selection process, species distribution/range files were delineated and georeferenced for every SGCN, if possible. For some data deficient SGCN, range files could not be generated.

Data made available via in-house databases and partner data (primarily from OKNP) were provided to SWAP Taxa Teams to assist in generating range files based on reviewed and verified species occurrence reports.

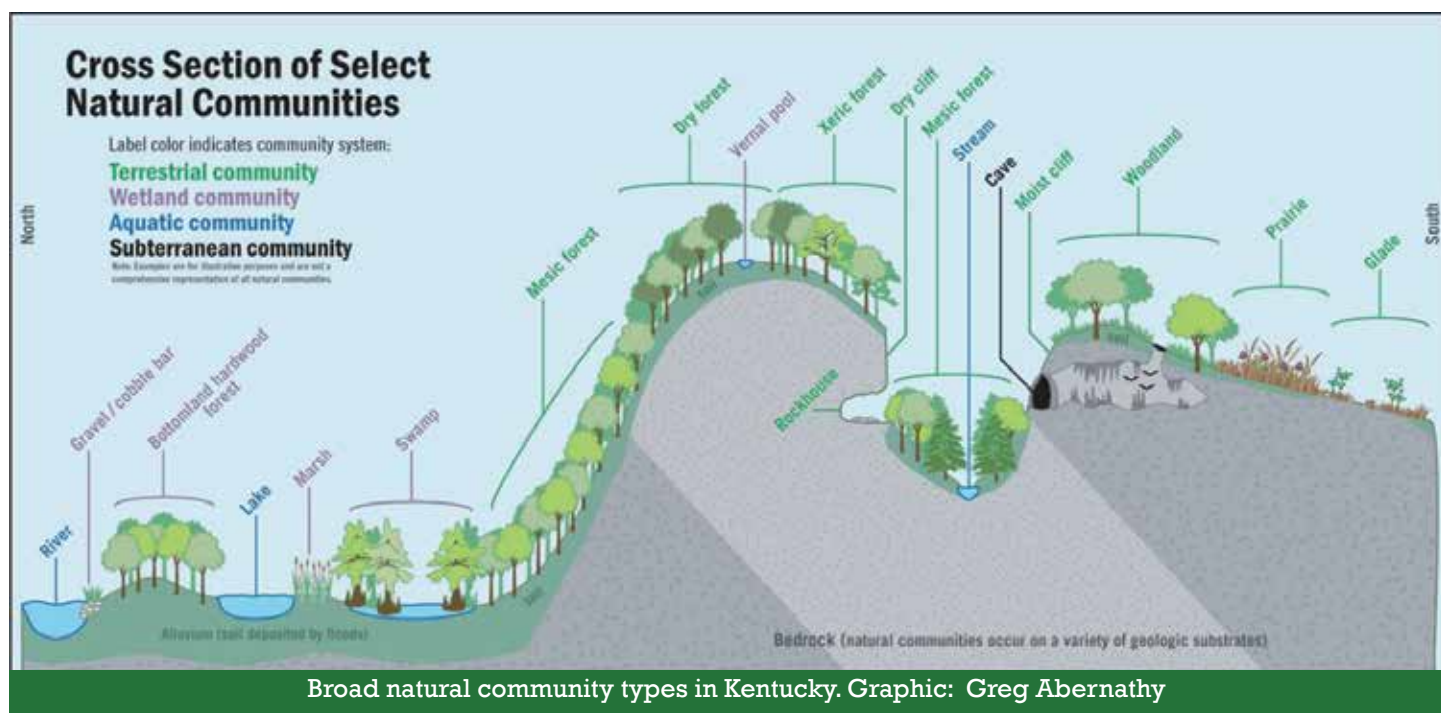
Given the unevenly distributed sampling efforts across taxa and across the state, species ranges may include areas where a species hasn't been reported but their presence is considered likely, as determined by the Taxa Teams. Taxa Team members were also provided the latitude to further refine species ranges by delineating migrating/breed/transient ranges or historic and current ranges for species exhibiting recent range contractions.

For aquatic species that utilize lotic habitats, watersheds (at the 12-digit, 10-digit, or 8-digit HUC) were often used to determine range boundaries. For terrestrial species, or lentic species, range boundaries were often tied to county or physiographic boundaries. The resulting range files for each SGCN are presented in the corresponding species profile sheets in Chapter 3.

Taxa Teams were tasked with comparing the distributions of SGCN within the nine physiographic regions described in Chapter 2. For lentic species, distributional data was compiled and reported by the Taxa Teams at the HUC-8 watershed level. Assuming data were available to provide a reliable result, Taxa Teams chose the physiographic regions or watersheds that could be expected to contain (or contained in the past) populations of each SGCN.

Categorizing SGCN Habitats

Species habitat can be segmented using a variety of classes (eg. terrestrial or aquatic, natural or anthropogenic, etc.). Often, any attempt to classify habitat types result in



Broad natural community types in Kentucky. Graphic: Greg Abernathy

identifying areas where lines are blurred or classes overlap. For example, wetlands are often utilized by both terrestrial (salamanders and birds) and aquatic (fishes and crayfishes) species and have been considered both terrestrial and aquatic habitats. In reality, habitats should be considered to occur on temporal and spatial continua rather than being composed of discrete and unchanging types. Habitat preferences were determined by the Taxa Teams for each SGCN. For lotic species, where preferred/utilized stream type(s) could be identified, Taxa Teams were provided with a set of 30 stream types (see table) for selection. Nomenclature for stream types were provided by the U.S. Stream Classification Dataset. Multiple stream types could be chosen based on their potential for use by SGCN. For terrestrial, semi-aquatic, or lentic species, habitats were characterized into 14 habitat guilds (see table). Multiple guilds could be chosen based on their potential for use by SGCN. Habitat guilds were compiled and consolidated from the OKNP natural communities list and the GAP/LANDFIRE National Terrestrial Ecosystems list.

Habitat Use and SGCN Occurrence Modeling

Utilizing the habitat guilds as detailed above to describe habitat use by SGCN, in general, is helpful to convey broad habitat types utilized by SGCN. However, such a broad categorization does not allow for further geospatial analysis as the guilds often do not reflect the specific habitat requirements of many species.

To further refine the habitat needs of SGCN, the GAP/LANDFIRE National Terrestrial Ecosystems dataset for Kentucky was utilized to model habitats for terrestrial and lentic SGCN that were not considered data deficient. Plants and terrestrial insects were excluded from the model based on the lack of data available. Each of the 38 ecosystem types reported from Kentucky were analyzed for their potential use and were categorized as being

Preferred, Suitable, Marginal, Unsuitable, or Not in Range for 128 SGCN. The 38 ecosystem types mapped in Kentucky were cross-walked to the most suitable habitat guild. Maps presented in Appendix 4.2 provide further information on habitat availability and distribution across physiographic region.

Distribution of SGCN across Physiographic Region

According to the data provided by the Taxa Teams, the Interior Plateau Physiographic Region contains the highest number of SGCN, representing 67% of the total SGCN listed as a part of this plan. The highest number of plant SGCN were reported from the Cumberland Plateau. If freshwater mussels and snails, fishes, and crayfishes are excluded from the analysis, a more even distribution of (terrestrial) SGCN is observed with all Physiographic Regions containing between 19% and 37% of SGCN. A summary of physiographic regions by taxonomic group is found below. Appendix 4.3 provides a summary of Habitat Type and Range for each SGCN by Taxa.

Distribution of SGCN across Watersheds

According to the data provided by the Taxa Teams, the Upper Green River watershed contains the highest number of aquatic SGCN, representing 70 total SGCN listed as a part of this plan. Other watersheds with a significant number of aquatic SGCN include the Barren, Lower Cumberland, Licking, and South Fork Cumberland watersheds. A summary of watersheds by taxonomic group is found below. Data on stream habitat types utilized the Stream Classification Framework for the SARP Region. Appendix 4.3 provides a summary of Habitat Type and Range for each SGCN by Taxa, with watersheds represented at the HUC-8 level.

Physiographic Region	Amphibians	Birds	Crustaceans	Fishes and Lampreys	Freshwater Mussels and Snails	Insects and Springtails	Mammals	Plants	Reptiles	Grand Total	Percent of all SGCN
Interior Plateau	16	79	28	46	81	35	23	23	20	351	67%
Interior River Valley And Hills	12	77	18	37	54	13	22	6	18	257	49%
Plateau Escarpment	12	65	12	28	47	20	21	26	10	241	46%
Bluegrass	9	77	12	19	59	20	19	13	9	237	45%
Cumberland Plateau	13	60	15	27	37	22	25	9	7	215	41%
Mississippi Valley Loess Plain	9	69	7	30	26	13	15	4	12	185	35%
Knobs	10	63	11	17	32	17	21	3	7	181	34%
Mississippi Alluvial Plain	8	71	5	29	9	5	10	3	13	153	29%
Cumberland Mountains	9	39	6	3	9	18	24	6	4	118	22%

8-Digit HUC Watershed	Amphibians	Crustaceans	Fishes	Freshwater Mussels and Snails	Grand Total
Upper Green	1	11	13	45	70
Barren	1	8	9	35	53
Lower Cumberland	1	6	11	32	50
Licking	1	3	9	37	50
Lower Tennessee	1	0	14	34	49
South Fork Cumberland	1	5	12	28	46
Upper Cumberland-Lake Cumberland	1	7	9	27	44
Lower Ohio	1	3	19	20	43
Lower Mississippi-Memphis	1	2	20	20	43
Middle Green	1	7	8	22	38
Lower Ohio-Bay	1	4	11	21	37
Lower Kentucky	1	6	7	22	36
Rockcastle	1	3	5	27	36
Red	0	5	7	24	36
Ohio Brush-Whiteoak	1	2	14	19	36
Rough	2	7	4	21	34
Rolling Fork	1	5	3	24	33
Obion	1	2	22	7	32
Kentucky Lake	1	3	12	16	32
Blue-Sinking	1	4	6	20	31
Upper Cumberland	1	7	4	18	30
Salt	1	5	2	21	29
Bayou De Chien-Mayfield	1	2	13	12	28
Little Scioto-Tygarts	1	2	7	18	28
Lower Ohio-Little Pigeon	1	3	7	17	28
Middle Ohio-Laughery	1	1	5	20	27
Highland-Pigeon	1	1	6	18	26
Silver-Little Kentucky	1	2	7	16	26
Upper Kentucky	1	5	4	15	25
South Fork Licking	1	2	2	19	24
Lower Green	1	5	4	14	24
South Fork Kentucky	1	4	4	14	23
Middle Fork Kentucky	1	3	4	12	20
Little Sandy	1	1	8	9	19
North Fork Kentucky	0	3	6	10	19
Tradewater	1	3	5	8	17
Obey	1	5	1	8	15
Pond	1	4	3	7	15
Lower Levisa	1	2	5	6	14
Upper Mississippi-Cape Girardeau	0	0	0	12	12
Tug	1	3	1	5	10
Upper Levisa	1	3	2	3	9
Powell	1	1	0	6	8
Raccoon-Symmes	1	0	0	6	7
Big Sandy	1	1	1	4	7
Unknown	0	0	1	3	4
Saline	0	0	0	4	4
Upper Cumberland	0	1	1	0	2
Middle Kentucky	0	1	0	0	1
Lower Cumberland	0	0	1	0	1

Distribution of SGCN across Habitat Guilds and Ecosystems

According to the data provided by the Taxa Teams, SGCN associations with designated habitat guilds is fairly balanced among multiple habitats. The Grassland/Savannah guild was associated with 101 (~19%) of all SGCN, followed closely by Mesic Forest (~17%), and Open Wetland (~16%). The highest number of plant SGCN were reported from the Cumberland Plateau. If freshwater mussels and snails, fishes, and crayfishes are excluded from the analysis, a more even distribution of (terrestrial) SGCN is observed with all Physiographic Regions containing between 19% and 37% of SGCN. A summary of physiographic regions by taxonomic group is found below. Amphibian SGCN were often associated with Mesic Forest and wetland habitats while the highest number of plant SGCN were reported from the Grassland/Savannah habitat guild. A summary of habitat guilds by taxonomic group is found below.

Ecosystem habitat preferences were assigned for terrestrial and lentic SGCN. Overall, highly altered

anthropogenic ecosystems (i.e. Quarries/Mines/Gravel Pits/Oils Wells, Developed High Intensity, and Undifferentiated Barren Land) were most often categorized as being unsuitable for most SGCN. The South Central Interior Mesophytic Forest was most often categorized as being Preferred or Suitable SGCN habitat, being designated as such for 42% of the modeled species. Other ecosystem types that were considered Preferred or Suitable habitat for many of the modeled SGCN included the South Central Low Plateau Dry Mesic Oak Forest, South Central Interior Small Stream and Riparian, Mississippi River Low Floodplain Bottomland Forest, and Mississippi River Riparian Forest. Agriculture lands, including Cultivated Cropland, Pasture/Hay, and Evergreen Plantations were often listed as marginal habitat, indicating that proper land management techniques are viable for improving SGCN habitat in agricultural settings. Similarly, Developed Low Intensity and Developed Open Space were often categorized as Suitable or Marginal habitat for SGCN. This indicates that management of suburban and rural lands for SGCN should be considered. A table of species evaluated and their categorization by ecosystem type is provided below.

Habitat Guild	Amphibians	Birds	Crustaceans	Fishes and Lampreys	Freshwater Mussels and Snails	Insects and Springtails	Mammals	Plants	Reptiles	Grand Total	Percent of all SGCN
Grassland/Savannah	6	30	6	0	0	17	7	27	8	101	19%
Mesic Forest	17	16	2	0	0	6	25	17	8	91	17%
Open Wetland	7	30	7	10	0	3	8	6	12	83	16%
River/Streams	9	32	5	6	0	1	2	8	13	76	14%
Forested Wetland	12	16	9	2	0	3	15	4	13	74	14%
Xeric Forest	13	17	0	0	0	5	9	17	12	73	14%
Lake/Pond	12	34	3	10	0	1	1	2	9	72	14%
Ag	7	35	6	0	0	1	4	0	10	63	12%
Floodplain/Sandbar	3	34	2	0	0	1	4	2	9	55	10%
Scrub-Shrub/Early Successional Forest	12	17	0	0	0	5	7	5	3	49	9%
Cave/Karst	5	0	7	2	1	19	11	0	1	46	9%
Cliff/Rockshelter	6	2	1	0	0	0	11	9	2	31	6%
Suburban	7	11	3	0	0	1	1	0	3	26	5%
Urban	0	2	0	0	0	1	1	0	1	5	1%

Ecosystem Type	Preferred	Suitable	Marginal	Unsuitable	Not in Range
Allegheny Cumberland Dry Oak Forest and Woodland Hardwood	5% (7)	22% (28)	14% (18)	55% (71)	3% (4)
Appalachian Hemlock Hardwood Forest	2% (2)	17% (22)	9% (12)	65% (83)	7% (9)
Central Interior Acidic Cliff and Talus	0% (0)	7% (9)	3% (4)	88% (112)	2% (3)
Central Interior Calcareous Cliff and Talus	0% (0)	9% (11)	6% (8)	82% (105)	3% (4)
Cultivated Cropland	0% (0)	9% (11)	39% (50)	52% (67)	0% (0)
Deciduous Plantations	0% (0)	0% (0)	12% (15)	88% (112)	1% (1)
Developed High Intensity	0% (0)	2% (2)	3% (4)	95% (122)	0% (0)
Developed Low Intensity	0% (0)	6% (8)	64% (82)	30% (38)	0% (0)
Developed Medium Intensity	0% (0)	5% (6)	28% (36)	67% (86)	0% (0)

Ecosystem Type	Preferred	Suitable	Marginal	Unsuitable	Not in Range
Developed Open Space	2% (2)	21% (27)	63% (81)	14% (18)	0% (0)
East Gulf Coastal Plain Jackson Plain Dry Flatwoods Open Understory Modifier	2% (2)	13% (16)	17% (22)	55% (71)	13% (17)
East Gulf Coastal Plain Large River Floodplain Forest Forest Modifier	4% (5)	16% (20)	20% (25)	48% (61)	13% (17)
East Gulf Coastal Plain Northern Loess Bluff Forest	0% (0)	5% (6)	9% (11)	70% (90)	16% (21)
East Gulf Coastal Plain Northern Loess Plain Oak Hickory Upland Hardwood Modifier	2 (3)	5% (6)	19% (24)	60% (78)	13% (17)
East Gulf Coastal Plain Northern Loess Plain Oak Hickory Upland Juniper Modifier	0% (0)	5% (6)	20% (26)	63% (80)	13% (16)
East Gulf Coastal Plain Northern Mesic Hardwood Forest	1% (1)	9% (12)	16% (21)	59% (75)	15% (19)
East Gulf Coastal Plain Small Stream and River Floodplain Forest	3 (4)	14% (18)	23% (30)	46% (59)	13% (17)
Evergreen Plantation or Managed Pine	0% (0)	5% (6)	31% (40)	64% (82)	0% (0)
Harvested Forest Grass Forb Regeneration	4% (5)	12% (15)	24% (30)	61% (78)	0% (0)
Harvested Forest Shrub Regeneration	0% (0)	4% (4)	26% (33)	71% (91)	0% (0)
Mississippi River Low Floodplain Bottomland Forest	9% (12)	19% (24)	30% (38)	27% (34)	16% (20)
Mississippi River Riparian Forest	9% (12)	19% (24)	30% (38)	27% (34)	16% (20)
Northern Atlantic Coastal Plain Dry Hardwood Forest	0% (0)	5% (7)	22% (28)	66% (85)	7% (8)
Open Water Fresh	7% (9)	25% (32)	5% (6)	63% (81)	0% (0)
Pasture Hay	7% (9)	10% (13)	25% (32)	58% (74)	0% (0)
Quarries Mines Gravel Pits and Oil Wells	0% (0)	2% (2)	8% (10)	90% (115)	1% (1)
South Central Interior Large Floodplain Forest Modifier	13% (16)	18% (23)	26% (33)	42% (54)	2% (2)

Assessing Habitat Condition

Data on habitat condition is lacking in Kentucky. Some natural terrestrial plant communities are monitored by OKNP (as described below). But, due to a lack of funding, data on habitat condition isn't available for most terrestrial systems. Utilizing data on Kentucky's Pre-Settlement Landcover compared to Existing Landcover (see Appendix 2.1), habitat availability can be approximated and conversion percentages can be calculated (Appendix 4.4). While Kentucky's Forests have been converted (most frequently) to agriculture, over 65% of Pre-settlement forested areas are still categorized as forest habitat.

Grassland and wetland habitats in Kentucky have been significantly impacted via conversion to agriculture and development, resulting in less than 1% and 13%, respectively, of their Pre-settlement habitats still available. However, it should be noted that in most of these areas, habitat quality has deteriorated from their pre-settlement condition. The loss of the American Chestnut, and impacts from invasive species and pathogens (i.e. hemlock wholly adelgid, emerald ash borer, southern pine beetle, Dutch elm disease, butternut canker, etc.) have significantly altered the composition and quality of forested habitat in Kentucky. Likewise, the conversion of warm-season grasslands to cool-season grasslands (primarily fescue)

has had far-ranging impacts to a significant number of SGCN. While these impacts are often articulated anecdotally, the extent of habitat degradation has not been fully quantified.

Aquatic habitat condition data is more abundant as a result of stream assessments conducted by the Kentucky Division of Water and reported in Kentucky's 2022 Integrated Report. These data, provide insight into a stream segment's suitability as warm water aquatic habitat or cold water aquatic habitat and includes assessments of 13,139.4 river miles and 212,585 lake acres. 41% of the assessed rivers and streams were categorized as fully supporting warm water aquatic habitat (n=2,537 assessment units) while 83% of the assessed rivers and streams were categorized as fully supporting cold water aquatic habitat (n=92). Of the 2,954 assessment units on the 2022 305(b) list, 1,979 assessment units are impaired for at least one designated use. Additional information on the condition of Kentucky's aquatic habitats is available via the Kentucky Division of Water Integrated Report Hub (Integrated Report Hub Site (arcgis.com)). Appendix 2.4 provides an interesting comparison of water travel time in Kentucky with and without impoundments, highlighting areas of the state where watershed systems remain relatively intact as well as those that have been most severely impacted by natural system modification.

Natural Communities as Habitat for Rare Species

The OKNP natural community classification is designed to highlight important community remnants that should be targeted for conservation and biodiversity protection. Natural communities are defined on the basis of dominant cover of plants in vertical strata, geographic location, specific landscape attributes and associated characteristic plants. These plant communities themselves can be important conservation targets, however, they also represent critical habitats for many rare animal and plant species, including many SGCN.

The wildflower royal catchfly (*Silene regia*), for example, requires tallgrass prairie to thrive, whereas Braun's rockcress (*Borodinia perstellata*) only occurs in calcareous mesophytic forests of the Inner Bluegrass region. In Kentucky, the frosted elfin butterfly (*Callophrys irus*) is only found in Cumberland Mountains pitch pine barrens and the red-cockaded woodpeckers (*Leuconotopicus borealis*) disappeared from this state with the decline of its critical habitat, Cumberland Plateau shortleaf pine savannah. The Black Mountain salamander (*Desmognathus welteri*) thrives in cool headwater streams in Appalachian mesophytic forests, while copper bellied water snakes (*Nerodia erythrogaster neglecta*) require bottomland hardwood forest or bald cypress tupelo swamp. Because many rare species are tightly associated

with specific natural communities and community integrity is essential for conservation of rare species, conservation of natural communities is species conservation. The key to protection of many rare plants and animals is the protection of these biologically diverse habitat remnants.

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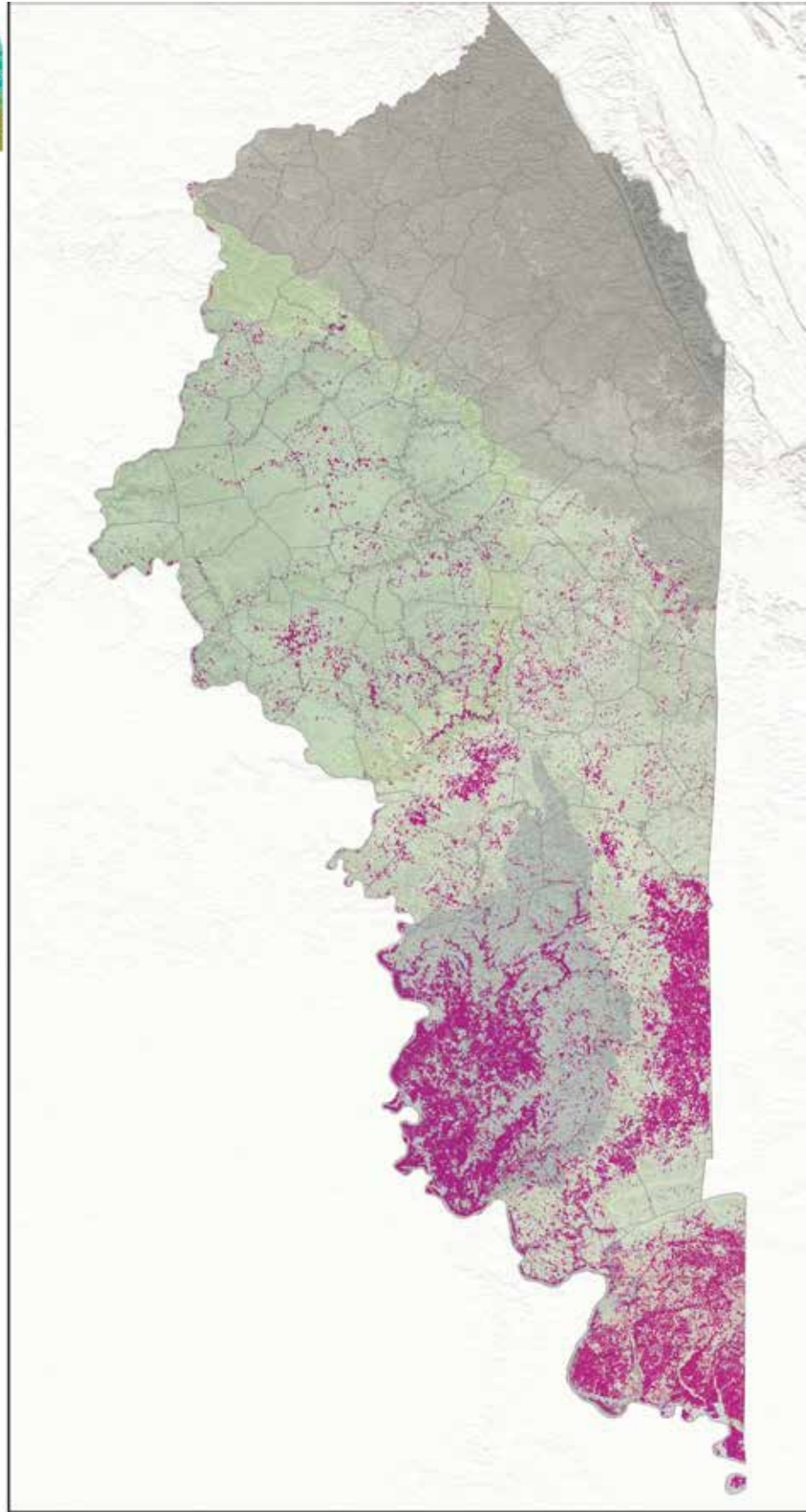
Thomas, Matthew R., et al. "Species-Level Recognition and Redescription of the Kentucky Arrow Darter, *Etheostoma spilotum* Gilbert (Percidae: Ictocara)." *Bulletin of the Peabody Museum of Natural History* 64.1 (2023): 39-80.

APX 4.1 Crosswalk of Natural Communities in SWAP

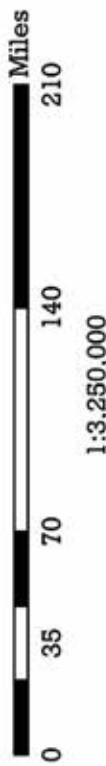
Community Common Name	OKNP Guild	SWAP Habitat Guild	State Protection Status	SRANK	GRANK
Acidic mesophytic forest	mesic and sub-xeric forest	mesic forest	N	S5	GNR
Acidic sub-xeric forest	mesic and sub-xeric forest	mesic forest	N	S5	GNR
Acidic Xeric forest/woodland	dry forest	xeric forest	N	S5	GNR
Appalachian mesophytic forest	mesic and sub-xeric forest	mesic forest	N	S4S5	GNR
Appalachian Northern White-cedar Cliff Woodland	dry forest	xeric forest	E	S1	G2G3
Appalachian sub-xeric forest	mesic and sub-xeric forest	mesic forest	N	S5	GNR
Bald-cypress - Water tupelo forest	forested wetland	forested wetland	E	S1	G3G5
Bluegrass Cat Prairie	edaphically controlled grassland	grassland/savannah	E	S1	G1Q
Bluegrass mesophytic cane forest	mesic and sub-xeric forest	mesic forest	E	S1	G1
Bluegrass rocky ledge	edaphically controlled grassland	grassland/savannah	E	S2	G2
Bluegrass savanna	fire dependent grasslands	grassland/savannah	E	S1	G1
Bluegrass sinkhole swamp forest	forested wetland	forested wetland	E	S1	G1G2
Bottomland hardwood forest	forested wetland	forested wetland	S	S3	GNR
Bottomland lake	seeps/marshes/wet meadows	open wetland	S	S2S3	GNR
Bottomland marsh	seeps/marshes/wet meadows	open wetland	T	S1S2	GNR
Bottomland ridge/terrace forest	forested wetland	forested wetland	E	S1	G2
Buttonbush shrub swamp	seeps/marshes/wet meadows	open wetland	S	S2S3	G3?
Calcareous mesophytic forest	mesic and sub-xeric forest	mesic forest	N	S5	GNR
Calcareous seep	seeps/marshes/wet meadows	open wetland	E	S1	G1
Calcareous sub-xeric forest	mesic and sub-xeric forest	mesic forest	N	S5	GNR
Coastal Plain forested acid seep	seeps/marshes/wet meadows	open wetland	E	S1	G2G3
Coastal PLain Loess Bluff Forest	mesic and sub-xeric forest	mesic forest	E	S2	G2G3
Cumberland Highlands Mesophytic Forest	mesic and sub-xeric forest	mesic forest	E	S1	G2G3
Cumberland Mountains acid bog	seeps/marshes/wet meadows	open wetland	E	S2	G2
Cumberland Mountains headwater seep	seeps/marshes/wet meadows	open wetland	E	S2	G1
Cumberland Mountains pitch pine barrens	fire dependent grasslands	grassland/savannah	E	S1	G2?
Cumberland Mountains xeric pine outcrop	edaphically controlled grassland	grassland/savannah	S	S3	G2G3
Cumberland Plateau Clifftop Sandstone Barren	fire dependent grasslands	grassland/savannah	E	S1	G3
Cumberland Plateau forested acid seep	seeps/marshes/wet meadows	open wetland	T	S1S2	G3?
Cumberland Plateau Heath Shrubland	fire dependent grasslands	grassland/savannah	S	S2S3	G3
Cumberland Plateau Riverscours prairie	river prairie	open wetland	E	S1S2	G2?
Cumberland Plateau shortleaf pine savanna	fire dependent grasslands	grassland/savannah	E	S1	G2
Cumberland Plateau shortleaf pine-oak forest	mesic and sub-xeric forest	mesic forest	T	S3?	G3G4
Cumberland Plateau upland depression marsh	seeps/marshes/wet meadows	open wetland	E	S2?	G3?
Cumberland Plateau wet flatwoods	flatwoods	forested wetland	E	S3S4	G3
Cumberland Plateau wet rockhouse	seeps/marshes/wet meadows	open wetland	T	S3	G2
Cumberland River Limestone Cliff Seep	seeps/marshes/wet meadows	open wetland	T	S3	G2G3
Cumberland Sandstone Flatrock Glade	edaphically controlled grassland	grassland/savannah	T	S1S2	G2G3
Dry limestone cliff/outcrop	dry forest	xeric forest	N	S5	GNR
Dry sandstone cliff/outcrop/rockhouse	edaphically controlled grassland	grassland/savannah	N	S5	GNR
Eastern Highland Rim xerohydric flatwoods	flatwoods	grassland/savannah	E	S2	G1?
Eastern Highland Rim xerohydric meadow	fire dependent grasslands	grassland/savannah	E	S1	GNR
Eastern knobs rocky ledge	edaphically controlled grassland	grassland/savannah	T	S2	G2
Gravel/cobble bar	river prairie	open wetland	N	S5	GNR
Hemlock yellow-birch forest	mesic and sub-xeric forest	mesic forest	E	S1	G3
Hemlock-mixed forest	mesic and sub-xeric forest	mesic forest	N	S4S5	GNR
Interior Low Plateau acid seep	seeps/marshes/wet meadows	open wetland	T	S2	G2G3
Interior Low Plateau post oak barrens	fire dependent grasslands	grassland/savannah	T	S2	G2G3
Kentucky Knobs shale barrens	fire dependent grasslands	grassland/savannah	T	S2S3	G2?
Kentucky Knobs siltstone barrens	fire dependent grasslands	grassland/savannah	T	S2	G2?
Limestone flatrock glade	edaphically controlled grassland	grassland/savannah	E	S1	G3

Community Common Name	OKNP Guild	SWAP Habitat Guild	State Protection Status	SRANK	GRANK
Limestone Slope Glade	edaphically controlled grassland	grassland/savannah	E	S1	G2G3
Limestone/dolomite prairie	fire dependent grasslands	grassland/savannah	E	S1	G2G3
Mesic - wet limestone cliff/outcrop	seeps/marshes/wet meadows	open wetland	N	S5	GNR
Mesic - wet sandstone cliff/outcrop/rockhouse	seeps/marshes/wet meadows	open wetland	N	S5	GNR
Mud flat	mud flat	floodplain/sandbar	N	S5	GNR
Outer bluegrass dolomite glade	edaphically controlled grassland	grassland/savannah	E	S1	G1Q
Riparian forest	forested wetland	forested wetland	N	S5	GNR
Sand bar	sand bar	floodplain/sandbar	S	S3?	GNR
Sandstone barrens	fire dependent grasslands	grassland/savannah	E	S1	G2G3
Sandstone prairie	fire dependent grasslands	grassland/savannah	E	S1	GNR
Shale glade	edaphically controlled grassland	grassland/savannah	S	S2S3	G2
Shawnee Hills sandstone glade	edaphically controlled grassland	grassland/savannah	T	S1S2	G3?
Sinkhole/depression marsh	seeps/marshes/wet meadows	open wetland	E	S1S2	G3G4
Small stream scour forest	forested wetland	forested wetland	N	S4	GNR
Tallgrass prairie	fire dependent grasslands	grassland/savannah	E	S1	G1G2
Western Kentucky Cordgrass prairie	seeps/marshes/wet meadows	open wetland	E	S1	G1Q
Western Kentucky xerohydric flatwoods	flatwoods	grassland/savannah	E	S1	G2G3
Wet depression hardwood forest	forested wetland	forested wetland	T	S2	G3G4
Wet flatwoods	flatwoods	forested wetland	E	S3S4	G3G4Q
White pine - mixed forest	mesic and sub-xeric forest	mesic forest	S	S3	G4
xeric red-cedar oak forest/woodland	dry forest	xeric forest	N	S5	GNR

Habitat Guild: Agricultural

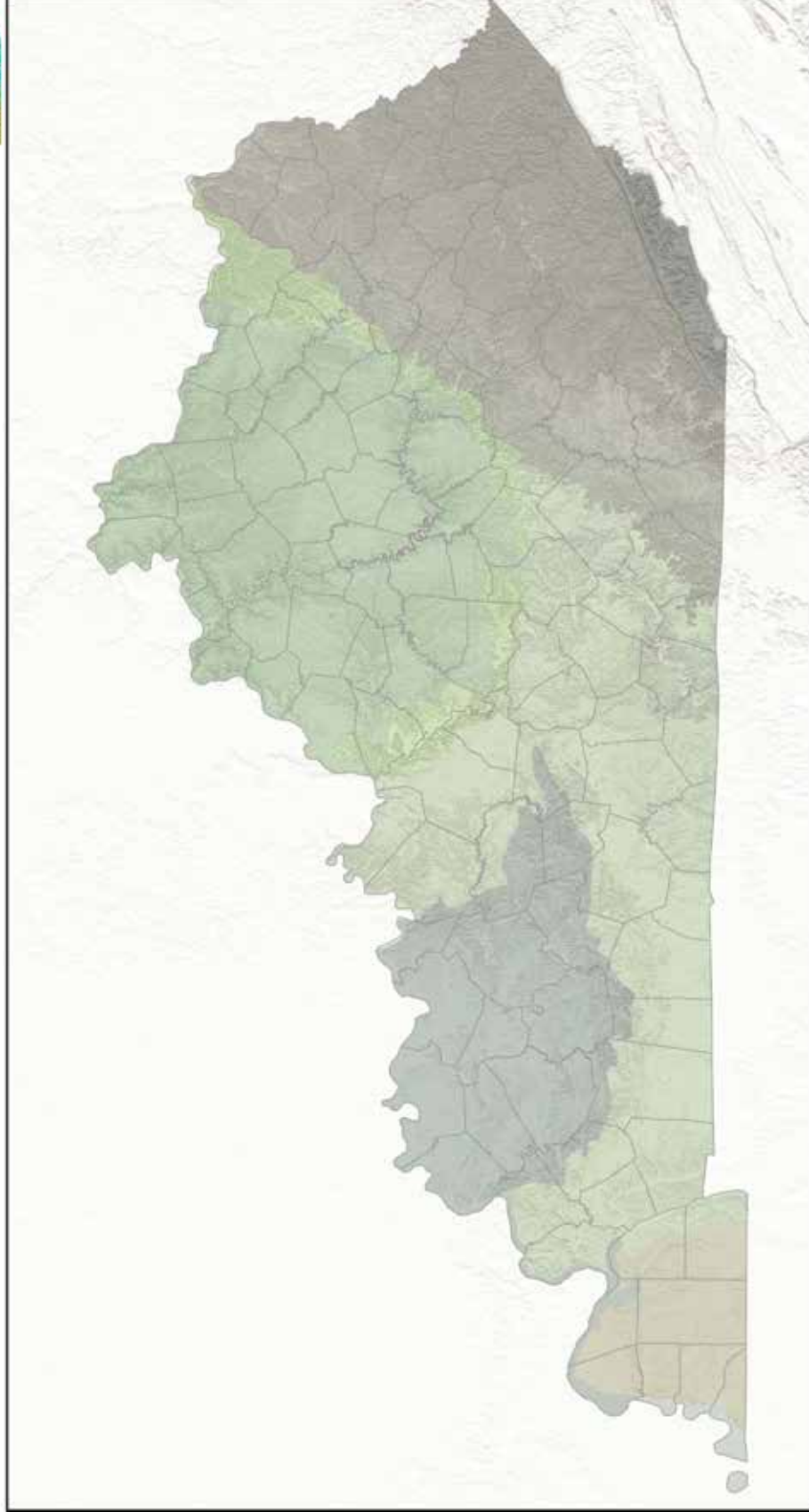


- Terrestrial Guild**
- Agriculture
- Physiographic Regions**
- Bluegrass
 - Cumberland mountains
 - Cumberland plateau
 - Interior plateau
 - Interior river valley and hills
 - Knoxs
 - Mississippi alluvial plain
 - Mississippi valley loess plains
 - Plateau escarpment
 - County Boundary Lines

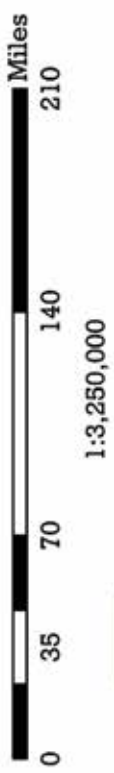


Map prepared by GIS staff at KDFWR in partnership with OKSP and TNC. Service Layers courtesy of KyFromAbove, Esri, USGS.

Habitat Guild: Cliff/Rockshelter

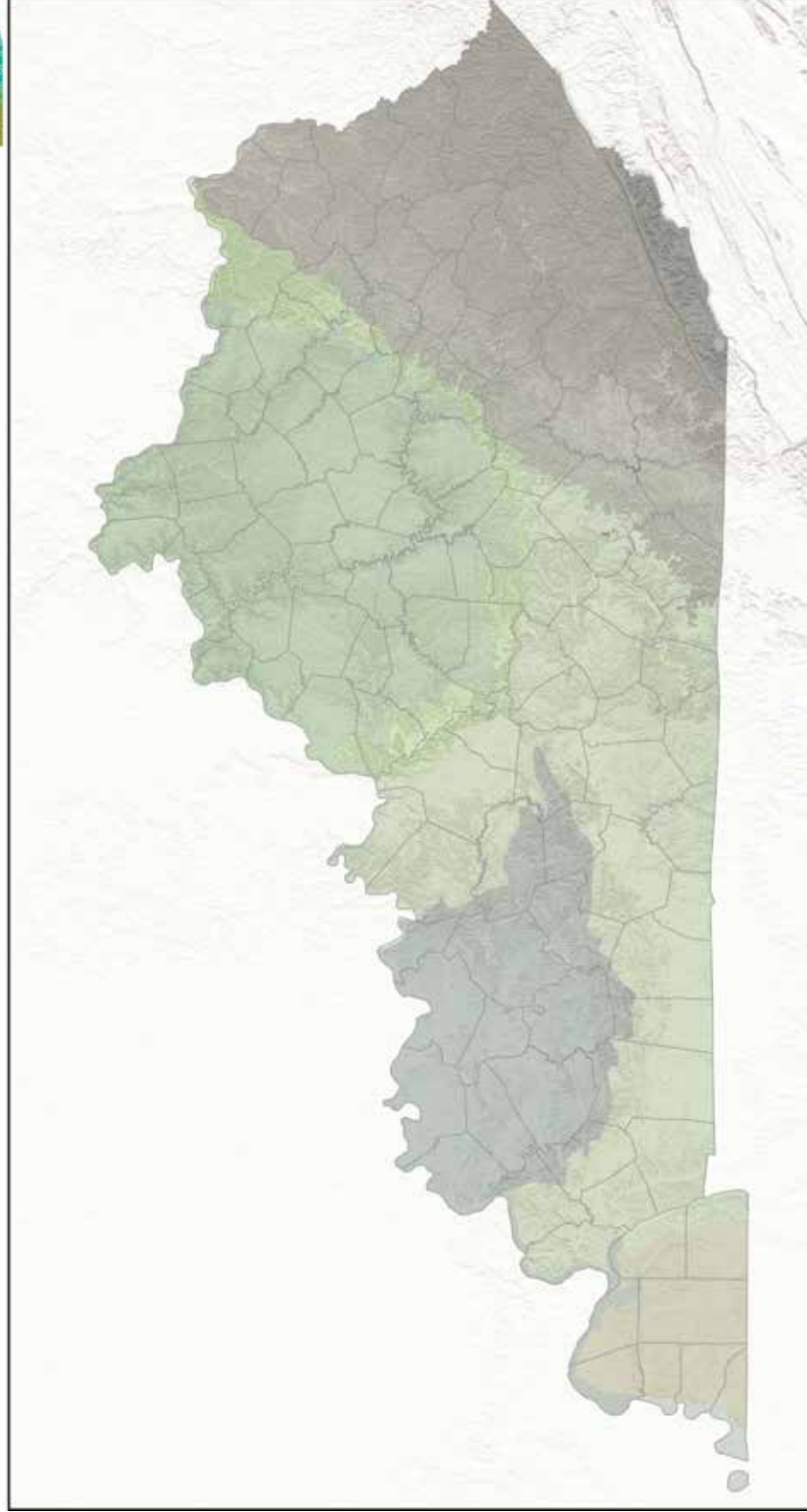


- Terrestrial Guild**
- Cliff/Rockshelter**
- Physiographic Regions**
- Bluegrass
- Cumberland mountains
- Cumberland plateau
- Interior plateau
- Interior river valley and hills
- Knoxs
- Mississippi alluvial plain
- Mississippi valley loess plains
- Plateau escarpment
- County Boundary Lines



Map prepared by GIS staff at KDFWR in partnership with OENP and TNC. Service Layers courtesy of KyFromAbove, Esri, USGS.

Habitat Guild: Floodplain/Sandbar

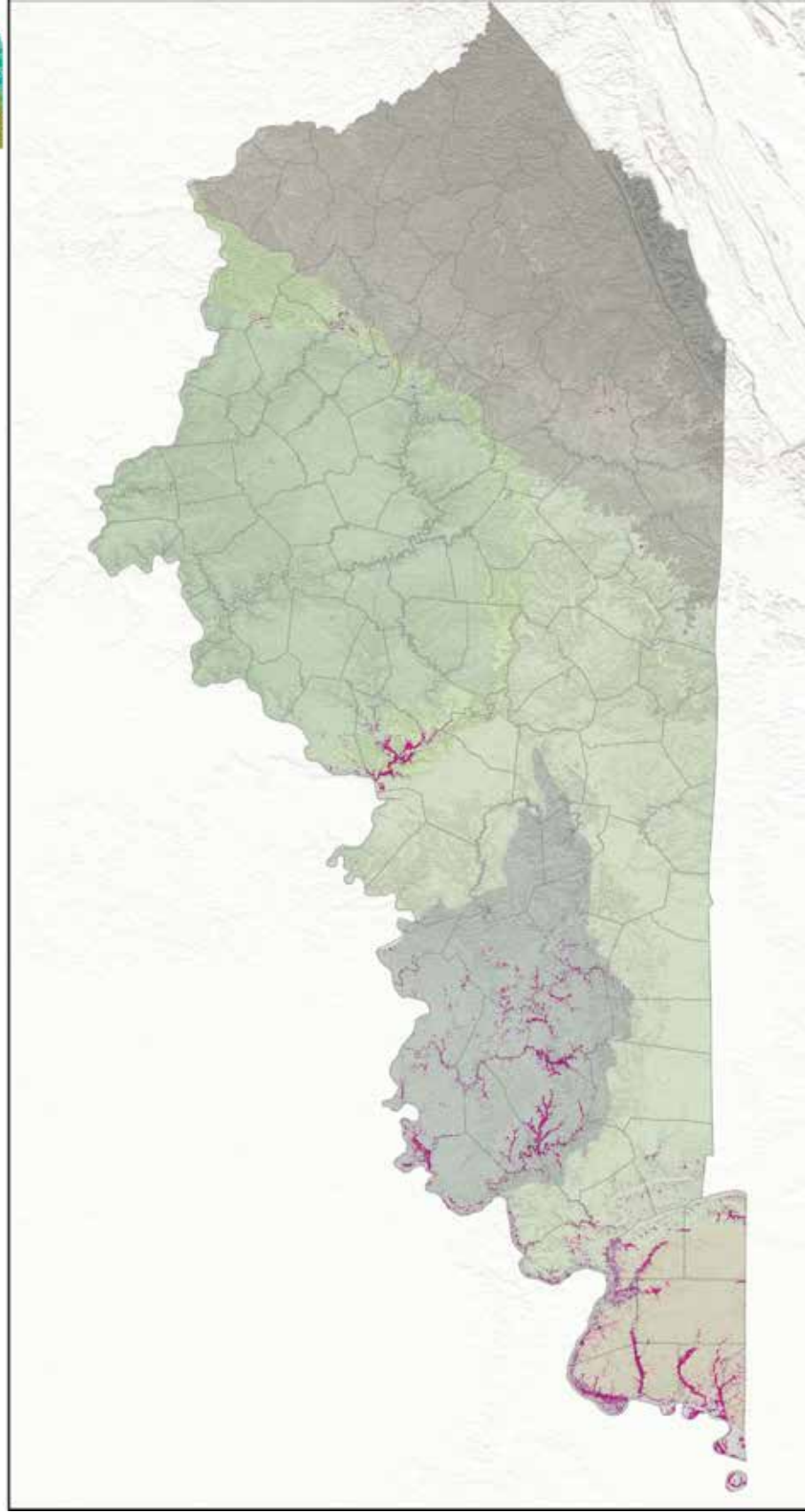


- Terrestrial Guild
- Floodplain/Sandbar
- Physiographic Regions
- Bluegrass
- Cumberland mountains
- Cumberland plateau
- Interior plateau
- Interior river valley and hills
- Knoxs
- Mississippi alluvial plain
- Mississippi valley loess plains
- Plateau escarpment
- County Boundary Lines



Map prepared by GIS staff at KDWPA in partnership with OENP and TNC. Service Layers courtesy of KyFromAbove, Esri, USGS.

Habitat Guild: Forested Wetland



- | | |
|---|--|
| Terrestrial Guild | Physiographic Regions |
| Forested Wetland | Interior river valley and hills |
| Bluegrass | Knobs |
| Cumberland mountains | Mississippi alluvial plain |
| Cumberland plateau | Mississippi valley loess plains |
| Interior plateau | Plateau escarpment |
| | County Boundary Lines |



Map prepared by GIS staff at KDFWR in partnership with OKNP and TNC. Service Layers courtesy of KyFromAbove, Esri, USGS.

Habitat Guild: Grassland/Savannah



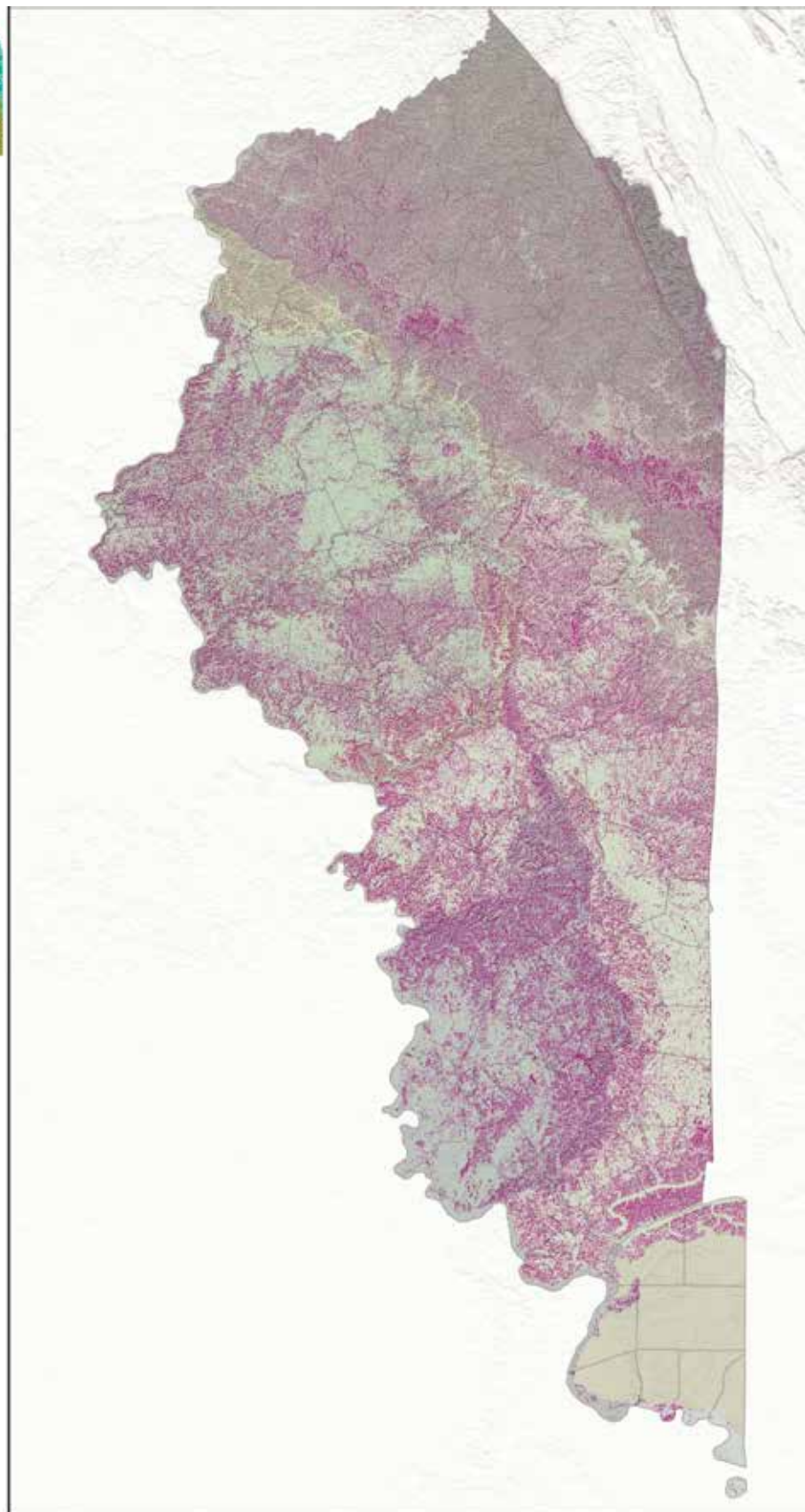
- Terrestrial Guild**
- Grassland/Savannah
- Physiographic Regions**
- Bluegrass
 - Cumberland mountains
 - Cumberland plateau
 - Interior plateau
 - Interior river valley and hills
 - Knoxs
 - Mississippi alluvial plain
 - Mississippi valley loess plains
 - Plateau escarpment
 - County Boundary Lines

0 35 70 140 210 Miles
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Maps prepared by GIS staff at KDFWR in partnership with OENP and TNC. Service layers courtesy of MyFromAbove, Esri, USGS.

Habitat Guild: Mesic Forest

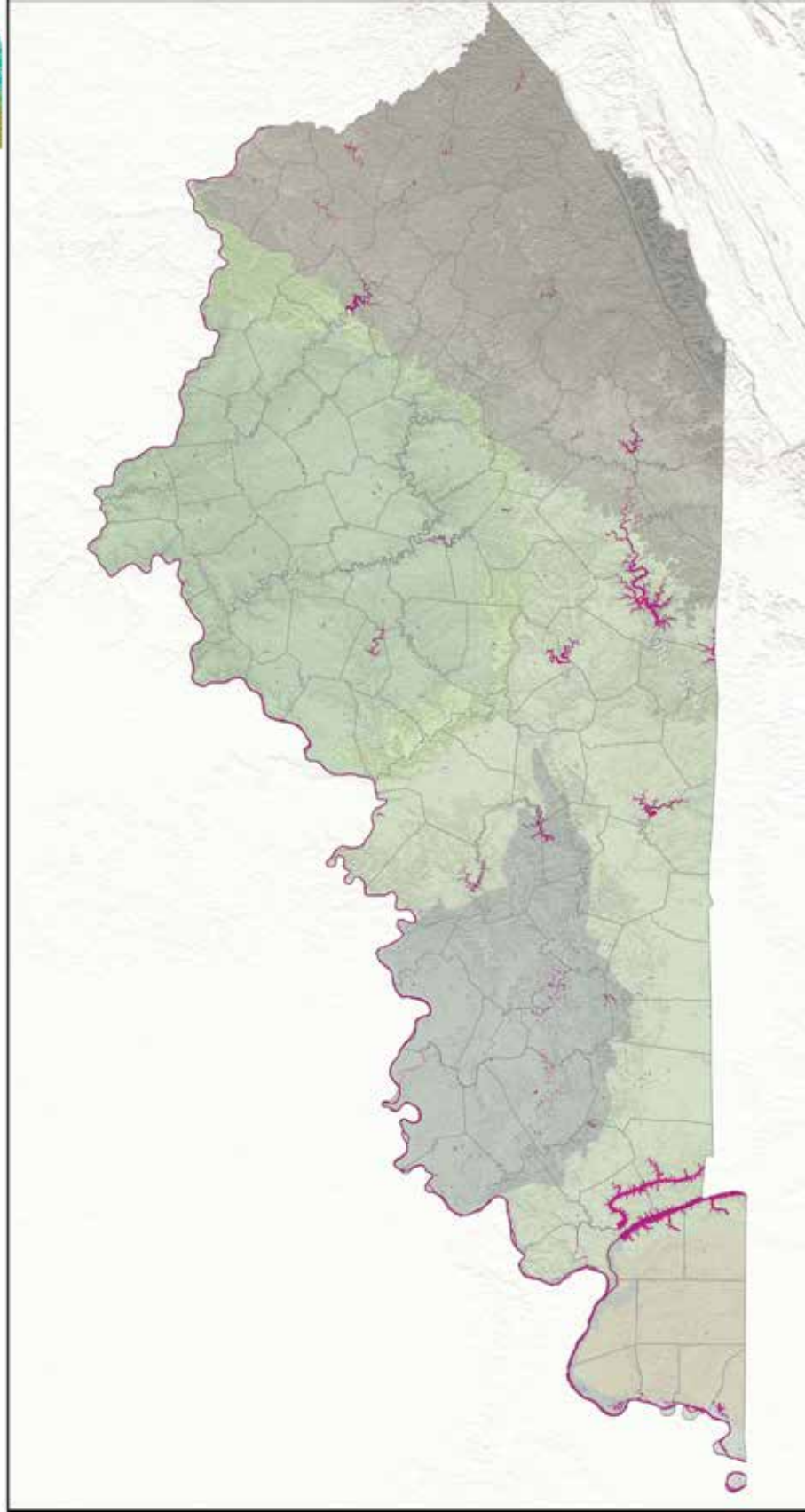


- Interior river valley and hills
- Knob
- Mississippi alluvial plain
- Mississippi valley loess plains
- Plateau escarpment
- County Boundary Lines
- Terrestrial Guild
- Mesic Forest
- Physiographic Regions
- Bluegrass
- Cumberland mountains
- Cumberland plateau
- Interior plateau

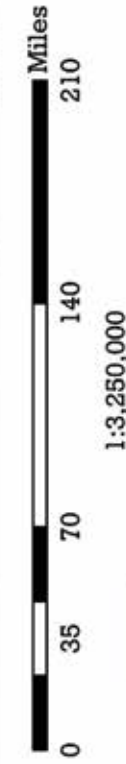


Map prepared by GIS staff at KDFWR in partnership with OENP and TNC. Service layers courtesy of MyFromAbove, Esri, USGS.

Habitat Guild: Open Water

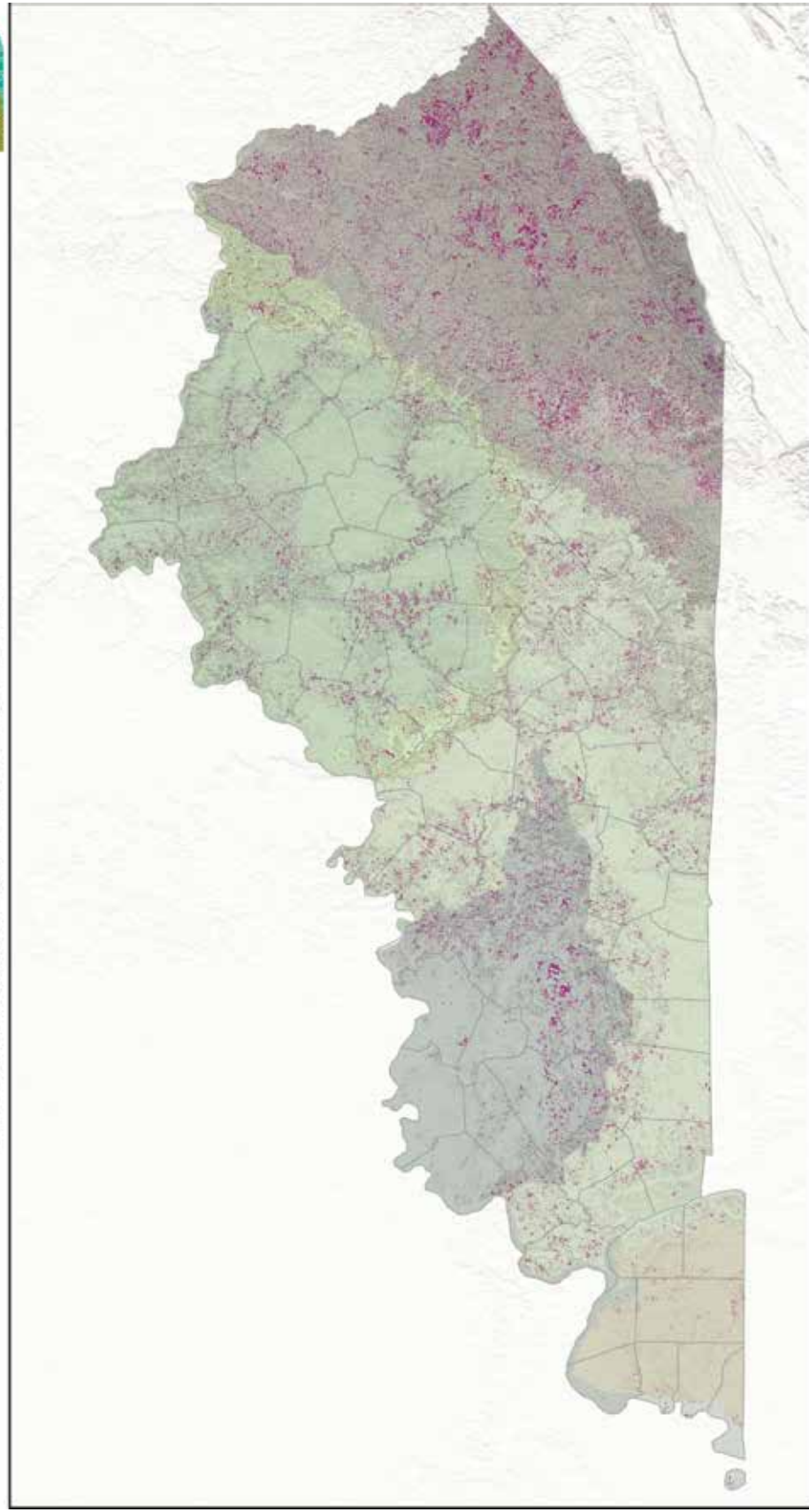


- Terrestrial Guild**
- Open Water
- Physiographic Regions**
- Bluegrass
 - Cumberland mountains
 - Cumberland plateau
 - Interior plateau
 - Interior river valley and hills
 - Knobs
 - Mississippi alluvial plain
 - Mississippi valley loess plains
 - Plateau escarpment
 - County Boundary Lines

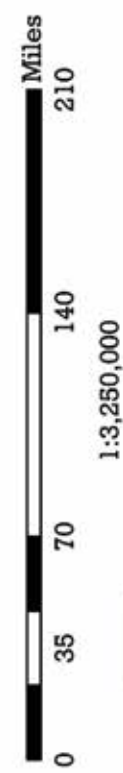


Map prepared by GIS staff at KDFWR in partnership with OENP and TNC. Service Layers courtesy of RHPromAbove, Esri, USGS.

Habitat Guild: Scrub Shrub/Early Successional Forest

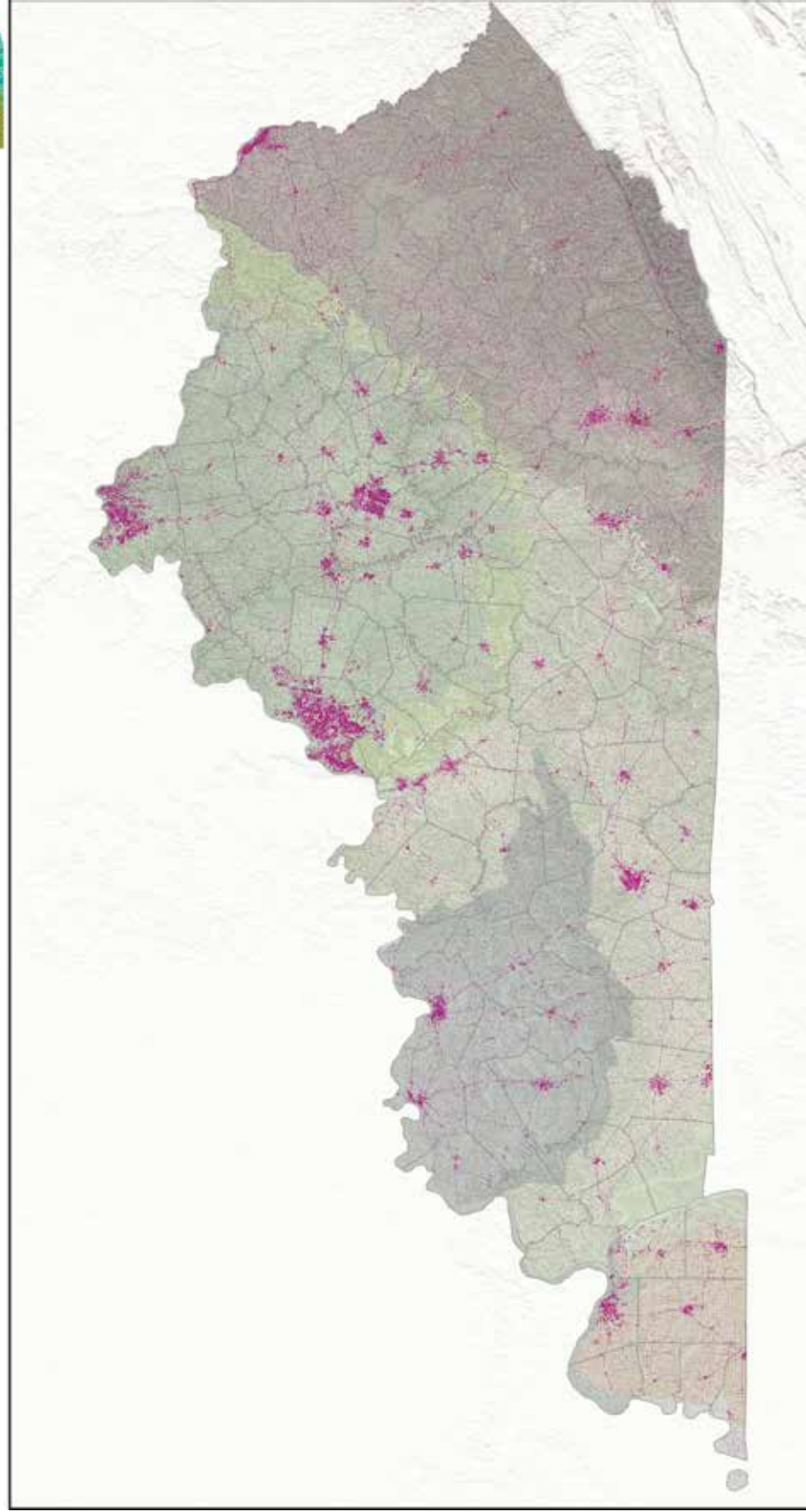


- Terrestrial Guild**
- Scrub Shrub/Early Successional Forest
- Physiographic Regions**
- Bluegrass
- Cumberland mountains
- Cumberland plateau
- Interior plateau
- Interior river valley and hills
- Knobs
- Mississippi alluvial plain
- Mississippi valley loess plains
- Plateau escarpment
- County Boundary Lines

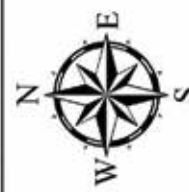


Map prepared by GIS staff at KDFWR in partnership with OENP and TNC. Service layers courtesy of MyFromAbove, Esri, USGS.

Habitat Guild: Suburban

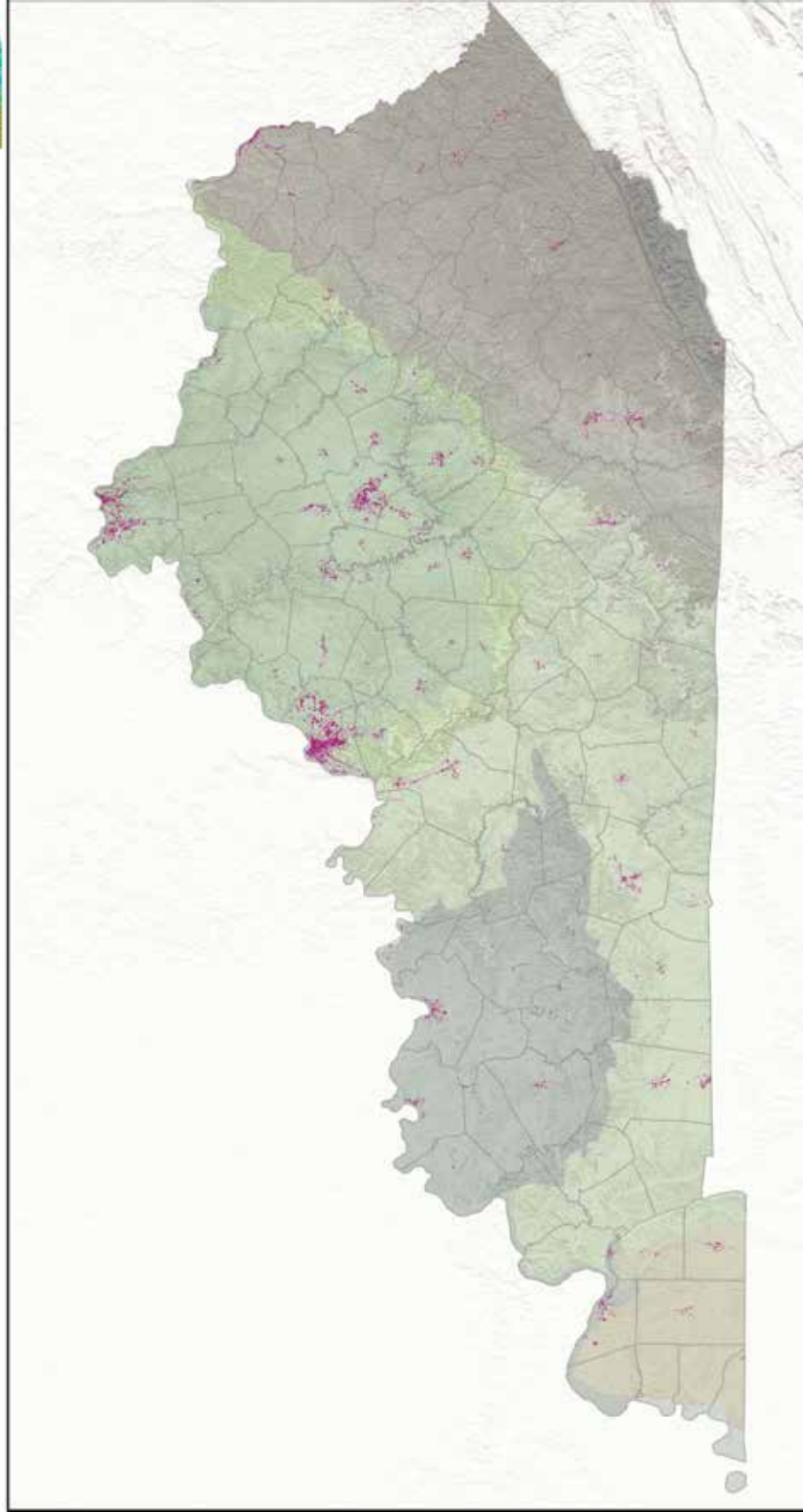


- Terrestrial Guild
- Suburban
- Physiographic Regions
- Bluegrass
- Cumberland mountains
- Cumberland plateau
- Interior plateau
- Interior river valley and hills
- Knobs
- Mississippi alluvial plain
- Mississippi valley loess plains
- Plateau escarpment
- County Boundary Lines

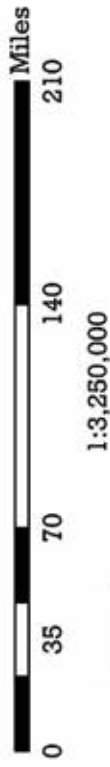


Maps prepared by GIS staff at KDFWR in partnership with OENP and TNC. Service layers courtesy of Rhythmic, Bart, USGS.

Habitat Guild: Urban

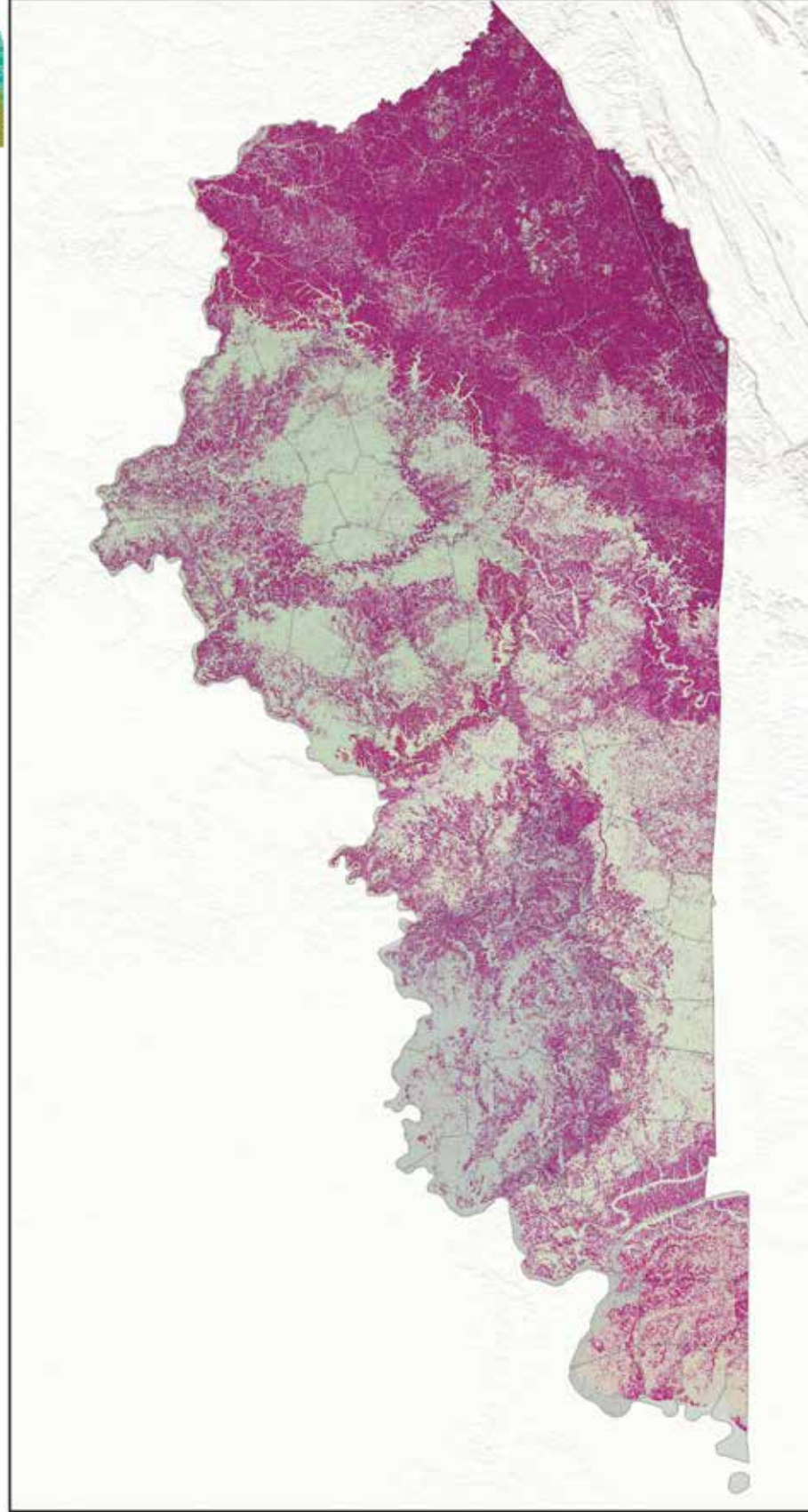


- Terrestrial Guild**
- urban
- Physiographic Regions**
- Bluegrass
- Cumberland mountains
- Cumberland plateau
- Interior plateau
- Interior river valley and hills
- Knoxs
- Mississippi alluvial plain
- Mississippi valley loess plains
- Plateau escarpment
- County Boundary Lines



Maps prepared by GIS staff at KDFWR in partnership with OENP and TNC. Service Layers courtesy of KyFromAbove, Esri, USGS.

Habitat Guild: Xeric Forest



- Terrestrial Guild
 - Xeric Forest
- Physiographic Regions
 - Interior river valley and hills
 - Krobs
 - Mississippi alluvial plain
 - Mississippi valley loess plains
 - Plateau escarpment
 - County Boundary Lines
 - Bluegrass
 - Cumberland mountains
 - Cumberland plateau
 - Interior plateau



Maps prepared by GIS staff at KDFWR in partnership with OKSP and TNC. Service Layers courtesy of RHPDataBrew, Esri, USGS.

APX 4.3a Amphibian SGCN Habitat Type and Range

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Amphibians	<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs	N/A	Forested Wetland, Mesic Forest, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar
Amphibians	<i>Ambystoma barbouri</i>	Streamside Salamander	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau	N/A	Forested Wetland, Grassland/Savannah, Mesic Forest, Xeric Forest, Lake/Pond, River/Streams, Ag, Suburban, Scrub-Shrub/Early Successional Forest
Amphibians	<i>Ambystoma JJUL</i>	Unisexual Ambystoma	Bluegrass	N/A	Forested Wetland, Mesic Forest, Xeric Forest, Lake/Pond, Suburban, Scrub-Shrub/Early Successional Forest
Amphibians	<i>Ambystoma talpoideum</i>	Mole Salamander	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, Xeric Forest, Open Wetland, Lake/Pond, Scrub-Shrub/Early Successional Forest
Amphibians	<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Warm-Low Gradient-Stream, Other
Amphibians	<i>Aneides aeneus</i>	Green Salamander	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs, Interior Plateau, Interior River Valley And Hills	N/A	Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest
Amphibians	<i>Cryptobranchius alleganiensis alleganiensis</i>	Eastern Hellbender	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	Barren, Big Sandy, Blue-Sinking, Licking, Little Sandy, Little Scioto-Tygarts, Lower Kentucky, Lower Levisa, Middle Fork Kentucky, Middle Ohio-Laughery, Obey, Ohio Brush-Whiteoak, Powell, Racoon-Symmes, Rockcastle, Rolling Fork, Rough Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Tug, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky, Upper Levisa	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Cool-Confined-Large River
Amphibians	<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, Xeric Forest, River/Streams
Amphibians	<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	N/A	Cave/Karst, Cliff/Rockshelter, Forested Wetland, Mesic Forest, Xeric Forest, River/Streams, Floodplain/Sandbar, Suburban, Scrub-Shrub/Early Successional Forest
Amphibians	<i>Desmognathus ochrophaeus</i>	Allegheny Mountain Dusky Salamander	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment	N/A	Cliff/Rockshelter, Mesic Forest, River/Streams, Scrub-Shrub/Early Successional Forest
Amphibians	<i>Desmognathus weileri</i>	Black Mountain Salamander	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs, Interior Plateau	N/A	Cave/Karst, Cliff/Rockshelter, Mesic Forest, River/Streams
Amphibians	<i>Eurycea guttolineata</i>	Three-lined Salamander	Interior Plateau, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, River/Streams, Floodplain/Sandbar, Scrub-Shrub/Early Successional Forest

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Amphibians	<i>Hyla avivoca</i>	Bird-voiced Treefrog	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond
Amphibians	<i>Hyla gratiosa</i>	Barking Treefrog	Interior Plateau	N/A	Grassland/Savannah, Open Wetland, Lake/Pond, Ag
Amphibians	<i>Hyla versicolor</i>	Gray Treefrog	Cumberland Plateau, Interior Plateau	N/A	Forested Wetland, Mesic Forest, Xeric Forest, Open Wetland, Lake/Pond, Ag, Suburban, Scrub-Shrub/Early Successional Forest
Amphibians	<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Plateau Escarpment, Interior Plateau, Interior River Valley and Hills, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Lake/Pond, Ag
Amphibians	<i>Lithobates blairi</i>	Plains Leopard Frog	Mississippi Alluvial Plain	N/A	Forested Wetland, Grassland/Savannah, Open Wetland, Lake/Pond, Ag
Amphibians	<i>Lithobates pipiens</i>	Northern Leopard Frog	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs	N/A	Open Wetland, Lake/Pond, River/Streams, Ag
Amphibians	<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Bluegrass	N/A	Mesic Forest, Xeric Forest, Suburban, Scrub-Shrub/Early Successional Forest
Amphibians	<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs	N/A	Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest
Amphibians	<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, Xeric Forest, Suburban
Amphibians	<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Cumberland Mountains, Cumberland Plateau	N/A	Cliff/Rockshelter, Mesic Forest, Xeric Forest
Amphibians	<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	N/A	Cave/Karst, Forested Wetland, Grassland/Savannah, Mesic Forest, Xeric Forest, Lake/Pond, River/Streams, Suburban, Scrub-Shrub/Early Successional Forest
Amphibians	<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Mesic Forest, Xeric Forest, Lake/Pond, Ag, Scrub-Shrub/Early Successional Forest
Amphibians	<i>Siren intermedia</i>	Lesser Siren	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Highland-Pigeon, Kentucky Lake, Lower Cumberland, Lower Green, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Obion, Pond, Rough, Tradewater	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Unconfined-Medium River, Other

APX 4.3b Bird SGCN Habitat Type and Range

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Birds	<i>Accipiter striatus</i>	Sharp-shinned Hawk	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Mesic Forest, Xeric Forest, Suburban
Birds	<i>Actitis macularia</i>	Spotted Sandpiper	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar
Birds	<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag
Birds	<i>Anas rubripes</i>	American Black Duck	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Birds	<i>Antrostomus carolinensis</i>	Chuck-will's-widow	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest
Birds	<i>Antrostomus vociferus</i>	Whip-poor-will	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Mesic Forest, Xeric Forest
Birds	<i>Ardea alba</i>	Great Egret	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar
Birds	<i>Asio flammeus</i>	Short-eared Owl	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Birds	<i>Asio otus</i>	Long-eared Owl	Plateau Escarpment, Bluegrass, Knobs, Interior River Valley and Hills	N/A	Grassland/Savannah, Scrub-Shrub/Early Successional Forest
Birds	<i>Aythya affinis</i>	Lesser Scaup	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Lake/Pond, River/Streams
Birds	<i>Aythya marila</i>	Greater Scaup	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Lake/Pond, River/Streams
Birds	<i>Bartramia longicauda</i>	Upland Sandpiper	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Floodplain/Sandbar, Ag
Birds	<i>Bonasa umbellus</i>	Ruffed Grouse	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs	N/A	Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest
Birds	<i>Botaurus lentiginosus</i>	American Bittern	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond
Birds	<i>Butorides virescens</i>	Green Heron	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Suburban
Birds	<i>Calidris alba</i>	Sanderling	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Birds	<i>Calidris alpina</i>	Dunlin	Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Birds	<i>Calidris himantopus</i>	Stilt Sandpiper	Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Birds	<i>Calidris pusilla</i>	Semipalmated Sandpiper	Cumberland Plateau, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Birds	<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Birds	<i>Cardellina canadensis</i>	Canada Warbler	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest
Birds	<i>Centronyx henslowii</i>	Henslow's Sparrow	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag
Birds	<i>Charadrius melodus</i>	Piping Plover	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Lake/Pond, River/Streams, Floodplain/Sandbar
Birds	<i>Chlidonias niger</i>	Black Tern	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Lake/Pond, River/Streams, Floodplain/Sandbar
Birds	<i>Circus hudsonius</i>	Northern Harrier	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Open Wetland, Ag
Birds	<i>Cistothorus stellaris</i>	Sedge Wren	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Open Wetland, Ag
Birds	<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Birds	<i>Colinus virginianus</i>	Northern Bobwhite	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag, Scrub-Shrub/Early Successional Forest
Birds	<i>Corvus corax</i>	Common Raven	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Interior Plateau	N/A	Cliff/Rockshelter, Mesic Forest, Xeric Forest
Birds	<i>Cygnus buccinator</i>	Trumpeter Swan	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar
Birds	<i>Dolichonyx oryzivorus</i>	Bobolink	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag
Birds	<i>Dryobates borealis</i>	Red-cockaded Woodpecker	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment	N/A	Mesic Forest, Xeric Forest
Birds	<i>Empidonax minimus</i>	Least Flycatcher	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Scrub-Shrub/Early Successional Forest
Birds	<i>Empidonax traillii</i>	Willow Flycatcher	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Open Wetland, Lake/Pond, River/Streams, Scrub-Shrub/Early Successional Forest
Birds	<i>Euphagus carolinus</i>	Rusty Blackbird	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Birds	<i>Falco peregrinus</i>	Peregrine Falcon	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Cliff/Rockshelter, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag, Urban, Suburban

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Birds	<i>Falco sparverius</i>	American Kestrel	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag, Urban, Suburban
Birds	<i>Gallinago delicata</i>	Wilson's Snipe	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, Floodplain/Sandbar, Ag, Suburban
Birds	<i>Gallinula galeata</i>	Common Gallinule	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland
Birds	<i>Geothlypis formosa</i>	Kentucky Warbler	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, Xeric Forest, Floodplain/Sandbar
Birds	<i>Grus americana</i>	Whooping Crane	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Open Wetland, Floodplain/Sandbar, Ag
Birds	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar
Birds	<i>Hylocichla mustelina</i>	Wood Thrush	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Mesic Forest, Xeric Forest
Birds	<i>Ixobrychus exilis</i>	Least Bittern	Cumberland Plateau, Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Birds	<i>Lanius ludovicianus</i>	Loggerhead Shrike	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag
Birds	<i>Limnodromus griseus</i>	Short-billed Dowitcher	Cumberland Plateau, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Birds	<i>Limnithlypis swainsonii</i>	Swainson's Warbler	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Interior Plateau, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest
Birds	<i>Lophodytes cucullatus</i>	Hooded Merganser	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar
Birds	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Grassland/Savannah, Xeric Forest, Ag
Birds	<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	Cumberland Plateau, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar
Birds	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Suburban
Birds	<i>Pandion haliaetus</i>	Osprey	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Suburban

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Birds	<i>Parkesia motacilla</i>	Louisiana Waterthrush	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, River/Streams, Floodplain/Sandbar
Birds	<i>Passerculus sandwichensis</i>	Savannah Sparrow	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag
Birds	<i>Peucaea aestivalis</i>	Bachman's Sparrow	Interior Plateau, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Xeric Forest
Birds	<i>Phalaropus tricolor</i>	Wilson's Phalarope	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Birds	<i>Pluvialis dominica</i>	American Golden-plover	Cumberland Plateau, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Lake/Pond, Floodplain/Sandbar, Ag
Birds	<i>Pluvialis squatarola</i>	Black-bellied Plover	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Lake/Pond, Floodplain/Sandbar, Ag
Birds	<i>Podiceps auritus</i>	Horned Grebe	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Lake/Pond, River/Streams
Birds	<i>Podilymbus podiceps</i>	Pied-billed Grebe	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams
Birds	<i>Porzana carolina</i>	Sora	Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Open Wetland

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Birds	<i>Protonotaria citrea</i>	Prothonotary Warbler	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar
Birds	<i>Rallus elegans</i>	King Rail	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Open Wetland
Birds	<i>Rallus limicola</i>	Virginia Rail	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Grassland/Savannah, Open Wetland
Birds	<i>Riparia riparia</i>	Bank Swallow	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	River/Streams, Floodplain/Sandbar
Birds	<i>Scolopax minor</i>	American Woodcock	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Floodplain/Sandbar, Ag, Suburban, Scrub-Shrub/Early Successional Forest
Birds	<i>Setophaga cerulea</i>	Cerulean Warbler	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, Xeric Forest
Birds	<i>Setophaga discolor</i>	Prairie Warbler	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Xeric Forest, Scrub-Shrub/Early Successional Forest
Birds	<i>Setophaga striata</i>	Blackpoll Warbler	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Mesic Forest, Xeric Forest, Suburban, Scrub-Shrub/Early Successional Forest
Birds	<i>Setophaga tigrina</i>	Cape May Warbler	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	N/A	Mesic Forest, Xeric Forest, Suburban, Scrub-Shrub/Early Successional Forest

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Birds	<i>Setophaga virens</i>	Black-throated Green Warbler	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Mesic Forest, Xeric Forest
Birds	<i>Spiza americana</i>	Dickcissel	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag
Birds	<i>Spizella pusilla</i>	Field Sparrow	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag, Scrub-Shrub/Early Successional Forest
Birds	<i>Sternula antillarum athalassos</i>	Interior Least Tern	Cumberland Plateau, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	River/Streams, Floodplain/Sandbar, Ag
Birds	<i>Sturnella magna</i>	Eastern Meadowlark	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag
Birds	<i>Thryomanes bewickii</i>	Bewick's Wren	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Ag, Scrub-Shrub/Early Successional Forest
Birds	<i>Tringa flavipes</i>	Lesser Yellowlegs	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Birds	<i>Tringa solitaria</i>	Solitary Sandpiper	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Lake/Pond, River/Streams, Floodplain/Sandbar, Ag

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Birds	<i>Tyto alba</i>	Barn Owl	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Open Wetland, Ag, Suburban
Birds	<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Scrub-Shrub/Early Successional Forest
Birds	<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Scrub-Shrub/Early Successional Forest
Birds	<i>Vireo bellii</i>	Bell's Vireo	Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Scrub-Shrub/Early Successional Forest

APX 4.3c Crustacean SGCN Habitat Type and Range

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Crustaceans	<i>Barbicambarus cornutus</i>	Bottlebrush Crayfish	Interior Plateau	Barren, Upper Green	Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confinement-Medium River, Warm-Moderately Confinement-Medium River, Warm-Unconfinement-Medium River
Crustaceans	<i>Caecidotea barri</i>	Clifton Cave Isopod	Bluegrass	Lower Kentucky	Cave/Karst
Crustaceans	<i>Cambarellus puer</i>	Swamp Dwarf Crayfish	Mississippi Valley Loess Plain	N/A	Forested Wetland
Crustaceans	<i>Cambarellus shufeldtii</i>	Cajun Dwarf Crayfish	Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Ohio, Obion	Forested Wetland, Open Wetland, Lake/Pond
Crustaceans	<i>Cambarus adustus</i>	Dusky Mudbug	Knobs	N/A	Grassland/Savannah, Mesic Forest, Ag. Suburban
Crustaceans	<i>Cambarus bartonii cavatus</i>	Appalachian Brook Crayfish	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau	Barren, Big Sandy, Blue-Sinking, Licking, Little Sandy, Little Scioto-Tygarts, Lower Green, Lower Kentucky, Lower Levisa, Lower Ohio-Little Pigeon, Middle Fork Kentucky, Middle Ohio-Laughery, North Fork Kentucky, Obey, Ohio Brush-Whiteoak, Rockcastle, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Tug, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky, Upper Levisa	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Moderately Confinement-Medium River, Warm-Low Gradient-Small River
Crustaceans	<i>Cambarus batchi</i>	Bluegrass Crayfish	Cumberland Plateau, Bluegrass	N/A	Forested Wetland, Grassland/Savannah, Ag. Suburban
Crustaceans	<i>Cambarus bouchardi</i>	Big South Fork Crayfish	Plateau Escarpment	South Fork Cumberland	Warm-Medium Gradient-Small River
Crustaceans	<i>Cambarus buntingi</i>	Longclaw Crayfish	Cumberland Mountains, Cumberland Plateau	Upper Cumberland	Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-Medium Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confinement-Medium River, Warm-Moderately Confinement-Medium River, Warm-Unconfinement-Medium River
Crustaceans	<i>Cambarus callinus</i>	Big Sandy Crayfish	Cumberland Plateau	Lower Levisa, Tug, Upper Levisa	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Cool-Medium Gradient-Small River, Warm-Moderately Confinement-Medium River, Warm-Unconfinement-Medium River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Crustaceans	<i>Cambarus deweesae</i>	Valley Flame Crayfish	Cumberland Plateau, Bluegrass, Knobs, Interior Plateau	Lower Kentucky, Obey, Rolling Fork, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green	Forested Wetland, Grassland/Savannah, Floodplain/Sandbar, Ag
Crustaceans	<i>Cambarus dubius</i>	Upland Burrowing Crayfish	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment	N/A	Cliff/Rockshelter, Forested Wetland, Mesic Forest, Open Wetland
Crustaceans	<i>Cambarus friaufi</i>	Hairy Crayfish	Interior Plateau	Barren, Lower Cumberland, Red	Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River
Crustaceans	<i>Cambarus graysoni</i>	Twospot Crayfish	Plateau Escarpment, Knobs, Interior Plateau, Interior River Valley And Hills	Barren, Middle Green, Red, Rolling Fork, Rough, Upper Cumberland-Lake Cumberland, Upper Green	Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River
Crustaceans	<i>Cambarus guenterii</i>	Redbird Crayfish	Cumberland Plateau	Lower Kentucky, South Fork Kentucky, Upper Kentucky	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-Low Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River
Crustaceans	<i>Cambarus hatfieldi</i>	Tug Valley Crayfish	Cumberland Plateau	Tug	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River
Crustaceans	<i>Cambarus hazardi</i>	Brawny Crayfish	Cumberland Plateau, Plateau Escarpment, Bluegrass	Licking, Lower Kentucky, North Fork Kentucky, Upper Kentucky	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-Low Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River
Crustaceans	<i>Cambarus jezerinaci</i>	Spiny Scale Crayfish	Cumberland Mountains, Cumberland Plateau	South Fork Kentucky, Upper Cumberland	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream
Crustaceans	<i>Cambarus ortmanni</i>	Ortmann's Mudbug	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	N/A	Grassland/Savannah, Open Wetland, River/Streams, Ag

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Crustaceans	<i>Cambarus parvoculus</i>	Mountain Midget Crayfish	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Interior Plateau	Middle Fork Kentucky, North Fork Kentucky, Powell, South Fork Cumberland, South Fork Kentucky, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Kentucky, Upper Levisa	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream
Crustaceans	<i>Cambarus rusticiformis</i>	Depression Crayfish	Cumberland Mountains, Plateau Escarpment, Interior Plateau	Barren, Lower Cumberland, Middle Green, Obey, Pond, Red, Rockcastle, Rough, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confinned-Medium River, Warm-Moderately Confinned-Medium River, Warm-Unconfinned-Medium River
Crustaceans	<i>Cambarus sciotoensis</i>	Teays River Crayfish	Cumberland Plateau, Knobs	Little Scioto-Tygart	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confinned-Medium River, Warm-Unconfinned-Medium River
Crustaceans	<i>Cambarus striatus</i>	Ambiguous Crayfish	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	Barren, Lower Green, Lower Kentucky, Middle Green, Middle Kentucky, Upper Green	Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Unconfinned-Medium River
Crustaceans	<i>Cambarus taylori</i>	Cutshin Crayfish	Cumberland Plateau	Middle Fork Kentucky	Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River
Crustaceans	<i>Creaserinus fodiens</i>	Digger Crayfish	Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Forested Wetland, Grassland/Savannah, Ag
Crustaceans	<i>Faxonius bellator</i>	Screaming Eagle Crayfish	Interior Plateau	N/A	Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream
Crustaceans	<i>Faxonius bisectus</i>	Crittenden Crayfish	Interior Plateau	Lower Ohio-Bay	Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Crustaceans	<i>Faxonius burri</i>	Blood River Crayfish	Interior Plateau	Kentucky Lake	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River
Crustaceans	<i>Faxonius elix</i>	Mowild Crayfish	Bluegrass	Blue-Sinking, Salt	Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River
Crustaceans	<i>Faxonius jeffersoni</i>	Louisville Crayfish	Bluegrass	Silver-Little Kentucky	Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River
Crustaceans	<i>Faxonius kentuckiensis</i>	Kentucky Crayfish	Interior Plateau, Interior River Valley And Hills	Lower Cumberland, Lower Ohio-Bay, Tradewater	Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River
Crustaceans	<i>Faxonius lancifer</i>	Shrimp Crayfish	Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland
Crustaceans	<i>Faxonius margorectus</i>	Livingston Crayfish	Interior Plateau	Lower Cumberland, Lower Ohio-Bay	Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream
Crustaceans	<i>Faxonius palmeri palmeri</i>	Gray-Speckled Crayfish	Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Ohio, Obion	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Crustaceans	<i>Faxonius pardalotus</i>	Leopard Crayfish	Interior Plateau, Interior River Valley And Hills	Mainstem of Lower Ohio	Warm-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Crustaceans	<i>Faxonius rafinesquei</i>	Rough River Crayfish	Interior Plateau, Interior River Valley And Hills	Lower Green, Pond, Rough	Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River
Crustaceans	<i>Faxonius ronaldi</i>	Mud River Crayfish	Interior Plateau, Interior River Valley And Hills	Middle Green	Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Crustaceans	<i>Faxonius rusticus</i>	Rusty Crayfish	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	Licking, Middle Green, Rolling Fork, Rough, Salt, South Fork Licking, Upper Green	Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confining-Medium River, Warm-Moderately Confining-Medium River, Warm-Unconfining-Medium River
Crustaceans	<i>Faxonius tricuspis</i>	Western Highland Crayfish	Interior Plateau, Interior River Valley And Hills	Highland-Pigeon, Kentucky Lake, Lower Cumberland, Lower Green, Lower Ohio-Bay, Middle Green, Pond, Red, Rough, Tradewater	Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Moderately Confining-Medium River, Warm-Unconfining-Medium River
Crustaceans	<i>Gammarus bousfieldi</i>	Bousfield's Amphipod	Bluegrass, Interior Plateau	Blue-Sinking, Salt	River/Streams
Crustaceans	<i>Lacunicambarus chimera</i>	Crawzilla Crawdad	Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Grassland/Savannah, Open Wetland, River/Streams, Ag, Suburban
Crustaceans	<i>Macrobrachium ohione</i>	Ohio Shrimp	Interior River Valley And Hills	Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar
Crustaceans	<i>Orconectes barri</i>	Cumberland Plateau Cave Crayfish	Plateau Escarpment	Obey, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland	Cave/Karst
Crustaceans	<i>Orconectes inermis inermis</i>	Ghost Crayfish	Knobs, Interior Plateau, Interior River Valley And Hills	Blue-Sinking, Lower Green, Lower Ohio-Little Pigeon, Rolling Fork, Rough, Salt, Upper Green	Cave/Karst
Crustaceans	<i>Orconectes packardii</i>	Appalachian Cave Crayfish	Plateau Escarpment, Interior Plateau	Lower Kentucky, Obey, Rockcastle, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky	Cave/Karst
Crustaceans	<i>Orconectes pellucidus</i>	Mammoth Cave Crayfish	Interior Plateau, Interior River Valley and Hills	Barren, Kentucky Lake, Lower Cumberland, Middle Green, Pond, Red, Tradewater, Upper Green	Cave/Karst
Crustaceans	<i>Palaemonias ganteri</i>	Mammoth Cave Shrimp	Interior Plateau, Interior River Valley and Hills	Barren, Upper Green	Cave/Karst
Crustaceans	<i>Procambarus viaeviridis</i>	Vernal Crayfish	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams
Crustaceans	<i>Stygobromus vitreus</i>	An Amphipod	Interior Plateau	N/A	Cave/Karst

APX 4.3d Fishes and Lamprey SGCN Habitat Type and Range

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Fishes	<i>Acipenser fulvescens</i>	Lake Sturgeon	Cumberland Plateau, Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Highland-Pigeon, Lower Cumberland, Lower Ohio, Ohio Brush-Whiteoak, Rockcastle, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland	Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Cool-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River, Other
Fishes	<i>Allohistium maydeni</i>	Redlips Darter	Cumberland Plateau, Plateau Escarpment, Interior Plateau	Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland	Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Confined-Medium River
Fishes	<i>Alosa alabamae</i>	Alabama Shad	Bluegrass, Interior Plateau, Mississippi Alluvial Plain	Kentucky Lake, Lower Mississippi-Memphis	Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Fishes	<i>Amblyopsis spelaea</i>	Northern Cavefish	Interior Plateau	N/A	Cave/Karst
Fishes	<i>Ammocrypta clara</i>	Western Sand Darter	Cumberland Plateau, Interior Plateau, Interior River Valley And Hills	North Fork Kentucky, Upper Green	Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River
Fishes	<i>Anguilla rostrata</i>	American Eel	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Barren, Highland-Pigeon, Kentucky Lake, Little Sandy, Lower Cumberland, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, Middle Green, Obey, Ohio Brush-Whiteoak, Red, Tradewater, Upper Green	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Cool-Unconfined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Fishes	<i>Atractosteus spatula</i>	Alligator Gar	Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Kentucky Lake, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, Tradewater	Warm-Moderately Confined-Large River, Warm-Unconfined-Large River, Other

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Fishes	<i>Carpionodes velifer</i>	Highfin Carpsucker	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	Blue-Sinking, Highland-Pigeon, Little Sandy, Little Scioto-Tygart, Lower Green, Lower Kentucky, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Silver-Little Kentucky	Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Cool-Unconfined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Cool-Confined-Large River, Warm-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River, Other
Fishes	<i>Chrosomus cumberlandensis</i>	Blackside Dace	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment	North Fork Kentucky, Rockcastle, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland	Cold-High Gradient-Stream, Cool-High Gradient-Stream
Fishes	<i>Clinostomus elongatus</i>	Redside Dace	Cumberland Plateau, Plateau Escarpment, Knobs	Licking, Upper Kentucky	Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream
Fishes	<i>Cycleptus elongatus</i>	Blue Sucker	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	Highland-Pigeon, Licking, Lower Cumberland, Lower Green, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Silver-Little Kentucky, Upper Green	Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Cool-Unconfined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Cool-Confined-Large River, Warm-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Fishes	<i>Cyprinella camura</i>	Bluntnose Shiner	Mississippi Valley Loess Plain	Obion	Warm-Low Gradient-Stream
Fishes	<i>Cyprinella venusta</i>	Blacktail Shiner	Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Kentucky Lake, Lower Ohio, Lower Tennessee, Obion	Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Cool-Moderately Confined-Medium River, Cool-Unconfined-Medium River, Warm-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Fishes	<i>Erimystax insignis</i>	Blotched Chub	Plateau Escarpment, Interior Plateau	Red	Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River
Fishes	<i>Erimystax x-punctatus</i>	Gravel Chub	Cumberland Plateau, Bluegrass, Interior Plateau	Ohio Brush-Whiteoak	Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Cool-Confined-Large River, Warm-Moderately Confined-Large River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Fishes	<i>Erimyzon sucetta</i>	Lake Chubsucker	Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Obion, Tradewater	Open Wetland, Lake/Pond
Fishes	<i>Esox niger</i>	Chain Pickerel	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Kentucky Lake, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Middle Green	Open Wetland, Lake/Pond, River/Streams
Fishes	<i>Etheostoma barbouri</i>	Teardrop Darter	Knobs, Interior Plateau, Interior River Valley And Hills	Barren, Upper Green	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River
Fishes	<i>Etheostoma chienense</i>	Relict Darter	Mississippi Valley Loess Plain	Bayou De Chien-Mayfield	Warm-Low Gradient-Stream
Fishes	<i>Etheostoma derivativum</i>	Stone Darter	Interior Plateau	Red	Cool-Medium Gradient-Stream
Fishes	<i>Etheostoma fusiforme</i>	Swamp Darter	Mississippi Alluvial Plain	Obion	Forested Wetland, Open Wetland, Lake/Pond
Fishes	<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Plateau Escarpment	South Fork Cumberland	Cool-Confinement-Medium River
Fishes	<i>Etheostoma lynceum</i>	Brighteye Darter	Mississippi Valley Loess Plain	Obion	Warm-Low Gradient-Stream
Fishes	<i>Etheostoma nebra</i>	Buck Darter	Plateau Escarpment, Interior Plateau	Upper Cumberland-Lake Cumberland	Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River
Fishes	<i>Etheostoma parvipinne</i>	Goldstripe Darter	Interior Plateau, Mississippi Valley Loess Plain	Kentucky Lake, Obion	Cool-Low Gradient-Stream, Cold-Low Gradient-Stream, Other
Fishes	<i>Etheostoma proellare</i>	Cypress Darter	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Kentucky Lake, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, Obion	Cool-Low Gradient-Stream, Warm-Low Gradient-Stream, Other
Fishes	<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Mississippi Valley Loess Plain	Obion	Warm-Low Gradient-Stream, Other
Fishes	<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment	South Fork Cumberland, Upper Cumberland-Lake Cumberland	Cold-High Gradient-Stream, Cool-High Gradient-Stream
Fishes	<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Cumberland Plateau	Middle Fork Kentucky, North Fork Kentucky, South Fork Kentucky, Upper Kentucky	Cold-High Gradient-Stream, Cool-High Gradient-Stream
Fishes	<i>Etheostoma susanae</i>	Cumberland Darter	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs	Upper Cumberland	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Fishes	<i>Etheostoma swaini</i>	Gulf Darter	Mississippi Valley Loess Plain	Obion	Warm-Low Gradient-Stream
Fishes	<i>Etheostoma tecumsehii</i>	Shawnee Darter	Interior Plateau, Interior River Valley and Hills	Pond	Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream
Fishes	<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Interior Plateau, Interior River Valley and Hills	N/A	Cold-Medium Gradient-Stream, Cold-Low Gradient-Stream, Other
Fishes	<i>Fundulus chrysotus</i>	Golden Topminnow	Mississippi Alluvial Plain	Obion	Open Wetland, Lake/Pond
Fishes	<i>Fundulus dispar</i>	Starhead Topminnow	Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Obion	Open Wetland, Lake/Pond
Fishes	<i>Hemitremia flammea</i>	Flame Chub	Cumberland Plateau, Interior Plateau	Barren, Red	Cold-Medium Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Cold-Low Gradient-Stream
Fishes	<i>Hybognathus hayi</i>	Cypress Minnow	Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Ohio, Middle Green	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Other
Fishes	<i>Hybognathus placitus</i>	Plains Minnow	Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Fishes	<i>Hybopsis amnis</i>	Pallid Shiner	Plateau Escarpment, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	South Fork Cumberland	Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Moderately Confined-Large River
Fishes	<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Barren, Kentucky Lake, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Obion, Rolling Fork, Rough, Upper Green	Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Fishes	<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Cumberland Plateau, Plateau Escarpment, Knobs	Licking, Little Sandy, Lower Levisa, North Fork Kentucky, South Fork Kentucky, Upper Kentucky	Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River
Fishes	<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Interior River Valley And Hills, Mississippi Valley Loess Plain	Lower Tennessee	Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Fishes	<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Cumberland Plateau, Plateau Escarpment, Interior Plateau	Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland, Upper Green	Cold-High Gradient-Stream, Cool-High Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River
Fishes	<i>Ictiobus niger</i>	Black Buffalo	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygart, Lower Cumberland, Lower Green, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Obion, Ohio Brush-Whiteoak, Red, Rough, Silver-Little Kentucky, South Fork Licking, Tradewater	Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Cool-Unconfined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River, Other
Fishes	<i>Lepomis marginatus</i>	Dollar Sunfish	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Kentucky Lake, Lower Tennessee, Obion	Open Wetland, Lake/Pond, River/Streams
Fishes	<i>Lepomis miniatus</i>	Redspotted Sunfish	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Middle Green, Obion, Pond	Open Wetland, Lake/Pond, River/Streams
Fishes	<i>Lethenteron appendix</i>	American Brook Lamprey	Cumberland Plateau, Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley and Hills	Barren, Licking, Little Sandy, Little Scioto-Tygart, Lower Levisa, Middle Fork Kentucky, North Fork Kentucky, Ohio Brush-Whiteoak, South Fork Kentucky, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky	Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Moderately Confined-Large River
Fishes	<i>Lota lota</i>	Burbot	Bluegrass, Interior Plateau, Interior River Valley And Hills	Blue-Sinking, Lower Ohio-Bay, Ohio Brush-Whiteoak	Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Cool-Confined-Large River, Warm-Moderately Confined-Large River
Fishes	<i>Macrhybopsis geida</i>	Sturgeon Chub	Interior River Valley and Hills, Mississippi Alluvial Plain	Lower Mississippi-Memphis	Warm-Unconfined-Large River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Fishes	<i>Macrhybopsis hyostoma</i>	Shoal Chub	Cumberland Plateau, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	Big Sandy, Blue-Sinking, Highland-Pigeon, Licking, Little Sandy, Little Scioto-Tygart, Lower Levisa, Lower Mississippi-Memphis, Lower Ohio, Middle Fork Kentucky, North Fork Kentucky, Ohio Brush-Whiteoak, Silver-Little Kentucky, South Fork Kentucky, Tug-Upper Green, Upper Levisa	Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Cool-Unconfined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Cool-Confined-Large River, Warm-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Fishes	<i>Macrhybopsis meeki</i>	Sicklefin Chub	Interior River Valley And Hills, Mississippi Alluvial Plain	Lower Mississippi-Memphis	Warm-Unconfined-Large River
Fishes	<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Mississippi Valley Loess Plain	Obion	Warm-Low Gradient-Stream
Fishes	<i>Nocomis biguttatus</i>	Hornyhead Chub	Bluegrass	Lower Kentucky	Warm-Medium Gradient-Stream, Warm-Medium Gradient-Small River
Fishes	<i>Nothonotus maculatus</i>	Spotted Darter	Cumberland Plateau, Bluegrass, Interior Plateau, Interior River Valley And Hills	Barren, Upper Green	Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River
Fishes	<i>Nothonotus microlepidus</i>	Smallscale Darter	Interior Plateau	Lower Cumberland, Red	Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River
Fishes	<i>Notropis albizonatus</i>	Palezone Shiner	Plateau Escarpment, Interior Plateau	South Fork Cumberland	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River
Fishes	<i>Notropis buchanani</i>	Ghost Shiner	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	Licking, Little Sandy, Little Scioto-Tygart, Lower Green, Lower Kentucky, Lower Ohio-Little Pigeon, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Rolling Fork, Rough, Silver-Little Kentucky, South Fork Cumberland, Upper Green	Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Moderately Confined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Fishes	<i>Notropis dorsalis</i>	Bigmouth Shiner	Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Mississippi-Memphis	Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River
Fishes	<i>Notropis hudsonius</i>	Spottail Shiner	Cumberland Plateau, Plateau Escarpment, Bluegrass, Interior River Valley And Hills, Mississippi Valley Loess Plain	Little Scioto-Tygart, Ohio Brush-Whiteoak	Cool-Confined-Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Fishes	<i>Notropis maculatus</i>	Taillight Shiner	Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Obion	Open Wetland, Lake/Pond, River/Streams
Fishes	<i>Notropis shumardi</i>	Silverband Shiner	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Obion	Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Fishes	<i>Notropis</i> sp. cf. <i>spectrunculus</i>	Sawfin Shiner	Plateau Escarpment, Interior Plateau	South Fork Cumberland, Upper Cumberland-Lake Cumberland	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River
Fishes	<i>Noturus exilis</i>	Slender Madtom	Bluegrass, Interior Plateau, Interior River Valley And Hills	Lower Cumberland, Red, South Fork Licking	Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream, Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River
Fishes	<i>Noturus hildebrandi</i>	Least Madtom	Mississippi Valley Loess Plain	Obion	Warm-Low Gradient-Stream
Fishes	<i>Noturus phaeus</i>	Brown Madtom	Mississippi Valley Loess Plain	Obion	Warm-Low Gradient-Stream
Fishes	<i>Noturus stigmosus</i>	Northern Madtom	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	Blue-Sinking, Licking, Lower Levisa, Lower Ohio, Lower Ohio-Little Pigeon, Middle Fork Kentucky, Rolling Fork, Salt, Silver-Little Kentucky, Upper Levisa	Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Moderately Confined-Medium River, Warm-Moderately Confined-Medium River, Warm-Moderately Confined-Large River
Fishes	<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Obion, Pond, Rough, Tradewater, Upper Green	Open Wetland, Lake/Pond, River/Streams
Fishes	<i>Percina macrocephala</i>	Longhead Darter	Cumberland Plateau, Plateau Escarpment, Knobs, Interior Plateau	Barren, Ohio Brush-Whiteoak, Upper Green	Cool-Medium Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River
Fishes	<i>Percina squamata</i>	Olive Darter	Cumberland Plateau, Plateau Escarpment	Rockcastle, South Fork Cumberland	Cool-High Gradient-Small River, Cool-Confined-Medium River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Fishes	<i>Percopsis omiscomaycus</i>	Trout-perch	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau	Little Sandy, Little Scioto-Tygart, Lower Levisa, Ohio Brush-Whiteoak	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River
Fishes	<i>Phenacobius uranops</i>	Stargazing Minnow	Cumberland Plateau, Plateau Escarpment, Interior Plateau, Interior River Valley And Hills	Barren, Upper Green	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Cool-Confined-Medium River, Cool-Moderately Confined-Medium River, Warm-Confined-Medium River, Warm-Moderately Confined-Medium River
Fishes	<i>Platygobio gracilis</i>	Flathead Chub	Interior River Valley And Hills, Mississippi Alluvial Plain	Unknown	Warm-Unconfined-Large River
Fishes	<i>Polyodon spathula</i>	Paddlefish	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Blue-Sinking, Kentucky Lake, Licking, Little Sandy, Lower Cumberland, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Salt, Silver-Little Kentucky, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland	Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River, Other
Fishes	<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Mississippi Alluvial Plain	Lower Mississippi-Memphis	Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Fishes	<i>Thoburnia atripinnis</i>	Blackfin Sucker	Interior Plateau	Barren	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River
Fishes	<i>Typhlichthys subterraneus</i>	Southern Cavefish	Plateau Escarpment, Interior Plateau	N/A	Cave/Karst
Fishes	<i>Umbra limi</i>	Central Mudminnow	Interior Plateau, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Kentucky Lake, Lower Tennessee, Obion	Forested Wetland, Open Wetland, Lake/Pond, River/Streams

APX 4.3e Freshwater Mussel and Snail SGCN Habitat Type and Range

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Freshwater Mussels and Snails	<i>Actinonaias pectorosa</i>	Pheasantshell	Cumberland Plateau, Plateau Escarpment, Bluegrass, Interior Plateau	Powell, Red, Rockcastle, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Alasmidonta atropurpurea</i>	Cumberland Elktoe	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Interior Plateau	Powell, Rockcastle, South Fork Cumberland, Upper Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Alasmidonta marginata</i>	Elktoe	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	Barren, Licking, Little Sandy, Lower Kentucky, Middle Fork Kentucky, North Fork Kentucky, Rockcastle, Rolling Fork, Rough, Salt, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Alasmidonta viridis</i>	Slippershell Mussel	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau	Barren, Licking, Lower Kentucky, Middle Fork Kentucky, North Fork Kentucky, Rockcastle, Rolling Fork, Rough, Salt, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky	Warm-Medium Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Anodontoides denigrata</i>	Cumberland Papershell	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment	Powell, Rockcastle, Upper Cumberland	Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream
Freshwater Mussels and Snails	<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley and Hills	Barren, Bayou De Chien-Mayfield, Big Sandy, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Sandy, Little Scioto-Tygart, Lower Cumberland, Lower Green, Lower Kentucky, Lower Levisa, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Fork Kentucky, Middle Green, Middle Ohio-Laughery, North Fork Kentucky, Obey, Obion, Ohio Brush-Whiteoak, Pond, Red, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Tradewater, Tug, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky, Upper Levisa	Warm-Low Gradient-Stream
Freshwater Mussels and Snails	<i>Antroselates spiralis</i>	Shaggy Cavesnail	Interior Plateau	N/A	Cave/Karst
Freshwater Mussels and Snails	<i>Callinina georgiana</i>	Banded Mysterysnail	Interior Plateau, Interior River Valley and Hills	N/A	Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Cumberland Plateau, Plateau Escarpment	Barren, Lower Cumberland, Lower Green, Middle Green, Obey, Pond, Powell, Red, Rockcastle, Rough, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Freshwater Mussels and Snails	<i>Cambarunio iris</i>	Rainbow	Bluegrass	Big Sandy, Licking, Little Sandy, Little Scioto-Tygart, Lower Kentucky, Lower Levisa, Middle Fork Kentucky, Middle Ohio-Laughery, North Fork Kentucky, Ohio Brush-Whiteoak, Raccoon-Symmes, Rolling Fork, Saline, Salt, Silver-Little Kentucky, South Fork Kentucky, South Fork Licking, Tug, Upper Kentucky, Upper Levisa	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Unconfined-Medium River
Freshwater Mussels and Snails	<i>Cambarunio taeniatus</i>	Painted Creekshell	Cumberland Plateau, Plateau Escarpment	Lower Cumberland, Red, Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Cumberlandia monodonta</i>	Spectaclecase	Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley and Hills	Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, South Fork Cumberland, Upper Cumberland-Lake Cumberland, Upper Green	Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confin-Medium River, Warm-Confin-Large River
Freshwater Mussels and Snails	<i>Cyprogenia stegaria</i>	Fanshell	Cumberland Plateau, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	Barren, Licking, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Rolling Fork, Upper Green	Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confin-Medium River, Warm-Confin-Large River
Freshwater Mussels and Snails	<i>Dilatata sampsoni</i>	Sampson Sprite	NULL	N/A	NULL
Freshwater Mussels and Snails	<i>Dromus dromas</i>	Dromedary Pearlymussel	Plateau Escarpment, Interior Plateau	South Fork Cumberland	Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confin-Medium River
Freshwater Mussels and Snails	<i>Elimia costifera</i>	Corded Elimia	Cumberland Mountains, Cumberland Plateau, Interior Plateau	Barren, Pond, Red, Salt, South Fork Kentucky, Upper Cumberland, Upper Green	Warm-Low Gradient-Stream
Freshwater Mussels and Snails	<i>Elimia curreyana</i>	Amber Elimia	Interior Plateau	Barren, Upper Green	Warm-Low Gradient-Stream
Freshwater Mussels and Snails	<i>Elimia ebenum</i>	Ebony Elimia	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau	Barren, Blue-Sinking, Licking, Lower Cumberland, Lower Kentucky, Middle Fork Kentucky, Middle Green, North Fork Kentucky, Obey, Ohio Brush-Whiteoak, Red, Rockcastle, Rolling Fork, Rough, Salt, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confin-Medium River
Freshwater Mussels and Snails	<i>Elimia edgariana</i>	Cumberland Elimia	Interior Plateau, Interior River Valley and Hills	Barren, Blue-Sinking, Lower Cumberland, Middle Green, Obey, Red, South Fork Cumberland, Upper Cumberland-Lake Cumberland, Upper Green	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confin-Medium River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Freshwater Mussels and Snails	<i>Elimia laqueata</i>	Panel Elimia	Cumberland Mountains, Interior Plateau, Interior River Valley and Hills	Barren, Blue-Sinking, Lower Cumberland, Middle Green, Obey, Pond, Red, Rockcastle, Rough, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confin-Medium River
Freshwater Mussels and Snails	<i>Elimia livescens</i>	Liver Elimia	Cumberland Plateau, Plateau Escarpment, Bluegrass, Interior Plateau	Barren, Blue-Sinking, Licking, Lower Kentucky, Lower Ohio-Bay, Middle Fork Kentucky, Rockcastle, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Licking, Tradewater, Upper Cumberland, Upper Green	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confin-Medium River
Freshwater Mussels and Snails	<i>Elimia plicatastriata</i>	Carved Elimia	Plateau Escarpment, Knobs, Interior Plateau	Obey, Rockcastle, Rolling Fork, South Fork Cumberland, Upper Cumberland-Lake Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Elipsaria lineolata</i>	Butterfly	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygart, Lower Cumberland, Lower Green, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Raccoon-Symmes, Rolling Fork, Saline, Salt, Silver-Little Kentucky, South Fork Licking, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky	Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Warm-Confin-Medium River, Warm-Confin-Large River
Freshwater Mussels and Snails	<i>Elipio crassidens</i>	Elephantear	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Big Sandy, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Sandy, Little Scioto-Tygart, Lower Cumberland, Lower Green, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Raccoon-Symmes, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, Upper Green	Warm-Confin-Medium River, Warm-Confin-Large River
Freshwater Mussels and Snails	<i>Epioblasma brevidens</i>	Cumberlandian Combshell	Plateau Escarpment, Interior Plateau	South Fork Cumberland, Upper Cumberland-Lake Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confin-Medium River
Freshwater Mussels and Snails	<i>Epioblasma capsaeformis</i>	Oyster Mussel	Plateau Escarpment, Interior Plateau	South Fork Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confin-Medium River
Freshwater Mussels and Snails	<i>Epioblasma obliquata</i>	Catspaw	Bluegrass, Interior Plateau, Interior River Valley and Hills	Licking, Upper Green	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confin-Medium River, Warm-Confin-Large River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Freshwater Mussels and Snails	<i>Epioblasma rangiana</i>	Northern Riffleshell	Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	Licking	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Epioblasma triquetra</i>	Snuffbox	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	Licking, Little Scioto-Tygarts, Middle Fork Kentucky, Ohio Brush-Whiteoak, Red, Rolling Fork, South Fork Kentucky, Upper Green, Upper Kentucky	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Epioblasma walkeri</i>	Tan Riffleshell	Plateau Escarpment, Interior Plateau	South Fork Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River
Freshwater Mussels and Snails	<i>Eupera cubensis</i>	Mottled Fingernailclam	Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Other
Freshwater Mussels and Snails	<i>Ferrissia californica</i>	Fragile Ancyliid	Cumberland Plateau, Bluegrass, Interior Plateau, Mississippi Valley Loess Plain	Barren, Little Sandy, Little Scioto-Tygarts, Lower Kentucky, Lower Levisa, Lower Tennessee, Red, South Fork Licking, Upper Green	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River
Freshwater Mussels and Snails	<i>Ferrissia rivularis</i>	Creeping Ancyliid	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Bayou De Chien-Mayfield, Big Sandy, Blue-Sinking, Licking, Little Sandy, Little Scioto-Tygarts, Lower Green, Lower Kentucky, Lower Levisa, Lower Tennessee, Middle Fork Kentucky, Middle Green, Middle Ohio-Laughery, North Fork Kentucky, Obey, Ohio Brush-Whiteoak, Red, Rockcastle, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Tradewater, Tug, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River
Freshwater Mussels and Snails	<i>Fusconaia subrotunda</i>	Longsolid	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Green, Lower Levisa, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, North Fork Kentucky, South Fork Kentucky, Upper Green	Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Gyraulus deflectus</i>	Flexed Gyro	NULL	N/A	NULL
Freshwater Mussels and Snails	<i>Gyraulus parvus</i>	Ash Gyro	Cumberland Mountains, Cumberland Plateau, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Bayou De Chien-Mayfield, Blue-Sinking, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Tennessee, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Pond, Rolling Fork, Rough, Salt, Silver-Little Kentucky, Tug, Upper Cumberland	NULL
Freshwater Mussels and Snails	<i>Hemistena lata</i>	Cracking Pearlymussel	Plateau Escarpment, Bluegrass, Interior Plateau	Unknown	Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Freshwater Mussels and Snails	<i>Laevapex fuscus</i>	Dusky Anclid	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Blue-Sinking, Licking, Lower Cumberland, Lower Kentucky, Lower Ohio-Bay, Lower Tennessee, Middle Fork Kentucky, Middle Green, Middle Ohio-Laughery, North Fork Kentucky, Obion, Ohio Brush-Whiteoak, Red, Rockcastle, Rolling Fork, Salt, South Fork Cumberland, South Fork Kentucky, South Fork Licking, Tradewater, Tug, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Lampsilis abrupta</i>	Pink Mucket	Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	Barren, Kentucky Lake, Licking, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Middle Ohio-Laughery, Upper Green, Upper Mississippi-Cape Girardeau	Warm-Low Gradient-Small River, Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Lampsilis hydana</i>	Louisiana Fatmucket	Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Obion	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Lampsilis ovata</i>	Pocketbook	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygart, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Raccoon-Symmes, Rockcastle, Rolling Fork, Saline, Silver-Little Kentucky, South Fork Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Mississippi-Cape Girardeau	Warm-Low Gradient-Small River, Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Lasmigona compressa</i>	Creek Heelsplitter	Cumberland Plateau, Bluegrass, Knobs	Little Scioto-Tygart, Ohio Brush-Whiteoak, Raccoon-Symmes	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Leaunio lienosus</i>	Little Spectaclecase	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Barren, Bayou De Chien-Mayfield, Highland-Pigeon, Little Sandy, Lower Green, Lower Kentucky, Lower Levisa, Lower Tennessee, Middle Fork Kentucky, Middle Green, Obion, Ohio Brush-Whiteoak, Pond, Rockcastle, Rolling Fork, Rough, South Fork Kentucky, Upper Green, Upper Kentucky	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Leaunio ortmanni</i>	Kentucky Creekshell	Interior Plateau, Interior River Valley and Hills	Barren, Rough, Upper Green	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Leaunio pataecus</i>	Dwarf Rainbow	Interior Plateau	Lower Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Leaunio vanuxemensis</i>	Mountain Creekshell	Interior Plateau	Lower Cumberland, Red	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Leptodea leptodon</i>	Scaleshell	Bluegrass, Interior Plateau	Unknown	Warm-Confinde-Medium River, Warm-Confinde-Large River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Freshwater Mussels and Snails	<i>Leptoxis praerosa</i>	Onyx Rocksnail	Cumberland Plateau, Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley and Hills	Barren, Licking, Lower Kentucky, Lower Ohio, Middle Ohio-Laughery, Red, Rockcastle, Silver-Little Kentucky, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green	Warm-Low Gradient-Small River, Warm-Confined-Medium River
Freshwater Mussels and Snails	<i>Leptoxis trilineata</i>	Broad Mudalia	Bluegrass	N/A	Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Ligumia recta</i>	Black Sandshell	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Bayou De Chien-Mayfield, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygart, Lower Cumberland, Lower Green, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Rockcastle, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Licking, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Levisa, Upper Mississippi-Cape Girardeau	Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Lioplax sulculosa</i>	Furrowed Lioplax	Bluegrass, Interior River Valley and Hills	Barren, Blue-Sinking, Licking, Lower Kentucky, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Rough, Salt, South Fork Licking	Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Lithasia armigera</i>	Armored Rocksnail	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	Highland-Pigeon, Kentucky Lake, Lower Cumberland, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Red, Upper Cumberland-Lake Cumberland	Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Lithasia curta</i>	Knobby Rocksnail	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Lithasia geniculata</i>	Ornate Rocksnail	Plateau Escarpment, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Lithasia salebrosa</i>	Muddy Rocksnail	Interior Plateau, Interior River Valley and Hills	N/A	Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Lithasia verrucosa</i>	Varicose Rocksnail	Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Medionidus conradicus</i>	Cumberland Moccasinshell	Plateau Escarpment, Bluegrass, Interior Plateau	Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland	Warm-Low Gradient-Stream, Warm-Confined-Gradient-Small River, Warm-Confined-Medium River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Freshwater Mussels and Snails	<i>Obovaria olivaria</i>	Hickorynut	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Barren, Bayou De Chien-Mayfield, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Lower Cumberland, Lower Green, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Upper Green, Upper Mississippi-Cape Girardeau	Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Obovaria retusa</i>	Ring Pink	Cumberland Plateau, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	Upper Green	Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Obovaria subrotunda</i>	Round Hickorynut	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	Highland-Pigeon, Licking, Middle Fork Kentucky, South Fork Kentucky, South Fork Licking, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Paetulinio fabalis</i>	Rayed Bean	Plateau Escarpment, Bluegrass, Interior Plateau	Licking	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Pegias fabula</i>	Littlewing Pearlymussel	Plateau Escarpment, Interior Plateau	Rockcastle, South Fork Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Physa pomilia</i>	Claiborne Physa	Interior Plateau, Interior River Valley And Hills	Lower Ohio-Bay, Rolling Fork, Salt, Upper Green	Warm-Low Gradient-Small River, Warm-Confined-Medium River
Freshwater Mussels and Snails	<i>Physella globosa</i>	Globose Physa	NULL	N/A	NULL
Freshwater Mussels and Snails	<i>Pisidium compressum</i>	Ridgedbeaked Peaclam	Cumberland Mountains, Interior Plateau	Lower Cumberland, Powell, Red, Upper Cumberland	Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Planorbula armigera</i>	Thicklip Rams Horn	NULL	Lower Green, Lower Ohio-Bay	NULL
Freshwater Mussels and Snails	<i>Plethobasus cicatricosus</i>	White Wartyback	Bluegrass, Interior Plateau, Interior River Valley and Hills	Blue-Sinking, Lower Ohio-Little Pigeon, Lower Tennessee, Silver-Little Kentucky	Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	Bluegrass, Interior Plateau, Interior River Valley and Hills	Kentucky Lake, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Upper Mississippi-Cape Girardeau	Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Plethobasus cyphus</i>	Sheepnose	Cumberland Plateau, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygart, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Raccoon-Symmes, Upper Green, Upper Mississippi-Cape Girardeau	Warm-Confined-Medium River, Warm-Confined-Large River
Freshwater Mussels and Snails	<i>Pleurobema clava</i>	Clubshell	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	Licking, Rough, Upper Green	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confined-Medium River, Warm-Confined-Large River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Freshwater Mussels and Snails	<i>Pleurobema cordatum</i>	Ohio Pigtoe	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Green, Lower Kentucky, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Cumberland, South Fork Licking, Upper Cumberland-Lake Cumberland, Upper Green, Upper Mississippi-Cape Girardeau	Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Pleurobema oviforme</i>	Tennessee Clubshell	Plateau Escarpment, Interior Plateau	Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Pleurobema plenum</i>	Rough Pigtoe	Bluegrass, Interior Plateau, Interior River Valley And Hills	Barren, Licking, Middle Green, Upper Green	Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	Barren, Blue-Sinking, Highland-Pigeon, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Kentucky, Lower Ohio-Bay, Lower Tennessee, Middle Green, North Fork Kentucky, Obey, Ohio Brush-Whiteoak, Pond, Red, Rolling Fork, Rough, Salt, South Fork Kentucky, South Fork Licking, Tradewater, Upper Cumberland, Upper Green, Upper Kentucky	Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Pleurocera acuta</i>	Sharp Hornsnail	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	Barren, Blue-Sinking, Highland-Pigeon, Licking, Little Scioto-Tygarts, Lower Cumberland, Lower Kentucky, Lower Ohio-Bay, Lower Tennessee, Middle Green, North Fork Kentucky, Obey, Ohio Brush-Whiteoak, Pond, Red, Rolling Fork, Rough, Salt, South Fork Kentucky, South Fork Licking, Tradewater, Upper Cumberland, Upper Green, Upper Kentucky	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Pleurocera alveare</i>	Rugged Hornsnail	Interior Plateau, Interior River Valley and Hills	Barren, Middle Green, Red, Rough, Upper Green	Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Pleurocera canaliculata</i>	Silty Hornsnail	Cumberland Plateau, Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Little Sandy, Little Scioto-Tygarts, Lower Cumberland, Lower Kentucky, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Green, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Red, Rolling Fork, Rough, Salt, Silver-Little Kentucky, South Fork Kentucky, South Fork Licking, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, Upper Kentucky	Warm-Low Gradient-Small River, Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Pleurocera curta</i>	Shortspire Hornsnail	Plateau Escarpment, Interior Plateau, Interior River Valley and Hills	Kentucky Lake, Lower Tennessee, Red, Rockcastle, Upper Cumberland, Upper Cumberland-Lake Cumberland	Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Pleurocera walkeri</i>	Telescope Hornsnail	Interior Plateau	N/A	Warm-Low Gradient-Small River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Freshwater Mussels and Snails	<i>Pleuroaia dolabelloides</i>	Slabside Pearlymussel	Interior Plateau	Red	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Pomatiopsis cincinnatiensis</i>	Brown Walker	Bluegrass, Knobs	Licking, Little Scioto-Tygart, Silver-Little Kentucky, South Fork Licking, Upper Green	Warm-Low Gradient-Small River, Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Potamilus capax</i>	Fat Pocketbook	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	Highland-Pigeon, Lower Cumberland, Lower Green, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Saline, Silver-Little Kentucky, Tradewater, Upper Mississippi-Cape Girardeau	Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Potamilus purpuratus</i>	Bleufer	Bluegrass, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Kentucky Lake, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, Ohion, Upper Mississippi-Cape Girardeau	Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Promenetus exacuouus</i>	Sharp Sprite	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Mississippi Valley Loess Plain	Lower Kentucky, Lower Tennessee, North Fork Kentucky, Ohio Brush-Whiteoak, Rockcastle, Upper Green	NULL
Freshwater Mussels and Snails	<i>Ptychobranchnus subtentus</i>	Fluted Kidneyshell	Cumberland Plateau, Plateau Escarpment, Interior Plateau	Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland	Warm-Low Gradient-Small River, Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Quadrula fragosa</i>	Winged Mapleleaf	Bluegrass, Interior Plateau	Unknown	Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Rhodacme elatior</i>	Domed Ancyliid	Plateau Escarpment, Interior Plateau	Upper Green, Upper Kentucky	Warm-Low Gradient-Small River, Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Rhodacme hinkleyi</i>	Knobby Ancyliid	Interior Plateau, Interior River Valley and Hills	Licking, Lower Kentucky, Red, Rockcastle, Rough, Upper Green	Warm-Low Gradient-Small River, Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Sagittunio subrostratus</i>	Pondmussel	Interior River Valley And Hills, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Ohio-Bay, Lower Tennessee	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Simpsonaia ambigua</i>	Salamander Mussel	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	Licking, Lower Kentucky, Middle Fork Kentucky, Middle Ohio-Laughery, Ohio Brush-Whiteoak, Rolling Fork, Salt, South Fork Licking, Upper Green, Upper Kentucky	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Somatogyrus integra</i>	Ohio Pebblesnail	Bluegrass	Salt	Warm-Low Gradient-Small River, Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Somatogyrus trothis</i>	A Freshwater Snail	NULL	Licking, Lower Ohio-Little Pigeon	Warm-Low Gradient-Small River, Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Sphaerium striatum</i>	Striated Fingernailclam	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Mississippi Valley Loess Plain	Barren, Licking, Little Sandy, Little Scioto-Tygart, Lower Cumberland, Lower Kentucky, Lower Levisa, Lower Tennessee, Powell, Red, Rockcastle, Rolling Fork, Salt, Silver-Little Kentucky, South Fork Licking, Upper Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confinde-Medium River, Warm-Moderately Confinde-Large River

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Freshwater Mussels and Snails	<i>Theiladerma cylindrica</i>	Rabbitsfoot	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Barren, Blue-Sinking, Highland-Pigeon, Kentucky Lake, Licking, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Ohio-Little Pigeon, Lower Tennessee, Middle Ohio-Laughery, Red, Rolling Fork, Rough, South Fork Kentucky, Upper Green, Upper Mississippi-Cape Girardeau	Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Toxolasma lividum</i>	Purple Lilliput	Cumberland Plateau, Plateau Escarpment, Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Licking, Lower Cumberland, Lower Tennessee, Rockcastle, Rolling Fork, Salt, South Fork Cumberland, Upper Cumberland-Lake Cumberland, Upper Green	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confinde-Medium River
Freshwater Mussels and Snails	<i>Toxolasma texasiense</i>	Texas Lilliput	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Mississippi-Memphis, Lower Tennessee, Obion, Tradewater	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Trifogonia nobilis</i>	Gulf Mapleleaf	Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	Bayou De Chien-Mayfield, Lower Cumberland, Lower Mississippi-Memphis, Lower Ohio, Lower Ohio-Bay, Lower Tennessee, Upper Mississippi-Cape Girardeau	Warm-Confinde-Medium River, Warm-Confinde-Large River
Freshwater Mussels and Snails	<i>Uniomereus tetralasmus</i>	Pondhorn	Bluegrass, Interior River Valley and Hills	Bayou De Chien-Mayfield, Highland-Pigeon, Lower Cumberland, Lower Green, Lower Mississippi-Memphis, Lower Ohio, Lower Tennessee, Obion, Rough, Tradewater, Upper Mississippi-Cape Girardeau	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River
Freshwater Mussels and Snails	<i>Venustaconcha troostensis</i>	Cumberland Bean	Cumberland Plateau, Plateau Escarpment, Interior Plateau	Rockcastle, South Fork Cumberland, Upper Cumberland-Lake Cumberland	Warm-Low Gradient-Stream, Warm-Low Gradient-Small River, Warm-Confinde-Medium River

APX 4.3f Insect and Springtail SGCN Habitat Type and Range

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Insects and Springtails	<i>Acroneuria covelli</i>	River Stone	Bluegrass, Knobs	N/A	Other
Insects and Springtails	<i>Acroneuria hitchcocki</i>	Kentucky Stone	Plateau Escarpment	N/A	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream
Insects and Springtails	<i>Agapetus gelbae</i>		Bluegrass	N/A	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream
Insects and Springtails	<i>Agapetus kirchneri</i>		Cumberland Mountains, Cumberland Plateau, Plateau Escarpment	N/A	NULL
Insects and Springtails	<i>Allocapnia cunninghami</i>	Karst Snowfly	Interior Plateau	N/A	Cool-Medium Gradient-Stream
Insects and Springtails	<i>Amphiagrion saucium</i>	Eastern Red Damselfly	Cumberland Mountains, Cumberland Plateau, Mississippi Valley Loess Plain	N/A	Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cold-Low Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Other
Insects and Springtails	<i>Arigomphus maxwelli</i>	Bayou Clubtail	Mississippi Valley Loess Plain	N/A	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Other
Insects and Springtails	<i>Bombus pensylvanicus</i>	American Bumble Bee	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah
Insects and Springtails	<i>Calephelis borealis</i>	Northern Metalmark	Cumberland Plateau, Plateau Escarpment, Bluegrass	N/A	Grassland/Savannah
Insects and Springtails	<i>Calephelis muticum</i>	Swamp Metalmark	Bluegrass, Interior Plateau, Interior River Valley and Hills	N/A	Grassland/Savannah, Open Wetland
Insects and Springtails	<i>Callophrys irus</i>	Frosted Elfin	Cumberland Mountains	N/A	Grassland/Savannah
Insects and Springtails	<i>Calopteryx dimidiata</i>	Sparkling Jewelwing	Cumberland Plateau, Interior Plateau	N/A	NULL
Insects and Springtails	<i>Celithemis verna</i>	Double-ringed Pennant	Interior Plateau, Mississippi Valley Loess Plain	N/A	Other
Insects and Springtails	<i>Chlosyne gorgone</i>	Gorgone Checkerspot	Knobs, Interior Plateau	N/A	Grassland/Savannah

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Insects and Springtails	<i>Danaus plexippus plexippus</i>	Monarch	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Mesic Forest, Xeric Forest, Open Wetland, Ag, Urban, Suburban, Scrub-Shrub/Early Successional Forest
Insects and Springtails	<i>Enallagma daeckii</i>	Attenuated Bluet	Interior Plateau, Mississippi Valley Loess Plain	N/A	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Other
Insects and Springtails	<i>Erora laeta</i>	Early Hairstreak	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Interior Plateau	N/A	Mesic Forest, Xeric Forest
Insects and Springtails	<i>Erynnis martialis</i>	Mottled Duskywing	Interior Plateau, Interior River Valley and Hills	N/A	Grassland/Savannah
Insects and Springtails	<i>Euphyes dukesi</i>	Dukes' Skipper	Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Forested Wetland, Grassland/Savannah
Insects and Springtails	<i>Gomphurus hybridus</i>	Cocoa Clubtail	Interior Plateau, Interior River Valley and Hills	N/A	NULL
Insects and Springtails	<i>Hansonoperla hokolesqua</i>	Splendid Stone	Plateau Escarpment, Knobs	N/A	Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream
Insects and Springtails	<i>Hydroptila coweetensis</i>	A Hydroptilid Caddisfly	Cumberland Plateau, Plateau Escarpment	N/A	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream
Insects and Springtails	<i>Hydroptila decia</i>	Knoxville Hydroptilan Micro Caddisfly	Cumberland Plateau, Plateau Escarpment	N/A	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream
Insects and Springtails	<i>Hydroptila howelli</i>	A Hydroptilid Caddisfly	Knobs, Interior Plateau	N/A	Cool-Medium Gradient-Stream
Insects and Springtails	<i>Hydroptila kuehnei</i>	A Hydroptilid Caddisfly	Knobs, Interior Plateau	N/A	Cool-Medium Gradient-Stream
Insects and Springtails	<i>Hystrichophora loricana</i>	An Olethreutine Moth	Bluegrass	N/A	Grassland/Savannah
Insects and Springtails	<i>Lepidostoma ethieri</i>	A Lepidostomatid Caddisfly	Cumberland Mountains	N/A	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream
Insects and Springtails	<i>Leuctra schusteri</i>	Karst Needlefly	Interior Plateau	N/A	Cold-Medium Gradient-Stream
Insects and Springtails	<i>Litobrancha recurvata</i>	A Burrowing Mayfly	Cumberland Mountains	N/A	NULL

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Insects and Springtails	<i>Lyttosia permagnaria</i>	A Geometrid Moth	Cumberland Mountains, Cumberland Plateau, Interior Plateau	N/A	Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest
Insects and Springtails	<i>Maccaffertium bednariki</i>	A Heptageniid Mayfly	Cumberland Plateau, Knobs, Interior Plateau	N/A	Cool-Medium Gradient-Stream, Warm-Medium Gradient-Stream
Insects and Springtails	<i>Manophylax butleri</i>	Bottle Cap Caddisfly	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment	N/A	NULL
Insects and Springtails	<i>Mesamia straminea</i>	Helianthus Leafhopper	Interior Plateau	N/A	Grassland/Savannah
Insects and Springtails	<i>Nannothemis bella</i>	Elfin Skimmer	Plateau Escarpment, Knobs, Interior Plateau	N/A	Other
Insects and Springtails	<i>Nehalennia gracilis</i>	Sphagnum Sprite	Mississippi Valley Loess Plain	N/A	Other
Insects and Springtails	<i>Nehalennia integricollis</i>	Southern Sprite	Interior Plateau, Mississippi Valley Loess Plain	N/A	Other
Insects and Springtails	<i>Nehalennia irene</i>	Sedge Sprite	Bluegrass	N/A	Other
Insects and Springtails	<i>Neophylax lewisae</i>		Interior Plateau	N/A	Cool-Medium Gradient-Stream
Insects and Springtails	<i>Ophiogomphus howei</i>	Pygmy Snaketail	Cumberland Plateau, Plateau Escarpment	N/A	Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cold-Low Gradient-Stream
Insects and Springtails	<i>Ophiogomphus mainensis</i>	Maine Snaketail	Plateau Escarpment, Interior Plateau	N/A	Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River
Insects and Springtails	<i>Papaipema beeriana</i>	Blazing Star Stem Borer	Bluegrass, Interior Plateau	N/A	Grassland/Savannah
Insects and Springtails	<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth	Interior Plateau	N/A	Grassland/Savannah
Insects and Springtails	<i>Papaipema leucostigma</i>	Columbine Borer Moth	Interior Plateau	N/A	Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest
Insects and Springtails	<i>Papaipema silphii</i>	Silphium Borer Moth	Plateau Escarpment	N/A	Grassland/Savannah
Insects and Springtails	<i>Papaipema sp. 5</i>	Rare Cane Borer Moth	Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Lake/Pond, River/Streams, Floodplain/Sandbar
Insects and Springtails	<i>Papaipema speciosissima</i>	Osmunda Borer Moth	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Insects and Springtails	<i>Poanes viator</i>	Broad-winged Skipper	Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland
Insects and Springtails	<i>Polycentropus neiswanderi</i>	A Polycentropodid Caddisfly	Knobs, Interior Plateau	N/A	Cool-Medium Gradient-Stream
Insects and Springtails	<i>Prairiana kansana</i>	A Cicadellid Leafhopper	Interior Plateau	N/A	Grassland/Savannah
Insects and Springtails	<i>Pseudanopthalmus caecus</i>	Clifton Cave Beetle	Bluegrass	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus calcareus</i>	Limestone Cave Beetle	Cumberland Plateau	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus catorcyctos</i>	Lesser Adams Cave Beetle	Bluegrass	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus cnephosus</i>	A Cave Obligate Beetle	Knobs	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus conditus</i>	Hidden Cave Beetle	Bluegrass	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus frigidus</i>	Icebox Cave Beetle	Cumberland Plateau	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus globiceps</i>	Round-headed Cave Beetle	Interior River Valley And Hills	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus homi</i>	Garman's Cave Beetle	Bluegrass	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus hypolithos</i>	Ashcamp Cave Beetle	Cumberland Plateau	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus inexpectatus</i>	Surprising Cave Beetle	Interior Plateau, Interior River Valley And Hills	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus major</i>	Beaver Cave Beetle	Bluegrass	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus pholeter</i>	Greater Adams Cave Beetle	Bluegrass	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus pubescens intrepidus</i>	A Cave Obligate Beetle	Interior Plateau	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus puteanus</i>	Old Well Cave Beetle	Bluegrass	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus rogersae</i>	Rogers' Cave Beetle	Cumberland Mountains	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus scholasticus</i>	Scholarly Cave Beetle	Cumberland Mountains	N/A	Cave/Karst
Insects and Springtails	<i>Pseudanopthalmus troglodytes</i>	Louisville Cave Beetle	Bluegrass	N/A	Cave/Karst

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Insects and Springtails	<i>Pseudosinella espanita</i>	A Cave Obligate Springtail	Interior Plateau	N/A	Cave/Karst
Insects and Springtails	<i>Rasvena tema</i>	Vermont Salifly	Cumberland Mountains, Cumberland Plateau	N/A	Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream
Insects and Springtails	<i>Rhyacophila appalachia</i>	A Rhyacophilid Caddisfly	Cumberland Plateau	N/A	Cool-Medium Gradient-Stream
Insects and Springtails	<i>Satyrium favonius ontario</i>	Northern Oak Hairstreak	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Mesic Forest, Xeric Forest
Insects and Springtails	<i>Soyedina calcareo</i>	Karst Forestfly	Interior Plateau	N/A	Cold-Medium Gradient-Stream, Cool-Medium Gradient-Stream
Insects and Springtails	<i>Speyeria diana</i>	Diana Fritillary	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs	N/A	Grassland/Savannah, Mesic Forest, Scrub-Shrub/Early Successional Forest
Insects and Springtails	<i>Stylurus notatus</i>	Elusive Clubtail	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	N/A	Cool-Confined-Large River, Warm-Confined Large River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River, Other
Insects and Springtails	<i>Stylurus scudleri</i>	Zebra Clubtail	Cumberland Mountains, Plateau Escarpment, Knobs, Interior Plateau	N/A	Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cool-Low Gradient-Stream, Warm-High Gradient-Stream, Warm-Medium Gradient-Stream, Warm-Low Gradient-Stream, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River, Cool-Low Gradient-Small River, Warm-High Gradient-Small River, Warm-Medium Gradient-Small River, Warm-Low Gradient-Small River, Other
Insects and Springtails	<i>Telegonus cellus</i>	Gold-banded Skipper	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs	N/A	Grassland/Savannah, Scrub-Shrub/Early Successional Forest
Insects and Springtails	<i>Tomocerus missus</i>	A Cave Obligate Springtail	Interior Plateau	N/A	Cave/Karst

APX 4.3g Mammal SGCN Habitat Type and Range

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Mammals	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Cave/Karst, Cliff/Rockshelter, Forested Wetland, Mesic Forest, Xeric Forest
Mammals	<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Cumberland Plateau, Plateau Escarpment, Knobs	N/A	Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest
Mammals	<i>Lasionycteris noctivagans</i>	Silver-haired Bat	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest
Mammals	<i>Lasiurus seminolus</i>	Seminole Bat	Knobs, Interior Plateau, Interior River Valley And Hills	N/A	Mesic Forest, Xeric Forest
Mammals	<i>Mustela frenata</i>	Long-tailed Weasel	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills	N/A	Forested Wetland, Mesic Forest, Open Wetland, Scrub-Shrub/Early Successional Forest
Mammals	<i>Mustela nivalis</i>	Least Weasel	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs	N/A	Forested Wetland, Grassland/Savannah, Mesic Forest, Ag
Mammals	<i>Myodes gapperi maurus</i>	Kentucky Red-backed Vole	Cumberland Mountains, Cumberland Plateau	N/A	Forested Wetland, Mesic Forest
Mammals	<i>Myotis austroriparius</i>	Southeastern Myotis	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Cave/Karst, Forested Wetland, Mesic Forest, Open Wetland
Mammals	<i>Myotis grisescens</i>	Gray Myotis	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Cave/Karst, River/Streams
Mammals	<i>Myotis leibii</i>	Eastern Small-footed Myotis	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	N/A	Cave/Karst, Cliff/Rockshelter
Mammals	<i>Myotis lucifugus</i>	Little Brown Bat	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Cave/Karst, Cliff/Rockshelter, Forested Wetland, Mesic Forest, Xeric Forest, Ag, Urban, Suburban

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Mammals	<i>Myotis septentrionalis</i>	Northern Long-Eared Bat	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest
Mammals	<i>Myotis sodalis</i>	Indiana Bat	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Cave/Karst, Cliff/Rockshelter, Forested Wetland, Mesic Forest, Xeric Forest
Mammals	<i>Neotoma magister</i>	Allegheny Woodrat	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	N/A	Cave/Karst, Cliff/Rockshelter, Mesic Forest, Xeric Forest
Mammals	<i>Ondatra zibethicus</i>	Muskrat	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams
Mammals	<i>Oryzomys palustris</i>	Marsh Rice Rat	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Open Wetland, Floodplain/Sandbar
Mammals	<i>Parascalops breweri</i>	Hairy-tailed Mole	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass	N/A	Mesic Forest, Ag, Scrub-Shrub/Early Successional Forest
Mammals	<i>Perimyotis subflavus</i>	Tricolored Bat	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Cave/Karst, Cliff/Rockshelter, Forested Wetland, Mesic Forest, Xeric Forest
Mammals	<i>Peromyscus gossypinus</i>	Cotton Mouse	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, Open Wetland, Floodplain/Sandbar, Scrub-Shrub/Early Successional Forest
Mammals	<i>Peromyscus maniculatus nubiterrae</i>	Cloudland Deer Mouse	Cumberland Mountains, Cumberland Plateau	N/A	Mesic Forest
Mammals	<i>Sorex cinereus</i>	Cinereus Shrew	Cumberland Mountains, Cumberland Plateau, Interior Plateau, Interior River Valley and Hills	N/A	Forested Wetland, Grassland/Savannah, Mesic Forest

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Mammals	<i>Sorex dispar blitchi</i>	Long-tailed Shrew	Cumberland Mountains, Cumberland Plateau	N/A	Cliff/Rockshelter, Mesic Forest
Mammals	<i>Sorex fumeus</i>	Smoky Shrew	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau	N/A	Forested Wetland, Mesic Forest, Floodplain/Sandbar
Mammals	<i>Sorex hoyi</i>	Pygmy Shrew	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Forested Wetland, Grassland/Savannah, Mesic Forest, Open Wetland
Mammals	<i>Sorex longirostris</i>	Southeastern Shrew	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, Floodplain/Sandbar
Mammals	<i>Spilogale putorius</i>	Eastern Spotted Skunk	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs	N/A	Cliff/Rockshelter, Mesic Forest
Mammals	<i>Sylvilagus aquaticus</i>	Swamp Rabbit	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Grassland/Savannah, Open Wetland, Scrub-Shrub/Early Successional Forest
Mammals	<i>Sylvilagus obscurus</i>	Appalachian Cottontail	Cumberland Mountains, Cumberland Plateau	N/A	Mesic Forest
Mammals	<i>Synaptomys cooperi</i>	Southern Bog Lemming	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	N/A	Grassland/Savannah, Mesic Forest, Open Wetland, Scrub-Shrub/Early Successional Forest
Mammals	<i>Taxidea taxus</i>	American Badger	Interior Plateau, Interior River Valley and Hills	N/A	Grassland/Savannah, Ag
Mammals	<i>Urocyon cinereoargenteus</i>	Gray Fox	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, Scrub-Shrub/Early Successional Forest

APX 4.3h Plant SGCN Habitat Type and Range

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Plants	<i>Actaea rubifolia</i>	Appalachian Bugbane	Interior Plateau, Interior River Valley and Hills	N/A	Mesic Forest
Plants	<i>Agalinis auriculata</i>	Earleaf False Foxglove	Bluegrass, Interior Plateau	N/A	Grassland/Savannah
Plants	<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Plateau Escarpment	N/A	Grassland/Savannah
Plants	<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Plateau Escarpment	N/A	Cliff/Rockshelter
Plants	<i>Apios priceana</i>	Price's Potato-bean	Interior Plateau	N/A	Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest
Plants	<i>Arabis patens</i>	Spreading Rockcress	Interior Plateau	N/A	Cliff/Rockshelter, Xeric Forest
Plants	<i>Aureolaria patula</i>	Spreading False Foxglove	Plateau Escarpment, Interior Plateau	N/A	Mesic Forest
Plants	<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Interior Plateau	N/A	Grassland/Savannah
Plants	<i>Berberis canadensis</i>	American Barberry	Plateau Escarpment	N/A	Grassland/Savannah, Xeric Forest
Plants	<i>Borodinia perstellata</i>	Braun's Rockcress	Bluegrass	N/A	Mesic Forest, Xeric Forest
Plants	<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Plateau Escarpment	N/A	Grassland/Savannah, River/Streams
Plants	<i>Carex decomposita</i>	Epiphytic Sedge	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland
Plants	<i>Carex juniperorum</i>	Juniper Sedge	Bluegrass	N/A	Grassland/Savannah
Plants	<i>Carex roanensis</i>	Roan Mountain Sedge	Cumberland Mountains	N/A	Mesic Forest, Xeric Forest
Plants	<i>Carex timida</i>	Timid Sedge	Plateau Escarpment, Bluegrass, Interior Plateau	N/A	Mesic Forest, Xeric Forest
Plants	<i>Clinopodium glabellum</i>	Savory	Bluegrass	N/A	Grassland/Savannah, Xeric Forest
Plants	<i>Collinsonia verticillata</i>	Whorled Horse-balm	Cumberland Mountains	N/A	Mesic Forest
Plants	<i>Conradina verticillata</i>	Cumberland Rosemary	Plateau Escarpment	N/A	Grassland/Savannah, River/Streams

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Plants	<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Cumberland Plateau, Plateau Escarpment	N/A	Mesic Forest, Floodplain/Sandbar
Plants	<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Interior Plateau, Interior River Valley and Hills	N/A	Grassland/Savannah
Plants	<i>Eriogonum harperi</i>	Harper's Wild Fleabane	Interior Plateau	N/A	Grassland/Savannah
Plants	<i>Eurybia saxicastellii</i>	Rockcastle Aster	Plateau Escarpment	N/A	Grassland/Savannah, River/Streams, Scrub-Shrub/Early Successional Forest
Plants	<i>Fimbristylis perpusilla</i>	Harper's fimbry	Interior Plateau, Mississippi Valley Loess Plain	N/A	Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar
Plants	<i>Glandularia canadensis</i>	Rose Mock-vervain	Interior Plateau	N/A	Cliff/Rockshelter, Mesic Forest
Plants	<i>Gratiola quartermanniae</i>	Quartermann's Hedge-hyssop	Interior Plateau	N/A	Grassland/Savannah, Open Wetland
Plants	<i>Helianthus eggerthii</i>	Eggert's Sunflower	Interior Plateau	N/A	Grassland/Savannah, Scrub-Shrub/Early Successional Forest
Plants	<i>Hexastylis contracta</i>	Southern Heartleaf	Plateau Escarpment	N/A	Mesic Forest
Plants	<i>Leavenworthia exigua</i> var. <i>laciniata</i>	Kentucky Gladecress	Bluegrass	N/A	Grassland/Savannah
Plants	<i>Marshallia pulchra</i>	Barbara's Buttons	Plateau Escarpment	N/A	Grassland/Savannah, River/Streams
Plants	<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Plateau Escarpment	N/A	Cliff/Rockshelter
Plants	<i>Monotropsis odorata</i>	Sweet Pinesap	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment	N/A	Xeric Forest
Plants	<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Interior Plateau	N/A	Grassland/Savannah
Plants	<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Interior Plateau	N/A	Forested Wetland, Open Wetland
Plants	<i>Paxistima canbyi</i>	Canby's Mountain-lover	Plateau Escarpment, Bluegrass, Knobs	N/A	Cliff/Rockshelter, Xeric Forest
Plants	<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Interior Plateau	N/A	Grassland/Savannah
Plants	<i>Physaria globosa</i>	Globe Bladderpod	Bluegrass	N/A	Xeric Forest

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Plants	<i>Platanthera integrilabia</i>	White Fringeless Orchid	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment	N/A	Forested Wetland, Grassland/Savannah, Open Wetland
Plants	<i>Polymnia laevigata</i>	Tennessee Leafcup	Mississippi Alluvial Plain	N/A	Mesic Forest
Plants	<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Cumberland Plateau, Plateau Escarpment	N/A	Cold-High Gradient-Stream, Cold-Medium Gradient-Stream, Cool-High Gradient-Stream, Cool-Medium Gradient-Stream, Cold-High Gradient-Small River, Cold-Medium Gradient-Small River, Cool-High Gradient-Small River, Cool-Medium Gradient-Small River
Plants	<i>Primula frenchii</i>	French's Shooting Star	Plateau Escarpment, Interior River Valley And Hills	N/A	Cliff/Rockshelter
Plants	<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Interior Plateau	N/A	Grassland/Savannah
Plants	<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Cumberland Plateau, Bluegrass, Knobs	N/A	Scrub-Shrub/Early Successional Forest
Plants	<i>Sabulina fontinalis</i>	Water Stitchwort	Bluegrass	N/A	Forested Wetland
Plants	<i>Schisandra glabra</i>	Bay Starvine	Cumberland Plateau, Plateau Escarpment	N/A	Mesic Forest
Plants	<i>Schoenoplectiella hallii</i>	Hall's Bulrush	Interior Plateau	N/A	Open Wetland, Lake/Pond
Plants	<i>Schwalbea americana</i>	Chaffseed	Plateau Escarpment	N/A	Grassland/Savannah
Plants	<i>Scutellaria saxatilis</i>	Rock Skullcap	Cumberland Mountains, Plateau Escarpment	N/A	Mesic Forest, Xeric Forest
Plants	<i>Silene ovata</i>	Ovate Catchfly	Cumberland Mountains, Plateau Escarpment, Interior River Valley and Hills	N/A	Cliff/Rockshelter, Xeric Forest
Plants	<i>Silene regia</i>	Royal Catchfly	Interior Plateau, Interior River Valley and Hills	N/A	Grassland/Savannah
Plants	<i>Silphium wasiotense</i>	Appalachian Rosinweed	Cumberland Plateau	N/A	Xeric Forest, Scrub-Shrub/Early Successional Forest

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Plants	<i>Solidago albopilosa</i>	White-haired Goldenrod	Plateau Escarpment, Mississippi Alluvial Plain	N/A	Cliff/Rockshelter
Plants	<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Plateau Escarpment	N/A	Grassland/Savannah, River/Streams
Plants	<i>Solidago faucibus</i>	Gorge Goldenrod	Cumberland Plateau	N/A	Mesic Forest
Plants	<i>Solidago shortii</i>	Short's Goldenrod	Bluegrass	N/A	Grassland/Savannah
Plants	<i>Spiraea virginiana</i>	Virginia Spiraea	Plateau Escarpment	N/A	Grassland/Savannah, River/Streams
Plants	<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Plateau Escarpment, Knobs	N/A	Xeric Forest
Plants	<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Cumberland Plateau	N/A	Xeric Forest
Plants	<i>Trifolium kentuckiense</i>	Kentucky Clover	Bluegrass	N/A	Mesic Forest, Xeric Forest
Plants	<i>Trifolium reflexum</i>	Buffalo Clover	Interior Plateau, Mississippi Valley Loess Plain	N/A	Cliff/Rockshelter, Mesic Forest, Xeric Forest
Plants	<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Bluegrass	N/A	Grassland/Savannah, Mesic Forest
Plants	<i>Vitis rupestris</i>	Sand Grape	Plateau Escarpment, Interior Plateau	N/A	Grassland/Savannah, River/Streams

APX 4.3i Reptile SGCN Habitat Type and Range

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Reptiles	<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, Xeric Forest, Open Wetland, Lake/Pond, River/Streams
Reptiles	<i>Apalone mutica mutica</i>	Midland Smooth Softshell	Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Warm-Moderately Confined-Medium River, Warm-Unconfined-Medium River, Warm-Moderately Confined-Large River, Warm-Unconfined-Large River
Reptiles	<i>Aspidoscelis sexlineata</i>	Six-lined Racerunner	Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Grassland/Savannah, Xeric Forest, Ag
Reptiles	<i>Cemophora coccinea</i>	Scarletsnake	Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley and Hills	N/A	Grassland/Savannah, Xeric Forest
Reptiles	<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag, Suburban
Reptiles	<i>Clonophis kirtlandii</i>	Kirtland's Snake	Bluegrass, Knobs, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Forested Wetland, Mesic Forest, Open Wetland, River/Streams, Floodplain/Sandbar, Urban, Suburban
Reptiles	<i>Crotalus horridus</i>	Timber Rattlesnake	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Cliff/Rockshelter, Mesic Forest, Xeric Forest, Scrub-Shrub/Early Successional Forest
Reptiles	<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, River/Streams, Floodplain/Sandbar
Reptiles	<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Reptiles	<i>Graptemys pseudogeographica pseudogeographica</i>	Northern False Map Turtle	Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Reptiles	<i>Kinosternon subrubrum</i>	Eastern Mud Turtle	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Cave/Karst, Forested Wetland, Mesic Forest, Open Wetland, Lake/Pond, River/Streams
Reptiles	<i>Lampropeltis elapsoides</i>	Scarlet Kingsnake	Cumberland Plateau, Plateau Escarpment, Interior Plateau	N/A	Xeric Forest

SWAP Group	Scientific Name	Common Name	Physiographic Region	Watersheds	Habitat
Reptiles	<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Bluegrass, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, River/Streams, Floodplain/Sandbar
Reptiles	<i>Nerodia cyclopion</i>	Mississippi Green Watersnake	Mississippi Alluvial Plain	N/A	Forested Wetland, Open Wetland, River/Streams, Floodplain/Sandbar
Reptiles	<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Bluegrass, Interior Plateau, Interior River Valley And Hills	N/A	Forested Wetland, Mesic Forest, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Reptiles	<i>Nerodia fasciata confluens</i>	Broad-banded Watersnake	Mississippi Alluvial Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams, Floodplain/Sandbar, Ag
Reptiles	<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard	Cumberland Plateau, Plateau Escarpment, Interior Plateau	N/A	Grassland/Savannah, Xeric Forest, Ag
Reptiles	<i>Pantherophis guttatus</i>	Red Cornsnake	Cumberland Plateau, Plateau Escarpment, Interior Plateau, Interior River Valley And Hills	N/A	Grassland/Savannah, Mesic Forest, Xeric Forest, Ag
Reptiles	<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Interior Plateau, Interior River Valley and Hills	N/A	Grassland/Savannah, Xeric Forest, Scrub-Shrub/Early Successional Forest
Reptiles	<i>Plestiodon anthracinus</i>	Coal Skink	Cumberland Mountains, Cumberland Plateau, Plateau Escarpment, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Mesic Forest, Xeric Forest
Reptiles	<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink	Cumberland Mountains, Plateau Escarpment, Interior Plateau	N/A	Grassland/Savannah, Xeric Forest, Ag, Suburban
Reptiles	<i>Sistrurus miliarius streckeri</i>	Western Pygmy Rattlesnake	Interior Plateau	N/A	Grassland/Savannah, Mesic Forest, Xeric Forest, Ag
Reptiles	<i>Tantilla coronata</i>	Southeastern Crowned Snake	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Valley Loess Plain	N/A	Cliff/Rockshelter, Grassland/Savannah, Xeric Forest, Scrub-Shrub/Early Successional Forest
Reptiles	<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	Interior River Valley And Hills, Mississippi Alluvial Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams
Reptiles	<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Plateau Escarpment, Bluegrass, Knobs, Interior Plateau, Interior River Valley And Hills, Mississippi Alluvial Plain, Mississippi Valley Loess Plain	N/A	Forested Wetland, Open Wetland, Lake/Pond, River/Streams

APX 4.4 Habitat Condition Changes by Habitat Guild

Kentucky Then	Acreage	Kentucky Now	Acreage	Percentage
Forest	17,755,103	Agriculture	4,360,938	24.56%
		Developed	1,263,675	7.12%
		Barren Land	49,103	0.28%
		Forest	11,557,173	65.09%
		Herbaceous	196,946	1.11%
		Schrub/scrub	193,538	1.09%
		Open Water	95,408	0.54%
		Wetland	38,323	0.22%
Savannas	3,891,148	Agriculture	2,008,866	51.63%
		Developed	401,042	10.31%
		Barren Land	6,052	0.16%
		Forest	1,409,896	36.23%
		Herbaceous	20,535	0.53%
		Schrub/scrub	18,938	0.49%
		Open Water	20,408	0.52%
		Wetland	5,410	0.14%
Grasslands	1,775,137	Agriculture	1,270,920	71.60%
		Developed	171,441	9.66%
		Barren Land	2,314	0.13%
		Forest	307,467	17.32%
		Herbaceous	6,626	0.37%
		Schrub/scrub	5,019	0.28%
		Open Water	4,332	0.24%
		Wetland	7,018	0.40%
Wetlands	2,266,851	Agriculture	1,147,908	50.64%
		Developed	243,544	10.74%
		Barren Land	5,530	0.24%
		Forest	359,415	15.86%
		Herbaceous	8,917	0.39%
		Schrub/scrub	3,832	0.17%
		Open Water	191,962	8.47%
		Wetland	305,742	13.49%

CHAPTER 5: THREATS TO SGCN

Approach to Assessing Threat

To prioritize actions to conserve Kentucky's species of greatest conservation need, threats must be not only identified, but categorized based on threat type and severity. By doing so, threats can be compared across taxa utilizing a standard nomenclature and ranked to focus actions on threats with the greatest impact to one or several species.

To standardize language used across taxonomic groups for describing SGCN threats, 11 categories containing 40 subcategories, were utilized. These categories and subcategories were provided from

A Standard Lexicon for Biodiversity Conservation: Unified Classification of Threats and Actions. A list threat categories and subcategories are provided below. Taxa teams were encouraged to develop and provide more specific threat information during the threat analysis process including a descriptive title and comments that would provide readers further clarity. Taxa teams were also encouraged to differentiate between stressors (i.e. habitat loss) and threats (i.e. Residential Development). If a species was experiencing multiple threats within the same category (i.e. Oil and Gas Drilling and Mining and Quarrying) the threat was categorized using the parent category (i.e. Energy Production and Mining).

IUCN-CMP Threat Classification	Category	Subcategory
1	Residential and Commercial Development	
	1.1	Housing and urban areas
	1.2	Commercial and industrial areas
	1.3	Tourism and recreation areas
2	Agriculture and Aquaculture	
	2.1	Annual and perennial nontimber crops
	2.2	Wood and pulp plantations
	2.3	Livestock farming and ranching
	2.4	Marine and freshwater aquaculture
3	Energy Production and Mining	
	3.1	Oil and gas drilling
	3.2	Mining and quarrying
	3.3	Renewable energy
4	Transportation and Service Corridors	
	4.1	Roads and railroads
	4.2	Utility and service lines
	4.3	Shipping lanes
	4.4	Flight paths
5	Biological Resource Use	
	5.1	Hunting and collecting terrestrial animals
	5.2	Gathering terrestrial plants
	5.3	Logging and wood harvesting
	5.4	Fishing and harvesting aquatic resources
6	Human Intrusions and Disturbance	
	6.1	Recreational activities
	6.2	War, civil unrest and military exercises
	6.3	Work and other activities
7	Natural System Modifications	
	7.1	Fire and fire suppression
	7.2	Dams and water management/use
	7.3	Other ecosystem modifications
8	Invasive and Other Problematic Species and Genes	
	8.1	Invasive non-native/alien species
	8.2	Problematic native species
	8.3	Introduced genetic material

IUCN-CMP Threat Classification	Category	Subcategory
9	Pollution	
	9.1	Household sewage and urban waste water
	9.2	Industrial and military effluents
	9.3	Agricultural and forestry effluents
	9.4	Garbage and solid waste
	9.5	Air-borne pollutants
	9.6	Excess energy
10	Geological events	
	10.1	Volcanoes
	10.2	Earthquakes/Tsunamis
	10.3	Avalanches/Landslides
11	Climate Change and Severe Weather	
	11.1	Habitat shifting and alteration
	11.2	Droughts
	11.3	Temperature extremes
	11.4	Storms and flooding

Determining Threat Level

Taxa teams generated a list of threats for each SGCN. Threats were categorized as either 'Existing' or 'Potential' according to whether the threat had been observed in Kentucky as of the plan development date. For Data Deficient species, threats, if known, were provided.

Quantification of a specific threat was based on three factors that define severity: Impact, Scale, and Likelihood. These factors account for the degree to which a threat negatively influences a population (i.e. impact), the spatial extent of the impact (i.e. scale), and the temporal extent of the impact (i.e. likelihood). Each factor is explained further below.

Impact

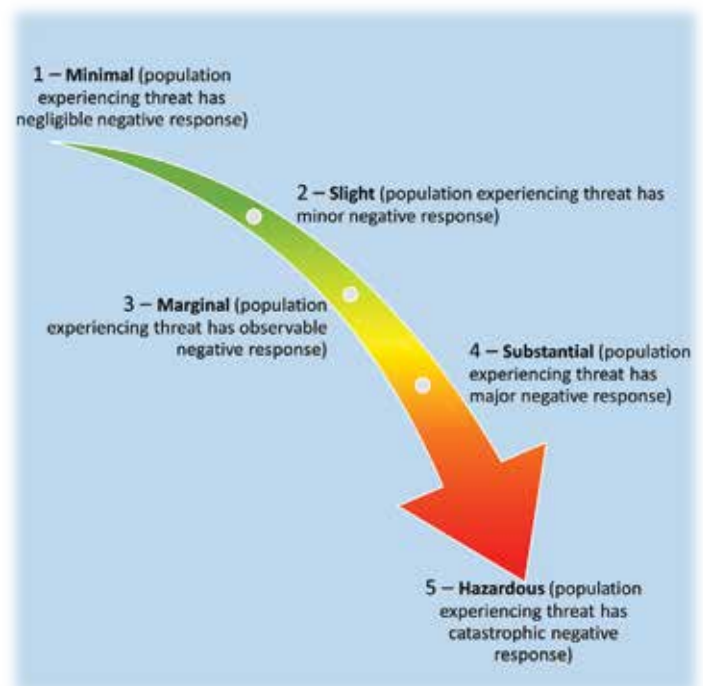
Impact was the degree to which a threat negatively influences (or could influence) a population. Impact is scored from 1 to 5 with a score of 5 corresponding to the most severe negative impact. Scoring was conducted using the following categories:

1 – Minimal (population experiencing threat has negligible negative response)

2 – Slight (population experiencing threat has minor negative response)

3 – Marginal (population experiencing threat has observable negative response)

4 – Substantial (population experiencing threat has major negative response)



5 – Hazardous (population experiencing threat has catastrophic negative response)

Scale

Scale is meant to describe the spatial extent over which the impact is (or could be) observed. Scale is scored from 1 to 5 with a score of 5 corresponding to an impact that is (or could be) observed across the species range in Kentucky. Scoring should be conducted using the following categories:

1 – Local (threat is restricted to a narrow portion of the species range)

2 – Community (threat could or does occur across a few locations).

3 – Regional (threat can or does occur across most of a physiographic region or major watershed)

4 – Pervasive (threat can or does occur across multiple physiographic regions or major watersheds)

5 – Range-wide (threat can or does occur across most of the species' range in KY)

Likelihood

Likelihood is meant to describe the frequency with which existing threats are observed or the potential that future threats may occur. Likelihood is scored from 1 to 5 with a score of 5 corresponding to an impact that is either frequently occurring (in the case of an existing threat) or that is certain to occur in the next 10 years. Scoring should be conducted using the following categories:

1 – Rare/Improbable (threat occurs very infrequently or is very unlikely to occur in the next 10 years).

2 – Infrequent/Unlikely (threat has been observed infrequently or is unlikely to occur in the next 10 years).

3 – Occasional/Possible (threat is observed from time to time or may be observed in the next 10 years).

4 – Common/Probable (threat is commonly observed at present or is probable to occur in the next 10 years).

5 – Frequent/Certain (threat is frequently observed at present or is certain to occur in the next 10 years).

A weighted sum will be utilized to determine the level of each threat. Severity will be calculated as follows:

$$(\text{Impact} \times 3) + (\text{Scale} \times 2) + (\text{Likelihood} \times 1) = \text{Threat Severity Score}$$

As scoring threats based on the criteria above can be subjective, the threat severity scores will be categorized to reflect the qualitative nature of the data collected. Categories are as follows:

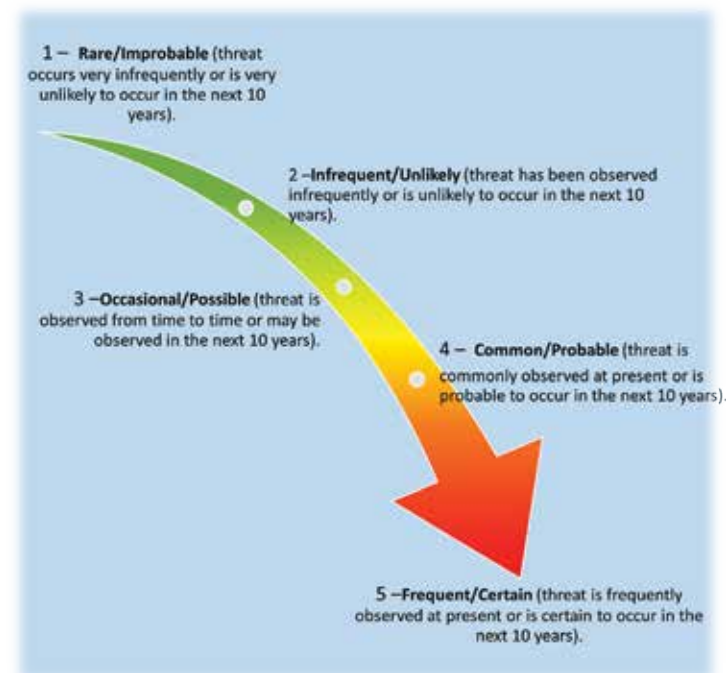
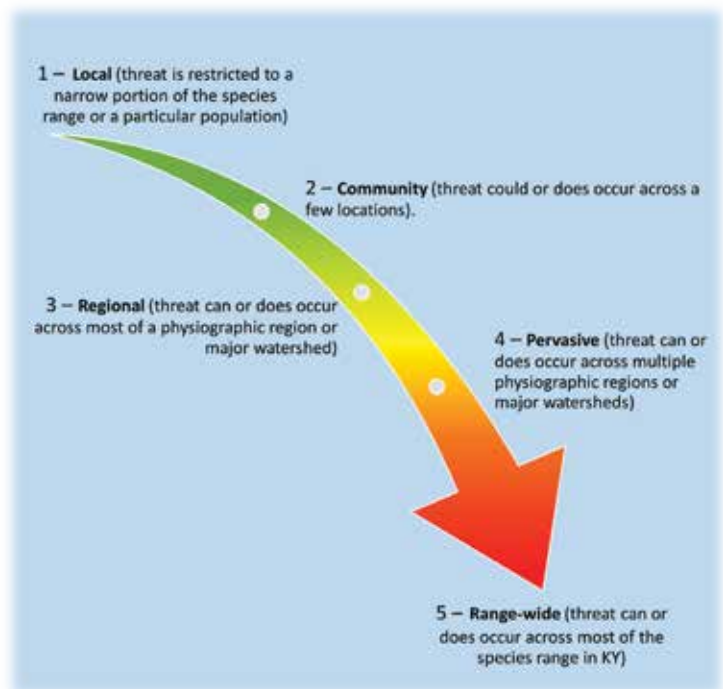
Minor – (Severity Threat Score 3 – 9)

Moderate – (Severity Threat Score 10 – 14)

Substantial – (Severity Threat Score 15 – 19)

Significant – (Severity Threat Score 20 – 24)

Severe – (Severity Threat Score 25 – 30)

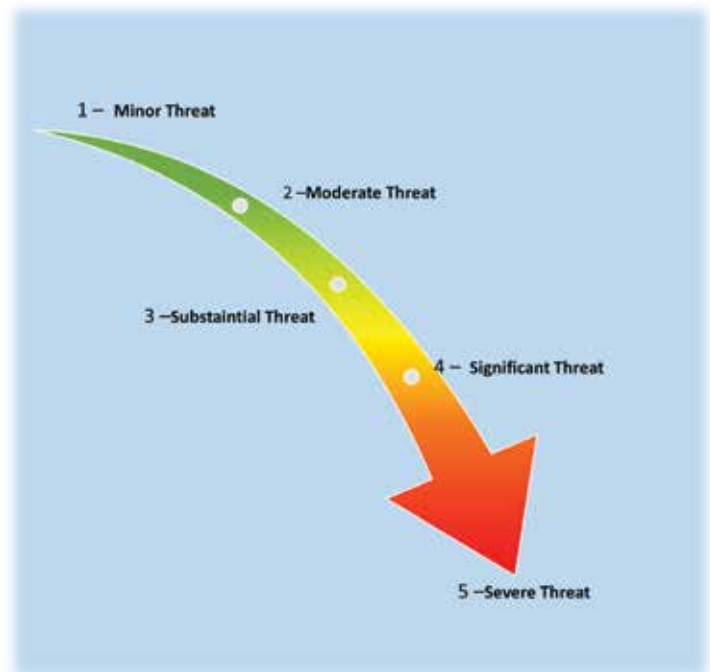


Agriculture and Aquaculture



Common Threats Across Taxa Groups

For the 527 SGCN, 1,841 specific threats were identified (Appendix 5.1a-i). Natural System Modification, Agriculture and Aquaculture, and Pollution were the most common threats attributed to SGCN across all taxa. A summary of threats by taxonomic group and by threat category are provided in the charts below. Further analysis of threats impacts SGCN is provided in the Taxa Overview sections and in Apx 5.1 a-i. Nearly 80% of the threats identified were categorized as 'Existing', meaning the threat had been observed in Kentucky. Most (approximately 71%) of the identified threats were categorized as either Significant or Severe. Climate change is recognized as a global threat of concern and compounds many potential and existing threats to SGCN. The complexity of this threat is further addressed in Apx 5.2 as related to Kentucky's SGCN and their habitats.



Threat Category	Amphibians	Birds	Crustaceans	Fishes and Lampreys	Freshwater Mussels and Snails	Insects and Springtails	Mammals	Plants	Reptiles	Grand Total
Natural System Modifications	1	57	3	67	115	64		69	15	391
Agriculture and Aquaculture	15	62	16	70		17	5	52	16	253
Pollution	3	50	1	84	62	42		1		243
Residential and Commercial Development	12	46	6	73		20	2	52	6	217
Invasive and Other Problematic Species and Genes	30	41	15	22	2	3	8	64	21	206
Biological Resource Use	10	20	1	35		8	12	50	16	152
Transportation and Service Corridors	7	26	2	64			2	17	17	135
Climate Change and Severe Weather	2	22		16			2	48	6	96
Human Intrusions and Disturbance	8	9	4	2		19	11	19	7	79
Energy Production and Mining	13	3	7	33	1	2	3	3	4	69
Grand Total	101	336	55	466	180	175	45	375	108	1841

Threat Category	Minor	Moderate	Substantial	Significant	Severe	Grand Total
Agriculture and Aquaculture	1	14	36	66	136	253
Biological Resource Use	2	11	26	47	66	152
Climate Change and Severe Weather		3	30	42	21	96
Energy Production and Mining			7	24	38	69
Human Intrusions and Disturbance	5	3	29	36	6	79
Invasive and Other Problematic Species and Genes		8	73	70	55	206
Natural System Modifications	1	26	70	167	127	391
Pollution	2	9	70	128	34	243
Residential and Commercial Development	2	34	20	65	96	217
Transportation and Service Corridors	3	14	29	34	55	135
Grand Total	16	122	390	679	634	1841

Natural System Modifications



Natural System Modifications was the top threat category impacting Kentucky SGCN. Photo: Dam on the Elkhorn, KDFWR

Biological Resource Use



Threats from Biological resource are varied and include both legal and illegal hunting & fishing, scientific plant and animal collecting, and logging. Photo: Logging impacting habitat, KDFWR

Pollution



Pollution was identified among the top three categories impacting Kentucky SGCN. The after effects of this spill in the Salt River was devastating to many aquatic species. Photo: Fish Kill on Salt River WMA, KDFWR

Invasive and Other Problematic Species



Invasive Species and Other Problematic Species was one of only two threat categories to be identified by all taxa groups. White nose syndrome in bats is just one example of a disease impacting Kentucky SGCN. Photo: WNS 3, John MacGregor

Human Intrusions and Disturbance



Threats from human intrusions and disturbance were primarily due to recreational activities. Photo: Human disturbance in a rock shelter, KDFWR.

Climate Change and Severe Weather



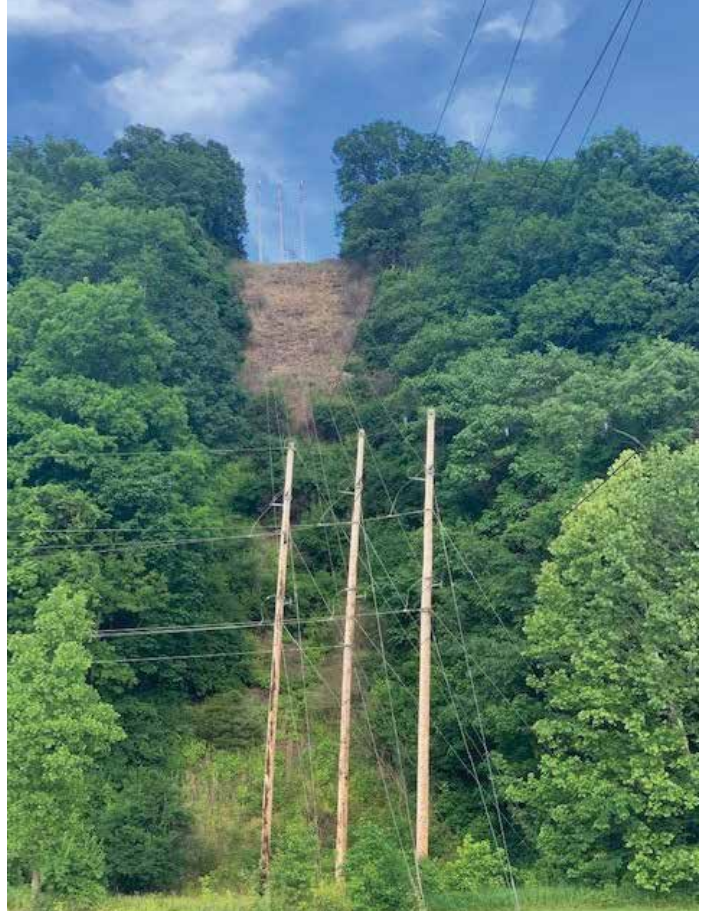
Droughts, temperature extremes, and storms/flooding can impact nesting success for SGCN like the Interior least tern. Photo: Least Tern Chick, John Brunjes.

Residential and Commercial Development



Residential and Commercial Development was identified among the top three threat categories to Kentucky SGCN, named by 8 of 9 taxa groups. Photo: Residential development, Dave Baker

Transportation and Service Corridors



All but two taxa groups identified threats from Transportation and Service corridors. Photo: powerline cut through forest, KDFWR

Energy Production and Mining



Energy Production and Mining was one of only two threat categories identified by all taxa groups. Photo: Strip mine aerial, Dave Baker

APX 5.1a Threats Identified for Amphibian SGCN

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Wetland loss due to agricultural conversion	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Wetland loss due to agricultural conversion	Residential and Commercial Development	Commercial and Industrial Areas	Existing	Significant	
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Wetland loss due to agricultural conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Ambystoma barbouri</i>	Streamside Salamander	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	Water quality issues and decreased lag time after rain events, combined sewer overflows, and herbicide/pesticide influence.
<i>Ambystoma barbouri</i>	Streamside Salamander	Road mortality	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Ambystoma barbouri</i>	Streamside Salamander	Ranavirus	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Substantial	
<i>Ambystoma barbouri</i>	Streamside Salamander	Habitat Degradation due to invasive plants	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Severe	Bush honeysuckle.
<i>Ambystoma barbouri</i>	Streamside Salamander	Conversion of suitable upland habitat to cropland	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Ambystoma JJUL</i>	Unisexual Ambystoma	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	
<i>Ambystoma JJUL</i>	Unisexual Ambystoma	Ranavirus	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Substantial	
<i>Ambystoma talpoideum</i>	Mole Salamander	Row crop agriculture	Invasive and Other Problematic Species and Genes	Annual and Perennial Nontimber Crops	Existing	Severe	Removal of forested habitat throughout species range.
<i>Ambystoma talpoideum</i>	Mole Salamander	Solar energy development	Energy Production and Mining	Renewable Energy	Possible	Significant	Placement of gravel pads under solar fields impacts species habitat.
<i>Ambystoma talpoideum</i>	Mole Salamander	Road mortality and dispersal barrier	Transportation and Service Corridors	Roads and Railroads	Existing	Severe	
<i>Ambystoma talpoideum</i>	Mole Salamander	Ranavirus	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Substantial	
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Habitat loss due to conversion to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Wetland loss due to conversion of wetlands to agriculture in decades past. Additional impacts due to changes in hydrology.
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Potential for spill from industrial sites	Pollution	Industrial and Military Effluents	Possible	Substantial	
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Aneides aeneus</i>	Green Salamander	Logging adjacent to sandstone outcrop	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Private land throughout the species range. Logging impacts solar exposure and humidity. Potential to reduce gene flow by isolating populations.
<i>Aneides aeneus</i>	Green Salamander	Mining	Energy Production and Mining	Mining and Quarrying	Existing	Severe	Mountaintop removal and hollow fills eliminate habitat.
<i>Aneides aeneus</i>	Green Salamander	Cell towers	Transportation and Service Corridors	Utility and Service Lines	Existing	Substantial	Placement of cell towers often occur in preferred habitat for the species.
<i>Aneides aeneus</i>	Green Salamander	Human recreation	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	Rock climbing, off trail camping.
<i>Aneides aeneus</i>	Green Salamander	Chytrid fungus	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Cryptobranchius alleganiensis alleganiensis</i>	Eastern Hellbender	Accidental catch and kill by fishermen	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	Trot lines and rod/reel fishing.
<i>Cryptobranchius alleganiensis alleganiensis</i>	Eastern Hellbender	Row crop and grazing practices	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Impacts to streams from siltation, increased stream temperature, erosion, etc.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Cryptobranchius allegheniensis allegheniensis</i>	Eastern Hellbender	Wet quarrying for gravel	Energy Production and Mining	Mining and Quarrying	Existing	Significant	Removal of stream sand and gravel.
<i>Cryptobranchius allegheniensis allegheniensis</i>	Eastern Hellbender	Coal mining	Energy Production and Mining	Mining and Quarrying	Existing	Significant	Water quality degradation from old mining activities in tributaries to streams used by the species.
<i>Cryptobranchius allegheniensis allegheniensis</i>	Eastern Hellbender	Chytrid fungus	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Significant	The impacts of this disease are unknown and need more investigation.
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Impacts to springfed small streams from sedimentation as a result of logging.
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Road construction	Transportation and Service Corridors	Roads and Railroads	Existing	Significant	Road construction eliminated an excellent population of species on LBL.
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Conversion of suitable upland habitat to cropland	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Natural resource extraction	Energy Production and Mining	Mining and Quarrying	Existing	Severe	Sedimentation from mineral extraction impacts larvae as well as acid drainage. Increased conductivity impacts prey availability.
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Timber cutting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Urbanization along Ohio River tributaries in northern Kentucky	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Power plant air-borne pollutants	Pollution	Air-borne Pollutants	Existing	Severe	Drastic decline of population downwind of powerplants.
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Human intrusions/disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Natural resource extraction	Energy Production and Mining	Mining and Quarrying	Existing	Severe	
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Timber cutting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Human disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Desmognathus welleri</i>	Black Mountain Salamander	Natural resource extraction	Energy Production and Mining	Mining and Quarrying	Existing	Severe	
<i>Desmognathus welleri</i>	Black Mountain Salamander	Timber cutting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Desmognathus welleri</i>	Black Mountain Salamander	Human disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Desmognathus welleri</i>	Black Mountain Salamander	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Eurycea guttolineata</i>	Three-lined Salamander	Agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Loss of habitat resulting from conversion to row crops.
<i>Eurycea guttolineata</i>	Three-lined Salamander	Logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Eurycea guttolineata</i>	Three-lined Salamander	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Eurycea guttolineata</i>	Three-lined Salamander	Road mortality	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Results in wetland habitat loss.
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.

Scientific Name	Common Name	Threat Title		Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Mining		Energy Production and Mining	Mining and Quarrying	Existing	Substantial	Mining activities create sedimentation and water quality issues.
<i>Hyla gratiosa</i>	Barking Treefrog	Wetland loss to agriculture		Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Hyla gratiosa</i>	Barking Treefrog	Development		Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Hyla gratiosa</i>	Barking Treefrog	Disease		Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Hyla versicolor</i>	Gray Treefrog	Agriculture		Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Possible	Severe	Potential loss of habitat being converted for agricultural land use.
<i>Hyla versicolor</i>	Gray Treefrog	Development		Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	
<i>Hyla versicolor</i>	Gray Treefrog	Disease		Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Agricultural conversion		Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Conversion of habitat to row crops. especially till farming.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Conversion of native grassland to woodland		Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Invasion of woody species and forest regeneration.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Disease		Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Road mortality		Transportation and Service Corridors	Roads and Railroads	Existing	Severe	
<i>Lithobates blairi</i>	Plains Leopard Frog	Wetland loss to agriculture		Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Lithobates blairi</i>	Plains Leopard Frog	Development		Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	
<i>Lithobates blairi</i>	Plains Leopard Frog	Disease		Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Lithobates blairi</i>	Plains Leopard Frog	Hybridization with southern leopard frogs		Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Severe	
<i>Lithobates pipiens</i>	Northern Leopard Frog	Development		Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Development in northern and central Kentucky.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Habitat loss due to agriculture		Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Conversion of habitat to row crop agriculture.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Ranavirus		Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Substantial	
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Development within habitat		Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Bush honeysuckle		Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	Habitat loss due to honeysuckle invasion.
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Limestone mining		Energy Production and Mining	Mining and Quarrying	Existing	Severe	
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Disease		Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Road construction		Transportation and Service Corridors	Roads and Railroads	Possible	Substantial	Habitat destruction potential with upgrade of existing roadway.
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Northern dispersal is limited		Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Significant	River barrier to the north.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Coal mining		Energy Production and Mining	Mining and Quarrying	Existing	Severe	Mountain top removal and surface mining.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Timber harvest		Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Human disturbance		Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Disease		Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Timber harvest		Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Possible	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Coal mining	Energy Production and Mining	Mining and Quarrying	Existing	Severe	
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Timber harvest	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Human intrusion/disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Natural resource extraction	Energy Production and Mining	Mining and Quarrying	Existing	Severe	
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Timber cutting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Groundwater contamination	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Human disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Disease	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Substantial	Chytrid fungus and/or ranaviruses.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Breeding ponds dry up before larvae fully develop	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Substantial	Adults are very long-lived and just one successful breeding event every 10 years or more is likely enough to maintain a healthy population in a given area.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Substantial	Destruction of vernal woodland pools and other breeding habitat.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Ranavirus	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Substantial	
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Chytrid fungus	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Siren intermedia</i>	Lesser Siren	Agricultural impacts	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Wetland habitat loss.
<i>Siren intermedia</i>	Lesser Siren	Disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	Potential disease including chytrid, ranavirus, and emerging disease threats.
<i>Siren intermedia</i>	Lesser Siren	Mining impacts	Energy Production and Mining	Mining and Quarrying	Existing	Substantial	Mining activities create sedimentation and water quality issues.

APX 5.1b Threats Identified for Bird SGCN

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Accipiter striatus</i>	Sharp-shinned Hawk	Habitat loss in Kentucky due to logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Moderate	This species often relies on pine forests which are susceptible to logging.
<i>Accipiter striatus</i>	Sharp-shinned Hawk	Window strikes	Residential and Commercial Development	Housing and Urban Areas	Existing	Moderate	This species is known to collide with windows, especially near bird feeders.
<i>Actitis macularia</i>	Spotted Sandpiper	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Actitis macularia</i>	Spotted Sandpiper	Agricultural run off and eutrophication of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Actitis macularia</i>	Spotted Sandpiper	Shoreline development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	Future development of shorelines may negatively affect habitat availability.
<i>Actitis macularia</i>	Spotted Sandpiper	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nonlumber Crops	Existing	Severe	These activities result in habitat loss. Retilling projects are an issue.
<i>Actitis macularia</i>	Spotted Sandpiper	Climate change resulting in changes to tundra habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	Habitat loss and timing of food availability/prey abundance. Timing of migration and energy depletion during migration may also be an issue.
<i>Anmodramus savaenarum</i>	Spotted Sandpiper	Habitat loss on the winter grounds	Agriculture and Aquaculture	Annual and Perennial Nonlumber Crops	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Anmodramus savaenarum</i>	Grasshopper Sparrow	Clean farming and mowing frequency	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	Mowing or cutting hay multiple times per year causes nest failure.
<i>Anmodramus savaenarum</i>	Grasshopper Sparrow	Feral cat predation	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Substantial	This is especially an issue on farms.
<i>Anmodramus savaenarum</i>	Grasshopper Sparrow	Habitat quality and fragmentation	Agriculture and Aquaculture	Annual and Perennial Nonlumber Crops	Existing	Moderate	This species requires larger tracts of grassland habitat.
<i>Anas rubripes</i>	American Black Duck	Hybridization with closely related species	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Moderate	Hybridization with mallards.
<i>Anas rubripes</i>	American Black Duck	Water pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Anas rubripes</i>	American Black Duck	Shoreline development	Residential and Commercial Development	Housing and Urban Areas	Existing	Moderate	Results in habitat loss.
<i>Anas rubripes</i>	American Black Duck	Highly Pathogenic Avian Flu	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	
<i>Anrostomus carolinensis</i>	Chuck-will's-widow	Pesticide use	Pollution	Agricultural and Forestry Effluents	Possible	Substantial	Is suspected in aerial insectivore declines.
<i>Anrostomus carolinensis</i>	Chuck-will's-widow	Habitat conditions	Natural System Modifications	Fire and Fire Suppression	Existing	Substantial	Open woodland habitats may need management with fire or invasive species may need managed in the understory.
<i>Anrostomus carolinensis</i>	Chuck-will's-widow	Predation and nest disturbance by feral cats and dogs	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Moderate	
<i>Anrostomus carolinensis</i>	Chuck-will's-widow	Habitat loss at stop over sites or on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central America or the Caribbean.
<i>Anrostomus vociferus</i>	Whip-poor-will	Lack of forest openings and forests with open understories	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Habitat management is likely needed to promote more suitable habitat.
<i>Anrostomus vociferus</i>	Whip-poor-will	Pesticide use	Pollution	Agricultural and Forestry Effluents	Possible	Substantial	Is suspected in aerial insectivore declines.
<i>Anrostomus vociferus</i>	Whip-poor-will	Predation and nest disturbance by feral cats and dogs	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Moderate	
<i>Anrostomus vociferus</i>	Whip-poor-will	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central America.
<i>Ardea alba</i>	Great Egret	Bottomland hardwoods removal due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nonlumber Crops	Existing	Severe	Lots of habitat loss in the past. Huge impact in the past, less impact currently. Present loss is less.
<i>Ardea alba</i>	Great Egret	Timber harvest	Biological Resource Use	Logging and Wood Harvesting	Existing	Moderate	May result in loss of nesting trees.
<i>Ardea alba</i>	Great Egret	Human disturbance	Human Intrusions and Disturbance	Recreational Activities	Possible	Minor	At rookery sites.
<i>Ardea alba</i>	Great Egret	Water pollution and contaminants	Pollution	Pollution- Other	Existing	Substantial	Pesticides, neonics, mercury, DDT in the past, and fertilizers.
<i>Ardea alba</i>	Great Egret	Double Crested Cormorants rookery competition and subsequent destruction of rookeries	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Substantial	This has been a problem at several locations.
<i>Ardea alba</i>	Great Egret	Bottomland hardwoods removal due to development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Lots of habitat loss in the past. Huge impact in the past, less impact currently. Present loss is less.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Asio flammeus</i>	Short-eared Owl	Clean farming practices / frequency of mowing	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	Pasture and hayfields are important for roosting and foraging habitat.
<i>Asio flammeus</i>	Short-eared Owl	Secondary exposure to rodenticides	Pollution	Agricultural and Forestry Effluents	Existing	Moderate	
<i>Asio flammeus</i>	Short-eared Owl	Habitat loss and fragmentation in Kentucky	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	Habitat loss from agriculture, livestock grazing, and development appears to be the major cause of population declines. Short-eared Owls require large uninterrupted tracts of open grasslands, and appear to be particularly sensitive to habitat loss and fragmentation.
<i>Asio flammeus</i>	Short-eared Owl	Effects of climate change on prey abundance and habitat on breeding grounds	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Substantial	For the most part, this species nests in Canada. Climate change and resulting habitat change, floods/droughts may effect the prey (vole) abundance for this species on both the breeding and winter grounds.
<i>Asio otus</i>	Long-eared Owl	Habitat loss in Kentucky due to logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Moderate	Long-eared Owl populations need both grassland and wooded areas; they are vulnerable to the loss of isolated tree groves, especially pine.
<i>Asio otus</i>	Long-eared Owl	Secondary rodenticide exposure	Pollution	Agricultural and Forestry Effluents	Possible	Moderate	
<i>Aythya affinis</i>	Lesser Scaup	Highly Pathogenic Avian Flu	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	
<i>Aythya affinis</i>	Lesser Scaup	Water pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Aythya marila</i>	Greater Scaup	Highly Pathogenic Avian Flu	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	
<i>Aythya marila</i>	Greater Scaup	Water pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Bartramia longicauda</i>	Upland Sandpiper	Clean farming practices	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	Result in habitat degradation.
<i>Bartramia longicauda</i>	Upland Sandpiper	Habitat loss on the winter grounds	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Bonasa umbellus</i>	Ruffed Grouse	Range contraction due to climate change	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Significant	Shift to high elevations are evident between Breeding Bird Atlases in several eastern states.
<i>Bonasa umbellus</i>	Ruffed Grouse	West Nile Virus	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Substantial	a. A challenge study conducted in 2015 found ruffed grouse to be highly vulnerable to WNV mortality, with 70-90% of infected grouse unlikely to survive in the wild. b. The frequency and severity of WNV have increased since 2012, with warming spring temperatures being an important driver of prevalence and severity (i.e., WNV is a climate change exacerbated avian disease).
<i>Bonasa umbellus</i>	Ruffed Grouse	Habitat loss due to maturation of forests	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	Lack of forest management/logging where needed.
<i>Bolaurus lentiginosus</i>	American Bittern	Eutrophication and pollution of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	Contamination of wetlands is tied to invasive plant species. Prey loss may also occur due to agricultural chemicals.
<i>Bolaurus lentiginosus</i>	American Bittern	Urban and residential development	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	This results in habitat loss.
<i>Bolaurus lentiginosus</i>	American Bittern	Invasive wetland plants	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Significant	Phragmites and other species have altered habitat conditions.
<i>Bolaurus lentiginosus</i>	American Bittern	Wetland loss due to conversion of wetlands for agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Past wetland loss and current renewal of drainage systems. Aging drainage systems can be good shorebird habitat. Expiring WRP is also a concern.
<i>Butorides virescens</i>	Green Heron	Clean farming practices	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Butorides virescens</i>	Green Heron	Loss of riparian forest habitat to development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Calidris alba</i>	Sanderling	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Calidris alba</i>	Sanderling	Agricultural run off and eutrophication of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Calidris alba</i>	Sanderling	Shoreline development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	Future development of shorelines may negatively affect habitat availability.
<i>Calidris alba</i>	Sanderling	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	These activities result in habitat loss. Rellling projects are an issue.
<i>Calidris alba</i>	Sanderling	Unsustainable hunting on the winter grounds	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Significant	Many shorebirds are hunted in the Caribbean and South America. Hunting may be causing declines in some shorebird species.
<i>Calidris alba</i>	Sanderling	Climate change resulting in changes to tundra habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	Habitat loss and timing of food availability/prey abundance. Timing of migration and energy depletion during migration may also be an issue.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Calidris alpina</i>	Dunlin	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Calidris alpina</i>	Dunlin	Shoreline development due to agriculture	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	Future development of shorelines may negatively affect habitat availability.
<i>Calidris alpina</i>	Dunlin	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	These activities result in habitat loss. Reilling projects are an issue.
<i>Calidris alpina</i>	Dunlin	Climate change resulting in changes to tundra habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	
<i>Calidris himantopus</i>	Silt Sandpiper	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Calidris himantopus</i>	Silt Sandpiper	Agricultural run off and eutrophication of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Calidris himantopus</i>	Silt Sandpiper	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	These activities result in habitat loss. Reilling projects are an issue.
<i>Calidris himantopus</i>	Silt Sandpiper	Unsustainable hunting on the winter grounds	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Significant	Many shorebirds are hunted in the Caribbean and South America. Hunting may be causing declines in some shorebird species.
<i>Calidris himantopus</i>	Silt Sandpiper	Climate change resulting in changes to tundra habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	Habitat loss and timing of food availability/prey abundance. Timing of migration and energy depletion during migration may also be an issue.
<i>Calidris himantopus</i>	Silt Sandpiper	Habitat loss on the winter grounds	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Agricultural run off and eutrophication of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Shoreline development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	Future development of shorelines may negatively affect habitat availability.
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	These activities result in habitat loss. Reilling projects are an issue.
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Unsustainable hunting on the winter grounds	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Significant	Many shorebirds are hunted in the Caribbean and South America. Hunting may be causing declines in some shorebird species.
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Climate change resulting in changes to tundra habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	Habitat loss and timing of food availability/prey abundance. Timing of migration and energy depletion during migration may also be an issue.
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Habitat loss on the winter grounds	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Agricultural run off and eutrophication of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Shoreline development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	Future development of shorelines may negatively affect habitat availability.
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	These activities result in habitat loss. Reilling projects are an issue.
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Climate change resulting in changes to tundra habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	Habitat loss and timing of food availability/prey abundance. Timing of migration and energy depletion during migration may also be an issue.
<i>Cardellina canadensis</i>	Canada Warbler	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Substantial	
<i>Cardellina canadensis</i>	Canada Warbler	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Cardellina canadensis</i>	Canada Warbler	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Cardellina canadensis</i>	Canada Warbler	Early successional forest habitat loss in Kentucky	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Habitat management is needed to promote suitable habitat conditions.
<i>Cardellina canadensis</i>	Canada Warbler	Feral hogs	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Possible	Moderate	This species requires an older grassland that hasn't been disturbed in 2+ years.
<i>Centronyx henslowii</i>	Henslow's Sparrow	Clean farming and mowing frequency	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Centronyx henslowii</i>	Henslow's Sparrow	Habitat fragmentation	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Substantial	This species requires larger tracts of grassland habitat. Fragmentation probably occurs most often due to agricultural activities.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Centronyx henslowii</i>	Henslow's Sparrow	Exotic grasses hindering habitat structure	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Fescue and other invasive plants have changed the structure of many grassland habitats. This species is often found in native grass fields.
<i>Centronyx henslowii</i>	Henslow's Sparrow	Fire suppression degrades habitat	Natural System Modifications	Fire and Fire Suppression	Existing	Substantial	This species benefits from fire or other management at a 3-4 year interval, otherwise succession results in habitat loss.
<i>Centronyx henslowii</i>	Henslow's Sparrow	Feral cat predation	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	
<i>Centronyx henslowii</i>	Henslow's Sparrow	Habitat loss on winter grounds	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	This is an issue in the Southeast United States. Fire and management is often needed.
<i>Charadrius melodus</i>	Piping Plover	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Charadrius melodus</i>	Piping Plover	Lack of sandbar habitat	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Charadrius melodus</i>	Piping Plover	Shoreline development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	Future development of shorelines may negatively affect habitat availability.
<i>Charadrius melodus</i>	Piping Plover	Climate change resulting in changes to breeding habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	This species breeds in coastal and shoreline habitats.
<i>Chidonias niger</i>	Black Tern	Water pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Chidonias niger</i>	Black Tern	Shoreline development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Circus hudsonius</i>	Northern Harrier	Clean farming practices / frequency of mowing	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	Pasture and hayfields are important winter foraging habitat.
<i>Circus hudsonius</i>	Northern Harrier	Effects of climate change on prey abundance and habitat on breeding grounds	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Moderate	This species nests in Kentucky, but a significant portion of the population nests north of here and winters here. Climate change and resulting habitat change, floods/droughts may effect the prey (vole) abundance for this species on both the breeding and winter grounds.
<i>Circus hudsonius</i>	Northern Harrier	Habitat loss in Kentucky	Natural System Modifications	Fire and Fire Suppression	Existing	Substantial	Mostly due to the succession of habitat on reclaimed strip mines.
<i>Cistothorus stellaris</i>	Sedge Wren	Wetland conversion to other land uses	Agriculture and Aquaculture	Annual and Perennial Nonwinter Crops	Existing	Significant	Mostly converted to row crops.
<i>Cistothorus stellaris</i>	Sedge Wren	Clean farming and mowing frequency	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	This species will nest in wet hayfields and is subject to nest loss from mowing.
<i>Cistothorus stellaris</i>	Sedge Wren	Winter habitat availability	Agriculture and Aquaculture	Annual and Perennial Nonwinter Crops	Existing	Substantial	Species winters in wet meadows in the Southeast United States.
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Moderate	
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Habitat loss on the winter grounds	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Vehicle collisions	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Climate change affecting prey abundance	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Significant	Timing and abundance of caterpillar emergence which is main prey base.
<i>Colinus virginianus</i>	Northern Bobwhite	Clean farming, overgrazing and mowing frequency	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	Lack of fence rows and overgrown areas reduces habitat quality. Mowing or cutting hay multiple times per year causes nest failure.
<i>Colinus virginianus</i>	Northern Bobwhite	Habitat fragmentation due to agricultural practices	Agriculture and Aquaculture	Annual and Perennial Nonwinter Crops	Existing	Significant	This species requires larger tracts of grassland habitat. Row crop fields often result in fragmentation.
<i>Colinus virginianus</i>	Northern Bobwhite	Exotic grasses hindering habitat structure	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	Fescue and other invasive plants have changed the structure of many grassland habitats.
<i>Colinus virginianus</i>	Northern Bobwhite	Feral cat predation	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	This is especially an issue on farms.
<i>Colinus virginianus</i>	Northern Bobwhite	Fire suppression and other management needed to maintain habitat	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	Early successional habitat requires management.
<i>Colinus virginianus</i>	Northern Bobwhite	Severe winter weather	Climate Change and Severe Weather	Temperature Extremes	Existing	Substantial	Is known to cause high winter mortality.
<i>Corvus corax</i>	Common Raven	West Nile Virus	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Substantial	Was a significant problem for this species in the past and probably continues to be.
<i>Corvus corax</i>	Common Raven	Illegal killing	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Possible	Minor	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Corvus corax</i>	Common Raven	Nest site disturbance	Transportation and Service Corridors	Roads and Railroads	Possible	Minor	Nest sites on manmade structures (e.g. bridges) are susceptible to disturbance.
<i>Cygnus buccinator</i>	Trumpeter Swan	Water pollution	Pollution	Pollution- Other	Existing	Moderate	
<i>Cygnus buccinator</i>	Trumpeter Swan	Highly Pathogenic Avian Flu	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Substantial	
<i>Cygnus buccinator</i>	Trumpeter Swan	Lead poisoning	Pollution	Pollution- Other	Existing	Substantial	Fishing lures, etc.
<i>Cygnus buccinator</i>	Trumpeter Swan	Competition with mute swans	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	Competition and hybridization with mute swans.
<i>Dolichonyx oryzivorus</i>	Bobolink	Clean farming and mowing frequency	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	Mowing or cutting hay multiple times per year causes nest failure.
<i>Dolichonyx oryzivorus</i>	Bobolink	Feral cat predation	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	This is especially an issue on farms. Cooper et al. (2012) documents this species to be predated by cats.
<i>Dolichonyx oryzivorus</i>	Bobolink	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Dryobates borealis</i>	Red-cockaded Woodpecker	Habitat degradation due to southern pine beetle and lack of management	Natural System Modifications	Natural System Modifications- Other	Existing	Significant	This species requires mature open pine habitat, much of which was destroyed by a previous pine beetle outbreak. Cavities are constructed in live, old pine trees. Habitat management that preserves large tracts of suitable habitat is lacking.
<i>Empidonax minimus</i>	Least Flycatcher	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Empidonax minimus</i>	Least Flycatcher	Habitat loss in Kentucky	Natural System Modifications	Fire and Fire Suppression	Existing	Substantial	This species nests on shrubby reclaimed mines in far east Kentucky. Habitat management is needed to set back succession and promote suitable habitat conditions.
<i>Empidonax minimus</i>	Least Flycatcher	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central America.
<i>Empidonax traillii</i>	Willow Flycatcher	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Empidonax traillii</i>	Willow Flycatcher	Habitat loss in Kentucky	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	Loss of shrubland habitat due to clean farming and other activities that result in loss of shrubs.
<i>Empidonax traillii</i>	Willow Flycatcher	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Empidonax traillii</i>	Willow Flycatcher	Feral cat predation	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	Cooper et al. (2012) documents this species to be predated by cats.
<i>Euphagus carolinus</i>	Rusty Blackbird	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Moderate	
<i>Euphagus carolinus</i>	Rusty Blackbird	Loss of bottomland hardwoods habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	These areas have been converted to row crops.
<i>Euphagus carolinus</i>	Rusty Blackbird	Water quality and contaminants	Pollution	Pollution- Other	Existing	Substantial	This species feeds at a high trophic level off aquatic insects.
<i>Falco peregrinus</i>	Peregrine Falcon	Highly Pathogenic Avian Flu	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Moderate	A notable number of peregrine deaths were observed in other states due to high path avian flu in 2022. We have yet to understand the population-level effects.
<i>Falco peregrinus</i>	Peregrine Falcon	Trichomoniasis	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Moderate	This disease, which peregrines get from the pigeons they eat, can hinder the survival of young.
<i>Falco peregrinus</i>	Peregrine Falcon	Lead and mercury contaminants	Pollution	Pollution- Other	Existing	Moderate	Documented through various studies.
<i>Falco peregrinus</i>	Peregrine Falcon	Human disturbance	Human Intrusions and Disturbance	Work and Other Activities	Existing	Minor	Destruction of nest sites may occur if population is not managed.
<i>Falco sparverius</i>	American Kestrel	Habitat loss in Kentucky due to clean farming	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	Stop mowing so much.
<i>Falco sparverius</i>	American Kestrel	Cavity nest site loss	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Removal of snags and old trees.
<i>Falco sparverius</i>	American Kestrel	Secondary exposure to rodenticides	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	We have documented this through our own studies.
<i>Falco sparverius</i>	American Kestrel	Pesticide use	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	Causing lower prey abundance (e.g. grasshoppers).
<i>Gallinago delicata</i>	Wilson's Snipe	Wetland removal and stream channelization due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Moderate	
<i>Gallinago delicata</i>	Wilson's Snipe	Incompatible water level management	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Gallinago delicata</i>	Wilson's Snipe	Eutrophication and pollution of wetlands	Pollution	Pollution- Other	Existing	Substantial	
<i>Gallinula galeata</i>	Common Gallinule	Wetland habitat loss to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Geothlypis formosa</i>	Kentucky Warbler	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Substantial	
<i>Geothlypis formosa</i>	Kentucky Warbler	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Geothlypis formosa</i>	Kentucky Warbler	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Geothlypis formosa</i>	Kentucky Warbler	Habitat loss in Kentucky	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Habitat management is needed to promote suitable habitat conditions. This species needs a well-developed mid story.
<i>Grus americana</i>	Whooping Crane	Powerline collisions	Transportation and Service Corridors	Utility and Service Lines	Existing	Moderate	
<i>Grus americana</i>	Whooping Crane	Illegal hunting	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Moderate	
<i>Grus americana</i>	Whooping Crane	Water pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Highly Pathogenic Avian Flu	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Substantial	A notable number of eagle deaths were observed due to high path avian flu in 2022. We have yet to understand the population-level effects.
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Logging near nests	Biological Resource Use	Logging and Wood Harvesting	Existing	Moderate	Logging near to nests may cause nest disturbance or nest destruction if federal guidelines are not followed. Recent lumber market conditions have resulted in increased logging activity in Kentucky.
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Contaminants including rodenticides, barbiturates, lead and mercury	Pollution	Pollution- Other	Existing	Substantial	Many studies have documented these ongoing issues.
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Human disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Minor	Nests can receive too much attention from the public, causing reduced nesting success or failure.
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Droughts, storms and flooding due to climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Moderate	Droughts storms and flooding may affect habitat availability and nest productivity in the future.
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Illegal shooting	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Minor	Has been documented in Kentucky.
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Powerline electrocutions	Transportation and Service Corridors	Utility and Service Lines	Existing	Minor	
<i>Hylocichla ustulata</i>	Wood Thrush	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Moderate	
<i>Hylocichla ustulata</i>	Wood Thrush	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Hylocichla ustulata</i>	Wood Thrush	Habitat fragmentation and loss in Kentucky	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	Habitat fragmentation is known to be an issue and management is needed to promote suitable habitat conditions in some areas.
<i>Hylocichla ustulata</i>	Wood Thrush	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central America or the Caribbean.
<i>Hylocichla ustulata</i>	Wood Thrush	Feral cat predation	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	
<i>Ixobrychus exilis</i>	Least Bittern	Eutrophication and pollution of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	Contamination of wetlands is tied to invasive plant species. Prey loss may also occur due to agricultural chemicals.
<i>Ixobrychus exilis</i>	Least Bittern	Urban and residential development	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	This results in habitat loss.
<i>Ixobrychus exilis</i>	Least Bittern	Wetland loss due to conversion of wetlands for agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Past wetland loss and current renewal of drainage systems. Aging drainage systems can be good shorebird habitat. Expiring WRP is also a concern.
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Vehicle collisions	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	Known to be a problem.
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Clean farming practices	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	Shrub and fencerow removal.
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Exotic shrub encroachment	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	Alters habitat structure in fencerows, shrubby patches, etc.
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Feral cat predation	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Pesticide use	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	Limits prey abundance.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Severe weather	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Significant	Climate change may cause fluctuating/declining prey abundance limiting food availability. Severe weather events hinder survival.
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Agricultural run off and eutrophication of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	These activities result in habitat loss. Reilling projects are an issue.
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Unsustainable hunting on the winter grounds	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Significant	Many shorebirds are hunted in the Caribbean and South America. Hunting may be causing declines in some shorebird species.
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Climate change resulting in changes to nesting habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	Habitat loss and timing of food availability/prey abundance. Timing of migration and energy depletion during migration may also be an issue.
<i>Limnithypis swainsonii</i>	Swainson's Warbler	Loss of cane habitat	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Limnithypis swainsonii</i>	Swainson's Warbler	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Substantial	One study estimated that Swainson's Warblers were among the most vulnerable of all species to communication tower collisions.
<i>Limnithypis swainsonii</i>	Swainson's Warbler	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Limnithypis swainsonii</i>	Swainson's Warbler	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central America and the Caribbean.
<i>Limnithypis swainsonii</i>	Swainson's Warbler	Loss of rhododendron thickets and other dense understories in East Kentucky	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Could be remedied with management.
<i>Lophodytes cucullatus</i>	Hooded Merganser	Water pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Lophodytes cucullatus</i>	Hooded Merganser	Breeding habitat loss to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Substantial	Probably breeds on backwater sloughs.
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Snag, mast and woodland availability	Natural System Modifications	Natural System Modifications- Other	Existing	Substantial	Availability of nut-producing trees, dead trees and general availability of open-forest habitats are probably the biggest factors limiting the population.
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	Bottomland hardwoods removal due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Lots of habitat loss in the past. Huge impact past, less impact currently. Present loss is less.
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	Timber harvest	Biological Resource Use	Logging and Wood Harvesting	Existing	Moderate	May result in loss of nesting trees.
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	Human disturbance at rookery sites	Human Intrusions and Disturbance	Recreational Activities	Existing	Minor	
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	Water pollution and contaminants	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	Pesticides, neonics, mercury, DDT in the past, and fertilizers.
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	Bottomland hardwoods removal due to development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Lots of habitat loss in the past. Huge impact past, less impact currently. Present loss is less.
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Human-wildlife conflict	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Moderate	Removal of nests in urban areas (permitted).
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Bottomland hardwoods removal due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Lots of habitat loss in the past. Huge impact past, less impact currently. Present loss is less.
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Timber harvest	Biological Resource Use	Logging and Wood Harvesting	Existing	Moderate	May result in loss of nesting trees.
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Human disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Minor	At rookery sites.
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Water pollution and contaminants	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	Pesticides, neonics, mercury, DDT in the past, and fertilizers.
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Bottomland hardwoods removal due to development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Lots of habitat loss in the past. Huge impact past, less impact currently. Present loss is less.
<i>Pandion haliaetus</i>	Osprey	Fishing line and trash entanglement	Pollution	Garbage and Solid Waste	Existing	Substantial	Adult ospreys are attracted to fishing line and other manmade objects for nesting material. Young may become entangled in the nest, which can lead to death. Less commonly, adults may become entangled.
<i>Pandion haliaetus</i>	Osprey	Storms and flooding due to climate change	Climate Change and Severe Weather	Storms and Flooding	Existing	Substantial	Severe flooding and storms can result in loss of nest productivity.
<i>Pandion haliaetus</i>	Osprey	Management of utility infrastructure	Transportation and Service Corridors	Utility and Service Lines	Existing	Substantial	Ospreys often nest on cell towers and utility lines. Continued work with relevant industries will be required to sustain the population. 5G upgrade requires increased coordination with utility companies.
<i>Pandion haliaetus</i>	Osprey	Mercury and other contaminants	Pollution	Pollution- Other	Existing	Moderate	Mercury, lead and other contaminants have been documented in ospreys. Effects on survival have yet to be fully understood.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central America and the Caribbean.
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Substantial	
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Poor water quality	Energy Production and Mining	Mining and Quarrying	Existing	Substantial	Results in lower prey abundance.
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Loss of riparian and bottomland hardwood forest in Kentucky due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Loss and degradation of headwater streams	Energy Production and Mining	Mining and Quarrying	Existing	Substantial	
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Loss of riparian and bottomland hardwood forest in Kentucky due mining and quarrying	Energy Production and Mining	Mining and Quarrying	Existing	Significant	
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Clean farming and mowing frequency	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	Mowing or cutting hay multiple times per year causes nest failure.
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Feral cat predation	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Substantial	This is especially an issue on farms.
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Pesticide use	Pollution	Agricultural and Forestry Effluents	Existing	Moderate	
<i>Peucaea aestivalis</i>	Bachman's Sparrow	Fire is needed to manage habitat	Natural System Modifications	Fire and Fire Suppression	Existing	Substantial	
<i>Peucaea aestivalis</i>	Bachman's Sparrow	Habitat is scarce outside of Fort Campbell	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Moderate	
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Agricultural run off and eutrophication of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Shoreline development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Minor	Future development of shorelines may negatively affect habitat availability.
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	These activities result in habitat loss. Rellling projects are an issue.
<i>Pluvialis dominica</i>	American Golden-plover	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Pluvialis dominica</i>	American Golden-plover	Agricultural run off and eutrophication of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Pluvialis dominica</i>	American Golden-plover	Shoreline development	Residential and Commercial Development	Housing and Urban Areas	Existing	Moderate	Future development of shorelines may negatively affect habitat availability.
<i>Pluvialis dominica</i>	American Golden-plover	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	These activities result in habitat loss. Rellling projects are an issue.
<i>Pluvialis dominica</i>	American Golden-plover	Unsustainable hunting on the winter grounds	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Significant	Many shorebirds are hunted in the Caribbean and South America. Hunting may be causing declines in some shorebird species.
<i>Pluvialis dominica</i>	American Golden-plover	Climate change resulting in changes to tundra habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	Habitat loss and timing of food availability/prey abundance. Timing of migration and energy depletion during migration may also be an issue.
<i>Pluvialis dominica</i>	American Golden-plover	Habitat loss on the winter grounds due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Pluvialis squatarola</i>	Black-bellied Plover	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Pluvialis squatarola</i>	Black-bellied Plover	Agricultural run off and eutrophication of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Pluvialis squatarola</i>	Black-bellied Plover	Shoreline development	Residential and Commercial Development	Housing and Urban Areas	Possible	Minor	Future development of shorelines may negatively affect habitat availability.
<i>Pluvialis squatarola</i>	Black-bellied Plover	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	These activities result in habitat loss. Rellling projects are an issue.
<i>Pluvialis squatarola</i>	Black-bellied Plover	Unsustainable hunting on the winter grounds	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Significant	Many shorebirds are hunted in the Caribbean and South America. Hunting may be causing declines in some shorebird species.
<i>Pluvialis squatarola</i>	Black-bellied Plover	Climate change resulting in changes to tundra habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	Habitat loss and timing of food availability/prey abundance. Timing of migration and energy depletion during migration may also be an issue.
<i>Pluvialis squatarola</i>	Black-bellied Plover	Habitat loss on the winter grounds	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Podiceps auritus</i>	Horned Grebe	Water contamination from industrial sources	Pollution	Industrial and Military Effluents	Existing	Minor	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Podiceps auritus</i>	Horned Grebe	Agricultural run off	Pollution	Agricultural and Forestry Effluents	Existing	Moderate	
<i>Podiceps auritus</i>	Horned Grebe	Drainage of wetlands for agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Podiceps auritus</i>	Horned Grebe	Human disturbance (boating activity)	Human Intrusions and Disturbance	Recreational Activities	Existing	Moderate	
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Water contamination from industrial sources	Pollution	Industrial and Military Effluents	Possible	Minor	
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Agricultural run off	Pollution	Agricultural and Forestry Effluents	Possible	Moderate	
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Drainage of wetlands for agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	Past conversion of wetlands for agriculture, especially outside of Kentucky.
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Human disturbance (boating activity)	Human Intrusions and Disturbance	Recreational Activities	Existing	Moderate	Happens in Kentucky. Causes energy depletion.
<i>Porzana carolina</i>	Sora	Eutrophication and pollution of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	Prey loss may also occur due to agricultural chemicals.
<i>Porzana carolina</i>	Sora	Urban and residential development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	This results in habitat loss.
<i>Porzana carolina</i>	Sora	Invasive wetland plants	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Significant	Phragmites and other species have altered habitat conditions.
<i>Porzana carolina</i>	Sora	Wetland loss due to conversion of wetlands for agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Past wetland loss and current renewal of drainage systems. Aging drainage systems can be good shorebird habitat. Expiring WRP is also a concern.
<i>Protonotaria citrea</i>	Prothonotary Warbler	Loss of bottomland hardwood forest and wet forest types	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Protonotaria citrea</i>	Prothonotary Warbler	Competition for cavity nest sites with other species	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Species and Genes	Existing	Substantial	Starlings and other native species can out compete this species for cavities.
<i>Protonotaria citrea</i>	Prothonotary Warbler	Flood events causing nest failure	Climate Change and Severe Weather	Storms and Flooding	Possible	Moderate	
<i>Protonotaria citrea</i>	Prothonotary Warbler	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter coastal habitats in Central and South America, probably threatened by development.
<i>Protonotaria citrea</i>	Prothonotary Warbler	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Protonotaria citrea</i>	Prothonotary Warbler	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Moderate	
<i>Rallus elegans</i>	King Rail	Eutrophication and pollution of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	Prey loss may occur due to agricultural chemicals.
<i>Rallus elegans</i>	King Rail	Urban and residential development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	This results in habitat loss.
<i>Rallus elegans</i>	King Rail	Invasive wetland plants	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Significant	Phragmites and other species have altered habitat conditions.
<i>Rallus elegans</i>	King Rail	Wetland loss due to conversion of wetlands for agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Past wetland loss and current renewal of drainage systems. Aging drainage systems can be good shorebird habitat. Expiring WRP is also a concern.
<i>Rallus limicola</i>	Virginia Rail	Eutrophication and pollution of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	Contamination of wetlands is tied to invasive plant species. Prey loss may also occur due to agricultural chemicals.
<i>Rallus limicola</i>	Virginia Rail	Urban and residential development	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	This results in habitat loss.
<i>Rallus limicola</i>	Virginia Rail	Invasive wetland plants	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Significant	Phragmites and other species have altered habitat conditions.
<i>Rallus limicola</i>	Virginia Rail	Wetland loss due to conversion of wetlands for agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Past wetland loss and current renewal of drainage systems. Expiring WRP is also a concern.
<i>Riparia riparia</i>	Bank Swallow	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central America.
<i>Riparia riparia</i>	Bank Swallow	Nest destruction due to river dredging and barge operations.	Transportation and Service Corridors	Shipping Lanes	Possible	Moderate	This species nests on vertical sand or mud banks. Erosion control and flood control projects that remove these banks or make them less steep make them unsuitable for Bank Swallows.
<i>Riparia riparia</i>	Bank Swallow	Pesticide use	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	Has been implicated in aerial insecticide declines.
<i>Scolecophax minor</i>	American Woodcock	Habitat loss due to forest succession and suppression of disturbance regimes	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Species needs early successional habitat.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Scelopax minor</i>	American Woodcock	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Non timber Crops	Existing	Severe	
<i>Scelopax minor</i>	American Woodcock	Water pollution (e.g. heavy metals, pesticides, herbicides, etc.)	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Setophaga cerulea</i>	Cerulean Warbler	Habitat loss in Kentucky	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Species requires canopy gaps and uneven-aged forest stands. Forest management can be used to accomplish this.
<i>Setophaga cerulea</i>	Cerulean Warbler	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in South America.
<i>Setophaga cerulea</i>	Cerulean Warbler	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Moderate	
<i>Setophaga cerulea</i>	Cerulean Warbler	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Setophaga discolor</i>	Prairie Warbler	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Moderate	
<i>Setophaga discolor</i>	Prairie Warbler	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Setophaga discolor</i>	Prairie Warbler	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Setophaga discolor</i>	Prairie Warbler	Open woodland habitat loss in Kentucky	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Habitat management is needed to promote suitable habitat conditions.
<i>Setophaga striata</i>	Blackpoll Warbler	Loss of stop-over habitat in Kentucky	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Substantial	
<i>Setophaga striata</i>	Blackpoll Warbler	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in South America.
<i>Setophaga striata</i>	Blackpoll Warbler	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Setophaga striata</i>	Blackpoll Warbler	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Moderate	
<i>Setophaga tigrina</i>	Cape May Warbler	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Setophaga tigrina</i>	Cape May Warbler	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Substantial	
<i>Setophaga tigrina</i>	Cape May Warbler	Loss of stop-over habitat in Kentucky	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Substantial	Found in woodland and shrubland habitat. Also likes pines
<i>Setophaga tigrina</i>	Cape May Warbler	Habitat loss on winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	
<i>Setophaga virens</i>	Black-throated Green Warbler	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Setophaga virens</i>	Black-throated Green Warbler	Hemlock Woolly Adelgid effects on nesting habitat	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Existing	Substantial	
<i>Setophaga virens</i>	Black-throated Green Warbler	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Moderate	
<i>Setophaga virens</i>	Black-throated Green Warbler	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Spiza americana</i>	Dickcissel	Clean farming and mowing frequency	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	Mowing or cutting hay multiple times per year causes nest failure.
<i>Spiza americana</i>	Dickcissel	Feral cat predation	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Existing	Substantial	This is especially an issue on farms.
<i>Spiza americana</i>	Dickcissel	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Spiza americana</i>	Dickcissel	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Moderate	
<i>Spiza americana</i>	Dickcissel	Take on winter grounds	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Moderate	The greatest threat to Dickcissels is on their wintering grounds in the llanos region of Venezuela, where flocks can number in the millions. There, the birds may be regarded as pests to ripening grain crops, since the 1960s, roosting birds have been sprayed at night with pesticides, causing massive mortality.
<i>Spiza americana</i>	Dickcissel	Pesticide use	Pollution	Agricultural and Forestry Effluents	Existing	Moderate	
<i>Spizella pusilla</i>	Field Sparrow	Clean farming and mowing frequency	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	Mowing or cutting hay multiple times per year causes nest failure. This species requires old fields- often which haven't been mowed in 2-3 years.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Spizella pusilla</i>	Field Sparrow	Feral cat predation	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	This is especially an issue on farms.
<i>Spizella pusilla</i>	Field Sparrow	Development of grassy old fields	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Sterna antillarum athalassos</i>	Interior Least Tern	River dredging	Transportation and Service Corridors	Shipping Lanes	Existing	Substantial	This species needs river islands.
<i>Sterna antillarum athalassos</i>	Interior Least Tern	Flooding events precluding use of islands for nesting	Climate Change and Severe Weather	Storms and Flooding	Existing	Substantial	
<i>Sterna antillarum athalassos</i>	Interior Least Tern	Lack of islands with open habitat for nesting	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Suppression of disturbance.
<i>Sterna antillarum athalassos</i>	Interior Least Tern	ATV use on nest islands causing nest disturbance and destruction	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Sterna antillarum athalassos</i>	Interior Least Tern	Predation of nests accessible to ground predators	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Significant	
<i>Sturnella magna</i>	Eastern Meadowlark	Feral cat predation	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	Raccoons and other over populated native predators are also likely a problem.
<i>Sturnella magna</i>	Eastern Meadowlark	Clean farming and mowing frequency	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	While mowing once annually maintains meadowlark habitat, mowing multiple times per year causes nest failure.
<i>Sturnella magna</i>	Eastern Meadowlark	Habitat fragmentation	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Thryomanes bewickii</i>	Bewick's Wren	Competition for nest sites with other species	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Species and Genes	Existing	Severe	Species does not compete well with the House Wren, European Starling, House Sparrow, and Carolina Wren.
<i>Thryomanes bewickii</i>	Bewick's Wren	Pesticide use	Pollution	Agricultural and Forestry Effluents	Possible	Substantial	This has been suggested as a cause of decline.
<i>Tringa flavipes</i>	Lesser Yellowlegs	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Tringa flavipes</i>	Lesser Yellowlegs	Agricultural run off and eutrophication of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Tringa flavipes</i>	Lesser Yellowlegs	Shoreline development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	Future development of shorelines may negatively affect habitat availability.
<i>Tringa flavipes</i>	Lesser Yellowlegs	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	These activities result in habitat loss. Retilling projects are an issue.
<i>Tringa flavipes</i>	Lesser Yellowlegs	Unsustainable hunting on the winter grounds	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Significant	Many shorebirds are hunted in the Caribbean and South America. Hunting may be causing declines in some shorebird species.
<i>Tringa flavipes</i>	Lesser Yellowlegs	Climate change resulting in changes to tundra habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	Habitat loss and timing of food availability/prey abundance. Timing of migration and energy depletion during migration may also be an issue.
<i>Tringa flavipes</i>	Lesser Yellowlegs	Habitat loss to agriculture on the winter grounds	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Tringa solitaria</i>	Solitary Sandpiper	Lack of stop over habitat due to water levels	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Water levels are often not managed to optimize shorebird habitat during peak migration.
<i>Tringa solitaria</i>	Solitary Sandpiper	Agricultural run off and eutrophication of wetlands	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Tringa solitaria</i>	Solitary Sandpiper	Shoreline development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	Future development of shorelines may negatively affect habitat availability.
<i>Tringa solitaria</i>	Solitary Sandpiper	Stream channelization, wetland conversion due to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	These activities result in habitat loss. Retilling projects are an issue.
<i>Tringa solitaria</i>	Solitary Sandpiper	Climate change resulting in changes to tundra habitat	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Existing	Significant	Habitat loss and timing of food availability/prey abundance. Timing of migration and energy depletion during migration may also be an issue.
<i>Tringa solitaria</i>	Solitary Sandpiper	Habitat loss due to agriculture on the winter grounds	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central or South America.
<i>Tyto alba</i>	Barn Owl	Mowing and haying frequency	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Severe	Increased frequency in mowing and haying in recent decades results in habitat degradation.
<i>Tyto alba</i>	Barn Owl	Secondary exposure to rodenticides	Pollution	Agricultural and Forestry Effluents	Existing	Significant	Documented through research conducted by KDFWR and others.
<i>Tyto alba</i>	Barn Owl	Human disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Moderate	Most human disturbance is due to well-meaning humans, rather than people using their barns for agricultural activities.
<i>Tyto alba</i>	Barn Owl	Disease and parasites	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Moderate	We have a study on this currently and this may be a somewhat significant issue.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Tyto alba</i>	Barn Owl	Predation by raccoons and great-horned owls	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Substantial	Very common, unless species is managed.
<i>Tyto alba</i>	Barn Owl	Vehicle collision	Transportation and Service Corridors	Roads and Railroads	Existing	Moderate	
<i>Tyto alba</i>	Barn Owl	Powerline electrocutions	Transportation and Service Corridors	Utility and Service Lines	Existing	Minor	
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Hybridization with Blue-winged Warblers	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Significant	
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Lack of early successional patches within Kentucky's forested landscapes at high elevations	Natural System Modifications	Fire and Fire Suppression	Existing	Substantial	Prescribed fire is needed to promote suitable habitat conditions, especially on high elevation, reclaimed mines.
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Collisions with communication towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Substantial	
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Feral Hogs	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Possible	Moderate	
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Collisions with communications towers during migration	Transportation and Service Corridors	Utility and Service Lines	Existing	Moderate	
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Lack of early successional patches within Kentucky's forested landscapes	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	Lack of forest management.
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	This species is a neotropical migrant and spends the winter in Central America or the Caribbean.
<i>Vireo bellii</i>	Bell's Vireo	"Clean" agriculture practices	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Minor	Clearing of shrubby areas on farms.
<i>Vireo bellii</i>	Bell's Vireo	Habitat loss on the winter grounds	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	
<i>Vireo bellii</i>	Bell's Vireo	Window strikes during migration	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Moderate	
<i>Vireo bellii</i>	Bell's Vireo	Feral cat predation	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Substantial	

APX 5.1c Threats Identified for Crustacean SGCN

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Barbicambarus comutus</i>	Bottlebrush Crayfish	Sedimentation from ag practices and loss of riparian habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Barbicambarus comutus</i>	Bottlebrush Crayfish	Habitat loss via impoundment	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Barbicambarus comutus</i>	Bottlebrush Crayfish	Bait bucket introduction of nonnative species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Significant	
<i>Cambarus adustus</i>	Dusky Mudbug	Hydrologic changes from development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Substantial	Tile and drain habitat for development reduces the ability for the species to utilize the site.
<i>Cambarus adustus</i>	Dusky Mudbug	Pesticide use in ag settings	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Possible	Significant	Neo-nic pesticide use and drift off site can impact crayfish populations.
<i>Cambarus batchi</i>	Bluegrass Crayfish	Hydrologic changes from development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Substantial	Tile and drain habitat for development reduces the ability for the species to utilize the site.
<i>Cambarus batchi</i>	Bluegrass Crayfish	Pesticide use in ag settings	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Possible	Significant	Neo-nic pesticide use and drift off site can impact crayfish populations.
<i>Cambarus bouchardi</i>	Big South Fork Crayfish	Episodic spills along transportation corridors	Transportation and Service Corridors	Roads and Railroads	Possible	Moderate	
<i>Cambarus bouchardi</i>	Big South Fork Crayfish	Invasive crayfish introduction	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Severe	
<i>Cambarus callainus</i>	Big Sandy Crayfish	Coal mining and sedimentation	Energy Production and Mining	Mining and Quarrying	Existing	Significant	
<i>Cambarus callainus</i>	Big Sandy Crayfish	Development near riparian zone	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Cambarus callainus</i>	Big Sandy Crayfish	Invasive species introduction	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Severe	
<i>Cambarus friaufi</i>	Harry Crayfish	Sedimentation and loss of interstitial habitat	Agriculture and Aquaculture	Livestock Farming and Ranching	Possible	Significant	
<i>Cambarus friaufi</i>	Harry Crayfish	Invasive crayfish introduction	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Severe	
<i>Cambarus guenteri</i>	Redbird Crayfish	Loss of habitat from sedimentation associated with mineral extraction	Energy Production and Mining	Mining and Quarrying	Existing	Severe	
<i>Cambarus guenteri</i>	Redbird Crayfish	Invasive crayfish introduction	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Severe	
<i>Cambarus haffieldi</i>	Tug Valley Crayfish	Sedimentation and loss of suitable habitat in stream	Energy Production and Mining	Mining and Quarrying	Existing	Severe	
<i>Cambarus haffieldi</i>	Tug Valley Crayfish	Invasive crayfish introduction	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Severe	
<i>Cambarus hazardi</i>	Brawny Crayfish	Loss of habitat from sedimentation associated with mineral extraction	Energy Production and Mining	Mining and Quarrying	Existing	Severe	
<i>Cambarus hazardi</i>	Brawny Crayfish	Invasive crayfish introduction	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Severe	
<i>Cambarus parvoculus</i>	Mountain Midget Crayfish	Open pasture encroaching into riparian zone	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Moderate	Sedimentation and erosion associated with cattle in streams.
<i>Cambarus parvoculus</i>	Mountain Midget Crayfish	Sedimentation from logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Cambarus parvoculus</i>	Mountain Midget Crayfish	Sedimentation for coal mining	Energy Production and Mining	Mining and Quarrying	Existing	Significant	
<i>Cambarus taylori</i>	Cutshin Crayfish	Loss of habitat from sedimentation associated with mineral extraction	Energy Production and Mining	Mining and Quarrying	Existing	Severe	
<i>Cambarus taylori</i>	Cutshin Crayfish	Invasive crayfish introduction	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Severe	
<i>Faxonius bisectus</i>	Crittenden Crayfish	Sedimentation from ag practices and loss of riparian habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Faxonius bisectus</i>	Crittenden Crayfish	Bait bucket introduction of nonnative species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Faxonius burri</i>	Blood River Crayfish	Sedimentation from ag practices and loss of riparian habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Faxonius burri</i>	Blood River Crayfish	Channelization of streams throughout range	Natural System Modifications	Natural System Modifications- Other	Existing	Significant	
<i>Faxonius burri</i>	Blood River Crayfish	Bait bucket introduction of competing crayfish species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Possible	Significant	
<i>Faxonius elix</i>	Mowild Crayfish	Direct loss of habitat due to development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Faxonius elix</i>	Mowild Crayfish	Sedimentation from ag practices and loss of riparian habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Faxonius elix</i>	Mowild Crayfish	Bait bucket introduction of nonnative species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Possible	Significant	
<i>Faxonius jeffersoni</i>	Louisville Crayfish	Direct loss of habitat due to development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Faxonius jeffersoni</i>	Louisville Crayfish	Sedimentation from ag practices and loss of riparian habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Faxonius jeffersoni</i>	Louisville Crayfish	Bait bucket introduction of nonnative species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Possible	Significant	
<i>Faxonius kentuckiensis</i>	Kentucky Crayfish	Sedimentation from ag practices and loss of riparian habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Faxonius kentuckiensis</i>	Kentucky Crayfish	Bait bucket introduction of nonnative species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Possible	Significant	
<i>Faxonius margorectus</i>	Livingston Crayfish	Sedimentation from ag practices and loss of riparian habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Faxonius margorectus</i>	Livingston Crayfish	Bait bucket introduction of nonnative species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Possible	Significant	
<i>Faxonius rafinesquei</i>	Rough River Crayfish	Sedimentation from ag practices and loss of riparian habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Faxonius rafinesquei</i>	Rough River Crayfish	Bait bucket introduction of nonnative species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Possible	Significant	
<i>Orconectes barri</i>	Cumberland Plateau Cave Crayfish	Pesticide from ag use	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Possible	Substantial	
<i>Orconectes barri</i>	Cumberland Plateau Cave Crayfish	Human intrusion into occupied habitats	Human intrusions and Disturbance	Recreational Activities	Possible	Significant	
<i>Orconectes inermis inermis</i>	Ghost Crayfish	Pesticide from ag use	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Possible	Substantial	
<i>Orconectes inermis inermis</i>	Ghost Crayfish	Human intrusion into occupied habitats	Human intrusions and Disturbance	Recreational Activities	Possible	Significant	
<i>Orconectes packardii</i>	Appalachian Cave Crayfish	Pesticide from ag use	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Possible	Substantial	
<i>Orconectes packardii</i>	Appalachian Cave Crayfish	Human intrusion into occupied habitats	Human intrusions and Disturbance	Recreational Activities	Possible	Significant	
<i>Orconectes pelliculidus</i>	Mammoth Cave Crayfish	Pesticide from ag use	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Possible	Substantial	
<i>Orconectes pelliculidus</i>	Mammoth Cave Crayfish	Human intrusion into occupied habitats	Human intrusions and Disturbance	Recreational Activities	Possible	Significant	
<i>Palaeomonias genteri</i>	Mammoth Cave Shrimp	Chemical spills resulting from traffic accidents	Transportation and Service Corridors	Roads and Railroads	Possible	Significant	
<i>Palaeomonias genteri</i>	Mammoth Cave Shrimp	Oil, gas, and brine pollution from drilling activity	Energy Production and Mining	Oil and Gas Drilling	Possible	Significant	
<i>Palaeomonias genteri</i>	Mammoth Cave Shrimp	Siltation and chemical runoff from ag practices	Pollution	Agricultural and Forestry Effluents	Possible	Significant	
<i>Palaeomonias genteri</i>	Mammoth Cave Shrimp	Contaminants from urban stormwater runoff	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Palaeomonias genteri</i>	Mammoth Cave Shrimp	Impacted flow pattern and siltation from impoundment	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	Before its removal, Lock and Dam No. 6 created a bizarre flow pattern in the Mammoth Cave system and increased sedimentation.

APX 5.1d Threats Identified for Fishes and Lamprey SGCN

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Acipenser fulvescens</i>	Lake Sturgeon	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	High silt loads on spawning substrates can lead to larval mortality.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Overfishing	Biological Resource Use	Fishing and Harvesting Aquatic Resources	Existing	Severe	Due to the commercial value of sturgeon products, especially caviar, illegal harvest has and continues to be a threat to all species.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Severe	Sturgeon populations could be negatively affected by the predicted impacts of global climate change on river ecosystems worldwide. An increase in global temperatures may result in the extinction and extirpation of species and populations, as many are already near the upper limit of temperature for proper development and growth.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	All sturgeon species are affected by numerous forms of water pollution from a variety of sources. They are susceptible to bioaccumulation of contaminants and have a low capacity to detoxify various compounds relative to other bony fishes. High silt loads on spawning substrates can lead to larval mortality.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Existing	Severe	Invasive species negatively affect early life stages. Introduced exotic species such as Common Carp and Round Goby are known to prey on eggs and perhaps larvae of Lake Sturgeon in the Great Lakes drainages.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Dams negatively affect spawning migrations, quality and quantity of spawning habitat, embryo and larval development, genetic diversity and growth.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	All sturgeon species are affected by numerous forms of water pollution from a variety of sources. They are susceptible to bioaccumulation of contaminants and have a low capacity to detoxify various compounds relative to other bony fishes. High silt loads on spawning substrates can lead to larval mortality.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	All sturgeon species are affected by numerous forms of water pollution from a variety of sources. They are susceptible to bioaccumulation of contaminants and have a low capacity to detoxify various compounds relative to other bony fishes. High silt loads on spawning substrates can lead to larval mortality.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Industrial use of waterways	Transportation and Service Corridors	Shipping Lanes	Existing	Severe	All life stages are impacted by commercial vessel passage. Larvae are susceptible to propeller-induced shear stress. Juveniles and adults are susceptible to entrainment by towboat propellers and during channel dredging and water diversions.
<i>Allohistium maydeni</i>	Redlips Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Allohistium maydeni</i>	Redlips Darter	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Allohistium maydeni</i>	Redlips Darter	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Severe	Predicted impacts of climate change could potentially increase the vulnerability of the species. Intensified droughts and elevated stream temperatures would have detrimental effects on existing populations.
<i>Allohistium maydeni</i>	Redlips Darter	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Allohistium maydeni</i>	Redlips Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	River fragmentation and hydrologic alterations caused by dams have reduced or eliminated populations of this species. Most tributary systems within the species' range have been impacted by impoundments. Other artificial instream barriers (e.g., low head dams and culvert crossings) that block fish movements and fragment populations also negatively impact this species.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Alohistium maydeni</i>	Redlips Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Increased sedimentation (siltation), turbidity, nutrient enrichment, and other pollutants from poor land use practices have negatively affected and continue to impact this species.
<i>Alohistium maydeni</i>	Redlips Darter	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and manure spills.
<i>Alohistium maydeni</i>	Redlips Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Alohistium maydeni</i>	Redlips Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Alosa alabamiae</i>	Alabama Shad	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Significant	Excessive sedimentation and changes in water quality parameters, including turbidity, flow, oxygen content, and pollutants are a potential threat. Water quality and sedimentation impacts result from channel dredging in large rivers and land-based activities, including agriculture, silviculture, and industrial, commercial, and residential development.
<i>Alosa alabamiae</i>	Alabama Shad	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Possible	Significant	Excessive sedimentation and changes in water quality parameters, including turbidity, flow, oxygen content, and pollutants are a potential threat. Water quality and sedimentation impacts result from channel dredging in large rivers and land-based activities, including agriculture, silviculture, and industrial, commercial, and residential development.
<i>Alosa alabamiae</i>	Alabama Shad	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Range-wide population declines have been largely attributed to the construction of dams that block access to spawning sites. Dams on the Mississippi and Ohio rivers may have precluded spawning migrations in Kentucky waters.
<i>Alosa alabamiae</i>	Alabama Shad	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Excessive sedimentation and changes in water quality parameters, including turbidity, flow, oxygen content, and pollutants are a potential threat. Water quality and sedimentation impacts result from channel dredging in large rivers and land-based activities, including agriculture, silviculture, and industrial, commercial, and residential development.
<i>Alosa alabamiae</i>	Alabama Shad	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Significant	Excessive sedimentation and changes in water quality parameters, including turbidity, flow, oxygen content, and pollutants are a potential threat. Water quality and sedimentation impacts result from channel dredging in large rivers and land-based activities, including agriculture, silviculture, and industrial, commercial, and residential development.
<i>Alosa alabamiae</i>	Alabama Shad	Industrial use of waterways	Transportation and Service Corridors	Shipping Lanes	Possible	Significant	Excessive sedimentation and changes in water quality parameters, including turbidity, flow, oxygen content, and pollutants are a potential threat. Water quality and sedimentation impacts result from channel dredging in large rivers and land-based activities, including agriculture, silviculture, and industrial, commercial, and residential development.
<i>Amblyopsis spelaean</i>	Northern Cavefish	Overexploitation	Biological Resource Use	Fishing and Harvesting Aquatic Resources	Possible	Severe	Overcollection of cavefish, legal or otherwise, for the aquarium trade or scientific purposes could potentially reduce or eliminate local populations.
<i>Amblyopsis spelaean</i>	Northern Cavefish	Quarrying and mining operations	Energy Production and Mining	Mining and Quarrying	Existing	Severe	Cave habitat degradation resulting from direct destruction or manipulation during quarrying and mining operations, highway construction, and urban development has negatively impacted populations.
<i>Amblyopsis spelaean</i>	Northern Cavefish	Human disturbance of cave habitats	Human Intrusions and Disturbance	Recreational Activities	Possible	Severe	Human disturbance caused by increased cave visitation traffic may have severe impacts to cavefish populations by disrupting spawning behavior, food resources, and causing stress to animals.
<i>Amblyopsis spelaean</i>	Northern Cavefish	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Hydrological manipulations, including underground water removal for human consumption, irrigation, or industry can lower water tables. Impoundments also threaten populations by increasing back-flooding and altering flow regimes and groundwater levels within cave systems.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Amblyopsis spelaea</i>	Northern Cavefish	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Groundwater pollution is a documented factor negatively affecting all cave amblyopsids. Threats include eutrophication and contamination from agricultural and industrial runoff containing pesticides, fertilizers, heavy metals, and sewage effluent.
<i>Amblyopsis spelaea</i>	Northern Cavefish	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	Groundwater pollution that is acute in nature, such as a toxic spill resulting in a large impulse of contaminants into a cave system may result in direct, mass mortality leading to local extirpations.
<i>Amblyopsis spelaea</i>	Northern Cavefish	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Cave habitat degradation resulting direct destruction or manipulation during quarrying and mining operations, highway construction, and urban development has negatively impacted populations.
<i>Amblyopsis spelaea</i>	Northern Cavefish	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Cave habitat degradation resulting direct destruction or manipulation during quarrying and mining operations, highway construction, and urban development has negatively impacted populations.
<i>Ammocrypta clara</i>	Western Sand Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Increased sedimentation from agriculture, road construction, and other forms of human development is a primary threat to populations range-wide.
<i>Ammocrypta clara</i>	Western Sand Darter	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Significant	Increased sedimentation from agriculture, road construction, and other forms of human development is a primary threat to populations range-wide.
<i>Ammocrypta clara</i>	Western Sand Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	River fragmentation and hydrologic alterations caused by dams have reduced or eliminated populations of this species.
<i>Ammocrypta clara</i>	Western Sand Darter	Channelization and dredging	Natural System Modifications	Natural System Modifications- Other	Existing	Severe	Channelization and dredging threaten populations by directly destroying or degrading the substrate and increasing siltation.
<i>Ammocrypta clara</i>	Western Sand Darter	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Ammocrypta clara</i>	Western Sand Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Water quality degradation from nutrient enrichment and other pollutants from agricultural, residential, commercial and industrial sources negatively impact the species.
<i>Ammocrypta clara</i>	Western Sand Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Increased sedimentation from agriculture, road construction, and other forms of human development is a primary threat to populations range-wide.
<i>Ammocrypta clara</i>	Western Sand Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Increased sedimentation from agriculture, road construction, and other forms of human development is a primary threat to populations range-wide.
<i>Anguilla rostrata</i>	American Eel	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Dams may reduce or prevent upstream and downstream migrations necessary to complete the catadromous life cycle. Turbine mortality has also been reported as a source of mortality, especially for outmigrating adults.
<i>Atractosteus spatula</i>	Alligator Gar	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Populations are vulnerable to extirpation due to loss of floodplain spawning habitat and nurseries, as well as habitat for prey (forage) species. Specific causes are difficult to identify, but dams, channelization, and levee construction on rivers and tributary streams have eliminated many wetlands and reduced connectivity between larger, more open systems occupied by adults and wetlands necessary for reproduction.
<i>Atractosteus spatula</i>	Alligator Gar	Overfishing	Biological Resource Use	Fishing and Harvesting Aquatic Resources	Existing	Significant	Populations are vulnerable to overharvest because the species exhibits a periodic life history strategy: individuals are long-lived, slow to mature, highly fecund and exhibit highly variable recruitment associated with unstable environments.
<i>Atractosteus spatula</i>	Alligator Gar	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Populations have been greatly reduced by dams that block longitudinal movement, levees that block lateral movement in to riparian zones, and water diversion structures that reduce high flow pulses.
<i>Atractosteus spatula</i>	Alligator Gar	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Populations are vulnerable to extirpation due to loss of floodplain spawning habitat and nurseries, as well as habitat for prey (forage) species. Specific causes are difficult to identify, but dams, channelization, and levee construction on rivers and tributary streams have eliminated many wetlands and reduced connectivity between larger, more open systems occupied by adults and wetlands necessary for reproduction.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Atractosteus spatula</i>	Alligator Gar	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Significant	Populations are vulnerable to extirpation due to loss of floodplain spawning habitat and nurseries, as well as habitat for prey (forage) species. Specific causes are difficult to identify, but dams, channelization, and levee construction on rivers and tributary streams have eliminated many wetlands and reduced connectivity between larger, more open systems occupied by adults and wetlands necessary for reproduction.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Significant	The Highfin Carpsucker is reported to be more sensitive to high siltation and turbidity than other carpsuckers. In parts of the Great Plains and Midwest, population declines have been reported in areas where intensive agriculture has resulted in high silt loads in streams and rivers. Other land use activities causing excessive sedimentation in streams are possible threats.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Possible	Significant	The Highfin Carpsucker is reported to be more sensitive to high siltation and turbidity than other carpsuckers. In parts of the Great Plains and Midwest, population declines have been reported in areas where intensive agriculture has resulted in high silt loads in streams and rivers. Other land use activities causing excessive sedimentation in streams are possible threats.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Possible	Significant	The Highfin Carpsucker is reported to be more sensitive to high siltation and turbidity than other carpsuckers. In parts of the Great Plains and Midwest, population declines have been reported in areas where intensive agriculture has resulted in high silt loads in streams and rivers. Other land use activities causing excessive sedimentation in streams are possible threats.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Substantial	Although the species can occur in impoundments, riverine habitat fragmentation and increased siltation caused by dams may have contributed to population declines.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Significant	The Highfin Carpsucker is reported to be more sensitive to high siltation and turbidity than other carpsuckers. In parts of the Great Plains and Midwest, population declines have been reported in areas where intensive agriculture has resulted in high silt loads in streams and rivers. Other land use activities causing excessive sedimentation in streams are possible threats.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	The Highfin Carpsucker is reported to be more sensitive to high siltation and turbidity than other carpsuckers. In parts of the Great Plains and Midwest, population declines have been reported in areas where intensive agriculture has resulted in high silt loads in streams and rivers. Other land use activities causing excessive sedimentation in streams are possible threats.
<i>Chasomus cumberlandensis</i>	Blackside Dace	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Chasomus cumberlandensis</i>	Blackside Dace	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Chasomus cumberlandensis</i>	Blackside Dace	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Significant	Predicted impacts of climate change could potentially increase the vulnerability of the species. Intensified droughts and elevated stream temperatures would have detrimental effects to small headwater streams in the upper Cumberland River drainage.
<i>Chasomus cumberlandensis</i>	Blackside Dace	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Chasomus cumberlandensis</i>	Blackside Dace	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Severe	Construction of dams or other artificial barriers that block fish movements and fragment populations would negatively impact this species. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Chasomus cumberlandensis</i>	Blackside Dace	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Land-use activities resulting in increased sedimentation and turbidity, elevated conductivity levels, and introduction of nutrients and chemical pollutants in streams negatively impact this species.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Clinostomus elongatus</i>	Redside Dace	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Land-use activities that increase turbidity, silt deposition, and mean water temperature have negatively impacted this species.
<i>Clinostomus elongatus</i>	Redside Dace	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Land-use activities that increase turbidity, silt deposition, and mean water temperature have negatively impacted this species.
<i>Clinostomus elongatus</i>	Redside Dace	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Substantial	Climate change associated effects in freshwater ecosystems, including rising stream temperatures, pose potential threats to southern peripheral populations.
<i>Clinostomus elongatus</i>	Redside Dace	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Land-use activities that increase turbidity, silt deposition, and mean water temperature have negatively impacted this species.
<i>Clinostomus elongatus</i>	Redside Dace	Predation	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Species and Genes- Other	Possible	Substantial	Introduction of non-native trout species has been linked to declines and extirpation in some northern populations.
<i>Clinostomus elongatus</i>	Redside Dace	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Dams and other artificial barriers would block fish movements and fragment populations. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Clinostomus elongatus</i>	Redside Dace	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Land-use activities that increase turbidity, silt deposition, and mean water temperature have negatively impacted this species.
<i>Clinostomus elongatus</i>	Redside Dace	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Land-use activities that increase turbidity, silt deposition, and mean water temperature have negatively impacted this species.
<i>Cycleptus elongatus</i>	Blue Sucker	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Significant	Sensitive to water quality degradation. Increased sedimentation from various land-use activities and pollution from industrial and agricultural sources may have contributed to population declines and continue to have negative impacts.
<i>Cycleptus elongatus</i>	Blue Sucker	Overfishing	Biological Resource Use	Fishing and Harvesting Aquatic Resources	Possible	Significant	Historically, overfishing has been documented as a cause of declines range-wide. Currently, commercial harvest and bowfishing could negatively impact populations, particularly in western Kentucky.
<i>Cycleptus elongatus</i>	Blue Sucker	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Possible	Substantial	Sensitive to water quality degradation. Increased sedimentation from various land-use activities and pollution from industrial and agricultural sources may have contributed to population declines and continue to have negative impacts.
<i>Cycleptus elongatus</i>	Blue Sucker	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Possible	Substantial	Sensitive to water quality degradation. Increased sedimentation from various land-use activities and pollution from industrial and agricultural sources may have contributed to population declines and continue to have negative impacts.
<i>Cycleptus elongatus</i>	Blue Sucker	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Habitat fragmentation and alterations of natural flow regimes caused by dams on large rivers have been attributed to population declines range-wide.
<i>Cycleptus elongatus</i>	Blue Sucker	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Sensitive to water quality degradation. Increased sedimentation from various land-use activities and pollution from industrial and agricultural sources may have contributed to population declines and continue to have negative impacts.
<i>Cycleptus elongatus</i>	Blue Sucker	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	Sensitive to water quality degradation. Increased sedimentation from various land-use activities and pollution from industrial and agricultural sources may have contributed to population declines and continue to have negative impacts.
<i>Cycleptus elongatus</i>	Blue Sucker	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Substantial	Sensitive to water quality degradation. Increased sedimentation from various land-use activities and pollution from industrial and agricultural sources may have contributed to population declines and continue to have negative impacts.
<i>Cyprinella camura</i>	Bluntnose Shiner	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channelization, loss of riparian vegetation, and alteration or removal of floodplain wetlands could negatively impact the species.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Cyprinella camura</i>	Blunface Shiner	Invasive species	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Species and Genes- Other	Possible	Substantial	Although not documented in Terrapin Creek, the introduction or dispersal of Red Shiner, <i>Cyprinella lutrensis</i> , could negatively impact the species through hybridization and competition for resources.
<i>Cyprinella camura</i>	Blunface Shiner	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Construction of dams or other artificial barriers that block fish movements and fragment populations would negatively impact this species. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Cyprinella camura</i>	Blunface Shiner	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Cyprinella camura</i>	Blunface Shiner	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Cyprinella camura</i>	Blunface Shiner	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channelization, loss of riparian vegetation, and alteration or removal of floodplain wetlands could negatively impact the species.
<i>Cyprinella camura</i>	Blunface Shiner	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Stream channelization, loss of riparian vegetation, and alteration or removal of floodplain wetlands could negatively impact the species.
<i>Cyprinella venusta</i>	Blacktail Shiner	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Cyprinella venusta</i>	Blacktail Shiner	Invasive species	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Species and Genes- Other	Possible	Significant	Populations in Kentucky could be negatively affected by range expansion and increased abundance of the Red Shiner, <i>Cyprinella lutrensis</i> , a species that is known to hybridize with the Blacktail Shiner. Degraded water quality and habitat conditions have been linked to elevated rates of hybridization between the two species.
<i>Cyprinella venusta</i>	Blacktail Shiner	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Cyprinella venusta</i>	Blacktail Shiner	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Cyprinella venusta</i>	Blacktail Shiner	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Erimystax insignis</i>	Blotched Chub	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact this species.
<i>Erimystax insignis</i>	Blotched Chub	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact this species.
<i>Erimystax insignis</i>	Blotched Chub	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact this species.
<i>Erimystax insignis</i>	Blotched Chub	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	River fragmentation and hydrologic alterations caused by dams are detrimental to this species. Impoundments have likely eliminated populations from the middle Cumberland and lower Tennessee River drainages.
<i>Erimystax insignis</i>	Blotched Chub	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Erimystax insignis</i>	Blotched Chub	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact this species.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Erimystax insignis</i>	Blotched Chub	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact this species.
<i>Erimystax insignis</i>	Blotched Chub	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact this species.
<i>Erimystax x-punctatus</i>	Gravel Chub	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	Increased sedimentation from various land-use activities has been cited as range-wide threat to this species. Whether sedimentation contributed to extirpation of populations in Kentucky is unknown, but possible.
<i>Erimystax x-punctatus</i>	Gravel Chub	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Possible	Severe	Increased sedimentation from various land-use activities has been cited as range-wide threat to this species. Whether sedimentation contributed to extirpation of populations in Kentucky is unknown, but possible.
<i>Erimystax x-punctatus</i>	Gravel Chub	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Possible	Severe	Increased sedimentation from various land-use activities has been cited as range-wide threat to this species. Whether sedimentation contributed to extirpation of populations in Kentucky is unknown, but possible.
<i>Erimystax x-punctatus</i>	Gravel Chub	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Severe	Dams are known to have eliminated and degraded habitat for this species range-wide. The only known occurrence of this species from the Green River was prior to impoundment of Green River Lake.
<i>Erimystax x-punctatus</i>	Gravel Chub	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Severe	Increased sedimentation from various land-use activities has been cited as range-wide threat to this species. Whether sedimentation contributed to extirpation of populations in Kentucky is unknown, but possible.
<i>Erimystax x-punctatus</i>	Gravel Chub	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	Increased sedimentation from various land-use activities has been cited as range-wide threat to this species. Whether sedimentation contributed to extirpation of populations in Kentucky is unknown, but possible.
<i>Erimystax x-punctatus</i>	Gravel Chub	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Severe	Increased sedimentation from various land-use activities has been cited as range-wide threat to this species. Whether sedimentation contributed to extirpation of populations in Kentucky is unknown, but possible.
<i>Erimyzon sucetta</i>	Lake Chubsucker	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Siltation and polluted runoff from poor agricultural practices is a primary threat to populations. Alteration or removal of oxbows, sloughs, swamps and other wetland systems for agricultural, urban, commercial, and residential development has reduced or eliminated habitat. Extremely susceptible to increased sedimentation, turbidity, and pollutants from agricultural, urban, and industrial development.
<i>Erimyzon sucetta</i>	Lake Chubsucker	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Siltation and polluted runoff from poor agricultural practices is a primary threat to populations. Alteration or removal of oxbows, sloughs, swamps and other wetland systems for agricultural, urban, commercial, and residential development has reduced or eliminated habitat. Extremely susceptible to increased sedimentation, turbidity, and pollutants from agricultural, urban, and industrial development.
<i>Erimyzon sucetta</i>	Lake Chubsucker	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Siltation and polluted runoff from poor agricultural practices is a primary threat to populations. Alteration or removal of oxbows, sloughs, swamps and other wetland systems for agricultural, urban, commercial, and residential development has reduced or eliminated habitat. Extremely susceptible to increased sedimentation, turbidity, and pollutants from agricultural, urban, and industrial development.
<i>Erimyzon sucetta</i>	Lake Chubsucker	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Siltation and polluted runoff from poor agricultural practices is a primary threat to populations. Alteration or removal of oxbows, sloughs, swamps and other wetland systems for agricultural, urban, commercial, and residential development has reduced or eliminated habitat. Extremely susceptible to increased sedimentation, turbidity, and pollutants from agricultural, urban, and industrial development.
<i>Esox niger</i>	Chain Pickerel	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	Stream channelization and alteration or removal of oxbows, sloughs, swamps, and other wetland systems may have contributed to population declines and extirpation.
<i>Esox niger</i>	Chain Pickerel	Overfishing	Biological Resource Use	Fishing and Harvesting Aquatic Resources	Possible	Substantial	Although angler reports are uncommon, overharvest is a potential threat under existing recreational fishing regulations in Kentucky.
<i>Esox niger</i>	Chain Pickerel	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	Stream channelization and alteration or removal of oxbows, sloughs, swamps, and other wetland systems may have contributed to population declines and extirpation.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Etheostoma barbouri</i>	Teardrop Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Etheostoma barbouri</i>	Teardrop Darter	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Possible	Significant	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Etheostoma barbouri</i>	Teardrop Darter	Channelization and dredging	Natural System Modifications	Natural System Modifications- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Etheostoma barbouri</i>	Teardrop Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Possibly sensitive to aquatic pollution and sedimentation. Erosion, nutrient, pesticide runoff from poor agricultural practices may have caused population declines and extirpations.
<i>Etheostoma barbouri</i>	Teardrop Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Etheostoma barbouri</i>	Teardrop Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Etheostoma chienense</i>	Relict Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Loss of riparian vegetation and increased sediment loads associated with poor agricultural and other land-use practices, and pollutants originating from municipal wastewater plants or agricultural livestock operations have reduced populations and continue to impact the species.
<i>Etheostoma chienense</i>	Relict Darter	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Severe	Climate change is likely to adversely affect the species due to alteration of hydrologic cycles of headwater reaches, but the extent or magnitude of this threat has not been quantified at this time.
<i>Etheostoma chienense</i>	Relict Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Clearing and draining of wetlands and irrigation has reduced groundwater levels and base flows within Bayou de Chien and its tributaries. The resulting drying stream conditions effectively isolate populations and increase predation pressure on adults and juveniles.
<i>Etheostoma chienense</i>	Relict Darter	Channelization and dredging	Natural System Modifications	Natural System Modifications- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Etheostoma chienense</i>	Relict Darter	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted range of this species makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Etheostoma chienense</i>	Relict Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Increased sediment loads associated with poor agricultural and other land-use practices, and pollutants originating from municipal wastewater plants or agricultural livestock operations have reduced populations and continue to impact the species.
<i>Etheostoma chienense</i>	Relict Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Channelization of the Bayou de Chien mainstem and its tributaries, and the deforestation and drainage of wetlands are primary threats. The removal and lack of shade-producing and habitat-producing (e.g., instream small wood) riparian vegetation have limited the species' distribution within portions Bayou de Chien drainage.
<i>Etheostoma chienense</i>	Relict Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Significant	Loss of riparian vegetation and increased sediment loads associated with roads and other transportation or utility corridors have negatively impacted the species.
<i>Etheostoma derivativum</i>	Stone Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Etheostoma derivativum</i>	Stone Darter	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Possible	Significant	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Etheostoma derivativum</i>	Stone Darter	Channelization and dredging	Natural System Modifications	Natural System Modifications- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Etheostoma derivativum</i>	Stone Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Possibly sensitive to aquatic pollution and sedimentation. Erosion, nutrient, pesticide runoff from poor agricultural practices may have caused population declines and extirpations.
<i>Etheostoma derivativum</i>	Stone Darter	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Etheostoma derivativum</i>	Stone Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Etheostoma derivativum</i>	Stone Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Etheostoma fusiforme</i>	Swamp Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Etheostoma fusiforme</i>	Swamp Darter	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Substantial	Introduced non-native species could negatively impact populations through predation, hybridization, competition for resources, the spread of disease or parasites, and altering of the food web.
<i>Etheostoma fusiforme</i>	Swamp Darter	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Etheostoma fusiforme</i>	Swamp Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Etheostoma fusiforme</i>	Swamp Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Etheostoma fusiforme</i>	Swamp Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from poor land use practices have negatively affected and continue to impact this species. The downstream extent of the range in the Big South Fork is negatively impacted by poor water quality from acid mine drainage emanating from tributaries.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Significant	Predicted impacts of climate change could potentially increase the vulnerability of the species. Intensified droughts can lead to population decline, habitat loss, and crowding in microhabitats.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from poor land use practices have negatively affected and continue to impact this species. The downstream extent of the range in the Big South Fork is negatively impacted by poor water quality from acid mine drainage emanating from tributaries.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Severe	Introduced and invasive Rusty Crayfish, <i>Faxonius rusticus</i> , have been documented in the Big South Fork and could outcompete the Tuxedo Darter for nesting cover habitats and prey on young. Crayfish abundance has been reported to be higher in the downstream portions of the range affected by impoundment.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Impoundment of the lower Big South Fork by Lake Cumberland has eliminated free flowing riverine habitat by reducing current velocities and increasing sedimentation, conditions not conducive to successful reproduction and survivability.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Acute pollution incidents	Pollution	Pollution- Other	Possible	Severe	The restricted range of this species makes it susceptible to acute point-source pollution events, such as chemical and manure spills.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from poor land use practices have negatively affected and continue to impact this species. The downstream extent of the range in the Big South Fork is negatively impacted by poor water quality from acid mine drainage emanating from tributaries.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from poor land use practices have negatively affected and continue to impact this species. The downstream extent of the range in the Big South Fork is negatively impacted by poor water quality from acid mine drainage emanating from tributaries.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Substantial	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from poor land use practices have negatively affected and continue to impact this species. The downstream extent of the range in the Big South Fork is negatively impacted by poor water quality from acid mine drainage emanating from tributaries.
<i>Etheostoma lynceum</i>	Brighteye Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Removal of instream woody debris and loss of undercut bank habitat would be detrimental.
<i>Etheostoma lynceum</i>	Brighteye Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Construction of dams or other artificial barriers that block fish movements and fragment populations would negatively impact this species. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Etheostoma lynceum</i>	Brighteye Darter	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Etheostoma lynceum</i>	Brighteye Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Etheostoma lynceum</i>	Brighteye Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Removal of instream woody debris and loss of undercut bank habitat would be detrimental.
<i>Etheostoma lynceum</i>	Brighteye Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Removal of instream woody debris and loss of undercut bank habitat would be detrimental.
<i>Etheostoma nebra</i>	Buck Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture and other forms of human development has likely been a major cause of extirpation of populations. Destruction of springs and spring runs, small impoundments and other barriers also result in habitat fragmentation and isolation of populations.
<i>Etheostoma nebra</i>	Buck Darter	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Severe	Predicted impacts of climate change could potentially increase the vulnerability of the species. Intensified droughts and elevated stream temperatures would have detrimental effects on existing populations.
<i>Etheostoma nebra</i>	Buck Darter	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Severe	Introduced non-native species could negatively impact populations through predation, competition for resources, the spread of disease or parasites, and altering of the food web.
<i>Etheostoma nebra</i>	Buck Darter	Alteration of water flow	Natural System Modifications	Natural System Modifications- Other	Possible	Severe	Destruction of springs and spring runs, small impoundments and other barriers also result in habitat fragmentation and isolation of populations.
<i>Etheostoma nebra</i>	Buck Darter	Channelization and dredging	Natural System Modifications	Natural System Modifications- Other	Existing	Severe	Stream channel disturbances including gravel removal and channelization directly destroy in-stream habitat and increase sedimentation.
<i>Etheostoma nebra</i>	Buck Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Possibly sensitive to aquatic pollution and sedimentation. Erosion and pesticide runoff from poor agricultural and other land-use practices may have contributed to population declines and extirpations.
<i>Etheostoma nebra</i>	Buck Darter	Acute pollution incidents	Pollution	Pollution- Other	Possible	Severe	The restricted range of this species makes it susceptible to acute point-source pollution events, such as chemical and manure spills.
<i>Etheostoma nebra</i>	Buck Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture and other forms of human development has likely been a major cause of extirpation of populations. Destruction of springs and spring runs, small impoundments and other barriers also result in habitat fragmentation and isolation of populations.
<i>Etheostoma nebra</i>	Buck Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Highway construction and expansion has resulted in habitat loss and water quality degradation.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture-Other	Existing	Severe	Loss of wooded riparian areas associated with agriculture and other forms of human development can cause the decline or extirpation of local populations. Removal of forest around springs and spring runs causes increased isolation and degradation of aquatic habitat.
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Small impoundments and other barriers result in habitat fragmentation and isolation of populations. Hydrological manipulations, including underground water removal for human consumption, irrigation, or industry can lower water tables, leading to reduced groundwater discharge and drying of spring habitat.
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Loss of wooded riparian areas associated with agriculture and other forms of human development can cause the decline or extirpation of local populations. Removal of forest around springs and spring runs causes increased isolation and degradation of aquatic habitat.
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Loss of wooded riparian areas associated with agriculture and other forms of human development can cause the decline or extirpation of local populations. Removal of forest around springs and spring runs causes increased isolation and degradation of aquatic habitat.
<i>Etheostoma proelare</i>	Cypress Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Etheostoma proelare</i>	Cypress Darter	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Possible	Substantial	Introduced non-native species could negatively impact populations through predation, hybridization, competition for resources, the spread of disease or parasites, and altering of the food web.
<i>Etheostoma proelare</i>	Cypress Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Etheostoma proelare</i>	Cypress Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Etheostoma proelare</i>	Cypress Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Removal of instream woody debris and loss of undercut bank habitat would be detrimental.
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Construction of dams or other artificial barriers that block fish movements and fragment populations would negatively impact this species. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation has negatively impact this species. Removal of instream woody debris and loss of undercut bank habitat are detrimental.
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Removal of instream woody debris and loss of undercut bank habitat would be detrimental.
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Significant	Predicted impacts of climate change could potentially increase the vulnerability of the species. Intensified droughts and elevated stream temperatures would have detrimental effects to small headwater streams in the upper Cumberland River basin.
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Severe	Construction of dams or other artificial barriers that block fish movements and fragment populations would negatively impact this species. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Land-use activities resulting in increased sedimentation and turbidity, elevated conductivity levels, and introduction of nutrients and chemical pollutants in streams negatively impact this species.
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Significant	Predicted impacts of climate change could potentially increase the vulnerability of the species. Intensified droughts and elevated stream temperatures would have detrimental effects to small headwater streams in the upper Kentucky River basin.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Severe	Construction of dams or other artificial barriers that block fish movements and fragment populations would negatively impact this species. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Land-use activities resulting in increased sedimentation and turbidity, elevated conductivity levels, and introduction of nutrients and chemical pollutants in streams negatively impact this species.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Etheostoma susanae</i>	Cumberland Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma susanae</i>	Cumberland Darter	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma susanae</i>	Cumberland Darter	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Significant	Predicted impacts of climate change could potentially increase the vulnerability of the species. Intensified droughts and elevated stream temperatures would have detrimental effects to small headwater streams in the upper Cumberland River drainage.
<i>Etheostoma susanae</i>	Cumberland Darter	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma susanae</i>	Cumberland Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Construction of dams or other artificial barriers that block fish movements and fragment populations would negatively impact this species. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Etheostoma susanae</i>	Cumberland Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Land-use activities resulting in increased sedimentation and turbidity, nutrient enrichment and other pollutants that degrade water quality in streams negatively impact this species.
<i>Etheostoma susanae</i>	Cumberland Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Land-use activities resulting in increased sedimentation and turbidity, nutrient enrichment and other pollutants that degrade water quality in streams negatively impact this species.
<i>Etheostoma susanae</i>	Cumberland Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated populations and threaten recovery efforts.
<i>Etheostoma swaini</i>	Gulf Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Removal of instream woody debris and loss of undercut bank habitat would be detrimental.
<i>Etheostoma swaini</i>	Gulf Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Construction of dams or other artificial barriers that block fish movements and fragment populations would negatively impact this species. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Etheostoma swaini</i>	Gulf Darter	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Etheostoma swaini</i>	Gulf Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Etheostoma swaini</i>	Gulf Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Removal of instream woody debris and loss of undercut bank habitat would be detrimental.
<i>Etheostoma swaini</i>	Gulf Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Removal of instream woody debris and loss of undercut bank habitat would be detrimental.
<i>Etheostoma tecumsehii</i>	Shawnee Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Conversion of forests for agriculture and other land uses could negatively affect the species, especially during periods of drought, by raising stream water temperatures and reducing groundwater inflows that maintain base flow.
<i>Etheostoma tecumsehii</i>	Shawnee Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Impoundments destroy free-flowing stream habitat required by the species. Populations isolation and fragmentation has resulted from small flood control reservoirs present in the upper Pond River drainage. Any additional reservoir construction and loss of free-flowing stream habitat would further impact existing populations.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Etheostoma tecumsehii</i>	Shawnee Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Etheostoma tecumsehii</i>	Shawnee Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Conversion of forests for agriculture and other land uses could negatively affect the species, especially during periods of drought, by raising stream water temperatures and reducing groundwater inflows that maintain base flow.
<i>Etheostoma tecumsehii</i>	Shawnee Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Removal of riparian zone vegetation for construction of transportation corridors could have local impacts to populations by increasing sedimentation and turbidity.
<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Loss of forested areas associated with agriculture and other forms of human development can cause the decline or extirpation of local populations. Removal of forest around springs and spring runs causes increased isolation and drying of aquatic habitat.
<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Hydrological manipulations, including underground water removal for human consumption, irrigation, or industry can lower water tables, leading to reduced groundwater discharge and drying of spring habitat.
<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Groundwater pollution is a documented factor negatively affecting all cave amblyopsids, but its effect on Karst Cavefish is uncertain. Potential threats to populations include eutrophication and contamination from agricultural and industrial runoff containing pesticides, fertilizers, heavy metals, and sewage effluent.
<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Loss of forested areas associated with agriculture and other forms of human development can cause the decline or extirpation of local populations. Removal of forest around springs and spring runs causes increased isolation and drying of aquatic habitat.
<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Loss of forested areas associated with agriculture and other forms of human development can cause the decline or extirpation of local populations. Removal of forest around springs and spring runs causes increased isolation and drying of aquatic habitat.
<i>Fundulus chrysotus</i>	Golden Topminnow	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Fundulus chrysotus</i>	Golden Topminnow	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Substantial	Introduced non-native species could negatively impact populations through predation, hybridization, competition for resources, the spread of disease or parasites, and altering of the food web.
<i>Fundulus chrysotus</i>	Golden Topminnow	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Fundulus chrysotus</i>	Golden Topminnow	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Fundulus chrysotus</i>	Golden Topminnow	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Fundulus dispar</i>	Starhead Topminnow	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Fundulus dispar</i>	Starhead Topminnow	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Substantial	Introduced non-native species could negatively impact populations through predation, hybridization, competition for resources, the spread of disease or parasites, and altering of the food web.
<i>Fundulus dispar</i>	Starhead Topminnow	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Fundulus dispar</i>	Starhead Topminnow	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Fundulus dispar</i>	Starhead Topminnow	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Hemitemra flammea</i>	Flame Chub	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Loss of wooded riparian areas associated with agriculture and other forms of human development can cause the decline or extirpation of local populations. Removal of forest around springs and spring runs causes increased isolation and drying of aquatic habitat.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Hemitremia flammea</i>	Flame Chub	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Loss of wooded riparian areas associated with agriculture and other forms of human development can cause the decline or extirpation of local populations. Removal of forest around springs and spring runs causes increased isolation and drying of aquatic habitat.
<i>Hemitremia flammea</i>	Flame Chub	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Hydrological manipulations, including underground water removal for human consumption, irrigation, or industry can lower water tables, leading to reduced groundwater discharge and drying of spring habitat.
<i>Hemitremia flammea</i>	Flame Chub	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Potential threats to populations include eutrophication and contamination from agricultural and industrial runoff containing pesticides, fertilizers, heavy metals, and sewage effluent.
<i>Hemitremia flammea</i>	Flame Chub	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Hemitremia flammea</i>	Flame Chub	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Loss of wooded riparian areas associated with agriculture and other forms of human development can cause the decline or extirpation of local populations. Removal of forest around springs and spring runs causes increased isolation and drying of aquatic habitat.
<i>Hemitremia flammea</i>	Flame Chub	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Loss of wooded riparian areas associated with agriculture and other forms of human development can cause the decline or extirpation of local populations. Removal of forest around springs and spring runs causes increased isolation and drying of aquatic habitat.
<i>Hybognathus hayi</i>	Cypress Minnow	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channelization and alteration or removal of oxbows, sloughs, swamps, and other wetland systems has reduced or eliminated habitat for this species.
<i>Hybognathus hayi</i>	Cypress Minnow	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Substantial	Introduced non-native species could negatively impact populations through predation, hybridization, competition for resources, the spread of disease or parasites, and altering of the food web.
<i>Hybognathus hayi</i>	Cypress Minnow	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Hybognathus hayi</i>	Cypress Minnow	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	Stream channelization and alteration or removal of oxbows, sloughs, swamps, and other wetland systems has reduced or eliminated habitat for this species.
<i>Hybognathus hayi</i>	Cypress Minnow	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Significant	Stream channelization and alteration or removal of oxbows, sloughs, swamps, and other wetland systems has reduced or eliminated habitat for this species.
<i>Hybognathus placitus</i>	Plains Minnow	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Hybognathus placitus</i>	Plains Minnow	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Severe	Introduced non-native species may negatively impact populations through predation, competition for food resources, or hybridization.
<i>Hybognathus placitus</i>	Plains Minnow	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Fragmentation of rivers by dams and the subsequent habitat changes that occur are the greatest threat to the species range-wide. Alterations of natural flow regimes and interruption of free-flowing habitat have resulted in population declines and extirpations.
<i>Hybognathus placitus</i>	Plains Minnow	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Hybognathus placitus</i>	Plains Minnow	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Hybopsis amnis</i>	Pallid Shiner	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	Although uncertain, excessive sedimentation from a wide range of land-use activities is considered the most likely cause of declines in this species range-wide.
<i>Hybopsis amnis</i>	Pallid Shiner	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Possible	Severe	Although uncertain, excessive sedimentation from a wide range of land-use activities is considered the most likely cause of declines in this species range-wide.
<i>Hybopsis amnis</i>	Pallid Shiner	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Possible	Severe	Although uncertain, excessive sedimentation from a wide range of land-use activities is considered the most likely cause of declines in this species range-wide.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Hybopsis amnis</i>	Pallid Shiner	Alteration of water flow	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Decreased base flow and other habitat modifications associated with land clearing, drainage, and development are considered likely causes of population decline and extirpation.
<i>Hybopsis amnis</i>	Pallid Shiner	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Hybopsis amnis</i>	Pallid Shiner	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	Although uncertain, excessive sedimentation from a wide range of land-use activities is considered the most likely cause of declines in this species range-wide.
<i>Hybopsis amnis</i>	Pallid Shiner	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Severe	Although uncertain, excessive sedimentation from a wide range of land-use activities is considered the most likely cause of declines in this species range-wide.
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Impoundments have altered flow regimes and fragmented free-flowing riverine habitats. Dams may block movements of adults and ammocoetes.
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Impoundments have altered flow regimes and fragmented free-flowing riverine habitats. Dams may block movements of adults and ammocoetes.
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Impoundments have altered flow regimes and fragmented free-flowing riverine habitats. Dams may block movements of adults and ammocoetes.
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Severe	Impoundments have altered flow regimes and fragmented free-flowing riverine habitats. Dams may block movements of adults and ammocoetes.
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Ictalurus niger</i>	Black Buffalo	Overfishing	Biological Resource Use	Fishing and Harvesting Aquatic Resources	Possible	Substantial	Commercial harvest and bowfishing could negatively impact populations, particularly in western Kentucky.
<i>Ictalurus niger</i>	Black Buffalo	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Substantial	Dietary overlap between Black Buffalo and introduced Black Carp, <i>Mylopharyngodon piceus</i> , both molluscivores, may adversely affect Black Buffalo populations.
<i>Ictalurus niger</i>	Black Buffalo	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Substantial	Although the species can occur in impoundments, fragmentation of riverine habitat by dams may have contributed to declines by impeding natural movements and isolating populations.
<i>Lepomis marginatus</i>	Dollar Sunfish	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Lepomis marginatus</i>	Dollar Sunfish	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Lepomis marginatus</i>	Dollar Sunfish	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Lepomis marginatus</i>	Dollar Sunfish	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species.
<i>Lepomis miniatius</i>	Redspotted Sunfish	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Alteration or removal of oxbows, sloughs, swamps and other wetland systems for agricultural, urban, commercial, and residential development has reduced or eliminated habitat.
<i>Lepomis miniatius</i>	Redspotted Sunfish	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Lepomis miniatius</i>	Redspotted Sunfish	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Alteration or removal of oxbows, sloughs, swamps and other wetland systems for agricultural, urban, commercial, and residential development has reduced or eliminated habitat.
<i>Lepomis miniatius</i>	Redspotted Sunfish	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Alteration or removal of oxbows, sloughs, swamps and other wetland systems for agricultural, urban, commercial, and residential development has reduced or eliminated habitat.
<i>Lethenteron appendix</i>	American Brook Lamprey	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Lethenteron appendix</i>	American Brook Lamprey	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Lethenteron appendix</i>	American Brook Lamprey	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Severe	Impoundments have altered flow regimes and fragmented free-flowing riverine habitats. Dams may block movements of adults and ammocoetes.
<i>Lethenteron appendix</i>	American Brook Lamprey	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	Land use activities that increase silt loads in streams likely have a negative impact on spawning lampreys and ammocoetes.
<i>Lota lota</i>	Burbot	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Substantial	Climate change associated effects in freshwater ecosystems, including rising stream temperatures, pose potential threats to southern peripheral populations.
<i>Lota lota</i>	Burbot	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Habitat fragmentation and alterations of natural flow regimes caused by dams on large rivers have been attributed to population declines range-wide.
<i>Lota lota</i>	Burbot	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Pollution (general) has been documented as a significant factor leading to range-wide declines of populations in streams and rivers.
<i>Macrhybopsis gelida</i>	Sturgeon Chub	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	Pollution from industrial and agricultural sources that degrade water quality has negatively impacted this species and continues to be a threat.
<i>Macrhybopsis gelida</i>	Sturgeon Chub	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Dams on large rivers have degraded habitat for the species by altering natural flow regimes and reducing turbidity. Irrigation diversion structures and other channelization activities that destroy shallow gravel-bottomed shoals have reduced habitat for young-of-the-year.
<i>Macrhybopsis gelida</i>	Sturgeon Chub	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Pollution from industrial and agricultural sources that degrade water quality has negatively impacted this species and continues to be a threat.
<i>Macrhybopsis gelida</i>	Sturgeon Chub	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	Pollution from industrial and agricultural sources that degrade water quality has negatively impacted this species and continues to be a threat.
<i>Macrhybopsis gelida</i>	Sturgeon Chub	Industrial use of waterways	Transportation and Service Corridors	Shipping Lanes	Existing	Severe	Modifications to the Mississippi River to support commercial navigation have altered aquatic habitats. Maintenance of navigation channels (e.g., dredging) may disturb habitats critical to certain life history stages.
<i>Macrhybopsis hyostoma</i>	Shoal Chub	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Significant	Because this species requires clean sand or gravel substrates, increased sedimentation from various land-use activities may negatively impact populations. Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities may have reduced or eliminated populations in Kentucky.
<i>Macrhybopsis hyostoma</i>	Shoal Chub	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Possible	Significant	Because this species requires clean sand or gravel substrates, increased sedimentation from various land-use activities may negatively impact populations. Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities may have reduced or eliminated populations in Kentucky.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Machybopsis hyostoma</i>	Shoal Chub	Mining and oil and gas exploration/extraction practices	Energy Production and Mining	Energy Production and Mining- Other	Possible	Significant	Because this species requires clean sand or gravel substrates, increased sedimentation from various land-use activities may negatively impact populations. Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities may have reduced or eliminated populations in Kentucky.
<i>Machybopsis hyostoma</i>	Shoal Chub	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	In some parts of its range, extirpations of populations have been attributed to habitat fragmentation, reduced turbidity, and altered natural flow regimes caused by dams.
<i>Machybopsis hyostoma</i>	Shoal Chub	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Significant	Because this species requires clean sand or gravel substrates, increased sedimentation from various land-use activities may negatively impact populations. Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities may have reduced or eliminated populations in Kentucky.
<i>Machybopsis hyostoma</i>	Shoal Chub	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Because this species requires clean sand or gravel substrates, increased sedimentation from various land-use activities may negatively impact populations. Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities may have reduced or eliminated populations in Kentucky.
<i>Machybopsis meeki</i>	Sicklefin Chub	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	Pollution from industrial and agricultural sources that degrade water quality has negatively impacted this species and continues to be a threat.
<i>Machybopsis meeki</i>	Sicklefin Chub	Alteration of water flow	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	Dams on large rivers have degraded habitat by altering natural flow regimes and reducing turbidity. Irrigation diversion structures and other channelization activities that alter shallow, riverine shorelines with gradually sloping banks have reduced habitat for young-of-the-year.
<i>Machybopsis meeki</i>	Sicklefin Chub	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Pollution from industrial and agricultural sources that degrade water quality has negatively impacted this species and continues to be a threat.
<i>Machybopsis meeki</i>	Sicklefin Chub	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	Pollution from industrial and agricultural sources that degrade water quality has negatively impacted this species and continues to be a threat.
<i>Machybopsis meeki</i>	Sicklefin Chub	Industrial use of waterways	Transportation and Service Corridors	Shipping Lanes	Existing	Severe	Modifications to the Mississippi River to support commercial navigation have altered aquatic habitats. Maintenance of navigation channels (e.g., dredging) may disturb habitats critical to certain life history stages.
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation reduce available instream habitat. Large woody debris, which creates habitat heterogeneity (riffle, pool, runs, undercut banks, log jams, etc.) is essential to the survival of this species. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Construction of dams or other artificial barriers that block fish movements and fragment populations would negatively impact this species. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation reduce available instream habitat. Large woody debris, which creates habitat heterogeneity (riffle, pool, runs, undercut banks, log jams, etc.) is essential to the survival of this species. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Stream channel disturbance and loss of riparian vegetation reduce available instream habitat. Large woody debris, which creates habitat heterogeneity (riffle, pool, runs, undercut banks, log jams, etc.) is essential to the survival of this species. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Predation	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Species and Genes- Other	Possible	Severe	Impounded conditions may increase the likelihood of predation by large piscivorous species that are adapted to lentic habitats.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Severe	Low head dams on Elkhorn Creek and the Kentucky River may negatively impact this species by reducing flow, increasing sedimentation, and restricting upstream and downstream movement of fishes.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Severe	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Severe	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Nothonotus maculatus</i>	Spotted Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality. Increased sedimentation from these sources has negatively impacted populations range-wide.
<i>Nothonotus maculatus</i>	Spotted Darter	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Significant	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality. Increased sedimentation from these sources has negatively impacted populations range-wide.
<i>Nothonotus maculatus</i>	Spotted Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	River fragmentation and hydrologic alterations caused by dams have reduced or eliminated populations of this species.
<i>Nothonotus maculatus</i>	Spotted Darter	Channelization and dredging	Natural System Modifications	Natural System Modifications- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality. Increased sedimentation from these sources has negatively impacted populations range-wide.
<i>Nothonotus maculatus</i>	Spotted Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Water quality degradation from nutrient enrichment and other pollutants from agricultural, residential, commercial and industrial sources also negatively impact the species.
<i>Nothonotus maculatus</i>	Spotted Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality. Increased sedimentation from these sources has negatively impacted populations range-wide.
<i>Nothonotus maculatus</i>	Spotted Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality. Increased sedimentation from these sources has negatively impacted populations range-wide.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Nothonotus microlepidus</i>	Smallscale Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality. Increased sedimentation from these sources has negatively impacted populations range-wide.
<i>Nothonotus microlepidus</i>	Smallscale Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	River fragmentation and hydrologic alterations caused by dams have reduced or eliminated populations of this species.
<i>Nothonotus microlepidus</i>	Smallscale Darter	Channelization and dredging	Natural System Modifications	Natural System Modifications- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality. Increased sedimentation from these sources has negatively impacted populations range-wide.
<i>Nothonotus microlepidus</i>	Smallscale Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Water quality degradation from nutrient enrichment and other pollutants from agricultural, residential, commercial and industrial sources also negatively impact the species.
<i>Nothonotus microlepidus</i>	Smallscale Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality. Increased sedimentation from these sources has negatively impacted populations range-wide.
<i>Nothonotus microlepidus</i>	Smallscale Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, gravel removal, road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality. Increased sedimentation from these sources has negatively impacted populations range-wide.
<i>Notropis albigonatus</i>	Palezone Shiner	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have negatively impacted the species.
<i>Notropis albigonatus</i>	Palezone Shiner	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have negatively impacted the species.
<i>Notropis albigonatus</i>	Palezone Shiner	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Increased sedimentation, turbidity, and introduction of chemical pollutants from various land-use activities are primary threats to the species. Water pollution from coal mining activity has had detrimental impacts to the Little South Fork population.
<i>Notropis albigonatus</i>	Palezone Shiner	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Impoundment of Lake Cumberland has likely eliminated populations in the middle Cumberland River and its tributaries, including a single known historic record from Marrowbone Creek. Any additional reservoir construction and loss of free-flowing stream habitat would likely eliminate existing populations.
<i>Notropis albigonatus</i>	Palezone Shiner	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Notropis albigonatus</i>	Palezone Shiner	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have negatively impacted the species.
<i>Notropis albigonatus</i>	Palezone Shiner	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have negatively impacted the species.
<i>Notropis albigonatus</i>	Palezone Shiner	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have negatively impacted the species.
<i>Notropis buchanani</i>	Ghost Shiner	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Natropis buchananii</i>	Ghost Shiner	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis buchananii</i>	Ghost Shiner	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis buchananii</i>	Ghost Shiner	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Severe	Dams have been cited as a possible cause of extirpation in some parts of range. Hydrologic alterations by dams on the Ohio River and its tributaries may have negatively impacted populations in Kentucky.
<i>Natropis buchananii</i>	Ghost Shiner	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis buchananii</i>	Ghost Shiner	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis buchananii</i>	Ghost Shiner	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis dorsalis</i>	Bigmouth Shiner	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis dorsalis</i>	Bigmouth Shiner	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Natropis dorsalis</i>	Bigmouth Shiner	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis dorsalis</i>	Bigmouth Shiner	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis dorsalis</i>	Bigmouth Shiner	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis hudsonius</i>	Spottail Shiner	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis hudsonius</i>	Spottail Shiner	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis hudsonius</i>	Spottail Shiner	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis hudsonius</i>	Spottail Shiner	Non-native introduction	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Species and Genes- Other	Possible	Substantial	A single native occurrence is recognized at the Ohio-Mississippi River confluence. However, recent records of this species from the Ohio River in northeastern Kentucky may have originated from artificial introduction from populations outside of the Ohio River basin.
<i>Natropis hudsonius</i>	Spottail Shiner	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Substantial	Hydrologic alterations by dams on the Ohio and Mississippi Rivers may have negatively impacted populations regionally and locally.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Natropis hudsonius</i>	Spottail Shiner	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis hudsonius</i>	Spottail Shiner	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis hudsonius</i>	Spottail Shiner	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis maculatus</i>	Taillight Shiner	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis maculatus</i>	Taillight Shiner	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Substantial	Introduced non-native species could negatively impact populations through predation, hybridization, competition for resources, the spread of disease or parasites, and altering of the food web.
<i>Natropis maculatus</i>	Taillight Shiner	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis maculatus</i>	Taillight Shiner	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis maculatus</i>	Taillight Shiner	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Natropis shumardi</i>	Silverband Shiner	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Severe	Presumably, impoundments have eliminated this species from large areas of its range in the Missouri River and elsewhere. Elimination of sandbar habitat by channelization and other modifications of large rivers for navigation has likely had detrimental impacts.
<i>Natropis sp. cf. spectrunculus</i>	Sawfin Shiner	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Removal of riparian vegetation and other land-use activities that increase sedimentation and turbidity, or introduce chemical pollutants negatively impact the species.
<i>Natropis sp. cf. spectrunculus</i>	Sawfin Shiner	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Removal of riparian vegetation and other land-use activities that increase sedimentation and turbidity, or introduce chemical pollutants negatively impact the species.
<i>Natropis sp. cf. spectrunculus</i>	Sawfin Shiner	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Removal of riparian vegetation and other land-use activities that increase sedimentation and turbidity, or introduce chemical pollutants negatively impact the species.
<i>Natropis sp. cf. spectrunculus</i>	Sawfin Shiner	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Impoundment of Lake Cumberland has likely eliminated in the middle Cumberland River and its tributaries. Any additional reservoir construction and loss of free-flowing stream habitat would likely eliminate existing populations.
<i>Natropis sp. cf. spectrunculus</i>	Sawfin Shiner	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Removal of riparian vegetation and other land-use activities that increase sedimentation and turbidity, or introduce chemical pollutants negatively impact the species.
<i>Natropis sp. cf. spectrunculus</i>	Sawfin Shiner	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Removal of riparian vegetation and other land-use activities that increase sedimentation and turbidity, or introduce chemical pollutants negatively impact the species.
<i>Natropis sp. cf. spectrunculus</i>	Sawfin Shiner	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Removal of riparian vegetation and other land-use activities that increase sedimentation and turbidity, or introduce chemical pollutants negatively impact the species.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Noturus exilis</i>	Slender Madtom	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus exilis</i>	Slender Madtom	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	River fragmentation and hydrologic alterations caused by dams are detrimental to this species. Impoundments likely contributed to the extirpation of populations in the upper Green and Barren River drainages. River fragmentation and hydrologic alterations caused by dams are detrimental to this species. Impoundments likely contributed to the extirpation of populations in the upper Green and Barren River drainages. Land-use activities that reduce or eliminate groundwater discharge into streams could also negatively impact populations.
<i>Noturus exilis</i>	Slender Madtom	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus exilis</i>	Slender Madtom	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus exilis</i>	Slender Madtom	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus hildebrandi</i>	Least Madtom	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus hildebrandi</i>	Least Madtom	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Construction of dams or other artificial barriers that block fish movements and fragment populations would negatively impact this species. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Noturus hildebrandi</i>	Least Madtom	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Noturus hildebrandi</i>	Least Madtom	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus hildebrandi</i>	Least Madtom	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus hildebrandi</i>	Least Madtom	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Noturus phaeus</i>	Brown Madtom	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus phaeus</i>	Brown Madtom	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	Construction of dams or other artificial barriers that block fish movements and fragment populations would negatively impact this species. Impoundment resulting in the loss of free-flowing stream habitat could eliminate existing populations.
<i>Noturus phaeus</i>	Brown Madtom	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and sewage spills.
<i>Noturus phaeus</i>	Brown Madtom	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus phaeus</i>	Brown Madtom	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus phaeus</i>	Brown Madtom	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus stigmosus</i>	Northern Madtom	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus stigmosus</i>	Northern Madtom	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Significant	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus stigmosus</i>	Northern Madtom	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Hydrologic alterations by dams on the Ohio River and its tributaries have fragmented and reduced populations in Kentucky. Impoundment likely contributed to the extirpation of the species from the Green.
<i>Noturus stigmosus</i>	Northern Madtom	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Noturus stigmosus</i>	Northern Madtom	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Noturus stigmosus</i>	Northern Madtom	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Stream channel disturbance and loss of riparian vegetation may negatively impact this species. Madtoms in general are sensitive to changes in substrate stability and avoid areas dominated by silt and sand. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Possible	Significant	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Possible	Substantial	Introduced non-native species could negatively impact populations through predation, hybridization, competition for resources, the spread of disease or parasites, and altering of the food web.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Significant	Stream channelization and alteration or removal of floodplain wetlands and oxbow lakes has reduced or eliminated habitat for this species. Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities may result in direct and indirect mortality, habitat modification and destruction, altered stream flow, reproductive and behavioral changes.
<i>Percina macrocephala</i>	Longhead Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Percina macrocephala</i>	Longhead Darter	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Percina macrocephala</i>	Longhead Darter	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Percina macrocephala</i>	Longhead Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	River fragmentation and hydrologic alterations caused by dams have reduced or eliminated populations of this species. Other artificial instream barriers (e.g., low head dams and culvert crossings) that block fish movements and fragment populations also negatively impact this species.
<i>Percina macrocephala</i>	Longhead Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Increased sedimentation (siltation), turbidity, nutrient enrichment, and other pollutants from poor land use practices have negatively affected and continue to impact this species.
<i>Percina macrocephala</i>	Longhead Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Percina macrocephala</i>	Longhead Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Percina squamata</i>	Olive Darter	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Percina squamata</i>	Olive Darter	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Percina squamata</i>	Olive Darter	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Severe	Predicted impacts of climate change could potentially increase the vulnerability of the species. Intensified droughts and elevated stream temperatures would have detrimental effects on existing populations.
<i>Percina squamata</i>	Olive Darter	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Percina squamata</i>	Olive Darter	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	River fragmentation and hydrologic alterations caused by dams have reduced or eliminated populations of this species. Most tributary systems within the species' range have been impacted by impoundments. Other artificial instream barriers (e.g., low head dams and culvert crossings) that block fish movements and fragment populations also negatively impact this species.
<i>Percina squamata</i>	Olive Darter	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Increased sedimentation (siltation), turbidity, nutrient enrichment, and other pollutants from poor land use practices have negatively affected and continue to impact this species.
<i>Percina squamata</i>	Olive Darter	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	The restricted distribution of this species in Kentucky makes it susceptible to acute point-source pollution events, such as chemical and manure spills.
<i>Percina squamata</i>	Olive Darter	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Percina squamata</i>	Olive Darter	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, resource extraction (surface coal mining, oil and gas exploration and drilling, and logging), road construction and maintenance, and other human development activities have reduced or eliminated habitat and degraded water quality.
<i>Percopsis omiscomaycus</i>	Trout-perch	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated habitat and increased water temperatures, negatively impacting populations.
<i>Percopsis omiscomaycus</i>	Trout-perch	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated habitat and increased water temperatures, negatively impacting populations.
<i>Percopsis omiscomaycus</i>	Trout-perch	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Substantial	Climate change associated effects in freshwater ecosystems, including rising stream temperatures, pose potential threats to southern peripheral populations.
<i>Percopsis omiscomaycus</i>	Trout-perch	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated habitat and increased water temperatures, negatively impacting populations.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Percopsis omiscomaycus</i>	Trout-perch	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Sensitive to aquatic pollution and sedimentation. Erosion and pesticide runoff from poor agricultural practices have caused population declines and extirpations.
<i>Percopsis omiscomaycus</i>	Trout-perch	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated habitat and increased water temperatures, negatively impacting populations.
<i>Percopsis omiscomaycus</i>	Trout-perch	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with surface coal mining, logging, agriculture, road construction and maintenance, and other human development activities have reduced or eliminated habitat and increased water temperatures, negatively impacting populations.
<i>Phenacobius uranops</i>	Stargazing Minnow	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact the species.
<i>Phenacobius uranops</i>	Stargazing Minnow	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact the species.
<i>Phenacobius uranops</i>	Stargazing Minnow	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact the species.
<i>Phenacobius uranops</i>	Stargazing Minnow	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	River fragmentation and hydrologic alterations caused by dams are detrimental to this species. Impoundment of Lake Cumberland has likely eliminated populations in the middle Cumberland River and its tributaries. Dams on the Green and Barren Rivers have likely reduced distributions within those drainages.
<i>Phenacobius uranops</i>	Stargazing Minnow	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact the species.
<i>Phenacobius uranops</i>	Stargazing Minnow	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact the species.
<i>Phenacobius uranops</i>	Stargazing Minnow	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Significant	Chronic increased sedimentation, turbidity, nutrient enrichment, and other pollutants from various land-use activities have negatively affected and continue to impact the species.
<i>Platygobio gracilis</i>	Flathead Chub	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Significant	Pollution from industrial and agricultural sources that degrade water quality have likely contributed to population declines and continue to negatively impact this species.
<i>Platygobio gracilis</i>	Flathead Chub	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Dams on large rivers have negatively impacted the species by altering natural flow regimes, reducing turbidity, and fragmenting once continuous free-flowing reaches. Irrigation diversion structures and other channelization activities have been linked to declines in some parts of its range.
<i>Platygobio gracilis</i>	Flathead Chub	Waste effluents and contaminants	Pollution	Pollution- Other	Possible	Significant	Pollution from industrial and agricultural sources that degrade water quality have likely contributed to population declines and continue to negatively impact this species.
<i>Platygobio gracilis</i>	Flathead Chub	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Significant	Pollution from industrial and agricultural sources that degrade water quality have likely contributed to population declines and continue to negatively impact this species.
<i>Polyodon spathula</i>	Paddlefish	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Industrial pollutants, including organochlorine and heavy metal contaminants accumulate in the flesh and gonads, causing developmental and other chronic health problems. Increased siltation degrades spawning habitat by inundating clean, hard substrates required to deposit eggs for proper aeration and development of embryos.
<i>Polyodon spathula</i>	Paddlefish	Overfishing	Biological Resource Use	Fishing and Harvesting Aquatic Resources	Existing	Severe	High demand for Paddlefish roe (eggs) as a substitute for Sturgeon caviar has led to increasing legal, but overly exploitive, and illegal commercial harvest. Most populations cannot support high levels of exploitation because of relatively low recruitment and growth rates, delayed maturation, reaching a harvestable size before maturation, and the lack of annual spawning by females.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Polyodon spathula</i>	Paddlefish	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Severe	Populations could be negatively affected by the predicted impacts of global climate change on river ecosystems in temperate North America. Reduced precipitation and flow, increased frequency of droughts, and more extreme floods will likely worsen existing threats to the species and its habitat.
<i>Polyodon spathula</i>	Paddlefish	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	Industrial pollutants, including organochlorine and heavy metal contaminants accumulate in the flesh and gonads, causing developmental and other chronic health problems. Increased siltation degrades spawning habitat by inundating clean, hard substrates required to deposit eggs for proper aeration and development of embryos.
<i>Polyodon spathula</i>	Paddlefish	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Severe	Paddlefish are at high risk for threats from invasive species. Potential negative effects include direct competition for resources, vectors for the spread of disease or parasites, and more subtle effects such as altering of the food web. The largest threat comes from filter-feeding invasive (big-headed) carps, which have increased exponentially over the past decade.
<i>Polyodon spathula</i>	Paddlefish	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Dams block access to spawning grounds and fragment formerly contiguous populations, threatening genetic integrity and viability.
<i>Polyodon spathula</i>	Paddlefish	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	Industrial pollutants, including organochlorine and heavy metal contaminants accumulate in the flesh and gonads, causing developmental and other chronic health problems. Increased siltation degrades spawning habitat by inundating clean, hard substrates required to deposit eggs for proper aeration and development of embryos.
<i>Polyodon spathula</i>	Paddlefish	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Industrial pollutants, including organochlorine and heavy metal contaminants accumulate in the flesh and gonads, causing developmental and other chronic health problems. Increased siltation degrades spawning habitat by inundating clean, hard substrates required to deposit eggs for proper aeration and development of embryos.
<i>Polyodon spathula</i>	Paddlefish	Industrial use of waterways	Transportation and Service Corridors	Shipping Lanes	Existing	Severe	Juveniles are susceptible to entrainment during industrial water use and channel dredging. All life stages are impacted from commercial vessel passage, through entrainment by towboat propellers and stranding during commercial vessel drawdown and subsequent dewatering of littoral zones.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	All sturgeon species are affected by numerous forms of water pollution from a variety of sources. They are susceptible to bioaccumulation of contaminants and have a low capacity to detoxify various compounds relative to other bony fishes. High silt loads on spawning substrates can lead to larval mortality.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Overfishing	Biological Resource Use	Fishing and Harvesting Aquatic Resources	Existing	Severe	Due to the commercial value of sturgeon products, especially caviar, illegal harvest has and continues to be a threat to all species.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Severe	Sturgeon populations could be negatively affected by the predicted impacts of global climate change on river ecosystems worldwide. An increase in global temperatures may result in the extinction and extirpation of species and populations, as many are already near the upper limit of temperature for proper development and growth.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Mining and oil and gas exploration/extraction	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	All sturgeon species are affected by numerous forms of water pollution from a variety of sources. They are susceptible to bioaccumulation of contaminants and have a low capacity to detoxify various compounds relative to other bony fishes. High silt loads on spawning substrates can lead to larval mortality.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Invasive species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Possible	Severe	Invasive species negatively affect early life stages. Introduced exotic species may consume eggs and perhaps larvae.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Hybridization	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Severe	Pallid Sturgeon hybridize with morphologically similar and more common Shovelnose Sturgeon, which has caused problems with accurate identification of species and may lead to loss of unique genetic variation in Pallid Sturgeon.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Dams can negatively affect spawning migrations, quality and quantity of spawning habitat, embryo and larval development, genetic diversity and growth.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Severe	All sturgeon species are affected by numerous forms of water pollution from a variety of sources. They are susceptible to bioaccumulation of contaminants and have a low capacity to detoxify various compounds relative to other bony fishes. High silt loads on spawning substrates can lead to larval mortality.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	All sturgeon species are affected by numerous forms of water pollution from a variety of sources. They are susceptible to bioaccumulation of contaminants and have a low capacity to detoxify various compounds relative to other bony fishes. High silt loads on spawning substrates can lead to larval mortality.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Industrial use of waterways	Transportation and Service Corridors	Shipping Lanes	Existing	Severe	All life stages are impacted by commercial vessel passage. Larvae are susceptible to propeller-induced shear stress. Juveniles and adults are susceptible to entrainment by towboat propellers and during channel dredging and water diversions.
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Excessive sedimentation from a variety of sources is a major stressor. The predominant source is agricultural activities that have been pervasive throughout the range of the species.
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Silviculture	Biological Resource Use	Logging and Wood Harvesting	Possible	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, logging, road construction and maintenance, and other human development activities could reduce or eliminate populations.
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Predation	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Species and Genes- Other	Possible	Significant	Predation pressure could increase with the introduction of piscivorous sportfish species that are not native or currently present in the upper Barren River drainage.
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Fragmentation and subsequent isolation of populations has resulted from the impoundment of Barren River Lake. Smaller barriers, including a mill dam and multiple road culverts have further severed population connectivity.
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, logging, road construction and maintenance, and other human development activities could reduce or eliminate populations.
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Possible	Severe	Stream channel disturbance and loss of wooded riparian vegetation associated with agriculture, logging, road construction and maintenance, and other human development activities could reduce or eliminate populations.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Overexploitation	Biological Resource Use	Fishing and Harvesting Aquatic Resources	Possible	Severe	Overcollection of cavefish, legal or otherwise, for the aquarium trade or scientific purposes could potentially reduce or eliminate local populations.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Quarrying and mining operations	Energy Production and Mining	Mining and Quarrying	Existing	Severe	Cave habitat degradation resulting direct destruction or manipulation during quarrying and mining operations, highway construction, and urban development has negatively impacted populations.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Human disturbance of cave habitats	Human Intrusions and Disturbance	Recreational Activities	Possible	Severe	Groundwater pollution that is acute in nature, such as a toxic spill resulting in a large impulse of contaminants into a cave system may result in direct, mass mortality leading to local extirpations.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Alteration of water flow	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Hydrological manipulations, including underground water removal for human consumption, irrigation, or industry can lower water tables. Impoundments also threaten populations by increasing back-flooding and altering flow regimes and groundwater levels within cave systems.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Waste effluents and contaminants	Pollution	Pollution- Other	Existing	Significant	Groundwater pollution is a documented factor negatively affecting all cave amblyopids. Threats include eutrophication and contamination from agricultural and industrial runoff containing pesticides, fertilizers, heavy metals, and sewage effluent.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Acute pollution incidents	Pollution	Pollution- Other	Possible	Significant	Groundwater pollution that is acute in nature, such as a toxic spill resulting in a large impulse of contaminants into a cave system may result in direct, mass mortality leading to local extirpations.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Cave habitat degradation resulting direct destruction or manipulation during quarrying and mining operations, highway construction, and urban development has negatively impacted populations.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Construction of transportation corridors	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	Cave habitat degradation resulting direct destruction or manipulation during quarrying and mining operations, highway construction, and urban development has negatively impacted populations.
<i>Umbra limi</i>	Central Mudminnow	Agricultural conversion of stream and wetland habitat	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Alteration or removal of oxbows, sloughs, swamps and other wetland systems for agricultural, urban, commercial, and residential development has reduced or eliminated habitat for this species.
<i>Umbra limi</i>	Central Mudminnow	Global climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Substantial	Climate change associated effects in freshwater ecosystems, including rising stream temperatures, pose potential threats to southern peripheral populations.
<i>Umbra limi</i>	Central Mudminnow	Predation	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Species and Genes- Other	Possible	Severe	Predation from introduced piscivorous species could threaten populations.
<i>Umbra limi</i>	Central Mudminnow	Human development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Alteration or removal of oxbows, sloughs, swamps and other wetland systems for agricultural, urban, commercial, and residential development has reduced or eliminated habitat for this species.

APX 5.1e Threats Identified for Freshwater Mussel and Snail SGCN

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Actinonaias pectorosa</i>	Pheasantshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	Impacts to stream connectivity for fish migration due to the creation of Lake Cumberland.
<i>Actinonaias pectorosa</i>	Pheasantshell	Pollution	Pollution	Industrial and Military Effluents	Existing	Substantial	Polluted waters in their natural range from abandoned mine drainage.
<i>Alasmidonta atropurpurea</i>	Cumberland Elktoe	Competition from Non-Natives	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Significant	Asian clam competition.
<i>Alasmidonta atropurpurea</i>	Cumberland Elktoe	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Alasmidonta atropurpurea</i>	Cumberland Elktoe	Pollution	Pollution	Industrial and Military Effluents	Existing	Significant	Reduction in quality habitat due to pollution due to mine drainage from oil and coal.
<i>Alasmidonta marginata</i>	Elktoe	Competition from Non-Natives	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Significant	Asian clam competition.
<i>Alasmidonta marginata</i>	Elktoe	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Alasmidonta marginata</i>	Elktoe	Pollution	Pollution	Agricultural and Forestry Effluents	Existing	Significant	
<i>Alasmidonta viridis</i>	Slippershell Mussel	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Alasmidonta viridis</i>	Slippershell Mussel	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Anodontoides denigrata</i>	Cumberland Papershell	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat due to stream channelization and modification.
<i>Anodontoides denigrata</i>	Cumberland Papershell	Pollution	Pollution	Pollution- Other	Existing	Substantial	Poor water quality associated with abandoned mine lands and run-off.
<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	Natural Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of habitat due to agriculture and development.
<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	Pollution	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Antroselates spiralis</i>	Shaggy Cavesnail	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Antroselates spiralis</i>	Shaggy Cavesnail	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Callinina georgiana</i>	Banded Mysterysnail	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	Changes in natural flow and temperature fluctuations due to impoundment by dams.
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, as well as riparian zone modification.
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Pollution	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Pollution	Pollution	Household Sewage and Urban Waste Water	Existing	Substantial	
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Habitat Degradation	Pollution	Household Sewage and Urban Waste Water	Existing	Substantial	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, as well as riparian zone modification.
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Pollution	Pollution	Industrial and Military Effluents	Existing	Substantial	
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Habitat Degradation	Pollution	Industrial and Military Effluents	Existing	Substantial	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, as well as riparian zone modification.
<i>Cambarunio iris</i>	Rainbow	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	Changes in natural flow fluctuations due to impoundment by dams.
<i>Cambarunio iris</i>	Rainbow	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat.
<i>Cambarunio iris</i>	Rainbow	Pollution	Pollution	Pollution- Other	Existing	Substantial	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Cambarus taeniatus</i>	Painted Creekshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Cambarus taeniatus</i>	Painted Creekshell	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	Loss of quality habitat due to riparian zone modification, stream channelization, dredging, sand and gravel mining, as well as sedimentation from road construction and agriculture.
<i>Cambarus taeniatus</i>	Painted Creekshell	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Cumberlandia monodonta</i>	Spectaclecase	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Cumberlandia monodonta</i>	Spectaclecase	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat due to stream channelization and dredging.
<i>Cumberlandia monodonta</i>	Spectaclecase	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Cyprogenia stegaria</i>	Fanshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	Unnatural changes in flow and temperature fluctuations due to dam control.
<i>Cyprogenia stegaria</i>	Fanshell	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Dromus dromas</i>	Dromedary Pearlmussel	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	
<i>Ellipsaria lineolata</i>	Butterfly	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Ellipsaria lineolata</i>	Butterfly	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat due to dredging and stream channelization.
<i>Ellipsaria lineolata</i>	Butterfly	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Elliptio crassidens</i>	Elephantear	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	Change in natural condition due to dams and stream channelization.
<i>Elliptio crassidens</i>	Elephantear	Natural Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Moderate	Loss of aquatic habitat due to development, agriculture, and stream channelization/ditching as well as gravel/sand removal or quarrying (e.g., mineral excavation).
<i>Elliptio crassidens</i>	Elephantear	Pollution	Pollution	Industrial and Military Effluents	Existing	Significant	
<i>Elliptio crassidens</i>	Cumberlandian Combshell	Siltation	Energy Production and Mining	Mining and Quarrying	Existing	Significant	Loss of quality habitat caused by increased silt levels from in stream mining and agriculture.
<i>Elliptio crassidens</i>	Cumberlandian Combshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	Changes in natural conditions caused by impoundments and stream channelization.
<i>Elliptio crassidens</i>	Cumberlandian Combshell	Pollution	Pollution	Pollution- Other	Existing	Significant	Reduction in water quality caused by drainage from abandoned mines.
<i>Epiblasma capsaeformis</i>	Oyster Mussel	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	
<i>Epiblasma capsaeformis</i>	Oyster Mussel	Pollution	Pollution	Household Sewage and Urban Waste Water	Existing	Substantial	Reduction in water quality due to run-off from abandoned mines and sewage treatment.
<i>Epiblasma obliquata</i>	Catspaw	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Changes in natural conditions due to water level fluctuations from dams and the corresponding influences.
<i>Epiblasma obliquata</i>	Catspaw	Pollution	Pollution	Pollution- Other	Possible	Severe	
<i>Epiblasma rangiana</i>	Northern Riffleshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	
<i>Epiblasma rangiana</i>	Northern Riffleshell	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	Loss of quality habitat due to navigational dredging and quarrying.
<i>Epiblasma rangiana</i>	Northern Riffleshell	Pollution	Pollution	Pollution- Other	Existing	Severe	
<i>Epiblasma triquetra</i>	Snuffbox	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Epiblasma triquetra</i>	Snuffbox	Habitat Degradation	Natural System Modifications	Natural System Modifications- Other	Existing	Significant	Loss of quality habitat due to channelization, development in the riparian zone, and gravel mining.
<i>Epiblasma triquetra</i>	Snuffbox	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Epiblasma walkeri</i>	Tan Riffleshell	Natural Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of habitat due to stream channelization, siltation, agriculture and development.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Epiblasma walkeri</i>	Tan Riffshell	Pollution	Pollution	Pollution- Other	Existing	Severe	Reduction in water quality due to run-off from abandoned mines and oil wells.
<i>Eupera cubensis</i>	Mottled Fingernailclam	Loss of wetland habitat	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	
<i>Fusconaia subrotunda</i>	Longsolid	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	Changes in natural conditions by dams causing migration barrier and impoundment.
<i>Fusconaia subrotunda</i>	Longsolid	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat due to abandoned coal mines and quarrying.
<i>Fusconaia subrotunda</i>	Longsolid	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Hemistena lata</i>	Cracking Pearlymussel	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Hemistena lata</i>	Cracking Pearlymussel	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Changes in water quality from sedimentation caused by road construction, urbanization, and coal mine drainage.
<i>Hemistena lata</i>	Cracking Pearlymussel	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Lampsilis abrupta</i>	Pink Mucket	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	
<i>Lampsilis abrupta</i>	Pink Mucket	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	
<i>Lampsilis abrupta</i>	Pink Mucket	Pollution	Pollution	Agricultural and Forestry Effluents	Existing	Substantial	
<i>Lampsilis hydana</i>	Louisiana Fatmucket	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Habitat loss due to development and agriculture.
<i>Lampsilis hydana</i>	Louisiana Fatmucket	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Lampsilis ovata</i>	Pocketbook	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	
<i>Lampsilis ovata</i>	Pocketbook	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of habitat from stream channelization and riparian zone removal for agricultural development.
<i>Lampsilis ovata</i>	Pocketbook	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Lasmigona compressa</i>	Creek Heelsplitter	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Habitat loss due to gravel mining.
<i>Lasmigona compressa</i>	Creek Heelsplitter	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Leaunio lerosus</i>	Little Spectaclecase	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat due to stream channelization.
<i>Leaunio lerosus</i>	Little Spectaclecase	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Leaunio orthmanni</i>	Kentucky Creekshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	Changes in natural flow fluctuations due to impoundment by dams.
<i>Leaunio orthmanni</i>	Kentucky Creekshell	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat due to stream channelization, sand and gravel mining, as well as riparian zone modification.
<i>Leaunio orthmanni</i>	Kentucky Creekshell	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Leaunio pataecus</i>	Dwarf Rainbow	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Leaunio pataecus</i>	Dwarf Rainbow	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, as well as riparian zone modification.
<i>Leaunio pataecus</i>	Dwarf Rainbow	Pollution	Pollution	Pollution- Other	Existing	Severe	
<i>Leaunio vanuxemensis</i>	Mountain Creekshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Leaunio vanuxemensis</i>	Mountain Creekshell	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, riparian zone modification, as well as road construction and development in the watershed.
<i>Leaunio vanuxemensis</i>	Mountain Creekshell	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Leptodea leptodon</i>	Scaleshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Leptodea leptodon</i>	Scaleshell	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Habitat loss from navigational dredging, gravel and sand removal, as well as riparian zone development.
<i>Leptodea leptodon</i>	Scaleshell	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Ligumia recta</i>	Black Sandshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Ligumia recta</i>	Black Sandshell	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat due to development, road construction, gravel and sand removal.
<i>Ligumia recta</i>	Black Sandshell	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Lopax sulculosa</i>	Furrowed Loplax	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	Changes in natural flow and temperature fluctuations due to impoundment by dams.
<i>Lithasia armigera</i>	Armored Rocksnail	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Lithasia curta</i>	Knobby Rocksnail	Habitat degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	
<i>Lithasia geniculata</i>	Ornate Rocksnail	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Lithasia geniculata</i>	Ornate Rocksnail	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Lithasia salebrosa</i>	Muddy Rocksnail	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Lithasia verrucosa</i>	Varicose Rocksnail	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Medionidus conradicus</i>	Cumberland Moccasinshell	Habitat Degradation	Natural System Modifications	Natural System Modifications- Other	Existing	Significant	Loss of quality habitat from development, road construction, gravel and sand removal.
<i>Medionidus conradicus</i>	Cumberland Moccasinshell	Pollution	Pollution	Pollution- Other	Existing	Significant	Reduction in water quality caused by acid mine drainage.
<i>Obovaria olivaria</i>	Hickorynut	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	Changes in natural flow fluctuations due to impoundment by dams.
<i>Obovaria olivaria</i>	Hickorynut	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat caused by dredging as well as sand and gravel mining.
<i>Obovaria olivaria</i>	Hickorynut	Pollution	Pollution	Pollution- Other	Existing	Severe	
<i>Obovaria retusa</i>	Ring Pink	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Changes in natural flow fluctuations due to impoundment by dams.
<i>Obovaria retusa</i>	Ring Pink	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	Loss of quality habitat caused by dredging, sand and gravel mining, riparian zone modification, and stream channelization.
<i>Obovaria retusa</i>	Ring Pink	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Obovaria subrotunda</i>	Round Hickorynut	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Obovaria subrotunda</i>	Round Hickorynut	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat caused by stream channelization, sand and gravel mining, as well as riparian zone modification.
<i>Paetulunio fabalis</i>	Rayed Bean	Natural System Modification	Pollution	Pollution- Other	Existing	Substantial	
<i>Paetulunio fabalis</i>	Rayed Bean	Habitat Degradation	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Paetulunio fabalis</i>	Rayed Bean	Pollution	Pollution	Other Ecosystem Modifications	Existing	Severe	Loss of quality habitat due to siltation from development and agriculture.
<i>Pegias fabula</i>	Littletwing Pearlymussel	Natural System Modification	Natural System Modifications	Pollution- Other	Existing	Severe	
<i>Pegias fabula</i>	Littletwing Pearlymussel	Habitat Degradation	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Pegias fabula</i>	Littletwing Pearlymussel	Pollution	Pollution	Other Ecosystem Modifications	Existing	Severe	Sedimentation from coal mining and agriculture.
<i>Plethobasus cicatricosus</i>	White Wartback	Natural System Modification	Natural System Modifications	Pollution- Other	Existing	Significant	
<i>Plethobasus cicatricosus</i>	White Wartback	Habitat Degradation	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Changes in natural flow fluctuations due to impoundment by dams.
<i>Plethobasus cicatricosus</i>	White Wartback	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	Loss of quality habitat due to dredging, sand and gravel mining.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Plethobasus cicatricosus</i>	White Wartyback	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	Changes in natural flow fluctuations due to impoundment by dams.
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	Loss of quality habitat due to dredging as well as sand and gravel mining.
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Plethobasus cyphus</i>	Sheepnose	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Plethobasus cyphus</i>	Sheepnose	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss in quality habitat due to stream channelization, dredging, as well as sand and gravel mining.
<i>Plethobasus cyphus</i>	Sheepnose	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Pleurobema clava</i>	Clubshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Pleurobema clava</i>	Clubshell	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, as well as riparian zone modification.
<i>Pleurobema clava</i>	Clubshell	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	Changes in natural flow fluctuations due to impoundment by dams.
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, as well as riparian zone modification.
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, as well as riparian zone modification.
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Pollution	Pollution	Pollution- Other	Existing	Significant	Reduction in water quality from acid mine drainage.
<i>Pleurobema plenum</i>	Rough Pigtoe	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Pleurobema plenum</i>	Rough Pigtoe	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, as well as riparian zone modification.
<i>Pleurobema plenum</i>	Rough Pigtoe	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, and riparian zone modification.
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Pleurocera acuta</i>	Sharp Hornsnail	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, as well as riparian zone modification.
<i>Pleurocera alveare</i>	Rugged Hornsnail	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Pleurocera alveare</i>	Rugged Hornsnail	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	
<i>Pleurocera canaliculata</i>	Silty Hornsnail	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Moderate	
<i>Pleurocera curta</i>	Shortspire Hornsnail	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Pleurocera walkeri</i>	Telescope Hornsnail	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Pleuroaia dolabeloides</i>	Slabside Pearlymussel	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Pleuroaia dolabellodes</i>	Slabside Pearlymussel	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of aquatic habitat due to gravel/sand removal, development and agriculture as well as habitat degradation due to siltation from agriculture.
<i>Pleuroaia dolabellodes</i>	Slabside Pearlymussel	Pollution	Pollution	Pollution- Other	Existing	Severe	
<i>Potamilus capax</i>	Fat Pocketbook	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	
<i>Potamilus capax</i>	Fat Pocketbook	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	Loss of quality habitat due to dredging as well as sand and gravel mining.
<i>Potamilus purpuratus</i>	Bleufer	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, as well as riparian zone modification.
<i>Potamilus purpuratus</i>	Bleufer	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Ptychobranchus subtertius</i>	Fluted Kidneyshell	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	Changes in natural flow fluctuations due to impoundment by dams.
<i>Ptychobranchus subtertius</i>	Fluted Kidneyshell	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat due to sand and gravel mining.
<i>Ptychobranchus subtertius</i>	Fluted Kidneyshell	Pollution	Pollution	Pollution- Other	Existing	Significant	Reduction of water quality from acid mine drainage.
<i>Quadrula fragosa</i>	Winged Mapleleaf	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	
<i>Quadrula fragosa</i>	Winged Mapleleaf	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	Loss of aquatic habitat to development and agriculture.
<i>Rhodacme elatior</i>	Domed Ancylid	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Rhodacme hinkleyi</i>	Knobby Ancylid	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Sagittinio subrostratus</i>	Pondmussel	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat from agriculture in the surrounding watershed.
<i>Sagittinio subrostratus</i>	Pondmussel	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Simpsonaia ambigua</i>	Salamander Mussel	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	Changes in natural flow fluctuations due to impoundment by dams.
<i>Simpsonaia ambigua</i>	Salamander Mussel	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat due to stream channelization, dredging, sand and gravel mining, as well as riparian zone modification.
<i>Simpsonaia ambigua</i>	Salamander Mussel	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Thelidema cylindrica</i>	Rabbitsfoot	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Thelidema cylindrica</i>	Rabbitsfoot	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	Loss of quality habitat due to dredging, sand and gravel mining, as well as riparian zone modification.
<i>Thelidema cylindrica</i>	Rabbitsfoot	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Toxolasma lividum</i>	Purple Liliuput	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Toxolasma lividum</i>	Purple Liliuput	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat due to sand and gravel mining, riparian zone modification, as well as sedimentation from road construction, coal mines, and urban development.
<i>Toxolasma lividum</i>	Purple Liliuput	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Toxolasma texasiense</i>	Texas Liliuput	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Substantial	
<i>Toxolasma texasiense</i>	Texas Liliuput	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat due to stream channelization as well as sand and gravel mining.
<i>Toxolasma texasiense</i>	Texas Liliuput	Pollution	Pollution	Pollution- Other	Existing	Substantial	
<i>Tritogonia nobilis</i>	Gulf Mapleleaf	Natural System Modification	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Tritogonia nobilis</i>	Gulf Mapleleaf	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Minor	Loss of quality habitat due to development and agriculture.
<i>Tritogonia nobilis</i>	Gulf Mapleleaf	Pollution	Pollution	Pollution- Other	Existing	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Unioneus tetralasmus</i>	Pondhorn	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Possible	Moderate	
<i>Venustaconcha troostensis</i>	Cumberland Bean	Habitat Degradation	Natural System Modifications	Other Ecosystem Modifications	Existing	Substantial	Loss of quality habitat due to riparian zone modification.
<i>Venustaconcha troostensis</i>	Cumberland Bean	Pollution	Pollution	Pollution- Other	Existing	Significant	Sedimentation from road construction, coal mines, and urban development. Reduction in water quality from from abandoned mine drainage.

APX 5.1f Threats Identified for Insect and Springtail SCN

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Acronuria covelli</i>	River Stone	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Acronuria covelli</i>	River Stone	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Acronuria hitchcocki</i>	Kentucky Stone	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Acronuria hitchcocki</i>	Kentucky Stone	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Agapetus gelbae</i>		Nonpoint source pollution	Pollution	Pollution- Other	Existing	Severe	
<i>Agapetus kirchneri</i>		Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Agapetus kirchneri</i>		Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Allocapnia cunninghami</i>	Karst Snowfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Existing	Significant	Streams where species occurs are physically disturbed. Gravel dredging.
<i>Allocapnia cunninghami</i>	Karst Snowfly	Nonpoint source pollution	Pollution	Pollution- Other	Possible	Significant	
<i>Amphiegrion saucium</i>	Eastern Red Damsel	Logging	Biological Resource Use	Logging and Wood Harvesting	Possible	Substantial	
<i>Amphiegrion saucium</i>	Eastern Red Damsel	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Existing	Significant	Beavers are an issue for this species.
<i>Amphiegrion saucium</i>	Eastern Red Damsel	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Argomphus maxwelli</i>	Bayou Clubtail	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Argomphus maxwelli</i>	Bayou Clubtail	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Bombus pensylvanicus</i>	American Bumble Bee	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Substantial	
<i>Bombus pensylvanicus</i>	American Bumble Bee	Pathogen spillover from commercial bees	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Substantial	
<i>Bombus pensylvanicus</i>	American Bumble Bee	Pesticides	Pollution	Agricultural and Forestry Effluents	Existing	Severe	
<i>Bombus pensylvanicus</i>	American Bumble Bee	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Substantial	
<i>Calephelis borealis</i>	Northern Metalmark	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	
<i>Calephelis borealis</i>	Northern Metalmark	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	
<i>Calephelis muticum</i>	Swamp Metalmark	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	Wetland destruction.
<i>Calephelis muticum</i>	Swamp Metalmark	Fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Calephelis muticum</i>	Swamp Metalmark	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Wetland destruction is a key issue for this species.
<i>Calophrys irus</i>	Frosted Elfin	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	
<i>Calophrys irus</i>	Frosted Elfin	Improper fire regimes	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	Arson and lack of natural firebreaks are significant issues for this species.
<i>Calophrys irus</i>	Frosted Elfin	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Possible	Severe	
<i>Calopteryx dimidiata</i>	Sparkling Jewelwing	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Existing	Severe	
<i>Calopteryx dimidiata</i>	Sparkling Jewelwing	Pollution	Pollution	Pollution- Other	Existing	Severe	
<i>Celithemis verna</i>	Double-ringed Pennant	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	
<i>Celithemis verna</i>	Double-ringed Pennant	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Celithemis verna</i>	Double-ringed Pennant	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Celithemis verna</i>	Double-ringed Pennant	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Chlosyne gorgone</i>	Gorgone Checkerspot	Land conversion to agriculture	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	
<i>Chlosyne gorgone</i>	Gorgone Checkerspot	Fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	Barrens required for species.
<i>Chlosyne gorgone</i>	Gorgone Checkerspot	Land conversion to residential and commercial development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	
<i>Danaus plexippus plexippus</i>	Monarch	Agricultural conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Loss of milkweed stems due to extensive crop cover.
<i>Danaus plexippus plexippus</i>	Monarch	Ophryocystis elektroscirta	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	Protozoan parasite that infects monarchs and can cause deformities preventing monarchs from migrating or shortening their lifespan.
<i>Danaus plexippus plexippus</i>	Monarch	Pesticides	Pollution	Agricultural and Forestry Effluents	Existing	Severe	Agricultural and household pesticides, particularly neonicotinoids, can kill or harm adult butterflies and caterpillars.
<i>Danaus plexippus plexippus</i>	Monarch	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	Loss of nectaring resources and available host plants due to habitat conversion and alteration.
<i>Enallagma daeckii</i>	Attenuated Bluet	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Enallagma daeckii</i>	Attenuated Bluet	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Erora laeta</i>	Early Hairstreak	Logging and silviculture	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Erora laeta</i>	Early Hairstreak	Beech Bark disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Substantial	
<i>Erynnis marialis</i>	Mottled Duskywing	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	
<i>Erynnis marialis</i>	Mottled Duskywing	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Euphyes dukes</i>	Dukes' Skipper	Logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Species requires shaded swamps. Intolerant of open, sunny wetlands.
<i>Euphyes dukes</i>	Dukes' Skipper	Wetland destruction	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	
<i>Gomphurus hybridus</i>	Cocoa Clubtail	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Possible	Substantial	
<i>Gomphurus hybridus</i>	Cocoa Clubtail	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Hansonoperla hoklesqua</i>	Splendid Stone	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Hansonoperla hoklesqua</i>	Splendid Stone	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Hydroptila covei</i>	A Hydroptilid Caddisfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Hydroptila covei</i>	A Hydroptilid Caddisfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Hydroptila decia</i>	Knoxville Hydroptilid Micro Caddisfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Hydroptila decia</i>	Knoxville Hydroptilid Micro Caddisfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Hydroptila howelli</i>	A Hydroptilid Caddisfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Hydroptila howelli</i>	A Hydroptilid Caddisfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Hydroptila kuehnei</i>	A Hydroptilid Caddisfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Hydroptila kuehnei</i>	A Hydroptilid Caddisfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Hystichophora loricana</i>	An Olethreutine Moth	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	
<i>Hystichophora loricana</i>	An Olethreutine Moth	Improper fire regimes	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Hystichophora loricana</i>	An Olethreutine Moth	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	
<i>Lepidostoma etrieri</i>	A Lepidostomatid Caddisfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Lepidostoma etrieri</i>	A Lepidostomatid Caddisfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Leuctra schusteri</i>	Karst Needlfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Leuctra schusteri</i>	Karst Needlfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Libbrancha recurvata</i>	A Burrowing Mayfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Libbrancha recurvata</i>	A Burrowing Mayfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Lyttosia permagnaria</i>	A Geometrid Moth	Logging	Biological Resource Use	Logging and Wood Harvesting	Possible	Severe	
<i>Lyttosia permagnaria</i>	A Geometrid Moth	Resource extraction	Energy Production and Mining	Mining and Quarrying	Existing	Severe	
<i>Maccaffertium bednariki</i>	A Heptageniid Mayfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Maccaffertium bednariki</i>	A Heptageniid Mayfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Manophylax butleri</i>	Bottle Cap Caddisfly	Drying of rockshelters due to logging	Biological Resource Use	Logging and Wood Harvesting	Possible	Substantial	Requires wet rock for diet of algae, fungi, diatoms.
<i>Manophylax butleri</i>	Bottle Cap Caddisfly	Rockshelter disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Manophylax butleri</i>	Bottle Cap Caddisfly	Improper waste disposal	Pollution	Pollution- Other	Existing	Significant	
<i>Mesania straminea</i>	Helianthus Leafhopper	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	
<i>Mesania straminea</i>	Helianthus Leafhopper	Improper fire regimes	Natural System Modifications	Fire and Fire Suppression	Possible	Significant	
<i>Mesania straminea</i>	Helianthus Leafhopper	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Nannothemis bella</i>	Elfin Skimmer	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Nannothemis bella</i>	Elfin Skimmer	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Nehalennia gracilis</i>	Sphagnum Sprite	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Existing	Significant	
<i>Nehalennia gracilis</i>	Sphagnum Sprite	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Nehalennia integricollis</i>	Southern Sprite	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Existing	Significant	
<i>Nehalennia integricollis</i>	Southern Sprite	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Nehalennia irene</i>	Sedge Sprite	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Existing	Significant	
<i>Nehalennia irene</i>	Sedge Sprite	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Neophylax lewisae</i>		Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Neophylax lewisae</i>		Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Ophiogomphus howei</i>	Pygmy Snaketail	Alterations to hydrology	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	
<i>Ophiogomphus howei</i>	Pygmy Snaketail	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Ophiogomphus malinensis</i>	Maine Snaketail	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Ophiogomphus malinensis</i>	Maine Snaketail	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Papaiperna beeriana</i>	Blazing Star Stem Borer	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	
<i>Papaiperna beeriana</i>	Blazing Star Stem Borer	Improper fire regimes	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Papaiperna beeriana</i>	Blazing Star Stem Borer	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Papaiperna eryngii</i>	Rattlesnake-master Borer Moth	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	
<i>Papaiperna eryngii</i>	Rattlesnake-master Borer Moth	Poaching	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Possible	Severe	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth	Improper fire regimes	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth	Pesticides	Pollution	Agricultural and Forestry Effluents	Existing	Severe	
<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Only occurs on protected land.
<i>Papaipema leucostigma</i>	Columbine Borer Moth	Logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Papaipema leucostigma</i>	Columbine Borer Moth	Pesticides	Pollution	Agricultural and Forestry Effluents	Existing	Significant	
<i>Papaipema leucostigma</i>	Columbine Borer Moth	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Papaipema siphii</i>	Siphium Borer Moth	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Possible	Severe	
<i>Papaipema siphii</i>	Siphium Borer Moth	Improper fire regimes	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Papaipema siphii</i>	Siphium Borer Moth	Pesticides	Pollution	Agricultural and Forestry Effluents	Existing	Significant	
<i>Papaipema siphii</i>	Siphium Borer Moth	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	Only aware of one population in KY.
<i>Papaipema</i> sp. 5	Rare Cane Borer Moth	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Severe	
<i>Papaipema</i> sp. 5	Rare Cane Borer Moth	Improper fire regimes	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Papaipema</i> sp. 5	Rare Cane Borer Moth	Pesticides	Pollution	Agricultural and Forestry Effluents	Possible	Significant	
<i>Papaipema</i> sp. 5	Rare Cane Borer Moth	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	
<i>Papaipema speciosissima</i>	Osmunda Borer Moth	Wetland conversion	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	
<i>Poanes viator</i>	Broad-winged Skipper	Mowing of larval host	Natural System Modifications	Natural System Modifications- Other	Existing	Significant	
<i>Poanes viator</i>	Broad-winged Skipper	Wetland destruction	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	
<i>Polycentropus neiswanderi</i>	A Polycentropodid Caddisfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Polycentropus neiswanderi</i>	A Polycentropodid Caddisfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Prairiana kansana</i>	A Cicadellid Leafhopper	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	
<i>Prairiana kansana</i>	A Cicadellid Leafhopper	Improper fire regimes	Natural System Modifications	Fire and Fire Suppression	Possible	Significant	
<i>Prairiana kansana</i>	A Cicadellid Leafhopper	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Pseudanophtthalmus caecus</i>	Clifton Cave Beetle	Cave entrance closure	Natural System Modifications	Natural System Modifications- Other	Existing	Significant	Human-accessible entrance to cave blasted shut during road construction. Impact is unknown due to inability to survey cave.
<i>Pseudanophtthalmus calcareus</i>	Limestone Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanophtthalmus calcareus</i>	Limestone Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanophtthalmus catoyctos</i>	Lesser Adams Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanophtthalmus catoyctos</i>	Lesser Adams Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanophtthalmus cnephosus</i>	A Cave Obligate Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	
<i>Pseudanophtthalmus cnephosus</i>	A Cave Obligate Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanophtthalmus conditus</i>	Hidden Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanophtthalmus conditus</i>	Hidden Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Pseudanopthalmus frigidus</i>	Icebox Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanopthalmus frigidus</i>	Icebox Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanopthalmus globiceps</i>	Round-headed Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanopthalmus globiceps</i>	Round-headed Cave Beetle	Structural changes to cave.	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanopthalmus horni</i>	Garman's Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanopthalmus horni</i>	Garman's Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanopthalmus hypolithos</i>	Ashcamp Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanopthalmus hypolithos</i>	Ashcamp Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanopthalmus inexpectatus</i>	Surprising Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	
<i>Pseudanopthalmus inexpectatus</i>	Surprising Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave. Unlikely due to location on MCNP property.
<i>Pseudanopthalmus major</i>	Beaver Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanopthalmus major</i>	Beaver Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanopthalmus pholeter</i>	Greater Adams Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanopthalmus pholeter</i>	Greater Adams Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanopthalmus pubescens intrepidus</i>	A Cave Obligate Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanopthalmus pubescens intrepidus</i>	A Cave Obligate Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanopthalmus puteanus</i>	Old Well Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanopthalmus puteanus</i>	Old Well Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanopthalmus rogersae</i>	Rogers' Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanopthalmus rogersae</i>	Rogers' Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanopthalmus scholasticus</i>	Scholarly Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	Cave is gated.
<i>Pseudanopthalmus scholasticus</i>	Scholarly Cave Beetle	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	Changes to airflow/humidity/temperature of cave.
<i>Pseudanopthalmus troglodytes</i>	Louisville Cave Beetle	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Significant	
<i>Pseudanopthalmus troglodytes</i>	Louisville Cave Beetle	Structural changes to cave	Residential and Commercial Development	Commercial and Industrial Areas	Existing	Substantial	One of the caves species is known from was bulldozed due to development.
<i>Pseudosirella espanita</i>	A Cave Obligate Springtail	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Substantial	
<i>Pseudosirella espanita</i>	A Cave Obligate Springtail	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Moderate	Changes to airflow/humidity/temperature of cave.
<i>Rasveta tema</i>	Vermont Salfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Rasveta tema</i>	Vermont Salfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Rhyacophila appalachia</i>	A Rhyacophilid Caddisfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Rhyacophila appalachia</i>	A Rhyacophilid Caddisfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Satyrium favonius ontario</i>	Northern Oak Hairstreak	Agricultural conversion	Agriculture and Aquaculture	Agriculture and Aquaculture- Other	Existing	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Satyrus favorinus ontario</i>	Northern Oak Hairstreak	Pesticides	Pollution	Agricultural and Forestry Effluents	Existing	Significant	May prefer nectar from insect galls as food resource over nectar from flowering plants.
<i>Satyrus favorinus ontario</i>	Northern Oak Hairstreak	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Soyedina calcaria</i>	Karst Forestfly	Alterations to hydrology and stream channel	Natural System Modifications	Natural System Modifications- Other	Possible	Significant	
<i>Soyedina calcaria</i>	Karst Forestfly	Nonpoint source pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Speyeria diana</i>	Diana Fritillary	Logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	Clear cutting is detrimental to species.
<i>Speyeria diana</i>	Diana Fritillary	Resource Extraction	Energy Production and Mining	Mining and Quarrying	Existing	Severe	Strip mining
<i>Speyeria diana</i>	Diana Fritillary	Pesticides	Pollution	Agricultural and Forestry Effluents	Existing	Significant	Population greatly impacted by spongy moth (<i>Lymantria dispar dispar</i>) control measures.
<i>Speyeria diana</i>	Diana Fritillary	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Stylurus notatus</i>	Elusive Clubtail	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Existing	Severe	
<i>Stylurus notatus</i>	Elusive Clubtail	Pollution	Pollution	Pollution- Other	Existing	Significant	
<i>Stylurus scudder</i>	Zebra Clubtail	Alterations to hydrology	Natural System Modifications	Natural System Modifications- Other	Existing	Severe	Beavers building dams in habitat.
<i>Stylurus scudder</i>	Zebra Clubtail	Pollution	Pollution	Pollution- Other	Possible	Significant	
<i>Telegonus cellus</i>	Gold-banded Skipper	Logging	Agriculture and Aquaculture	Wood and Pulp Plantations	Existing	Severe	Clear cutting.
<i>Telegonus cellus</i>	Gold-banded Skipper	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Severe	
<i>Tomocerus missus</i>	A Cave Obligate Springtail	Vandalism	Human Intrusions and Disturbance	Recreational Activities	Possible	Substantial	
<i>Tomocerus missus</i>	A Cave Obligate Springtail	Structural changes to cave	Natural System Modifications	Natural System Modifications- Other	Possible	Moderate	Changes to airflow/humidity/temperature of cave.

APX 5.1g Threats Identified for Mammal SGCN

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Human intrusion into roosting sites (hibernacula and summer)	Human Intrusions and Disturbance	Recreational Activities	Existing	Severe	
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Habitat alteration near roosting sites via logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Habitat loss due to development	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Disturbance of maternity sites from recreational climbers	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Human intrusion into roosting sites (hibernacula and summer)	Human Intrusions and Disturbance	Recreational Activities	Existing	Severe	
<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Habitat alteration near roosting sites via logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Habitat loss due to development	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	
<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Disturbance of maternity sites from recreational climbers	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Mustela nivalis</i>	Least Weasel	Predation by feral cats	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	
<i>Myodes gapperi maurus</i>	Kentucky Red-backed Vole	Habitat loss and fragmentation due to logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Myotis austroriparius</i>	Southeastern Myotis	Habitat loss due to ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Myotis grisescens</i>	Gray Myotis	Human disturbance of maternity sites	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Myotis leibii</i>	Eastern Small-footed Myotis	Human intrusion into hibernacula	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Myotis leibii</i>	Eastern Small-footed Myotis	Disturbance of maternity sites from recreational climbers	Human Intrusions and Disturbance	Recreational Activities	Possible	Substantial	
<i>Myotis lucifugus</i>	Little Brown Bat	White Nose Syndrome	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Severe	
<i>Myotis lucifugus</i>	Little Brown Bat	Human intrusion into hibernacula	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Myotis lucifugus</i>	Little Brown Bat	Habitat loss due to improper logging practices	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	Logging around hibernacula or maternity sites.
<i>Myotis septentrionalis</i>	Northern Long-Eared Bat	White Nose Syndrome	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Severe	
<i>Myotis septentrionalis</i>	Northern Long-Eared Bat	Human intrusion into hibernacula	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Myotis septentrionalis</i>	Northern Long-Eared Bat	Habitat loss due to improper logging practices	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	Logging around hibernacula or maternity sites.
<i>Myotis sodalis</i>	Indiana Bat	White Nose Syndrome	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Severe	WNS was first detected in Kentucky in 2011 and has spread throughout the Indiana bat hibernacula since then.
<i>Myotis sodalis</i>	Indiana Bat	Human intrusion into hibernacula	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Myotis sodalis</i>	Indiana Bat	Removal of maternity sites	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Nectoma magister</i>	Allegheny Woodrat	Raccoon roundworm	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Genes- Other	Possible	Substantial	
<i>Nectoma magister</i>	Allegheny Woodrat	Habitat loss and fragmentation logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Ondatra zibethicus</i>	Muskrat	Water pollution resulting from agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Possible	Substantial	
<i>Ondatra zibethicus</i>	Muskrat	Increased flooding and high intensity rain events	Climate Change and Severe Weather	Storms and Flooding	Possible	Substantial	
<i>Ondatra zibethicus</i>	Muskrat	Habitat loss from mining and conversion of wetland vegetation	Energy Production and Mining	Mining and Quarrying	Existing	Significant	Increased salinity from mining results in loss of cattails and other native wetland vegetation.
<i>Perimyotis subflavus</i>	Tricolored Bat	White Nose Syndrome	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Severe	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Perimyotis subflavus</i>	Tricolored Bat	Human intrusion into hibernacula	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Peromyscus gossypinus</i>	Cotton Mouse	habitat loss due to agricultural conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Peromyscus maniculatus nuberiae</i>	Cloudland Deer Mouse	Habitat loss due to logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Sorex cinereus</i>	Cinereus Shrew	Agriculture impacts and conversion of wetland habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Agricultural impacts are mainly associated with populations in the western subspecies range.
<i>Sorex cinereus</i>	Cinereus Shrew	Road construction	Transportation and Service Corridors	Roads and Railroads	Possible	Significant	Plans for large interstate corridors planned may impact western sub species.
<i>Sorex cinereus</i>	Cinereus Shrew	Coal mining	Energy Production and Mining	Mining and Quarrying	Existing	Substantial	
<i>Sorex cinereus</i>	Cinereus Shrew	Renewable energy development	Energy Production and Mining	Renewable Energy	Possible	Significant	
<i>Sorex cinereus</i>	Cinereus Shrew	Habitat loss due to timber extraction	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Sorex dispar blitchi</i>	Long-tailed Shrew	Timber extraction	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Sorex dispar blitchi</i>	Long-tailed Shrew	Climate change	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Substantial	
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Habitat loss to logging	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Vehicle collisions	Transportation and Service Corridors	Roads and Railroads	Existing	Significant	
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Trapping bycatch	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Moderate	
<i>Sylvilagus aquaticus</i>	Swamp Rabbit	Habitat loss due to agricultural conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Sylvilagus aquaticus</i>	Swamp Rabbit	Rabbit hemorrhagic disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Significant	
<i>Sylvilagus obscurus</i>	Appalachian Cottontail	Rabbit hemorrhagic disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Possible	Significant	

APX 5.1h Threats Identified for Plant SGCN

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Abdrpa aprica</i>	Open-ground Whitlow-grass	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Abdrpa aprica</i>	Open-ground Whitlow-grass	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Abdrpa aprica</i>	Open-ground Whitlow-grass	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Abdrpa aprica</i>	Open-ground Whitlow-grass	Mismanaged roadsides and utilities	Transportation and Service Corridors	Roads and Railroads	Existing	Severe	
<i>Actaea rubifolia</i>	Appalachian Bugbane	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Substantial	
<i>Actaea rubifolia</i>	Appalachian Bugbane	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Actaea rubifolia</i>	Appalachian Bugbane	Gathering terrestrial plants	Biological Resource Use	Gathering Terrestrial Plants	Existing	Substantial	
<i>Actaea rubifolia</i>	Appalachian Bugbane	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Actaea rubifolia</i>	Appalachian Bugbane	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Substantial	Ice storms and tornadoes have recently damaged habitat of many populations.
<i>Actaea rubifolia</i>	Appalachian Bugbane	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Actaea rubifolia</i>	Appalachian Bugbane	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	Can have both positive and negative impacts on populations.
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Agalinis auriculata</i>	Earleaf False Foxglove	woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Mismanaged roadsides and utilities	Transportation and Service Corridors	Roads and Railroads	Existing	Severe	Several populations occur along roadsides and utilities.
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Droughts	Climate Change and Severe Weather	Droughts	Existing	Significant	
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Substantial	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Tourism and recreation areas	Residential and Commercial Development	Tourism and Recreation Areas	Existing	Significant	
<i>Apios priceana</i>	Price's Potato-bean	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Apios priceana</i>	Price's Potato-bean	Droughts	Climate Change and Severe Weather	Droughts	Existing	Significant	
<i>Apios priceana</i>	Price's Potato-bean	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Apios priceana</i>	Price's Potato-bean	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Apios priceana</i>	Price's Potato-bean	Herbivory	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Apios priceana</i>	Price's Potato-bean	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Apios priceana</i>	Price's Potato-bean	Mismanaged roadsides and utilities	Transportation and Service Corridors	Roads and Railroads	Existing	Significant	
<i>Arabis patens</i>	Spreading Rockcress	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Arabis patens</i>	Spreading Rockcress	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Arabis patens</i>	Spreading Rockcress	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Arabis patens</i>	Spreading Rockcress	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	
<i>Aureolaria patula</i>	Spreading False Foxglove	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Aureolaria patula</i>	Spreading False Foxglove	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Significant	
<i>Aureolaria patula</i>	Spreading False Foxglove	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Aureolaria patula</i>	Spreading False Foxglove	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Aureolaria patula</i>	Spreading False Foxglove	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	
<i>Aureolaria patula</i>	Spreading False Foxglove	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Gathering terrestrial plants	Biological Resource Use	Gathering Terrestrial Plants	Existing	Substantial	
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	Can have both positive and negative impacts on populations.
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Lack of natural disturbances by large migrating ungulates	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Severe	
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Borodinia perstellata</i>	Braun's Rockcress	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Borodinia perstellata</i>	Braun's Rockcress	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Borodinia perstellata</i>	Braun's Rockcress	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Borodinia perstellata</i>	Braun's Rockcress	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Severe	
<i>Borodinia perstellata</i>	Braun's Rockcress	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Calamovilla arcuata</i>	Cumberland Sandgrass	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Calamovilla arcuata</i>	Cumberland Sandgrass	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Calamovilla arcuata</i>	Cumberland Sandgrass	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Severe	
<i>Calamovilla arcuata</i>	Cumberland Sandgrass	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Calamovilla arcuata</i>	Cumberland Sandgrass	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Significant	
<i>Calamovilla arcuata</i>	Cumberland Sandgrass	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Carex decomposita</i>	Epiphytic Sedge	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Carex decomposita</i>	Epiphytic Sedge	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Severe	
<i>Carex decomposita</i>	Epiphytic Sedge	Droughts	Climate Change and Severe Weather	Droughts	Existing	Substantial	
<i>Carex decomposita</i>	Epiphytic Sedge	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Significant	
<i>Carex decomposita</i>	Epiphytic Sedge	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Substantial	
<i>Carex decomposita</i>	Epiphytic Sedge	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Severe	
<i>Carex decomposita</i>	Epiphytic Sedge	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Carex juniperorum</i>	Juniper Sedge	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Carex juniperorum</i>	Juniper Sedge	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	
<i>Carex juniperorum</i>	Juniper Sedge	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	Can have both positive and negative impacts on populations.
<i>Carex juniperorum</i>	Juniper Sedge	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Significant	
<i>Carex juniperorum</i>	Juniper Sedge	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Carex juniperorum</i>	Juniper Sedge	woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Carex juniperorum</i>	Juniper Sedge	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Carex roanensis</i>	Roan Mountain Sedge	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Carex roanensis</i>	Roan Mountain Sedge	Mining and quarrying	Energy Production and Mining	Mining and Quarrying	Existing	Severe	This known location occurs on Black Mountain, oil/gas and coal mining occurs within the general habitat.
<i>Carex roanensis</i>	Roan Mountain Sedge	Oil and gas drilling	Energy Production and Mining	Energy Production and Mining- Other	Existing	Severe	This known location occurs on Black Mountain, oil/gas and coal mining occurs within the general habitat.
<i>Carex roanensis</i>	Roan Mountain Sedge	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Carex roanensis</i>	Roan Mountain Sedge	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Substantial	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Carex roanensis</i>	Roan Mountain Sedge	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	
<i>Carex timida</i>	Timid Sedge	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Substantial	
<i>Carex timida</i>	Timid Sedge	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Carex timida</i>	Timid Sedge	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Severe	
<i>Carex timida</i>	Timid Sedge	Lack of natural disturbances by large migrating ungulates	Natural System Modifications	Natural Systems Modifications- Other	Existing	Substantial	
<i>Carex timida</i>	Timid Sedge	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	
<i>Conradina verticillata</i>	Cumberland Rosemary	Temperature extremes and droughts	Climate Change and Severe Weather	Climate and Severe Weather- Other	Possible	Significant	
<i>Conradina verticillata</i>	Cumberland Rosemary	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Severe	
<i>Conradina verticillata</i>	Cumberland Rosemary	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Conradina verticillata</i>	Cumberland Rosemary	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Severe	
<i>Conradina verticillata</i>	Cumberland Rosemary	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Conradina verticillata</i>	Cumberland Rosemary	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Conradina verticillata</i>	Cumberland Rosemary	Tourism and recreation areas	Residential and Commercial Development	Tourism and Recreation Areas	Existing	Significant	
<i>Cyripedium kentuckiense</i>	Kentucky Lady's-slipper	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Substantial	
<i>Cyripedium kentuckiense</i>	Kentucky Lady's-slipper	Gathering terrestrial plants	Biological Resource Use	Gathering Terrestrial Plants	Existing	Substantial	
<i>Cyripedium kentuckiense</i>	Kentucky Lady's-slipper	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Cyripedium kentuckiense</i>	Kentucky Lady's-slipper	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Substantial	
<i>Cyripedium kentuckiense</i>	Kentucky Lady's-slipper	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Significant	Several populations have decline or become extirpated due to riparian bank erosion.
<i>Cyripedium kentuckiense</i>	Kentucky Lady's-slipper	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Significant	
<i>Cyripedium kentuckiense</i>	Kentucky Lady's-slipper	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Cyripedium kentuckiense</i>	Kentucky Lady's-slipper	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Substantial	
<i>Cyripedium kentuckiense</i>	Kentucky Lady's-slipper	Roads and railroads	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	One population occurs near a bridge.
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	Although thinning of canopy can be beneficial, excessive logging and soil disturbance can be detrimental to this species.
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Severe	
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Severe	
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Eriogonum harperi</i>	Harper's Wild Fleabane	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Eriogonum harperi</i>	Harper's Wild Fleabane	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Severe	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Eriogonum harperi</i>	Harper's Wild Fleabane	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Eriogonum harperi</i>	Harper's Wild Fleabane	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Eriogonum harperi</i>	Harper's Wild Fleabane	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Storms and flooding	Climate Change and Severe Weather	Climate and Severe Weather- Other	Existing	Severe	
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Significant	
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	
<i>Glandularia canadensis</i>	Rose Mock-verbain	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Substantial	
<i>Glandularia canadensis</i>	Rose Mock-verbain	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Glandularia canadensis</i>	Rose Mock-verbain	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	Logging near the populations can exacerbate the invasive issue and alter sensitive habitat.
<i>Glandularia canadensis</i>	Rose Mock-verbain	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Significant	
<i>Glandularia canadensis</i>	Rose Mock-verbain	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	Tree of heaven is a serious threat on the sites where this species occurs.
<i>Glandularia canadensis</i>	Rose Mock-verbain	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Gratiola quattermaniae</i>	Quatterman's Hedge-hyssop	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Gratiola quattermaniae</i>	Quatterman's Hedge-hyssop	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	Cattle grazing may have both positive and negative effects.
<i>Gratiola quattermaniae</i>	Quatterman's Hedge-hyssop	Droughts	Climate Change and Severe Weather	Droughts	Existing	Significant	
<i>Gratiola quattermaniae</i>	Quatterman's Hedge-hyssop	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Gratiola quattermaniae</i>	Quatterman's Hedge-hyssop	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Gratiola quattermaniae</i>	Quatterman's Hedge-hyssop	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Gratiola quattermaniae</i>	Quatterman's Hedge-hyssop	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Helianthus eggertii</i>	Eggert's Sunflower	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Helianthus eggertii</i>	Eggert's Sunflower	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Helianthus eggerii</i>	Egger's Sunflower	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Helianthus eggerii</i>	Egger's Sunflower	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Helianthus eggerii</i>	Egger's Sunflower	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Severe	
<i>Helianthus eggerii</i>	Egger's Sunflower	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Helianthus eggerii</i>	Egger's Sunflower	Mismanaged roadsides and utilities	Transportation and Service Corridors	Roads and Railroads	Existing	Significant	Several populations occur along roadsides and utilities. Herbicide usage and inappropriate mowing along roadsides and utilities can impact these populations.
<i>Hexastylis contracta</i>	Southern Heartleaf	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Hexastylis contracta</i>	Southern Heartleaf	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Significant	
<i>Hexastylis contracta</i>	Southern Heartleaf	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Hexastylis contracta</i>	Southern Heartleaf	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	Invasive plants such as tree of heaven as well and also hemlock woolly adelgid.
<i>Hexastylis contracta</i>	Southern Heartleaf	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Possible	Significant	
<i>Hexastylis contracta</i>	Southern Heartleaf	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Leavenworthia exigua</i> var. <i>lachnieta</i>	Kentucky Gladiolus	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	Although thinning of canopy can be beneficial, excessive logging and soil disturbance can be detrimental to this species.
<i>Leavenworthia exigua</i> var. <i>lachnieta</i>	Kentucky Gladiolus	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Leavenworthia exigua</i> var. <i>lachnieta</i>	Kentucky Gladiolus	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Leavenworthia exigua</i> var. <i>lachnieta</i>	Kentucky Gladiolus	Lack of natural disturbances by large migrating ungulates	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Leavenworthia exigua</i> var. <i>lachnieta</i>	Kentucky Gladiolus	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Severe	
<i>Leavenworthia exigua</i> var. <i>lachnieta</i>	Kentucky Gladiolus	Commercial and industrial areas	Residential and Commercial Development	Commercial and Industrial Areas	Existing	Significant	
<i>Leavenworthia exigua</i> var. <i>lachnieta</i>	Kentucky Gladiolus	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Leavenworthia exigua</i> var. <i>lachnieta</i>	Kentucky Gladiolus	Mismanaged right of ways	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Significant	Several populations occur along roadsides and utilities. Herbicide usage and inappropriate mowing along roadsides and utilities can impact these populations.
<i>Marshallia pulchra</i>	Barbara's Buttons	Temperature extremes	Climate Change and Severe Weather	Climate and Severe Weather- Other	Possible	Severe	Heat waves and droughts.
<i>Marshallia pulchra</i>	Barbara's Buttons	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Severe	
<i>Marshallia pulchra</i>	Barbara's Buttons	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Marshallia pulchra</i>	Barbara's Buttons	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Marshallia pulchra</i>	Barbara's Buttons	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Marshallia pulchra</i>	Barbara's Buttons	Tourism and recreation areas	Residential and Commercial Development	Tourism and Recreation Areas	Possible	Significant	
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Droughts	Climate Change and Severe Weather	Droughts	Existing	Substantial	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Possible	Significant	
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Tourism and recreation areas	Residential and Commercial Development	Tourism and Recreation Areas	Existing	Significant	
<i>Monotropis odorata</i>	Sweet Pinesap	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Monotropis odorata</i>	Sweet Pinesap	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Monotropis odorata</i>	Sweet Pinesap	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Monotropis odorata</i>	Sweet Pinesap	woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Monotropis odorata</i>	Sweet Pinesap	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Mismanaged roadsides and utilities	Transportation and Service Corridors	Roads and Railroads	Existing	Severe	The only extant population is on a roadside.
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Severe	
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Severe	The one extant population is located along a popular trail.
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Droughts	Climate Change and Severe Weather	Droughts	Existing	Significant	
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Severe	
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Temperature extremes	Climate Change and Severe Weather	Temperature Extremes	Possible	Substantial	Heat waves.
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	Invasive plants such as <i>Lonicera maackii</i> as well as non native Euonymus scale (<i>Unaspis euonymi</i>).
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Phemeranthus calcaricus</i>	Limestone Farnflower	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Phemeranthus calcaricus</i>	Limestone Farnflower	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	Cattle grazing may have both positive and negative effects.
<i>Phemeranthus calcaricus</i>	Limestone Farnflower	Droughts	Climate Change and Severe Weather	Droughts	Existing	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Plemeranthus calcaricus</i>	Limestone Farnflower	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Plemeranthus calcaricus</i>	Limestone Farnflower	Problematic native species	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Significant	The native privet forms thickets and can become extremely dominant in areas surrounding the glades.
<i>Plemeranthus calcaricus</i>	Limestone Farnflower	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Plemeranthus calcaricus</i>	Limestone Farnflower	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Severe	
<i>Plemeranthus calcaricus</i>	Limestone Farnflower	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Plemeranthus calcaricus</i>	Limestone Farnflower	Mismanaged utilities	Transportation and Service Corridors	Roads and Railroads	Existing	Significant	There is a population within an TVA powerline.
<i>Physaria globosa</i>	Globe Bladderpod	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Physaria globosa</i>	Globe Bladderpod	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Physaria globosa</i>	Globe Bladderpod	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Physaria globosa</i>	Globe Bladderpod	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Physaria globosa</i>	Globe Bladderpod	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Woody encroachment	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Severe	
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Moderate	Cattle grazing has occurred at one private site and one DBNF site. A former Landowner incentive program project fenced cattle from both sites in 2006-2007.
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Gathering terrestrial plants	Biological Resource Use	Gathering Terrestrial Plants	Possible	Substantial	
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Droughts	Climate Change and Severe Weather	Droughts	Possible	Substantial	
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Significant	
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Problematic native species	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Significant	Competition and altering of habitat from native species such as <i>Lygodium palmatum</i> , <i>Dichanthelium microcarpon</i> , and woody species such as <i>Acer rubrum</i> can be problematic.
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Hydrologic changes	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	The habitat for this species is especially sensitive to changes in hydrology and not likely to withstand much alteration. Often times, changes in hydrology are a result of logging, development, or habitat changes in species composition and structure.
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Herbivory	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Pletanthera integrilabia</i>	White Fringeless Orchid	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	
<i>Polymnia laevigata</i>	Tennessee Leafcup	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Polymnia laevigata</i>	Tennessee Leafcup	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	
<i>Polymnia laevigata</i>	Tennessee Leafcup	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Polymnia laevigata</i>	Tennessee Leafcup	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Possible	Substantial	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Polymnia laevigata</i>	Tennessee Leafcup	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Polymnia laevigata</i>	Tennessee Leafcup	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Severe	Extreme events can cause excessive erosion or scouring of the streambed and lead to population decline.
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Possible	Significant	Aquatic invasives could become a problem at extant populations.
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Severe	
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Water pollution	Pollution	Pollution- Other	Existing	Significant	Suspended sediment and runoff from mining, logging, agriculture, and urban areas.
<i>Primula frenchii</i>	French's Shooting Star	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Primula frenchii</i>	French's Shooting Star	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Primula frenchii</i>	French's Shooting Star	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Primula frenchii</i>	French's Shooting Star	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	Damming of habitat along impounded rivers, such as rough river lake, has indirectly and in some cases, directly, damages populations and habitat.
<i>Primula frenchii</i>	French's Shooting Star	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Annual and Perennial Nontimber Crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Invasive Non-native/Alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Fire and Fire Suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Severe	
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Housing and Urban Areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Mismanaged roadsides and utilities	Transportation and Service Corridors	Roads and Railroads	Existing	Significant	
<i>Riparidosia hermaphrodita</i>	Virginia Mallow	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	
<i>Riparidosia hermaphrodita</i>	Virginia Mallow	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Riparidosia hermaphrodita</i>	Virginia Mallow	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Riparidosia hermaphrodita</i>	Virginia Mallow	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Riparidosia hermaphrodita</i>	Virginia Mallow	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Riparidosia hermaphrodita</i>	Virginia Mallow	mismanaged right of ways	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	
<i>Sabulina fortitralis</i>	Water Stitchwort	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	
<i>Sabulina fortitralis</i>	Water Stitchwort	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Sabulina fortitralis</i>	Water Stitchwort	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Sabulina fortinialis</i>	Water Stitchwort	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Schisandra glabra</i>	Bay Starvine	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Substantial	
<i>Schisandra glabra</i>	Bay Starvine	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Schisandra glabra</i>	Bay Starvine	Gathering terrestrial plants	Biological Resource Use	Gathering Terrestrial Plants	Possible	Moderate	Medicinal plant.
<i>Schisandra glabra</i>	Bay Starvine	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Schisandra glabra</i>	Bay Starvine	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Schisandra glabra</i>	Bay Starvine	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Schisandra glabra</i>	Bay Starvine	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Severe	
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Droughts	Climate Change and Severe Weather	Droughts	Existing	Substantial	
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Significant	
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Substantial	
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Hybridization with related native species	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Species and Genes- Other	Possible	Substantial	
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Schwalbea americana</i>	Chaffseed	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Schwalbea americana</i>	Chaffseed	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Schwalbea americana</i>	Chaffseed	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Schwalbea americana</i>	Chaffseed	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Severe	
<i>Schwalbea americana</i>	Chaffseed	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Schwalbea americana</i>	Chaffseed	Mismanaged roadsides and utilities	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Scutellaria saxatilis</i>	Rock Skullcap	Logging and Wood Harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Scutellaria saxatilis</i>	Rock Skullcap	Invasive Non-native/Alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	
<i>Silene ovata</i>	Ovate Catchfly	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Possible	Substantial	
<i>Silene ovata</i>	Ovate Catchfly	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Silene ovata</i>	Ovate Catchfly	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Silene ovata</i>	Ovate Catchfly	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Silene ovata</i>	Ovate Catchfly	Herbivory	Natural System Modifications	Natural Systems Modifications- Other	Existing	Substantial	
<i>Silene ovata</i>	Ovate Catchfly	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Silene ovata</i>	Ovate Catchfly	Mismanaged roadsides	Transportation and Service Corridors	Roads and Railroads	Existing	Severe	There is a roadside population that has been impacted by broadcast herbicide spraying.
<i>Silene regia</i>	Royal Catchfly	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Silene regia</i>	Royal Catchfly	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	Cattle grazing may have both positive and negative effects.
<i>Silene regia</i>	Royal Catchfly	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Silene regia</i>	Royal Catchfly	Lack of natural disturbances by large migrating ungulates	Natural System Modifications	Natural Systems Modifications- Other	Existing	Substantial	
<i>Silene regia</i>	Royal Catchfly	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Silene regia</i>	Royal Catchfly	Mismanaged right of ways	Transportation and Service Corridors	Roads and Railroads	Existing	Severe	Several populations occur along roadsides. Herbicide usage and inappropriate mowing along roadsides and utilities can impact these populations.
<i>Silphium lasiotense</i>	Appalachian Rosinweed	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Substantial	
<i>Silphium lasiotense</i>	Appalachian Rosinweed	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Silphium lasiotense</i>	Appalachian Rosinweed	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Silphium lasiotense</i>	Appalachian Rosinweed	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Silphium lasiotense</i>	Appalachian Rosinweed	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Silphium lasiotense</i>	Appalachian Rosinweed	Mismanaged right of ways	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Severe	
<i>Solidago albobiplosa</i>	White-haired Goldenrod	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Possible	Substantial	
<i>Solidago albobiplosa</i>	White-haired Goldenrod	Droughts	Climate Change and Severe Weather	Droughts	Existing	Significant	
<i>Solidago albobiplosa</i>	White-haired Goldenrod	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Significant	
<i>Solidago albobiplosa</i>	White-haired Goldenrod	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Severe	
<i>Solidago albobiplosa</i>	White-haired Goldenrod	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	Non native plants such as Japanese stilt grass, as well as hemlock woolly adelgid.
<i>Solidago albobiplosa</i>	White-haired Goldenrod	Pathogens and Microbes	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	Fungal rusts have been documented to impact viability and vigor.
<i>Solidago albobiplosa</i>	White-haired Goldenrod	Tourism and Recreation areas	Residential and Commercial Development	Tourism and Recreation Areas	Existing	Severe	
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Significant	
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Temperature extremes	Climate Change and Severe Weather	Temperature Extremes	Existing	Substantial	
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Tourism and recreation areas	Residential and Commercial Development	Tourism and Recreation Areas	Existing	Significant	
<i>Solidago faucibus</i>	Gorge Goldenrod	Annual and perennial nontimber crops	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Substantial	
<i>Solidago faucibus</i>	Gorge Goldenrod	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Solidago fauchus</i>	Gorge Goldenrod	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Solidago fauchus</i>	Gorge Goldenrod	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Substantial	
<i>Solidago fauchus</i>	Gorge Goldenrod	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Substantial	
<i>Solidago fauchus</i>	Gorge Goldenrod	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	
<i>Solidago shortii</i>	Short's Goldenrod	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Severe	Fescue conversion of habitat for grazing.
<i>Solidago shortii</i>	Short's Goldenrod	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Solidago shortii</i>	Short's Goldenrod	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Solidago shortii</i>	Short's Goldenrod	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Solidago shortii</i>	Short's Goldenrod	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Solidago shortii</i>	Short's Goldenrod	Lack of natural disturbances by large migrating ungulates	Natural System Modifications	Natural Systems Modifications- Other	Existing	Severe	
<i>Solidago shortii</i>	Short's Goldenrod	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Severe	
<i>Solidago shortii</i>	Short's Goldenrod	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	
<i>Solidago shortii</i>	Short's Goldenrod	Mismanaged roadsides and utilities	Transportation and Service Corridors	Roads and Railroads	Existing	Significant	
<i>Spiraea virginiana</i>	Virginia Spiraea	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Severe	
<i>Spiraea virginiana</i>	Virginia Spiraea	Temperature extremes	Climate Change and Severe Weather	Temperature Extremes	Possible	Severe	
<i>Spiraea virginiana</i>	Virginia Spiraea	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Significant	
<i>Spiraea virginiana</i>	Virginia Spiraea	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Spiraea virginiana</i>	Virginia Spiraea	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Spiraea virginiana</i>	Virginia Spiraea	Herbivory	Natural System Modifications	Natural Systems Modifications- Other	Possible	Substantial	
<i>Spiraea virginiana</i>	Virginia Spiraea	Tourism and recreation areas	Residential and Commercial Development	Tourism and Recreation Areas	Possible	Significant	
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Significant	
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Substantial	
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Mining and quarrying	Energy Production and Mining	Mining and Quarrying	Existing	Significant	Limestone quarries exist near populations and have negatively impacted at least one population.
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Mismanaged right of ways	Transportation and Service Corridors	Transportation and Service Corridors- Other	Existing	Significant	There are a few populations located on roadsides.
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Substantial	
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	There can be both positive and negative effects of logging.
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Significant	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Trifolium kentuckiense</i>	Kentucky Clover	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Trifolium kentuckiense</i>	Kentucky Clover	Droughts	Climate Change and Severe Weather	Droughts	Existing	Substantial	
<i>Trifolium kentuckiense</i>	Kentucky Clover	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Severe	
<i>Trifolium kentuckiense</i>	Kentucky Clover	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Trifolium kentuckiense</i>	Kentucky Clover	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Trifolium kentuckiense</i>	Kentucky Clover	Utility and service lines	Transportation and Service Corridors	Utility and Service Lines	Existing	Substantial	
<i>Trifolium reflexum</i>	Buffalo Clover	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Substantial	
<i>Trifolium reflexum</i>	Buffalo Clover	Habitat shifting and alteration	Climate Change and Severe Weather	Habitat Shifting and Alteration	Existing	Substantial	
<i>Trifolium reflexum</i>	Buffalo Clover	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Substantial	
<i>Trifolium reflexum</i>	Buffalo Clover	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Trifolium reflexum</i>	Buffalo Clover	Pathogens and Microbes	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Substantial	Powdery mildew.
<i>Trifolium reflexum</i>	Buffalo Clover	Fire and fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Trifolium reflexum</i>	Buffalo Clover	Lack of natural disturbances by large migrating ungulates	Natural System Modifications	Natural Systems Modifications- Other	Existing	Substantial	
<i>Trifolium reflexum</i>	Buffalo Clover	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Substantial	
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Livestock farming and ranching	Agriculture and Aquaculture	Livestock Farming and Ranching	Existing	Significant	Conversion of grazing lands to fescue.
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Logging and wood harvesting	Biological Resource Use	Logging and Wood Harvesting	Existing	Severe	
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Severe	
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Lack of natural disturbances by large migrating ungulates.	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Herbivory	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Housing and urban areas	Residential and Commercial Development	Housing and Urban Areas	Existing	Severe	
<i>Vitis rupestris</i>	Sand Grape	Storms and flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Substantial	
<i>Vitis rupestris</i>	Sand Grape	Temperature extremes	Climate Change and Severe Weather	Temperature Extremes	Possible	Substantial	
<i>Vitis rupestris</i>	Sand Grape	Recreational activities	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Vitis rupestris</i>	Sand Grape	Invasive non-native/alien species	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Vitis rupestris</i>	Sand Grape	Hybridization with related native species	Invasive and Other Problematic Species and Genes	Invasive and Other Problematic Species and Genes- Other	Existing	Substantial	This species has been shown to hybridize with a more common grape species.
<i>Vitis rupestris</i>	Sand Grape	Dams and water management/use	Natural System Modifications	Dams and Water Management/Use	Existing	Significant	
<i>Vitis rupestris</i>	Sand Grape	Woody encroachment	Natural System Modifications	Natural Systems Modifications- Other	Existing	Significant	
<i>Vitis rupestris</i>	Sand Grape	Tourism and recreation areas	Residential and Commercial Development	Tourism and Recreation Areas	Existing	Substantial	

APX 5.1.i Threats Identified for Reptile SGCN

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	Intentional mortality via human interaction.
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Wetland/hibernacula loss due to ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Road mortality	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Mining	Energy Production and Mining	Mining and Quarrying	Existing	Significant	Mining activities create sedimentation and water quality issues.
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Solar development	Energy Production and Mining	Renewable Energy	Possible	Significant	
<i>Apalone mutica mutica</i>	Midland Smooth Softshell	Ag Conversion of Habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	Habitat loss and population isolation.
<i>Apalone mutica mutica</i>	Midland Smooth Softshell	Nest loss due to flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Severe	
<i>Apalone mutica mutica</i>	Midland Smooth Softshell	Dredging along the Mississippi	Transportation and Service Corridors	Shipping Lanes	Existing	Severe	Deposit of dredged materials onto nesting grounds.
<i>Apalone mutica mutica</i>	Midland Smooth Softshell	Human intrusion	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Apalone mutica mutica</i>	Midland Smooth Softshell	Vegetative succession	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	
<i>Aspidozelis sexlineata</i>	Six-lined Racerunner	Fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	loss of habitat due to fire suppression and forest encroachment.
<i>Aspidozelis sexlineata</i>	Six-lined Racerunner	Reclamation activities associated with eroded and barren lands	Human Intrusions and Disturbance	Human Intrusions and Disturbance- Other	Existing	Significant	Habitat loss due to reclamation of eroded hillsides, gravel pits, quarries, and deer licks.
<i>Cemophora coccinea</i>	Scarletsnake	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Cemophora coccinea</i>	Scarletsnake	Fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Cemophora coccinea</i>	Scarletsnake	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Habitat loss via ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Loss of habitat due to wetland conversion to agricultural production.
<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Roadkill/movement barriers	Transportation and Service Corridors	Roads and Railroads	Existing	Severe	mortality events associated with highways throughout species range.
<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Nest predation from hogs	Invasive and Other Problematic Species and Genes	Invasive Non-native/Alien species	Existing	Significant	
<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Nest predation from native species	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Severe	Raccoon and skunk predation on nests.
<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Climate change impacts to sex ratios	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Significant	Climate change has the potential to impact sex ratios in eggs/nests.
<i>Chionophis kirtlandii</i>	Kirtland's Snake	Residential and industrial development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Chionophis kirtlandii</i>	Kirtland's Snake	Roadkill	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Chionophis kirtlandii</i>	Kirtland's Snake	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Chionophis kirtlandii</i>	Kirtland's Snake	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Crotalus horridus</i>	Timber Rattlesnake	Direct killing and pet trade/collection	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Crotalus horridus</i>	Timber Rattlesnake	Surface mining associated habitat loss	Energy Production and Mining	Mining and Quarrying	Existing	Substantial	
<i>Crotalus horridus</i>	Timber Rattlesnake	Road mortality	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Crotalus horridus</i>	Timber Rattlesnake	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Crotalus horridus</i>	Timber Rattlesnake	Human disturbance/intrusion	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Crotalus horridus</i>	Timber Rattlesnake	Fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Habitat loss due to ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Roadkill	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Ag conversion of habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	Habitat loss and population isolation.
<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Nest loss due to flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Severe	
<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Dredging along the Mississippi	Transportation and Service Corridors	Shipping Lanes	Existing	Severe	Deposit of dredged materials onto nesting grounds.
<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Human disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Vegetative succession	Natural System Modifications	Other Ecosystem Modifications	Existing	Significant	
<i>Graptemys pseudogeographica kohnii</i>	Northern False Map Turtle	Ag conversion of habitat	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Significant	habitat loss and population isolation.
<i>Graptemys pseudogeographica kohnii</i>	Northern False Map Turtle	Nest loss due to flooding	Climate Change and Severe Weather	Storms and Flooding	Existing	Severe	
<i>Graptemys pseudogeographica kohnii</i>	Northern False Map Turtle	Dredging along the Mississippi	Transportation and Service Corridors	Shipping Lanes	Existing	Severe	Deposit of dredged materials onto nesting grounds.
<i>Graptemys pseudogeographica kohnii</i>	Northern False Map Turtle	Human disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Graptemys pseudogeographica kohnii</i>	Northern False Map Turtle	Vegetation succession	Natural System Modifications	Other Ecosystem Modifications	Existing	Severe	
<i>Kinosternon subrubrum</i>	Eastern Mud Turtle	Habitat loss via ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Loss of habitat due to wetland conversion to agricultural production.
<i>Kinosternon subrubrum</i>	Eastern Mud Turtle	Roadkill/movement barriers	Transportation and Service Corridors	Roads and Railroads	Existing	Severe	Mortality events associated with highways throughout species range.
<i>Kinosternon subrubrum</i>	Eastern Mud Turtle	Nest predation from hogs	Invasive and Other Problematic Species and Genes	Invasive Non-native/ Alien species	Existing	Significant	
<i>Kinosternon subrubrum</i>	Eastern Mud Turtle	Nest predation from native species	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Severe	Raccoon and skunk predation on nests.
<i>Kinosternon subrubrum</i>	Eastern Mud Turtle	Climate change impacts to sex ratios	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Significant	Climate change has the potential to impact sex ratios in eggs/nests
<i>Lampropeltis elapsoides</i>	Scarlet Kingsnake	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Lampropeltis elapsoides</i>	Scarlet Kingsnake	Fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Lampropeltis elapsoides</i>	Scarlet Kingsnake	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Climate change impacts to sex ratios	Climate Change and Severe Weather	Climate Change and Severe Weather- Other	Possible	Significant	Climate change has the potential to impact sex ratios in eggs/nests.
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Accidental fishing catches	Biological Resource Use	Fishing and Harvesting Aquatic Resources	Existing	Significant	Incidental catch of individuals via bank lines and trot lines.
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Conversion of wetlands to agriculture	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Human disturbance	Human Intrusions and Disturbance	Recreational Activities	Existing	Substantial	
<i>Nerodia cyclopten</i>	Mississippi Green Watersnake	Habitat loss via ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Loss of habitat due to wetland conversion to agricultural production.

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Nerodia cycloptor</i>	Mississippi Green Watersnake	Roadkill/movement barriers	Transportation and Service Corridors	Roads and Railroads	Existing	Severe	Mortality events associated with highways throughout species range.
<i>Nerodia cycloptor</i>	Mississippi Green Watersnake	Nest predation from native species	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Severe	Raccoon and skunk predation on nests.
<i>Nerodia cycloptor</i>	Mississippi Green Watersnake	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Nerodia cycloptor</i>	Mississippi Green Watersnake	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Wetland loss due to ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Surface mining	Energy Production and Mining	Mining and Quarrying	Existing	Significant	
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Roadkill	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Nerodia fasciata confinis</i>	Broad-banded Watersnake	Habitat loss via ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	Loss of habitat due to wetland conversion to agricultural production.
<i>Nerodia fasciata confinis</i>	Broad-banded Watersnake	Roadkill/movement barriers	Transportation and Service Corridors	Roads and Railroads	Existing	Severe	Mortality events associated with highways throughout species range.
<i>Nerodia fasciata confinis</i>	Broad-banded Watersnake	Nest predation from native species	Invasive and Other Problematic Species and Genes	Problematic Native Species	Existing	Severe	
<i>Nerodia fasciata confinis</i>	Broad-banded Watersnake	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Nerodia fasciata confinis</i>	Broad-banded Watersnake	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard	Habitat loss to ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard	Loss of habitat due to forest encroachment	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard	Pesticide use and impacts to prey availability	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Substantial	
<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard	Nests impacted by hogs	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Substantial	
<i>Pantherophis guttatus</i>	Red Cornsnake	Habitat loss due to fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Pantherophis guttatus</i>	Red Cornsnake	Roadkill	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Pantherophis guttatus</i>	Red Cornsnake	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Pantherophis guttatus</i>	Red Cornsnake	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	fire suppression and forest encroachment	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	Pet trade and general killing	Biological Resource Use	Hunting and Collecting Terrestrial Animals	Existing	Severe	
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	hog impacts	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Substantial	
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	Roadkill	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Plesiodon anthracinus</i>	Coal Skink	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Plesiodon anthracinus</i>	Coal Skink	Fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Substantial	

Scientific Name	Common Name	Threat Title	Threat Category	Threat Subcategory	Threat Type	Threat Category	Threat Comments
<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink	Habitat loss due to ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink	Loss of habitat due to forest encroachment	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	
<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink	Nests impacted by hogs	Invasive and Other Problematic Species and Genes	Invasive Non-native/Allen species	Existing	Substantial	
<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink	Fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Sistrurus mliarius streckeri</i>	Western Pygmy Rattlesnake	Fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Significant	
<i>Sistrurus mliarius streckeri</i>	Western Pygmy Rattlesnake	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Substantial	
<i>Sistrurus mliarius streckeri</i>	Western Pygmy Rattlesnake	Direct killing and pet trade/collection	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Fire suppression	Natural System Modifications	Fire and Fire Suppression	Existing	Severe	Loss of habitat due to fire suppression and forest encroachment.
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Reclamation activities associated with eroded and barren lands	Human Intrusions and Disturbance	Human Intrusions and Disturbance- Other	Existing	Significant	Habitat loss due to reclamation of eroded hillsides, gravel pits, quarries, and deer ticks.
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Roadkill	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Development	Residential and Commercial Development	Residential and Commercial Development- Other	Existing	Significant	
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	wetland loss to ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	Roadkill	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	
<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Wetland loss due to ag conversion	Agriculture and Aquaculture	Annual and Perennial Nontimber Crops	Existing	Severe	
<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Roadkill	Transportation and Service Corridors	Roads and Railroads	Existing	Substantial	
<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Snake fungal disease	Invasive and Other Problematic Species and Genes	Pathogens and Microbes	Existing	Significant	
<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Direct killing by humans	Biological Resource Use	Biological Resource Use- Other	Existing	Severe	

APX 5.2 Impacts and Strategies for Addressing Climate Change

Overview

Global climate change compounds existing threats to Kentucky's species and habitats of conservation concern. The Environmental Protection Agency (EPA) predicts the southeastern United States will be subject to climate change impacts including water resource issues, impacts on human health, impacts to agricultural systems, as well as ecosystem impacts. Considering these threats, biologists and land managers have begun to plan for these negative impacts.

Over the past decade, changing climate has resulted in higher frequency of flooding, more frequent droughts, reduction of crop yields, and concern for competing demands for water in the Ohio, Tennessee, and Cumberland Rivers. A wide range of shifting climate impacts have already been observed including changing temperatures, changing water regimes, shifts in rain/snow events, shifts in surface and groundwater levels, and changing ocean systems (including strengthening storms and sea level rise). Kentucky's SWAP adopts a strategy of increasing resilience through direct actions which will increase the probability that species and habitats of conservation concern will adapt to impacts of climate change throughout Kentucky. Below are three specific goals of Kentucky's Climate Change Plan:

Goal One: Conserve and restore resilient, connected, and biodiverse ecosystems in Kentucky; sustain social-ecological systems and functions

Goal Two: Create or protect 'key' or 'concentrating' habitats and climate resilient priorities

Goal Three: Implement nature-based solutions to mitigate impacts of climate change while benefitting SGCN

Potential Impact of Changing Climates to Kentucky SGCN and their habitats

During this revision, 527 SGCN were identified in 9 taxonomic groups. Some of these species are SGCN as they have experienced significant population declines over the past three decades, some require specialized habitats or breeding locations, some are endemics with very small distributions in Kentucky, and some of these species are of concern because non-native invasive species or diseases threaten population persistence.

Habitat alteration was determined to be a significant threat to Kentucky's SGCN, whether the result of residential and commercial development, agriculture and ranching, energy production and mining, transportation and service corridors, natural resource use/logging,

or natural system modification by dams or stream channelization. Any of these threats have the potential to cause major habitat changes which could result in population declines of SGCN. While it is important to note that human/nature/climate interactions are extremely difficult to forecast, climate change has the potential to exacerbate existing conservation threats by altering both terrestrial and aquatic systems.

It is difficult to predict how climate change may impact many SGCN. It is quite likely that the impacts of other identified threats would be exacerbated for many species. For some SGCN thought to be glacial relicts to Kentucky (like the Virginia Big-Eared Bat or Long-Tailed Shrew) or species with the southern extent of their range occurs in Kentucky (like the Burbot or the Eastern Red-Backed Salamander) a warming climate could lead to extirpation from the state. Other SGCN with the northern extent of their range currently in Kentucky (like the cotton mouse or Southern Brook Lamprey) could experience range expansion. Some southern species have already demonstrated range expansions throughout Kentucky over the past few decades (i.e. Nine-Banded Armadillo and Evening Bat). Similarly, invasive species common to the southern U.S. (such as imported fire ants) will likely continue to spread northward, potentially resulting in a negative impact to small mammal, reptile, and amphibian populations.

Of the 1,841 threats identified, 96 threats were associated with Climate Change and Severe Weather. Roughly 65% of the threats associated with Climate Change and Severe Weather were considered Severe or Significant by the Taxa Teams. Taxonomic groups identified most often as being impacted by climate change were plants, birds, and fishes. Further, when considering the direct impacts of energy production to SGCN, 69 threats were identified.

A Strategy of Resilience: Kentucky's Climate Change Action Items

During this revision, actions were outlined to enhance ecosystem resilience to climate change and to promote nature-based solutions which improve habitats for SGCN while directly mitigating impacts of climate change. The following actions seek to restore and maintain habitats and populations of conservation concern, increase the ability of populations to adapt to climate change-driven stressors, reduce known stressors such as habitat fragmentation and habitat loss and threats of invasive species and disease.

Goal One: Conserve and restore functioning resilient, connected, and biodiverse ecosystems in Kentucky; sustain social-ecological systems and functions.

By conserving and restoring climate resilient ecosystems, Kentucky will harbor healthier SGCN populations. In turn, these populations will be able to persist

despite environmental threats resulting from global climate change. Regional conservation actions which improve the capacity of both ecological and human systems to deal with the impacts of climate change will be optimally beneficial. (Figures 1-3)

Action 1a. Fully implement Kentucky's Wildlife Action Plan

Action 1b. Utilize Natural Resources Conservation Service (NRCS) programs and other funding sources to protect headwater streams and conserve and restore riparian buffers.

Action 1c. Facilitate and assist with the development of Kentucky's Prescribed Fire Council and with the goals and objectives identified by this group.

Action 1d. Create and implement habitat improvement teams on both private and public lands in Kentucky.

Action 1e. Create early successional habitats on mitigated minelands to benefit grassland species such as the Grasshopper Sparrow (*Ammadramus savannarum*), Henslow's Sparrow (*Ammadramus henslowii*), Northern Bobwhite (*Colinus virginianus*), Coal Skink (*Plestiodon anthracinus*), American Woodcock (*Scolopax minor*), etc.

Action 1f. Implement early detection and rapid response programs for non-native invasive species such as Cogongrass, fire ants, and Asian Carp.

Action 1g. Implement early detection and rapid response programs for wildlife disease threats (e.g., Chytrid Fungus, *Batrachochytrium dendrobatidis*).

Action 1h. Improve the quality of existing habitats to decrease the likelihood of invasive species becoming established.

Action 1i. Implement the Kentucky Department of Fish and Wildlife Resources Quail Restoration Plan in addition to managing for other grassland birds and pollinators.

Action 1j. Implement the Northern Bobwhite Conservation Initiative Quail Plan in addition to managing for other grassland birds and pollinators.

Action 1k. Implement freshwater adaptation approaches to enable aquatic ecosystems to provide for both human and wildlife needs in the face of changing climates (e.g., invest in applied research on the impacts of climate change on specific ecosystems and link adaptation strategies to this research).

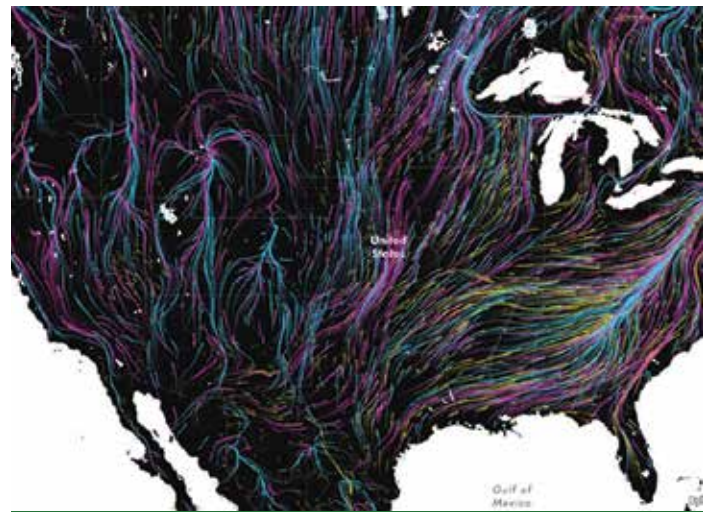


Figure 1. Critical Climate Migration Corridors for North American Amphibians, Birds, and Mammals. The Central Appalachians are critically important for climate migration.

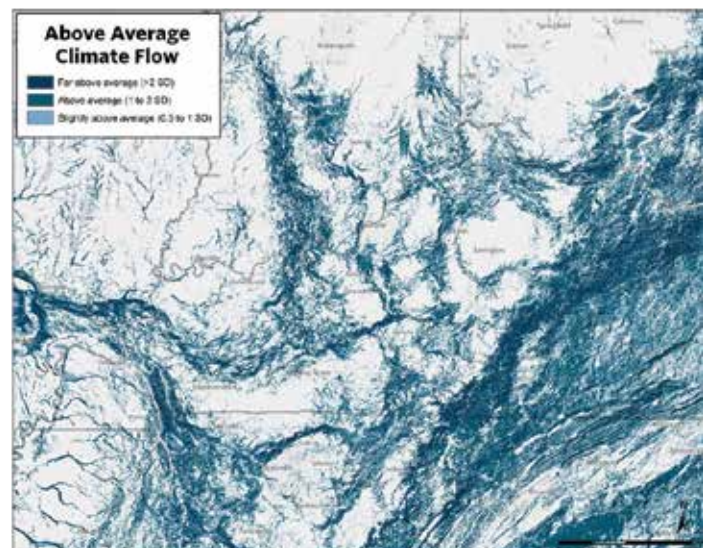


Figure 2. Climate Flow Zones are the most important areas for safeguarding biodiversity because they contain known locations of unique communities and rare species, yet also have large areas of intact habitats, allowing populations to move and shift over time.

Goal Two: Create or protect “key” habitats and climate resilient priorities (Figures 5-7). “Key” habitats often harbor a high proportion of individuals for certain species. For example, a Priority 1 hibernacula for the federally listed Indiana Bat may harbor greater than 25% of Kentucky's Indiana bat population in the winter months. Protecting these types of habitats is vital to long-term population persistence of multiple SCGN (Figures 1-3).

Action 2a. Identify and protect refugia and concentrating habitats for SGCN, particularly subterranean systems and breeding areas. Identify and protect climatic refugia and associated biodiversity. ‘Climatic refugia’ are areas that are least likely to undergo significant climate induced changes.

Action 2b. Restore stream and river channels utilizing mitigation Fees-in-lieu-of (FILO) and other funding. Remove aquatic barriers for dispersal including dams and improperly constructed culverts, where applicable.

Action 2c. Create/restore breeding habitats for species for which breeding habitats are limiting. Implement translocation programs for these species if necessary for population persistence.

Action 2d. Facilitate Safe Harbor Agreements on private lands in Kentucky housing key or concentrating habitats.

Action 2e. Restore original air flow patterns in caves with evidence of large bat populations prior to human modification. Restoration practices may include creating air dams to cool caves and/or opening sink holes that have been filled with debris or human garbage.

Goal Three: Implement nature-based solutions to mitigate impacts of climate change while benefiting SGCN. Prioritizing improvement of habitats for SGCN while directly mitigating climate change with nature-based solutions will deliver high conservation impact.

Action 3a. Evaluate feasibility and partner with state, federal, and private entities where appropriate to scale conservation using ecosystem service markets focused on carbon sequestration (Figure 4).

Action 3b. Conserve, restore, and protect Kentucky floodplains habitats within the Mississippi Basin by promoting floodplain restoration as a Nature-Based Climate Solution versus hard infrastructure solutions to increased flood risk (e.g., levees, water control structures). Floodplain conservation achieves stacking benefits of nutrient reduction, flood attenuation, and benefits to SGCN; these floodplain conservation actions have an impact to greater objectives in the Mississippi River Basin and Gulf of Mexico.

Action 3c. Evaluate and implement high potential agricultural initiatives to benefit early successional and grassland SGCN which provide increased habitat while also leveraging carbon markets for in-field and edge-of-field conservation agriculture practices.



Figure 3. Climate resilient areas in Kentucky. This network represents areas of confirmed biodiversity which are resilient due to prevalence of intact natural habitats. Larger areas of natural habitat are considered ‘diffuse flow zones’ while smaller areas are considered ‘concentrated flow zones’. Resilient lands are lands where high microclimatic diversity and low levels of human modification provide species with connected, diverse conditions they will need to persist and adapt to changing regional climates.

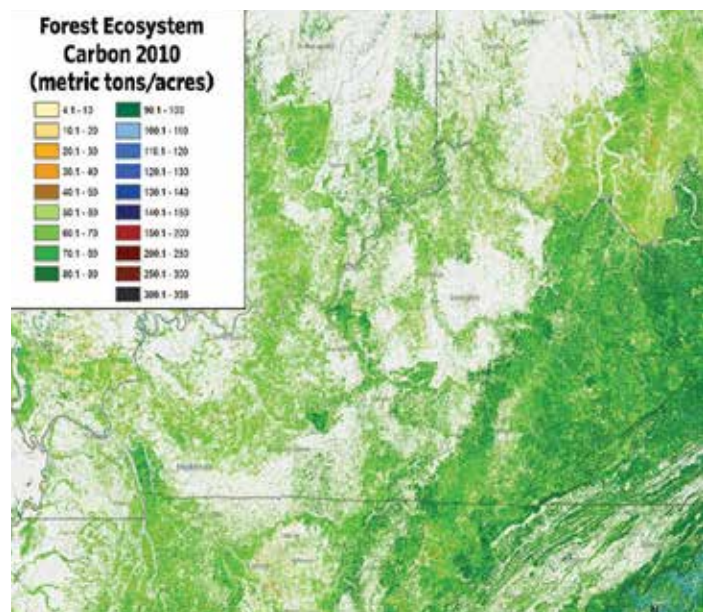


Figure 4. Central Appalachian forests have globally significant capacity to sequester carbon through protection and improved forest management.

Conclusion

In addition to existing threats such as habitat loss and fragmentation, global climate change has the potential to increase stressors to fish and wildlife populations and ecosystems in Kentucky. One objective of the STWG program is to prevent additional species from becoming federally listed under the Endangered Species Act. If appropriately funded, actions outlined in Kentucky's Climate Change Plan and Kentucky's SWAP would increase the resilience of our resident fish and wildlife populations in the face of climate change and will increase the likelihood of survival and recruitment of these populations. At current levels of funding (less than 1 million dollars per year in Kentucky), Kentucky will not be able to effectively implement this plan. The three goals comprising this Climate Change Plan and the goals of the SWAP as a whole would require far greater funding than the current level. Land managers and biologists across the nation realize that long-term conservation of biodiversity requires corridors and intact habitat.

To effectively identify and conserve high-quality fish and wildlife corridors in Kentucky, we are in desperate need of funding and spending authority for land acquisition, conservation easements, and habitat restoration practices. In the absence of adequate funding for Kentucky's SWAP and Climate Change Plan, Kentucky's natural resources will continue to be degraded and fragmented and fish and wildlife populations will continue to decline.

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CHAPTER 6: HABITAT AND SPECIES MONITORING

Monitoring Kentucky's Species of Greatest Conservation Need (SGCN) will involve collection and analysis of data across varying geographic and temporal scales while also being focused on both population and habitat assessments. Complexity for such monitoring efforts is increased when considering the different types of data collection necessary to monitor for SGCN and the availability of resources required to conduct scientifically robust data collection. Development of an SGCN monitoring plan was segmented into data collection and is presented below.

Habitat Monitoring

Each Species of Greatest Conservation Need is reliant upon a suite of specific environmental conditions and resources to survive and persist. To properly analyze Kentucky's habitat availability, habitat types are broadly partitioned into terrestrial habitat monitoring and aquatic habitat monitoring.

Terrestrial Habitat Monitoring

Kentucky encompasses over 40,000 square miles of surface area. Monitoring such a large area directly, and in

detail, is impossible and is outside of the scope of a State Wildlife Action Plan. However, remote collection of data, at scale, to allow for analysis of trends in habitat change throughout the state is feasible and can be informative. In some circumstances, detailed and direct monitoring of critical habitats, that are either rare or are disproportionately utilized, is warranted.

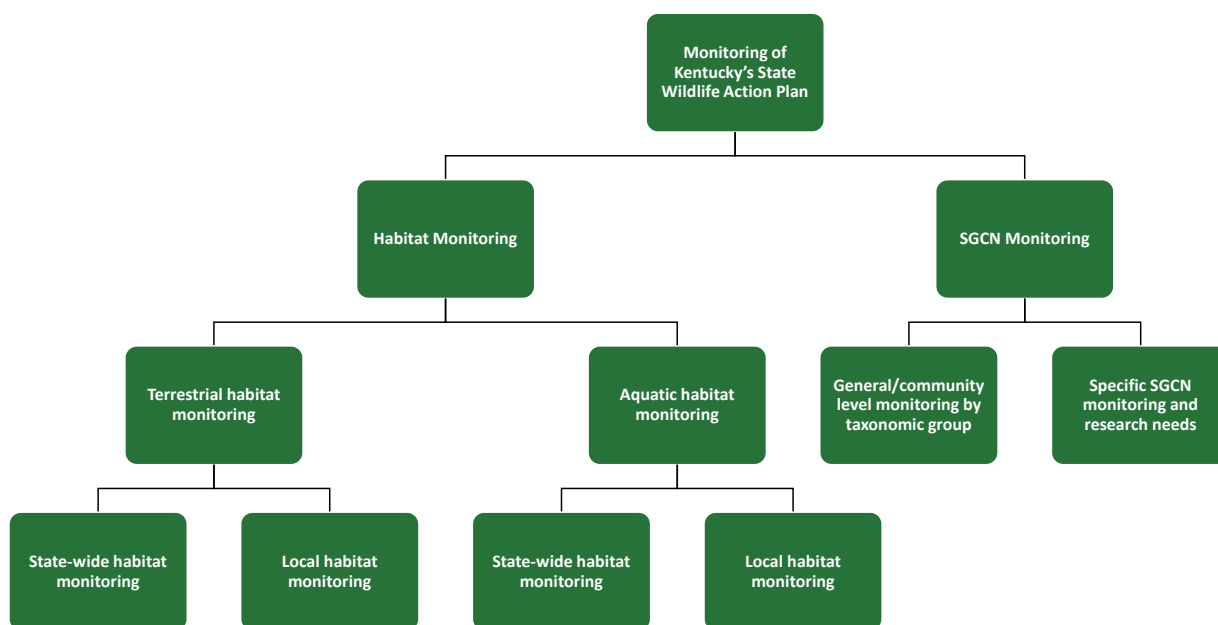
Terrestrial habitat monitoring can be segmented into two projects, state-wide habitat monitoring and local habitat monitoring.

Statewide Terrestrial Habitat Monitoring

Utilization of remote sensing techniques, particularly the collection and analysis of georeferenced light detection and ranging (LIDAR), aerial photography, and simultaneous multi-spectral satellite imagery allows for comparisons of habitats (and habitat changes) across time. These data are readily available in the public domain for analysis.

For many of Kentucky's terrestrial SGCN, habitat preferences were assigned to the categorized GAP/ LANDFIRE Terrestrial Ecosystems dataset from 2011. This project was initiated primarily to delineate Conservation Opportunity Areas (see Chapter 7) by identifying areas of Kentucky with a disproportionately high number of SGCN

SWAP Monitoring Tree



species observations and habitat availability. However, this dataset also provides a baseline by which future remote sensing datasets may be compared. This will allow for changes to SGCN habitat availability to be estimated across time as future datasets become available.

A similar project was recently completed by the Kentucky Department of Fish and Wildlife Resources specific to the loss of grassland habitat in eastern Kentucky. In a 16-county area in southeast Kentucky, according to available remote sensing data, from 2011-2019 open land/grassland habitats decreased from 574,356 acres to 257,711 while shrub dominated habitat increased from 20,561 to 100,051 acres. This conversion of grassland to shrubland (typically dominated by Autumn Olive) resulted in a corresponding loss of vital habitat for elk as well as many bird and small mammal SGCN. Habitat management, in the form of prescribed fire, was initiated on nearly 4,000 acres of land where shrub encroachment was identified utilizing remote sensing technology.

State-wide analyses to better identify changes in terrestrial habitats for SGCN should be conducted given the data collected as a part of this SWAP revision. Ultimately, utilizing remote sensing to monitor terrestrial habitats is one of the only practical methods available given the limited funds available.

Local-scale Terrestrial Habitat Monitoring

Vegetation monitoring is the practice of collecting species and habitat data over the course of multiple years, which facilitates analysis to identify population trends, detect changes to overall habitat conditions, make conservation assessments, and evaluate progress toward management objectives. In Kentucky, monitoring natural communities is led by OKNP in partnership with other state and federal agencies, and is integrated into multiple OKNP conservation programs.

Many of OKNP plant monitoring programs guide our management techniques to maintain healthy populations of SGCN and conserve the species richness, quality, and overall biodiversity of our remnant grasslands. Coordination between biologists and land managers ensures that management decisions are tied to site-specific monitoring data. A data-driven understanding of how management actions affect restoration and recovery efforts helps to inform decisions on state nature preserves and provides guidance for managers of public and private lands throughout Kentucky to preserve our natural heritage for future generations.

OKNP plant conservation programs are comprised of numerous projects for which over 200 long term monitoring plots have been established to assess trends and management objectives. These plots have been installed on state (including 17 OKNP natural areas)

and federal lands across Kentucky and capture long and short-term trend data for 85 rare plants and 13 rare natural communities located in wetlands grassland and forests. Most of these plots are sampled using the Carolina Vegetation Survey methodology, with a smaller number of plots using standard belted transects, point-line intercept transects, or customized monitoring protocols. Ultimately, this terrestrial habitat monitoring approach allows for data collection and analysis for not only plant SGCN but also for animal SGCN that rely upon these areas for habitat as well.

Beyond simply monitoring rare plant species, monitoring their surrounding habitat is critical for conservation efforts, because most rare plants are tightly associated with rare and high-quality natural communities. Approximately 60% of rare plants in Kentucky are associated with habitats that require some level of natural disturbance to persist, such as a deep soil prairie maintained with wildfire, or an isolated wetland maintained by beavers and old growth tip up mounds. The quality and integrity of the associated habitat for SCCN is directly linked to the recovery of the species. Focusing on these remnant habitats often benefits multiple SGCN species simultaneously.

Although OKNP and partners administer programs devoted to monitoring rare plants and high-quality natural communities in Kentucky, the majority of state listed/SGCN plants and state listed natural communities are not included in monitoring programs due to insufficient resources and staff. If dedicated resources were increased, these monitoring programs would be able to expand their scope to focus on additional priority SGCN and state listed plants, and more detailed data collection, analysis, and significant research could be conducted and shared with natural areas managers for the adaptive management process.

Habitat monitoring on Wildlife Management Areas (WMA's), managed by KDFWR, also provides insight into management of SGCN on publicly owned land. WMA's are classified into three tiers based on manage intensity.

High Management Level WMA's are continually managed and typically have onsite staff, infrastructure, marked access sites and parking lots. These areas tend to be larger and are either owned or leased long-term by the department.

Moderate Management Level WMA's are not as intensively managed, and staff are typically not onsite. Management is limited to habitat and maintenance through prescribed fire, mowing, upkeep of access sites and boundaries and long-term habitat work such as forest stand improvements or wetland development and manipulation.

Low Management Level WMA's are typically remote and receive little or no active management. Practices are limited to general maintenance and marking boundaries, though some long-term habitat work may be ongoing.

While active management projects vary across WMA's, habitat monitoring continues to be an important component of land management. A High and Moderate Level WMA's, habitat monitoring would be associated with data collection pre and post management treatment. For Low Management Level WMA's, habitat monitoring would be associated with surveys for invasive species encroachment.

Aquatic Habitat Monitoring

Kentucky has over 90,000 miles of streams and 45 major lakes distributed across thirteen major river basins. At current funding levels, implementation of a monitoring plan for Kentucky's aquatic habitats is precluded at a basin-wide level. Instead, utilizing external capacity building via partnerships with other governmental organizations will be relied upon. Limited aquatic habitat monitoring at the local/sub-basin level can be implemented as a component of habitat restoration projects.

Statewide Aquatic Habitat Monitoring

As a part of its obligations under the Clean Water Act, the Kentucky Division of Water has conducted surface water monitoring throughout the state for over 40 years. A wetland monitoring program was initiated in 2010. This statewide monitoring program is focused on the collection and analysis of data to determine if the water quality is protective of human health while supporting healthy aquatic communities. Data collection programs include Ambient Rivers Monitoring, Ambient Lakes Monitoring, Intensive Survey Monitoring (i.e. Total Maximum Daily Load or TMDL), Probabilistic Stream Bio-assessment Monitoring, Reference Reach Monitoring, Fish Tissue Monitoring, and Wetland Monitoring. While these programs were established to provide information related to the earlier mentioned priorities, the collected data are useful for SGCN habitat monitoring across Kentucky. Given the magnitude of the dataset available, and the repeated sampling at established sites across multiple decades, utilization of these data allows for inferences to be made regarding changes to aquatic SGCN habitats.

Developing and maintaining a relationship that allows for continued data exchange is vital to implementation statewide aquatic habitat monitoring. Accessing and analyzing data collected by the Kentucky Division of Water in areas where SGCN reside should be planned as funding levels allow.

Local-scale Aquatic Habitat Monitoring

Focused local-scale aquatic habitat monitoring allows for more refined analysis of habitat availability and quality. When coupled with habitat restoration, local-scale aquatic habitat monitoring can provide an indication of the benefits

of restoration actions for SGCN.

The Kentucky Department of Fish and Wildlife Resources (KDFWR) utilizes the Stream Team Program to conduct stream and wetland restoration projects throughout the state. These projects, conducted as an offset to stream and wetland impacts associated with development within a particular watershed, are typically focused on repairing eroding/unstable streams or restoring hydrologic connectivity to drained wetlands. Prior to construction, an intense analysis of the stream (including biological and habitat data collection) is conducted. Post construction, monitoring of the site is conducted annually for a minimum of five years.

For projects conducted by the Stream Team Program in areas where SGCN may be encountered, pre and post construction monitoring data can be utilized to monitor specific changes to aquatic habitats. Engaging with the Stream Team Program to collect and analyze data as relevant to SGCN should be planned as funding allows.

Monitoring Species of Greatest Conservation Need

Monitoring SGCN populations is vital to adaptive management and future revisions of the SWAP. Monitoring can be segmented into general/community level monitoring conducted (or needed) for each taxonomic group or the monitoring and research needs of particular species. A complete list of research and monitoring needs by species is provided in the Apx 6.1a-6.1i. An overview of monitoring needs by each taxonomic group considered in this SWAP revision is found below.

Amphibians

Information gathered by general sampling and targeted species surveys by the state herpetologist is used to monitor amphibian SGCN in Kentucky. Occurrence data from other sources is also tabulated, reviewed, analyzed, and incorporated into the Kentucky Fish and Wildlife Information System (KFWIS). Some of these sources include KDFWR field personnel, biologists from various other state and federal agencies, members of the Kentucky Herpetological Society, scientific reports and publications, data from preserved amphibians stored in museums and university collections, data reported by scientific and educational collection permit holders (consulting firms, university professors, and graduate students), and observations reported to KDFWR by members of the overall herpetological community and the general public.

Effectively monitoring Kentucky's 25 amphibian SGCN will require the use of a variety of known field techniques coupled with the development and implementation of new survey and inventory methods. Among these are

coverboard arrays, evening on-foot flashlight surveys along steep slopes, cliffs, and rock outcrops, voice surveys for frogs at potential breeding locations, larval surveys using dipnets and minnow traps, and the collection of water samples for eDNA analysis for aquatic larvae and adults. Targeted surveys at fixed locations with repeated visits will be needed to collect presence-absence and numerical data that will allow KDFWR to detect changes in distribution and abundance over time and in some cases evaluate the effectiveness of management activities on amphibian species and communities.



Snorkel surveys to locate Eastern hellbender salamanders have given partners an opportunity to collect eggs, rear young in captivity, and restock historically occupied streams. Monitoring of these release sites is a high priority to document survivorship of released animals. Photo: John MacGregor

Category	Species Included	Approach
Data Deficient Amphibians	Unisexual Ambystoma	Use molecular methods to determine distribution; each of these has a widespread and morphologically identical sibling species occurring in Kentucky
	Blanchard's Cricket Frog	
	Mississippi Slimy Salamander	
Significant decline in large portion of Kentucky range	Northern Crawfish Frog	Evening voice surveys at known and potential breeding sites; egg mass counts and tadpole monitoring at breeding ponds
	Northern Leopard Frog	
Significant general decline across whole Kentucky range	Midland Mud Salamander	Larval surveys in seeps, springs, and small streams; possible use of eDNA methodology
Significant regional declines	Northern Dusky Salamander	Surveys for adults throughout known range using appropriate field techniques.
	Black Mountain Salamander	
	Cumberland Plateau Salamander	
Very rare and/or difficult to find or track	Three-toed Amphiuma	Eastern Hellbender and Three-toed Amphiuma: possible use of eDNA followed by aquatic trapping.
	Eastern Hellbender	
	Yellow-spotted Woodland Salamander	Yellow-spotted Woodland Salamander: night searches along outcrops and steep slopes.
	Plains Leopard Frog	Plains Leopard Frog: visual searches by road, on foot.
Very limited ranges in Kentucky but doing well where regularly tracked	Barking Treefrog	Barking Treefrog: voice surveys at known and potential breeding sites; tadpole monitoring at selected breeding ponds; fund or implement a telemetry study to determine habitat use by adults when they are away from breeding ponds; fund or implement a molecular study to evaluate the potential genetic distinctness of the isolated Kentucky population.
	Gray Treefrog	Gray Treefrog (<i>Hyla versicolor</i>): voice surveys at known and potential breeding sites; determine degree if hybridization with sympatric Cope's Gray Treefrogs (<i>Hyla chrysoscelis</i>).
	Three-lined Salamander	Three-lined Salamander: monitor adults and larvae from both populations in streams, springs, and wetland habitats; evaluate potential hybridization with Long-tailed Salamanders in SE Calloway County.
	Red-backed Salamander	Red-backed Salamander: monitor adults from both known populations in upland forests; monitor loss of occupied habitat due to rapid development; search steep forested slopes from Campbell County eastward to search for new isolated colonies.

Category	Species Included	Approach
Potentially stable in Kentucky	Bird-voiced Treefrog	Bird-voiced Treefrog: conduct voice surveys at known and potential sites; investigate potentially extirpated populations in Ballard, Livingston (Black Pond), & Fulton (Reelfoot Lake NWR) counties.
	Eastern Spadefoot	Eastern Spadefoot: monitor known breeding sites for tadpoles.
	Streamside Salamander	Streamside Salamander and Mole Salamander: larval surveys at known and likely breeding sites.
	Mole Salamander	Green Salamander: daytime searches to check crevice occupation along cliffs, rock outcrops, and isolated boulders.
	Green Salamander	Spotted Dusky Salamander: search for adults and nests along suitable streams and wetland edges.
	Spotted Dusky Salamander	

Birds

The monitoring of bird populations in Kentucky is accomplished through a few different programs at KDFWR. The Nongame Avian Monitoring Program handles the monitoring of landbirds (raptors, songbirds, nightjars, corvids, etc.), the Migratory Bird Program is tasked with monitoring waterfowl, wading birds, shorebirds and marshbirds, the Small Game Program monitors Northern Bobwhite and the Turkey-Grouse Program monitors Ruffed Grouse. Nationally coordinated monitoring efforts such as the Breeding Bird Survey and Christmas Bird Count also provide important information on Kentucky birds. Multi-state working groups guide monitoring efforts for select species of concern (e.g., Loggerhead Shrike, Golden-winged Warbler, etc.) Mammoth Cave National Park, Clark's River National Wildlife Refuge and the Daniel Boone National Forest also collect data on birds. Occurrence data from all these sources is tabulated, reviewed, analyzed, and incorporated into the Kentucky Fish and Wildlife Information System (KFWIS).



Long-term mist-netting for songbirds is conducted at 3 locations in Kentucky to measure vital rates for bird SGCN. Photo: KDFWR

Species or Species Group	Project Title	Project Description	Timeline	Geographic Scope	Agency or Organization Leads
Songbirds	Partners in Flight Point Count Surveys	Auditory point count surveys for songbirds at select locations.	Long-term	Statewide at select locations	KDFWR Nongame Avian Monitoring Program
Bald Eagle	Bald Eagle Nest Surveys	Aerial surveys documenting nest occupancy. One third of the state is surveyed each year and regions are rotated to maintain statewide data.	Long-term	Statewide, rotating regional survey	KDFWR Nongame Avian Monitoring Program
Bald and Golden Eagles	Midwinter Eagle Surveys	Annual counts of eagles observed on standardized survey routes. Effort was reduced after 2021, but surveys will be continued at 3 routes to monitor long-term trends.	Long-term	3 locations: Lake Cumberland, Land Between the Lakes, Ballard WMA	KDFWR Nongame Avian Monitoring Program
Peregrine Falcon	Peregrine Falcon Nest Monitoring	Monitoring and management of nesting population, including productivity monitoring, banding, nest box maintenance, and surveys for new nest sites.	Long-term	Statewide	KDFWR Nongame Avian Monitoring Program
All birds	Christmas Bird Count	The Christmas Bird Count is a nationally coordinated, volunteer run survey which occurs December 14 to January 5 each year.	Long-term, indefinitely	Statewide	National Audubon Society, Kentucky Ornithological Society
All birds	Breeding Bird Survey	The Breeding Bird Survey is a nationally coordinated effort to monitor the status and trends of North American bird populations.	Long-term, indefinitely	Statewide	United States Geological Survey, Kentucky Ornithological Society
Songbirds	Monitoring Avian Productivity and Survivorship (MAPS)	Long-term mist-netting for songbirds is conducted at 3 locations in KY to measure vital rates for SGCN.	Long-term	Shaker Village of Pleasant Hill, Mammoth Cave National Park, and Clark's River National Wildlife Refuge	Shaker Village- KDFWR Nongame Avian Monitoring Program; Mammoth Cave National Parks Service; Clark's River- USFWS; national program coordinated by the Institute for Bird Populations

Species or Species Group	Project Title	Project Description	Timeline	Geographic Scope	Agency or Organization Leads
Songbirds	Songbird Migration Monitoring	Long-term mist-netting for songbirds is conducted at Shaker Village of Pleasant Hill to measure response to habitat management for SGCN birds.	Long-term	Shaker Village of Pleasant Hill	KDFWR Nongame Avian Monitoring Program
Songbirds and Shorebirds	Motus Network	The Motus System is a collaborative network of automated radio telemetry receivers that track individuals of numerous species of birds. KDFWR currently has plans to track Golden-winged Warblers, Field Sparrows and Wood Thrush using this technology. Projects led by other states will result in information collected via the Motus network in Kentucky on many migratory species.	Long-term	Towers are currently being installing at several locations throughout the state.	KDFWR Nongame Avian Monitoring Program; Southeastern Motus working Group
Chuck will's Widow, Eastern Whip-poor-will	Kentucky Nightjar Survey	The surveys are a sub-study of a national effort, the Nightjar Survey Network. The purpose of the study is to investigate population trends for nightjars in Kentucky and to measure their response to forest management in selected areas.	2016-2025	Statewide at select locations	KDFWR Nongame Avian Monitoring Program, The Center for Conservation Biology (CCB) and the Maine Natural History Observatory (MNHO)
Golden-winged Warbler	Golden-winged Warbler Atlas Surveys	Auditory point count and call back surveys for Golden-winged Warblers in southeastern Kentucky.	Long-term	Southeast KY	KDFWR Nongame Avian Monitoring Program, Cornell Lab of Ornithology (CLO) and the Golden-winged Warbler (GWWA) Working Group
Loggerhead Shrike	Loggerhead Shrike Monitoring	Banding and monitoring project focused on finding nesting territories and banding/resighting birds to evaluate site fidelity and survival.	Long-term	Central and Western KY	KDFWR Nongame Avian Monitoring Program, Eastern Loggerhead Shrike Working Group
Raptor SGCN	Raptor Contaminants and disease monitoring	Necropsies on deceased specimens and testing through qualified labs for disease and contaminants.	As necessary	Statewide	KDFWR Nongame Avian Monitoring Program and Wildlife Disease Program
Barn Owls	Kentucky Barn Owl Project	Barn Owl surveys are conducted on a 3-year interval. During this effort, which began in 2010, nesting and roosting barn owls are counted statewide.	Long-term	Statewide	KDFWR Nongame Avian Monitoring Program
Select waterfowl species	Waterfowl banding programs	Long term waterfowl banding provides demographic data from hunter harvested waterfowl SGCN.	Long-term	Selected locations statewide	KDFWR Migratory Bird Program, USFWS, Mississippi Flyway Gamebird Technical Section
All waterfowl species	Mid-winter waterfowl surveys	This is a nationwide, standardized monitoring effort measuring abundance of waterfowl in KY each winter.	Long-term	Selected locations statewide	KDFWR Migratory Bird Program, USFWS, Mississippi Flyway Gamebird Technical Section
Interior Least Tern	Interior Least Tern Nest Monitoring	Annually monitors the lower Ohio River population through aerial surveys and ground nest counts.	Long-term	Lower Ohio River and Mississippi River	KDFWR Migratory Bird Program, Missouri Department of Conservation, Interior Least Tern Working Group
American Woodcock	American Woodcock banding and surveys	Banding and annual singing grounds surveys to monitor woodcock population.	Long-term	Central Kentucky	KDFWR Migratory Bird Program

Crustaceans

A crustacean monitoring program has not been initiated in Kentucky to date. Most of the available data are a result of focused research projects or reported bycatch from aquatic surveys. Taxonomic uncertainty (particularly for many crayfishes) and a lack of training availability for identification (particularly for shrimps, isopods, and amphipods) has further hindered the establishment of any monitoring programs.

For stream-dwelling crustacean species, increased monitoring can be opportunistically accomplished by increased reporting of bycatch from aquatic community surveys. Multiple government agencies and private organizations conduct stream surveys, including benthic sampling of wadable waters, annually throughout Kentucky. At minimum, collection, deposition, and retention of crustacean specimens in publicly accessible museums would allow for post hoc monitoring. Additional training of field personnel conducting in-stream surveys in identification of crayfish to the species level would further capitalize on resources available.

Burrowing crayfish species have traditionally been under-sampled. Starting in 2023, KDFWR initiated a regional

“crayfish blitz” to increase data collection. By coordinating the participation of over 20 crayfish researchers from five states, over 50 sites were surveyed for burrowing crayfish in three days. This model for data collection is likely to be employed annually with all regions of the Kentucky being sampled over a 5-year to 10-year period.

Bait bucket introduction of non-native crayfish species is often identified as a threat to stream dwelling crayfishes.



Intensive ‘crayfish blitz’ surveys will be used to collect data annually throughout Kentucky. Data from the first year’s blitz resulted in new distribution information for several SGCN crayfish species. Photo: KDFWR

Monitoring for invasive species introduction should be prioritized based on stream access and utilization as a fishery as well as native species rarity. Species such as the Big South Fork Crayfish, with a known global distribution in one stream, should be prioritized for bait bucket species introduction monitoring over crayfish SGCN with a broader range. Development of occupancy models and standardized survey protocols that minimize effort while maximizing detection probability should be developed and implemented as funding allows.

It is unlikely that monitoring of Kentucky's non-crayfish crustacean fauna will be implemented without first increasing the knowledge base for identification and sampling techniques for this group. Incentivizing academic studies of this group, by funding research with post-secondary educational institutions, will be required. Further, development of training material/publications that provide biologists and researchers with the necessary information for proper field collection and identification of Kentucky's non-crayfish crustacean fauna will be needed in order for long term monitoring to be accomplished.

Fishes and Lampreys

Information gathered through fish community sampling and targeted species surveys is used to monitor fish species of greatest conservation need (SGCN) in Kentucky. Fish community sampling is the most common approach used to collect species occurrence data in Kentucky. It is an efficient and effective way to monitor most fish SGCN, despite the use of selective gear that may capture only a part of the entire community at a given location. However, several species are not easily captured with conventional gear types (e.g., seining and electrofishing) and are categorized as "Data Deficient." Use of different gear types and methods will be necessary to acquire more accurate distributional estimates for species that occur in deep water and lentic habitats such as large rivers and wetlands.

Each year, species occurrence data (presence-only, presence-absence, or relative abundance) are collected by the Kentucky Department of Fish and Wildlife Resources (KDFWR), Office of Kentucky Nature Preserves (OKNP), and Kentucky Division of Water (KDOW). In addition, scientific collecting by universities, consulting firms, and government agencies provide distribution and population data for fishes across the state. Data from the above sources are stored in the following repositories: Kentucky Fish and Wildlife Information System (KDFWR), Natural Heritage Program Network (OKNP), and Kentucky Water Assessment Database (KDOW). Monitoring Kentucky's fish SGCN is a joint effort between KDFWR and OKNP. This is accomplished, in part, using methodology of the Natural Heritage Program Network, which employs data management software and GIS for mapping spatial distributions of species. Federally listed species having a recovery plan are monitored following species-specific



Biologists use a seine and backpack electrofisher to survey West Drakes Fork in Simpson County.
Photo: KDFWR

protocols and schedules detailed in the plan.

Generally, distributional and population data available for fish SGCN are assessed on a periodic basis (e.g., every 5 to 10 years), but because the level of survey effort varies among species, the level of knowledge is more complete for some species than others (e.g., "Data Deficient" species). In addition, much of the available occurrence data for individual species are presence-only based on incidental observations rather than conducted under a sampling design that accounts for potential spatial and detection biases. More targeted surveys at fixed locations with repeated visits are needed for presence-absence data for monitoring changes in distribution and abundance, especially of rare or low-density species.

Kentucky is fortunate in having a substantial historical database for fishes, and several agencies and individuals dedicated to continued collection of information on the state's fish fauna. Effective monitoring will require maintaining accurate distributional data over extensive time periods to assess population trends that may be associated with landscape changes, including habitat loss and restoration, migration or dispersal, and other factors.

Established monitoring programs in Kentucky that include fish SGCN are presented below.

Monitoring Program	Lead	Description	Website (if available)
Statewide fish surveys	KDFWR	Fish community sampling and species status surveys.	
Kentucky Natural Heritage Program	KNP	Statewide surveys for rare species and maintenance of Natural Heritage Program Network data on rare species and natural community data.	https://eec.ky.gov/Nature-Preserves/Pages/default.aspx
Scientific collecting for research and monitoring by entities other than KDFWR	KDFWR	Species occurrence data reported by universities, consulting firms, and other entities as required for a scientific collecting permit.	
Surface water monitoring for compliance with Clean Water Act regulations.	KDOW	Fish community sampling at established sites statewide for assessments of waterbodies to determine if water quality standards are being met.	https://eec.ky.gov/Environmental-Protection/Water/Pages/default.aspx
Annual Lake Sturgeon sampling with trotlines	KDFWR	Targeted sampling for Lake Sturgeon in the upper Cumberland River drainage to assess population restoration efforts.	https://fw.ky.gov/Fish/Pages/Lake-Sturgeon.aspx

Freshwater Mussels and Snails

Conservation of mussels in Kentucky is accomplished by examining the current status and distribution of the existing populations. Conservation efforts should be focused at the basin, not state, level. For example, fanshells are found in the Green, Salt, and Licking Rivers and are three separate populations for protection of the species. Having three separate management units prevents any one event within one river system from eliminating the species from the state, and each area is self-sustaining independently of the others.

In Kentucky, the best areas for freshwater mussel abundance and diversity are often areas of high biological diversity for other aquatic species. As a result, mussel monitoring programs often serve as a indicator of river health to support other aquatic species. Prioritization of areas within rivers (management units) that historically have many species increases efficiency by collecting more data with less sampling effort. Priority management units with boundaries defined by HUC (Hydrologic Unit) 14 or 12 basins in Kentucky have already been identified based on presence of imperiled mussels as the most appropriate areas for augmentation, expansion, and reintroduction. Additional priority management units may be identified as more information becomes available. Each priority management unit is reviewed and ranked based on the level of conservation priority for each species and the cumulative diversity of rare species within the unit. Once specific sites within the priority management unit have been selected, sites with multiple rare species are ranked higher than sites with low diversity. All management units in Kentucky are divided into hydrologic units based on 8 digit, 12 digit, and 14 digit hydrologic unit Codes (HUC). Species richness is identified within each of the HUC's and prioritized based on the level of richness. We identified ten HUC 12 priority management units and several



Snorkel surveys allow biologists to monitor the success of freshwater mussel reintroduction projects.
Photo: KDFWR

HUC 14 priority management units. The highest HUC 12 was labeled Priority Management Unit 1 and had four smaller units (either HUC 14 or a combination of adjacent HUC 14s). These ten Priority Management Units support most of the freshwater mussel richness in Kentucky. However, species may also be ranked based on status, culture capability (e.g., host known, handling sensitivity, fecundity, number of donor females, fish host sensitivity), costs, and other considerations. In the case of extremely rare animals (i.e., present at only one site), it may be necessary to hold brood stock in captivity for expansion purposes.

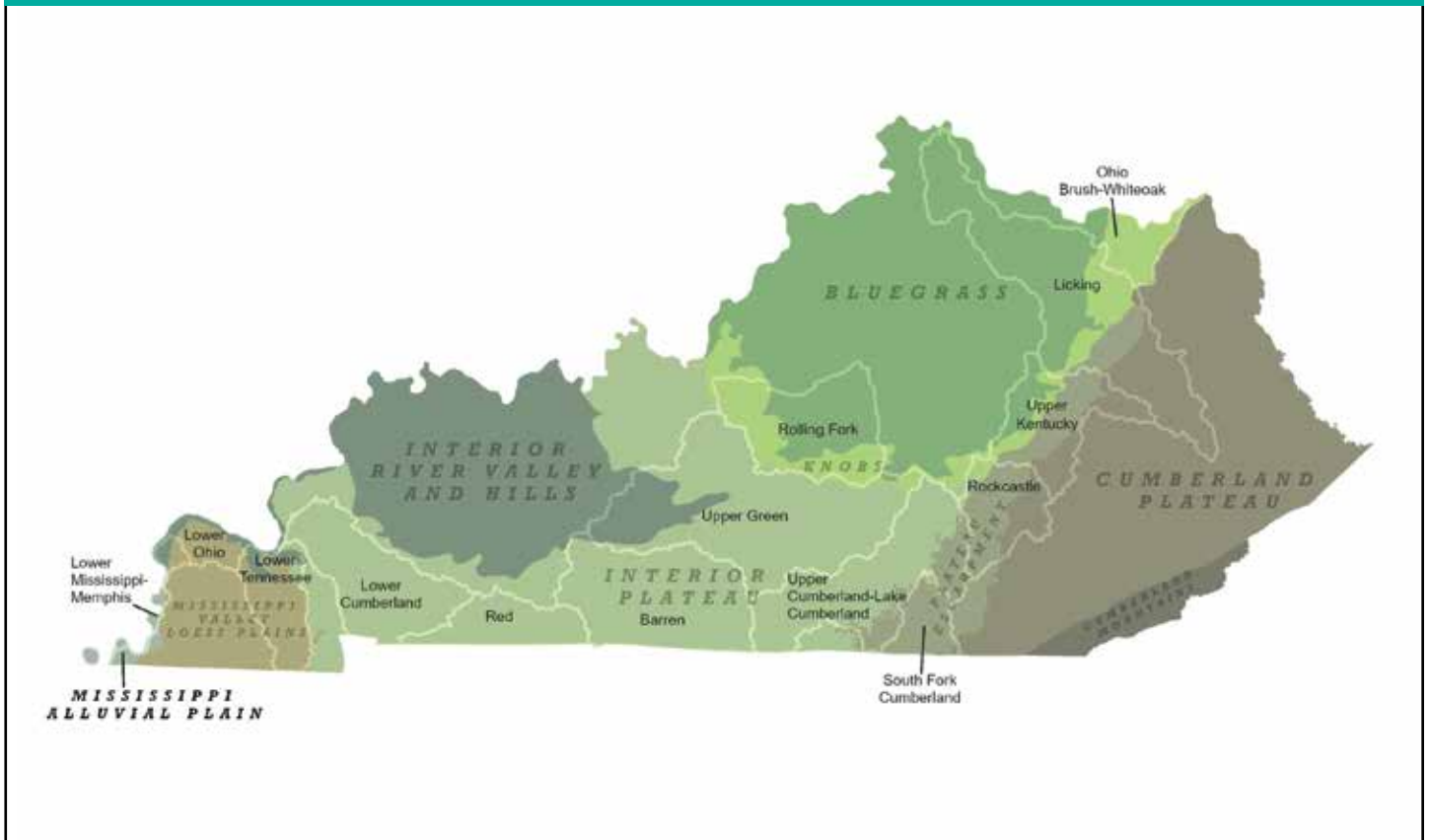
Monitoring of the mussel populations at multiple sites over time permits trends to be established within the river systems. Presence/probable absence

data is collected each time a site is examined with a defined time or unit of effort. For intense quantitative monitoring, girds are randomly selected and excavated for mussels. Data on species, size, and age (if possible) are collected for all individuals observed. Assessment of the mussel population was designed to determine presence of rare species (0.001 to 0.01 mussels/m²) or a species that makes up < 1 % of the assemblage, estimate population density, estimate size structure to indicate recent recruitment (individuals <20-40mm in length), and to establish guidelines for monitoring the site and others over time (i.e., establish long-term trends). The goals are to monitor several priority sites every 4-6 years so that >60% of all SWAP species are represented annually. Sites are in several river systems, especially those that contain unique species or

high species richness and multiple Species of Greatest Conservation Need.

For example, 7 locations in the Green River within Mammoth Cave National Park are monitored, with each site sampled on a 4- or 5-year rotation. Since most mussels live in excess of 10-20 years, this interval is sufficient to detect lack of reproduction or recruitment and to take the necessary management steps (augmentation, reintroduction, or translocation) to mitigate low numbers. Good mussel populations maintain sufficient numbers of several species, have a high species diversity, and are represented by multiple year classes of multiple species. Reintroductions with tagged individuals can be made at the sites and often show up in the data at the next monitoring event to allow biologists to evaluate the success of the management actions.

Freshwater Mussel Priority Conservation Units



Insects and Springtails

Invertebrates are often understudied, a fact reflected by the relative lack of monitoring programs targeting them in Kentucky. As the state's natural heritage program, the Office of Kentucky Nature Preserves (OKNP) works to close this gap by conducting inventories and monitoring for rare species of butterflies, moths, dragonflies, damselflies, native bees, cave beetles, tiger beetles, and other terrestrial and aquatic invertebrates such as snails, aggregating data from external sources such as museum collections

and iNaturalist, and assigning state conservation status ranks for rare species using standard heritage ranking methodology.

In Kentucky, monitoring of rare invertebrates (including insect groups such as Hymenoptera, Lepidoptera, Odonata, and others) is lead by OKNP, in partnership with other state and federal agencies, researchers, and taxa group experts and is integrated into multiple OKNP conservation programs. Rare invertebrates are monitored at varying levels of intensity according to their state and federal

conservation status. State listed species are tracked with basic observational data that is georeferenced in the Kentucky Natural Heritage Database, which is maintained by OKNP. For some globally rare insects, such as the Rattlesnake-master Borer Moth (*Papaipema eryngii*), more intensive programmatic monitoring is conducted using standardized methodology to analyze trends over the course of decades and contribute to adaptive management of priority sites.

OKNP recently expanded their Native Bee Inventory and Monitoring Program and is working to document species distributions across the state in partnership with the United States Fish and Wildlife Service (USFWS). In 2023, this program began establishing long-term monitoring protocols and sampling plots to assess population trends. These efforts will address the lack of baseline data for Kentucky's native bees, assess their rarity, and highlight species for inclusion in future iterations of the Kentucky SWAP and OKNP's list of state endangered and threatened species.

OKNP also conducts long-term butterfly monitoring in pre-established long-term vegetation plots in high-quality grasslands that evaluate grassland habitat change over time in response to various management techniques. This design will allow butterfly trend data to be paired with concurrent vegetation data, providing insight into the drivers of change and informing management decisions. Additionally, concurrent monitoring of insects and floral communities provides the opportunity to cross-train entomologists and botanists, which is vital to establishing information on host plant usage and plant-pollinator interactions.

In addition to long-term monitoring of rare invertebrate species, OKNP began exhaustive invertebrate surveys within forested seeps in the Cumberland Plateau in conjunction with large-scale White Fringeless Orchid (*Platanthera integrilabia*) and seep restoration projects located on state and federal lands. This project seeks to document invertebrates associated with this understudied habitat, and to assess differences in invertebrate assemblages across sites having undergone various management treatments including debris dams, canopy removal, and prescribed fire.

The Kentucky Department of Fish and Wildlife Resources (KDFWR) participates and trains the public in methodology of several national monarch butterfly monitoring programs, with support and additional outreach from OKNP and other partners. These programs include the Monarch Larva Monitoring Project, the Integrated Monarch Monitoring Program, the Monarch Watch tagging program, and Project Monarch Health's OE (*Ophryocystis elektroscirrha*) sampling program. OKNP and KDFWR participate in annual butterfly counts held in central Kentucky to census butterfly species throughout the region. Additionally, site-specific long-term invertebrate monitoring occurs at several protected natural areas, including

Floracliff Nature Sanctuary and Shaker Village of Pleasant Hill. Biologists maintain preserve species lists, document observations, and host outreach and citizen science events to educate and engage the public in invertebrate conservation. The Cumberland Piedmont Network conducts long-term monitoring of cave crickets at Mammoth Cave National Park, using the crickets as indicators of overall cave ecosystem health.



OKNP and KDFWR participate and train volunteers to collect data in several monarch butterfly national monitoring programs. Photo: KDFWR

The USFWS conducts annual surveys for the Karst Snowfly, collecting data to inform the Karst Snowfly listing decision scheduled for FY26. Additional systematic caddisfly monitoring would provide significant insights. A statewide, drainage-based survey would likely yield numerous state records, particularly in the Jackson Purchase region, around direct tributaries of the Ohio River, and around larger rivers such as the Green River.

Monitoring efforts are limited by staffing and resource constraints, often requiring that time and funds be allocated only to the most imperiled species. With increased resources, invertebrate monitoring could be expanded to include additional priority species and detect population declines before they become critical. New monitoring programs dedicated to invertebrate groups of emerging conservation concern, such as fireflies or Syrphidae, could be created. The knowledge gained from these new and expanded programs could be used to inform the management of natural areas, engage the public, and safeguard Kentucky's invertebrate biodiversity.

Mammals

Monitoring mammal SGCN in Kentucky requires a wide array of study designs and capture/collection techniques. Unlike other taxonomic groups, community sampling is ineffective when considering the entire mammal fauna of Kentucky. As a result, monitoring Kentucky's mammal SGCN can only be accomplished by employing multiple survey methods.

The Kentucky Department of Fish and Wildlife Resources has coordinated and conducted hibernacula surveys for cave dwelling bats since the 1980's. These surveys occur on a biannual basis for Kentucky's most important hibernacula containing large numbers of rare bat species. Other caves with smaller numbers of hibernating bats are typically surveyed less frequently and opportunistically as time allows. Survey effort and methodology have been standardized to allow for comparison of bat populations over several years. Similarly, rare bat species that utilize caves and rockshelters for maternity sites are also surveyed (typically via emergence count) annually or biannually. Emergence counts from maternity sites in ephemeral roosts (trees or artificial roosts) occur with less frequency but should be prioritized higher as funding allows. Participation in national bat monitoring programs (such as NABat) aren't considered viable given the coarse scale of data collection and the lack of data protection afforded for sensitive sites.

A coordinated effort to collect baseline distributional data on Kentucky's small mammal fauna was initiated by KDFWR throughout the 1980's and 1990's. The data provided by the Statewide Small Mammal Survey has been foundational for the creation of Wildlife Action Plans for Kentucky. However, since completion of the initial statewide survey, very few small mammal surveys have been conducted. And none have been initiated at the physiographic region, let alone statewide, scale. The lack of current small mammal data necessitated many species being included as data deficient in the current plan. Reestablishment of the Statewide Small Mammal Survey, with a focus on collecting data for presumably rare species or habitats, is needed.

Species more easily detected using trail cameras (i.e., the Eastern spotted skunk, Allegheny woodrat, American badger, etc.) allow for more efficient data collection, especially if coupled with citizen science projects. Utilization of Artificial Intelligence programs to detect and identify mammal SGCN in trail camera photos further increases efficiency. Future efforts to establish and maintain a trail camera repository where citizen scientists, KDFWR staff, and partners, can upload photos and metadata (site location, data, bait type, camera type, etc.) for processing and analysis is more affordable and practical than ever. Providing a best practices guide for camera surveys for cryptic species should be prioritized.



Trail camera surveys help biologists detect and identify mammal SGCN like this spotted skunk.
Photo: James Kiser



This automatic telemetry system installed at Yellowbank WMA helps detect the presence of Indiana bats. Photo: KDFWR

Plants

OKNP is the federal cooperator and lead for the federally endangered plant program (Section 6 of the Endangered Species Act), which is focused on preventing plant extinctions globally. In partnership with USFWS, OKNP coordinates the monitoring and management of ten federally listed plants and several additional globally at-risk plants. Monitoring is conducted using standardized methodologies that are selected according to the rarity and life history of each federally listed species. This includes long-term quantitative research plots along defined transects, and/or inventories with more qualitative data to assess trends and threats. The Section 6 Program is the longest standing plant conservation program in the state, and partners heavily with many southeastern states on overlapping species conservation efforts. Federally listed species and associated habitats that occur on OKNP natural areas have received the most conservation and monitoring focus and are most represented in current monitoring programs across the state.

Other plant monitoring programs administered by OKNP include the Kentucky Natural Heritage Database, Kentucky Forest Biodiversity Monitoring Program, OKNP Fire Monitoring Program, Kentucky Rare Plant Translocation Program, Green River Assessment Project, Kentucky Lichen Monitoring Program, Kentucky Roadside Pollinator Habitat Assessment Program, Natural Areas Inventory Program and the OKNP iNaturalist Monitoring Program. State listed and SGCN plant monitoring is integrated within all of these conservation programs in order to capture additional data on priority rare plants and quality natural communities.

Additional monitoring of important habitats and natural communities are integrated into several other important conservation programs that primarily focus on habitat monitoring and trends. These include community monitoring programs managed primarily by the National Park Service, fire effects monitoring plots on the DBNF, the Forest Inventory and Analysis National Program managed by the Kentucky Division of Forestry and the USFS, the Kentucky Division of Water’s Wetland Monitoring and Assessment Program, as well as stream restoration monitoring programs managed by KDFWR and NKU.



An OKNP botanist demonstrates techniques used to monitor for rare plants. Photo: OKNP.

Despite efforts by several agencies to monitor rare plants and important habitat/natural communities, the majority of state listed/SGCN plants and state listed natural communities are not included in monitoring programs due to a lack of resources and staff devoted to these conservation efforts. With additional resources and focus, monitoring programs would be able to expand and focus on additional priority SGCN and state listed plants, and more detailed data, analysis and significant research could be collected and shared with natural areas managers for the adaptive management process.

Monitoring Program	Lead	Description	Website (if available)
Kentucky Endangered Plant Program/Section 6	OKNP/USFWS	The federally listed plant/Section 6 program, managed by OKNP, focuses on annual surveys, monitoring, management, and research of 10 federally listed plants along with an additional dozen globally rare at-risk plants that may warrant federal listing. Through this program, an additional 4 species have recovered and removed from federal listing over the two past decades. Long term monitoring of federally listed plants and their associated habitats has been installed and data is collected annually on nearly all of our federally listed plants.	www.fws.gov/office/kentucky-ecological-services
Kentucky Plant Conservation Program	OKNP	OKNP tracks 197 state endangered vascular plants and 128 state threatened vascular plants across the state and works on OKNP natural areas and partner lands (federal, state and private) on monitoring select rare natural communities and state listed plants. Currently, there are over 200 vegetation long term quantitative monitoring plots scattered across the state in OKNP natural areas, federal and private lands. Methodologies followed include the CVS (Carolina vegetation survey), point/line/transects, census data). Rare species are embedded within the community plots. Long term vegetation monitoring plots are located in 17 OKNP natural areas and forests service lands and include 13 rare natural communities and 85 rare and watch list plant species and are aimed capturing short and long term trends in species and communities.	www.eec.ky.gov/Nature-Preserves/biodiversity/Pages/Rare-Plant-Program.aspx

Monitoring Program	Lead	Description	Website (if available)
OKNP fire monitoring program	OKNP	Photo-monitoring and basic vegetation data collection on fire units within the OKNP system: structure, major plant groups (herbaceous/woody/graminoids), fuels.	www.eec.ky.gov/Nature-Preserves/Documents/Final%202022%20Annual%20Report_%20annual%20KHLF_%20biennial%20OKNP_%20quadrennial%20Rare%20Plant.pdf
Kentucky Rare Plant Translocation Program	OKNP	Information on all rare plant populations that have been introduced in natural areas is maintained in a database managed by OKNP and periodically monitored for quality and restoration success. Seed banking and living collection information is also maintained in this database.	https://eec.ky.gov/Nature-Preserves/Documents/Final%202022%20Annual%20Report_%20annual%20KHLF_%20biennial%20OKNP_%20quadrennial%20Rare%20Plant.pdf
Green River Assessment Project	OKNP	Over 45 vegetation monitoring plots were installed pre dam removal within the Green River in order to assess riparian area changes with removal of dams. Sampling is conducted on a 5 year rotation. Aquatic monitoring is also part of this project.	https://eec.ky.gov/Nature-Preserves/Documents/Final%202022%20Annual%20Report_%20annual%20KHLF_%20biennial%20OKNP_%20quadrennial%20Rare%20Plant.pdf
Kentucky Natural Heritage Database program	OKNP	Monitoring of all T and E, listed plants in the state database, Monitoring varies depending on the rarity of the species, from annual to 20 years (varying level of priorities). There are many historic (has not been seen in the state for 20+ years) in the OKNP natural heritage database due to lack of resources/staff. OKNP tracks 197 state endangered vascular plants and 128 state threatened vascular plants, along with detailed information on an additional 234 vascular plants of conservation concern, including 80 special concern, 88 watch list, 49 historic, and 18 extirpated.	
Kentucky Forest Biodiversity Monitoring program	OKNP/KDA	The Office of Kentucky Nature Preserves, in partnership with the Kentucky Department of Agriculture, maintains long term monitoring vegetation and forested rare species plots within every county in Kentucky and monitors all of these sites on a 5 year census. There are over 300 monitoring plots that look at trends in Kentucky's forests in terms of overall plant biodiversity, invasive species abundance, rare species with a special focus on forest medicinals such as <i>Panax quiquefolia</i> .	www.eec.ky.gov/Nature-Preserves/Documents/Final%202022%20Annual%20Report_%20annual%20KHLF_%20biennial%20OKNP_%20quadrennial%20Rare%20Plant.pdf
Kentucky Lichen monitoring program	OKNP	The OKNP has 26 lichen monitoring plots within fire dependent grassland sites and monitors these populations every few years to look at trends.	www.eec.ky.gov/Nature-Preserves/Documents/Final%202022%20Annual%20Report_%20annual%20KHLF_%20biennial%20OKNP_%20quadrennial%20Rare%20Plant.pdf
Kentucky Roadside pollinator habitat assessment program	OKNP/KYTC	OKNP maintains a database of quality pollinator habitat along state maintained roads in Kentucky and works with KYTC on inventories, management recommendations and site protection of priority roadside habitat.	www.eec.ky.gov/Nature-Preserves/Documents/Final%202022%20Annual%20Report_%20annual%20KHLF_%20biennial%20OKNP_%20quadrennial%20Rare%20Plant.pdf
OKNP Inaturalist inventory and analysis program	OKNP	Community scientist network of rare species volunteers that assist in collecting heritage level data that is then integrated into the OKNP natural heritage database. Plant projects on inaturalist have been the primary focus, but numerous taxa groups have been developed to network with Kentucky's community scientists and exchange valuable conservative species data. Important information on invasive species along with phenology is also collected and shared through these projects. This is a great way to network with the community and build a volunteer monitoring program.	State Level collections project: www.inaturalist.org/projects/kentucky-plants-of-conservation-concern State Level traditional private group for rare plant volunteers: www.inaturalist.org/projects/rare-plants-of-kentucky Federally listed plants in US: www.inaturalist.org/projects/us-federally-threatened-endangered-species Natureserve network: www.inaturalist.org/projects/natureserve-network-invasives-umbrella-project
NPS natural community and rare species monitoring program	NPS	NPS monitors natural communities and select rare species within park service lands in order to assess trends. OKNP collaborates with the NPS on select projects and communities. National parks with vegetation monitoring plots include Big South Fork NRA, Cumberland Gap National Park and Mammoth Cave National Park.	https://www.nps.gov/im/cupn/index.htm https://www.nps.gov/im/aphn/about.htm
DBNF fire monitoring vegetation plots	DBNF/TNC/OKNP	The Daniel Boone National Forest, in partnership with TNC, has installed fire monitoring plots within select management units in the southern Cumberland Plateau. This was facilitated through the fire learning network. OKNP assists in vegetation data collection.	www.data.fs.usda.gov/geodata/rastergateway/rave/index.php
Forest Inventory and Analysis National Program	USFS/KDF	The U.S. Department of Agriculture maintains several long-term, standardized land-cover/land-use assessments that are very informative concerning the availability of habitats on a broad scale, and at a coarse scale. Specifically, the Forest Inventory and Analysis (FIA) program, within the U.S. Forest Service, maintains a rigorous spatially-balanced long-term monitoring tool for forest plants (particularly trees), which provides an assessment of the extent and condition of the nation's forests from a forestry standpoint. But, these inventories can provide an overall perspective of forest species composition, regeneration, and extent, which for decades has informed assessments of the many species dependent on forest land-cover. The Forest Inventory and Analysis (FIA) program of the U.S. Forest Service provides the information needed to assess America's forests. The long history of scientifically credible FIA data provides critical status and trend information to resource managers, policy makers, investors, and the public through a system of annual resource inventory that covers both public and private forest lands across the United States. FIA reports on status and trends in forest area and location; in the species, size, and health of trees; in total tree growth, mortality, and removals by harvest; in wood production and utilization rates by various products; and in forest land ownership. Kentucky has 4,923 FIA monitoring plots across the state, with 2,438 currently forested.	www.public.tableau.com/views/FIA_OneClick_V1_2/Factsheet?%3AshowVizHom=e=0
Non Native Invasive Species Program	DBNF	NNIS-mapping invasive species across the forest in order to assist with priority invasive species management projects.	www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5145012.pdf

Reptiles

Information gathered by targeted species surveys and general sampling by the state herpetologist is used to monitor SGCN (Species of Greatest Conservation Need) reptiles in Kentucky. Occurrence data from other sources is also tabulated, reviewed, analyzed, and incorporated into the Kentucky Fish and Wildlife Information System (KFWIS). Some of these sources include records from KDFWR field personnel, biologists from various other state and federal agencies, and members of the Kentucky

Herpetological Society. Scientific reports and publications, data from preserved amphibians stored in museums and university collections, data reported by scientific and educational collection permit holders (consulting firms, university professors, and graduate students), and observations reported to KDFWR by members of the overall herpetological community and the general public are also part of the monitoring process.

Effectively monitoring Kentucky's 25 SGCN reptiles will require the use of assorted known field techniques

coupled with the development and implementation of new survey and inventory methods. Among these will be coverboard arrays, drift fences with funnel/pitfall traps or trail cameras, binocular and spotting scope surveys, and the development and use of eDNA collection and detection techniques in both aquatic and terrestrial situations. Targeted surveys at fixed locations with repeated visits will be needed to collect presence-absence and numerical data that will allow KDFWR to detect changes in distribution and abundance over time and in some cases evaluate the effectiveness of management activities on reptile species and communities.



Coverboard surveys are one method used by biologists to detect the presence of SGCN reptiles.
Photo: KDFWR

Category	Species Included	Approach
Significant decline in large portion of Kentucky range	Southeastern Five-lined Skink	Set up and regularly monitor coverboard arrays in appropriate habitat; use of drift fences and funnel traps and/or pitfall traps; develop eDNA methodology to detect transient use of coverboards; road surveys for <u>Scarletsnake</u> , Scarlet Kingsnake, Western Pygmy, and Southeastern Crowned Snake.
	Eastern Slender Glass Lizard	
	Scarletsnake	
	Scarlet Kingsnake	
	Northern Pinesnake	
	Western Pygmy Rattlesnake	
	Southeastern Crowned Snake	
Significant general decline across Kentucky range	Six-lined Racerunner	Visual surveys in abandoned quarries and gravel pits; set up and regularly monitor coverboard arrays in appropriate habitat; use of drift fences and funnel traps and/or pitfall traps.
Significant regional declines	Red Cornsnake (eastern population)	Red Cornsnake (Red River Gorge): set up/regularly monitor coverboard arrays; develop eDNA methodology to detect transient use of coverboards.
	Eastern Ribbonsnake (East of Western Coal Fields)	E Ribbonsnake and E Mud Turtle: visual surveys, coverboards at water's edge, and eDNA surveys in sinkhole wetlands.
	Eastern Mud Turtle (sinkhole wetlands in eastern Pennyrile area)	E Ribbonsnake and E Mud Turtle: visual surveys, coverboards at water's edge, and eDNA surveys in sinkhole wetlands.
Very rare and/or difficult to find or track – true status in Kentucky unknown	Coal Skink	Coal Skink: set up/regularly monitor coverboard arrays; develop eDNA methodology to detect transient use of coverboards.
	Mississippi Green Watersnake	Mississippi Green Watersnake: use eDNA and deploy and monitor water's edge coverboards in wetlands along the Mississippi River.
	Alligator Snapping Turtle	Alligator Snapping Turtle: use eDNA (followed by targeted trapping) in aquatic habitats.
Very limited range in Kentucky but doing well where regularly tracked	Broad-banded Watersnake	Broad-banded Watersnake: coverboard and visual surveys in Fulton County.
	Western Ribbonsnake	Western Ribbonsnake: coverboard and visual surveys in Fulton County, along Mississippi River north to Ballard Co, and at new site on LBL-Honker Lake.
	Kirtland's Snake	Kirtland's Snake: coverboard surveys for all populations.
	Southern Painted Turtle	Southern Painted Turtle: spotting scope surveys; trapping and subsequent molecular study to determine extent of hybridization from Land Between the Lakes and Livingston County westward.
Likely stable in Kentucky but not monitored as closely as needed to determine real conservation status	Northern Cottonmouth	Snakes: coverboard surveys for Timber Rattlesnakes; visual, spotting scope, and coverboard surveys including some cover objects placed partly in water for Cottonmouths, Mudsnares, and Copperbelly Watersnakes.
	Timber Rattlesnake	
	Western Mudsnares	
	Copperbelly Watersnake	
	Midland Smooth Softshell	Turtles: spotting scope and binocular surveys; monitor nesting activity on Mississippi River sand islands and beaches for all 3 turtles.
	Mississippi Map Turtle	
	Northern False Map Turtle	

APX 6.1a Needs Identified for Amphibian SGCN

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Distribution and abundance	Survey	Determine actual distribution and abundance in Kentucky.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Protect and restore natural stream channels, bayous, swamps, and wetlands	Management	Protect existing natural stream channels, bayous, swamps and wetlands.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Restore degraded wetland habitats	Management	Restore existing natural stream channels, bayous, swamps and wetlands.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Protect wetland habitat	Management	Protect open to semi-open wetland habitat for breeding or foraging.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Restore and/or create wetland habitat	Management	Restore degraded wetland habitat and/or create open to semi-open wetland habitat for breeding or foraging.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Provide patches of open habitat adjacent to wetlands	Management	Provide patches of open land/grassland adjacent to wetlands for egg-laying or foraging.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Restore and create upland breeding habitat	Management	Identify, restore, and/or create upland vegetated vernal pools and small breeding ponds in open habitat.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Acris blanchardi</i>	Blanchard's Cricket Frog	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Ambystoma barbouri</i>	Streamside Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Ambystoma barbouri</i>	Streamside Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Ambystoma barbouri</i>	Streamside Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Ambystoma barbouri</i>	Streamside Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Ambystoma JJUL</i>	Unisexual Ambystoma	Additional surveys	Survey	Development is occurring in three of the four sites the species in known from in Kentucky. Additional surveys needed to find new populations and to determine how the species is being impacted.
<i>Ambystoma JJUL</i>	Unisexual Ambystoma	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Ambystoma JJUL</i>	Unisexual Ambystoma	Amphibian crossing structures	Management	Create safe road crossing structures in areas known to have populations.
<i>Ambystoma JJUL</i>	Unisexual Ambystoma	Protect existing forested areas	Management	Protect existing areas of good forest cover.
<i>Ambystoma JJUL</i>	Unisexual Ambystoma	Restore and maintain sites with good forest cover	Management	Restore degraded forested sites and maintain good forest cover.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Ambystoma JJJL</i>	Unisexual Ambystoma	Protect woodland breeding ponds	Management	Protect existing woodland breeding ponds.
<i>Ambystoma JJJL</i>	Unisexual Ambystoma	Restore and/or create woodland breeding ponds	Management	Restore and/or create woodland breeding ponds.
<i>Ambystoma JJJL</i>	Unisexual Ambystoma	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.
<i>Ambystoma JJJL</i>	Unisexual Ambystoma	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Ambystoma JJJL</i>	Unisexual Ambystoma	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Ambystoma JJJL</i>	Unisexual Ambystoma	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Ambystoma JJJL</i>	Unisexual Ambystoma	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Ambystoma talpoideum</i>	Mole Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Ambystoma talpoideum</i>	Mole Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Ambystoma talpoideum</i>	Mole Salamander	Assessment of how timber removal impacts habitat use and movement	Research	Research needed to determine how timber removal impacts habitat use and migration.
<i>Ambystoma talpoideum</i>	Mole Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Ambystoma talpoideum</i>	Mole Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Protect existing wetland habitats	Management	Protect existing natural stream channels, bayous, swamps and wetlands.
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Restore degraded wetland habitats	Management	Restore existing natural stream channels, bayous, swamps and wetlands.
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Aneides aeneus</i>	Green Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Aneides aeneus</i>	Green Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Aneides aeneus</i>	Green Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Aneides aeneus</i>	Green Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Cryptobranchius alleganiensis alleganiensis</i>	Eastern Hellbender	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cryptobranchius alleganiensis alleganiensis</i>	Eastern Hellbender	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Cryptobranchius alleganiensis alleganiensis</i>	Eastern Hellbender	Dam removal	Management	Restore natural stream connectivity by removing dams.
<i>Cryptobranchius alleganiensis alleganiensis</i>	Eastern Hellbender	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Cryptobranchius alleganiensis alleganiensis</i>	Eastern Hellbender	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Desmognathus ochrophaeus</i>	Allegheny Mountain Dusky Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Desmognathus ochrophaeus</i>	Allegheny Mountain Dusky Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Desmognathus ochrophaeus</i>	Allegheny Mountain Dusky Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Desmognathus ochrophaeus</i>	Allegheny Mountain Dusky Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Desmognathus welteri</i>	Black Mountain Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Protect existing forested areas	Management	Protect existing areas of good forest cover.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Restore and maintain sites with good forest cover	Management	Restore degraded forested sites and maintain good forest cover.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Work with regulatory agencies and private partners to minimize the impacts of surface mining and other forms of mineral extraction	Management	Minimize the impacts of surface mining and other forms of mineral extraction.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Protect cave, spring, and seep areas	Management	Protect caves, cool springs, seeps and small streams
<i>Desmognathus welteri</i>	Black Mountain Salamander	Identify and restore cave, spring, and seep habitats	Management	Identify, restore, and reforest cave, cool spring, seep and small stream habitats.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Raise awareness of the recreational impacts to amphibian habitat from off-trail ATV use	Management	Direct ATV traffic to approved trails and hardened stream crossings.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Raise awareness of the importance and diversity of amphibians in Kentucky	Management	Engage with the public to inform citizens of the impacts recreational activities can have on Black Mountain salamanders and provide suitable alternatives.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Desmognathus welteri</i>	Black Mountain Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Eurycea guttolineata</i>	Three-lined Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Eurycea guttolineata</i>	Three-lined Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Eurycea guttolineata</i>	Three-lined Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Eurycea guttolineata</i>	Three-lined Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Hyla gratiosa</i>	Barking Treefrog	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Hyla gratiosa</i>	Barking Treefrog	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Hyla gratiosa</i>	Barking Treefrog	Protect wetland habitat	Management	Protect open to semi-open wetland habitat for breeding or foraging.
<i>Hyla gratiosa</i>	Barking Treefrog	Restore and/or create wetland habitat	Management	Restore degraded wetland habitat and/or create open to semi-open wetland habitat for breeding or foraging.
<i>Hyla gratiosa</i>	Barking Treefrog	Restore and create upland breeding habitat	Management	Identify, restore, and/or create upland vegetated vernal pools and small breeding ponds in open habitat.
<i>Hyla gratiosa</i>	Barking Treefrog	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Hyla gratiosa</i>	Barking Treefrog	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Hyla gratiosa</i>	Barking Treefrog	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.
<i>Hyla gratiosa</i>	Barking Treefrog	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Hyla gratiosa</i>	Barking Treefrog	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Hyla gratiosa</i>	Barking Treefrog	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Hyla gratiosa</i>	Barking Treefrog	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Hyla versicolor</i>	Gray Treefrog	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Hyla versicolor</i>	Gray Treefrog	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Hyla versicolor</i>	Gray Treefrog	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Hyla versicolor</i>	Gray Treefrog	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Provide patches of open habitat adjacent to wetlands	Management	Provide patches of open land/grassland adjacent to wetlands for egg-laying or foraging.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Restore and create upland breeding habitat	Management	Identify, restore, and/or create upland vegetated vernal pools and small breeding ponds in open habitat.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Lithobates areolatus circulosus</i>	Northern Crawfish Frog	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Lithobates blairi</i>	Plains Leopard Frog	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lithobates blairi</i>	Plains Leopard Frog	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Lithobates blairi</i>	Plains Leopard Frog	Protect wetland habitat	Management	Protect open to semi-open wetland habitat for breeding or foraging.
<i>Lithobates blairi</i>	Plains Leopard Frog	Restore and/or create wetland habitat	Management	Restore degraded wetland habitat and/or create open to semi-open wetland habitat for breeding or foraging.
<i>Lithobates blairi</i>	Plains Leopard Frog	Provide patches of open habitat adjacent to wetlands	Management	Provide patches of open land/grassland adjacent to wetlands for egg-laying or foraging.
<i>Lithobates blairi</i>	Plains Leopard Frog	Restore and create upland breeding habitat	Management	Identify, restore, and/or create upland vegetated vernal pools and small breeding ponds in open habitat.
<i>Lithobates blairi</i>	Plains Leopard Frog	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Lithobates blairi</i>	Plains Leopard Frog	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Lithobates blairi</i>	Plains Leopard Frog	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.
<i>Lithobates blairi</i>	Plains Leopard Frog	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Lithobates blairi</i>	Plains Leopard Frog	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Lithobates blairi</i>	Plains Leopard Frog	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Lithobates blairi</i>	Plains Leopard Frog	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Protect wetland habitat	Management	Protect open to semi-open wetland habitat for breeding or foraging.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Restore and/or create wetland habitat	Management	Restore degraded wetland habitat and/or create open to semi-open wetland habitat for breeding or foraging.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Provide patches of open habitat adjacent to wetlands	Management	Provide patches of open land/grassland adjacent to wetlands for egg-laying or foraging.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Restore and create upland breeding habitat	Management	Identify, restore, and/or create upland vegetated vernal pools and small breeding ponds in open habitat.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Protect warm season grasslands and special open habitats.	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Lithobates pipiens</i>	Northern Leopard Frog	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Protect existing forested areas	Management	Protect existing areas of good forest cover.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Restore and maintain sites with good forest cover	Management	Restore degraded forested sites and maintain good forest cover.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Work with regulatory agencies and private partners to minimize the impacts of surface mining and other forms of mineral extraction	Management	Minimize the impacts of surface mining and other forms of mineral extraction.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Communicate impacts of fire to amphibian populations and habitats	Management	Reduce the impacts of campfires and prescribed fire along/near rock outcrops and cliff lines.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Restrict ATV traffic to approved trails and hardened stream crossings	Management	Restrict ATV traffic to approved trails and hardened stream crossings.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Raise awareness of the importance and diversity of amphibians in Kentucky	Management	Engage with the public to inform citizens of the impacts recreational activities can have on Cumberland Plateau salamanders and provide suitable alternatives.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Plethodon kentucki</i>	Cumberland Plateau Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Protect existing forested areas	Management	Protect existing areas of good forest cover.
<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Restore and maintain sites with good forest cover	Management	Restore degraded forested sites and maintain good forest cover.
<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Plethodon mississippi</i>	Mississippi Slimy Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Protect existing forested areas	Management	Protect existing areas of good forest cover.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Restore and maintain sites with good forest cover	Management	Restore degraded forested sites and maintain good forest cover.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Communicate impacts of fire to amphibian populations and habitats	Management	Reduce the impacts of campfires and prescribed fire along/near rock outcrops and cliff lines.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Raise awareness of the recreational impacts to amphibian habitat from off-trail ATV use	Management	Direct ATV traffic to approved trails and hardened stream crossings.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Work with regulatory agencies and private partners to minimize the impacts of surface mining and other forms of mineral extraction	Management	Minimize the impacts of surface mining and other forms of mineral extraction.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Plethodon pauleyi</i>	Yellow-spotted Woodland Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Protect existing forested areas	Management	Protect existing areas of good forest cover.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Restore and maintain sites with good forest cover	Management	Restore degraded forested sites and maintain good forest cover.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Work with regulatory agencies and private partners to minimize the impacts of surface mining and other forms of mineral extraction	Management	Minimize the impacts of surface mining and other forms of mineral extraction.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Raise awareness of the recreational impacts to amphibian habitat from off-trail ATV use	Management	Direct ATV traffic to approved trails and hardened stream crossings.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Protect cave, spring, and seep areas	Management	Protect caves, cool springs, seeps and small streams.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Identify and restore cave, spring, and seep habitats	Management	Identify, restore, and reforest cave, cool spring, seep and small stream habitats.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Pseudotriton montanus diastictus</i>	Midland Mud Salamander	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Protect existing forested areas	Management	Protect existing areas of good forest cover.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Restore and maintain sites with good forest cover	Management	Restore degraded forested sites and maintain good forest cover.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Prescribed fire management	Management	Use prescribed fire to manage forest habitat.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Protect woodland breeding ponds	Management	Protect existing woodland breeding ponds.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Restore and/or create woodland breeding ponds	Management	Restore and/or create woodland breeding ponds.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Restore and create upland breeding habitat	Management	Identify, restore, and/or create upland vegetated vernal pools and small breeding ponds in open habitat.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Management	Develop and implement decontamination procedures as a part of scientific collection permit regulations.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Scaphiopus halbrookii</i>	Eastern Spadefoot	Amend transportation regs to minimize disease transmission.	Management	Amend transportation regs to minimize disease transmission.
<i>Scaphiopus halbrookii</i>	Eastern Spadefoot	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Management	Develop education and outreach materials to inform the public of disease issues and minimization measures.
<i>Scaphiopus halbrookii</i>	Eastern Spadefoot	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Scaphiopus halbrookii</i>	Eastern Spadefoot	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.
<i>Siren intermedia</i>	Lesser Siren	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Siren intermedia</i>	Lesser Siren	Disease surveillance	Survey	Conduct baseline surveys for disease presence statewide.
<i>Siren intermedia</i>	Lesser Siren	Disease reporting portal	Management	Develop public reporting portal to notify agency of disease outbreak.
<i>Siren intermedia</i>	Lesser Siren	Develop disease response plan	Management	Develop agency response plan for reactive testing along leading edge of disease outbreaks when reported.

APX 6.1b Needs Identified for Bird SGCN

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Accipiter striatus</i>	Sharp-shinned Hawk	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Actitis macularius</i>	Spotted Sandpiper	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Actitis macularius</i>	Spotted Sandpiper	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Analyze Data from Kentucky Quail Focal Areas Surveys	Research	Partner with a university to analyze data from Kentucky's Quail Focal Area Surveys (2008-2022).
<i>Anas rubripes</i>	American Black Duck	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Anas rubripes</i>	American Black Duck	Monitor the effects of Highly Pathogenic Avian Influenzas and other diseases on bird populations	Research	Work with the KDFWR Wildlife Disease Program and SCWDS to monitor for current and emerging disease-related threats. Work with the KY Department of Agriculture, USDA and other state and federal agencies to mitigate disease-related threats, when they occur.
<i>Antrostomus carolinensis</i>	Chuck-will's-widow	Continue Kentucky nightjar survey	Survey	Continue the Kentucky nightjar survey until sufficient data is collected to calculate trends for this species.
<i>Antrostomus carolinensis</i>	Chuck-will's-widow	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds. Concerted efforts to survey for this and other nocturnal birds may be included in the 2nd BBA effort.
<i>Antrostomus carolinensis</i>	Chuck-will's-widow	Conduct research on life history, vital rates and beneficial habitat management actions for nightjars	Research	Work with a university to conduct detailed research on this species which may reveal causes for decline and management actions that may increase populations.
<i>Antrostomus carolinensis</i>	Chuck-will's-widow	Conduct or support research on the effects of pesticide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance and bird health. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Antrostomus carolinensis</i>	Chuck-will's-widow	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances (https://motus.org/). Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Antrostomus vociferus</i>	Whip-poor-will	Continue Kentucky nightjar survey	Survey	Continue the Kentucky nightjar survey until sufficient data has been collected to calculate trends for this species.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Anthus vociferus</i>	Whip-poor-will	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds. Concerted efforts to survey for this and other nocturnal birds may be included in the 2nd BBA effort.
<i>Anthus vociferus</i>	Whip-poor-will	Conduct research on life history, vital rates and beneficial habitat management actions for nightjars	Research	Work with a university to conduct detailed research on this species which may reveal causes for decline and management actions that may increase populations.
<i>Anthus vociferus</i>	Whip-poor-will	Conduct or support research on the effects of pesticide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance and bird health in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Anthus vociferus</i>	Whip-poor-will	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Ardea alba</i>	Great Egret	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Asio flammeus</i>	Short-eared Owl	Statewide Winter Survey	Survey	Conduct a statewide winter survey during multiple years to better understand the abundance and distribution of this species in the state.
<i>Asio otus</i>	Long-eared Owl	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Aythya affinis</i>	Lesser Scaup	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Aythya affinis</i>	Lesser Scaup	Monitor the effects of Highly Pathogenic Avian Influenzas and other diseases on bird populations	Research	Work with the KDFWR Wildlife Disease Program and SCWDS to monitor for current and emerging disease-related threats. Work with the KY Department of Agriculture, USDA and other state and federal agencies to mitigate disease-related threats, when they occur.
<i>Aythya marila</i>	Greater Scaup	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Aythya marila</i>	Greater Scaup	Monitor the effects of Highly Pathogenic Avian Influenzas and other diseases on bird populations	Research	Work with the KDFWR Wildlife Disease Program and SCWDS to monitor for current and emerging disease-related threats. Work with the KY Department of Agriculture, USDA and other state and federal agencies to mitigate disease-related threats, when they occur.
<i>Bartramia longicauda</i>	Upland Sandpiper	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Bonasa umbellus</i>	Ruffed Grouse	Monitor grouse population response to habitat improvement using Automated Recording Units	Survey	Use Automated Recording Units (ARUs) to conduct long term drumming surveys to evaluate the effects of habitat management on grouse populations at focal areas.
<i>Bonasa umbellus</i>	Ruffed Grouse	Expand LIDAR analysis across grouse range in eastern Kentucky	Research	Light detection and ranging (LIDAR) allows quantification of forest canopy height, which subsequently can be used to create habitat suitability models for various species. A past research collaboration between the University of Kentucky and KDFWR evaluated leaf-off LIDAR for depicting forest canopy height and grouse habitat, but the scope was limited to a few grouse focal areas. Expand this analysis across the entire eastern KY grouse range to permit estimates of occupancy and abundance for grouse and other species.
<i>Bonasa umbellus</i>	Ruffed Grouse	Research on vital rates and habitat use	Research	Capture grouse at study sites in eastern KY to study vital rates and habitat use under current conditions. Consider concurrent research on other birds that utilize young forest (e.g., whip-poor-will) where feasible.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Botaurus lentiginosus</i>	American Bittern	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's first BBA occurred from 1985-1991, and thus the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The second BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the second breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds. Concerted efforts to survey for marshbirds statewide may be included in the 2nd BBA effort.
<i>Botaurus lentiginosus</i>	American Bittern	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Butorides virescens</i>	Green Heron	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Calidris alba</i>	Sanderling	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Calidris alba</i>	Sanderling	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Calidris alba</i>	Sanderling	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances (https://motus.org/). Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Calidris alpina</i>	Dunlin	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Calidris alpina</i>	Dunlin	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Calidris alpina</i>	Dunlin	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances (https://motus.org/). Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Calidris himantopus</i>	Stilt Sandpiper	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Calidris himantopus</i>	Stilt Sandpiper	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Cardellina canadensis</i>	Canada Warbler	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cardellina canadensis</i>	Canada Warbler	Collaborate with partners to create tower strike incidental take permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Centronyx henslowii</i>	Henslow's Sparrow	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Centronyx henslowii</i>	Henslow's Sparrow	Support and Fund the Southern Grassland Bird Collaborative	Research	This research project is a collaboration between 4 bird joint ventures, research scientists and state agencies (southerngrasslandbirds.org). The project will focus on Northern Bobwhite, Eastern Meadowlark and Henslow's Sparrow and collect data across multiple states to determine the habitat factors that drive patterns of distribution and abundance of grassland birds and affect demographic rates associated with population growth or declines. After data collection, the group aims to produce spatially explicit maps to delineate those landscapes where conservation delivery will be most impactful.
<i>Centronyx henslowii</i>	Henslow's Sparrow	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Centronyx henslowii</i>	Henslow's Sparrow	Analyze Data from Kentucky Quail Focal Areas Surveys	Research	Partner with a university to analyze data from Kentucky's Quail Focal Area Surveys (2008-2022).
<i>Charadrius melodus</i>	Piping Plover	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Charadrius melodus</i>	Piping Plover	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Charadrius melodus</i>	Piping Plover	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Chlidonias niger</i>	Black Tern	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Chlidonias niger</i>	Black Tern	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Circus hudsonius</i>	Northern Harrier	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cistothorus stellaris</i>	Sedge Wren	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Conduct research to identify causes of decline	Research	Conduct research on demographics, abundance, productivity, migration and survival with the goal of identifying potential causes of declines and management that may benefit the species.
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Work with partners to develop incidental take permits for tower strikes	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Colinus virginianus</i>	Northern Bobwhite	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Colinus virginianus</i>	Northern Bobwhite	Monitor response at the landscape scale	Survey	Use Automated Recording Units (ARUs) to conduct acoustic surveys to evaluate the effects of habitat management on quail populations at focal areas.
<i>Colinus virginianus</i>	Northern Bobwhite	Analyze data from Kentucky Quail Focal Areas Surveys	Research	Partner with a university to analyze data from Kentucky's Quail Focal Area Surveys (2008-2022).
<i>Colinus virginianus</i>	Northern Bobwhite	Support and fund the Southern Grassland Bird Collaborative	Research	This research project is a collaboration between 4 bird joint ventures, research scientists and state agencies (southerngrasslandbirds.org). The project will focus on Northern Bobwhite, Eastern Meadowlark and Henslow's Sparrow and collect data across multiple states to determine the habitat factors that drive patterns of distribution and abundance of grassland birds and affect demographic rates associated with population growth or declines. After data collection, the group aims to produce spatially explicit maps to delineate those landscapes where conservation delivery will be most impactful.
<i>Colinus virginianus</i>	Northern Bobwhite	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Colinus virginianus</i>	Northern Bobwhite	Create a better understanding of landowner adoption of conservation practices	Research	Conduct human dimensions studies within focal areas to determine attributes of landowners who adopt practices for wildlife.
<i>Colinus virginianus</i>	Northern Bobwhite	Research on the carbon storage and sequestration potential of grasslands	Research	Utilize existing and planned stands of native warm-season grass to determine the carbon sequestration and storage potential of native grasslands. Work with the University of Kentucky, Kentucky State University and University of Tennessee extension professionals to identify and coordinate monitoring.
<i>Corvus corax</i>	Common Raven	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cygnus buccinator</i>	Trumpeter Swan	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cygnus buccinator</i>	Trumpeter Swan	Monitor the effects of Highly Pathogenic Avian Influenzas and other diseases on bird populations	Research	Work with the KDFWR Wildlife Disease Program and SCOWDS to monitor for current and emerging disease-related threats. Work with the KY Department of Agriculture, USDA and other state and federal agencies to mitigate disease-related threats, when they occur.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Dolichonyx oryzivorus</i>	Bobolink	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Dolichonyx oryzivorus</i>	Bobolink	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Dryobates borealis</i>	Red-cockaded Woodpecker	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Empidonax minimus</i>	Least Flycatcher	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds. Concerted efforts to survey for this and other high elevation species may be included in the 2nd BBA effort.
<i>Empidonax traillii</i>	Willow Flycatcher	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Empidonax traillii</i>	Willow Flycatcher	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Euphagus carolinus</i>	Rusty Blackbird	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Euphagus carolinus</i>	Rusty Blackbird	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Euphagus carolinus</i>	Rusty Blackbird	Conduct or support research on the effects of pesticides and other contaminants on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticides and other contaminants on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Euphagus carolinus</i>	Rusty Blackbird	Conduct research to identify causes of decline	Research	Conduct research on demographics, abundance, migration and survival with the goal of identifying potential causes of declines and management that may benefit the species.
<i>Euphagus carolinus</i>	Rusty Blackbird	Collaborate with partners to create tower strike incidental take permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Falco peregrinus</i>	Peregrine Falcon	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Falco peregrinus</i>	Peregrine Falcon	Monitor for the effects of Highly Pathogenic Avian Flu and other diseases	Research	Work with veterinary diagnostic labs to monitor deceased specimens for Highly Pathogenic Avian Flu and other diseases. Continue to monitor the state's nesting population to look for population level effects
<i>Falco peregrinus</i>	Peregrine Falcon	Monitor for the effects of the disease Trichomoniasis on nesting survival	Research	Test for trichomonas in nestlings and monitor subsequent survival. Research the efficacy of treatment on survival.
<i>Falco sparverius</i>	American Kestrel	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Falco sparverius</i>	American Kestrel	Conduct research to identify causes of decline	Research	Conduct research on demographics, abundance, productivity and survival with the goal of identifying potential causes of declines and management that may benefit the species.
<i>Falco sparverius</i>	American Kestrel	Monitor for exposure to pesticides, rodenticides and other contaminants	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. Work with veterinary labs to test deceased individuals for exposure to contaminants and other causes of mortality. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Gallinago delicata</i>	Wilson's Snipe	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Gallinula galeata</i>	Common Gallinule	Survey for occurrence	Survey	This species is data deficient and more data on occurrence is needed.
<i>Gallinula galeata</i>	Common Gallinule	Acquisition and protection of habitat	Management	Acquire high quality suitable habitat under public ownership or protect via permanent easements. For this species, the protection of emergent marshes dominated by herbaceous aquatic vegetation would be particularly beneficial. Areas near to or within the Highland Rim and Shawnee Hills (Green River region), especially those near Sloughs WMA, Green River Lake WMA, and in Muhlenberg, Hopkins and Ohio County should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for marshbird species.
<i>Geothlypis formosa</i>	Kentucky Warbler	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Geothlypis formosa</i>	Kentucky Warbler	Collaborate with partners to create tower strike incidental lake permit	Management	Work with the USFWS to develop an incidental lake permit process for relevant industries.
<i>Grus americana</i>	Whooping Crane	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Monitor for the effects of Highly Pathogenic Avian Flu	Survey	Continue to monitor the state's nesting population, at least through 2027, to look for population level effects of Highly Pathogenic Avian Flu.
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Surveillance for disease and contaminant threats	Research	Work with the KDFWR Wildlife Disease Program and SCWDS to monitor for current and emerging threats from diseases and contaminants.
<i>Hylocichla mustelina</i>	Wood Thrush	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Hylocichla mustelina</i>	Wood Thrush	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Hylocichla mustelina</i>	Wood Thrush	Collaborate with partners to create tower strike incidental lake permit	Management	Work with the USFWS to develop an incidental lake permit process for relevant industries.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Ixobrychus exilis</i>	Least Bittern	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's first BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The second BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the second breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds. Concerted efforts to survey for marshbirds statewide may be included in the 2nd BBA effort.
<i>Ixobrychus exilis</i>	Least Bittern	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Loggerhead Shrike Monitoring	Research	Continue to monitor loggerhead shrike populations using color bands to assess survival. Survey for nesting locations to evaluate nest success.
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Conduct research to identify causes of decline	Research	Conduct research on demographics, abundance, productivity, migration and survival with the goal of identifying potential causes of declines and management that may benefit the species. Monitor for factors affecting survival including disease and anthropogenic causes of mortality.
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. Test deceased individuals for pesticide accumulation and other causes of mortality. Sample live birds for contaminants and other potential causes of decline as methods become available. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Limothlypis swainsonii</i>	Swainson's Warbler	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Limnithlypis swainsonii</i>	Swainson's Warbler	Conduct or support research on changes in habitat abundance and distribution	Research	Conduct or support research on changes in abundance and distribution of Giant Cane and Rhododendron, and on the abundance and habitat use of Swainson's Warblers in Kentucky or as part of broader regional initiatives.
<i>Limnithlypis swainsonii</i>	Swainson's Warbler	Collaborate with partners to create tower strike incidental take permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Lophodytes cucullatus</i>	Hooded Merganser	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lophodytes cucullatus</i>	Hooded Merganser	Monitor the effects of Highly Pathogenic Avian Influenzas and other diseases on bird populations	Research	Work with the KDFWR Wildlife Disease Program and SCWDS to monitor for current and emerging disease-related threats. Work with the KY Department of Agriculture, USDA and other state and federal agencies to mitigate disease-related threats, when they occur.
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Support and fund expansion of the Motus network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Pandion haliaetus</i>	Osprey	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Collaborate with partners to create tower strike incidental take permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Peucaea aestivalis</i>	Bachman's Sparrow	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds. Concerted efforts to survey for this species and others at Fort Campbell may be included in the 2nd BBA effort.
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pluvialis dominica</i>	American Golden-plover	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pluvialis dominica</i>	American Golden-plover	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Pluvialis squatarola</i>	Black-bellied Plover	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pluvialis squatarola</i>	Black-bellied Plover	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Pluvialis squatarola</i>	Black-bellied Plover	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Podiceps auritus</i>	Horned Grebe	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Podiceps auritus</i>	Horned Grebe	Monitor the effects of Highly Pathological Avian Influenzas and other diseases on bird populations	Research	Work with the KDFWR Wildlife Disease Program and SCWDS to monitor for current and emerging disease-related threats. Work with the KY Department of Agriculture, USDA and other state and federal agencies to mitigate disease-related threats, when they occur.
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Monitor the effects of Highly Pathological Avian Influenzas and other diseases on bird populations	Research	Work with the KDFWR Wildlife Disease Program and SCWDS to monitor for current and emerging disease-related threats. Work with the KY Department of Agriculture, USDA and other state and federal agencies to mitigate disease-related threats, when they occur.
<i>Porzana carolina</i>	Sora	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Porzana carolina</i>	Sora	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Porzana carolina</i>	Sora	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Protonotaria citrea</i>	Prothonotary Warbler	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Protonotaria citrea</i>	Prothonotary Warbler	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Protonotaria citrea</i>	Prothonotary Warbler	Collaborate with partners to create tower strike incidental take permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Rallus elegans</i>	King Rail	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Rallus elegans</i>	King Rail	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Rallus limicola</i>	Virginia Rail	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's first BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The second BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the second breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds. Concerted efforts to survey for marshbirds statewide may be included in the 2nd BBA effort.
<i>Rallus limicola</i>	Virginia Rail	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Rallus limicola</i>	Virginia Rail	Support and fund expansion of the Motus network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Riparia riparia</i>	Bank Swallow	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Riparia riparia</i>	Bank Swallow	Conduct or support research on the effects of pesticide use on aerial insectivores	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Scolopax minor</i>	American Woodcock	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Scolopax minor</i>	American Woodcock	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Scolopax minor</i>	American Woodcock	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Setophaga cerulea</i>	Cerulean Warbler	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Setophaga cerulea</i>	Cerulean Warbler	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Setophaga cerulea</i>	Cerulean Warbler	Collaborate with partners to create tower strike incidental lake permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Setophaga discolor</i>	Prairie Warbler	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Setophaga discolor</i>	Prairie Warbler	Collaborate with partners to create tower strike incidental lake permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Setophaga striata</i>	Blackpoll Warbler	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Setophaga striata</i>	Blackpoll Warbler	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this and other migratory species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Setophaga striata</i>	Blackpoll Warbler	Collaborate with partners to create tower strike incidental lake permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Setophaga tigrina</i>	Cape May Warbler	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Setophaga tigrina</i>	Cape May Warbler	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this and other migratory species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Setophaga tigrina</i>	Cape May Warbler	Collaborate with partners to create tower strike incidental lake permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Setophaga virens</i>	Black-throated Green Warbler	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Setophaga virens</i>	Black-throated Green Warbler	Hemlock Woolly Adelgid Research	Research	Conduct or support research on the decline of Eastern Hemlock trees from Hemlock Woolly Adelgid and the efficacy of using chemical and biological treatments to protect hemlock trees. Conduct or support continued population monitoring of Black-throated Green Warbler in the affected region of Kentucky.
<i>Setophaga virens</i>	Black-throated Green Warbler	Collaborate with partners to create tower strike incidental lake permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Spiza americana</i>	Dickcissel	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Spiza americana</i>	Dickcissel	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Spiza americana</i>	Dickcissel	Analyze Data from Kentucky Quail Focal Areas Surveys	Research	Partner with a university to analyze data from Kentucky's Quail Focal Area Surveys (2008-2022).
<i>Spiza americana</i>	Dickcissel	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Spiza americana</i>	Dickcissel	Collaborate with partners to create tower strike incidental take permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Spizella pusilla</i>	Field Sparrow	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Spizella pusilla</i>	Field Sparrow	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Spizella pusilla</i>	Field Sparrow	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Spizella pusilla</i>	Field Sparrow	Analyze Data from Kentucky Quail Focal Areas Surveys	Research	Partner with a university to analyze data from Kentucky's Quail Focal Area Surveys (2008-2022).
<i>Sturnella antillarum athalassos</i>	Interior Least Tern	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Sturnella antillarum athalassos</i>	Interior Least Tern	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel full life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Sturnella magna</i>	Eastern Meadowlark	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Sturnella magna</i>	Eastern Meadowlark	Support and Fund the Southern Grassland Bird Collaborative	Research	This research project is a collaboration between 4 bird joint ventures, research scientists and state agencies (southerngrasslandbirds.org). The project will focus on Northern Bobwhite, Eastern Meadowlark and Henslow's Sparrow and collect data across multiple states to determine the habitat factors that drive patterns of distribution and abundance of grassland birds and affect demographic rates associated with population growth or declines. After data collection, the group aims to produce spatially explicit maps to delineate those landscapes where conservation delivery will be most impactful.
<i>Sturnella magna</i>	Eastern Meadowlark	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Sturnella magna</i>	Eastern Meadowlark	Analyze Data from Kentucky Quail Focal Areas Surveys	Research	Partner with a university to analyze data from Kentucky's Quail Focal Area Surveys (2008-2022).
<i>Thryomanes bewickii</i>	Bewick's Wren	Conduct 2nd Statewide Kentucky Breeding Bird Atlas (BBA)	Survey	Kentucky's 1st BBA occurred from 1985-1991, thus, the data is now over 30 years old. Atlases are extremely valuable tools for bird conservation, providing information on the current distribution of birds and (if they are repeated) how this is changing over time. The 2nd BBA will help to identify important areas for this species which may not already be obvious and develop conservation strategies in those areas. Changes in distribution documented through the 2nd breeding bird atlas will help assess the effects of climate change, habitat loss and other widespread issues on this species. Collecting a new dataset using modern methods (e-bird) also sets the stage for long-term monitoring for this species and all of Kentucky's breeding birds.
<i>Thryomanes bewickii</i>	Bewick's Wren	Conduct or support research on the effects of pesticide and fungicide use on bird populations	Research	Conduct, facilitate and fund research on the effects of pesticide use on prey abundance, bird health and direct mortality in birds. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Tringa flavipes</i>	Lesser Yellowlegs	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Tringa flavipes</i>	Lesser Yellowlegs	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Tringa flavipes</i>	Lesser Yellowlegs	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Tringa solitaria</i>	Solitary Sandpiper	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Tringa solitaria</i>	Solitary Sandpiper	Evaluate and support research on the impacts of climate change on shorebird populations	Research	Support research to better understand the role of climate change in contributing to shorebird population declines and management efforts that may curtail declines. As appropriate, work with multi-state working groups, flyways and joint ventures on large scale research projects. Publish results in peer-reviewed journals.
<i>Tyto alba</i>	Barn Owl	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Tyto alba</i>	Barn Owl	Monitor for exposure to pesticides, rodenticides and other contaminants	Research	Work with veterinary labs to test deceased individuals for exposure to contaminants and other causes of mortality.
<i>Tyto alba</i>	Barn Owl	Monitor for prevalence and severity of diseases	Research	Work with veterinary labs to test deceased individuals for exposure to various diseases that may have population-level effects.
<i>Tyto alba</i>	Barn Owl	Conduct research on genetics	Research	Conduct research on genetics to evaluate factors that may affect population health.
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Golden Winged Warbler Survey	Survey	Continue golden-winged warbler surveys to assess population trends. Expand surveys to new areas to better document nesting distribution.
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Support and Fund Expansion of the Motus Network in Kentucky	Research	Support the expansion of the Motus network in Kentucky and conduct or support tagging projects for this species. There is a need to better understand the migratory movements and survival of this species. Automated radio telemetry allows researchers to track small species over large distances. Data collected through this research will fuel life cycle conservation for this migratory species by allowing for a better understanding of migration paths, stopover locations and winter areas.
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Support research to identify causes of decline	Research	Support research on demographics, abundance, productivity, migration and survival with the goal of identifying potential causes of declines and management that may benefit the species.
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Collaborate with partners to create tower strike incidental take permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Collaborate with partners to create tower strike incidental take permit	Management	Work with the USFWS to develop an incidental take permit process for relevant industries.
<i>Vireo bellii</i>	Belt's Vireo	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

APX 6.1c Needs Identified for Crustacean SGCN

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Barbicambarus cornutus</i>	Bottlebrush Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Barbicambarus cornutus</i>	Bottlebrush Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Caecidotea barri</i>	Clifton Cave Isopod	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarellus puer</i>	Swamp Dwarf Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Cambarellus shufeldtii</i>	Cajun Dwarf Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Cambarus adustus</i>	Dusky Mudbug	Continued monitoring for new populations	Survey	Conduct additional surveys for new populations of the species in Kentucky.
<i>Cambarus adustus</i>	Dusky Mudbug	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarus bartonii cavatus</i>	Appalachian Brook Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Cambarus bartonii cavatus</i>	Appalachian Brook Crayfish	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Cambarus batchi</i>	Bluegrass Crayfish	Surveys in Pulaski and Jackson counties for new population	Survey	Surveys for burrowing crayfish populations in Jackson and Pulaski counties where the species has recently been reported.
<i>Cambarus bouchardi</i>	Big South Fork Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Cambarus bouchardi</i>	Big South Fork Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarus buntingi</i>	Longclaw Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Cambarus buntingi</i>	Longclaw Crayfish	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Cambarus callainus</i>	Big Sandy Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarus deweesae</i>	Valley Flame Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Cambarus deweesae</i>	Valley Flame Crayfish	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Cambarus dubius</i>	Upland Burrowing Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Cambarus dubius</i>	Upland Burrowing Crayfish	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Cambarus dubius was redescribed with a restricted range outside of Kentucky. Populations in Kentucky formerly referred to as <i>C. dubius</i> should be analyzed to determine if undescribed taxa occur in the state.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Cambarus friaufi</i>	Hairy Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarus graysoni</i>	Twospot Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Cambarus graysoni</i>	Twospot Crayfish	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Cambarus guenterii</i>	Redbird Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Cambarus guenterii</i>	Redbird Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarus hatfieldi</i>	Tug Valley Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarus hazardi</i>	Brawny Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Cambarus hazardi</i>	Brawny Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarus jezerinaci</i>	Spiny Scale Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Cambarus jezerinaci</i>	Spiny Scale Crayfish	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Cambarus ortmanni</i>	Ortmann's Mudbug	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Cambarus ortmanni</i>	Ortmann's Mudbug	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Cambarus parvoculus</i>	Mountain Midget Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarus parvoculus</i>	Mountain Midget Crayfish	Encourage proper forest management	Management	Develop forest management riparian buffer zone strategies and to reduce sedimentation.
<i>Cambarus parvoculus</i>	Mountain Midget Crayfish	Incorporate erosion control and bank stabilization on private tracts	Management	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.
<i>Cambarus rusticiformis</i>	Depression Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Cambarus rusticiformis</i>	Depression Crayfish	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Cambarus sciotensis</i>	Teays River Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Cambarus sciotensis</i>	Teays River Crayfish	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Cambarus striatus</i>	Ambiguous Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Cambarus striatus</i>	Ambiguous Crayfish	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Cambarus taylori</i>	Cutshin Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Cambarus taylori</i>	Cutshin Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Creaserinus fodiens</i>	Digger Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Creaserinus fodiens</i>	Digger Crayfish	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Faxonius bellator</i>	Screaming Eagle Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Faxonius bisectus</i>	Crittenden Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Faxonius bisectus</i>	Crittenden Crayfish	Continued monitoring for new populations	Survey	Conduct additional surveys for new populations of the species in Kentucky
<i>Faxonius bisectus</i>	Crittenden Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Faxonius burri</i>	Blood River Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Faxonius burri</i>	Blood River Crayfish	Continued monitoring for new populations	Survey	Conduct additional surveys for new populations of the species in Kentucky
<i>Faxonius burri</i>	Blood River Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Faxonius elix</i>	Mowild Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Faxonius elix</i>	Mowild Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Faxonius jeffersoni</i>	Louisville Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Faxonius jeffersoni</i>	Louisville Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Faxonius kentuckiensis</i>	Kentucky Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Faxonius kentuckiensis</i>	Kentucky Crayfish	Continued monitoring for new populations	Survey	Conduct additional surveys for new populations of the species in Kentucky.
<i>Faxonius kentuckiensis</i>	Kentucky Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Faxonius lancifer</i>	Shrimp Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Faxonius margorectus</i>	Livingston Crayfish	Continued monitoring for new populations	Survey	Conduct additional surveys for new populations of the species in Kentucky.
<i>Faxonius margorectus</i>	Livingston Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Faxonius margorectus</i>	Livingston Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Faxonius palmeri palmeri</i>	Gray-Speckled Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Faxonius pardalotus</i>	Leopard Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Faxonius rafinesquei</i>	Rough River Crayfish	Continued monitoring for new populations	Survey	Conduct additional surveys for new populations of the species in Kentucky.
<i>Faxonius rafinesquei</i>	Rough River Crayfish	Continued monitoring for non-native species introduction	Survey	Annual surveys at public access points to monitor for non-native crayfish species.
<i>Faxonius rafinesquei</i>	Rough River Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Faxonius raymondi</i>	Norwood River Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Faxonius ronaldi</i>	Mud River Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Faxonius rusticus</i>	Rusty Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Faxonius rusticus</i>	Rusty Crayfish	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Faxonius tricuspis</i>	Western Highland Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Gammarus bousfieldi</i>	Bousfield's Amphipod	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lacunicambarus chimera</i>	Crawzilla Crawdad	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Lacunicambarus chimera</i>	Crawzilla Crawdad	Conduct field surveys and genetic analyses to refine taxonomic status of the species in Kentucky	Research	Populations of the species in Kentucky should be analyzed to determine if undescribed taxa occur in the state.
<i>Macrobrachium ohione</i>	Ohio Shrimp	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Orconectes barri</i>	Cumberland Plateau Cave Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Orconectes inermis inermis</i>	Ghost Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Orconectes packardii</i>	Appalachian Cave Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Orconectes pellucidus</i>	Mammoth Cave Crayfish	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Palaemonias ganteri</i>	Mammoth Cave Shrimp	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Procambarus viaevidis</i>	Vernal Crayfish	Conduct field surveys to determine population status, life history, and habitat requirements of the species in Kentucky	Survey	Collect baseline information on the species range, habitat preferences, life history, and population status in Kentucky.
<i>Stygobromus vitreus</i>	An Amphipod	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

APX 6.1d Needs Identified for Fishes and Lamprey SGCN

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Acipenser fulvescens</i>	Lake Sturgeon	Population monitoring in the upper Cumberland River drainage	Survey	Continue sampling in the Cumberland River drainage using baited trotlines and collect data on length, weight, age, condition, and genetic diversity. All propagated young-of-year need to be PIT-tagged prior to release as well as all individuals captured during surveys without tags.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Identification and assessment of spawning locations and habitat	Survey	Preferred spawning habitat for Lake Sturgeon in the Cumberland River drainage is unknown. Potential spawning sites could be located by tracking reproductively mature adults during seasonal movements and validated by visual observation of spawning events and inspection of the substrate for eggs.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Evaluate seasonal movement patterns of adults	Research	Tracking reproductively mature adults using telemetry methods will be necessary to assess seasonal movements and locate potential spawning sites.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Population genetics research	Research	Parent-offspring relationships, genetic diversity, and inter-individual relatedness has not been adequately assessed for Lake Sturgeon being reintroduced in the Cumberland River drainage.
<i>Acipenser fulvescens</i>	Lake Sturgeon	Continue interstate collaboration through the Southeast Lake Sturgeon Working Group on reintroduction and monitoring efforts in the Cumberland River	Management	Annual Lake Sturgeon reintroduction and monitoring efforts in the Cumberland River has been coordinated with the Southeastern Lake Sturgeon Working Group, a partnership of federal, state, and local agencies, non-governmental organizations, and universities.
<i>Allothistium maydeni</i>	Redlips Darter	Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	More survey effort is needed in the Red River, Obey River, and Little South Fork Cumberland River drainages, where the species occurred historically. In currently occupied watersheds (Buck Creek, Rockcastle River, and Big South Fork), surveys are needed at new localities having suitable habitat that may result in new occurrences.
<i>Allothistium maydeni</i>	Redlips Darter	Identify watersheds containing the most robust populations and work to ensure they are protected	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Allothistium maydeni</i>	Redlips Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Allothistium maydeni</i>	Redlips Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Redlips Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Allothistium maydeni</i>	Redlips Darter	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are often difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied. Its presence has been sporadic and inconsistent in past survey efforts.
<i>Allothistium maydeni</i>	Redlips Darter	Assessment of watershed size, connectivity, and colonization potential among tributaries currently supporting populations	Research	Research by Compton and Taylor suggested that movement is minimal to nonexistent among tributary watersheds due to habitat degradation and impoundment.
<i>Alosa alabamae</i>	Alabama Shad	Targeted surveys in the lower Ohio, Tennessee, and Cumberland Rivers, where the species was known historically	Survey	Recently known only from the Mississippi River, where it presumably passes through during its seasonal migrations; other records in Kentucky waters predate 1900.
<i>Alosa alabamae</i>	Alabama Shad	Targeted surveys in the Mississippi River bordering western Kentucky	Survey	Missouri Department of Conservation's Big Rivers and Wetlands Field Station conducts fish sampling on a regular basis in the Mississippi River bordering Missouri and Kentucky. A coordinated effort between agencies would be most effective to locate this species.
<i>Alosa alabamae</i>	Alabama Shad	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Alabama Shad and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Amblyopsis spelaea</i>	Northern Cavefish	Surveys of cave systems between the main population centers in Grayson, Hart, and Hardin counties to determine levels of isolation or continuity	Survey	Surveys of cave systems are needed that occur between the main centers of distribution for Northern Cavefish in portions of Grayson, Hardin, and Hart counties to determine if the two main population centers in Kentucky are continuous or isolated by the Hart County Ridge.
<i>Amblyopsis spelaea</i>	Northern Cavefish	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Amblyopsis spelaea</i>	Northern Cavefish	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Northern Cavefish and evaluate the efficacy of eDNA for detecting the species in subterranean aquatic habitats compared with traditional survey methods.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Amblyopsis spelaea</i>	Northern Cavefish	Assess impacts of hydrological manipulations and increased siltation on cavefish populations	Research	As recommended by Niemiller and Fitzpatrick, studies are needed to assess the actual rather than speculative impacts on cavefish populations from increased siltation and sedimentation. Also, data are lacking on how the species respond to hydrological manipulations and the impacts of such manipulations on local populations.
<i>Amblyopsis spelaea</i>	Northern Cavefish	Population genetics research	Research	Future genetic work should focus on determining relationships of southern populations of Northern Cavefish in the Mammoth Cave area with those to the north in the Sinking Creek area of Breckinridge County. This work is currently underway by M.L. Niemiller (University of Alabama in Huntsville).
<i>Amblyopsis spelaea</i>	Northern Cavefish	Determine if Rainbow Trout and Banded Sculpin significantly prey on Northern Cavefish	Research	Conduct in situ studies to determine if Rainbow Trout (introduced) and Banded Sculpin have significant impacts on Northern Cavefish and other subterranean species, and determine their influence on subterranean faunal abundance and behavior.
<i>Ammocrypta clara</i>	Western Sand Darter	Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	More survey effort is needed in the Green and North Fork Kentucky rivers to determine the extent of the species' distribution within those systems. Surveys are also needed in historically occupied watersheds (Cumberland River in Wayne County, and Wolf Creek in Martin County) to determine if the species still persists in those systems.
<i>Ammocrypta clara</i>	Western Sand Darter	Identify watersheds containing the most robust populations and work to ensure they are protected	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Ammocrypta clara</i>	Western Sand Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Ammocrypta clara</i>	Western Sand Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Western Sand Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Ammocrypta clara</i>	Western Sand Darter	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are often difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied. Its presence has been sporadic and inconsistent in past survey efforts.
<i>Ammocrypta clara</i>	Western Sand Darter	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information for Kentucky populations is limited to unpublished field observations of habitat associations and estimated spawning period based on studies in other parts of the species' range. Spawning habitat, behavior, movements, and growth in Kentucky have not been studied. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Anguilla rostrata</i>	American Eel	Targeted surveys at historic and new locations in large rivers and tributaries to determine the species' distributional status and population densities	Survey	Available distributional records are scattered and from different sources (i.e., angler reports, scientific collections, and incidental captures during sportfish sampling). Additional information (e.g., specimen data) on eels captured is largely unavailable. Most records are based on a single individual that was released upon capture.
<i>Anguilla rostrata</i>	American Eel	Improve coordination between agencies and divisions conducting fish sampling using multiple gear types on large streams and rivers to report eel captures	Survey	Available distributional records are scattered and from different sources (i.e., angler reports, scientific collections, and incidental captures during sportfish sampling). Additional information (e.g., specimen data) on eels captured is largely unavailable. Most records are based on a single individual that was released upon capture.
<i>Anguilla rostrata</i>	American Eel	Public outreach encouraging anglers who capture eels to report photos, location data, and other information (e.g., length and weight) to help with monitoring efforts	Survey	Available distributional records are scattered and from different sources (i.e., angler reports, scientific collections, and incidental captures during sportfish sampling). Additional information (e.g., specimen data) on eels captured is largely unavailable. Most records are based on a single individual that was released upon capture.
<i>Anguilla rostrata</i>	American Eel	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Anguilla rostrata</i>	American Eel	Habitat use, movements, and basic population information	Research	Information on distribution and habitat affinities is limited and based mostly on anecdotal observations.
<i>Anguilla rostrata</i>	American Eel	Eliminate or reduce barriers to fish passage	Management	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal. Improve fish passage at hydropower dams.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Atractosteus spatula</i>	Alligator Gar	Targeted surveys of lotic and lentic habitats in the Four Rivers region of western Kentucky using gill nets with appropriately sized bar-mesh sizes.	Survey	Very little survey effort has been made for Alligator Gar in western Kentucky; therefore, information on survival, habitat use, and movements is severely limited.
<i>Atractosteus spatula</i>	Alligator Gar	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Atractosteus spatula</i>	Alligator Gar	Additional research to determine movements and habitat use in western Kentucky	Research	Expand upon research initiated by Murray State University examining movements of acoustic and satellite-tagged individuals in the Four Rivers region of western Kentucky.
<i>Atractosteus spatula</i>	Alligator Gar	Improve communication and cooperation with commercial fishers and recreational anglers on reporting Alligator Gar captures	Management	Better outreach and education, including how to identify the species, are needed to increase awareness of the Alligator Gar restoration program and why it is important.
<i>Atractosteus spatula</i>	Alligator Gar	Continue interstate collaboration and information exchange on management and conservation through the Alligator Gar Technical Committee	Management	The Alligator Gar Technical Committee was formed in 2008 in conjunction with the Southern Division of the American Fisheries Society to provide a network for fisheries professionals to collaborate and exchange information on the management and conservation of the species across its historic range.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Improve coordination between agencies and divisions conducting fish sampling using multiple gear types on large streams and rivers to acquire additional records and specimens	Survey	Current distributional knowledge is limited due to the difficulty of sampling large river habitats using wadeable fish sampling methods (i.e., backpack electrofishing and seining). Use of alternative methods, such as boat electrofishing, and collaboration among professionals working in different programs is important to obtain more accurate distributional estimates.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Carpiodes velifer</i>	Highfin Carpsucker	DNA sampling for specimen identification and to assess introgressive hybridization with other carpsuckers	Research	Morphological intermediacy has been documented among the three species of Carpiodes (carpsuckers), which could potentially make accurate identification of species difficult, especially between Highfin and River carpsuckers. DNA samples (fin clips) should be taken from any specimens identified as Highfin Carpsucker to evaluate identification and possible introgressive hybridization.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Highfin Carpsucker and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). A caveat in this case is the potential problem of hybridization.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Available biological and life-history information for this species is based on populations outside of Kentucky. Reproductive biology is poorly known and the spawning period in Kentucky is a rough estimate based on anecdotal reports of adults in breeding condition. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Eliminate or reduce barriers to fish passage	Management	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal. Improve fish passage at hydropower dams.
<i>Carpiodes velifer</i>	Highfin Carpsucker	Modify current dam operations on large rivers to restore a more natural hydrograph	Management	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Conduct periodic monitoring (5-year intervals) of extant populations and search for new populations following established methods	Survey	Standardized monitoring protocols developed by Black et al. (2013) are to be used in survey activities to evaluate the species' distribution and viability.
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Continue research on population genetics	Research	Evaluate gene flow and genetic diversity across the species' range.
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Work with federal and other state partners with implementation of actions necessary for species recovery and delisting, as described in the Blackside Dace Recovery Plan	Management	As outlined in the USFWS Recovery Plan for the Blackside Dace (2008), implementation of information gathering (research) and management is ongoing and needs to continue in order to fulfill recovery objectives.
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Consult with agency partners and species experts to determine what biological or ecological studies are needed to better understand the species' life history and sensitivity to threats	Management	Information such as sensitivity to elevated conductivity levels will help determine what management strategies are needed to improve the species' status across its range.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Clinostomus elongatus</i>	Redside Dace	Conduct periodic monitoring (5-year intervals) of extant populations and search for new populations following established methods.	Survey	The distribution of Redside Dace in Kentucky is well-documented and populations in the Licking and Red (Kentucky) River drainages are currently stable. Periodic surveys of populations should be continued every 5-10 years to monitor changes in distribution, abundance, and habitat conditions (Thomas and Brandt 2017). These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Clinostomus elongatus</i>	Redside Dace	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life history information for this species in Kentucky is limited to anecdotal observations of habitat association. More complete information on spawning locations and behavior, movements, habitat use throughout the year at different life stages, and sensitivity to stressors is needed to implement effective monitoring and conservation management of the species.
<i>Cycleptus elongatus</i>	Blue Sucker	Targeted surveys at historic and new locations in large rivers and tributaries to determine the species' distributional status and population densities	Survey	Enhance survey efforts through coordination between agencies and divisions (in Kentucky) and states bordering the Ohio and Mississippi rivers using boat electrofishing and gillnets.
<i>Cycleptus elongatus</i>	Blue Sucker	Improve coordination between agencies and divisions conducting fish sampling using multiple gear types on large streams and rivers to acquire additional records and specimens	Survey	Current distributional knowledge is limited due to the difficulty of sampling large river habitats using wadeable fish sampling methods (i.e., backpack electrofishing and seining). Use of alternative methods, such as boat electrofishing, and collaboration among professionals working in different programs is important to obtain more accurate distributional estimates.
<i>Cycleptus elongatus</i>	Blue Sucker	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Cycleptus elongatus</i>	Blue Sucker	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Blue Sucker and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in detecting presence in sections of large rivers and tributaries with potentially suitable habitat, but lacking occurrence records.
<i>Cycleptus elongatus</i>	Blue Sucker	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information for Kentucky populations is limited to anecdotal observations of habitat association and spawning period. Spawning locations, behavior and movement have not been observed. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Cycleptus elongatus</i>	Blue Sucker	Eliminate or reduce barriers to fish passage	Management	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal. Improve fish passage at hydropower dams. Modify current dam operations on large rivers to restore a more natural hydrograph to meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.
<i>Cycleptus elongatus</i>	Blue Sucker	Prevent overharvest that could result in population extirpations	Management	Review recreational and commercial fishing regulations and adjust as needed to ensure population sustainability.
<i>Cycleptus elongatus</i>	Blue Sucker	Reduce waste effluents and runoff into aquatic systems	Management	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff.
<i>Cyprinella camura</i>	Bluntnose Shiner	Targeted surveys in the Obion Creek and Reelfoot Lake watersheds to determine status in historical range and potential new occurrences	Survey	Determine the species' status in the Obion Creek watershed and the possibility of new occurrences in the Reelfoot Lake watershed and lower Mississippi River floodplain habitats in Fulton County.
<i>Cyprinella camura</i>	Bluntnose Shiner	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	In Kentucky, the Bluntnose Shiner is currently known from Terrapin Creek and minor North Fork Obion River tributaries in Graves County. Regular periodic monitoring (5-year intervals) at selected localities in these watersheds is needed and should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.
<i>Cyprinella camura</i>	Bluntnose Shiner	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Known life-history information for Kentucky populations is based on unpublished field observations of spawning period, habitat associations, and age and growth. Diet has not been studied and reproductive behavior is presumed based on other Cyprinella species. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Cyprinella camura</i>	Bluntnose Shiner	Determine vulnerability to displacement or loss through introgressive hybridization and competition with the Red Shiner (<i>Cyprinella lutrensis</i>)	Research	Examine potential for hybridization and competition between the Bluntnose Shiner and Red Shiner, particularly in relation to habitat and water quality degradation, as a possible reason for decline or extirpation in the Obion Creek watershed.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Cyprinella venusta</i>	Blacktail Shiner	Targeted surveys in the Four Rivers region of western Kentucky to refine distributional limits and population densities	Survey	Recent records for this species in the lower Ohio and Tennessee River drainages are sporadic. Additional surveys in these drainages are needed.
<i>Cyprinella venusta</i>	Blacktail Shiner	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Cyprinella venusta</i>	Blacktail Shiner	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Known life-history information for Kentucky populations is limited to unpublished field observations of spawning period and habitat associations. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Cyprinella venusta</i>	Blacktail Shiner	Determine vulnerability to displacement or loss through introgressive hybridization and competition with the Red Shiner (<i>Cyprinella lutrensis</i>)	Research	Examine potential hybridization and competition between the Blacktail Shiner and Red Shiner, particularly in relation to habitat and water quality degradation, where the two species are sympatric in the Four Rivers region of western Kentucky.
<i>Cyprinella venusta</i>	Blacktail Shiner	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	In floodplain lakes and lowland streams in the lower Ohio River drainage, the presence of this species has been sporadic and inconsistent in past survey efforts. Because these habitats are often difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied.
<i>Erimystax insignis</i>	Blotched Chub	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	The only remaining extant population in Kentucky is in the Red River (lower Cumberland) drainage. This population should be monitored in coordination with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Erimystax insignis</i>	Blotched Chub	Targeted surveys in the Little South Fork Cumberland River	Survey	More intensive surveys for this species are needed in the Little South Fork, where it was last collected in 1980 from multiple localities.
<i>Erimystax insignis</i>	Blotched Chub	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Known life-history information for Kentucky populations is limited to unpublished field observations of spawning period and habitat associations. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Erimystax insignis</i>	Blotched Chub	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Blotched Chub and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be especially useful in the Little South Fork.
<i>Erimystax x-punctatus</i>	Gravel Chub	Targeted surveys in the Ohio River at historic and recent occurrence localities to assess the species' current status as part of Kentucky's ichthyofauna	Survey	Considered extirpated in the Green River. The only known recent occurrence of this species in Kentucky is in the Ohio River; however, additional survey effort is needed to determine if an established population exists or if the few available records represent waifs from northern tributaries.
<i>Erimystax x-punctatus</i>	Gravel Chub	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Gravel Chub and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in the Ohio River.
<i>Erimystax x-punctatus</i>	Gravel Chub	Eliminate or reduce barriers to fish passage	Management	Modify current dam operations on large rivers to restore a more natural hydrograph to meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.
<i>Erimyzon sucetta</i>	Lake Chubsucker	Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	Known from scattered records western Kentucky from the lower Green River to the Coastal Plain. The apparently spotty distribution of this species may be an artifact of undersampling of lotic habitats, including sloughs, oxbows, floodplain lakes, and wetlands.
<i>Erimyzon sucetta</i>	Lake Chubsucker	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Erimyzon sucetta</i>	Lake Chubsucker	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Lake Chubsucker and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Erimyzon sucetta</i>	Lake Chubsucker	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are generally difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied. Its presence has been sporadic and inconsistent in past survey efforts.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Erimyzon sucetta</i>	Lake Chubsucker	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Reproductive behavior and spawning habitat in Kentucky are unknown. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Esox niger</i>	Chain Pickerel	Targeted surveys to determine the current distribution in Kentucky	Survey	Current distributional data is lacking. Targeted surveys of this species are needed for more accurate assessments its distribution in Kentucky.
<i>Esox niger</i>	Chain Pickerel	Improve coordination between agencies and divisions conducting fish sampling using multiple gear types on large rivers and reservoirs in western Kentucky to report Chain Pickerel captures	Survey	Available distributional records are few and scattered. Recently known only through anecdotal reports from anglers and incidental captures during sportfish sampling using boat electrofishing (i.e., angler reports, scientific collections, and incidental captures during sportfish sampling). Additional information (e.g., specimen data) on individuals captured is largely unavailable.
<i>Esox niger</i>	Chain Pickerel	Assess exploitation from recreational fisheries	Research	Determine catch rates and numbers harvested through creel surveys and angler reports.
<i>Esox niger</i>	Chain Pickerel	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Chain Pickerel and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Etheostoma barbouri</i>	Teardrop Darter	Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	A statewide distributional status assessment is a top priority for this species. Preliminary survey work in the Barren River drainage failed to detect the species at any location where it was previously reported. Additional locations in the upper Barren and upper Green River drainages need to be surveyed.
<i>Etheostoma barbouri</i>	Teardrop Darter	Identify watersheds containing the most robust populations and work to ensure they are protected	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Etheostoma barbouri</i>	Teardrop Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Etheostoma barbouri</i>	Teardrop Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Teardrop Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically sampled watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Etheostoma barbouri</i>	Teardrop Darter	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	The presence of this species can range from locally common to sporadic and rare. Where the species is uncommon, imperfect detection could result in underestimation of the species presence and distribution in some portions of its range.
<i>Etheostoma barbouri</i>	Teardrop Darter	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Although a life-history has been conducted, sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown. Factors causing the disappearance of the species from multiple streams in the Barren River drainage need to be investigated.
<i>Etheostoma chienense</i>	Relict Darter	Search for unknown occupied reaches in other Bayou de Chien tributaries and downstream reaches of Bayou de Chien and Little Bayou de Chien	Survey	Recently discovered occurrences in Cane Creek and Sand Creek demonstrate the need for continued searches in similar small tributary habitat.
<i>Etheostoma chienense</i>	Relict Darter	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Etheostoma chienense</i>	Relict Darter	Determine habitat preferences of juveniles and larvae	Research	The biology of the larval stage is unknown.
<i>Etheostoma chienense</i>	Relict Darter	Continue research on population genetics	Research	This will provide important information on the long-term viability of the species and help focus habitat recovery efforts in stream reaches that would improve population connectivity.
<i>Etheostoma chienense</i>	Relict Darter	Work with federal and other state partners on conservation and management actions identified in the Species Recovery Plan and 5-year review	Management	The latest 5-year review (2019) lists recommended recovery actions that should be made a priority over the next five years.
<i>Etheostoma derivativum</i>	Stone Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Etheostoma derivativum</i>	Stone Darter	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Previous surveys found this species to occur only in a limited section of Whippoorwill Creek, where it is generally uncommon to sporadic. It was not detected in Elk Fork, where it occurred historically. Imperfect detection using standard sampling methods could result in underestimation of the species presence and distribution.
<i>Etheostoma derivativum</i>	Stone Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Stone Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Etheostoma derivativum</i>	Stone Darter	Work to ensure that the population is protected in Whippoorwill Creek, Todd and Logan counties	Management	Pursue habitat protection or enhancement opportunities in the Whippoorwill Creek watershed, especially in the headwater reaches.
<i>Etheostoma fusiforme</i>	Swamp Darter	Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	Known only from two localities in the Reelfoot Lake watershed in Fulton County. Because this species appears to be extremely rare and its habitat (sloughs, oxbows, and wetlands) has been undersampled, it is possible that current records underestimate its actual distribution and abundance.
<i>Etheostoma fusiforme</i>	Swamp Darter	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Survey	This species has been elusive to detection using standard sampling methods. However, due to its cryptic nature and association with habitat that is generally difficult to access and sample effectively, the actual distribution and abundance of this species may be underestimated.
<i>Etheostoma fusiforme</i>	Swamp Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Swamp Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Etheostoma fusiforme</i>	Swamp Darter	Work to ensure that the population is protected in Hamby Pond, Fulton County	Management	Pursue habitat protection or enhancement opportunities for Hamby Pond.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Determine permanence of the species in the lower Big South Fork affected by impoundment	Survey	Determine if the current range of the species (24 miles) should be reduced due to degradation of sites occupied during drawdown of Lake Cumberland
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Continue population genetics research	Research	Continue research examining the level of genetic exchange, effective population size, and overall genetic diversity. This will provide important information on the long-term viability of the species and help focus habitat recovery efforts in stream reaches that would improve population connectivity.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Determine if the introduced Rusty Crayfish is causing displacement of Tuxedo Darter nesting habitat	Research	The rapid invasion of the Rusty Crayfish, <i>Faxonius rusticus</i> , into areas surveyed in 2014 was concerning given the potential impacts it could have on native crayfishes and benthic fishes, especially nest spawning species including the Tuxedo Darter.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Work with federal and other state partners on conservation and management actions identified in the Species Recovery Plan and 5-year review	Management	The latest 5-year review (2021) lists recommended recovery actions that should be made a priority over the next five years.
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Continue to remediate areas affected by acid mine drainage in the Big South Fork	Management	This is a long-term problem that demands uninterrupted attention to effectively mitigate negative impacts to aquatic organisms.
<i>Etheostoma lynceum</i>	Brighteye Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	The Kentucky distribution of the Brighteye Darter is well-known and limited to Terrapin Creek in Graves County. Regular periodic monitoring (5-year intervals) at selected localities is needed and should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.
<i>Etheostoma lynceum</i>	Brighteye Darter	Determine sensitivity to environmental stressors	Research	Although life-history has been studied, sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Etheostoma nebra</i>	Buck Darter	Continue monitoring reintroductions in the Flat Lick Creek watershed and survey areas outside of reintroduction sites to assess dispersal	Survey	Survey and monitoring are coordinated efforts between federal and state agency partners, universities, and non-government organizations.
<i>Etheostoma nebra</i>	Buck Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Buck Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Etheostoma nebra</i>	Buck Darter	Population genetics research	Research	Development and implementation of standard monitoring procedures, including genetic structure and population viability. Genetic makeup of the recently discovered population in Cedar Creek needs to be compared with the extant population in the Flat Lick Creek watershed.
<i>Etheostoma nebra</i>	Buck Darter	Continue captive propagation efforts to maintain both an ark population and for reintroduction into streams within the species' historic range	Management	Captive spawning/propagation protocols were developed in 2016 by Conservation Fisheries, Inc. (CFI). Reintroduction has occurred in a tributary of Flat Lick Creek and is a coordinated effort between CFI, USEFWS, and KDFWR.
<i>Etheostoma nebra</i>	Buck Darter	Identify candidate streams within the Buck Creek drainage with suitable habitat for reintroduction, and expand reintroduction efforts	Management	Release of captive spawned progeny marked with visible implant elastomer (VIE) tags into additional streams within the historic range, followed by surveys to monitor survival, growth, and movements.
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Conduct periodic monitoring (5-year intervals) of extant populations and search for new populations following established methods.	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations. The distribution of Goldstripe Darter in Kentucky is well-documented and populations appear to be currently stable. Terrapin Creek, Graves County, contains the most robust population and should be given top priority for protection.
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life history information for this species in Kentucky is limited to anecdotal observations of habitat association and spawning period. More complete information on spawning locations and behavior, movements, habitat use throughout the year at different life stages, and sensitivity to stressors is needed to implement effective monitoring and conservation management of the species.
<i>Etheostoma proellare</i>	Cypress Darter	Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	Known from sporadic records in the Coastal Plain and Four Rivers region of western Kentucky. Additional surveys focused on lowland creeks, oxbows, and wetlands will likely continue to produce new occurrence records.
<i>Etheostoma proellare</i>	Cypress Darter	Identify watersheds containing the most robust populations and work to ensure they are protected	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Etheostoma proellare</i>	Cypress Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Etheostoma proellare</i>	Cypress Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Cypress Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Etheostoma proellare</i>	Cypress Darter	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because of its small size and tendency to hide among small woody debris, detritus, and root masses along shorelines, this species can be difficult to detect and may be more widespread than current records show.
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	The Kentucky distribution of the Firebelly Darter is well-known and limited to the Terrapin Creek watershed in Graves County. Regular periodic monitoring (5-year intervals) at selected localities is needed and should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Determine sensitivity to environmental stressors	Research	Although a life history study has been conducted, sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Monitor existing populations and initiate searches for unknown populations within the species' historic range	Survey	Monitor existing Cumberland Arrow Darter populations and their habitats; initiate searches for unknown populations; and resurvey historical locations.
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Cumberland Arrow Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Additional research on life-history and sensitivity to environmental stressors	Research	In conjunction with research on the Kentucky Arrow Darter, continue basic research on the species' life-history and apply the results toward its management and conservation.
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Population genetics research	Research	Expand upon ongoing and completed Kentucky Arrow Darter population genetics research by including Cumberland Arrow Darter populations and compare levels and patterns of genetic diversity and isolation/fragmentation between the two species.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Monitor existing populations and initiate searches for unknown populations within the species' historic range	Survey	Monitor existing Kentucky Arrow Darter populations and their habitats: initiate searches for unknown populations; and resurvey historical locations.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Kentucky Arrow Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Continue research on population genetics	Research	Continue research on Kentucky Arrow Darter genetic diversity and gene flow and work cooperatively with partners to determine the most effective conservation approach for the species.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Additional research on life-history and sensitivity to environmental stressors	Research	Continue other basic research on the species' life-history and apply the results toward its management and conservation.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Work with federal and other state partners on conservation and management actions identified in the Kentucky Arrow Darter Recovery Outline	Management	A Recovery Outline (2017) lists actions to be followed in a recovery strategy to protect and recover the Kentucky Arrow Darter in its historic range (to the extent possible).
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Continue to develop and implement technology for maintaining and propagating the species in captivity	Management	Captive spawning/propagation protocols were developed in 2009 by Conservation Fisheries, Inc. (CFI). Successful reintroduction has occurred in Long Fork, Clay County, and is a coordinated effort between CFI, USFWS, and KDFWR.
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Evaluate reintroduction potential in additional streams having suitable habitat within the species' historic range	Management	Successful reintroduction has occurred in Long Fork, Clay County, and is a coordinated effort between CFI, USFWS, and KDFWR. The population is now being monitored annually for survival, natural reproduction, and movements.
<i>Etheostoma susanæ</i>	Cumberland Darter	Quantitative surveys in occupied streams to determine population size for each management unit	Survey	Conduct quantitative surveys in each occupied stream to determine the population size for each management unit identified in the draft recovery plan.
<i>Etheostoma susanæ</i>	Cumberland Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Cumberland Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Etheostoma susanæ</i>	Cumberland Darter	Continue research on population genetics	Research	Continue research efforts on population genetics; use results of the Tennessee Aquarium Conservation Institute genetics study to inform recovery efforts.
<i>Etheostoma susanæ</i>	Cumberland Darter	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life history information for this species is limited to anecdotal observations of habitat association and spawning period. More complete information on spawning locations and behavior, movements, habitat use throughout the year at different life stages, and sensitivity to stressors is needed to implement effective monitoring and conservation management of the species.
<i>Etheostoma susanæ</i>	Cumberland Darter	Work with federal and other state partners on conservation and management actions identified in the Species Recovery Plan and 5-year review	Management	The latest 5-year review (2018) lists recommended recovery actions that should be made a priority over the next five years.
<i>Etheostoma susanæ</i>	Cumberland Darter	Continue to develop and implement technology for maintaining and propagating the species in captivity	Management	Captive spawning/propagation protocols were developed in 2009 by Conservation Fisheries, Inc. (CFI). Successful reintroduction has occurred in Cogur Fork, McCreary County, and is a coordinated effort between CFI, USFWS, and KDFWR.
<i>Etheostoma susanæ</i>	Cumberland Darter	Evaluate reintroduction potential in additional streams having suitable habitat within the species' historic range	Management	Successful reintroduction has occurred in Cogur Fork, McCreary County, and is a coordinated effort between CFI, USFWS, and KDFWR. The population is now being monitored annually for survival, natural reproduction, and movements.
<i>Etheostoma swaini</i>	Gulf Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	In Kentucky, the Gulf Darter is currently known from Terrapin Creek and minor North Fork Obion River tributaries in Graves County. Regular periodic monitoring (5-year intervals) at selected localities in these watersheds is needed and should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.
<i>Etheostoma swaini</i>	Gulf Darter	Determine sensitivity to environmental stressors	Research	A life history study was conducted on a Gulf Darter population in Mississippi. Life-history characteristics of the northern fringe population in extreme southwestern Kentucky have not been studied and sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Etheostoma tecumsehii</i>	Shawnee Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	The Shawnee Darter is restricted to the Pond Creek watershed in the lower Green River drainage. Cicero and Butler recommended a re-survey every 5-10 years to assess the species' status. Monitoring should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Etheostoma tecumsehii</i>	Shawnee Darter	Population genetics research	Research	Evaluate gene flow and genetic diversity across the species' range, and determine long-term viability and effective population size.
<i>Etheostoma tecumsehii</i>	Shawnee Darter	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life history information for this species is limited to anecdotal observations of habitat association and spawning period. More complete information on spawning locations and behavior, movements, habitat use throughout the year at different life stages, and sensitivity to stressors is needed to implement effective monitoring and conservation management of the species.
<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Identify and survey springs located on private property within the suspected distribution of the species to discover additional populations	Survey	Recommended survey need by Niemiller and Fitzpatrick.
<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Establish a yearly census of two of the most significant populations during April or May to monitor population and demographic trends over time	Survey	Establish a yearly census at the two most significant localities (Morton Road in Todd County and Rich Pond in Warren County) during April or May to monitor population and demographic trends over time.
<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Shawnee Hills Cavefish and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Additional population genetic analyses to determine connectivity of populations in the Western Pennyroyal Karst	Research	Although dispersal ability in amblyopsid cavefishes is generally thought to be low, major flood events may result in long-distance dispersal of this species.
<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Work to protect the Rich Pond in Warren County, which supports a significant population	Management	Work to protect the Rich Pond population in Warren County through purchase of the spring and surrounding area, implementing habitat protection strategies, or by obtaining a conservation agreement with the landowner.
<i>Forbesichthys papilliferus</i>	Shawnee Hills Cavefish	Delineate the recharge zone and conduct annual monitoring of water quality at Rich Pond	Management	Recommended management need by Niemiller and Fitzpatrick.
<i>Fundulus chrysotus</i>	Golden Topminnow	Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	Known only from floodplain habitats in Fulton County. Because this species can be elusive to capture and its habitat (sloughs, oxbows, and wetlands) have been undersampled, it is possible that current records underestimate its actual distribution and abundance.
<i>Fundulus chrysotus</i>	Golden Topminnow	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Fundulus chrysotus</i>	Golden Topminnow	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Golden Topminnow and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Fundulus chrysotus</i>	Golden Topminnow	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are generally difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied. Its presence has been sporadic and inconsistent in past survey efforts.
<i>Fundulus chrysotus</i>	Golden Topminnow	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information for Kentucky populations is limited to unpublished field observations of habitat associations. Spawning habitat, behavior, movements, and growth have not been studied. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Fundulus dispar</i>	Starhead Topminnow	Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	Currently known only from floodplain habitats in Fulton County, but occurred historically in Murphy's Pond, Hickman County. Because this species can be elusive to capture and its habitat (sloughs, oxbows, and wetlands) have been undersampled, it is possible that current records underestimate its actual distribution and abundance.
<i>Fundulus dispar</i>	Starhead Topminnow	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Fundulus dispar</i>	Starhead Topminnow	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Starhead Topminnow and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Fundulus dispar</i>	Starhead Topminnow	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are generally difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied. Its presence has been sporadic and inconsistent in past survey efforts.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Fundulus dispar</i>	Starhead Topminnow	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information for Kentucky populations is limited to unpublished field observations of habitat associations. Spawning habitat, behavior, movements, and growth have not been studied. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Hemitrema flammea</i>	Flame Chub	Search for undocumented occurrences or populations in endorheic watersheds and spring-fed streams in the karst regions of the Interior Plateau	Survey	The habitat of this species, including small streams and spring outlets, has been undersampled. Additional surveys focusing on these areas could reveal additional populations or occurrences.
<i>Hemitrema flammea</i>	Flame Chub	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	The only remaining extant population in Kentucky is in a small endorheic watershed in the Red River (lower Cumberland) and Drakes Creek (Barren River) drainages. This population should be monitored in coordination with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Hemitrema flammea</i>	Flame Chub	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Known life-history information for this species is based on populations south of Kentucky. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Hybognathus hayi</i>	Cypress Minnow	Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	Known from scattered records on the Coastal Plain and the lower Green River drainage in western Kentucky. The lack of recent records may be due to undersampling of lentic habitats, including sloughs, oxbows, floodplain lakes, and wetlands.
<i>Hybognathus hayi</i>	Cypress Minnow	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Reproductive behavior, movements, and spawning habitat in Kentucky are unknown. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Hybognathus hayi</i>	Cypress Minnow	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Cypress Minnow and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Hybognathus hayi</i>	Cypress Minnow	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are generally difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied. Its presence has been sporadic and inconsistent in past survey efforts.
<i>Hybognathus placitus</i>	Plains Minnow	Targeted surveys in the Mississippi River bordering western Kentucky to assess the species' current status as part of Kentucky's ichthyofauna	Survey	Known only from the Mississippi River, where it was last documented in 1983. Missouri Department of Conservation's Big Rivers and Wetlands Field Station conducts fish sampling on a regular basis in the Mississippi River bordering Missouri and Kentucky. A coordinated effort between agencies would be most effective to locate this species.
<i>Hybognathus placitus</i>	Plains Minnow	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Plains Minnow and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in the lower Ohio River and Mississippi River bordering western Kentucky.
<i>Hybopsis amnis</i>	Pallid Shiner	Targeted surveys throughout the known historic range in Kentucky, including the lower Tennessee, Green, and upper Cumberland River drainages	Survey	Considered extirpated from the state until discovered in the Big South Fork Cumberland River in 2005. Other historic localities across the state need intensive surveys to determine if those populations are in fact extirpated.
<i>Hybopsis amnis</i>	Pallid Shiner	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Spawning behavior, movements, and habitat in Kentucky are unknown. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Hybopsis amnis</i>	Pallid Shiner	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Pallid Shiner and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in surveys of historic localities across the state.
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Intensive surveys during the spring spawning period at historic and new localities to more accurately determine the species' distributional status and population densities	Survey	Current distributional knowledge is limited due to the difficulty of collecting adults in large streams using wadeable fish sampling methods (i.e., backpack electrofishing and seining). Use of alternative methods, such as boat electrofishing, and collaboration among professionals working in different programs is important to obtain more accurate distributional estimates.
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Identify watersheds containing the most robust populations	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information for this species in Kentucky is limited to anecdotal observations of spawning period based on collections of gravid females and nuptial males. More complete information on spawning locations and behavior, movements, and habitat use throughout the year at various life-cycle stages is needed to implement effective monitoring and conservation management of the species.
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Chestnut Lamprey and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Intensive surveys during the spring spawning period at historic and new localities to more accurately determine the species' distributional status and population densities	Survey	This species is elusive to capture using standard methods for sampling fishes in Wadeable habitats. It is most easily captured during a short window of time in the spring, when adults are spawning in shallow areas of streams over rocky substrates; most of its life is spent buried in the substrate and not easily detected. Targeted surveys are needed for more accurate assessments of the species distribution in Kentucky.
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Identify watersheds containing the most robust populations	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information for this species in Kentucky is limited to anecdotal observations of spawning period based on collections of gravid females and nuptial males. More complete information on spawning locations and behavior, movements, and habitat use throughout the year at various life-cycle stages is needed to implement effective monitoring and conservation management of the species.
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Northern Brook Lamprey and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Intensive surveys during the spring spawning period in the Clarks River drainage and other Coastal Plain streams in western Kentucky to determine distributional limits and population estimates	Survey	This species is elusive to capture using standard methods for sampling fishes in Wadeable habitats. It is most easily captured during a short window of time in the spring, when adults are spawning in shallow areas of streams over rocky substrates; most of its life is spent buried in the substrate and not easily detected. Currently known from a limited section of the West Fork Clarks River. Additional targeted surveys are needed throughout the Clarks River drainage and other Coastal Plain streams in far western Kentucky to determine the distributional limits and population size of this species.
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Details of the species' life history, habitat requirements, and threat sensitivity	Research	No life-history information is available for this species in Kentucky. Information on spawning locations and behavior, movements, and habitat use throughout the year at various life-cycle stages is needed to implement effective monitoring and conservation management of the species.
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Southern Brook Lamprey and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Intensive surveys during the spring spawning period at historic and new localities to more accurately determine the species' distributional status and population densities	Survey	This species is elusive to capture using standard methods for sampling fishes in Wadeable habitats. It is most easily captured during a short window of time in the spring, when adults are spawning in shallow areas of streams over rocky substrates; most of its life is spent buried in the substrate and not easily detected. Targeted surveys are needed for more accurate assessments of the species distribution in Kentucky.
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Identify watersheds containing the most robust populations	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information for this species in Kentucky is limited to anecdotal observations of spawning period based on collections of gravid females and nuptial males. More complete information on spawning locations and behavior, movements, and habitat use throughout the year at various life-cycle stages is needed to implement effective monitoring and conservation management of the species.
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Mountain Brook Lamprey and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Ictiobus niger</i>	Black Buffalo	Targeted surveys at historic and new locations in large rivers and tributaries to determine the species' distributional status and population densities	Survey	Enhance survey efforts through coordination between agencies and divisions (in Kentucky) and states bordering the Ohio and Mississippi rivers using boat electrofishing and gillnets.
<i>Ictiobus niger</i>	Black Buffalo	DNA sampling for specimen identification and to assess introgressive hybridization with other carpsuckers	Research	Morphological intermediacy has been documented among the three species of <i>Ictiobus</i> (buffalos), which could potentially make accurate identification of species difficult, especially between Black and Smallmouth buffalos. DNA samples (fin clips) should be taken from any specimens identified as Black Buffalo to evaluate identification and possible introgressive hybridization.
<i>Ictiobus niger</i>	Black Buffalo	Assessment of exploitation rates from commercial and recreational fisheries	Research	Review and analyze commercial and recreational harvest data, as well as levels of nonreporting, to determine if current fishing pressure is sustainable.
<i>Ictiobus niger</i>	Black Buffalo	Eliminate or reduce barriers to fish passage	Management	Improve fish passage at hydropower dams. Modify current dam operations on large rivers to restore a more natural hydrograph to meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.
<i>Ictiobus niger</i>	Black Buffalo	Prevent overharvest that could result in population extirpations	Management	Review recreational and commercial fishing regulations and adjust as needed to ensure population sustainability.
<i>Ictiobus niger</i>	Black Buffalo	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems	Management	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan. Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species.
<i>Lepomis marginatus</i>	Dollar Sunfish	Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	This species occupies habitats that are often difficult to access and have been undersampled; therefore, it is possible that current records underestimate its actual distribution and abundance.
<i>Lepomis marginatus</i>	Dollar Sunfish	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Lepomis marginatus</i>	Dollar Sunfish	Identify watersheds containing the most robust populations and work to ensure they are protected	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Lepomis marginatus</i>	Dollar Sunfish	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Dollar Sunfish and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Lepomis marginatus</i>	Dollar Sunfish	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are generally difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied. Its presence has been sporadic and inconsistent in past survey efforts.
<i>Lepomis marginatus</i>	Dollar Sunfish	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information for Kentucky populations is limited to unpublished field observations of habitat associations. Spawning habitat, behavior, movements, and growth have not been studied. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Lepomis miniatus</i>	Redspotted Sunfish	Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	Surveys should focus on the lower Green, Tradewater, and the Four Rivers region of western Kentucky to determine if geographic gaps in the species' distribution are real or an artifact of sampling effort. This species occupies habitats that are often difficult to access and have been undersampled; therefore, it is possible that current records underestimate its actual distribution and abundance.
<i>Lepomis miniatus</i>	Redspotted Sunfish	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Lepomis miniatus</i>	Redspotted Sunfish	Identify watersheds containing the most robust populations and work to ensure they are protected	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Lepomis miniatus</i>	Redspotted Sunfish	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Redspotted Sunfish and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Lepomis miniatus</i>	Redspotted Sunfish	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are generally difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied. Its presence has been sporadic and inconsistent in past survey efforts.
<i>Lepomis miniatus</i>	Redspotted Sunfish	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information for Kentucky populations is limited to unpublished field observations of habitat associations. Spawning habitat, behavior, movements, and growth have not been studied. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Lethenteron appendix</i>	American Brook Lamprey	Intensive surveys during the spring spawning period at historic and new localities to more accurately determine the species' distributional status and population densities	Survey	Current distributional knowledge is limited due to the difficulty of collecting adults in large streams using wadeable fish sampling methods (i.e., backpack electrofishing and seining). Use of alternative methods, such as boat electrofishing, and collaboration among professionals working in different programs is important to obtain more accurate distributional estimates.
<i>Lethenteron appendix</i>	American Brook Lamprey	Identify watersheds containing the most robust populations	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Lethenteron appendix</i>	American Brook Lamprey	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Lethenteron appendix</i>	American Brook Lamprey	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information for this species in Kentucky is limited to anecdotal observations of spawning period based on collections of gravid females and nuptial males. More complete information on spawning locations and behavior, movements, and habitat use throughout the year at various life-cycle stages is needed to implement effective monitoring and conservation management of the species.
<i>Lethenteron appendix</i>	American Brook Lamprey	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for American Brook Lamprey and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Lota lota</i>	Burbot	Targeted surveys at historic and new locations in the Ohio River and lower reaches of major tributaries to determine if the species is established	Survey	These efforts should be coordinated with bordering states, including data sharing.
<i>Lota lota</i>	Burbot	Improve coordination between agencies and divisions conducting fish sampling using multiple gear types on large streams and rivers to report Burbot captures	Survey	Available distributional records are scattered and from different sources (i.e., angler and commercial fishing, and scientific collections). Most records are based on a single individual without much additional information.
<i>Lota lota</i>	Burbot	Public outreach encouraging anglers who capture Burbot to report photos, location data, and other information (e.g., length and weight) to help with monitoring efforts	Survey	Anglers may occasionally capture Burbot that go unreported.
<i>Lota lota</i>	Burbot	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Burbot and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in the Ohio River and lower reaches of major tributaries in Kentucky.
<i>Lota lota</i>	Burbot	Population genetics research	Research	If surveys are successful in producing specimens, DNA (fin clip) samples are needed to assess genetic diversity and interrelationships with populations in other parts of the species' range. These data are needed to determine population viability and whether it is native or introduced.
<i>Macrhybopsis gelida</i>	Sturgeon Chub	Targeted surveys in the Mississippi River bordering western Kentucky	Survey	Known only from the Mississippi River, where it was last documented in 2000. Missouri Department of Conservation's Big Rivers and Wetlands Field Station conducts fish sampling on a regular basis in the Mississippi River bordering Missouri and Kentucky. A coordinated effort between agencies would be most effective to locate this species.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Macrhybopsis gelida</i>	Sturgeon Chub	Work with federal and other state partners on conservation and management actions identified in the Species Status Assessment (SSA)	Management	The Sturgeon Chub was petitioned for federal listing under the Endangered Species Act and a Species Status Assessment was initiated in 2019.
<i>Macrhybopsis hyostoma</i>	Shoal Chub	Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	A statewide distributional status assessment is a top priority for this species. Surveys should focus on the Green, Barren, upper Cumberland, Kentucky, Licking, and Big Sandy River drainages.
<i>Macrhybopsis hyostoma</i>	Shoal Chub	Identify watersheds containing the most robust populations	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Macrhybopsis hyostoma</i>	Shoal Chub	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Macrhybopsis hyostoma</i>	Shoal Chub	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Spawning behavior, movements, and habitat in Kentucky are unknown. Specific factors causing the apparent disappearance and decline of populations need to be identified.
<i>Macrhybopsis hyostoma</i>	Shoal Chub	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Shoal Chub and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Macrhybopsis meeki</i>	Sicklefin Chub	Targeted surveys in the Mississippi River bordering western Kentucky	Survey	Known only from the Mississippi River, where it was last documented in 2000. Missouri Department of Conservation's Big Rivers and Wetlands Field Station conducts fish sampling on a regular basis in the Mississippi River bordering Missouri and Kentucky. A coordinated effort between agencies would be most effective to locate this species.
<i>Macrhybopsis meeki</i>	Sicklefin Chub	Work with federal and other state partners on conservation and management actions identified in the Species Status Assessment (SSA)	Management	The Sicklefin Chub was petitioned for federal listing under the Endangered Species Act and a Species Status Assessment was initiated in 2019.
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	The Kentucky distribution of the Blacktail Redhorse is well-known and limited to Terrapin Creek in Graves County. Regular periodic monitoring (5-year intervals) at selected localities is needed and should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Determine sensitivity to environmental stressors	Research	Although a life history study has been conducted, sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Targeted surveys in Elkhorn and Benson Creek watersheds to determine if the only known Kentucky population still exists	Survey	The last reported Hornyhead Chub occurrence in Kentucky was in 1999 from South Elkhorn Creek. A concentrated survey effort with replicate sampling at historic sites and additional locations is needed to determine if the population is extant.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring is contingent upon surveys demonstrating that the population is extant. Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Population genetics research	Research	If surveys are successful in producing specimens, DNA (fin clip) samples are needed to assess genetic diversity and interrelationships with populations north of the Ohio River. These data are needed to determine population viability and whether it is native or introduced.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Any life-history study is contingent upon successful surveys. Spawning behavior, movements, and habitat in Kentucky are unknown. Specific factors causing the apparent disappearance and decline of populations need to be identified.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Hornyhead Chub and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Nocomis biguttatus</i>	Hornyhead Chub	Reduce impacts of acute pollution incidents	Management	Improve mitigation and containment of major effluent spills of toxic or hazardous waste. Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Prevent predation impacts to Hornyhead Chub populations	Management	Refrain from stocking non-native piscivorous sportfish species in streams inhabited by Hornyhead Chub.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Nocomis biguttatus</i>	Hornyhead Chub	Protect riparian corridor habitat and maintain good water quality	Management	Acquisition and conservation easements of critical aquatic habitat. Provide incentives to protect riparian corridors and watersheds.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Prevent habitat loss and water quality degradation	Management	Inform and educate user groups on importance of riparian corridors and watersheds. Encourage and assist in development and implementation of Best Management Practices for aquatic systems
<i>Nocomis biguttatus</i>	Hornyhead Chub	Eliminate or reduce barriers to fish passage	Management	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal.
<i>Nocomis biguttatus</i>	Hornyhead Chub	Reduce waste effluents and runoff into aquatic systems.	Management	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff.
<i>Nothonotus maculatus</i>	Spotted Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	The distribution of the Spotted Darter in Kentucky is reasonably well known. The population in the upper Green River drainage is currently stable, but needs to be monitored at least every 5-10 years. Monitoring should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.
<i>Nothonotus maculatus</i>	Spotted Darter	Additional survey effort is needed to assess the current distribution and status in the Barren River drainage and North Fork Kentucky River	Survey	The species is sporadic and uncommon in the lower Barren River drainage (e.g., Gasper River) and possibly extirpated in the upper Barren River drainage (above Barren River Lake) and in the lower North Fork Kentucky River.
<i>Nothonotus maculatus</i>	Spotted Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Spotted Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Nothonotus microleptus</i>	Smallscale Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	The distribution of the Smallscale Darter in Kentucky is reasonably well known. Populations in the Little River and Red River (lower Cumberland drainage) appear to be currently stable, but need to be monitored at least every 5-10 years. Monitoring should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.
<i>Nothonotus microleptus</i>	Smallscale Darter	Survey additional locations within the Red and Little River drainages having suitable habitat that may harbor unreported populations	Survey	The species is sporadic and uncommon in the Little River in Trigg and Christian counties and locally common in limited sections of the Red River in Logan County. Undetected occurrences may exist at locations having suitable habitat that have either not been sampled or not sampled thoroughly.
<i>Nothonotus microleptus</i>	Smallscale Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Smallscale Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Nothonotus microleptus</i>	Smallscale Darter	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life history information for this species in Kentucky is limited to anecdotal observations of habitat association and spawning period. More complete information on spawning locations and behavior, movements, habitat use throughout the year at different life stages, and sensitivity to stressors is needed to implement effective monitoring and conservation management of the species.
<i>Notropis albizonatus</i>	Palezone Shiner	Continue to conduct fish inventories (at approximate 5-year intervals) in the Little South Fork to monitor the status and distribution of the species within the system	Survey	Surveys are coordinated efforts between KDFWR, USFWS, OKNP, and NGOs (e.g., universities).
<i>Notropis albizonatus</i>	Palezone Shiner	Targeted surveys in Rock Creek, lower Big South Fork Cumberland River, and Marrowbone Creek to determine the species' status in these watersheds	Survey	Discovery of a single specimen in Rock Creek in 2009 suggests the possibility that the species occurs in the lower Big South Fork and Rock Creek; however, the status of this record is questionable pending additional survey data. Additional surveys are needed in Marrowbone Creek, where a historic record is available.
<i>Notropis albizonatus</i>	Palezone Shiner	Determine habitat preferences of larvae and juveniles	Research	The biology of the larval stage is unknown and recruitment estimates are lacking.
<i>Notropis albizonatus</i>	Palezone Shiner	Continue research on population genetics	Research	Determine the level of genetic exchange (if any) between populations and diversity within populations (population genetics). Information on Palezone Shiner movements and genetics would provide important information on the species' long-term viability and its effective population size.
<i>Notropis albizonatus</i>	Palezone Shiner	Work with federal and other state partners on conservation and management actions identified in the Species Recovery Plan and 5-year review	Management	The latest 5-year review (2019) lists recommended recovery actions that should be made a priority over the next five years.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Notropis albigonzatus</i>	Palezone Shiner	Consult with agency partners and species experts to determine what biological or ecological studies are needed to better understand the species' life history and sensitivity to threats.	Management	Using this information, determine what management strategies are needed to improve the species' status in the Little South Fork.
<i>Notropis buchanani</i>	Ghost Shiner	Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	The status of this species is uncertain due to lack of information. The paucity of collection records may be explained by its tendency to occupy large river habitat, which is difficult to sample effectively for small fishes. Additional survey efforts are needed at known occurrence localities as well as deeper sections of riverine habitat using a benthic trawl.
<i>Notropis buchanani</i>	Ghost Shiner	Identify watersheds containing the most robust populations	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Notropis buchanani</i>	Ghost Shiner	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Notropis buchanani</i>	Ghost Shiner	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Known life-history information for Kentucky populations is limited to field observations of spawning period based on tuberculate males and gravid females, and habitat associations. Other aspects of life history are based on populations west of the Mississippi River. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Notropis buchanani</i>	Ghost Shiner	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Ghost Shiner and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Notropis buchanani</i>	Ghost Shiner	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied.
<i>Notropis buchanani</i>	Ghost Shiner	Eliminate or reduce barriers to fish passage	Management	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal. Modify current dam operations on large rivers to restore a more natural hydrograph to meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.
<i>Notropis dorsalis</i>	Bigmouth Shiner	Targeted surveys in the Mayfield Creek drainage to determine distributional limits and population density within the system	Survey	Known from three recent (2009-2017) collections in the Mayfield Creek drainage in Ballard, Carlisle, and Graves counties. Surveys of additional locations are needed to more accurately assess the species' linear distribution and abundance within the system.
<i>Notropis dorsalis</i>	Bigmouth Shiner	Targeted surveys in other Coastal Plain tributaries of the Mississippi and Ohio Rivers in western Kentucky to determine the species' current distributional status and population densities	Survey	Although not detected in past survey efforts in the Coastal Plain of western Kentucky outside of Mayfield Creek, future surveys in the region should focus on shallow, sandy-bottomed reaches of streams and small rivers to determine the potential presence of this species.
<i>Notropis dorsalis</i>	Bigmouth Shiner	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Notropis dorsalis</i>	Bigmouth Shiner	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Known life-history information for this species is based on populations in the Midwest. The population in Mayfield Creek has not been studied. Although it is reported to be tolerant of channelization and increased turbidity, and has increased in many regions where streams have been highly modified, it is uncertain whether this explains its recent appearance in Mayfield Creek.
<i>Notropis hudsonius</i>	Spottail Shiner	Targeted surveys in the Ohio and Mississippi River at historic and recent localities	Survey	These efforts should be coordinated with bordering states, including data sharing.
<i>Notropis hudsonius</i>	Spottail Shiner	Population genetics research	Research	If surveys are successful in producing specimens, DNA (fin clip) samples are needed to assess interrelationships with populations in the upper Midwest, Great Lakes, and Atlantic Slope drainages. These data are needed to determine specimens in the Ohio River are native or introduced.
<i>Notropis hudsonius</i>	Spottail Shiner	Adjust live bait regulations to ban the sale or use of bait originating from outside of Kentucky waters	Management	Prevent introduction and spread of non-native species or populations used as bait.
<i>Notropis maculatus</i>	Taillight Shiner	Search for undocumented occurrences or populations within the historically occupied range in western Kentucky	Survey	Environmental variables identified as covariates of occupancy could be used to target sites and specific habitats in future surveys. Results of eDNA surveys could also guide searches at new localities.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Notropis maculatus</i>	Taillight Shiner	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Based on information obtained through detection probability and site occupancy research. Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Notropis maculatus</i>	Taillight Shiner	Identify watersheds containing the most robust populations	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Notropis maculatus</i>	Taillight Shiner	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied.
<i>Notropis maculatus</i>	Taillight Shiner	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Chestnut Lamprey and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Notropis maculatus</i>	Taillight Shiner	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Expand upon life history notes presented by Burr and Page. Spawning habitat and movements in western Kentucky are unknown. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Notropis shumardi</i>	Silverband Shiner	Targeted surveys at historic and new locations in the lower Green and Four Rivers region of western Kentucky to determine the species' current distributional status and population densities	Survey	Although reported to be occasional to common in the main channels of the lower Ohio and Mississippi rivers, few recent collection records are available. No recent records are available from historic localities in the lower Green and Cumberland rivers. More sampling is needed in these large river habitats using methods targeting small benthic fishes (e.g., seine and benthic trawl).
<i>Notropis shumardi</i>	Silverband Shiner	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Based on information obtained through focused survey efforts. Monitoring should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Notropis shumardi</i>	Silverband Shiner	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Silverband Shiner and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in the lower Green, Tradewater, Cumberland, and Tennessee rivers where records are lacking or historic only.
<i>Notropis shumardi</i>	Silverband Shiner	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Known life-history information for this species is based on populations in the southwestern U.S. The population in the lower Ohio River basin has not been studied. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Notropis shumardi</i>	Silverband Shiner	Eliminate or reduce barriers to fish passage	Management	Modify current dam operations on large rivers to restore a more natural hydrograph to meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Targeted surveys in the Little South Fork Cumberland River and Rock Creek	Survey	The species is sporadic and rare in Rock Creek and possibly extirpated in the Little South Fork; however, more survey efforts are needed in those systems.
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Conduct periodic monitoring (5-year intervals) of extant populations and search for new populations following established methods.	Survey	This applies to healthy populations in Pitman Creek and Big South Fork. These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Sawfin Shiner and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be especially useful in the Little South Fork.
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life history information for this species in Kentucky is limited to anecdotal observations of habitat association. More complete information on spawning locations and behavior, movements, habitat use throughout the year at different life stages, and sensitivity to environmental stressors is needed to implement effective monitoring and conservation management of the species.
<i>Naturus exilis</i>	Slender Madtom	Targeted surveys in the Red River (lower Cumberland) drainage to assess distributional limits and population density	Survey	More intensive surveys for this species are needed in the Red River, where only three occurrences have been documented since 2000.
<i>Naturus exilis</i>	Slender Madtom	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	The only remaining extant populations in Kentucky are in the Red River and Donaldson Creek (lower Cumberland) drainages. These populations should be monitored in coordination with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Noturus exilis</i>	Slender Madtom	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Slender Madtom and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Noturus exilis</i>	Slender Madtom	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is often rare or occurs sporadically within its range, currently available collection records may underestimate the actual number and distribution of locations occupied.
<i>Noturus hildebrandi</i>	Least Madtom	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	The Kentucky distribution of the Least Madtom is well-known and limited to Terrapin Creek in Graves County. Regular periodic monitoring (5-year intervals) at selected localities is needed and should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.
<i>Noturus hildebrandi</i>	Least Madtom	Determine sensitivity to environmental stressors	Research	Although a life history study has been conducted, sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Noturus phaeus</i>	Brown Madtom	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	In Kentucky, the Brown Madtom is currently known from Terrapin Creek and minor North Fork Obion River tributaries in Graves County. Regular periodic monitoring (5-year intervals) at selected localities in these watersheds is needed and should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.
<i>Noturus phaeus</i>	Brown Madtom	Determine sensitivity to environmental stressors	Research	Although life-history has been studied, sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Noturus stigmosus</i>	Northern Madtom	Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	A statewide distributional status assessment has not been conducted for this species. It has not been documented in the upper Kentucky or Big Sandy River drainages in more than 20 years, so these watersheds should be prioritized.
<i>Noturus stigmosus</i>	Northern Madtom	Identify watersheds containing the most robust populations	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Noturus stigmosus</i>	Northern Madtom	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring effort should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.
<i>Noturus stigmosus</i>	Northern Madtom	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Northern Madtom and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be particularly useful in watersheds where the species is rare or sporadically represented in collection records.
<i>Noturus stigmosus</i>	Northern Madtom	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is often rare or occurs sporadically within its range, currently available collection records may underestimate the actual number and distribution of locations occupied.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Targeted surveys throughout the known range in western Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	Known from scattered records on the Coastal Plain and the lower Green River drainage in western Kentucky. The lack of recent records may be due to undersampling of lotic habitats, including sloughs, oxbows, floodplain lakes, and wetlands.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Based on information obtained through focused survey efforts. Monitoring should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are generally difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied. Its presence has been sporadic and inconsistent in past survey efforts.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Pugnose Minnow and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information for this species in Kentucky is limited to anecdotal observations of habitat association and spawning period based on tuberculate males and gravid females. More complete information on spawning locations and behavior, movements, habitat use throughout the year at different life stages, and sensitivity to environmental stressors is needed to implement effective monitoring and conservation management of the species.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Prevent habitat loss and water quality degradation	Management	Inform and educate user groups on importance of riparian corridors and watersheds. Encourage and assist in development and implementation of Best Management Practices for aquatic systems.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Restore stream and wetland habitat and improve water quality	Management	Restoration of degraded aquatic habitat through financial and technical assistance programs.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Protect riparian corridor habitat and maintain good water quality	Management	Acquisition and conservation easements of critical aquatic habitat. Provide incentives to protect riparian corridors and watersheds.
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems	Management	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan. Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species.
<i>Percina macrocephala</i>	Longhead Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	The distribution of the Longhead Darter in Kentucky is reasonably well known, but exists in isolated populations that need to be monitored at least every 5-10 years. Monitoring should be coordinated with other state and federal agencies, academic institutions, and non-government organizations.
<i>Percina macrocephala</i>	Longhead Darter	Additional survey effort is needed at historic localities in the Big Sandy, upper Kentucky, and South Fork Cumberland drainages	Survey	The species is presumed extirpated in the Big Sandy (Wolf Creek), upper Kentucky (South Fork), and South Fork Cumberland (Little South Fork) drainages; however, additional surveys are needed at historic localities and additional sites with suitable habitat.
<i>Percina macrocephala</i>	Longhead Darter	Details of the species' reproductive biology and sensitivity to environmental stressors	Survey	Some aspects of the species' life-history have been studied, including habitat association, movements, and diet; however its reproductive biology is poorly known and sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Percina macrocephala</i>	Longhead Darter	Identify watersheds containing the most robust populations and work to ensure they are protected	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Percina macrocephala</i>	Longhead Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Longhead Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Percina macrocephala</i>	Longhead Darter	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are often difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied. Its presence has been sporadic and inconsistent in past survey efforts.
<i>Percina squamata</i>	Olive Darter	Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	More survey effort is needed in the Rockcastle River and Big South Fork, including revisits to localities having occurrence records and additional locations having suitable habitat where it may have gone undetected.
<i>Percina squamata</i>	Olive Darter	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	Monitoring efforts should be coordinated with any existing programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Percina squamata</i>	Olive Darter	Identify watersheds containing the most robust populations and work to ensure they are protected	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Percina squamata</i>	Olive Darter	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Olive Darter and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in historically occupied watersheds and searching for undocumented occurrences where suitable habitat exists.
<i>Percina squamata</i>	Olive Darter	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is associated with habitats that are often difficult to sample, currently available occurrence records may underestimate the actual number and distribution of locations occupied. Its presence has been sporadic and inconsistent in past survey efforts.
<i>Percina squamata</i>	Olive Darter	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life-history information is poorly known, other than general habitat associations based on anecdotal field observations of habitat associations. Spawning period, habitat, behavior, movements, growth, and sensitivity to environmental stressors are unknown or poorly known.
<i>Percopsis omiscomaycus</i>	Trout-perch	Targeted surveys throughout the known range in Kentucky, including historic and recent localities, and additional locations having suitable habitat	Survey	Expand upon recent surveys conducted by D.J. Eisenhour (Morehead State University) by sampling additional historic localities and new locations that could reveal undocumented occurrences.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Percopsis omiscomaycus</i>	Trout-perch	Identify watersheds containing the most robust populations	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Percopsis omiscomaycus</i>	Trout-perch	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Percopsis omiscomaycus</i>	Trout-perch	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Trout-Perch and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Percopsis omiscomaycus</i>	Trout-perch	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species is often elusive to capture using standard fish sampling methods, currently available occurrence records may underestimate the actual number and distribution of locations occupied.
<i>Percopsis omiscomaycus</i>	Trout-perch	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Knowledge of Kentucky populations is limited to habitat associations and estimated spawning period based on unpublished field observations. Various aspects of life history are known mostly from northern, lake-dwelling populations. Stream-inhabiting populations in Kentucky have not been studied. Sensitivity to environmental stressors (e.g., landscape alteration, elevated temperature and turbidity, and hydrological changes) is unknown.
<i>Phenacobius uranops</i>	Stargazing Minnow	Targeted surveys in the Barren River at historic localities and additional locations having suitable habitat	Survey	The most recent available occurrence record for the Barren River is from 1990. Concentrated survey efforts focusing on historic occurrence localities and additional locations with suitable habitat are needed.
<i>Phenacobius uranops</i>	Stargazing Minnow	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	This applies to the Green River and in coordination with fish community monitoring following the removal of locks and dams 5 and 6.
<i>Phenacobius uranops</i>	Stargazing Minnow	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Stargazing Minnow and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be especially useful in the Barren River and other historic localities where the species is now presumed extirpated.
<i>Phenacobius uranops</i>	Stargazing Minnow	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Life history information for this species in Kentucky is limited to anecdotal observations of habitat association and spawning period based on tuberculate males and gravid females. More complete information on spawning locations and behavior, movements, habitat use throughout the year at different life stages, and sensitivity to environmental stressors is needed to implement effective monitoring and conservation management of the species.
<i>Platygobio gracilis</i>	Flathead Chub	Targeted surveys at historic localities in the lower Ohio and Mississippi Rivers bordering western Kentucky to assess the species' current status as part of Kentucky's ichthyofauna	Survey	Last available occurrence record for Kentucky was from the Mississippi River in 1983. A single record from the lower Ohio River near its confluence was from 1980. The absence of the species from recent (past 20+ years) benthic trawl sampling in the Mississippi River bordering western Kentucky by Missouri Dept. of Conservation suggests it may be extirpated from the state. A coordinated effort between agencies would be most effective to locate this species.
<i>Platygobio gracilis</i>	Flathead Chub	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Flathead Chub and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining). This could be useful in the lower Ohio River and Mississippi River bordering western Kentucky.
<i>Polyodon spathula</i>	Paddlefish	Population monitoring in the Ohio River basin in cooperation with the Ohio River Fisheries Management Team and the Mississippi Interstate Cooperative Resource Association (MICRA)	Survey	Continue Paddlefish sampling as part of the cooperative program coordinated by the Ohio River Fisheries Management Team and the Mississippi Interstate Cooperative Resource Association (MICRA). Information on population sizes, age structure, growth, and harvest rates is needed to assess current status and trends, and adjust regulations to ensure sustainability.
<i>Polyodon spathula</i>	Paddlefish	Assessment of exploitation rates from commercial and recreational fisheries	Research	Review and analyze commercial and recreational harvest data, as well as levels of nonreporting, to determine if current fishing pressure is sustainable.
<i>Polyodon spathula</i>	Paddlefish	Assess potential for entrainment losses associated with commercial navigation	Research	Evaluate impacts of entrainment associated with towboat propellers, dredging operations, water diversion points, and commercial navigation, and implement strategies to prevent or minimize entrainment.
<i>Polyodon spathula</i>	Paddlefish	Maintain commitment to the Joint Strategic Plan for Management of Mississippi River Basin Fisheries	Management	Under the Mississippi Interstate Cooperative Resource Association (MICRA) partnership, the common goal of the Plan is to: Coordinate the conservation, development, and utilization of sustainable interjurisdictional fishery and aquatic resources in the Mississippi River Basin for the public through cooperative management among the responsible entities.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Investigate potential presence of Pallid Sturgeon in the Lower Ohio River	Survey	In light of recent genetic evidence of Pallid X Shovelnose Sturgeon hybrids in the lower Ohio River, additional surveys and genetic sampling are needed from Smithland Lock & Dam to the Mississippi River confluence.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Life-history research	Research	While much has been learned about the Pallid Sturgeon since it was federally listed, data gaps remain that impede its recovery, including the characterization of spawning habitats and quantification of spawning success/failure based on collections of eggs, larvae, and young-of-year.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Population genetics research	Research	Development and implementation of standard monitoring procedures, including genetic structure and population viability, are needed for all management units across the Pallid Sturgeon's range.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Assess potential for entrainment losses associated with commercial navigation	Research	Evaluate impacts of entrainment associated with towboat propellers, dredging operations, water diversion points, and commercial navigation, and implement strategies to prevent or minimize entrainment.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Research to evaluate genetic differences across the species' range	Research	Fill data gaps in the lower Mississippi and portions of the lower Missouri River to more accurately define management units and ensure genetic integrity is maintained in stocking practices.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Work with federal and other state partners with implementation of actions necessary for species recovery and delisting, as described in the Pallid Sturgeon Recovery Plan	Management	USFWS Revised Recovery Plan for the Pallid Sturgeon (2014). Actions needed: 1. Conserve and restore Pallid Sturgeon individuals, populations, and habitats. 2. Conduct research necessary to promote survival and recovery of Pallid Sturgeon. 3. Obtain information on population genetics, status, and trends. 4. Maintain the Pallid Sturgeon Conservation Augmentation Program where deemed necessary. 5. Coordinate and implement conservation and recovery of Pallid Sturgeon. 6. Post downlisting or delisting planning.
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Maintain commitment to the Joint Strategic Plan for Management of Mississippi River Basin Fisheries	Management	Under the Mississippi Interstate Cooperative Resource Association (MICRA) partnership, the common goal of the Plan is to: Coordinate the conservation, development, and utilization of sustainable interjurisdictional fishery and aquatic resources in the Mississippi River Basin for the public through cooperative management among the responsible entities.
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Search for undocumented occurrences or populations within the historically occupied range in the Barren River drainage	Survey	Environmental variables identified as covariates of occupancy could be used to target sites and specific habitats in future surveys. Results of eDNA surveys could also guide searches at new localities.
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Population genetics research	Research	Determine the level of genetic exchange between populations and diversity within populations (population genetics). Information on Blackfin Sucker movements and genetics would provide important information on the species' long-term viability and its effective population size.
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Blackfin Sucker and evaluate the efficacy of eDNA for detecting the species compared to standard fish sampling methods (i.e., electrofishing and seining).
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Estimate detection probability for sampling methods used and account for incomplete detection when estimating the proportion of sites currently occupied	Research	Because this species can be elusive to capture using standard sampling methods (e.g., electrofishing and seining), currently available occurrence records may underestimate the actual number and distribution of locations occupied.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Additional surveys to circumscribe the distributional limits of the undescribed species in Pulaski County and document additional occurrences	Survey	Additional surveys are needed to document additional sites for the undescribed species in Pulaski County and determine if the distribution extends to the southwest along the escarpment of the Cumberland Plateau in Wayne County.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Delineate the recharge zones of known localities of the undescribed species in Pulaski County	Research	Delineate the recharge zones of known localities of the undescribed species in Pulaski County, particularly the Coral Cave system and Hail Cave system.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Evaluate use of environmental DNA for identifying occupancy and distribution	Research	Develop species-specific eDNA assay for Southern Cavefish and evaluate the efficacy of eDNA for detecting the species in subterranean aquatic habitats compared with traditional survey methods.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Assess impacts of hydrological manipulations and increased siltation on cavefish populations	Research	As recommended by Niemiller and Fitzpatrick, studies are needed to assess the actual rather than speculative impacts on cavefish populations from increased siltation and sedimentation. Also, data are lacking on how the species respond to hydrological manipulations and the impacts of such manipulations on local populations.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Determine the point source of groundwater contamination at Friendship Cave in Warren County and initiate a chemical cleanup of the cave	Management	Recommended management need by Niemiller and Fitzpatrick.
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Remove delapidated pump house and other debris at the entrance of L & N Railroad Cave in Barren County to improve cave habitat	Management	Recommended management need by Niemiller and Fitzpatrick.
<i>Umbra limi</i>	Central Mudminnow	Establish protocols, schedules, and sites for long-term monitoring of population trends and watershed conditions	Survey	These efforts should be coordinated with any existing monitoring programs established by other state and federal agencies, academic institutions, and non-government organizations. The Central Mudminnow's distribution in Kentucky is reasonably well known and its status, at least in some areas, appears to have improved in recent decades.
<i>Umbra limi</i>	Central Mudminnow	Survey additional locations in the Jackson Purchase area of western Kentucky having suitable habitat that could reveal previously undetected occurrences	Survey	Spring-fed wetlands, ditches, and shallow margins of lowland lakes have been undersampled and could support additional unknown occurrences or populations.
<i>Umbra limi</i>	Central Mudminnow	Identify watersheds containing the most robust populations	Survey	Identify watersheds having the best habitat conditions and that support the most robust populations through field surveys and available occurrence and population data. These locations deserve top priority for habitat protection or enhancement.
<i>Umbra limi</i>	Central Mudminnow	Details of the species' life history, habitat requirements, and threat sensitivity	Research	Knowledge of Kentucky populations is limited to habitat associations and distribution. Other life-history aspects are based on populations north of Kentucky.

APX 6.1e Needs Identified for Freshwater Mussel and Snail SGCN

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Actinonaias pectorosa</i>	Pheasantshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Alasmidonta atropurpurea</i>	Cumberland Elktoe	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Alasmidonta marginata</i>	Elktoe	Monitoring	Survey	Monitoring of existing sites and evaluation of historic sites for current status.
<i>Alasmidonta marginata</i>	Elktoe	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Alasmidonta viridis</i>	Slippershell Mussel	Monitoring	Survey	Monitoring of existing sites and evaluation of historic sites for current status.
<i>Alasmidonta viridis</i>	Slippershell Mussel	Status Surveys	Research	Examination of current distribution and current causes of declines.
<i>Anodontoides denigrata</i>	Cumberland Papershell	Monitoring	Survey	Monitoring of existing and historic sites for current status.
<i>Anodontoides denigrata</i>	Cumberland Papershell	Propagation and Culture	Research	Culture individuals for the purpose of augmentation and/or reintroduction to optimize populations in the Upper Cumberland River tribs in Kentucky.
<i>Anodontoides denigrata</i>	Cumberland Papershell	Research	Research	Examination of sites within current distribution to determine causes of declines.
<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	Status Surveys	Survey	Examination of existing and historic sites for current distribution status.
<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	Life history studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Antroselates spiralis</i>	Shaggy Cavesnail	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Antroselates spiralis</i>	Shaggy Cavesnail	Life History Studies	Research	Studies to determine basic life history, clutch size, age at maturity, habitat, and others.
<i>Antroselates spiralis</i>	Shaggy Cavesnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Antroselates spiralis</i>	Shaggy Cavesnail	Education and Awareness	Management	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Establish working groups to address various broad issues that pertain to water. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Antroselates spiralis</i>	Shaggy Cavesnail	Partnership Development	Management	Acquisition and conservation easements of critical aquatic habitat.
<i>Callinina georgiana</i>	Banded Mysterysnail	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Callinina georgiana</i>	Banded Mysterysnail	Collect baseline species information	Survey	Retrieving data. Wait a few seconds and try to cut or copy again.
<i>Callinina georgiana</i>	Banded Mysterysnail	Life History Studies	Research	Studies to determine basic life history, clutch size, age at maturity, habitat, and others.
<i>Callinina georgiana</i>	Banded Mysterysnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Callinina georgiana</i>	Banded Mysterysnail	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Callinina georgiana</i>	Banded Mysterysnail	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Genetic Testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems. Develop, encourage, and initiate local watershed improvement initiative. Acquisition and conservation easements of critical aquatic habitat. Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Education and Awareness	Management	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Cambarunio dactylus</i>	Cumberland River Rainbow	Species Management	Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.
<i>Cambarunio iris</i>	Rainbow	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Cambarunio iris</i>	Rainbow	Monitoring	Survey	Monitoring of existing long-term sites and historic sites for current status.
<i>Cambarunio iris</i>	Rainbow	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarunio iris</i>	Rainbow	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems. Acquisition and conservation easements of critical aquatic habitat. Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.
<i>Cambarunio iris</i>	Rainbow	Education and Awareness	Management	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Cambarunio iris</i>	Rainbow	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Cambarunio taeniatus</i>	Painted Creekshell	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Cambarunio taeniatus</i>	Painted Creekshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cambarunio taeniatus</i>	Painted Creekshell	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Cambarunio taeniatus</i>	Painted Creekshell	Genetic Testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Cambarunio taeniatus</i>	Painted Creekshell	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems. Acquisition and conservation easements of critical aquatic habitat. Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.
<i>Cambarunio taeniatus</i>	Painted Creekshell	Education and Awareness	Management	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Cambarunio taeniatus</i>	Painted Creekshell	Species Management	Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.
<i>Cambarunio taeniatus</i>	Painted Creekshell	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative.
<i>Cumberlandia monodonta</i>	Spectaclecase	Monitoring	Survey	Examination of existing and historic sites for current distribution status.
<i>Cumberlandia monodonta</i>	Spectaclecase	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cumberlandia monodonta</i>	Spectaclecase	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Cyprogenia stegaria</i>	Fanshell	Monitoring	Survey	Examination of existing and historic sites for current distribution status.
<i>Cyprogenia stegaria</i>	Fanshell	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Cyprogenia stegaria</i>	Fanshell	Collect baseline species information	Research	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Dilatata sampsoni</i>	Sampson Sprite	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Dromus dromas</i>	Dromedary Pearlymussel	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Dromus dromas</i>	Dromedary Pearlymussel	Propagation and Culture	Research	Augmentation of existing populations and reintroduction of the species into historic range. Development of propagation and culture techniques.
<i>Elimia costifera</i>	Corded Elimia	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Elimia curreyana</i>	Amber Elimia	Status Surveys	Survey	Identifying new areas that harbor the species within historic range.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Elimia curreyana</i>	Amber Elimia	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Elimia curreyana</i>	Amber Elimia	Life history studies	Research	Studies to determine basic life history, clutch size, age at maturity, habitat, and others.
<i>Elimia ebenum</i>	Ebony Elimia	Status Surveys	Survey	Identifying new areas that harbor the species within historic range
<i>Elimia ebenum</i>	Ebony Elimia	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Elimia ebenum</i>	Ebony Elimia	Life history studies	Research	Studies to determine basic life history, clutch size, age at maturity, habitat, and others.
<i>Elimia edgariana</i>	Cumberland Elimia	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Elimia laqueata</i>	Panel Elimia	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Elimia livescens</i>	Liver Elimia	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Elimia plicatastriata</i>	Carved Elimia	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Ellipsaria lineolata</i>	Butterfly	Monitoring	Survey	Monitoring of existing and historic sites for current status.
<i>Ellipsaria lineolata</i>	Butterfly	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Elliptio crassidens</i>	Elephantear	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Elliptio crassidens</i>	Elephantear	Propagation and Culture	Research	Development of propagation and culture techniques. Augmentation of existing populations and reintroduction of the species into historic range.
<i>Elliptio crassidens</i>	Elephantear	Collect baseline species information	Research	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Epioblasma brevidens</i>	Cumberlandian Combshell	Status Surveys	Survey	Monitoring of existing and historic sites for current status.
<i>Epioblasma brevidens</i>	Cumberlandian Combshell	Augmentation and Reintroduction	Research	Augmentation of existing populations and reintroduction of the species into historic range.
<i>Epioblasma capsaeformis</i>	Oyster Mussel	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Epioblasma capsaeformis</i>	Oyster Mussel	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Epioblasma obliquata</i>	Catspaw	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Epioblasma obliquata</i>	Catspaw	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Epioblasma rangiana</i>	Northern Riffleshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Epioblasma rangiana</i>	Northern Riffleshell	Monitoring	Research	Monitoring of existing reintroduction sites.
<i>Epioblasma rangiana</i>	Northern Riffleshell	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Epioblasma triquetra</i>	Snuffbox	Status Surveys	Survey	Examination of existing and historic sites for current distribution status.
<i>Epioblasma walkeri</i>	Tan Riffleshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Epioblasma walkeri</i>	Tan Riffleshell	Augmentation and Reintroduction	Research	Augmentation of existing populations and reintroduction of the species into historic range.
<i>Eupera cubensis</i>	Mottled Fingernailclam	Status Surveys	Survey	Data deficient species needs basic distribution information
<i>Eupera cubensis</i>	Mottled Fingernailclam	Basic distribution information	Survey	Surveys needed for the current species distribution.
<i>Eupera cubensis</i>	Mottled Fingernailclam	Life history studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Eupera cubensis</i>	Mottled Fingernailclam	Prevent wetland habitat loss	Management	Habitat restoration.
<i>Ferrissia californica</i>	Fragile Ancyloid	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Ferrissia rivularis</i>	Creeping Ancyloid	Status Surveys	Survey	Data deficient species needs basic distribution information. Species is most likely widespread in Kentucky rivers and streams, but is small and often overlooked.
<i>Fusconaia subrotunda</i>	Longsolid	Status Surveys	Survey	Examination of existing and historic sites for current distribution status.
<i>Fusconaia subrotunda</i>	Longsolid	Monitoring	Survey	Monitoring of existing sites.
<i>Fusconaia subrotunda</i>	Longsolid	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Fusconaia subrotunda</i>	Longsolid	Propagation and Culture	Research	Develop culture and propagation methods in order to augment low population numbers.
<i>Gyraulus deflectus</i>	Flexed Gyro	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Gyraulus parvus</i>	Ash Gyro	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Hemistena lata</i>	Cracking Pearlymussel	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Hemistena lata</i>	Cracking Pearlymussel	Propagation and Culture	Research	Augmentation of existing populations and reintroduction of the species into historic range. Develop culture and propagation methods.
<i>Hemistena lata</i>	Cracking Pearlymussel	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Laevapex fuscus</i>	Dusky Ancyloid	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Lampsilis abrupta</i>	Pink Mucket	Status Surveys	Survey	Examination of large river sites for new populations.
<i>Lampsilis abrupta</i>	Pink Mucket	Monitoring	Research	Monitoring of existing sites and reintroduction sites.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Lampsilis abrupta</i>	Pink Mucket	Collect baseline species information	Research	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lampsilis hydyana</i>	Louisiana Fatmucket	Status Surveys	Survey	Examination of existing and historic sites for current distribution status.
<i>Lampsilis hydyana</i>	Louisiana Fatmucket	Genetic testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Lampsilis ovata</i>	Pocketbook	Monitoring	Survey	Monitoring of existing long-term sites.
<i>Lampsilis ovata</i>	Pocketbook	Collect baseline species information	Research	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lasmigona compressa</i>	Creek Heelsplitter	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Lasmigona compressa</i>	Creek Heelsplitter	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lasmigona compressa</i>	Creek Heelsplitter	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Leaunio lienosus</i>	Little Spectaclecase	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Leaunio lienosus</i>	Little Spectaclecase	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Leaunio lienosus</i>	Little Spectaclecase	Genetic Testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Leaunio lienosus</i>	Little Spectaclecase	Propagation and Culture	Research	Develop culture and propagation methods.
<i>Leaunio ortmanni</i>	Kentucky Creekshell	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Leaunio ortmanni</i>	Kentucky Creekshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Leaunio ortmanni</i>	Kentucky Creekshell	Genetic Testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Leaunio ortmanni</i>	Kentucky Creekshell	Augmentation and Reintroduction	Research	Augmentation of existing populations and reintroduction of the species into historic range.
<i>Leaunio pataecus</i>	Dwarf Rainbow	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Leaunio pataecus</i>	Dwarf Rainbow	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Leaunio pataecus</i>	Dwarf Rainbow	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Leaunio pataecus</i>	Dwarf Rainbow	Genetic Testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Leaunio vanuxemensis</i>	Mountain Creekshell	Status Surveys	Survey	Identify new areas that harbor the species within historic range.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Leaunio vanuxemensis</i>	Mountain Creekshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Leaunio vanuxemensis</i>	Mountain Creekshell	Genetic Testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Leptodea leptodon</i>	Scaleshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Leptodea leptodon</i>	Scaleshell	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Leptodea leptodon</i>	Scaleshell	Augmentation and Reintroduction	Research	Augmentation of existing populations and reintroduction of the species into historic range in the Green River.
<i>Leptoxis praerosa</i>	Onyx Rocksnail	Status Surveys	Survey	Data deficient species needs basic distribution information
<i>Leptoxis trilineata</i>	Broad Mudalia	Status Surveys	Survey	Data deficient species needs basic distribution information
<i>Ligumia recta</i>	Black Sandshell	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Ligumia recta</i>	Black Sandshell	Monitoring	Survey	Monitoring of existing long-term sites for current status.
<i>Ligumia recta</i>	Black Sandshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Ligumia recta</i>	Black Sandshell	Augmentation and Reintroduction	Research	Augmentation of existing populations and reintroduction of the species into historic range.
<i>Lioplax sulculosa</i>	Furrowed Lioplax	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Lioplax sulculosa</i>	Furrowed Lioplax	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Lioplax sulculosa</i>	Furrowed Lioplax	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Lioplax sulculosa</i>	Furrowed Lioplax	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Lithasia armigera</i>	Armored Rocksnail	Status Surveys	Survey	Examination of large river sites for new populations.
<i>Lithasia armigera</i>	Armored Rocksnail	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lithasia armigera</i>	Armored Rocksnail	Life History Studies	Research	Studies to determine basic life history, clutch size, age at maturity, habitat, and others.
<i>Lithasia armigera</i>	Armored Rocksnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Lithasia armigera</i>	Armored Rocksnail	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Lithasia armigera</i>	Armored Rocksnail	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Lithasia curta</i>	Knobby Rocksnail	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Lithasia curta</i>	Knobby Rocksnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Lithasia curta</i>	Knobby Rocksnail	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Lithasia curta</i>	Knobby Rocksnail	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Lithasia geniculata</i>	Ornate Rocksnail	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lithasia geniculata</i>	Ornate Rocksnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Lithasia geniculata</i>	Ornate Rocksnail	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Lithasia geniculata</i>	Ornate Rocksnail	Partnership Development	Management	Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Lithasia salebrosa</i>	Muddy Rocksnail	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lithasia salebrosa</i>	Muddy Rocksnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Lithasia salebrosa</i>	Muddy Rocksnail	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Lithasia salebrosa</i>	Muddy Rocksnail	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Lithasia verrucosa</i>	Varicose Rocksnail	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lithasia verrucosa</i>	Varicose Rocksnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Lithasia verrucosa</i>	Varicose Rocksnail	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Lithasia verrucosa</i>	Varicose Rocksnail	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Medionidus conradicus</i>	Cumberland Moccasinshell	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Medionidus conradicus</i>	Cumberland Moccasinshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Medionidus conradicus</i>	Cumberland Moccasinshell	Augmentation and Reintroduction	Research	Culture individuals for the purpose of augmentation and/or reintroduction to optimize populations in the Upper Cumberland River tribs in Kentucky.
<i>Obovaria olivaria</i>	Hickorynut	Status Surveys	Survey	Examination of large river sites for new populations.
<i>Obovaria olivaria</i>	Hickorynut	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Obovaria retusa</i>	Ring Pink	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Obovaria retusa</i>	Ring Pink	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Obovaria retusa</i>	Ring Pink	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Obovaria retusa</i>	Ring Pink	Genetic testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Obovaria retusa</i>	Ring Pink	Propagation and Culture	Research	Development of propagation and culture techniques once individuals are found.
<i>Obovaria retusa</i>	Ring Pink	Establish a Captive Population	Research	Establish and hold a captive bred population and develop appropriate propagation and culture techniques once individuals are located.
<i>Obovaria subrotunda</i>	Round Hickorynut	Monitoring	Survey	Monitoring of existing long-term sites and historic sites for current status.
<i>Obovaria subrotunda</i>	Round Hickorynut	Status Surveys	Survey	Identifying new areas that harbor the species within historic range.
<i>Obovaria subrotunda</i>	Round Hickorynut	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Obovaria subrotunda</i>	Round Hickorynut	Augmentation and Reintroduction	Research	Augmentation of existing populations and reintroduction of the species into historic range.
<i>Paetulinio fabalis</i>	Rayed Bean	Status Surveys	Survey	Identifying new areas that harbor the species within historic range.
<i>Paetulinio fabalis</i>	Rayed Bean	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Paetulinio fabalis</i>	Rayed Bean	Genetic Testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Paetulinio fabalis</i>	Rayed Bean	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Pegias fabula</i>	Littlewing Pearlymussel	Monitoring	Survey	Monitoring of existing long-term sites.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Pegias fabula</i>	Littletwing Pearlymussel	Status Surveys	Survey	Examination of existing and historic sites for current distribution status, mostly in Upper Rockcastle River and Big South Fork Cumberland.
<i>Pegias fabula</i>	Littletwing Pearlymussel	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others. Collection of genetic material for examining species and population level genetics with similar species.
<i>Pegias fabula</i>	Littletwing Pearlymussel	Augmentation and Reintroduction	Research	Augmentation of existing populations and reintroduction of the species into historic range.
<i>Pegias fabula</i>	Littletwing Pearlymussel	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Physa pomila</i>	Claiborne Physa	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Physella globosa</i>	Globose Physa	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pisidium compressum</i>	Ridgedbeaked Peaclam	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Planorbula armigera</i>	Thicklip Rams Horn	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Plethobasus cicatricosus</i>	White Wartyback	Status Surveys	Survey	Examination of large river sites for new populations.
<i>Plethobasus cicatricosus</i>	White Wartyback	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Plethobasus cicatricosus</i>	White Wartyback	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Plethobasus cicatricosus</i>	White Wartyback	Propagation and Culture	Research	Develop culture and propagation methods.
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	Status Surveys	Survey	Examination of large river sites for new populations.
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Plethobasus cyphyus</i>	Sheepnose	Monitoring	Survey	Monitoring of existing long-term sites and historic sites for current status.
<i>Plethobasus cyphyus</i>	Sheepnose	Status Surveys	Survey	Examination of large river sites for new populations.
<i>Plethobasus cyphyus</i>	Sheepnose	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Plethobasus cyphyus</i>	Sheepnose	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Pleurobema clava</i>	Clubshell	Monitoring	Survey	Monitoring of existing long-term sites and historic sites for current status.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Pleurobema clava</i>	Clubshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pleurobema clava</i>	Clubshell	Genetic testing	Research	Collection of genetic material for examining species and population level genetics with similar species (<i>P. oviforme</i>).
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Monitoring	Survey	Monitoring of existing long-term sites.
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Status Surveys	Survey	Examination of large river sites for new populations.
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Genetic Testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Pleurobema plenum</i>	Rough Pigtoe	Monitoring	Survey	Monitoring of existing long-term sites.
<i>Pleurobema plenum</i>	Rough Pigtoe	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pleurobema plenum</i>	Rough Pigtoe	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Pleurobema plenum</i>	Rough Pigtoe	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Monitoring	Survey	Monitoring of existing long-term sites.
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Genetic Testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Pleurocera acuta</i>	Sharp Hornsnail	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Pleurocera acuta</i>	Sharp Hornsnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Pleurocera acuta</i>	Sharp Hornsnail	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Pleurocera acuta</i>	Sharp Hornsnail	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Pleurocera alveare</i>	Rugged Hornsnail	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pleurocera alveare</i>	Rugged Hornsnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Pleurocera alveare</i>	Rugged Hornsnail	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Pleurocera alveare</i>	Rugged Hornsnail	Partnership development	Management	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Pleurocera canaliculata</i>	Silty Hornsnail	Status Surveys	Survey	Data deficient species needs basic distribution information
<i>Pleurocera canaliculata</i>	Silty Hornsnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Pleurocera canaliculata</i>	Silty Hornsnail	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Pleurocera curta</i>	Shortspire Hornsnail	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pleurocera curta</i>	Shortspire Hornsnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Pleurocera curta</i>	Shortspire Hornsnail	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Pleurocera curta</i>	Shortspire Hornsnail	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Pleurocera walkeri</i>	Telescope Hornsnail	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pleurocera walkeri</i>	Telescope Hornsnail	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Pleurocera walkeri</i>	Telescope Hornsnail	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Pleurocera walkeri</i>	Telescope Hornsnail	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Pleuroaia dolabelloides</i>	Slabside Pearlymussel	Status Surveys	Survey	Examination of existing and historic sites for current distribution status.
<i>Pleuroaia dolabelloides</i>	Slabside Pearlymussel	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Pomatiopsis cincinnatiensis</i>	Brown Walker	Status Surveys	Survey	Data deficient species needs basic distribution information
<i>Potamilus capax</i>	Fat Pocketbook	Status Surveys	Survey	Examination of large river sites for new populations.
<i>Potamilus capax</i>	Fat Pocketbook	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Potamilus capax</i>	Fat Pocketbook	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Potamilus purpuratus</i>	Bleufer	Status Surveys	Survey	Examination of existing and historic sites for current distribution status.
<i>Potamilus purpuratus</i>	Bleufer	Monitoring	Survey	Establishment and monitoring of long-term monitoring sites.
<i>Potamilus purpuratus</i>	Bleufer	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Potamilus purpuratus</i>	Bleufer	Propagation and Culture	Research	Develop culture and propagation methods.
<i>Promenetus exacius</i>	Sharp Sprite	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Ptychobranchus subtentus</i>	Fluted Kidneyshell	Status Surveys	Survey	Monitoring of existing sites and evaluation of historic sites for current status.
<i>Ptychobranchus subtentus</i>	Fluted Kidneyshell	Augmentation and Reintroduction	Research	Augmentation of existing populations and reintroduction of the species into historic range.
<i>Quadrula fragosa</i>	Winged Mapleleaf	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Quadrula fragosa</i>	Winged Mapleleaf	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Quadrula fragosa</i>	Winged Mapleleaf	Augmentation and Reintroduction	Research	Augmentation of existing populations and reintroduction of the species into historic range from Upper Mississippi population (only known current distribution).
<i>Rhodacme elatior</i>	Domed Ancyliid	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Species is thought to only be found in the Green River.
<i>Rhodacme elatior</i>	Domed Ancyliid	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Rhodacme elatior</i>	Domed Ancyliid	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Rhodacme elatior</i>	Domed Ancyliid	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Rhodacme hinkleyi</i>	Knobby Ancyliid	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky. Species is thought to only be found in the Green River.
<i>Rhodacme hinkleyi</i>	Knobby Ancyliid	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Rhodacme hinkleyi</i>	Knobby Ancyliid	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about gastropod conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Rhodacme hinkleyi</i>	Knobby Ancyliid	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Sagittunio subrostratus</i>	Pondmussel	Status Surveys	Survey	Examination of existing and historic sites for current distribution status.
<i>Sagittunio subrostratus</i>	Pondmussel	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Sagittunio subrostratus</i>	Pondmussel	Propagation and Culture	Research	Development of propagation and culture techniques.
<i>Simpsonaia ambigua</i>	Salamander Mussel	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Simpsonaia ambigua</i>	Salamander Mussel	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Simpsonaia ambigua</i>	Salamander Mussel	Augmentation and Reintroduction	Research	Augmentation of existing populations and reintroduction of the species into historic range.
<i>Somatogyrus integra</i>	Ohio Pebblesnail	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Somatogyrus trothis</i>	A Freshwater Snail	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Sphaerium striatinum</i>	Striated Fingernailclam	Status Surveys	Survey	Data deficient species needs basic distribution information.
<i>Theiaderma cylindrica</i>	Rabbitsfoot	Monitoring	Survey	Monitoring of existing long-term sites.
<i>Theiaderma cylindrica</i>	Rabbitsfoot	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Theiaderma cylindrica</i>	Rabbitsfoot	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Toxolasma lividum</i>	Purple Lilliput	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Toxolasma lividum</i>	Purple Lilliput	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Toxolasma texasiense</i>	Texas Lilliput	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Toxolasma texasiense</i>	Texas Lilliput	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Toxolasma texasiense</i>	Texas Lilliput	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Toxolasma texasiense</i>	Texas Lilliput	Propagation and Culture	Research	Develop culture and propagation methods.
<i>Tritogonia nobilis</i>	Gulf Mapleleaf	Status Surveys	Survey	Examination of large river sites for new populations.
<i>Tritogonia nobilis</i>	Gulf Mapleleaf	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Tritogonia nobilis</i>	Gulf Mapleleaf	Genetic Testing	Research	Collection of genetic material for examining species and population level genetics with similar species.
<i>Tritogonia nobilis</i>	Gulf Mapleleaf	Propagation and Culture	Research	Develop culture and propagation methods.
<i>Tritogonia nobilis</i>	Gulf Mapleleaf	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds.
<i>Tritogonia nobilis</i>	Gulf Mapleleaf	Education and Awareness	Management	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Tritogonia nobilis</i>	Gulf Mapleleaf	Partnership Development	Management	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.
<i>Uniomerus tetralasmus</i>	Pondhorn	Status Surveys	Survey	Identifying new areas that harbor the species within historic range.
<i>Uniomerus tetralasmus</i>	Pondhorn	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Uniomerus tetralasmus</i>	Pondhorn	Life History Studies	Research	Studies to determine basic life history, such as fish hosts, age at maturity, habitat, and others.
<i>Uniomerus tetralasmus</i>	Pondhorn	Economic and Other Incentives	Management	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems. Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.
<i>Uniomerus tetralasmus</i>	Pondhorn	Education and Awareness	Management	Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.
<i>Uniomerus tetralasmus</i>	Pondhorn	Partnership Development	Management	Develop, encourage, and initiate local watershed improvement initiative. Acquisition and conservation easements of critical aquatic habitat. Develop mitigation plan for impacted aquatic systems.
<i>Venustaconcha troostensis</i>	Cumberland Bean	Monitoring	Survey	Monitoring of existing long-term sites.
<i>Venustaconcha troostensis</i>	Cumberland Bean	Status Surveys	Survey	Identify new areas that harbor the species within historic range.
<i>Venustaconcha troostensis</i>	Cumberland Bean	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Venustaconcha troostensis</i>	Cumberland Bean	Augmentation and Reintroduction	Research	Augmentation of existing populations and reintroduction of the species into historic range.

APX 6.1f Needs Identified for Insect and Springtail SGCN

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Acronuria covelli</i>	River Stone	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Acronuria hitchcocki</i>	Kentucky Stone	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Agapetus gelbae</i>		Locate additional populations	Survey	Monitor existing populations. Inventories to determine the existence of additional populations.
<i>Agapetus kirchneri</i>		Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Allocapnia cunninghami</i>	Karst Snowfly	Monitoring of known populations	Survey	Create a monitoring plan to determine stability of extant populations.
<i>Amphiagrion saucium</i>	Eastern Red Damsel	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Arigomphus maxwelli</i>	Bayou Clubtail	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Bombus pensylvanicus</i>	American Bumble Bee	Population trend monitoring	Survey	The extent of presumed declines is unknown.
<i>Calephelis borealis</i>	Northern Metalmark	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Calephelis borealis</i>	Northern Metalmark	Establish habitat requirements	Research	Determine regional and local scale habitat requirements.
<i>Calephelis muticum</i>	Swamp Metalmark	Locate additional populations	Survey	Inventories to determine the existence of additional populations.
<i>Callophrys irus</i>	Frosted Elfin	Population monitoring	Survey	Monitor populations in response to habitat management.
<i>Callophrys irus</i>	Frosted Elfin	Explore population expansion	Research	Evaluate feasibility of establishing new populations using individuals from regional populations. Establish partnerships with regional partners to establish best management practices.
<i>Calopteryx dimidiata</i>	Sparkling Jewelwing	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Celithemis verna</i>	Double-ringed Pennant	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Chlosyne gorgone</i>	Gorgone Checkerspot	Monitoring of known populations	Survey	Create a monitoring plan to determine stability of extant populations.
<i>Danaus plexippus plexippus</i>	Monarch	Increase participation in national monarch monitoring initiatives	Survey	National and international monarch monarch monitoring initiatives are well established, and seek participation across the monarch's breeding and migration range in North America. By increasing public awareness of and participation in these initiatives, more robust datasets will be available to Kentucky to determine population size, range, and fluctuations throughout the year.
<i>Danaus plexippus plexippus</i>	Monarch	Kentucky-specific habitat management research	Research	Partner with universities to conduct habitat management research specific to monarch butterflies at Wildlife Management Areas. Develop Kentucky-specific best management practices for mowing recommendations, milkweed regeneration time post-mowing, and monarch nectar preferences.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Enallagma daeckii</i>	Attenuated Bluet	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Erora laeta</i>	Early Hairstreak	Locate additional populations	Survey	Document all existing populations.
<i>Erynnis martialis</i>	Mottled Duskywing	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Euphyes dukesi</i>	Dukes' Skipper	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Gomphurus hybridus</i>	Cocoa Clubtail	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Hansonoperla hokolesqua</i>	Splendid Stone	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Hydroptila coweetensis</i>	A Hydroptilid Caddisfly	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Hydroptila decia</i>	Knoxville Hydroptilan Micro Caddisfly	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Hydroptila howelli</i>	A Hydroptilid Caddisfly	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Hydroptila kuehnei</i>	A Hydroptilid Caddisfly	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Hystrichophora loricana</i>	An Olethreutine Moth	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lepidostoma etnieri</i>	A Lepidostomatid Caddisfly	Locate additional populations	Survey	Monitor existing populations. Inventories to determine the existence of additional populations.
<i>Lepidostoma etnieri</i>	A Lepidostomatid Caddisfly	Life history research	Research	Investigate life history strategies of species to inform future management plans.
<i>Leuctra schusteri</i>	Karst Needlefly	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Litobrancha recurvata</i>	A Burrowing Mayfly	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Lyttosis permagnaria</i>	A Geometrid Moth	Locate additional populations	Survey	Inventories to determine the existence of additional populations. Document all existing populations.
<i>Lyttosis permagnaria</i>	A Geometrid Moth	Life history research	Research	Investigate life history strategies of species to inform future management plans.
<i>Maccaffertium bednariki</i>	A Heptageniid Mayfly	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Manophylax butleri</i>	Bottle Cap Caddisfly	Locate additional populations	Survey	Monitor existing populations. Inventories to determine the existence of additional populations.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Mesamia straminea</i>	Helianthus Leafhopper	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Nannothemis bella</i>	Elfin Skimmer	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Nehalennia gracilis</i>	Sphagnum Sprite	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Nehalennia integricollis</i>	Southern Sprite	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Nehalennia irene</i>	Sedge Sprite	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Neophylax lewisae</i>		Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Ophiogomphus howei</i>	Pygmy Snaketail	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Ophiogomphus mainensis</i>	Maine Snaketail	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Papaipema beeriana</i>	Blazing Star Stem Borer	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth	Annual population monitoring	Survey	Continue and expand upon annual population monitoring to inform management and ensure that appropriate refugia are left by management activities.
<i>Papaipema eryngii</i>	Rattlesnake-master Borer Moth	Life history research	Research	Investigate site-specific phenology and dispersal to inform future management plans.
<i>Papaipema leucostigma</i>	Columbine Borer Moth	Locate additional populations	Survey	Inventories to determine the existence of additional populations. Document all existing populations.
<i>Papaipema leucostigma</i>	Columbine Borer Moth	Life History Research	Research	Investigate life history strategies of species to inform future management plans.
<i>Papaipema silphii</i>	Silphium Borer Moth	Monitoring of known populations	Survey	Create a monitoring plan to determine stability of extant populations. Document all existing populations.
<i>Papaipema sp. 5</i>	Rare Cane Borer Moth	Monitoring of known populations	Survey	Monitor existing populations. Inventories to determine the existence of additional populations.
<i>Papaipema sp. 5</i>	Rare Cane Borer Moth	Formally describe species	Research	Publish formal description of species.
<i>Papaipema speciosissima</i>	Osmunda Borer Moth	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Papaipema speciosissima</i>	Osmunda Borer Moth	Investigate specific hydrology of occupied habitat	Research	Determine hydrologic habitat needs of species.
<i>Poanes viator</i>	Broad-winged Skipper	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Polycentropus neiswanderi</i>	A Polycentropodid Caddisfly	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Prairiana kansana</i>	A Cicadellid Leafhopper	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pseudanophtthalmus caecus</i>	Cliffion Cave Beetle	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pseudanophtthalmus caecus</i>	Cliffion Cave Beetle	Research feasibility of creating new entrance	Research	Study external cave structure and determine possibility of opening another entrance to cave to allow survey access. Gain better understanding of cave system.
<i>Pseudanophtthalmus calcareus</i>	Limestone Cave Beetle	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.
<i>Pseudanophtthalmus catoryctos</i>	Lesser Adams Cave Beetle	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.
<i>Pseudanophtthalmus cnephosus</i>	A Cave Obligate Beetle	Status surveys	Survey	Conduct surveys to determine population status and inform further conservation decisions.
<i>Pseudanophtthalmus conditus</i>	Hidden Cave Beetle	Status surveys	Survey	Conduct surveys to determine population status and inform further conservation decisions.
<i>Pseudanophtthalmus frigidus</i>	Icebox Cave Beetle	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.
<i>Pseudanophtthalmus globiceps</i>	Round-headed Cave Beetle	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.
<i>Pseudanophtthalmus horni</i>	Garman's Cave Beetle	Status surveys	Survey	Conduct surveys to determine population status and inform further conservation decisions.
<i>Pseudanophtthalmus hypolithos</i>	Ashcamp Cave Beetle	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.
<i>Pseudanophtthalmus inexpectatus</i>	Surprising Cave Beetle	Status surveys	Survey	Conduct surveys to determine population status and inform further conservation decisions.
<i>Pseudanophtthalmus major</i>	Beaver Cave Beetle	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.
<i>Pseudanophtthalmus pholeter</i>	Greater Adams Cave Beetle	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.
<i>Pseudanophtthalmus pubescens intrepidus</i>	A Cave Obligate Beetle	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.
<i>Pseudanophtthalmus puteanus</i>	Old Well Cave Beetle	Status surveys	Survey	Conduct surveys to determine population status and inform further conservation decisions.
<i>Pseudanophtthalmus rogersae</i>	Rogers' Cave Beetle	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Pseudanophthalmus scholasticus</i>	Scholarly Cave Beetle	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.
<i>Pseudanophthalmus troglodytes</i>	Louisville Cave Beetle	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.
<i>Pseudosinella espanita</i>	A Cave Obligate Springtail	Regular population monitoring	Survey	Implement regular population monitoring to determine whether specific conservation actions are needed.
<i>Rasvena terna</i>	Vermont Salifly	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Rhyacophila appalachia</i>	A Rhyacophilid Caddisfly	Locate additional populations	Survey	Monitor existing populations. Inventories to determine the existence of additional populations.
<i>Rhyacophila appalachia</i>	A Rhyacophilid Caddisfly	Life history research	Research	Investigate life history strategies of species to inform future management plans.
<i>Satyrrium favonius ontario</i>	Northern Oak Hairstreak	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Satyrrium favonius ontario</i>	Northern Oak Hairstreak	Create recommendations for habitat management	Management	Develop management plans addressing favorable timeline for herbicide application and prescribed fire to reduce impact on populations and maintain appropriate habitat structure.
<i>Soyedina calcareo</i>	Karst Forestfly	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Speyeria diana</i>	Diana Fritillary	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Stylurus notatus</i>	Elusive Clubtail	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Stylurus scudderii</i>	Zebra Clubtail	Locate additional populations	Survey	Monitor existing populations. Conduct inventories to determine the existence of additional populations.
<i>Telegonus cellus</i>	Gold-banded Skipper	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Telegonus cellus</i>	Gold-banded Skipper	Research regional differences	Research	Investigate morphological differences in bluegrass populations.
<i>Tomocerus missus</i>	A Cave Obligate Springtail	Status surveys	Survey	Conduct surveys to determine population status and inform further conservation decisions.

APX 6.1g Needs Identified for Mammal SGCN

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Lasionycteris noctivagans</i>	Silver-haired Bat	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Lasiurus seminolus</i>	Seminole Bat	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Mustela frenata</i>	Long-tailed Weasel	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Mustela nivalis</i>	Least Weasel	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Myodes gapperi maurus</i>	Kentucky Red-backed Vole	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Myotis austroriparius</i>	Southeastern Myotis	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Myotis grisescens</i>	Gray Myotis	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Myotis leibii</i>	Eastern Small-footed Myotis	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Myotis lucifugus</i>	Little Brown Bat	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Myotis septentrionalis</i>	Northern Long-Eared Bat	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Myotis sodalis</i>	Indiana Bat	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Neotoma magister</i>	Allegheny Woodrat	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Ondatra zibethicus</i>	Muskrat	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Oryzomys palustris</i>	Marsh Rice Rat	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Parascalops breweri</i>	Hairy-tailed Mole	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Perimyotis subflavus</i>	Tricolored Bat	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Peromyscus gossypinus</i>	Cotton Mouse	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Peromyscus maniculatus rubiterrae</i>	Cloudland Deer Mouse	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Sorex cinereus</i>	Cinereus Shrew	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Sorex dispar blitchi</i>	Long-tailed Shrew	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Sorex fumeus</i>	Smoky Shrew	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Sorex hoyi</i>	Pygmy Shrew	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Sorex longirostris</i>	Southeastern Shrew	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Radio telemetry survey	Research	Radio telemetry survey to assess home range and road crossing behavior
<i>Sylvilagus aquaticus</i>	Swamp Rabbit	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Sylvilagus obscurus</i>	Appalachian Cottontail	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Synaptomys cooperi</i>	Southern Bog Lemming	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Taxidea taxus</i>	American Badger	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky
<i>Urocyon cinereoargenteus</i>	Gray Fox	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky

APX 6.1h Needs Identified for Plant SGCN

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Abdrpa aprica</i>	Open-ground Whitlow-grass	Surveys for new populations	Survey	New surveys are needed in order to locate extant populations.
<i>Actaea rubifolia</i>	Appalachian Bugbane	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Actaea rubifolia</i>	Appalachian Bugbane	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Actaea rubifolia</i>	Appalachian Bugbane	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Actaea rubifolia</i>	Appalachian Bugbane	Develop and implement best management practices	Management	Develop and implement best management practices such as invasive species removal and forest preservation.
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Develop and implement best management practices	Management	Develop and implement best management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Develop and implement best management practices	Management	Develop and implement management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Status Survey	Survey	Conduct status surveys to assess current population trends and threats.
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control, and overall habitat management guidance.
<i>Apios priceana</i>	Price's Potato-bean	Status surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Apios priceana</i>	Price's Potato-bean	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Apios priceana</i>	Price's Potato-bean	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Apios priceana</i>	Price's Potato-bean	Life history, ecology and genetic research	Research	Life history, ecology, genetic and population viability analysis research.
<i>Apios priceana</i>	Price's Potato-bean	Develop and implement best management practices	Management	Development and implementation of best management practices such as canopy removal and overall habitat management guidance.
<i>Arabis patens</i>	Spreading Rockcress	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Arabis patens</i>	Spreading Rockcress	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Arabis patens</i>	Spreading Rockcress	Life history, ecology and genetic research	Research	Life history, ecology, genetic and population viability analysis research.
<i>Arabis patens</i>	Spreading Rockcress	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.
<i>Aureolaria patula</i>	Spreading False Foxglove	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Aureolaria patula</i>	Spreading False Foxglove	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Aureolaria patula</i>	Spreading False Foxglove	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Aureolaria patula</i>	Spreading False Foxglove	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Develop and implement best management practices	Management	Develop and implement best management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.
<i>Berberis canadensis</i>	American Barberry	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Borodinia perstellata</i>	Braun's Rockcress	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Borodinia perstellata</i>	Braun's Rockcress	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Borodinia perstellata</i>	Braun's Rockcress	Life history, ecology and genetic research	Research	Life history, ecology, genetic and population viability analysis research.
<i>Borodinia perstellata</i>	Braun's Rockcress	Develop critical habitat protection plan	Management	Develop a critical habitat protection plan with state, federal, universities and land trusts.
<i>Borodinia perstellata</i>	Braun's Rockcress	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.
<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Develop and implement best management practices	Management	Development and implementation of best management practices such as woody removal, invasive species control, and overall habitat management guidance.
<i>Carex decomposita</i>	Epiphytic Sedge	Surveys for new populations	Survey	Surveys for new populations and suitable habitat needs to occur in order to find additional populations or plan for translocations in the future.
<i>Carex decomposita</i>	Epiphytic Sedge	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Carex decomposita</i>	Epiphytic Sedge	Propagation and translocation research	Research	Research into propagation and translocation of this species in order to introduce into protected managed natural areas.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Carex decomposita</i>	Epiphytic Sedge	Life history, ecology, genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Carex decomposita</i>	Epiphytic Sedge	Develop and implement best management practices	Management	Development and implementation of best management practices for these upland wetland communities.
<i>Carex juniperorum</i>	Juniper Sedge	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Carex juniperorum</i>	Juniper Sedge	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Carex juniperorum</i>	Juniper Sedge	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Carex juniperorum</i>	Juniper Sedge	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Carex juniperorum</i>	Juniper Sedge	Develop and implement best management practices	Management	Develop and implement best management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.
<i>Carex roanensis</i>	Roan Mountain Sedge	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Carex roanensis</i>	Roan Mountain Sedge	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Carex roanensis</i>	Roan Mountain Sedge	Life history, ecology and genetic research	Research	Life history, ecology, genetic and population viability analysis research.
<i>Carex roanensis</i>	Roan Mountain Sedge	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.
<i>Carex timida</i>	Timid Sedge	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Carex timida</i>	Timid Sedge	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Carex timida</i>	Timid Sedge	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Carex timida</i>	Timid Sedge	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.
<i>Clinopodium glabellum</i>	Savory	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Collinsonia verticillata</i>	Whorled Horse-balm	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Conradina verticillata</i>	Cumberland Rosemary	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Conradina verticillata</i>	Cumberland Rosemary	Translocation research	Research	Continue and expand on translocation efforts and research with plant conservation alliance and conservation horticulturalist partners.
<i>Conradina verticillata</i>	Cumberland Rosemary	Life history, ecology, genetic research	Research	Life history, ecology and genetic and population viability analysis research.
<i>Conradina verticillata</i>	Cumberland Rosemary	Develop and implement best management practices	Management	Development and implementation of best management practices such as woody removal, invasive species control, and overall habitat management guidance.
<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Status Survey	Survey	Updated status survey to assess overall trends range wide, this has not been completed in all watersheds since the original discoveries.
<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Life history, pollination and mycorrhizal research	Research	Life history studies, pollination and mycorrhizal research
<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Site protection	Management	Protection and management of critical populations and habitats

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Surveys for new population	Survey	Additional surveys are needed to find undocumented populations on suitable habitat.
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Develop and implement best management practices	Management	Development and implementation of best management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.
<i>Eriogonum harperi</i>	Harper's Wild Fleabane	Baseline surveys to locate populations	Survey	New surveys on private and public lands are needed in the interior plateau to locate populations and begin conservation efforts.
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Status surveys	Survey	Status surveys are needed assess long term trends of populations.
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Life history, ecology, genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Invasive species management	Management	Managing the riparian areas for invasive species on the Rockcastle River and Big South Fork is needed to reduce reduce invasive threats.
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Development and implementation of best management practices	Management	Development and implementation of best management practices such as woody removal, invasive species control, and overall habitat management guidance.
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Surveys for new populations	Survey	Surveys for new populations and suitable habitat needs to occur in order to find additional populations or plan for translocations in the future.
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Status surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Life history, ecology, genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Propagation and translocation research	Research	Research into propagation and translocation of this species in order to introduce into protected managed natural areas.
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Develop and implement best management practices	Management	Develop and implement best management practices for mud flats along lakes and large rivers.
<i>Glandularia canadensis</i>	Rose Mock-vervain	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Glandularia canadensis</i>	Rose Mock-vervain	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future
<i>Glandularia canadensis</i>	Rose Mock-vervain	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Glandularia canadensis</i>	Rose Mock-vervain	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.
<i>Gratiola quartermantiae</i>	Quarterman's Hedge-hyssop	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Gratiola quartermantiae</i>	Quarterman's Hedge-hyssop	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Gratiola quartermantiae</i>	Quarterman's Hedge-hyssop	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Gratiola quartermantiae</i>	Quarterman's Hedge-hyssop	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Gratiola quartermantiae</i>	Quarterman's Hedge-hyssop	Develop and implement best management practices	Management	Develop and implement management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.
<i>Helianthus eggertii</i>	Eggert's Sunflower	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Helianthus eggertii</i>	Eggert's Sunflower	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Helianthus eggertii</i>	Eggert's Sunflower	Develop and implement best management practices	Management	Development and implementation of best management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.
<i>Helianthus eggertii</i>	Eggert's Sunflower	Management effects research	Management	Additional research is needed on management effects on species viability and habitat quality.
<i>Hexastylis contracta</i>	Southern Heartleaf	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Hexastylis contracta</i>	Southern Heartleaf	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Hexastylis contracta</i>	Southern Heartleaf	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Hexastylis contracta</i>	Southern Heartleaf	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.
<i>Leavenworthia exigua</i> var. <i>laciniata</i>	Kentucky Gladecress	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Leavenworthia exigua</i> var. <i>laciniata</i>	Kentucky Gladecress	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Leavenworthia exigua</i> var. <i>laciniata</i>	Kentucky Gladecress	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research
<i>Leavenworthia exigua</i> var. <i>laciniata</i>	Kentucky Gladecress	Develop and implement best management practices	Management	Development and implementation of best management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.
<i>Marshallia pulchra</i>	Barbara's Buttons	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Marshallia pulchra</i>	Barbara's Buttons	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Marshallia pulchra</i>	Barbara's Buttons	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Marshallia pulchra</i>	Barbara's Buttons	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Marshallia pulchra</i>	Barbara's Buttons	Develop and implement best management practices	Management	Development and implementation of best management practices such as woody removal, invasive species control, and overall habitat management guidance.
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Status surveys	Survey	Continue with status surveys to assess current population trends and threats. Continue to monitor the introduced population and assess viability.
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Translocation research	Research	Continue and expand on translocation efforts and research with plant conservation alliance and conservation horticulturalist partners.
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species removal and trail rerouting, overall habitat management guidance.
<i>Monotropsis odorata</i>	Sweet Pinesap	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Monotropsis odorata</i>	Sweet Pinesap	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Monotropsis odorata</i>	Sweet Pinesap	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Monotropsis odorata</i>	Sweet Pinesap	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control, and overall habitat management guidance.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Surveys for new populations	Survey	Additional surveys are needed to find undocumented populations on suitable habitat.
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Life history and ecology research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Develop and implement best management practices	Management	Development and implementation of best management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Surveys for new populations	Survey	New surveys are needed in order to locate extant populations.
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Status surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Develop and implement best management practices	Management	Development and implementation of best management practices such as woody removal, invasive species control, and overall habitat management guidance.
<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Develop and implement best management practices	Management	Develop and implement management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.
<i>Physaria globosa</i>	Globe Bladderpod	Status surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Physaria globosa</i>	Globe Bladderpod	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Physaria globosa</i>	Globe Bladderpod	Life history, ecology and genetic research	Research	Life history, ecology, genetic and population viability analysis research.
<i>Physaria globosa</i>	Globe Bladderpod	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Physaria globosa</i>	Globe Bladderpod	Develop critical habitat protection plan	Management	Develop a critical habitat protection plan with state, federal, universities and land trusts.
<i>Physaria globosa</i>	Globe Bladderpod	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Platanthera integrilabia</i>	White Fringeless Orchid	5 year species status reviews	Survey	Work with USFWS on 5 year species status reviews.
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Annual monitoring	Survey	This species needs to be monitored annually to look at population status trends with varying management regimes and abiotic factors such as temperature and precipitation.
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Mycorrhizal symbiont research	Research	Research is needed on the mycorrhizal symbionts of white fringeless orchid.
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Management effects research	Research	Additional research is needed on management effects (woody removal, invasive species removal, debris dam construction) on species viability/life history and natural communities quality.
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Manage seeps for woody encroachment and invasive species	Management	Manage seeps for woody encroachment and invasive species.
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Restore wetlands/hydrologic conditions	Management	Restoring appropriate hydrological conditions by construction debris dams and other hydrological manipulations, and removing canopy.
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Prescribed fire in adjacent upland systems	Management	Uplands forests/woodlands adjacent to the wetlands needs to be managed with fire in order to restore hydrology and disturbances on a larger scale with the forests and wetland microhabitats.
<i>Polymnia laevigata</i>	Tennessee Leafcup	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Polymnia laevigata</i>	Tennessee Leafcup	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Polymnia laevigata</i>	Tennessee Leafcup	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Polymnia laevigata</i>	Tennessee Leafcup	Develop and implement best management practices	Management	Develop and implement best management practices such as invasive species removal and forest preservation.
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Status Surveys	Survey	Continued status surveys to track trends and threats.
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Surveys for new populations	Survey	Survey additional habitat for undocumented populations.
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Life history, ecology and genetic studies	Research	Life history studies, population dispersal and general ecology, and genetic studies are needed to assess population viability.
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Watershed management	Management	General management of critical watersheds to protect and maintain existing habitat.
<i>Primula frenchii</i>	French's Shooting Star	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Primula frenchii</i>	French's Shooting Star	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Primula frenchii</i>	French's Shooting Star	Life history, ecology and genetic research	Research	Life history, ecology, genetic and population viability analysis research
<i>Primula frenchii</i>	French's Shooting Star	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Develop and implement best management practices	Management	Development and implementation of best management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Management effects research	Management	Additional research is needed on management effects on species viability and habitat quality.
<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Site protection	Management	Protection and management of critical populations and habitats.
<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control, and overall habitat management guidance.
<i>Sabulina fortinalis</i>	Water Stitchwort	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Sabulina fortinalis</i>	Water Stitchwort	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Sabulina fortinalis</i>	Water Stitchwort	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Sabulina fortinalis</i>	Water Stitchwort	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Sabulina fortinalis</i>	Water Stitchwort	Develop and implement best management practices	Management	Development and implementation of best management practices such as woody removal, invasive species control, and overall habitat management guidance.
<i>Schisandra glabra</i>	Bay Starvine	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Schisandra glabra</i>	Bay Starvine	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Schisandra glabra</i>	Bay Starvine	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Schisandra glabra</i>	Bay Starvine	Develop and implement best management practices	Management	Develop and implement best management practices such as invasive species removal and forest preservation.
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Surveys for new populations	Survey	Surveys for new populations and suitable habitat needs to occur in order to find additional populations or plan for translocations in the future.
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Status surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Propagation and translocation research	Research	Research into propagation and translocation of this species in order to introduce into protected managed natural areas.
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Life history, ecology, genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Schoenoplectella hallii</i>	Hall's Bulrush	Develop and implement best management practices	Management	Development and implementation of best management practices for these upland wetland communities.
<i>Schwalbea americana</i>	Chaffseed	Surveys for new populations	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Schwalbea americana</i>	Chaffseed	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Schwalbea americana</i>	Chaffseed	Translocation research	Research	Continue and expand on translocation efforts and research with plant conservation alliance and conservation horticulturalist partners.
<i>Schwalbea americana</i>	Chaffseed	Develop best management practices	Management	Best management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance needs to be developed.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Scutellaria saxatilis</i>	Rock Skullcap	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Scutellaria saxatilis</i>	Rock Skullcap	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Scutellaria saxatilis</i>	Rock Skullcap	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Silene ovata</i>	Ovate Catchfly	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Silene ovata</i>	Ovate Catchfly	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Silene ovata</i>	Ovate Catchfly	Translocation research	Research	Continue and expand on translocation efforts and research with plant conservation alliance and conservation horticulturalist partners.
<i>Silene ovata</i>	Ovate Catchfly	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Silene ovata</i>	Ovate Catchfly	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.
<i>Silene regia</i>	Royal Catchfly	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Silene regia</i>	Royal Catchfly	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Silene regia</i>	Royal Catchfly	Translocation research	Research	Increase translocation efforts and research with plant conservation alliance and conservation horticulturalist partners.
<i>Silene regia</i>	Royal Catchfly	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Silene regia</i>	Royal Catchfly	Develop and implement best management practices	Management	Develop and implement best management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance.
<i>Silphium lasiotense</i>	Appalachian Rosinweed	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Silphium lasiotense</i>	Appalachian Rosinweed	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Silphium lasiotense</i>	Appalachian Rosinweed	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Silphium lasiotense</i>	Appalachian Rosinweed	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control, prescribed fire and overall habitat management guidance.
<i>Solidago albopilosa</i>	White-haired Goldenrod	Status surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Solidago albopilosa</i>	White-haired Goldenrod	Genetic research	Research	Work with researchers to examine within and between population genetic diversity.
<i>Solidago albopilosa</i>	White-haired Goldenrod	Implement Adopt a rockhouse program	Management	Implement population monitoring and management program with partners and volunteers (Adopt a rockhouse program). Manage invasive species and monitor/manage rust levels through this program.
<i>Solidago albopilosa</i>	White-haired Goldenrod	Management effects research	Management	Additional research is needed on management effects on species viability and habitat quality.
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Life history, ecology, genetic research	Research	Life history, ecology and genetic and population viability analysis research.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Develop and implement best management practices	Management	Development and implementation of best management practices such as woody removal, invasive species control, and overall habitat management guidance.
<i>Solidago faucibus</i>	Gorge Goldenrod	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Solidago faucibus</i>	Gorge Goldenrod	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Solidago faucibus</i>	Gorge Goldenrod	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Solidago faucibus</i>	Gorge Goldenrod	Develop and implement best management practices	Management	Develop and implement best management practices such as invasive species removal and forest preservation.
<i>Solidago shortii</i>	Short's Goldenrod	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Solidago shortii</i>	Short's Goldenrod	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Solidago shortii</i>	Short's Goldenrod	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Solidago shortii</i>	Short's Goldenrod	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Solidago shortii</i>	Short's Goldenrod	Develop best management practices	Management	Best management practices such as fire prescription (seasonality), specific disturbance type effects (scrapping/trails) and overall habitat management guidance needs to be developed.
<i>Spiraea virginiana</i>	Virginia Spiraea	Status Surveys	Survey	Continue with status surveys to assess current population trends and threats.
<i>Spiraea virginiana</i>	Virginia Spiraea	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Spiraea virginiana</i>	Virginia Spiraea	Translocation research	Research	Continue and expand on translocation efforts and research with plant conservation alliance and conservation horticulturalist partners.
<i>Spiraea virginiana</i>	Virginia Spiraea	Develop and implement best management practices	Management	Development and implementation of best management practices such as woody removal, invasive species control, and overall habitat management guidance.
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Status Survey	Survey	Conduct status surveys to assess current population trends and threats.
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Site protection	Management	Protection and management of critical populations and habitats.
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Life history, ecology and genetic research	Research	Life history, ecology, genetic and population viability analysis research.
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control and overall habitat management guidance.
<i>Trifolium kentuckiense</i>	Kentucky Clover	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Trifolium kentuckiense</i>	Kentucky Clover	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Trifolium kentuckiense</i>	Kentucky Clover	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Trifolium kentuckiense</i>	Kentucky Clover	Site protection	Management	Protection and management of critical populations and habitats.
<i>Trifolium kentuckiense</i>	Kentucky Clover	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control, prescribed fire and overall habitat management guidance.
<i>Trifolium reflexum</i>	Buffalo Clover	Status Surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Trifolium reflexum</i>	Buffalo Clover	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Trifolium reflexum</i>	Buffalo Clover	Life history, ecology and genetic research	Research	Life history, ecology, genetic, and population viability analysis research.
<i>Trifolium reflexum</i>	Buffalo Clover	Develop and implement best management practices	Management	Development and implementation of best management practices such as invasive species control, prescribed fire and overall habitat management guidance.
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Post delisting monitoring and status surveys	Survey	Continue with post delisting monitoring and status surveys to assess current population trends and threats.
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Management effects research	Research	Additional research is needed on management effects on species viability and habitat quality.
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Develop cooperative management agreements with landowners	Management	Best management practices and cooperative management agreements, such as invasive species removal, specific disturbance type effects (scrapping/trails) and overall habitat management guidance needs to be developed.
<i>Vitis rupestris</i>	Sand Grape	Status surveys	Survey	Conduct status surveys to assess current population trends and threats.
<i>Vitis rupestris</i>	Sand Grape	Surveys for new populations or habitat	Survey	Additional surveys are needed to look for additional populations or suitable habitat than can serve as introduction sites in the future.
<i>Vitis rupestris</i>	Sand Grape	Life history, ecology, genetic research	Research	Life history, ecology and genetic and population viability analysis research.
<i>Vitis rupestris</i>	Sand Grape	Develop and implement best management practices	Management	Development and implementation of best management practices such as woody removal, invasive species control, and overall habitat management guidance.

APX 6.1.i Needs Identified for Reptile SGCN

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Apalone mutica mutica</i>	Midland Smooth Softshell	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Apalone mutica mutica</i>	Midland Smooth Softshell	Protect turtle nesting areas	Management	Protect turtle nesting areas on sandbars, islands, and beaches along large rivers and reservoir shorelines to stop threats of ATV & OHV traffic and general human disturbance.
<i>Apalone mutica mutica</i>	Midland Smooth Softshell	Restore and maintain turtle nesting areas	Management	Restore and maintain open turtle nesting areas (sandbars, islands, and beaches) along large rivers and reservoir shorelines by controlling vegetative succession.
<i>Aspidozelis sexlineata</i>	Six-lined Racerunner	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Aspidozelis sexlineata</i>	Six-lined Racerunner	Prescribed fire management	Management	Use prescribed fire to manage forest habitat.
<i>Aspidozelis sexlineata</i>	Six-lined Racerunner	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Aspidozelis sexlineata</i>	Six-lined Racerunner	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Cemophora coccinea</i>	Scarletsnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Cemophora coccinea</i>	Scarletsnake	Protect existing forested areas	Management	Protect existing areas of good forest cover.
<i>Cemophora coccinea</i>	Scarletsnake	Restore and maintain sites with good forest cover	Management	Restore degraded forested sites and maintain good forest cover.
<i>Cemophora coccinea</i>	Scarletsnake	Prescribed fire management	Management	Use prescribed fire to manage forest habitat.
<i>Cemophora coccinea</i>	Scarletsnake	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Cemophora coccinea</i>	Scarletsnake	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Cemophora coccinea</i>	Scarletsnake	Raise awareness of the importance and diversity of snakes in Kentucky	Management	Engage with the public to inform citizens of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.
<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Protect and restore natural stream channels, bayous, swamps, and wetlands	Management	Protect existing natural stream channels, bayous, swamps and wetlands.
<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Restore degraded wetland habitats	Management	Restore existing natural stream channels, bayous, swamps and wetlands.
<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Restore and/or create wetland habitat	Management	Restore degraded wetland habitat and/or create open to semi-open wetland habitat for breeding or foraging.
<i>Chrysemys dorsalis</i>	Southern Painted Turtle	Provide patches of open habitat adjacent to wetlands	Management	Provide patches of open land/grassland adjacent to wetlands for egg-laying or foraging.
<i>Clonophis kirtlandii</i>	Kirtland's Snake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Clonophis kirtlandii</i>	Kirtland's Snake	Protect and restore natural stream channels, bayous, swamps, and wetlands	Management	Protect existing natural stream channels, bayous, swamps and wetlands.
<i>Clonophis kirtlandii</i>	Kirtland's Snake	Restore degraded wetland habitats	Management	Restore existing natural stream channels, bayous, swamps and wetlands.
<i>Clonophis kirtlandii</i>	Kirtland's Snake	Provide patches of open habitat adjacent to wetlands	Management	Provide patches of open land/grassland adjacent to wetlands for egg-laying or foraging.
<i>Clonophis kirtlandii</i>	Kirtland's Snake	Protect unique disturbed sites	Management	Protect, restore, and/or create corridors and patches of open or beat-up urban fields, waste areas, grassy and weedy roadsides, seasonal wetlands, and roadsides with lots of crayfish burrows, earthworms, and surface debris in central and western Jefferson County.
<i>Clonophis kirtlandii</i>	Kirtland's Snake	Create corridors and patches of unique disturbed habitat	Management	Restore and/or create corridors and patches of open or beat-up urban fields, waste areas, grassy and weedy roadsides, seasonal wetlands, and roadsides with lots of crayfish burrows, earthworms, and surface debris in central and western Jefferson County.
<i>Clonophis kirtlandii</i>	Kirtland's Snake	Raise awareness of the importance and diversity of snakes in Kentucky	Management	Engage with the public to inform citizens of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.
<i>Crotalus horridus</i>	Timber Rattlesnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Graptemys pseudogeographica pseudogeographica</i>	Northern False Map Turtle	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Graptemys pseudogeographica pseudogeographica</i>	Northern False Map Turtle	Protect and restore natural stream channels, bayous, swamps, and wetlands	Management	Protect existing natural stream channels, bayous, swamps and wetlands.
<i>Graptemys pseudogeographica pseudogeographica</i>	Northern False Map Turtle	Restore degraded wetland habitats	Management	Restore existing natural stream channels, bayous, swamps and wetlands.
<i>Graptemys pseudogeographica pseudogeographica</i>	Northern False Map Turtle	Protect turtle nesting areas	Management	Protect turtle nesting areas on sandbars, islands, and beaches along large rivers and reservoir shorelines to stop threats of ATV & OHV traffic and general human disturbance.
<i>Graptemys pseudogeographica pseudogeographica</i>	Northern False Map Turtle	Restore and maintain turtle nesting areas	Management	Restore and maintain open turtle nesting areas (sandbars, islands, and beaches) along large rivers and reservoir shorelines by controlling vegetative succession.
<i>Kinostemon subrubrum</i>	Eastern Mud Turtle	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Kinostemon subrubrum</i>	Eastern Mud Turtle	Protect and restore natural stream channels, bayous, swamps, and wetlands	Management	Protect existing natural stream channels, bayous, swamps and wetlands.
<i>Kinostemon subrubrum</i>	Eastern Mud Turtle	Restore degraded wetland habitats	Management	Restore existing natural stream channels, bayous, swamps and wetlands.
<i>Kinostemon subrubrum</i>	Eastern Mud Turtle	Restore and/or create wetland habitat	Management	Restore degraded wetland habitat and/or create open to semi-open wetland habitat for breeding or foraging.
<i>Kinostemon subrubrum</i>	Eastern Mud Turtle	Provide patches of open habitat adjacent to wetlands	Management	Provide patches of open land/grassland adjacent to wetlands for egg-laying or foraging.
<i>Lampropeltis elapsoides</i>	Scarlet Kingsnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Lampropeltis elapsoides</i>	Scarlet Kingsnake	Protect existing forested areas	Management	Protect existing areas of good forest cover.
<i>Lampropeltis elapsoides</i>	Scarlet Kingsnake	Restore and maintain sites with good forest cover	Management	Restore degraded forested sites and maintain good forest cover.
<i>Lampropeltis elapsoides</i>	Scarlet Kingsnake	Prescribed fire management	Management	Use prescribed fire to manage forest habitat.
<i>Lampropeltis elapsoides</i>	Scarlet Kingsnake	Raise awareness of the importance and diversity of snakes in Kentucky	Management	Engage with the public to inform citizens of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Protect existing forested areas	Management	Protect existing areas of good forest cover.
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Restore and maintain sites with good forest cover	Management	Restore degraded forested sites and maintain good forest cover.
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Protect and restore natural stream channels, bayous, swamps, and wetlands	Management	Protect existing natural stream channels, bayous, swamps and wetlands.
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Restore degraded wetland habitats	Management	Restore existing natural stream channels, bayous, swamps and wetlands.
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Protect turtle nesting areas	Management	Protect turtle nesting areas on sandbars, islands, and beaches along large rivers and reservoir shorelines to stop threats of ATV & OHV traffic and general human disturbance.
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Restore and maintain turtle nesting areas	Management	Restore and maintain open turtle nesting areas (sandbars, islands, and beaches) along large rivers and reservoir shorelines by controlling vegetative succession.
<i>Nerodia cyclopion</i>	Mississippi Green Watersnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Nerodia cyclopion</i>	Mississippi Green Watersnake	Protect and restore natural stream channels, bayous, swamps, and wetlands	Management	Protect existing natural stream channels, bayous, swamps and wetlands.
<i>Nerodia cyclopion</i>	Mississippi Green Watersnake	Restore degraded wetland habitats	Management	Restore existing natural stream channels, bayous, swamps and wetlands.
<i>Nerodia cyclopion</i>	Mississippi Green Watersnake	Raise awareness of the importance and diversity of snakes in Kentucky	Management	Engage with the public to inform citizens of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Nerodia fasciata confluens</i>	Broad-banded Watersnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard	Prescribed fire management	Management	Use prescribed fire to manage forest habitat.
<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Pantherophis guttatus</i>	Red Cornsnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Pantherophis guttatus</i>	Red Cornsnake	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Pantherophis guttatus</i>	Red Cornsnake	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Pantherophis guttatus</i>	Red Cornsnake	Raise awareness of the importance and diversity of snakes in Kentucky	Management	Engage with the public to inform citizens of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	Prescribed fire management	Management	Use prescribed fire to manage forest habitat.
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake	Raise awareness of the importance and diversity of snakes in Kentucky	Management	Engage with the public to inform citizens of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.
<i>Plestiodon anthracinus</i>	Coal Skink	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Plestiodon anthracinus</i>	Coal Skink	Prescribed fire management	Management	Use prescribed fire to manage forest habitat.
<i>Plestiodon anthracinus</i>	Coal Skink	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Plestiodon anthracinus</i>	Coal Skink	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink	Prescribed fire management	Management	Use prescribed fire to manage forest habitat.
<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Sistrurus miliarius streckeri</i>	Western Pygmy Rattlesnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Sistrurus miliarius streckeri</i>	Western Pygmy Rattlesnake	Prescribed fire management	Management	Use prescribed fire to manage forest habitat.

Scientific Name	Common Name	Needs Title	Needs Category	Description
<i>Sistrurus miliarius streckeri</i>	Western Pygmy Rattlesnake	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Sistrurus miliarius streckeri</i>	Western Pygmy Rattlesnake	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Sistrurus miliarius streckeri</i>	Western Pygmy Rattlesnake	Raise awareness of the importance and diversity of snakes in Kentucky	Management	Engage with the public to inform citizens of the harm of killing snakes or collecting for the pet trade. Encourage proper identification of snakes to prevent unnecessary mortality.
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Protect existing forested areas	Management	Protect existing areas of good forest cover.
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Restore and maintain sites with good forest cover	Management	Restore degraded forested sites and maintain good forest cover.
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Prescribed fire management	Management	Use prescribed fire to manage forest habitat.
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Protect warm season grasslands and special open habitats	Management	Protect warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Restore and manage warm season grasslands and special open habitats	Management	Restore, maintain, and/or manage warm season grasslands, glades, prairie remnants, open woodlands, and special open habitats like gravel pits, old RR beds, abandoned quarries, eroded rocky or gravelly slopes (including highway and power line rights-of-way), and rocky hillsides.
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Raise awareness of the importance and diversity of snakes in Kentucky	Management	Engage with the public to inform citizens of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.
<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	Protect and restore natural stream channels, bayous, swamps, and wetlands	Management	Protect existing natural stream channels, bayous, swamps and wetlands.
<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	Restore degraded wetland habitats	Management	Restore existing natural stream channels, bayous, swamps and wetlands.
<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	Restore and/or create wetland habitat	Management	Restore degraded wetland habitat and/or create open to semi-open wetland habitat for breeding or foraging.
<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	Provide patches of open habitat adjacent to wetlands	Management	Provide patches of open land/grassland adjacent to wetlands for egg-laying or foraging.
<i>Thamnophis proximus proximus</i>	Western Ribbonsnake	Raise awareness of the importance and diversity of snakes in Kentucky	Management	Engage with the public to inform citizens of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.
<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Collect baseline species information	Survey	Develop and implement field survey protocols to collect data on the species distribution, occupancy trends, life history, and habitat needs in Kentucky.
<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Protect and restore natural stream channels, bayous, swamps, and wetlands	Management	Protect existing natural stream channels, bayous, swamps and wetlands.
<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Restore degraded wetland habitats	Management	Restore existing natural stream channels, bayous, swamps and wetlands.
<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Restore and/or create wetland habitat	Management	Restore degraded wetland habitat and/or create open to semi-open wetland habitat for breeding or foraging.
<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Provide patches of open habitat adjacent to wetlands	Management	Provide patches of open land/grassland adjacent to wetlands for egg-laying or foraging.
<i>Thamnophis saurita saurita</i>	Eastern Ribbonsnake	Raise awareness of the importance and diversity of snakes in Kentucky	Management	Engage with the public to inform citizens of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.

CHAPTER 7: CONSERVATION ACTIONS FOR SGCN

Identifying Conservation Actions

The most critical component of a SWAP revision includes not only development of conservation actions, but prioritizing the implementation of those actions, and focusing where actions are directed. At the same time, a framework must allow resource managers to capitalize on unforeseen opportunities (be it funding or partnership effort) or rapidly pivot to mitigate emerging threats as they develop. Creating a system that takes these factors into consideration, while also considering how implemented actions can provide collateral benefit to non-target SGCN, should be the goal. Consistent tracking of action implementation is crucial for conservation managers to have available, not only for future SWAP revisions, but to

inform and allow for adaptive management.

To standardize language used across taxonomic groups for describing Conservation Actions, seven categories containing 24 subcategories, were utilized. These categories and subcategories were provided from *A Standard Lexicon for Biodiversity Conservation: Unified Classification of Threats and Actions*. A list of conservation action categories and subcategories are provided below. Taxa teams were encouraged to develop and provide more specific information during the action development process including a descriptive title and comments that would provide plan users further clarity. If an action could be described using multiple subcategories within the same category (i.e. Formal Education and Training) the threat was categorized using the parent category (i.e. Education and Awareness).

IUCN-CMP Action Classification	Category	Subcategory
1	Land/Water Protection	
	1.1	Site/Area Protection
	1.2	Resource and Habitat Protection
2	Land/Water Management	
	2.1	Site/Area Management
	2.2	Invasive/Problematic Species Control
	2.3	Habitat and Natural Process Restoration
3	Species Management	
	3.1	Species Management
	3.2	Species Recovery
	3.3	Species Reintroduction
	3.4	Ex-situ Conservation
4	Education and Awareness	
	4.1	Formal Education
	4.2	Training
	4.3	Awareness and Communications
5	Law and Policy	
	5.1	Legislation
	5.2	Policies and Regulations
	5.3	Private Sector Standards and Codes
	5.4	Compliance and Enforcement
6	Livelihood, Economic, and Other Incentives	
	6.1	Linked Enterprises and Livelihood Alternatives
	6.2	Substitution
	6.3	Market Forces
	6.4	Conservation Payments
	6.5	Nonmonetary Values
7	External Capacity Building	
	7.1	Institution and Civil Society Development
	7.2	Alliance and Partnership Development
	7.3	Conservation Finance

As a first measure to ensure that focused conservation actions were provided, taxa teams were required to link proposed conservation actions with previously identified threats. Only conservation actions that mitigate, one or many, threats were included in the plan. This allows for more accurate prioritization (as described later), better success monitoring, and ensures that resources are allocated to maximize effectiveness. As many conservation actions have the ability to mitigate multiple threats (for example, Resource and Habitat Protection can mitigate threats associated with Development and Agriculture), a one-to-many relationship was allowed.

Conservation actions were not identified for data deficient species as the priority for that group is collection of data for further consideration of their status in future revisions. Further, a conservation action was not required to mitigate every identified threat.

Common Actions Across Taxa

For the 527 SGCN, 2,080 specific conservation actions were identified (Appendix 7.1 a-i). External Capacity Building, Land/Water Management, and Education and Awareness were the most common conservation actions attributed to SGCN across all taxa. A summary of conservation actions by taxonomic group is provided in the chart below. Further analysis of threats impacting SGCN is provide in the Taxa Overview sections.

While the identified actions represent a robust effort to encompass how conservation capital could be expended over the upcoming decade, it is not a complete list of actions that can or should be employed. Emerging technologies, innovation, and collaboration are likely to result in additional conservation actions being recognized. Conservation actions beyond those listed within the Plan will be assessed using the framework provided earlier and implementation will be evaluated throughout the duration of the Plan’s timeframe as funding allows.

Action Prioritization

To effectively implement thousands of actions across hundreds of SGCN, a framework for prioritization must be established. For this revision each action was

scored by the Advisory Team across two factors and six total metrics. The first action prioritization category, Effort, was scored utilizing three categorical metrics (Cost, Purview, and Bandwidth). The second action prioritization category, Impact, was scored utilizing three categorical metrics (Priority, Severity, and Success). Descriptions of each metric, and the corresponding score, are as follows:

Effort

Effort was scored via three categorical metrics. Cost was estimated based on prior projects initiated by KDFWR and did not include personnel to prevent redundancy with other metrics. Purview was scored based on the agency/group that would likely be the lead on implementing the action and considering if the action would be a collaborative effort. Bandwidth defines the commitment to the project, in terms of number of years, to completion. When considering the evaluation of effort metrics, a lower score corresponds to a lower expected effort to complete the action. Therefore, lower cumulative Effort scores are considered to be less time consuming and costly and may be considered more desirable. Scores were assigned as follows:

Cost (not including personnel time)

- 1 = under \$10,000
- 2 = \$10,000 - \$50,000
- 3 = over \$50,000

Purview

- 1 = Little or no time required by KDFWR staff
- 2 = shared time responsibility with KDFWR and at least one partner
- 3 = led by KDFWR

Bandwidth

- 1 = Anticipated project completion within one year

Action Type	Amphibians	Birds	Crustaceans	Fishes and Lampreys	Freshwater Mussels and Snails	Insects and Springtails	Mammals	Plants	Reptiles	Grand Total
External Capacity Building	10	144	13	149	76	30	4	56	1	483
Land/Water Management	23	45	13	202	20	82	15	60	14	474
Education and Awareness	19	170		81	54	47	11	57	6	445
Land/Water Protection	23	46	7	69		28	24	49	12	258
Livelihood, Economic and Other Incentives		50	2	65	54	2				173
Species Management		1			27		1	117		146
Law and Policy	25	17	15	41		3				101
Grand Total	100	473	50	607	231	192	55	339	33	2080

2 = Anticipated project completion in 1-3 years requiring multiple grant cycles

3 = Project is long-term or perpetual

Impact

Impact was scored via three categorical metrics. Priority is based upon the SGCN prioritization category as described in Chapter Three. Severity was scored based on the severity scores designated for threats that would be mitigated if the conservation action were to be initiated. Success was defined based on the level of certainty that the action, if implemented, would be successful in benefiting the SGCN. When considering the evaluation of Impact metrics, a higher score corresponds with a greater indication of the action resulting in overall SGCN conservation. Therefore, higher cumulative Impact scores are considered to be more beneficial to SGCN and may be considered more desirable. Scores were assigned as follows:

Priority

1 = Moderate (Tier 3)

2 = High (Tier 2)

3 = Highest (Tier 1)

Severity

1 = Action mitigates 1 or more minor or moderate threats

2 = Action mitigates one significant or severe threat, or 2 or more substantial threats

3 = Action mitigates more than 2 substantial, significant, or severe threats

Success

1 = New/unproven technique- success probability unknown

2 = New for KDFWR, others have successfully implemented

3 = Proven technique/action and agency familiarity, high probability of success

Determining Conservation Action Category

A weighted sum was calculated to determine the Effort and Impact scores as follows:

$(\text{Cost score} \times 10) + (\text{Bandwidth score} \times 5) + (\text{Purview}$

$\text{score} \times 1) = \text{Conservation Effort Score}$

$(\text{Success score} \times 10) + (\text{Priority score} \times 5) + (\text{Severity score} \times 1) = \text{Conservation Impact Score}$

As each metric was scored from 1-3, the range of scores possible scaled from 16-48. Scores were transformed to scale from 0-100 to allow for simplicity in displaying the results visually.

Effort and Impact scores were plotted to visualize conservation actions with Effort represented on the X-axis and Impact represented on the Y-axis. This resulted in each action being categorized as being Low-Effort/High-Impact, High-Effort/High-Impact, Low-Effort/Low Impact, High-Effort/Low-Impact.

Low-Effort/High-Impact Actions: Proceed

Conservation actions with an Effort Score < 50 and an Impact Score > 50 were placed into the *Proceed* Action Category. As evaluated, these actions may provide the largest conservation benefit relative to the anticipated time and financial cost. As a result, conservation actions that fall into this category should be considered desirable for implementation.

High-Effort/High-Impact Actions: Investigate

Conservation actions with an Effort Score > 50 and an Impact Score > 50 were placed into the *Investigate* Action Category. As evaluated, these actions may provide a large conservation benefit but may also require a significant time and financial cost. As a result, conservation actions that fall into this category may be considered desirable for implementation, but further investigation is required to ensure that the resources required for implementation are available. Actions that fall within this category are often warranted, but precluded, at existing funding levels associated with the State and Tribal Wildlife Grant (STWG) Program. Collaboration with partners that bring significant time and funding resources to the table will likely be required to implement many of the actions in this action category if additional funding for the STWG program isn't secured.

Low-Effort/Low-Impact Actions: Consider

Conservation actions with an Effort Score < 50 and an Impact Score < 50 were placed into the *Consider* Action Category. As evaluated, these actions may provide low conservation benefit but also demand a lower time and financial cost. As a result, conservation actions that fall into this category can be implemented opportunistically as resources are available. Implementation will be encouraged for any actions in this category that are considered favorable by partners to implement with little to no oversight by KDFWR.

High-Effort/Low-Impact Actions: Re-Evaluate

Conservation actions with an Effort Score > 50 and an Impact Score < 50 were placed into the *Re-Evaluate* Action Category. As evaluated, these actions may provide low conservation benefit but require at a high time and financial cost. As a result, conservation actions that fall into this category should be re-evaluated for implementation when partnership arise that can contribute outside time and financial resources. Implementation will be encouraged for any actions in this category that are considered favorable by partners to implement with little to no oversight by KDFWR.

Results of Conservation Action Categorization

All identified conservation actions were scored as described above to further partition them into groups based on anticipated inputs and outcomes. Very few (approximately 12%) of the conservation actions fell into the Re-evaluate category. Roughly 13% were scored as Low-Effort/High-Impact (i.e. Proceed Category). The balance of conservation actions (75%) was categorized as either Consider or Investigate.

The bulk of the conservation actions labeled as Proceed were categorized as External Capacity Building or Law and Policy. Conservation actions traditionally undertaken in prior Kentucky SWAPs were focused primarily on species monitoring and Land Management. This conducted analysis indicates that the largest conservation benefits may be realized by focusing more on the partner engagement and policy development when funds are lacking.

Nearly one-third of the identified conservation actions were scored as high-effort/high-impact. Often, these actions were categorized as Land/Water Management

or Land/Water Protection. Give the current funding limitations with the State and Tribal Wildlife Grant Program, it is unlikely that most of these conservation actions will be implemented without significant time and financial contributions from current and future partners. Identifying mutually beneficial partnerships will be critical to implementation until dedicated funding is available at the proper level to fully implement this plan.

External Capacity Building



Actions to create partnerships, and build infrastructure to do better conservation. Photo: KDFWR

Land and Water Management



Actions directed at conserving or restoring sites, habitats, and natural processes. Photo: KDFWR



Actions Implementation

Action categorization was meant to be used as a part of a decision-making framework for SWAP implementation. Effort and Impact scores are meant to provide insight into expected projects inputs and outcomes at the single species level. During the period of SWAP implementation, initiated actions will be analyzed to include collateral benefit, funding source and availability, and partner interest.

Collateral Benefit of Action Implementation

It should be realized that the Conservation Action prioritization and categorization procedure was scored at the individual species level. For some conservation actions, implementation results in a benefit to other species and species groups. For example, implementing changes to existing regulations to prohibit the movement of invasive aquatic species used as fishing bait would be beneficial to dozens of crustacean and fish SGCN. Grassland restoration and management activities at a given site may

benefit multiple bird, small mammal, and plant SGCN that co-occur in the area. These collateral benefits of conservation action implementation are not accounted for in the adopted categorization method and have the ability to alter the desirability of future implementation. While accounting for synergy between and among species groups proved too cumbersome for the categorization process, the effects should be considered.

Action Monitoring

To monitor conservation action implementation, units of measure were developed for each conservation action category. This will allow for collection of data on the extent to which an action has been implemented. Units of measure are provided in the following table.

It is anticipated that the KDFWR SWAP coordinator will maintain an ongoing dialog with resource managers within KDFWR and outside partners. Perpetual engagement will not only allow for conservation action implementation to occur but will allow for monitoring of the extent and effectiveness of action implementation.

IUCN-CMP Threat Classification	Category	Units of Measure
1	Land/Water Protection	
		Acres Protected (fee simple)
		Acres Protected (easement)
		Sites Protected (fee simple)
		Sites Protected (easement)
2	Land/Water Management	
		Acres directly managed via action implementation
		Sites directly managed via action implementation
		Linear feet of stream managed via action implementation
3	Species Management	
		Number of populations directly managed via action implementation
		Number of individuals propagated
		Number of individuals translocated to suitable habitat
		Number of individuals retained for future propagation
4	Education and Awareness	
		Public contact hours conducting action implementation
		Number of workshops/trainings conducted
		Number of materials produced and provided
5	Law and Policy	
		Number of regulatory amendments
		Number of new statutes or statutory amendments
		Number of citations/prosecutions
		Number of policies implemented or revised

IUCN-CMP Threat Classification	Category	Units of Measure
6	Livelihood, Economic, and Other Incentives	
		Amount of funding utilized for direct action implementation
		Acres enrolled/managed for direct action implementation
7	External Capacity Building	
		Partner contact hours conducting action implementation
		Number of new partnerships established
		Number of formal agreements implemented
		Number of programs developed and implemented

Kentucky's Conservation Opportunity Areas

Assessing Conservation Opportunity Areas

To highlight, geospatially, significant places in Kentucky to implement conservation actions and foster partner engagement, Conservation Opportunity Areas (COAs) were selected. The objective for delineating Conservation Opportunity Areas was to identify portions of Kentucky with high SGCN diversity where on-the-ground conservation actions can be implemented with increased likelihood of success. A priority was also placed on identifying areas where collaboration with other resource managers is likely. The process of selecting COAs was initiated by the Advisory Team in consultation with Taxa Team members and partners such as The Nature Conservancy (TNC), Office of Kentucky Nature Preserves (OKNP), Southeast Conservation Adaptation Strategy (SECAS), and the Midwest Landscape Initiative (MLI).

Conservation Opportunity Areas: A Regional Perspective

Kentucky geographic situation allows for its inclusion in multiple regional collaboration efforts. This further highlights Kentucky's unique position as a central link between the Southeast, Midwest, and Northeast. Inclusion in multiple regional blueprints for conservation underscores how conservation strategies employed within Kentucky's boundary have implications far beyond its borders. To fully capture its regional importance when developing COAs, the SWAP Advisory Team consulted with SECAS and MLI staff and data products.

Midwest Landscape Initiative

The Midwest Landscape Initiative (MLI) was developed as a regional collaboration network across thirteen midwestern states and three Canadian provinces to identify shared conservation priorities and develop

solutions for healthy, functioning ecosystems. Concurrent with the development of this SWAP revision, MLI is developing a Midwest Conservation Blueprint. The goal of the Midwest Conservation Blueprint is to provide a map of priority lands and waters for conservation across the Midwest. The official release date, projected to be during the summer of 2023, precluded the use of these products in development of COAs. However, MLI staff were consulted during the development of the following COAs. Upon finalization of this SWAP revision, COAs and modeling datasets described below, will be made available for incorporation into the Midwest Conservation Blueprint to highlight important areas in Kentucky for conservation and further refine the Midwest Conservation Blueprint.

Southeast Conservation Adaptation Strategy

SECAS is an initiative covering the Southeastern United States and Caribbean and provides a regional perspective on conservation of lands and waters. The Southeast Conservation Blueprint provides a regional spatial plan that identifies priority areas for a connected network of lands and waters. Priority areas are categorized as being Highest priority, High priority, Medium priority, or Priority connections. Inland hubs

Economic Livelihood and Incentives



Actions to use economic and other incentives to influence behavior. Photo: Jay E. Patel Pennsylvania Dept. of Environmental Protection

(areas of 5,000+ acres of highest priority Blueprint areas) and corridors (identified areas of least-cost path connectivity) were identified as a part of the Southeast Conservation Blueprint and were especially helpful in delineating COAs and identifying paths of connection between them.

Development of Aquatic and Terrestrial Habitat Priority Models

The Kentucky and Tennessee chapters of The Nature Conservancy (TNC) and OKNP were consulted to develop aquatic and terrestrial SGCN habitat priority models. For terrestrial and lentic SGCN that were not considered data deficient, the GAP/LANDFIRE Terrestrial Ecosystems dataset (2011) was utilized as a base coverage of ecosystems available for use as habitat. Insects were not included in this analysis given the lack of data associated with many Insect SGCN and the specificity of habitat (i.e. pollinator associations with specific plants) compared to the coarse scale of ecosystem type available.

For each terrestrial or lotic SGCN included in the model, each ecosystem type available in Kentucky was scored as either Preferred, Suitable, Marginal, Unsuitable, or Not in Range. Species occurrence data were consulted for scoring ecosystems as habitat suitability but were not relied upon exclusively as a direct link between mapped ecosystem type and the reporting of SGCN occurrence proved problematic. Ecosystem descriptions were compared to habitat

requirements for each SGCN in consultation with species experts to determine the proper score.

For lotic species, habitat requirements as reported by the Taxa Teams were compared with available statewide stream-type datasets to determine stream segment suitability for aquatic SGCN. Stream descriptors utilized for assessing habitat included stream confinement, size class, temperature, and gradient.

For every species (terrestrial or aquatic) included in the model, records were weighted based upon the date of observation (newer records were weighted more heavily than old records) and species priority (highest priority SGCN were weighted more heavily than high priority species which were weighted more heavily than moderate priority species). Terrestrial habitats (i.e. ecosystem types) were also weighted based on the habitat suitability categories referenced above, with unsuitable and out of range habitats scored at zero.

For the terrestrial model, footprints were built out from each SGCN record included within the model utilizing a ~100 acre hexagon coverage for the entire state. Seven-hundred acre rosettes consisting of the center hexagon the six immediately adjacent hexagons constitute the footprint for each record. The area within each rosette was weighted based upon habitat present, species priority level, and date of observation. Georeferenced, and current, range files for each SGCN included in the model were incorporated. This allowed for only habitats within a particular species range to contribute to the model. (Appendix 7.2)

For the aquatic model, longitudinal footprints were

Education and Awareness

HAVE YOU SEEN ME?



The Eastern Hellbender is:

- The largest salamander in Kentucky, can grow up to 24 inches in length
- Completely aquatic
- Not aggressive or poisonous
- Long lived (up to 30 years)

The Kentucky Department of Fish and Wildlife Resources is very interested in all locality records for the eastern hellbender. If you see this giant salamander, please e-mail John MacGregor (john.macgregor@ky.gov) or Greg Lipps (greglipps@aol.com) with locality information and a photograph, if possible.

Actions directed at people to improve understanding and skills and to influence behavior. Image: KDFWR

built out for each lotic SGCN utilizing upstream and downstream and downstream connectivity. Dams were considered barriers to movement for most SGCN and were not crossed with determining footprint extent. Latitudinal footprints for lotic SGCN were also calculated to assess the importance of upland, floodplain, and riparian areas as they relate to SGCN. (Appendix 7.2)

Determining and Delineating Conservation Opportunity Areas

Utilizing the SECAS Southeast Conservation Blueprint, TNC’s terrestrial and aquatic habitat priority models, and the United States Geologic Survey Protected Areas Dataset (PAD-US), the SWAP Advisory Team selected Conservation Opportunity Areas via a collaborative heads-up digitization process. Eleven sub-regions or watersheds were highlighted as Conservation Opportunity Areas based upon their abundance of extant SGCN utilized habitats, regional importance for conservation, and existing conservation efforts conducted by KDFWR and its partners. A priority was placed on capturing both areas that currently serve as vital habitats for SGCN as well as areas where restoration efforts could be conducted to maximize SGCN utilization and expansion. Consultation with Wildlife Action Plans from adjacent States further facilitated a regional approach for COA’s that approach Kentucky’s border.

Conservation Opportunity Areas were further refined and delineated based upon the factors that necessitated their initial selection. For aquatic species driven COA’s, such as the Green River COA, Licking River COA, etc., watershed boundaries were utilized to limit COA borders. For terrestrial plant and animal driven COA’s, county or physiographic boundaries were utilized to limit COAs.

The eleven COAs encompass roughly 9,146,350 acres (approximately 35% of Kentucky). Species of Greatest Conservation Need contained within each COA range from 97 SGCN (Tygarts-Kinniconick COA) to 240 SGCN (West Kentucky COA). A summary of SGCN by taxonomic group within each COA is provided below.

Conservation Opportunity Area	Amphibians	Birds	Crustaceans	Fishes and Lampreys	Freshwater Mussels and Snails	Insects and Springtails	Mammals	Plants	Reptiles	Grand Total
Big Barrens	8	77	12	25	57	1	16	16	15	227
Central Grasslands and Palisades	5	65	5	6	8	3	12	3	2	109
Cumberland Mountains	9	47	14	5	12	16	24	7	6	140
Green River	5	72	13	24	47	13	17	11	11	213
Jackson Purchase	11	79	10	46	40	11	16	6	21	240
Licking River	11	72	6	15	39	8	19	9	3	182
Muldraugh Prairies	6	65	16	14	42	12	19	9	9	192
Ohio River Floodplain	9	71	4	15	32	1	10	3	9	154
Plateau Escarpment	11	69	12	17	38	7	19	12	4	189
South Fork	6	45	9	17	41	3	18	22	8	169
Tygarts Kinniconick	10	34	4	10	17	1	14	6	1	97

Law and Policy



Actions to develop, change, influence, and help implement formal legislation, regulations, and voluntary standards. Photo: Matt Thomas

Species Management



Actions directed at managing or restoring species, focused on the SGCN Photo: Tara Littlefield

COA Summary Pages

A profile of the most pertinent information for each of Kentucky's COAs is provided in the following Summary Pages. Pages are presented alphabetically by COA name. Each summary page contains a brief overview of the COA, a breakdown of SGCN by taxonomic group and priority level, land use, and overview of common threats and actions for SGCN found within the COA. Additionally, some existing and potential partners that may assist in implementing conservation actions have been identified.

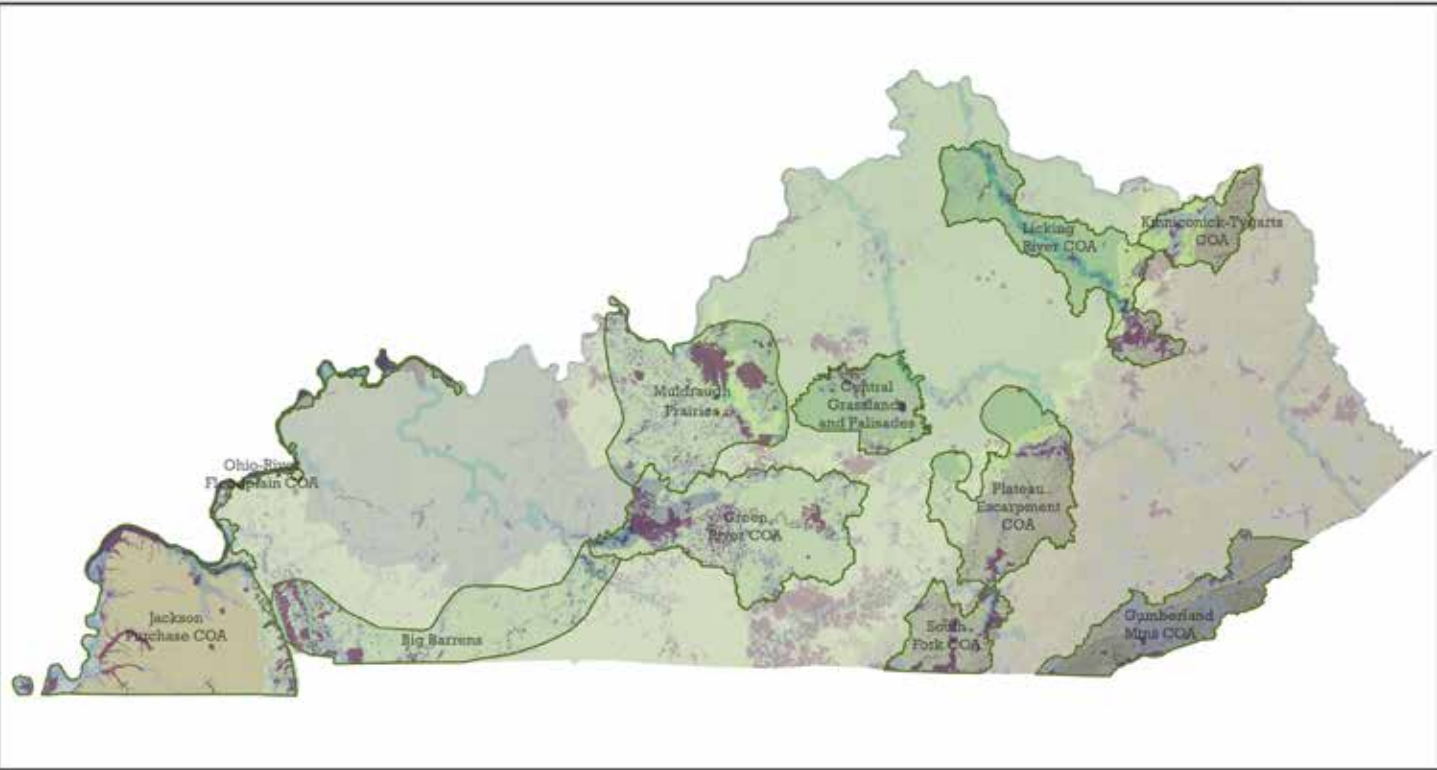
Development of the following summary pages was initiated to provide plan users with a brief account that highlights some of Kentucky's most vital natural areas and should be used as a catalyst for discussing future conservation efforts.

Land and Water Protection



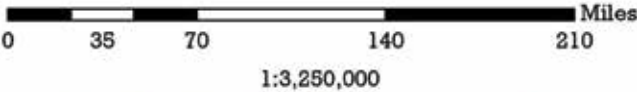
Actions to identify, establish, or expand legally protected areas through purchase or permanent easement and to protect resource rights.
Photo: Mark Godfrey, The Nature Conservancy

Conservation Opportunity Areas



Conservation Opportunity Areas

- SECAS Habitat Prioritization
- Priority connections
- High priority
- Highest priority



Maps prepared by GIS staff at KDFWR in partnership with OENP and TNC. Service Layers courtesy of DGL, KyFromAbove Partners and SECAS.

KENTUCKY'S CONSERVATION OPPORTUNITY AREAS



BIG BARRENS COA

The Big Barrens Conservation Opportunity Area (COA) includes 1,047,125 acres in south central Kentucky and is bordered by the Green River COA on the east and the West Kentucky COA to the west. The Big Barrens COA is situated within the Interior Plateau physiographic region. The landscape is primarily an open rolling karst plain often referred to as the Pennyroyal Plains and is characterized by numerous sinkholes, caves, underground streams, and upland grasslands and wetlands, although forested hilly areas and forested riparian corridors do occur here. The boundary was delineated by reviewing SGCN species locations and habitat, natural grassland/open wetland remnants and rare grassland/open wetland species occurrences in the OKNP natural heritage database. Big Barrens COA contains several important watersheds including the Red, Lower Cumberland and Barren River, as well smaller portions of the Middle Green and Pond River watersheds.

Kentucky once contained millions of acres of large expansive prairies and barrens prior to European settlement, and a large portion of these grasslands were in the Big Barrens COA. Today, few remnants remain in what is now a mostly agricultural landscape, with land use dominated by row crops, hay pasture and developed open space. Deciduous forests are a dominant land use category in riparian areas and also in some uplands. Top threats identified within this COA include natural system modification, pollution,



Globally rare Eastern Prairie Blue Wild Indigo, *Baptisia aberrans*, grows in open full sun on calcareous prairies and needs some level of disturbance to persist.

Photo: Tara Littlefield



Some of the largest blocks of remnant prairie east of the Mississippi River occur in Big Barrens COA.

Photo: Marc Evans

and agriculture and aquaculture. Despite these impacts, some of the largest blocks of remnant prairie east of the Mississippi River persist in this COA, primarily located on Fort Campbell Military Reservation, U. S. Forest Service (USFS) lands, state lands and along service corridors.

Big Barrens SGCN Priority by Taxa

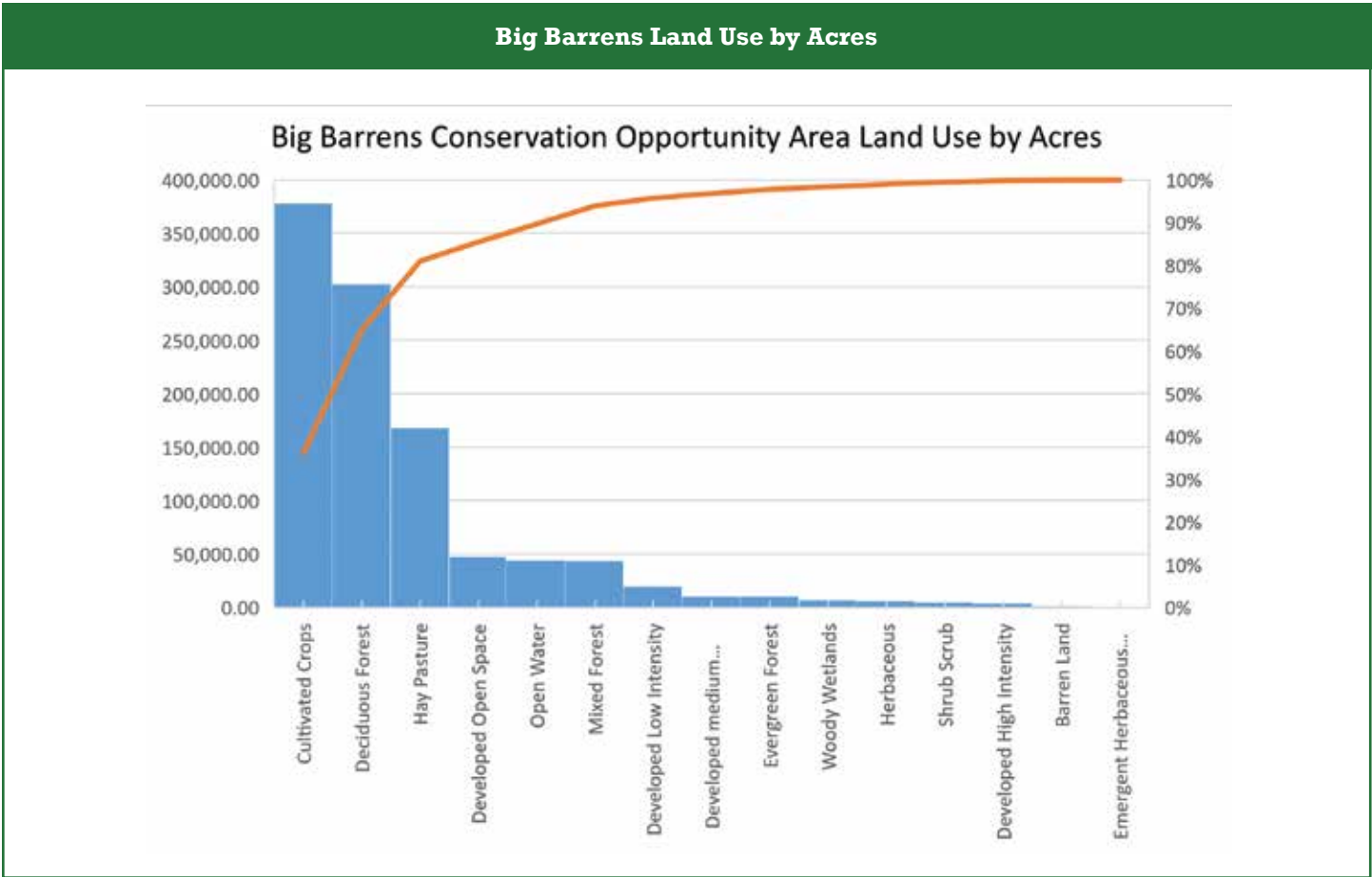
Taxa	Moderate Priority	High Priority	Highest Priority	Data Deficient	Plant	Grand Total
Amphibians	3	1	2	4		10
Birds	93	15	1	1		110
Crustaceans		6		11		17
Fishes	7	14	7	6		34
Freshwater Mussels and Snails	8	24	9	15		56
Insects		2				2
Mammals	2	10		12		24
Plants					32	32
Reptiles	1	2		14		17
Grand Total	114	74	19	63	32	302

Big Barrens COA has records for 302 SGCN, including 19 among the highest prioritization category for animals and 32 Tier 1 globally rare plants. The majority of SGCN occurring within this area are bird species (grassland and wetland associated birds), followed by freshwater mussels, snails, and fish. This COA contains numerous SGCN grassland and wetland associated species and is also a hotspot for state threatened and endangered grassland and open wetland plants and insects.

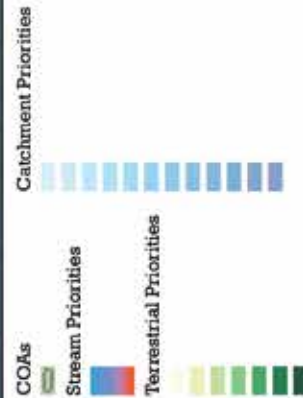
While the majority of this COA is in private ownership (82%), 18% of the land is owned by state and federal organizations including Land between the Lakes National Recreation Area, Fort Campbell Military Reservation, United States Fish and Wildlife Services (USFWS), Office of Kentucky Nature Preserves (OKNP), sites funded by the Kentucky Heritage Land Conservation Fund (KHLCF), University of Kentucky, Western Kentucky University, and Kentucky State Parks. There is opportunity to increase private land conservation through programs administered by Kentucky Department Fish and Wildlife Resources (KDFWR) and Natural Resource Conservation Service (NRCS), OKNP and USFWS. Priority conservation actions include Land/Water Protection, Land/Water Management, External Capacity Building, and Education and Awareness.



The Mountain Creekshell freshwater mussel is a highest priority SGCN. Within Kentucky, its current distribution is primarily within Big Barrens COA. For this species, additional work is warranted to collect baseline species information and to verify taxonomy.
Photo: Mike Compton



Big Barrens COA



Map prepared by GIS staff at KDFWR in partnership with OKMP and TNC. Service Layers courtesy of: Source: Esri, USDA FSA, Source: Esri, Mapbox, Earthstar Geographics, and the GIS User Community. DGI, KyFromAbove Partners, Esri, HERE, Garmin, SafeGraph, FMO, METI/MASA, USGS, EPA, NPS.



CENTRAL GRASSLANDS AND PALISADES COA

The Central Grasslands and Palisades Conservation Opportunity Area (COA) includes 471,905 acres in central Kentucky. The boundary was delineated utilizing the Chaplin River to the north, Dix River to the east, Beech Fork River to the west, and bounded by the Green River COA to the south. This COA includes the entirety of Washington, Mercer, and Boyle counties. The Central Grasslands and Palisades COA is mostly (93%) situated within the Bluegrass physiographic region with the remaining portion in the Knobs physiographic region. The Plateau Escarpment COA (to the east) and Muldraugh Prairies COA (to the west) reside adjacent to the Central Grasslands and Palisades COA. Much of the COA contains weathered limestone which produces sinking streams, springs, caves, and some of the oldest exposed geologic strata in Kentucky, vital to many SGCN. The channel of the Kentucky River throughout this COA is entrenched by nearly vertical limestone cliffs known as The Palisades. This area provides a rare habitat utilized by many SGCN including Globe Bladderpod, Rafinesque's Big-eared Bat, and the Eastern Small-footed Bat. The soils of this region are fertile, benefiting from the underlying nitrogen and phosphorus-rich limestone. These naturally productive soils have led to widespread agricultural use in the COA, but also provide potential for grassland restoration within this region.

Central Grasslands and Palisades COA has records for 112 SGCN, including 18 among the highest prioritization category. The majority of SGCN falling within this area are bird species. The top threats identified within this COA are Natural System Modification, Pollution,



Eastern meadowlark are a common bird in steep decline. Land use practices that provide increased acreage in pastureland, hay fields, and natural grasslands are vital to meadowlark survival.

Photo: KDFWR



The monarch butterfly has become a flagship species to help raise awareness about the decline of native pollinators. Incorporating insects during this revision will allow us to expand efforts to conserve native species in Kentucky. Photo: Nikki Nivision.

Central Grasslands and Palisades SGCN Priority by Taxa

Taxa	Moderate Priority	High Priority	Highest Priority	Data Deficient	Plant	Grand Total
Amphibians	1	1	1	2		5
Birds	63	12	1			76
Crustaceans				4		4
Fishes	1			3		4
Freshwater Mussels and Snails		1	1			2
Insects	1	1	2			4
Mammals	2	3		7		12
Plants					3	3
Reptiles	1			1		2
Grand Total	69	18	5	17	3	112

and Agriculture/Aquaculture. Much of the COA has been converted to agricultural use (59%) and development continues to increase around incorporated cities and along major transportation corridors.

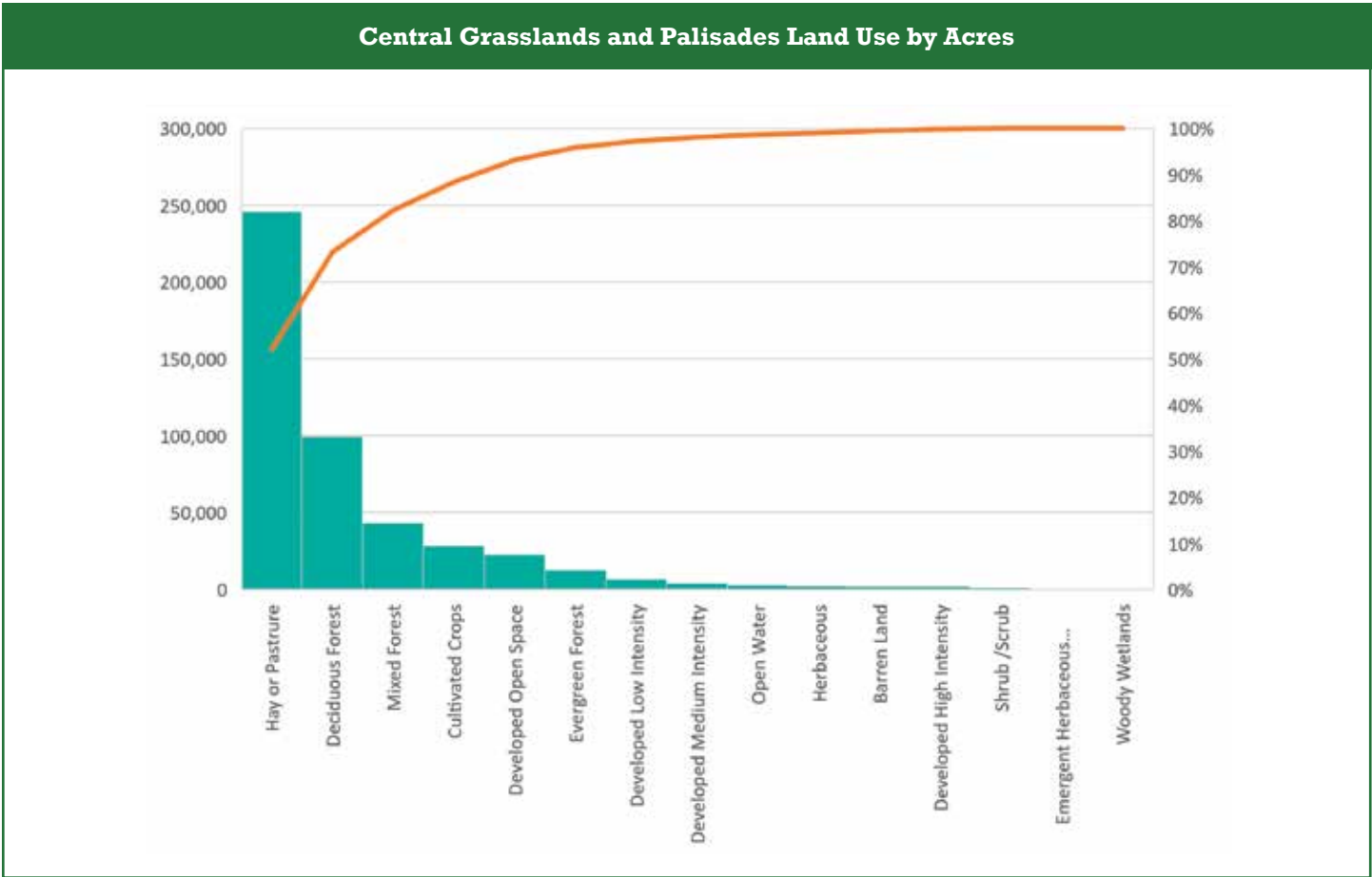
A major conservation focus for this region has been to restore native open land systems by removing eastern red cedar from quality hardwood systems and old fields along with restoration of native short-grass and forb systems. In 2008, a relatively small (2,855 acres) focus area was chosen for native grassland restoration in the far eastern region of the COA. Moving forward, an emphasis has been placed on the private working lands in the COA through a Focused Conservation Project (32,411 acres) in the north central region of the COA. This project prioritizes removal of eastern red cedar and implementation of native production solutions for cattle and hay operations. At present, much of the hay/pasture land coverage is dominated by non-native cool-season grass forage in the form of KY31 fescue.

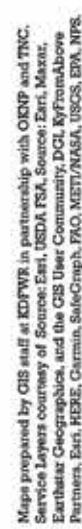
Restoration of native grassland systems benefits a variety of wildlife species including grassland birds, aquatic species, and pollinators. Considered one of the most imperiled plant communities in Kentucky, there remains less than 1% of the natural grasslands that existed in Kentucky before European settlement. Central Kentucky grasslands harbor some unique natural plant communities, broadly including natural prairies and barrens.

Collaborative partnerships to reduce or eliminate



threats to native open land systems are of highest priority in this COA, primarily through public outreach and continued working land projects. External capacity building will be essential to implement these and related projects. OKNP holds easements at conducts regular prescribed fire management at several locations within this COA including Perryville Battlefield State Historic Site. Current and potential partners include U.S. Fish and Wildlife Service, USDA-Farm Services Agency, USDA-Natural Resources Conservation Service, Kentucky Division of Conservation, Kentucky Division of Forestry, Kentucky Division of Water, Office of Kentucky Nature Preserves, Kentucky State Parks/Perryville Battlefield State Historic Site, and Shaker Village of Pleasant Hill.







CUMBERLAND MOUNTAINS COA

The Cumberland Mountains Conservation Opportunity Area (COA) encompasses 707,878 acres along the Tennessee and Virginia borders in the southeastern corner of Kentucky. The boundary of this COA is delineated on the south and east by the Tennessee and Virginia state lines, respectively. The northern edge follows the boundaries of Bell, Harlan and Letcher Counties, with the southern two thirds of Letcher County included in the COA. In general, this COA encompasses areas just slightly northwest of Pine Mountain south to the Black and Cumberland Mountain ranges. Much of the high elevation portions of these mountain ranges are included within this COA, including Black Mountain which is the highest point in the state at approximately 4100 feet. Cumberland Mountain COA has been heavily impacted by resources extraction in the form of both surface and underground coal mining, natural gas drilling, and logging. Most of this COA is comprised of Appalachian hardwood forests (75%) with interspersed grassland (2.7%) and scrub (2.5%) areas resulting from surface coal extraction. While most of this region is characterized by sandstone bedrock and acidic soils, there is a thin band of limestone that runs on the north face of Pine Mountain that contains numerous important limestone caves with SGCN species. Human settlement is contained within several small cities and along river and creek drainages with less than three percent of the area classified as developed.

The headwaters of both the Kentucky River (Middle and North Forks) and the Cumberland River (Clover Fork, Poor Fork and Martin's Fork) are situated within the



The Kentucky Red Backed Vole often utilizes rare mountain seep habitats. Baseline species information is needed regarding distribution, life history, and habitat needs for this highest priority SGCN.
Photo: John MacGregor.

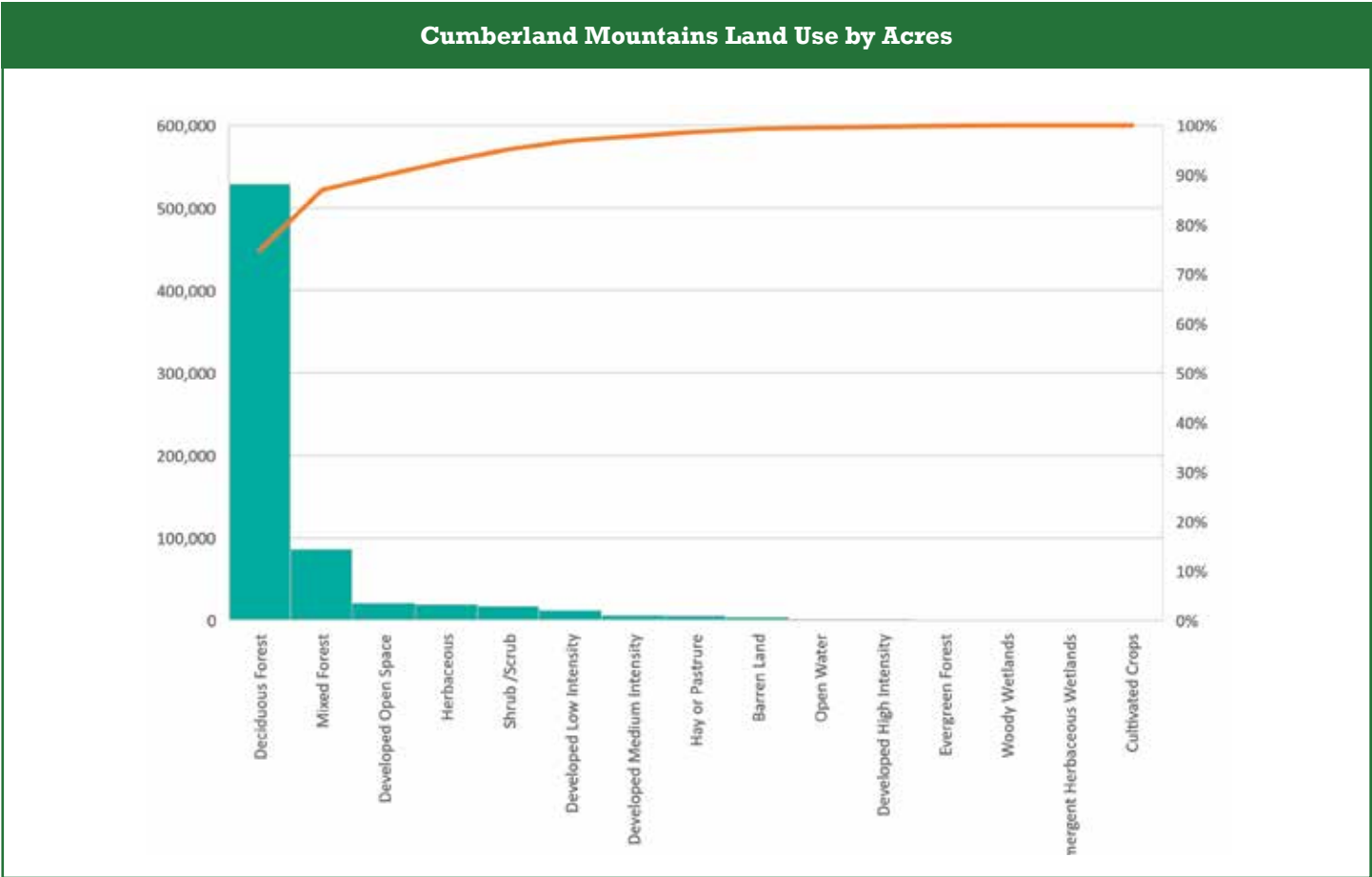
Cumberland Mountains SGCN Priority by Taxa						
Taxa	Moderate Priority	High Priority	Highest Priority	Data Deficient	Plant	Grand Total
Amphibians	3	1	1	5		10
Birds	45	8	1			54
Crustaceans		3		5		8
Fishes		1	3			4
Freshwater Mussels and Snails		2	2	1		5
Insects	4	6	7			17
Mammals	5	13	1	10		29
Plants					7	7
Reptiles	1			5		6
Grand Total	58	34	15	26	7	140

Cumberland Mountains COA. Other watersheds included within this COA at a much lesser extent include the South Fork of the Kentucky, Upper Levisa and Powell Rivers. The Kentucky River is a 260-mile-long major tributary of the Ohio River that supplies drinking water for approximately twenty percent of the state's population. The Cumberland River is also a major tributary of the Ohio River that flows 688 miles from this COA south through Tennessee until turning back north and forming Lake Barkley in far western Kentucky prior to its confluence with the Ohio River.

Of the 707,878 acres contained within the Cumberland Mountains COA, roughly ten percent is protected (77, 554 acres), including the 11,115 acres of Cumberland Gap National Historic Park located within Kentucky and this COA. Another 47,732 acres of coal and timber land are under Wildlife Management Area agreements for public hunting and habitat management yet remain in corporate ownership with no form of long-term protections in place. Resource extraction in the form of mountaintop removal coal mining and sandstone and limestone quarries have heavily altered habitats within this COA. Elimination, degradation and sedimentation of stream resources has impacted a variety of amphibians, crustaceans and fishes while the general disturbance of natural systems inherent to large-scale landscape modification has impacted a large number of bird, freshwater mussel, plant, reptile and terrestrial invertebrate species. Although reclaimed post-mining, these areas of resource extraction are quickly



The Cumberland Mountains are located in the southeast corner of eastern Kentucky and are characterized by linear mountain ridges, including Pine and Cumberland Mountains, running southwest to northeast through the COA. Photo: Marc Evans



recolonized with a variety of invasive herbaceous and shrub species such as Autumn Olive and Sericea Lespedeza.

The Cumberland Mountains COA has records for 140 SGCN, with 15 of those in the highest category of concern. Interestingly, birds and mammals make up 83 of the 140 listed species. Several globally rare natural communities occur in this COA, including the high elevation forests on the top of Black Mountain, headwater and streamside bog communities on Pine and Cumberland Mountains, and fire-maintained pitch pine barrens grasslands of Pine Mountain. These rare terrestrial communities contain concentrated populations of SGCN and state listed species and are important for the conservation of SGCN.

The modification of natural systems has an impact on the greatest number of species in this COA. High priority actions for the COA include: partnerships to reduce the prevalence of invasive species, land protection (old growth, corridors) and habitat management of existing conservation lands (such as prescribed fire and beaver mimicking disturbances for rare wetland habitats). External partnerships with KDFWR are already underway to improve habitats on reclaimed mine lands using prescribed fire and other means to reduce the incursion of invasive shrubs and to promote healthy grassland areas. Current partnerships exist with the Rocky Mountain Elk Foundation, Green Forest Works/University of Kentucky, and The Nature Conservancy, with the latter facilitating a permanent recreation and management easement on over 50,000 acres of land at the southern end of this COA.



The Yellow-spotted Woodland Salamander is difficult to survey for and its distribution in Kentucky is very poorly known. Surveys for this species within the Cumberland Mountains COA are a priority for this and other DD SGCN. Photo: John MacGregor.

Cumberland Mountains COA



Map prepared by GIS staff at KDFWR in partnership with ORHP and TNC. Service Layer courtesy of: Source: Esri, USDA, FSA, VGIN, Esri, HERE, Garmin, Swisstopo, PNO, METI/ANSA, USGS, EPA, NPS, Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, DOI, KyrTomAbove Partners.



GREEN RIVER COA

The Green River Conservation Opportunity Area (COA) includes 1,285,983 acres in southcentral Kentucky. The boundary was delineated utilizing most of the Upper Green River and Middle Green River watersheds. The Green River COA is mostly situated within the Interior Plateau physiographic region, although a portion of the Interior River Valley and Hills physiographic region resides within its boundary. The Big Barrens COA (to the west) and Muldraugh Prairies COA (to the north) reside immediately adjacent to the Green River COA. Much of the COA contains karst topography and subterranean habitats vital to many SGCN. The largest contiguous forest blocks are found within Mammoth Cave National Park (MCNP) and around Green River Lake Wildlife Management Area. Natural prairies and barrens occur in upland areas around MCNP as do some of the largest concentrations of intact upland depression ponds in the state. Both are vital habitats for many SGCN. Much of the COA has been converted to agricultural use while development continues to increase around incorporated cities and along major transportation corridors.

The Green River is a 384 mile long tributary of the Ohio River. It flows westward from Lincoln County in south central Kentucky along a slightly northwesterly path before emptying into the Ohio River in Henderson County. The most significant impoundment occurs at Green River Lake. Major tributaries to the Green River include the Little Barren, Nolin, and Barren rivers. The



Removal of Green River Lock and Dam #5.
Photo: Mike Wilkinson, The Nature Conservancy



The endangered Mammoth Cave Shrimp is endemic to just a few caves in Kentucky. Photo: Michael Durham

middle Green River flows through MCNP where it is a state designated Wild River. In the early 1900's, a series of dams were built along the Green River to allow barge traffic easier access to the Ohio River. Dams create pooled conditions that resulted in lower oxygen

Green River SGCN Priority by Taxa

Taxa	Moderate Priority	High Priority	Highest Priority	Data Deficient	Plant	Grand Total
Amphibians	1	2	1	2		6
Birds	77	12	1	1		91
Crustaceans		4	1	7		12
Fishes	2	10	4	6		22
Freshwater Mussels and Snails	4	21	7	3		35
Insects	2	6	6			14
Mammals	2	8		9		19
Plants					11	11
Reptiles	2			10		12
Grand Total	90	63	20	38	11	222

levels, more sediment deposition, higher temperatures, and present significant movement barriers to aquatic fish and wildlife species. Dams also flood and alter important riparian habitats that are important to many terrestrial plants.

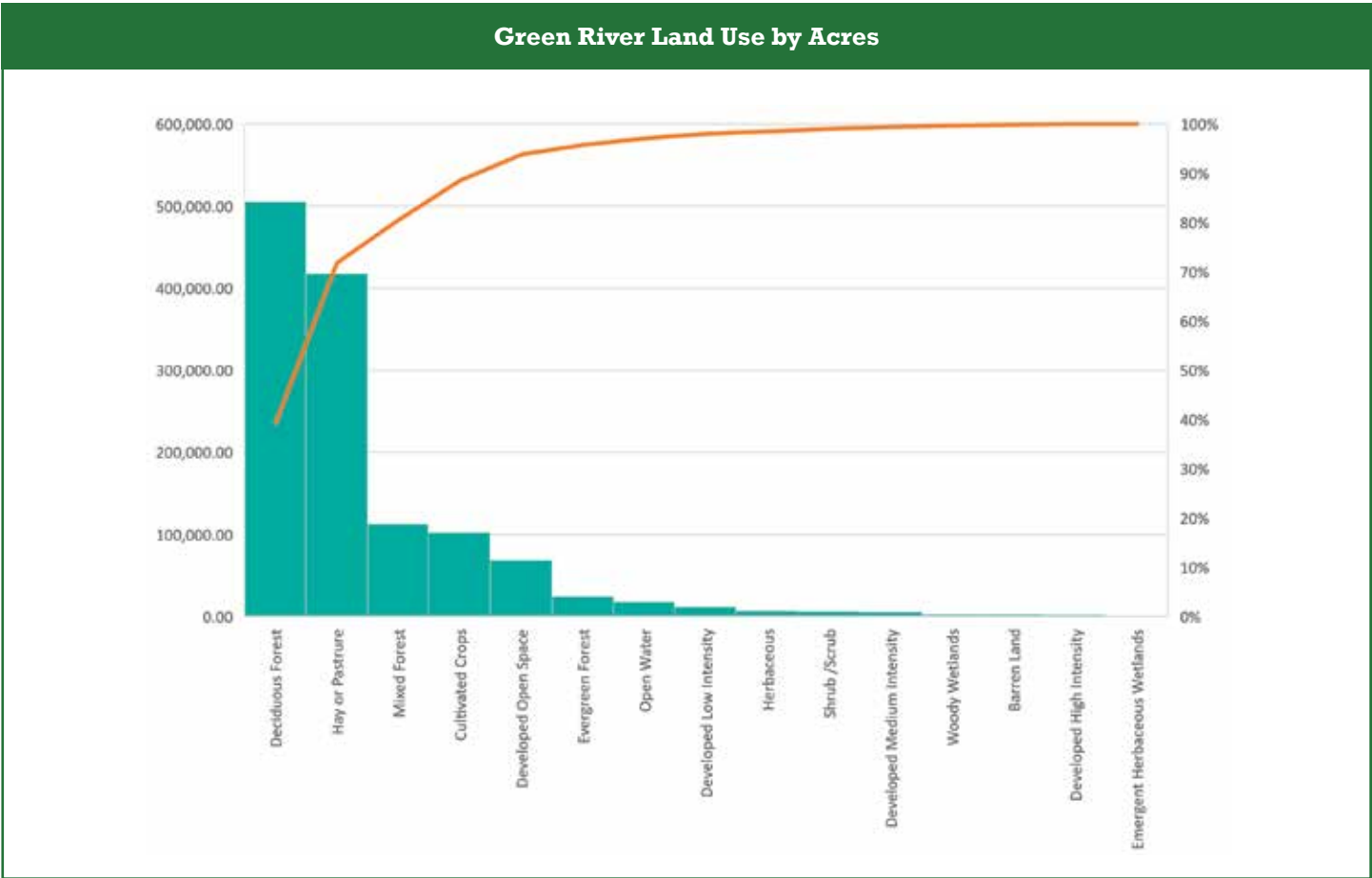
A major conservation focus for this region has been to restore the river’s natural systems by removing defunct and failing locks and dams. In 2021, removal of Lock and Dam #5 began. The effort was conducted as a partnership between The Nature Conservancy, U. S. Fish and Wildlife Service, U. S. Army Corps of Engineers, Kentucky Department of Fish and Wildlife Resources, and Kentucky Waterways Alliance. This project represents the largest dam removal in Kentucky’s history. Along with the removal of Lock and Dam #6, 197 miles of the Green River have been restored to free-flowing conditions.

Considered one of the most biodiverse rivers in the world, the Green River is home to more than 150 fish species and 70 species of freshwater mussels. Several species, like the Mammoth Cave Shrimp, are found nowhere else in the world. The Green River COA has records for 213 SGCN, including 18 in the highest prioritization category. There are also 11 SGCN plants occurring in the remnant grasslands, wetlands, outcrops and riparian communities in this COA. The majority of SGCN are aquatic species, evidenced by the top threats noted for this COA: Natural System Modification, Pollution, and Agriculture/Aquaculture.

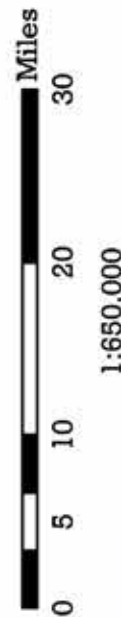
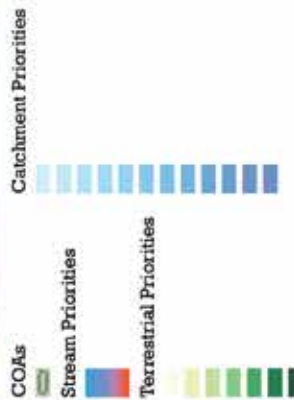
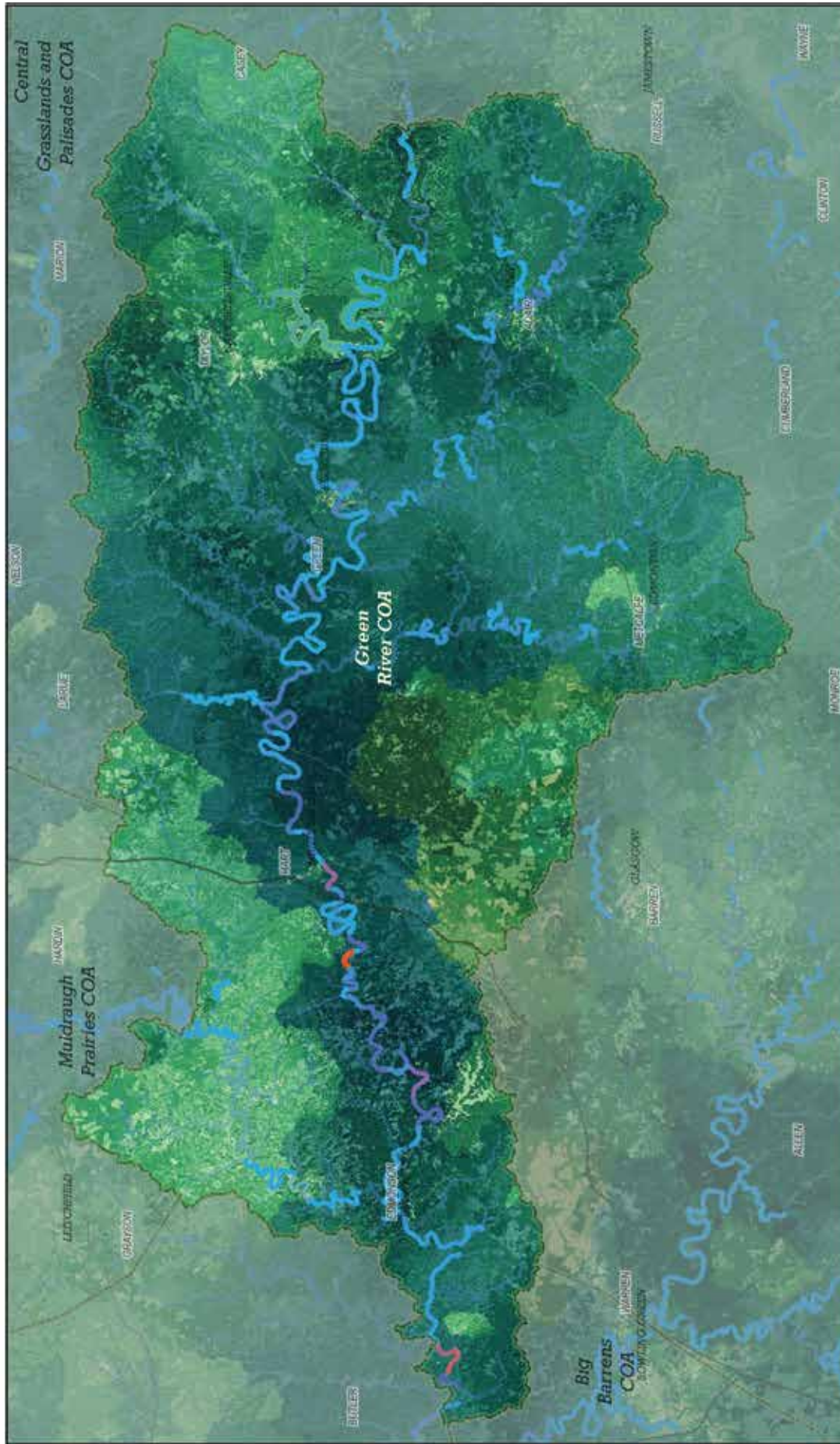
Collaborative partnerships to reduce or eliminate threats to aquatic habitats are of highest priority in this COA, primarily through public outreach and continued dam removal projects. External capacity building will be essential to implement these and related projects. Potential partnerships identified include collaboration with the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, USDA-Farm Services Agency, USDA-Natural Resources Conservation Service, U.S. Geological Survey, National Park Service, Kentucky Division of Conservation, Kentucky Division of Forestry, Kentucky Division of Water, Office of Kentucky Nature Preserves, and Western Kentucky University.



Green River freshwater mussel assemblage.
Photo: Monte McGregor



Green River COA



Maps prepared by GIS staff at EDFWR in partnership with OENP and TNC. Service layers courtesy of Esri, CGIA, USGS, DGI, KY From Above Partners, Esri, HERE, Garmin, SafeGraph, FHO, NEST/NASA, USGS, EPA, NPS.



JACKSON PURCHASE COA

The Jackson Purchase Conservation Opportunity Area (COA) includes 1,572,039 acres in far western Kentucky. It spans all of the Mississippi Alluvial Plain and Mississippi Valley Loess Plains regions, as well as portions of the Interior Low Plateau and Interior River Valleys and Hills physiographic regions. This COA is bordered by the Ohio River to the north, Kentucky Lake to the east, Mississippi River to the west, and extends south to the Tennessee state line. It includes the entirety of Marshall, Calloway, Graves, McCracken, Ballard, Carlisle, Hickman, and Fulton counties. Jackson Purchase COA is the northeastern part of the upper Mississippi Embayment, a part of the Gulf Coastal Plain and includes the lowest elevation in the Commonwealth. This part of Kentucky is relatively flat, with numerous lakes, ponds, sloughs, and swamps vital to many SGCN. There are some more hilly areas commonly referred to as the loess bluffs. The soils of this region are fertile, benefiting from the alluvial deposits. These fertile soils have led to widespread agriculture use in the COA. Much of the COA has been converted to agricultural use (55%) while development continues to increase around incorporated cities and along major transportation corridors (8%).

A major conservation focus for this region has been to restore native open land systems, manage bottomland hardwood forest, and maintain natural hydrologic regimes. A large part of the central (Graves County) Jackson Purchase COA was covered in barrens before European settlement. Although row crop and pasture/hay land is



Within Kentucky, the Broad-banded Watersnake is known only from the Mississippi Alluvial Plain within the Jackson Purchase COA. It often utilizes bottomland hardwood forests and cypress swamps both of which have been significantly altered for agricultural purposes. Photo: John MacGregor



Three Ponds State Nature Preserve, Hickman County. This and other natural sloughs within the Jackson Purchase COA provide important habitat for many aquatic and terrestrial SGCN. Photo: Matt Thomas

Jackson Purchase SGCN Priority by Taxa

Taxa	Moderate Priority	High Priority	Highest Priority	Data Deficient	Plant	Grand Total
Amphibians	2	3	1	5		11
Birds	84	14	1	1		100
Crustaceans			1	8		9
Fishes	21	20	4	8		53
Freshwater Mussels and Snails	1	28	2	8		39
Insects	5	7				12
Mammals	5	5		9		19
Plants					6	6
Reptiles	1	4		16		21
Grand Total	119	81	9	55	6	270

the majority of the landcover in the COA (42% and 12% respectively), this COA still supports a large amount of woody and emergent wetlands (almost 150,000 acres). Priorities in the COA include working lands solutions such as no-till farming, native buffers, and limiting subsurface drainage tile.

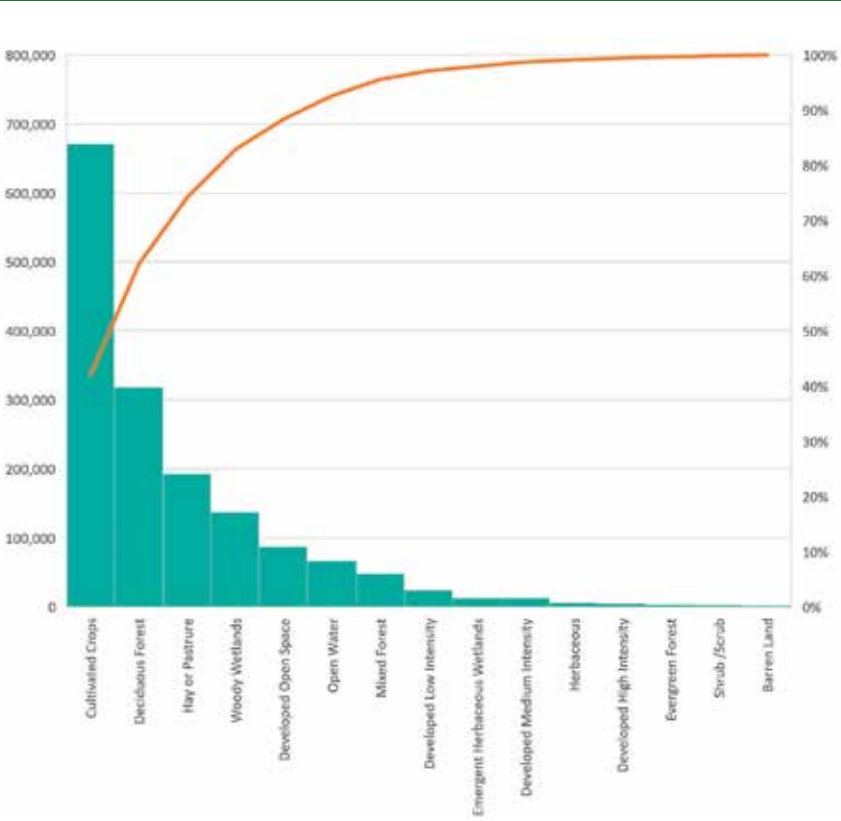
Restoration of native bottomland systems benefits a variety of wildlife species including birds, fishes, and aquatic invertebrates. Western Kentucky bottomland and upland systems harbor some unique natural plant communities, including natural sloughs, swamps, prairies, and barrens. Jackson Purchase COA contains 270 SGCN, including 9 among the highest prioritization category. The majority of these SGCN are bird species. Top threats identified within this COA are Natural system modification, Pollution, and Agriculture/Aquaculture.

Collaborative partnerships to reduce or eliminate threats to native upland and bottomland systems are of highest priority in this COA, primarily through public outreach and continued working land projects. External capacity building will be essential to implement these and related projects. Current and potential partners include USDA-Farm Services Agency, USDA-Natural Resources Conservation Service, Kentucky Division of Conservation, Kentucky Division of Transportation, Kentucky Division of Water, Office of Kentucky Nature Preserves, The Nature Conservancy, U. S. Fish and Wildlife Service, Clarks River National Wildlife Refuge and Murray State University.

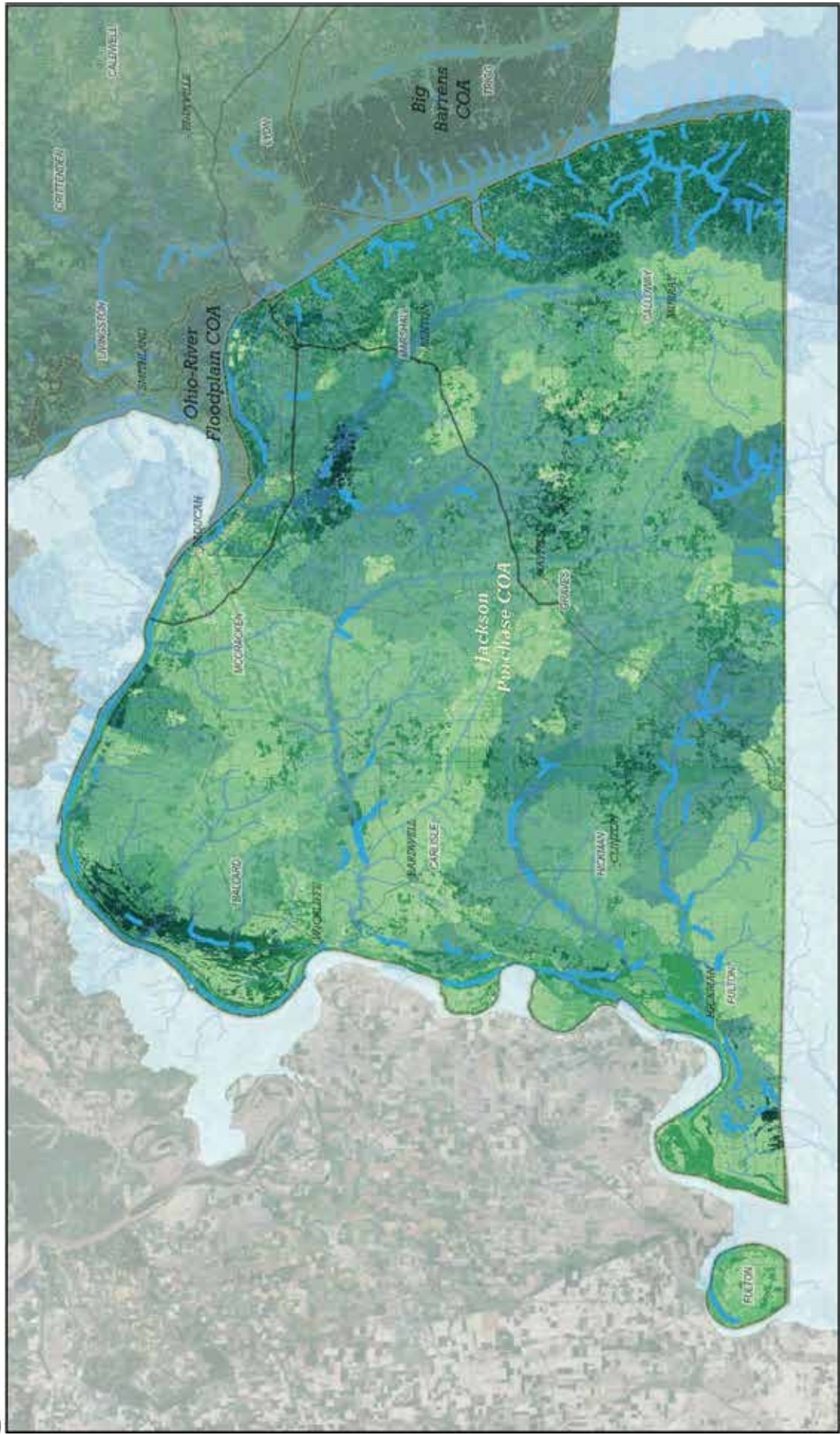


Blacktail Redhorse are among a few SGCN with Kentucky distributions restricted to Terrapin Creek. Long term monitoring of population trends and watershed conditions are an ongoing priority. Photo: KDFWR

Jackson Purchase Land Use by Acres



Jackson Purchase COA



Map prepared by GIS staff at KDFWR in partnership with OKFP and TNC. Services provided by Source ERI, USDA FSA, Source ERI, Mass. Geographic Information System, and the GIS User Community DCL. KY From Above Partners, ERI, HERE, Garmin, SafeGraph, FMO, NITV/NASA, USGS, EPA, NPS.



LICKING RIVER COA

Comprised of karst topography, steep to rolling hills and valleys, and rich natural resources, the Licking River Conservation Opportunity Area (COA) spans 869,653 acres in northeastern Kentucky and includes much of the Licking River watershed. The Licking River is thought to have been named for the natural salt springs and licks historically used by ungulates that congregated seasonally in the region. Ungulate fossils found near these licks, along with the presence of disturbance dependent remnant grasslands and SGCN plants such as Running Buffalo Clover and Short's goldenrod, provides further evidence of the extent of grassland and woodland habitat that once existed in this area.

The Licking River runs north to the Ohio River along a course of 303 miles and empties into the Ohio River just across from Cincinnati, Ohio. There are roughly 180 miles of free-flowing river from Cave Run Lake to the mouth of the Ohio River. The portion of the Licking River that lies within the Daniel Boone National Forest is dominated by deciduous forest and limited roadways. Unlike other rivers in the state, the Licking is relatively untouched by mining or heavy industrial development, and it moves primarily through forested and agricultural lands. Forests dominate the landscape within this COA, with over 464,000 acres comprising deciduous or mixed deciduous forest. These cover types are critical for many rare plants and forest dwelling SGCN including songbirds, insects, salamanders, and bats.

Once beyond Cave Run Lake, except for some small mill dams, there are no significant obstructions to aquatic



Actions to help prevent pollution and protect this watershed are critical to the management of SGCN.

Photo: Monte McGregor



The endangered northern riffleshell is a highest priority SGCN. Once widespread, Kentucky's population is currently restricted to the Licking River watershed. Photo: KDFWR

life movement. This allows for significant restoration potential work with aquatic organisms. Since the KDFWR Center for Mollusk Conservation Center began in 2002, over 95% of the mussel fauna have been restored to multiple sites in the river. These efforts are proving

Licking River SGCN Priority by Taxa

Taxa	Moderate Priority	High Priority	Highest Priority	Data Deficient	Plant	Grand Total
Amphibians	2	3	1	6		12
Birds	76	11		1		88
Crustaceans		1		4		5
Fishes	2	4		4		10
Freshwater Mussels and Snails	6	15	5	4		30
Insects		5	3			8
Mammals	5	4	1	11		21
Plants					9	9
Reptiles	2			2		4
Grand Total	93	43	10	32	9	187

effective, as reproduction of certain rare mussels are now being documented. Crayfish, aquatic insects, and fish are also benefactors of the restoration and protection efforts within these waterways.

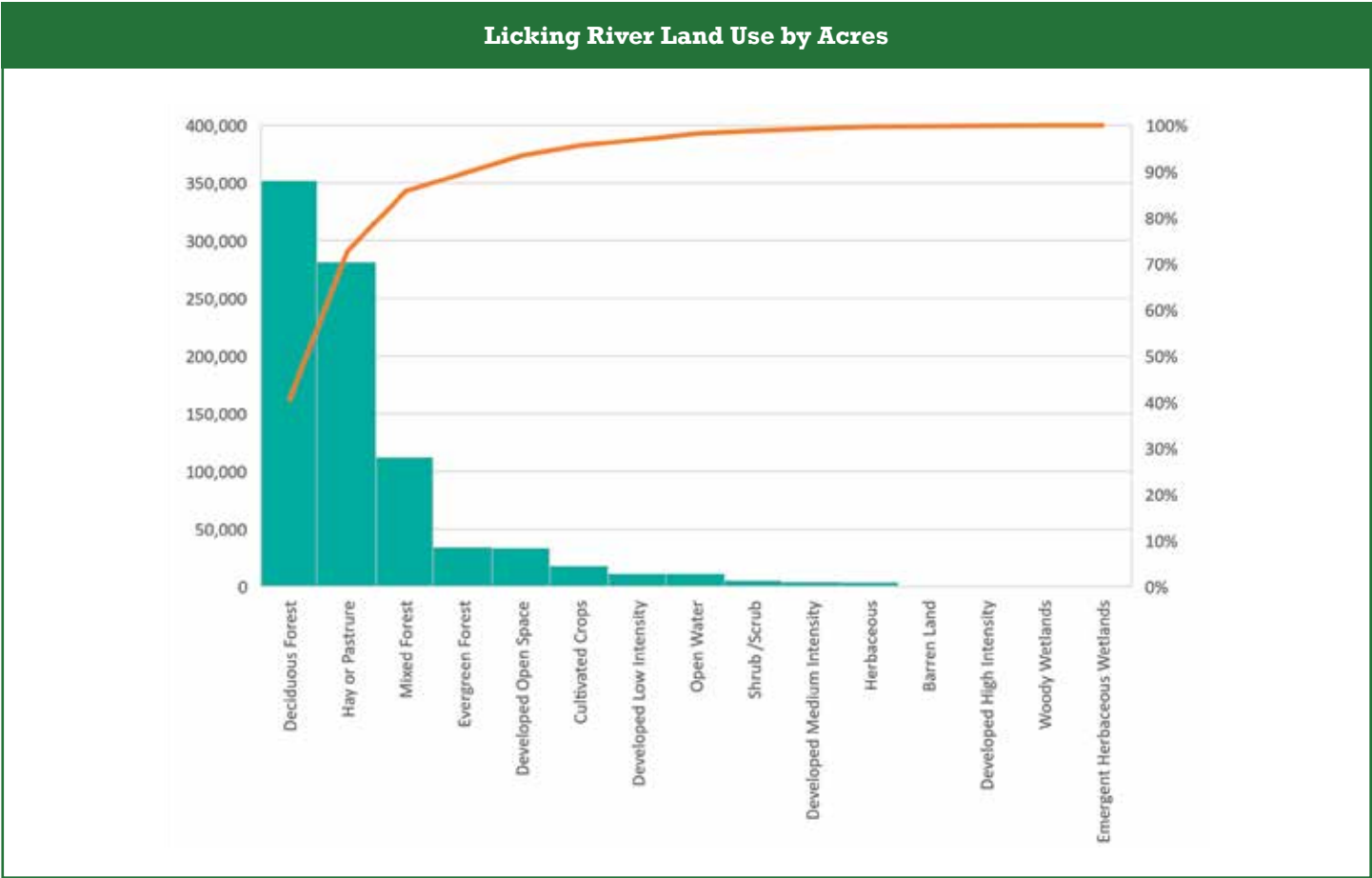
The Licking River is critical for many species of greatest conservation need and has high potential for significant long-term protection and management. There are 187 records of SGCN within the Licking River COA. Of the ten highest priority SGCN, six are aquatic species. In addition, there are important remnant grasslands located in this COA, particularly around the Blue Licks State Park and OKNP SNP areas. The globally rare outer bluegrass limestone prairies and barrens contain numerous SGCN and have been a restoration focus for OKNP, USFWS, Kentucky State Parks, and KDFWR (Clays Lick WMA area).

Partners have long recognized the importance of the Licking River and its surrounding landscape. The top threats to SGCN identified within this COA are Natural System Modification, Agriculture/Aquaculture, and Pollution. Corresponding actions identified for this COA include education and awareness of these natural resources and their management and protection needs. External capacity building is identified as a critical tool for reaching goals in this COA. Working with partners and building projects between state and federal agencies such as KDFWR, Office of Kentucky Nature Preserves, Division of Water, Division of Forestry, Daniel Boone

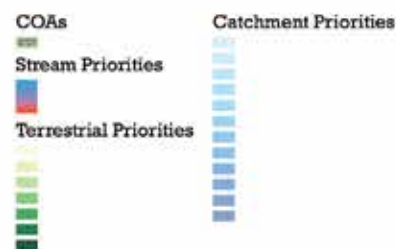
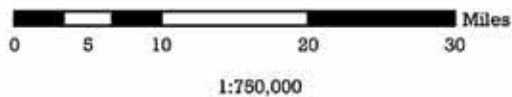
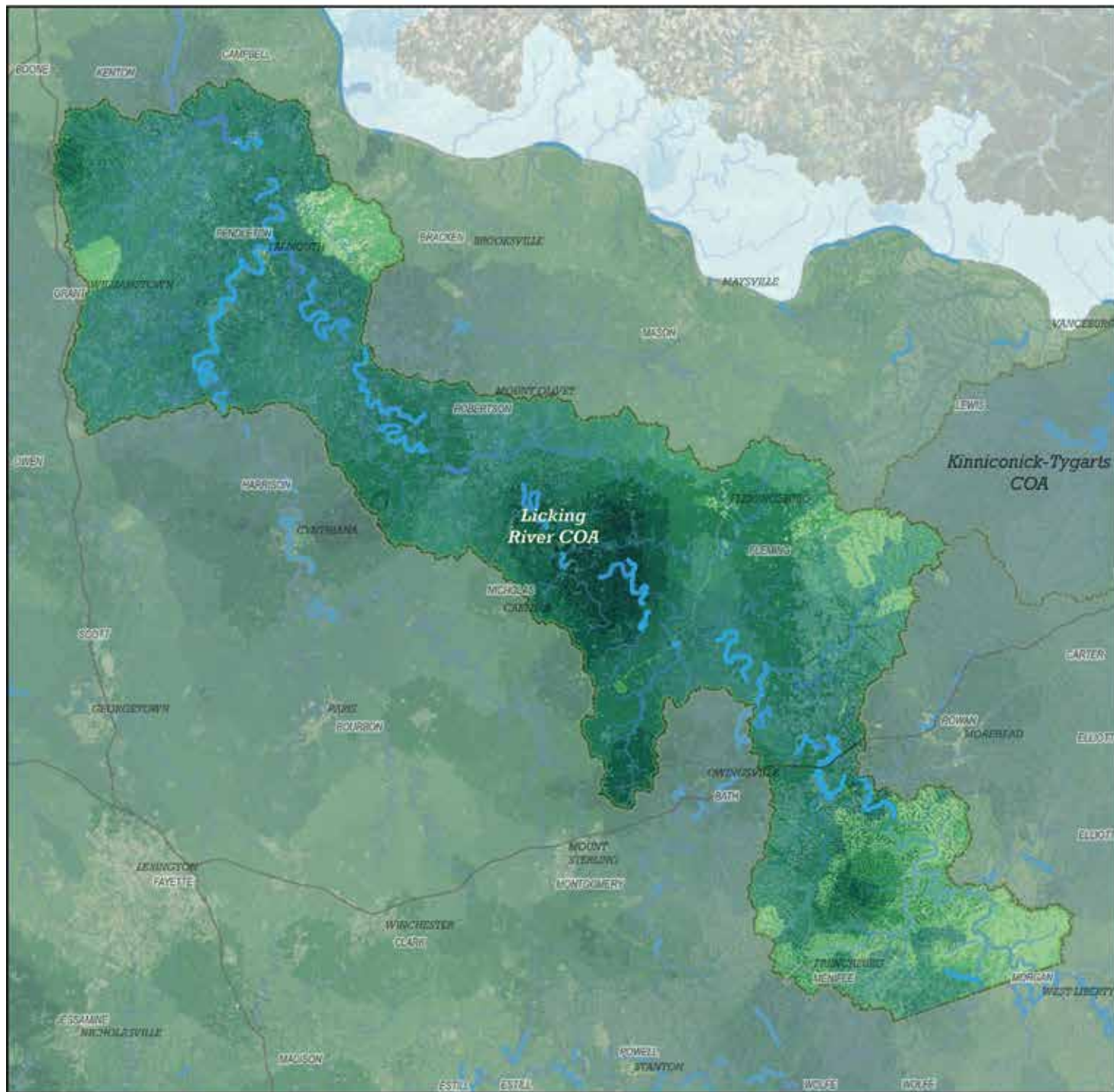


Nesting habitat for the prothonotary warbler includes large bodies of standing or slow-moving water. This cavity nesting bird will use artificial nesting structures like this one installed by KDFWR. Photo: KDFWR

National Forest and Natural Resource Conservation Service are critical. In addition, efforts should include working with non-governmental organizations, private partners, and land trusts. Land and water management was identified as the third highest priority action item. Actions that help prevent pollution and protect watersheds and healthy forest and open lands will be critical to the management of SGCN.



Licking River COA



Map prepared by GIS staff at EDFWR in partnership with OENP and TNC. Service Layers courtesy of: Source: Esri, USDA FSA, Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, DOI, KyFromAbove Partners, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS.



TEAM KENTUCKY
ENERGY AND ENVIRONMENT CABINET
OFFICE OF KENTUCKY NATURE ENGINEERS

The Nature Conservancy





MULDRAUGH PRAIRIES COA

The Muldraugh Prairies Conservation Opportunity Area (COA) includes 1,261,922.56 acres in central Kentucky and is bordered by the Ohio River to the North and the Green River COA to the south. The Muldraugh Prairies COA occurs primarily in the Interior Plateau and Knobs physiographic regions, but also contains portions of the Bluegrass and Interior River Valley and Hills regions. The landscape consists of open rolling karst plain with numerous sinkholes, caves and underground streams in the Interior Plateau and Bluegrass regions, as well as isolated and forested cone-shaped hills and ridge systems in the Knobs. Sandstone bluffs and more rugged forests occur in parts of the Interior River Valley and Hills. The boundary was delineated by reviewing locations of SGCN plants and animals, natural grassland/open wetland remnants and rare grassland/open wetland species occurrences in the OKNP natural heritage database. Although watersheds were not used to delineate this COA, it does include Several important watersheds in the COA include the Blue-Sinking, Rolling Fork, Rough, Salt, and the upper Green River watersheds.

Kentucky once contained millions of acres of prairies and barrens prior to European settlement. A large portion of these grasslands were located in the Muldraugh Prairies COA. Today, only a few remnants remain as a result of development and conversion to agricultural uses. The forests around Bernheim Forest and Fort Knox military reservation contain the largest forest blocks in the state outside of the South Fork COA. Barrens/grasslands have



The majority of SGCN occurring within Muldraugh COA are open grassland and wetland associated birds, including the high priority SGCN Loggerhead shrike. Photo: KDFWR



The northern cavefish is one of the SGCN that utilizes the numerous sinkholes, caves, and underground streams within Muldraugh Prairies COA. Photo: Dante Fenolio

Muldraugh Prairies SGCN Priority by Taxa

Taxa	Moderate	High	Highest	Data Deficient	Plant	Grand Total
Amphibians	2	1	1	2		6
Birds	65	11	1			77
Crustaceans		4	1	9		14
Fishes	4	2	3	6		15
Freshwater Mussels and Snails	3	18	4	7		32
Insects	1	7	4			12
Mammals	4	8		12		24
Plants					10	10
Reptiles	1			8		9
Grand Total	80	51	14	44	10	199

also been lost to vegetative succession. One of the largest documented glades, barrens and prairie complexes occurs in this COA within Fort Knox Military Reservation and surrounding private lands. Top threats identified within this COA include Natural System Modification, Pollution, Development, Agriculture/Aquaculture.

Muldraugh Prairies COA has records for 199 SGCN, including 14 among the highest prioritization category for animals and 10 SGCN plants. The majority of terrestrial SGCN occurring within this area are grassland and wetland associated birds, insects, and plants. Grassland and subterranean systems in this COA provide habitat for several high priority SGCN insects.

The majority of this COA is in private ownership. Land owned by state, federal and other conservation organizations includes the Office of Kentucky Nature Preserves (OKNP), United States Fish and Wildlife Services (USFWS), private conservation lands (Bernheim Forest), The Nature Conservancy, local conservation districts and fiscal courts, National Park Service (NPS), KDFWR, KDF, Kentucky State Parks and sites funded by the Kentucky Heritage Land Conservation Fund (KHLCHF). There is opportunity to increase private land conservation through programs administered by KDFWR and Natural Resource Conservation Service (NRCS), OKNP and USFWS. Priority conservation actions include Land/Water Protection, Land/ Water Management, External Capacity Building, and Education and Awareness.

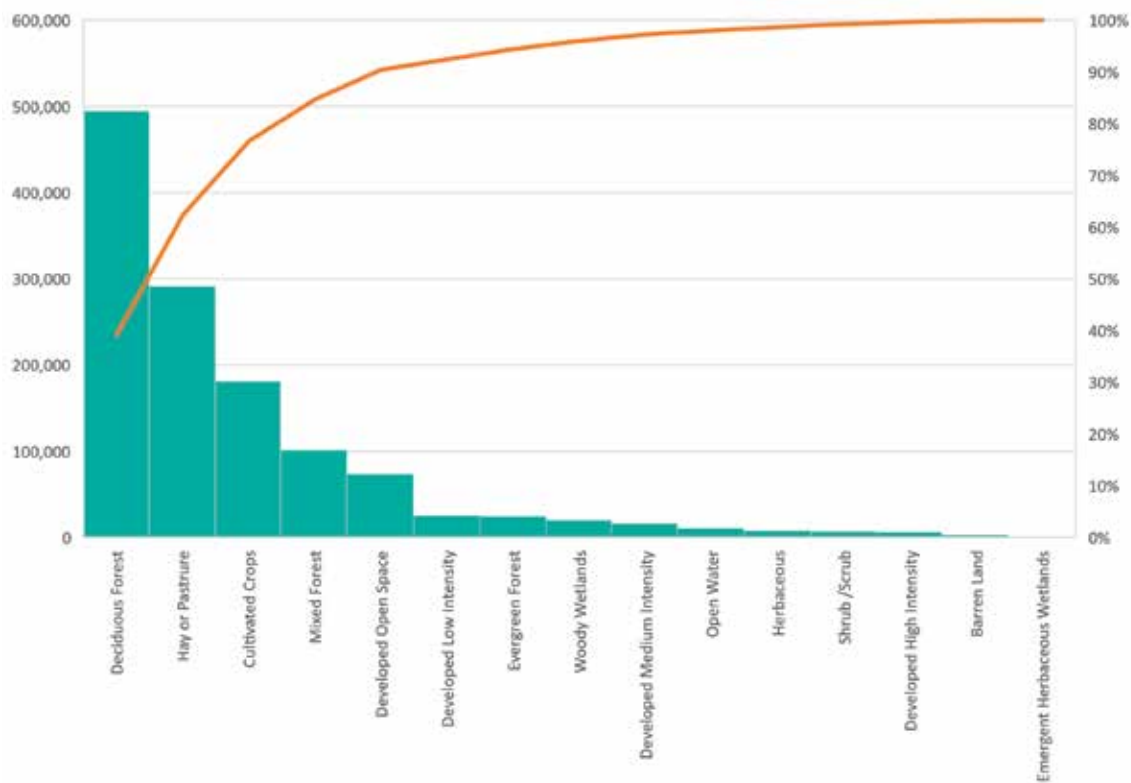


Eastview Barrens is the site of ongoing population monitoring and habitat enhancement measures for the highest priority SGCN Rattlesnake Master Borer moth and globally rare SGCN plants.
Photo: Ellis Lauder milk

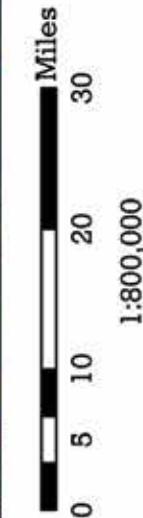
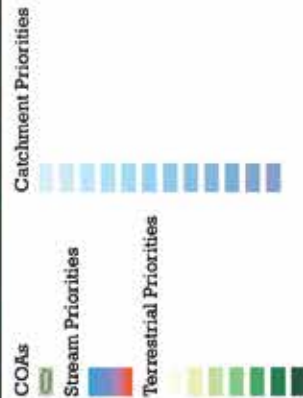
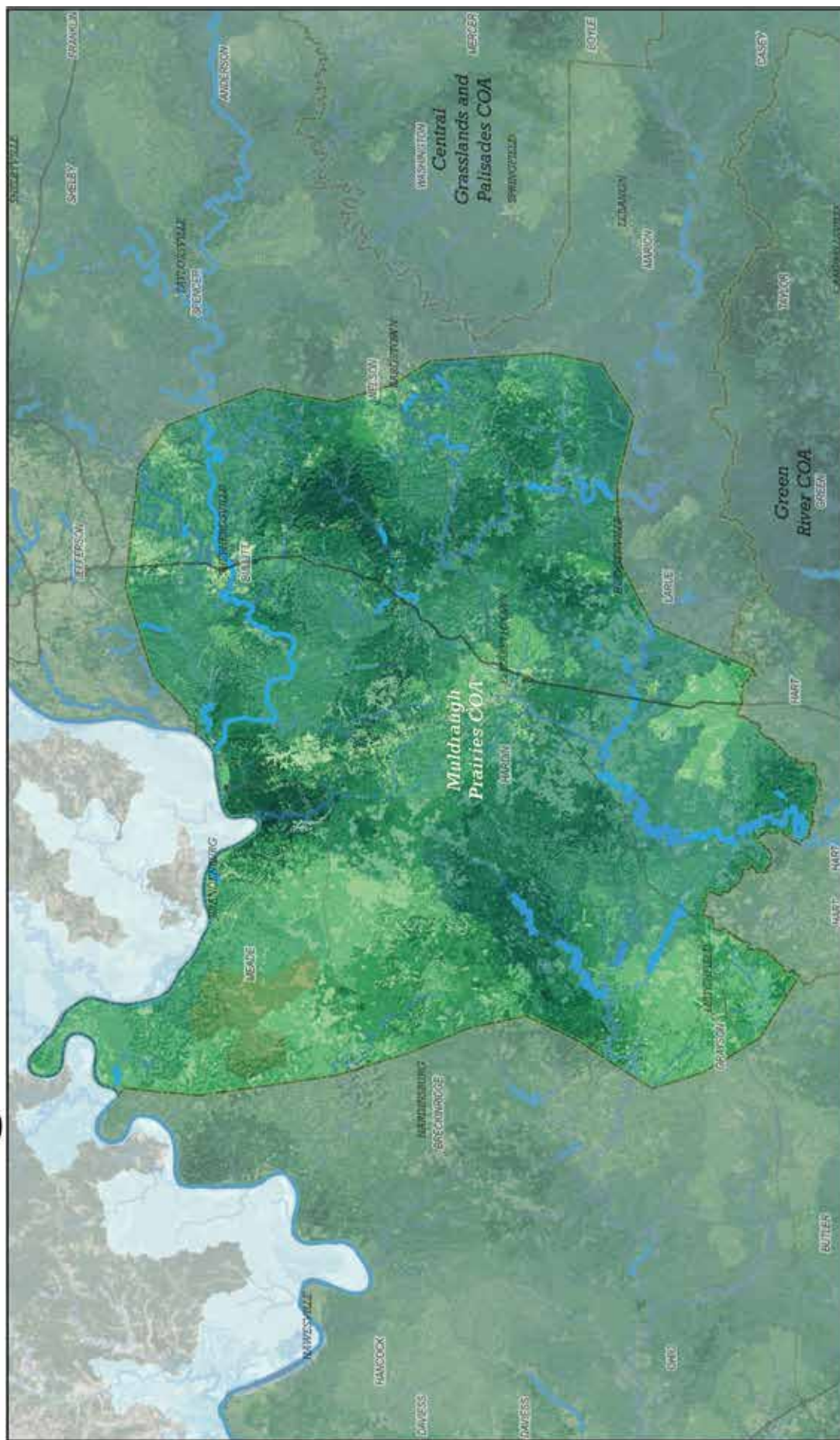


Several plant and animal SGCN occur in the limestone dolomite prairies, glades and barrens that occur within this COA. Photo: Brian Yahn

Muldraugh Prairies Land Use by Acres



Muldraugh Prairies COA



Maps prepared by GIS staff at KDFWR in partnership with OKNIP and TNC. Services Layers courtesy of Sources: Esri, USDA FSA, Sources: Esri, Maxar, Earthstar Geographics, and the GIS User Community. DCL, KY from Above Partners: Esri, HERE, Garmin, SafeGraph, FAO, NRTV/NASA, USGS, EPA, NPS.



OHIO RIVER FLOODPLAIN COA

The Ohio River Floodplains COA is located along the banks of the Ohio River between McCracken County and Daviess County. This COA is the smallest in land area identified within Kentucky SWAP at 186,918 acres. Although small in acreage, the floodplains, forests and bluffs along the Ohio River corridor hold a vast importance for both terrestrial and aquatic life. Within the COA, cropland and hay/pastureland comprise 31% of the land use, while 28% of the acreage is considered deciduous forest or woody wetlands.

The Ohio River is a critical thoroughfare for barge traffic and the movement of goods from the northeastern United States to the Mississippi and on to the Gulf of Mexico. To facilitate navigation, an infrastructure of docks and industrial facilities are common. The channel of the river itself and areas around docks are routinely dredged to remove silt and debris to allow for movement of large vessels. The floodplains within this COA are nutrient rich and highly desirable for agriculture. In addition, historic settlements along the Ohio River have been expanded and developed into urban areas such as Henderson, Owensboro, and Paducah. These cities now represent the central hubs for urban development within this COA.

Remaining natural areas in this COA provide critical habitat for many SGCN. Noteworthy habitats include cypress swamps, sloughs, streams, bottomland hardwood forests, flatwoods, wet prairies, mesic forests and sandstone bluffs. Five highest priority SGCN, the eastern hellbender, Crittenden crayfish, and three mussel species (pyramid pigtoe, ring pink and catspaw) currently occur



River traffic on the lower Ohio River in Ballard County.
Photo: Marc Evans



Minimizing nest disturbance is a high priority action for the recently delisted interior least tern.
Photo: John Brunjes

Ohio River SGCN Priority by Taxa						
Taxa	Moderate Priority	High Priority	Highest Priority	Data Deficient	Plant	Grand Total
Amphibians	3	3	1	2		9
Birds	77	12		1		90
Crustaceans			1	3		4
Fishes	5	2		5		12
Freshwater Mussels and Snails	1	22	3	3		29
Insects		1				1
Mammals	4	4		2		10
Plants					3	3
Reptiles	1	3		5		9
Grand Total	91	47	5	21	3	167

or have historic records in the COA. There are also 3 SGCN plants that occur in the wetlands and forests in this COA. Among the 47 SGCN considered High priority, 22 are freshwater mussels and 12 are birds. Natural System Modification, Agriculture and Pollution are noted as the top 3 threats in this COA. To address these threats, outreach and education regarding the impacts of improper land use practices and pollution impacts is important. Protection and proper management of land and water resources is critical to addressing the specific needs of Kentucky SGCN.

Kentucky's second National Wildlife Refuge (NWR), Green River NWR was established in 2019 to protect bottomland hardwood forest habitat to support migrating and wintering waterfowl, shorebirds, songbirds, raptors and other fish and other wildlife species. The U.S. Fish and Wildlife Service identified a 53,000-acre Conservation Partnership Area in the region, from which they will assemble 24,000 acres of land through donation and acquisition from willing sellers. While land acquisition will take years to complete, a portion of this project area falls within the Ohio River COA and represents an opportunity to work with partners to acquire lands within this project area.

As with the previous example, external capacity building will be an important key to implementing conservation actions within this COA. Current and potential partners to assist with land protection and management within this COA include the U. S. Army Corps of Engineers, U. S. Fish and Wildlife Service, Office of Kentucky Nature

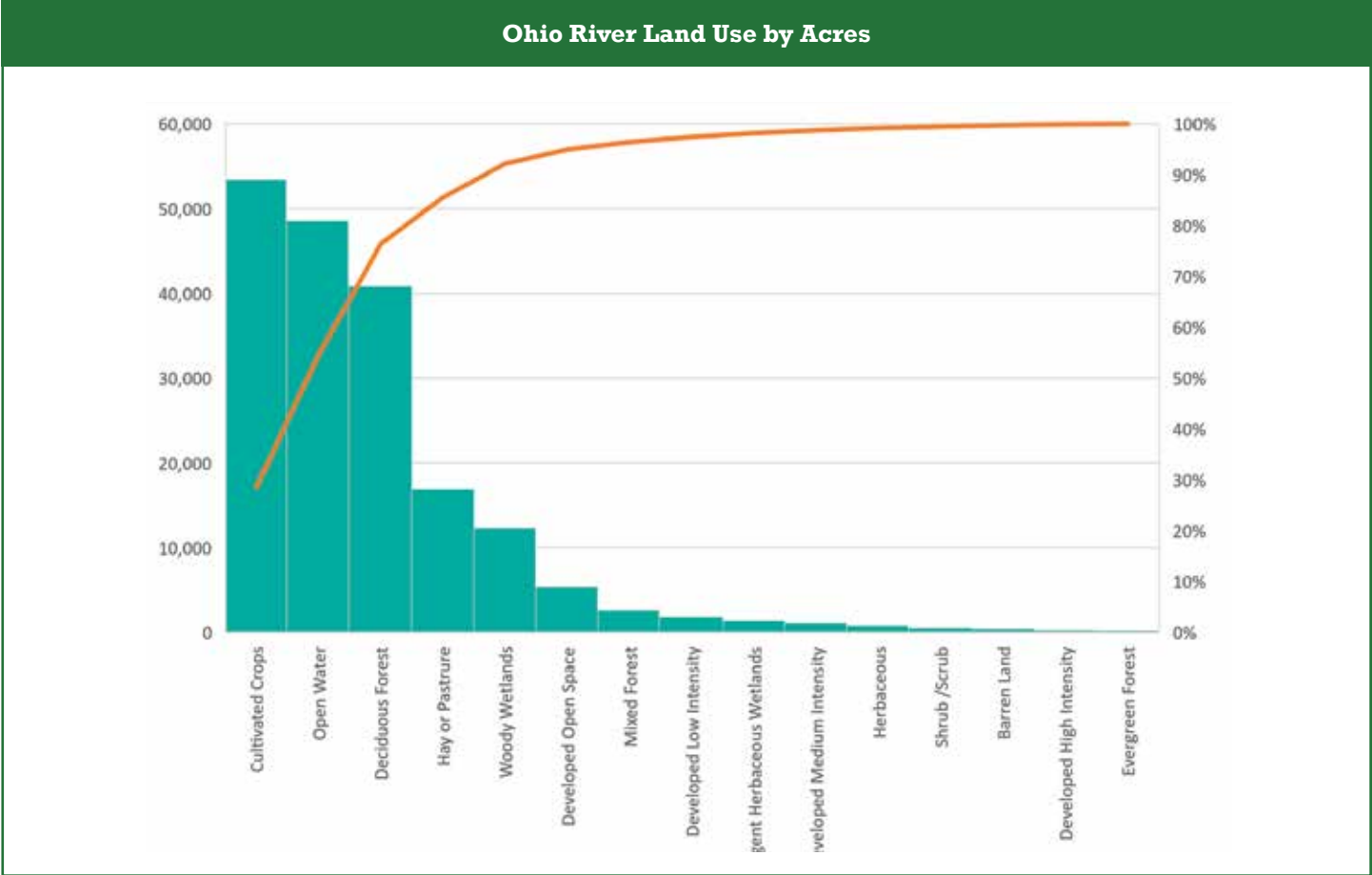


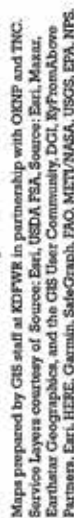
Ohio River backwater near Paducah, Kentucky. Ohio River Floodplains COA stretches along the banks of the Ohio River from McCracken County to Daviess County. Photo: Matt Thomas



Copperbelly watersnake are found in and along wetlands, lakes, ponds, and sluggish streams in the Ohio River COA. Photo: John MacGregor

Preserves, Kentucky State Parks, Kentucky Division of Water, Natural Resource Conservation Service, Kentucky Farm Bureau, Kentucky Division of Forestry, The Nature Conservancy, local governments, land trusts and collaborative environmental work groups.







PLATEAU ESCARPMENT COA

The Plateau Escarpment Conservation Opportunity Area (COA) includes 1,000,124 acres in southeastern Kentucky and lies primarily within the Cumberland Plateau physiographic region. It is associated with the Pottsville Escarpment, an area of erosion resistant sandstone that forms distinctive cliffs, gorges and is considered the transition from the Cumberland Plateau to the Bluegrass physiographic regions. The bulk of the COA includes the Rockcastle River watershed, which is designated as a state Wild River. This COA also contains priority areas identified in the upper Kentucky and extreme Upper Green River watersheds. The COA is adjacent to the South Fork COA to the south.

The Plateau Escarpment COA consists of 63% deciduous and mixed forest which are concentrated in the river gorges and steeper forested areas. A variety of terrestrial community types occur within this region, allowing for a diverse flora and fauna. These community types range from the shallow, xeric soils of sandstone ridges with pine oak forests/woodlands to Appalachian mesophytic forests in deep ravines that contain rich, deeper acidic soils.

Ninety percent of the 156,764 acres of protected lands within the COA are owned and managed by the Daniel Boone National Forests (DBNF). There are limited agricultural activities occurring throughout the Plateau Escarpment COA. Most is subsistence farming, with 25% of the total acreage within the COA considered hay/pasture. There are the usual concerns of agricultural runoff and leaking septic systems which impact water quality. With the topography and movement of water through tributaries in the



Sandstone rock shelters are sometimes used as maternity sites by the endangered Virginia big-eared bat. Photo: John MacGregor



The Plateau Escarpment lies within the Cumberland Plateau physiographic region, and is primarily deciduous and mixed forest. Sandstone geology in the area forms distinctive cliffs, gorges, and rock shelters that are essential habitat for many Kentucky SGCN. Photo: Zack Couch, KDFWR

Plateau Escarpment SGCN Priority by Taxa

Taxa	Moderate Priority	High Priority	Highest Priority	Data Deficient	Plant	Grand Total
Amphibians	2	2	1	6		11
Birds	69	11	1	1		82
Crustaceans		2	1	7		10
Fishes	1	5	3	2		11
Freshwater Mussels and Snails	3	14	9	3		29
Insects	1	5	2			8
Mammals	4	10	1	9		24
Plants					11	11
Reptiles	1			3		4
Grand Total	81	49	18	31	11	190

landscape to the Cumberland, Green and Kentucky Rivers, limiting pollutants is of utmost importance.

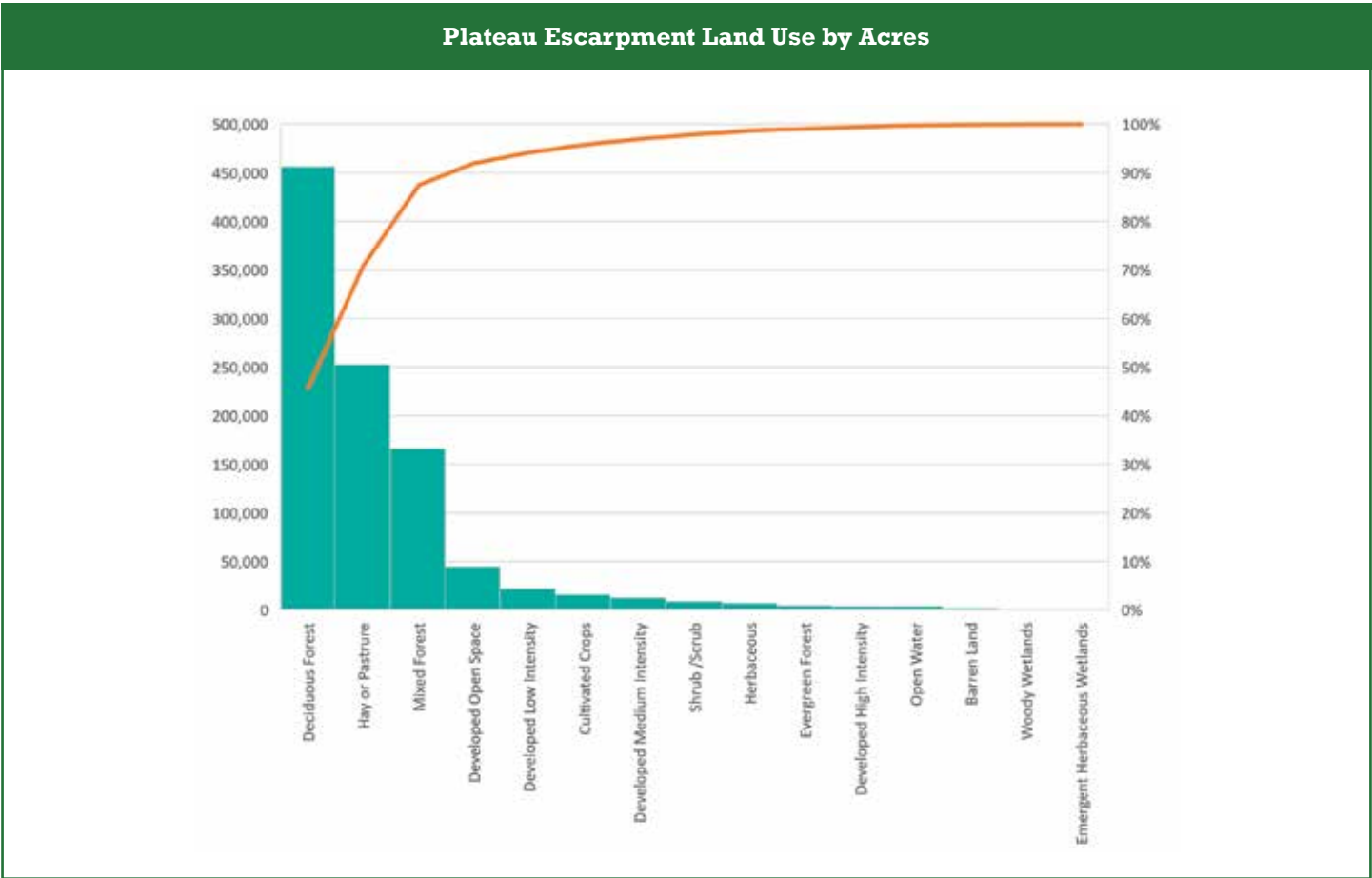
The top threats identified within this COA are Natural System Modification, Pollution, and Agriculture/Aquaculture. The Plateau Escarpment has a high potential for significant conservation projects to address these threats including long-term site protection, restoration work, and habitat management. For aquatic species, innovative work with partners can serve to reduce pollutants and identify barriers in need of removal. For terrestrial species, prescribed fire, invasive species management, and management of woodlands and prairie/barrens habitat benefit a variety of SGCN. OKNP currently works within this COA to manage one of the largest seep and pine barrens restoration sites.

There are 190 records of SGCN within the Plateau Escarpment COA. Of the 18 highest priority SGCN, there are 9 mussels, 3 fish, 2 insects, 1 mammal, 1 bird, 1 crustacean and 1 amphibian. In addition, the COA contains 11 SGCN plants. Several globally rare terrestrial natural communities occur within this COA, including riverscours prairies of the Rockcastle River and Buck Creek, upland seeps/wetlands of the Plateau Escarpment, xerohydric prairies of the Interior Plateau, upland pine oak savannahs, barrens, woodlands and glades in the Plateau Escarpment, and limestone prairies and barrens of the Outer Bluegrass near Stanford. These rare terrestrial communities contain concentrated populations of SGCN and are important areas SGCN conservation activities.

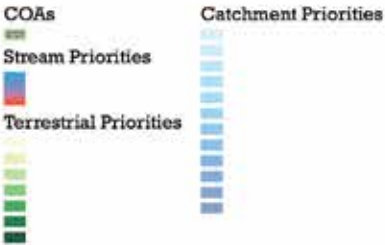
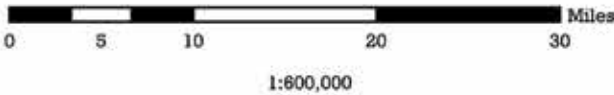
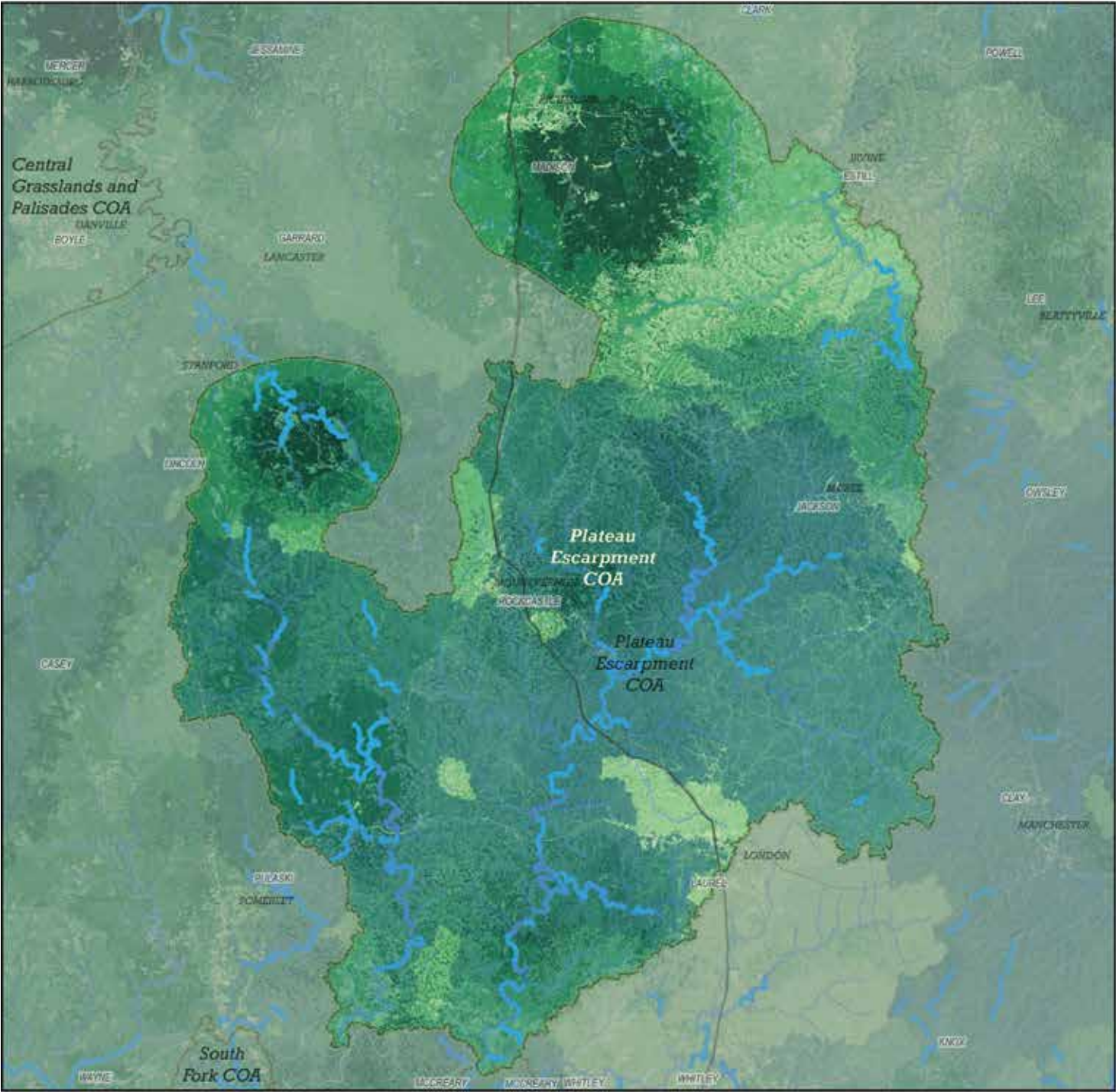


The globally rare Kentucky Lady's-Slipper orchid prefers mature forest and is sensitive to canopy disturbance. Photo: Tara Littlefield

Partners have long recognized the importance of the Plateau Escarpment and its surrounding landscape. Actions identified for this COA include education and awareness of these natural resources and their management and protection needs. External capacity building is identified as a critical tool for reaching goals in this COA. Working with partners and building projects between state and federal agencies such as KDFWR, Office of Kentucky Nature Preserves, Division of Water, Division of Forestry, Daniel Boone National Forest and Natural Resource Conservation Service are critical. In addition, efforts should include working with non-governmental organizations, private partners and land trusts. Land and water management was identified as the third highest priority action item. Actions that help prevent pollution and protect watersheds and healthy forest and open lands will be critical to the management of SGCN.



Plateau Escarpment COA



Maps prepared by GIS staff at KDFWR in partnership with OKNP and TNC. Service Layers courtesy of Source: Esri, USDA FSA, Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, DOI, KyFromAbove Partners, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS.





SOUTH FORK COA

The South Fork Conservation Opportunity Area (COA) encompasses 391,195 acres in southern Kentucky. This COA spans the southern ends of the Plateau Escarpment and Cumberland Plateau physiographic regions, and extends west to the Interior Plateau. The landscape of this COA is predominately deciduous and mixed forest (totaling 85% of the land area) with hay pasture being the next most prominent land use at 4.8%. The forests in the COA are a part of the largest contiguous forest block acreage known in Kentucky. Development in the area is sparse with the only city being Whitley City with a small population of less than 1,000 people. Developed land, including all levels of intensity, makes up only 2% of this COA.

South Fork COA takes its name from the Big South Fork of the Cumberland River which forms when the New and Clear Fork rivers merge in northern Tennessee. This 76-mile-long river runs north through the COA until it enters Lake Cumberland, and drains approximately 1,300 square miles within this COA and areas in northern Tennessee. The Big South Fork is designated as a Kentucky Wild River and much of its length is protected within the Big South Fork National River and Recreation Area facilitated by the National Park Service and within the Daniel Boone National Forest. In total, four designated Wild Rivers are situated within this COA: Big South Fork, Rock Creek, Little South Fork and the main stem of the Cumberland River upstream of Cumberland Falls.

This COA is well protected compared to others within the state. With large sections of this COA being



Within Kentucky, the endangered Palezone shiner is known only in the Little South Fork of the Cumberland River. Photo: Matt Thomas



More work is needed to understand the distribution, life history, and specific habitat needs of the eastern spotted skunk in Kentucky. Photo: John MacGregor

South Fork SGCN Priority by Taxa

Taxa	Moderate Priority	High Priority	Highest Priority	Data Deficient	Plant	Grand Total
Amphibians	1	1	1	3		6
Birds	46	9				55
Crustaceans			3	3		6
Fishes	2	6	6	1		15
Freshwater Mussels and Snails	3	16	10	1		30
Insects	1	1	1			3
Mammals	3	10		9		22
Plants					22	22
Reptiles	1			7		8
Grand Total	57	43	21	24	22	167

managed by both the National Park Service and the United States Forest Service, just under half of the COA is classified as protected (46.6%). McCreary County specifically is comprised of 61% federal property (NPS = 18%, USFS = 43%).

The South Fork COA has 167 SGCN. This list is dominated by birds (55), freshwater mussels and snails (30), plants (22), mammals (22), and fishes (15). Twenty-one of these species are listed as highest priority, with the majority being freshwater mussels. This COA contains one of the largest concentrations of SGCN plants in the state. Several globally rare terrestrial natural communities occur in this COA, including riverscours prairies of the free-flowing rivers, upland headwater seeps/wetlands, and upland pine oak savannahs, barrens, woodlands and glades that were historically much more common in the uplands of this COA. These rare terrestrial communities contain concentrated populations of SGCN and are important areas SGCN conservation activities.

Threats to conservation in this COA are predominately related to Agriculture/Aquaculture, Natural Systems Modifications, and Pollution, with a host of other threats contributing to a lesser extent. Given the water resources available, including the four Wild Rivers, conservation of stream resources is paramount within this COA. With a broad section of this COA under conservation protections, the stage is set to further conserve stream resources and the species that rely on those habitats. A cooperative agreement

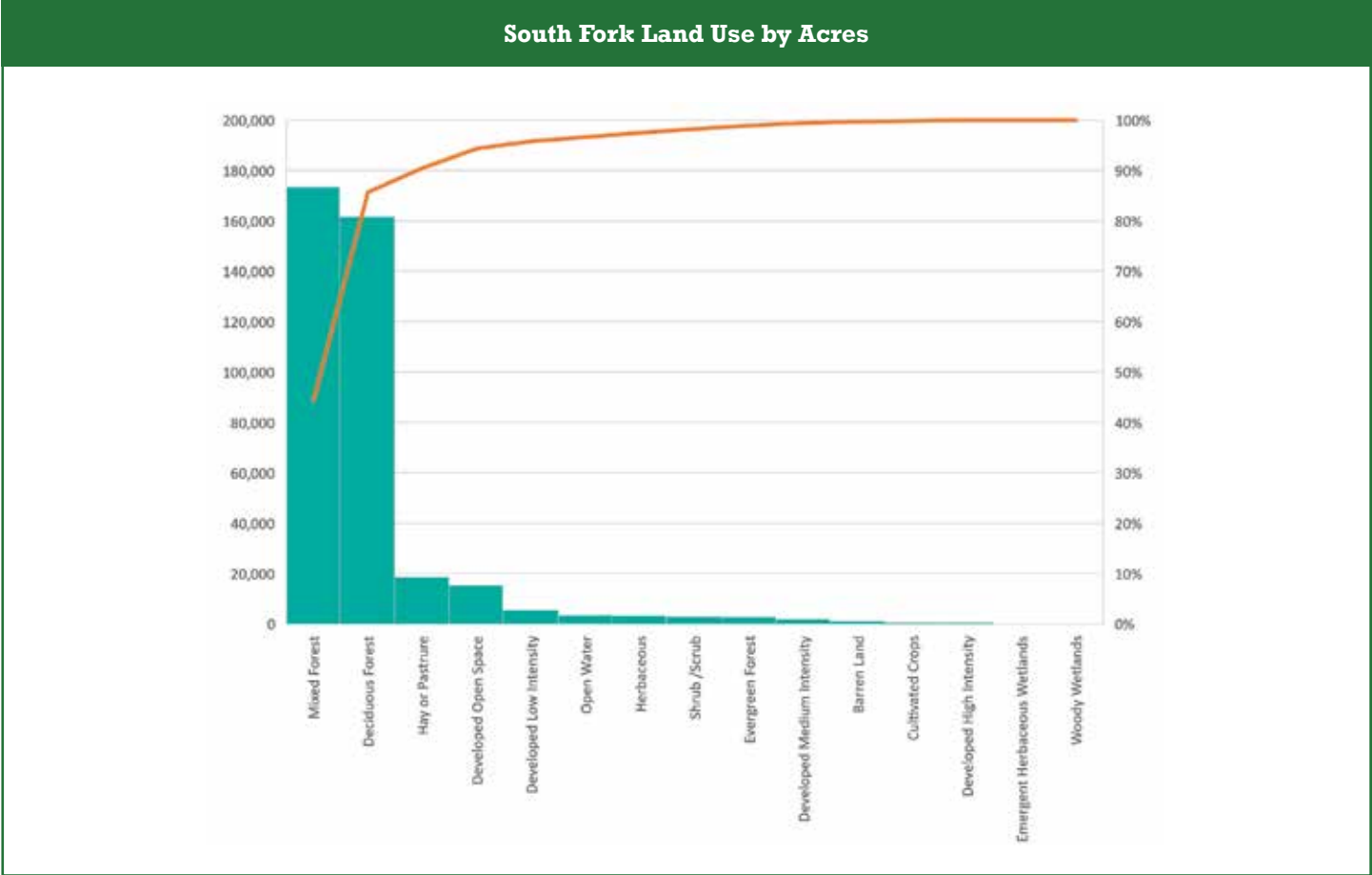


The Big South Fork of the Cumberland River is one of four rivers within South Fork COA to be designated as a Kentucky Wild River. Photo: John Hast

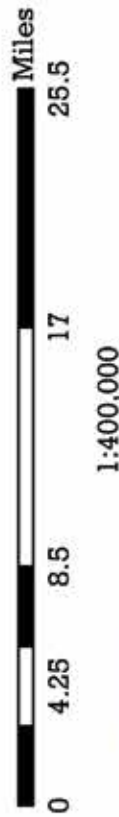
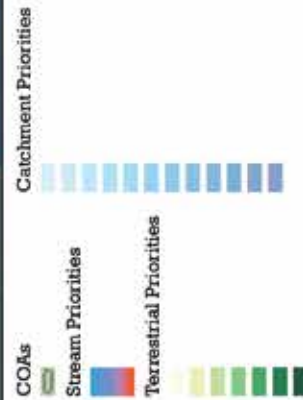
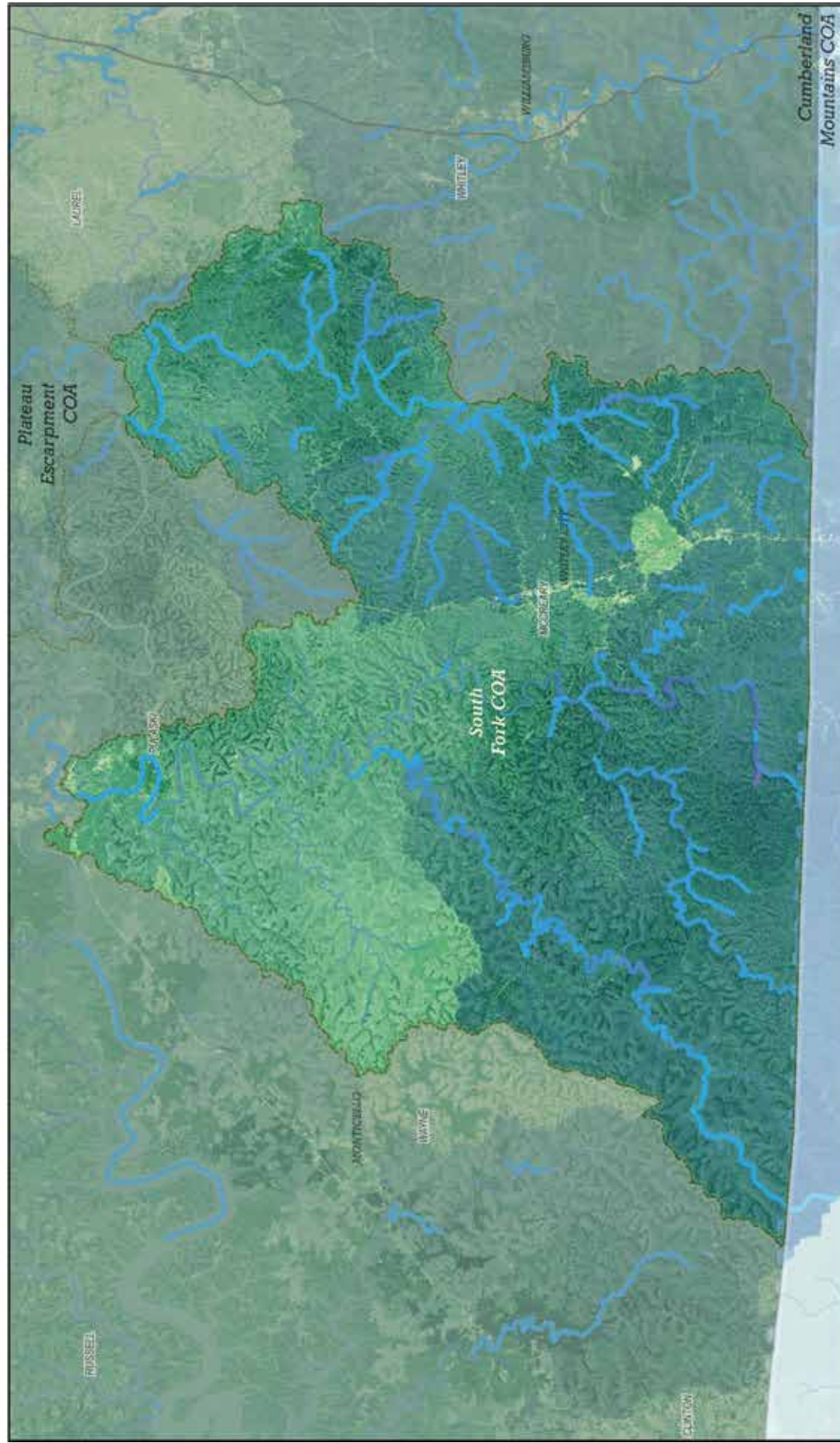


South Fork COA is dominated by forested habitat, much of which is in public ownership. This provides habitat management opportunities by a variety of conservation partners to benefit many SGCN. Photo: Zack Couch

is already in place on the entire Daniel Boone National Forest with multiple joint projects in place between the USFS and KDFWR. Additionally, the National Park Service is a cooperator on multiple black bear research projects currently and would represent a good partner within this COA. Any potential partnerships within this COA should include the Office of Kentucky Nature Preserves.



South Fork COA



Maps prepared by GIS staff at KDFWR in partnership with OKFP and TNC. Services layers courtesy of: Source: Esri, USDA FSA, Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, DGI, ByFromAbore Partners, Esri, HERE, Garmin, SafeGraph, FRC, MET/NASA, USGS, EPA, NPS.



TYGARTS KINNICONICK COA

The Tygarts Kinniconick Conservation Opportunity Area (COA) encompasses 331,938 acres in northeastern Kentucky. This COA was delineated from portions of two HUC-8 watersheds (Ohio Brush- Whiteoak and Little Scioto) in three counties (Carter, Greenup, and Lewis). Two significant, north-northeasterly flowing tributaries of the Ohio River provide its namesake. Kinniconick Creek flows for 48 miles long through Lewis County to its confluence with the Ohio River at Garrison. Tygarts Creek flows 62 miles from its origin in Carter County to its confluence with the Ohio River at South Shore in Greenup County.

The terrain of Tygarts-Kinniconick is more rugged than the Interior Plateau region to the west, but maximum elevation and local relief are lower than the Cumberland Mountains. Rounded hills and ridges and narrow valleys with high gradient streams characterize the landscape. The western portion of the COA draining Kinniconick Creek is underlain by Pennsylvanian through Silurian-aged sedimentary rock. The eastern portion draining Tygarts Creek has erosion-resistant Pennsylvanian-aged sandstone and conglomerate capping the ridges, with Mississippian limestone exposed in valleys and karst topography. Streams are cool and of moderate to high gradient with cobble or boulder substrates. Nutrient loads and alkalinity are lower than the Interior Plateau but higher than most of the Cumberland Plateau. These conditions result from land cover and use. The land cover is predominately (85%) deciduous and mixed forest, composed primarily of oak and oak-pine forest types. Land uses include logging, livestock farming,



Winter hibernacula for the endangered Indiana bat are restricted to a few caves with very specific conditions.
Photo: KDFWR.



Saltpeter Cave has experienced multiple impacts ranging from saltpeter mining to cave commercialization. Efforts to restore natural climate conditions and preclude vandalism have resulted in recolonization of the site by Indiana bats.
Photo: KDFWR

Tygarts Kinniconick SGCN Priority by Taxa

Taxa	Moderate Priority	High Priority	Highest Priority	Data Deficient	Plant	Grand Total
Amphibians	3	1	1	5		10
Birds	30	8				38
Crustaceans				4		4
Fishes	2	2		4		8
Freshwater Mussels and Snails	1	7	1	1		10
Insects		1				1
Mammals	3	8		6		17
Plants					6	6
Reptiles	1					1
Grand Total	40	27	2	20	6	95

and surface and underground coal mining.

The COA's notable karst topography is exemplified by the caverns encompassed by Carter Caves State Resort Park and two State Nature Preserves within the park's boundaries. The permanent protection of Carter Caves State Park and Nature Preserves is important both recreationally and biologically. Bat and Saltpeter caves provide wintering habitat for the federally endangered Indiana bat. Less than 1% of the COA is publicly owned, with the largest public land areas being Carter Caves State Resort Park (1,664 acres), adjacent Tygarts State Forest (939 acres), and the two Natures Preserves (collectively 157 acres). In addition to the important cave habitat for bats and other animals, the cave entrances harbor many glacial relict disjunct rare plants and snails due to the cool microclimate. There are also limestone outcrops and woodlands in the uplands of Tygart's Creek that contain several SGCN plants and animals, including some undescribed plant species currently under study.

A total of 95 SGCN are documented within the Tygarts-Kinniconick COA, including 27 within the highest prioritization category. The majority of SGCN falling within this COA are birds (38 species), followed by aquatic species (32 amphibians, crustaceans, fishes, and freshwater mussels and snails, collectively). There are also SGCN plants that occur within this COA, most occurring in upland limestone outcrops and woodlands. Others, such as Virginia spiraea, occur along the river scour riparian habitat of Kinniconick Creek and is dependent on free-flowing wild rivers and

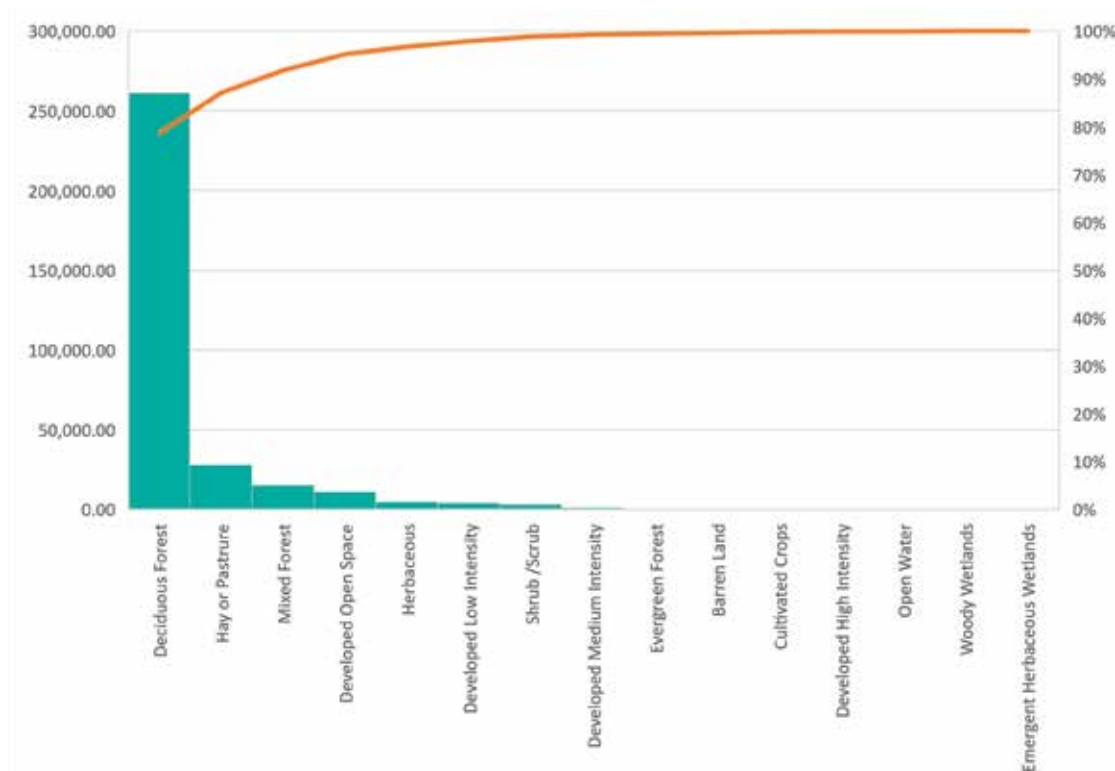


A 'hellbender hut' placed in Kinniconick Creek. Utilization of these artificial nest boxes allows for continued monitoring and future propagation efforts for the eastern hellbender. Photo: Sarah Tomke

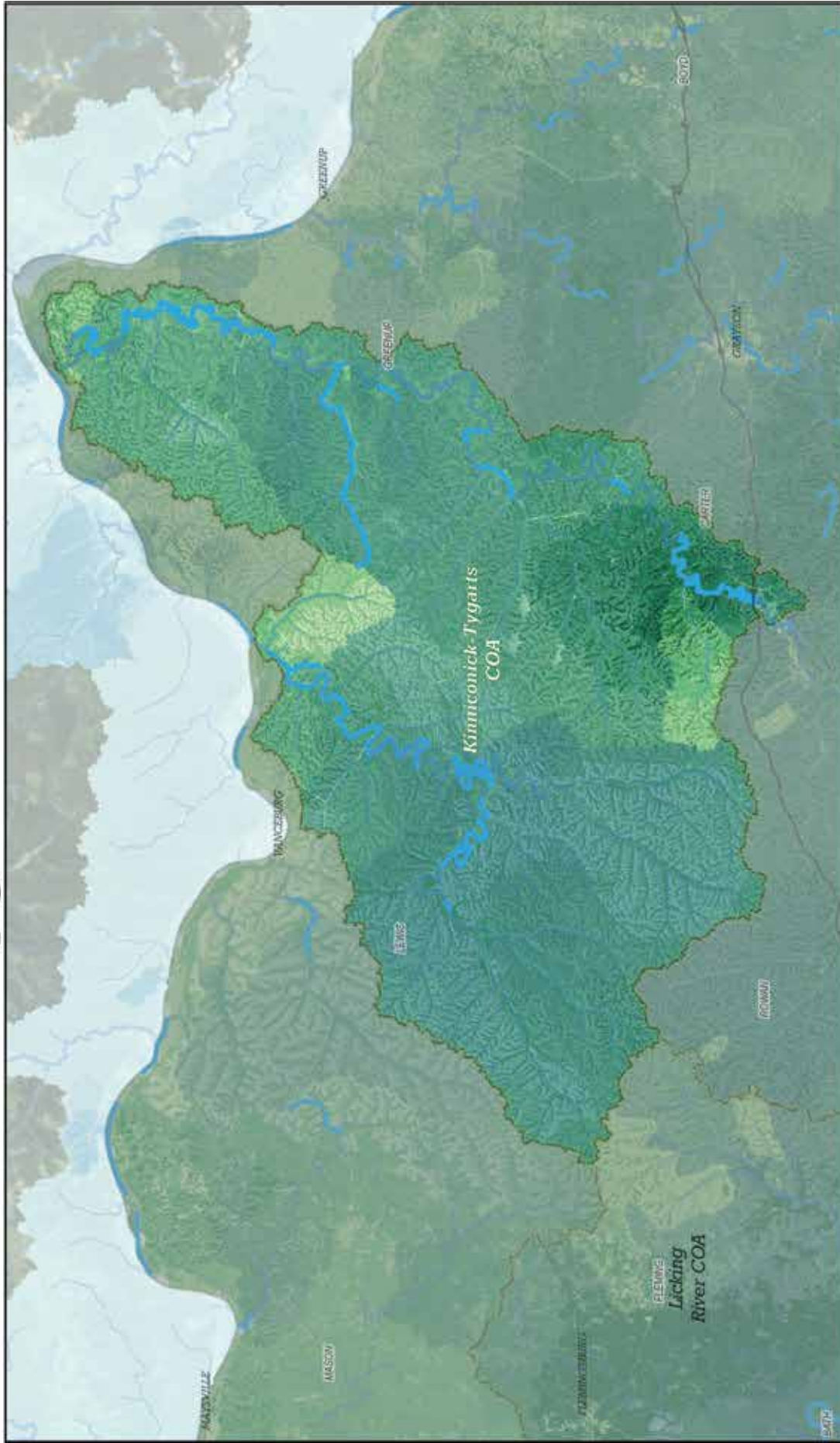
quality aquatic habitat. The top threats identified within this COA are Natural System Modification, Pollution, Agriculture/ Aquaculture, and Residential and Commercial Development. The highest priority conservation actions needed to address these threats include Education and Awareness, External Capacity Building, Land/Water Management and Protection.

Current and potential partnerships identified include collaboration with the U.S. Fish and Wildlife Service, USDA-Farm Services Agency, USDA-Natural Resources Conservation Service, Kentucky Division of Conservation, Kentucky Division of Forestry, Kentucky Division of Water, the Office of Kentucky Nature Preserves, and Kentucky State Parks.

Tygarts Kinniconick Land Use by Acres



Kinniconick-Tygarts COA



Catchment Priorities

COAs

Stream Priorities

Terrestrial Priorities

Miles



1:450,000



TEAM KENTUCKY
ENERGY AND ENVIRONMENT CABINET
OFFICE OF KENTUCKY NATURE PRESERVATION

The Nature Conservancy

Maps prepared by GIS staff at KDFWR in partnership with OKNP and TNC. Service layers courtesy of: Source: Esri, USDA, FSA, NGIN, Esri, HERE, Garmin, SafeGraph, FAO, METI/MASA, USGS, EPA, NPS, Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, DGI, KyFromAbove Partners.

APX 7.1a Actions Identified for Amphibian SGCN

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Ambystoma barbouri</i>	Streamside Salamander	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Ambystoma barbouri</i>	Streamside Salamander	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Ambystoma barbouri</i>	Streamside Salamander	Protect woodland breeding ponds	Protect existing woodland breeding ponds.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Ambystoma barbouri</i>	Streamside Salamander	Restore and/or create woodland breeding ponds	Restore and/or create woodland breeding ponds.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Ambystoma barbouri</i>	Streamside Salamander	Protect cave, spring, and seep areas	Protect caves, cool springs, seeps and small streams.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Ambystoma barbouri</i>	Streamside Salamander	Identify and restore cave, spring, and seep habitats	Identify, restore, and reforest cave, cool spring, seep and small stream habitats.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	81.25
<i>Ambystoma barbouri</i>	Streamside Salamander	Protect unique disturbed sites	Protect, restore, and/or create corridors and patches of open or beat-up urban fields, waste areas, grassy and weedy roadsides, seasonal wetlands, and roadsides with lots of crayfish burrows, earthworms, and surface debris in central and western Jefferson County.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Ambystoma barbouri</i>	Streamside Salamander	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	3.125	18.75
<i>Ambystoma barbouri</i>	Streamside Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	High	Consider	6.25	46.875
<i>Ambystoma barbouri</i>	Streamside Salamander	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	High	Consider	21.875	46.875
<i>Ambystoma barbouri</i>	Streamside Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	High	Consider	3.125	46.875
<i>Ambystoma talpoideum</i>	Mole Salamander	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	68.75
<i>Ambystoma talpoideum</i>	Mole Salamander	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Ambystoma talpoideum</i>	Mole Salamander	Protect woodland breeding ponds	Protect existing woodland breeding ponds.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	65.625
<i>Ambystoma talpoideum</i>	Mole Salamander	Restore and/or create woodland breeding ponds	Restore and/or create woodland breeding ponds.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Ambystoma talpoideum</i>	Mole Salamander	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	3.125	6.25
<i>Ambystoma talpoideum</i>	Mole Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	Moderate	Consider	6.25	31.25
<i>Ambystoma talpoideum</i>	Mole Salamander	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Ambystoma talpoideum</i>	Mole Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	31.25
<i>Aneides aeneus</i>	Green Salamander	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	78.125
<i>Aneides aeneus</i>	Green Salamander	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Aneides aeneus</i>	Green Salamander	Communicate impacts of fire to amphibian populations and habitats	Reduce the impacts of campfires and prescribed fire along/near rock outcrops and cliff lines.	Education and Awareness	Awareness and Communications	High	Consider	3.125	15.625
<i>Aneides aeneus</i>	Green Salamander	Work with regulatory agencies and private partners to minimize the impacts of surface mining and other forms of mineral extraction	Minimize the impacts of surface mining and other forms of mineral extraction.	External Capacity Building	Alliance and Partnership Development	High	Consider	34.375	18.75
<i>Aneides aeneus</i>	Green Salamander	Raise awareness of the importance and diversity of amphibians in Kentucky	Inform citizens of the impacts recreational activities can have on Green Salamanders and provide suitable alternatives.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	15.625
<i>Aneides aeneus</i>	Green Salamander	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Aneides aeneus</i>	Green Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	High	Consider	6.25	46.875
<i>Aneides aeneus</i>	Green Salamander	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	High	Consider	21.875	46.875
<i>Aneides aeneus</i>	Green Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	High	Consider	3.125	46.875
<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	100	100
<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	Protect large stream/river systems	Protect large stream/river systems.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	100	96.875
<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	Raise public awareness about hellbender disturbance	Improve public understanding about harm of moving rocks and collecting animals.	Education and Awareness	Awareness and Communications	Highest	Consider	6.25	34.375
<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	Regulation of gravel extraction	Work with regulatory agencies to ensure best management practices to minimize impacts of gravel removal to eastern hellbenders.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	18.75	34.375
<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	Develop and implement decontamination procedures as a part of scientific collection permit regulations	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	Highest	Proceed	6.25	62.5
<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	Highest	Proceed	21.875	62.5
<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	Highest	Proceed	3.125	62.5
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	68.75
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Protect cave, spring, and seep areas	Protect caves, cool springs, seeps and small streams.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	68.75
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Identify and restore cave, spring, and seep habitats	Identify, restore, and reforest cave, cool spring, seep and small stream habitats.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	3.125	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	Moderate	Consider	6.25	31.25
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	31.25
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	68.75
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Work with regulatory agencies and private partners to minimize the impacts of surface mining and other forms of mineral extraction	Minimize the impacts of surface mining and other forms of mineral extraction.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	34.375	3.125
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Raise awareness of the recreational impacts to amphibian habitat from off-trail ATV use	Direct ATV traffic to existing trails and hardened stream crossings.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	0
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Protect cave, spring, and seep areas	Protect caves, cool springs, seeps and small streams.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	68.75
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Identify and restore cave, spring, and seep habitats	Identify, restore, and reforest cave, cool spring, seep and small stream habitats.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	3.125	3.125
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Raise awareness of the importance and diversity of amphibians in Kentucky	Inform citizens of the impacts to northern dusky salamanders and provide suitable alternatives.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	0
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	Moderate	Consider	6.25	31.25
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Desmognathus fuscus</i>	Northern Dusky Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	31.25
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Protect existing forested areas	Protect existing forested habitats.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	68.75
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Work with regulatory agencies and private partners to minimize the impacts of surface mining and other forms of mineral extraction	Minimize the impacts of surface mining and other forms of mineral extraction.	Law and Policy	Policies and Regulations	Moderate	Proceed	18.75	65.625
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Protect cave, spring, and seep areas	Protect caves, cool springs, seeps and small streams.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	68.75
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Identify and restore cave, spring, and seep habitats	Identify, restore, and reforest cave, cool spring, seep and small stream habitats.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Raise awareness of the recreational impacts to amphibian habitat from off-trail ATV use	Direct ATV traffic to existing trails and hardened stream crossings.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Raise awareness of the importance and diversity of amphibians in Kentucky	Inform citizens of the impacts recreational activities can have on Allegheny Mountain Dusky Salamanders and provide suitable alternatives.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	3.125
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	Moderate	Consider	6.25	31.25
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Desmognathus ochropaeus</i>	Allegheny Mountain Dusky Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	31.25
<i>Eurycea guttolineata</i>	Three-lined Salamander	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Eurycea guttolineata</i>	Three-lined Salamander	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Eurycea guttolineata</i>	Three-lined Salamander	Protect natural stream channels, bayous, swamps, and wetlands	Protect existing natural stream channels, bayous, swamps and wetlands.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Eurycea guttolineata</i>	Three-lined Salamander	Restore degraded wetland habitats	Restore existing natural stream channels, bayous, swamps and wetlands.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Eurycea guttolineata</i>	Three-lined Salamander	Protect cave, spring, and seep areas	Protect caves, cool springs, seeps and small streams.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Eurycea guttolineata</i>	Three-lined Salamander	Identify and restore cave, spring, and seep habitats	Identify, restore, and reforest cave, cool spring, seep and small stream habitats.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Eurycea guttolineata</i>	Three-lined Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	High	Consider	6.25	46.875
<i>Eurycea guttolineata</i>	Three-lined Salamander	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	High	Consider	21.875	46.875
<i>Eurycea guttolineata</i>	Three-lined Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	High	Consider	3.125	46.875
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Protect existing wetland habitats	Protect existing natural stream channels, bayous, swamps and wetlands.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	84.375
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Restore degraded wetland habitats	Restore existing natural stream channels, bayous, swamps and wetlands.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Create wetland habitat	Create open to semi-open wetland habitat for breeding or foraging.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	84.375
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Develop and implement decontamination procedures as a part of scientific collection permit regulations	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	High	Consider	6.25	46.875
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	High	Consider	21.875	46.875
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	High	Consider	3.125	46.875

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Hyla versicolor</i>	Gray Treefrog	Protect wetland habitat	Protect open to semi-open wetland habitat for breeding or foraging.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	68.75
<i>Hyla versicolor</i>	Gray Treefrog	Restore and/or create wetland habitat	Restore degraded wetland habitat and/or create open to semi-open wetland habitat for breeding or foraging.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Hyla versicolor</i>	Gray Treefrog	Restore and create upland breeding habitat	Identify, restore, and/or create upland vegetated vernal pools and small breeding ponds in open habitat.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Investigate	100	68.75
<i>Hyla versicolor</i>	Gray Treefrog	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Hyla versicolor</i>	Gray Treefrog	Develop and implement decontamination procedures as a part of scientific collection permit regulations	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	Moderate	Consider	6.25	31.25
<i>Hyla versicolor</i>	Gray Treefrog	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Hyla versicolor</i>	Gray Treefrog	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	31.25
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	65.625
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	3.125	3.125
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Develop and implement decontamination procedures as a part of scientific collection permit regulations	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	Moderate	Consider	6.25	31.25
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	31.25
<i>Siren intermedia</i>	Lesser Siren	Protect natural stream channels, bayous, swamps, and wetlands	Protect existing natural stream channels, bayous, swamps and wetlands.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Siren intermedia</i>	Lesser Siren	Restore degraded wetland habitats	Restore existing natural stream channels, bayous, swamps and wetlands.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Siren intermedia</i>	Lesser Siren	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Develop and implement decontamination procedures as a part of scientific collection permit regulations.	Law and Policy	Policies and Regulations	High	Consider	6.25	46.875
<i>Siren intermedia</i>	Lesser Siren	Amend transportation regs to minimize disease transmission	Amend transportation regs to minimize disease transmission.	Law and Policy	Policies and Regulations	High	Consider	21.875	46.875
<i>Siren intermedia</i>	Lesser Siren	Develop education and outreach materials to inform the public of disease issues and minimization measures	Develop education and outreach materials to inform the public of disease issues and minimization measures.	Education and Awareness	Awareness and Communications	High	Consider	3.125	46.875

APX 7.1b Actions Identified for Bird SGCN

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Accipiter striatus</i>	Sharp-shinned Hawk	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Accipiter striatus</i>	Sharp-shinned Hawk	Restore pine forest on public lands	The species uses mostly evergreens, especially pines for nesting. Restore pine forest, where appropriate on public land.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	31.25
<i>Actitis macularia</i>	Spotted Sandpiper	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Actitis macularia</i>	Spotted Sandpiper	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Actitis macularia</i>	Spotted Sandpiper	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Actitis macularia</i>	Spotted Sandpiper	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125
<i>Actitis macularia</i>	Spotted Sandpiper	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds aim to curb threats. Efforts include the acquisition and protection of lands used as migratory pathways and nonbreeding sites and the education of landowners on regenerative agricultural and ranching practices.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Actitis macularia</i>	Spotted Sandpiper	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Actitis macularius</i>	Spotted Sandpiper	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Actitis macularius</i>	Spotted Sandpiper	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Actitis macularius</i>	Spotted Sandpiper	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	Moderate	Consider	6.25	0
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Work with agricultural trade organizations and the agricultural industry to promote grassland bird habitat on private lands	Consider the creation of grassland bird friendly certification programs. Continue to facilitate research on native forages and grazing for horses, beef, etc. Partner with personnel from local conservation districts and local production organizations (Cattlemen's Association, Soybean Association, etc.)	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	65.625	34.375
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Improve frequency of prescribed fire on public lands through partnerships	Prioritize partner collaboration with the Kentucky Prescribed Fire Council (KPF-C), Kentucky Division of Forestry (KDF), Office of Kentucky Nature Preserves (OKNP), and private contractors to increase the capacity of prescribed fire use on both public lands.	External Capacity Building	Alliance and Partnership Development	Moderate	Proceed	34.375	62.5
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Educate private landowners and the public on the importance of grassland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass, native grass and other types of grassy/shrubby habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Promote native grasses for hayfields and livestock grazing. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	50	3.125
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Incentivize management for grassland birds on private lands	Work through KDFWR's private lands program and the Natural Resource Conservation Service (NRCS) to increase habitat quality and availability on private lands. Utilize federal programs to implement native grass restoration, field borders, prescribed grazing, woody stem removal, delayed haying, and prescribed fire on both working and recreational private lands. Target efforts near to or within the previous Conservation Reserve Enhancement Program (CREP) Area and quail focal areas as designated in KDFWR's 2020 Quail Report. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	31.25
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Train resource managers on proper grassland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	0

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of native grasslands, wet prairies, reclaimed surface mines and unowned non-native grasslands would be particularly beneficial. Areas near to quail focal areas as designated in KDFWR's 2020 Quail Report should be prioritized to reduce habitat fragmentation. Additional areas near remnant native grasslands in Hardin, Grayson, Warren, Barren counties, as identified by KSNPC (2010) are high priority for protections as well. In addition, areas in Christian, Todd and Logan Counties, which were identified through a model of ecological potential developed by the Central Hardwoods Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	62.5
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Work with partners to improve quality of grassland habitat on public lands	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	96.875	0
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Increase access to prescribed fire educational opportunities	Host prescribed fire workshops. Invest monetary or in-kind resources for a KPC training coordinator for statewide logistic support, and partner collaboration aimed at increasing the amount of prescribed fire in the Commonwealth.	Education and Awareness	Education and Awareness- Other	Moderate	Re-Evaluate	96.875	31.25
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGON habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Anas rubripes</i>	American Black Duck	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGON habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	3.125	0
<i>Anas rubripes</i>	American Black Duck	Public outreach and communication	Raise public awareness of disease symptoms, reporting, and best management practices to reduce disease transmission.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	0
<i>Antrastomus carolinensis</i>	Chuck-will's-widow	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	High	Re-Evaluate	93.75	46.875
<i>Antrastomus carolinensis</i>	Chuck-will's-widow	Facilitate habitat management for this species on state and federal lands including the Land Between the Lakes NRA.	Coordinate with state and federal biologists and foresters to ensure open woodland conditions are incorporated into forest management prescriptions where appropriate.	Land/Water Management	Habitat and Natural Process Restoration	High	Consider	34.375	46.875
<i>Antrastomus carolinensis</i>	Chuck-will's-widow	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat fragmentation and loss on private lands. For this species, the protection of woodlands would be particularly beneficial. Forested areas near to Land Between the Lakes NRA, Mammoth Cave National Park, Green River Lake and East Gulf Coastal Plain should be prioritized. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	78.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Antrastomus carolinensis</i>	Chuck-will's-widow	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	High	Consider	21.875	46.875
<i>Antrastomus carolinensis</i>	Chuck-will's-widow	Train resource managers on proper woodland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of woodland birds and best management practices through workshops and regular communications.	Education and Awareness	Training	High	Consider	21.875	15.625
<i>Antrastomus carolinensis</i>	Chuck-will's-widow	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	High	Consider	6.25	15.625
<i>Antrastomus vociferus</i>	Whip-poor-will	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Antrastomus vociferus</i>	Whip-poor-will	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	Moderate	Consider	6.25	0
<i>Antrastomus vociferus</i>	Whip-poor-will	Work with forest industries and large industrial private landowners to promote sustainable forestry	Promote participation in the Sustainable Forestry Initiative, The White Oak Initiative, and the Kentucky Forest Stewardship Program. Hold workshops to train foresters on the habitat needs of forest birds and sustainable forestry in general. Collaborate with the Kentucky Division of Forestry and conservation organizations to better engage with this group.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	18.75	0
<i>Antrastomus vociferus</i>	Whip-poor-will	Educate the public on the necessity of diverse forest structure	Create or revamp educational campaigns to educate the public about the benefits of forest management and the importance of a diverse forest structure, including mature forest, early successional forest and open woodlands. Create and promote demonstration areas on public areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	65.625	0
<i>Antrastomus vociferus</i>	Whip-poor-will	Manage invasive species in forested areas to avoid further habitat degradation	Work through KDEWR's private lands program to manage invasive species on private lands. Utilize Environmental Quality Incentives Program (EQIP) contracts with NRCS, to manage kudzu, bush honeysuckle, winter creeper, etc. Work with KDEWR's public lands program and federal agencies to manage invasive species on public lands.	Land/Water Management	Invasive/Problematic Species Control	Moderate	Re-Evaluate	100	31.25
<i>Antrastomus vociferus</i>	Whip-poor-will	Incentivize management for diverse forest structure, including early successional forest on private lands	Work through KDEWR's private lands program to increase habitat quality and availability on private lands. Utilize Environmental Quality Incentives Program (EQIP) contracts with NRCS, including the Southeast Kentucky Early Successional Habitat Initiative (SEKESH), devoted specifically to young forest habitat. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	31.25
<i>Antrastomus vociferus</i>	Whip-poor-will	Facilitate habitat management for this species on state lands.	Coordinate with state biologists and foresters to ensure management needs are incorporated into forest management prescriptions.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Consider	34.375	31.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Antrastomus vociferus</i>	Whip-poor-will	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat fragmentation and loss on private lands. For this species, the protection of unfragmented forest, containing a variety of stages of succession would be particularly beneficial. Forested areas near to Mammoth Cave National Park, Land Between the Lakes NRA, and Daniel Boone National Forest should be prioritized. In addition, areas within the Cumberland Focal Landscape as designated by the Appalachian Mountains Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	62.5
<i>Antrastomus vociferus</i>	Whip-poor-will	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Antrastomus vociferus</i>	Whip-poor-will	Train resource managers on proper forest management techniques	Train staff from state and federal natural resource agencies on the habitat needs of forest birds and best management practices through workshops and regular communications.	Education and Awareness	Training	Moderate	Consider	21.875	0
<i>Antrastomus vociferus</i>	Whip-poor-will	Facilitate habitat management for this species on federal lands such as the Daniel Boone National Forest (DBNF) and Land Between the Lakes NRA.	Coordinate federal biologists and foresters to ensure management needs are incorporated into forest management prescriptions.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	31.25
<i>Antrastomus vociferus</i>	Whip-poor-will	Manage invasive species in forested areas through trainings	Hold workshops with land managers to discuss techniques for invasive plant eradication.	Education and Awareness	Training	Moderate	Consider	21.875	0
<i>Ardea alba</i>	Great Egret	Acquisition and protection of habitat	Acquire nesting habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of riparian forest where rookeries are known to occur would be particularly beneficial. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for this species.	Land/Water Protection	Site/Area Protection	Moderate	Investigate	96.875	65.625
<i>Ardea alba</i>	Great Egret	Raise public awareness about nest disturbance	Improve public understanding about harm of disturbing rookeries.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	6.25	0
<i>Ardea alba</i>	Great Egret	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	3.125	3.125
<i>Asio flammeus</i>	Short-eared Owl	Educate private landowners and the public on the importance of grassland and shrubland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass, native grass and other types of grassy/shrubby habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Promote native grasses for hayfields and livestock grazing. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	50	0

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Asio flammeus</i>	Short-eared Owl	Incentivize management for grassland birds on private lands	Work through KDFWR's private lands program and the Natural Resource Conservation Service (NRCS) to increase habitat quality and availability on private lands. Utilize federal programs to implement native grass restoration, field borders, prescribed grazing, woody stem removal, delayed haying, and prescribed fire on both working and recreational private lands. Target efforts near to or within the previous Conservation Reserve Enhancement Program (CREP) Area and quail focal areas as designated in KDFWR's 2020 Quail Report. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	31.25
<i>Asio flammeus</i>	Short-eared Owl	Improve grassland habitat structure on public lands	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	External Capacity Building- Other	Moderate	Investigate	65.625	62.5
<i>Asio flammeus</i>	Short-eared Owl	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of native grasslands, wet prairies, reclaimed surface mines and unowned non-native grasslands would be particularly beneficial. Areas near to quail focal areas as designated in KDFWR's 2020 Quail Report should be prioritized to reduce habitat fragmentation. Additional areas near remnant native grasslands in Hardin, Grayson, Warren, Barren counties, as identified by KSNPC (2010) are high priority for protections as well. In addition, areas in Christian, Todd and Logan Counties, which were identified through a model of ecological potential developed by the Central Hardwoods Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	62.5
<i>Asio flammeus</i>	Short-eared Owl	Educate the public on the effects of secondary rodenticide exposure	Create and implement an educational campaign on the effects of secondary rodenticide exposure in this and other species.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	0
<i>Asio flammeus</i>	Short-eared Owl	Train resource managers on proper grassland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	0
<i>Asio flammeus</i>	Short-eared Owl	Improve grassland habitat structure on KDFWR WMAs.	Work with site manager to improve grassland habitat structure and quality on WMAs.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	62.5
<i>Asio flammeus</i>	Short-eared Owl	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Asio otus</i>	Long-eared Owl	Increase habitat availability on public lands	Preserve or establish groves of evergreen trees near to open habitats on public lands.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	31.25
<i>Asio otus</i>	Long-eared Owl	Educate the public on the effects of secondary rodenticide exposure	Create and implement an educational campaign on the effects of secondary rodenticide exposure in this and other species.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	0
<i>Aythya affinis</i>	Lesser Scaup	Public outreach and communication	Raise public awareness of disease symptoms, reporting, and best management practices to reduce disease transmission.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	0
<i>Aythya marila</i>	Greater Scaup	Public outreach and communication	Raise public awareness of disease symptoms, reporting, and best management practices to reduce disease transmission.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	0
<i>Bartramia longicauda</i>	Upland Sandpiper	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds aim to curb threats. Efforts include the acquisition and protection of lands used as migratory pathways and nonbreeding sites and the education of landowners on regenerative agricultural and ranching practices.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Bonasa umbellus</i>	Ruffed Grouse	Acquisition and protection of habitat	Acquire large forest blocks in eastern Kentucky for public ownership or protect via long term easements to ensure connectivity of grouse populations across habitat fragmented by human development. For this species, protected forestlands must be legally and operationally capable of management via silviculture and prescribed fire to create and maintain early-successional, open-canopy forest within a mosaic of older forest. Areas near and within the Kentucky Ruffed Grouse and Young Forest Strategic Plan 2017-2027 should be prioritized. In addition, areas within the Cumberland Focal Landscape as designated by the Appalachian Mountains Joint Venture are high priority for protection.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	65.625
<i>Bonasa umbellus</i>	Ruffed Grouse	Facilitate grouse habitat management on state WMAs.	Coordinate KDFWR biologists to ensure grouse habitat management needs are incorporated into forest management prescriptions.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Consider	34.375	34.375
<i>Bonasa umbellus</i>	Ruffed Grouse	Incentivize management for diverse forest structure, including early successional forest on private lands	Work through KDFWR's private lands program and the Ruffed Grouse Society to increase young forest habitat quality and availability on private lands. Utilize Environmental Quality Incentives Program (EQIP) contracts with NRCS, including the Southeast Kentucky Early Successional Habitat Initiative (SEKESH), devoted specifically to young forest habitat. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Bonasa umbellus</i>	Ruffed Grouse	Educate the public on the benefits of forest management	Create or revamp educational campaigns to educate the public about the benefits of forest management for grouse and other wildlife. Create and promote demonstration areas on public areas. Use a variety of techniques including social media posts of educational videos and in-person field day events. Content should reference scientific findings validating the ecological value of young forest habitat resulting from forest management.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	65.625	3.125
<i>Bonasa umbellus</i>	Ruffed Grouse	Work with forest industries and large industrial private landowners to promote sustainable forestry	Promote participation in the Sustainable Forestry Initiative, the White Oak Initiative, and the Kentucky Forest Stewardship Program. Hold workshops to train foresters on the habitat needs of forest birds and sustainable forestry in general. Collaborate with the Kentucky Division of Forestry and conservation organizations to better engage with this group.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	18.75	3.125
<i>Bonasa umbellus</i>	Ruffed Grouse	Facilitate grouse habitat management on the Daniel Boone National Forest (DBNF).	Coordinate with DBNF biologists and foresters to ensure grouse habitat management needs are incorporated into forest management prescriptions.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Botaurus lentiginosus</i>	American Bittern	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide nesting, winter and stop over habitat. For this species, the protection of emergent marshes dominated by herbaceous aquatic vegetation would be particularly beneficial. Areas near to or within the Highland Rim and Shawnee Hills (Green River region), especially those near Sloughs WMA, Green River Lake WMA, and in Muhlenberg, Hopkins and Ohio County should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for marshbird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	65.625
<i>Botaurus lentiginosus</i>	American Bittern	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Investigate	100	65.625

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Botaurus lentiginosus</i>	American Bittern	Incentivize management for marshbird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts near to or within the Highland Rim and Shawnee Hills (Green River region). Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Botaurus lentiginosus</i>	American Bittern	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Botaurus lentiginosus</i>	American Bittern	Educate private landowners and the public on the importance of wetland habitat	Launch educational campaigns to promote the importance of wetland habitat. Create and promote demonstration areas on public lands.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	81.25	3.125
<i>Botaurus lentiginosus</i>	American Bittern	Manage invasive species in wetland areas to avoid further habitat degradation	Work through KDFWR's private lands program to manage invasive species on private lands. Utilize Environmental Quality Incentives Program (EQIP) contracts with NRCS, to manage phragmites and other invasive wetland plants. Work with KDFWR's public lands program and federal agencies to manage invasive species on public lands.	Land/Water Management	Invasive/Problematic Species Control	Moderate	Re-Evaluate	100	34.375
<i>Botaurus lentiginosus</i>	American Bittern	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	3.125	0
<i>Botaurus lentiginosus</i>	American Bittern	Improve habitat availability on public lands through training	Train staff from state and federal natural resource agencies on the habitat needs of marshbirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for this and other marshbird SGCN.	Education and Awareness	Training	Moderate	Re-Evaluate	53.125	34.375
<i>Botaurus lentiginosus</i>	American Bittern	Improve habitat availability on public lands through alliances and partnerships	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve marshbird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	65.625	34.375
<i>Botaurus lentiginosus</i>	American Bittern	Manage invasive species in wetland areas through trainings	Hold workshops with land managers to discuss techniques for invasive plant eradication.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Butorides virescens</i>	Green Heron	Educate private landowners and the public on the importance of wetland habitat	Launch educational campaigns to promote the importance of wetland habitat, even in small patches. Create and promote demonstration areas on public lands.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	81.25	0
<i>Butorides virescens</i>	Green Heron	Incentivize management for wetland habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Butorides virescens</i>	Green Heron	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	3.125	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Calidris alba</i>	Sanderling	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Calidris alba</i>	Sanderling	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Calidris alba</i>	Sanderling	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Calidris alba</i>	Sanderling	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125
<i>Calidris alba</i>	Sanderling	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Calidris alba</i>	Sanderling	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Calidris alba</i>	Sanderling	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Calidris alba</i>	Sanderling	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Calidris alpina</i>	Dunlin	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Calidris alpina</i>	Dunlin	Improve habitat on availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Calidris alpina</i>	Dunlin	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Calidris alpina</i>	Dunlin	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125
<i>Calidris alpina</i>	Dunlin	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Calidris alpina</i>	Dunlin	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Calidris alpina</i>	Dunlin	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Calidris alpina</i>	Dunlin	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Calidris himantopus</i>	Stilt Sandpiper	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Calidris himantopus</i>	Stilt Sandpiper	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Calidris himantopus</i>	Stilt Sandpiper	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season. Collaborate with Joint Ventures on multi-state projects to increase conservation implementation on private lands.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Calidris himantopus</i>	Stilt Sandpiper	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125
<i>Calidris himantopus</i>	Stilt Sandpiper	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds aim to curb threats. Efforts include the acquisition and protection of lands used as migratory pathways and nonbreeding sites and the education of landowners on regenerative agricultural and ranching practices.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Calidris himantopus</i>	Stilt Sandpiper	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Calidris himantopus</i>	Stilt Sandpiper	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Calidris himantopus</i>	Stilt Sandpiper	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	68.75
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds aim to curb threats. Efforts include the acquisition and protection of lands used as migratory pathways and nonbreeding sites and the education of landowners on regenerative agricultural and ranching practices.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Cardellina canadensis</i>	Canada Warbler	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Cardellina canadensis</i>	Canada Warbler	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Cardellina canadensis</i>	Canada Warbler	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Cardellina canadensis</i>	Canada Warbler	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations. For this species, the protection of forest with a diverse structure would be particularly beneficial. High elevation, forested areas in Bell and Harlan counties should be prioritized. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	62.5
<i>Cardellina canadensis</i>	Canada Warbler	Work with partners to educate the public on the importance of stopover habitat including patches in urban areas	Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes within parks. Restore shrubland and forest habitat in and near urban areas and promote select locations as demonstration areas.	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	96.875	0
<i>Cardellina canadensis</i>	Canada Warbler	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25
<i>Cardellina canadensis</i>	Canada Warbler	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Cardellina canadensis</i>	Canada Warbler	Feral hog educational campaign	Inform and provide mitigation strategies about the impacts of feral hogs to ground nesting songbirds and other wildlife.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	31.25
<i>Cardellina canadensis</i>	Canada Warbler	Feral hog eradication on public lands	Provide resources for feral hog eradication.	Land/Water Management	Invasive/Problematic Species Control	Moderate	Re-Evaluate	100	31.25
<i>Centronyx henslowii</i>	Henslow's Sparrow	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	High	Consider	6.25	15.625
<i>Centronyx henslowii</i>	Henslow's Sparrow	Work with agricultural trade organizations and the agricultural industry to promote grassland bird habitat on private lands	Consider the creation of grassland bird friendly certification programs. Continue to facilitate research on native forages and grazing for horses, beef, etc. Partner with personnel from local conservation districts and local production organizations (Cattlemen's Association, Soybean Association, etc.)	External Capacity Building	Alliance and Partnership Development	High	Re-Evaluate	65.625	46.875
<i>Centronyx henslowii</i>	Henslow's Sparrow	Improve frequency of prescribed fire on public lands through partnerships	Prioritize partner collaboration with the Kentucky Prescribed Fire Council (KPFC), Kentucky Division of Forestry (KDF), Office of Kentucky Nature Preserves (OKNP), and private contractors to increase the capacity of prescribed fire use on both public lands.	External Capacity Building	Alliance and Partnership Development	High	Proceed	34.375	78.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Centronyx henslowii</i>	Henslow's Sparrow	Educate private landowners and the public on the importance of grassland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass, native grass and other types of grassy habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Promote native grasses for hayfields and livestock grazing. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	High	Re-Evaluate	50	15.625
<i>Centronyx henslowii</i>	Henslow's Sparrow	Incentivize management for grassland birds on private lands	Work through KDFWR's private lands program and the Natural Resource Conservation Service (NRCS) to increase habitat quality and availability on private lands. Utilize federal programs to implement native grass restoration, field borders, prescribed grazing, woody stem removal, delayed haying, and prescribed fire on both working and recreational private lands. Target efforts near to or within the previous Conservation Reserve Enhancement Program (CREP) Area and quail focal areas as designated in KDFWR's 2020 Quail Report. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	50
<i>Centronyx henslowii</i>	Henslow's Sparrow	Train resource managers on proper grassland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	High	Consider	21.875	15.625
<i>Centronyx henslowii</i>	Henslow's Sparrow	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of native grasslands, wet prairies, reclaimed surface mines and unmowed non-native grasslands would be particularly beneficial. Areas near to quail focal areas as designated in KDFWR's 2020 Quail Report should be prioritized to reduce habitat fragmentation. Additional areas near remnant native grasslands in Hardin, Grayson, Warren, Barren counties, as identified by KSNPC (2010) are high priority for protections as well. In addition, areas in Christian, Todd and Logan Counties, which were identified through a model of ecological potential developed by the Central Hardwoods Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long term monitoring.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	78.125
<i>Centronyx henslowii</i>	Henslow's Sparrow	Work with partners to improve quality of grassland habitat on public lands	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	Alliance and Partnership Development	High	Re-Evaluate	96.875	21.875
<i>Centronyx henslowii</i>	Henslow's Sparrow	Increase access to prescribed fire educational opportunities	Host prescribed fire workshops. Invest monetary or in-kind resources for a KPFC training coordinator for statewide logistic support, and partner collaboration aimed at increasing the amount of prescribed fire in the Commonwealth.	Education and Awareness	Education and Awareness- Other	High	Re-Evaluate	96.875	46.875
<i>Centronyx henslowii</i>	Henslow's Sparrow	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Centronyx henslowii</i>	Henslow's Sparrow	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	High	Consider	34.375	15.625
<i>Charadrius melodus</i>	Piping Plover	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Charadrius melodus</i>	Piping Plover	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Charadrius melodus</i>	Piping Plover	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Charadrius melodus</i>	Piping Plover	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125
<i>Charadrius melodus</i>	Piping Plover	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Charadrius melodus</i>	Piping Plover	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Charadrius melodus</i>	Piping Plover	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	37.5
<i>Charadrius melodus</i>	Piping Plover	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Chidonias niger</i>	Black Tern	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Circus hudsonius</i>	Northern Harrier	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via long term easements to ensure resiliency of populations to habitat loss on private lands and climate change. For this species, the protection of grasslands, reclaimed surface mines and open marsh would be particularly beneficial. Areas near to or within Muhlenberg, Hopkins or Ohio County may be more likely to support nesting populations.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	62.5
<i>Circus hudsonius</i>	Northern Harrier	Manage vegetation on public lands to provide nesting habitat for this species	Harriers prefer more recently managed vegetation for foraging, but some grasslands should be left idle each year for nesting habitat. Management for native grasses, including prescribed fire at reclaimed surface mine ground at Peabody WMA will benefit this species, but select areas need to be left unmanaged each year for nesting.	Land/Water Management	Land/Water Management- Other	Moderate	Investigate	68.75	62.5
<i>Circus hudsonius</i>	Northern Harrier	Manage vegetation on public and private lands to provide winter habitat	The species will winter statewide in areas with reclaimed surface mines, native grasslands, and unmowed pasture. Work with public and private lands programs to increase unmowed grassy habitats in winter.	Land/Water Management	Site/Area Management	Moderate	Proceed	6.25	62.5
<i>Cistotheorus stellaris</i>	Sedge Wren	Educate private landowners and the public on the importance of grassland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass, native grass and other types of open habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Promote native grasses for hayfields and livestock grazing. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	50	3.125
<i>Cistotheorus stellaris</i>	Sedge Wren	Improve grassland habitat structure on public lands	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	Alliance and Partnership Development	Moderate	Investigate	65.625	65.625
<i>Cistotheorus stellaris</i>	Sedge Wren	Train resource managers on proper grassland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Cistotheorus stellaris</i>	Sedge Wren	Improve grassland habitat structure on KDFWR WMAs	Work with site manager to improve grassland habitat structure and quality on WMAs.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Cistotheorus stellaris</i>	Sedge Wren	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Incentivize bird-friendly building construction and renovation	Work with tail building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Colinus virginianus</i>	Northern Bobwhite	Acquisition and protection of habitat on public lands through trainings	Acquire high quality suitable habitat under public ownership or protect via long term easements to support populations that may be used as anchors for surrounding private lands work. For this species, the protection of native open lands, reclaimed surface mines and to a lesser extent, well managed non-native grasslands would be particularly beneficial. Areas near quail focal areas as designated in KDFWR's 2020 Quail Report should be prioritized to focus effort near stable populations. Additional areas near remnant native grasslands in Hardin, Grayson, Warren, Barren counties, as identified by KSNPC (2010) are high priority for protection as well. Areas throughout the Commonwealth identified as "High" in the Biologist Ranking Information map by the National Bobwhite and Grassland Initiative are of high priority for acquisition.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Colinus virginianus</i>	Northern Bobwhite	Improve grassland habitat structure on public lands through trainings	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	Moderate	Re-Evaluate	53.125	37.5
<i>Colinus virginianus</i>	Northern Bobwhite	Incentivize management for grassland birds on private lands	Work through KDFWR's private lands program and the Natural Resource Conservation Service (NRCS) to increase habitat quality and availability on private lands. Utilize federal programs to implement native grass restoration, field borders, prescribed grazing, woody stem removal, delayed haying, and prescribed fire on both working and recreational private lands. Target efforts near to or within the previous Conservation Reserve Enhancement Program (CREP) Area and quail focal areas as designated in KDFWR's 2020 Quail Report. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Colinus virginianus</i>	Northern Bobwhite	Educate private landowners and the public on the importance of grassland and shrubland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass, native grass and other types of grassy/shrubby habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Promote native grasses for hayfields and livestock grazing. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Education and Awareness- Other	Moderate	Re-Evaluate	50	6.25
<i>Colinus virginianus</i>	Northern Bobwhite	Improve frequency of prescribed fire on public lands through partnerships	Prioritize partner collaboration with the Kentucky Prescribed Fire Council (KPFC), Kentucky Division of Forestry (KDF), Office of Kentucky Nature Preserves (OKNP), and private contractors to increase the capacity of prescribed fire use on both public lands.	External Capacity Building	Alliance and Partnership Development	Moderate	Proceed	34.375	65.625
<i>Colinus virginianus</i>	Northern Bobwhite	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	Moderate	Consider	6.25	0
<i>Colinus virginianus</i>	Northern Bobwhite	Work with agricultural trade organizations and the agricultural industry to promote grassland bird habitat on private lands	Consider the creation of grassland bird friendly certification programs. Continue to facilitate research on native forages and grazing for horses, beef, etc. Partner with personnel from local conservation districts and local production organizations (Cattlemen's Association, Soybean Association, etc.).	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	65.625	37.5
<i>Colinus virginianus</i>	Northern Bobwhite	Increase access to prescribed fire educational opportunities	Host prescribed fire workshops. Invest monetary or in-kind resources for a KPFC training coordinator for statewide logistic support, and partner collaboration aimed at increasing the amount of prescribed fire in the Commonwealth.	Education and Awareness	Education and Awareness- Other	Moderate	Re-Evaluate	96.875	34.375
<i>Colinus virginianus</i>	Northern Bobwhite	Improve grassland habitat structure on public lands through partnerships and alliances	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	Alliance and Partnership Development	Moderate	Investigate	65.625	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Corvus corax</i>	Common Raven	Protect known nest sites	Work with mining companies and public agencies to avoid disturbance and destruction of known nest sites.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	0
<i>Cygnus buccinator</i>	Trumpeter Swan	Evaluate or support potential policy changes to reduce lead exposure	Support policy changes that would require the use of non-lead metals in hunting and fishing.	Law and Policy	Policies and Regulations	Moderate	Proceed	21.875	62.5
<i>Cygnus buccinator</i>	Trumpeter Swan	Raise public awareness about the dangers of using lead-based hunting and fishing equipment	Create and implement educational programs about the effects of lead exposure in waterfowl from fishing tackle and how sportsmen and women can help reduce risk of secondary exposure.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	37.5	0
<i>Dolichonyx oryzivorus</i>	Bobolink	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Dolichonyx oryzivorus</i>	Bobolink	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	Moderate	Consider	6.25	0
<i>Dolichonyx oryzivorus</i>	Bobolink	Work with agricultural trade organizations and the agricultural industry to promote grassland bird habitat on private lands	Consider the creation of grassland bird friendly certification programs. Continue to facilitate research on native forages and grazing for horses, beef, etc. Partner with personnel from local conservation districts and local production organizations (Cattlemen's Association, Soybean Association, etc.)	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	65.625	34.375
<i>Dolichonyx oryzivorus</i>	Bobolink	Educate private landowners and the public on the importance of grassland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass and other types of grassy/shrubby habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	50	3.125
<i>Dolichonyx oryzivorus</i>	Bobolink	Incentivize management for grassland birds on private lands	Work through KDFWR's private lands program and the Natural Resource Conservation Service (NRCS) to increase habitat quality and availability on private lands. Utilize federal programs to implement field borders, prescribed grazing, woody stem removal, and delayed haying on both working and recreational private lands. Target efforts within the inner bluegrass (nesting range) or statewide (migratory range). Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Dolichonyx oryzivorus</i>	Bobolink	Train resource managers on proper grassland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Dolichonyx oryzivorus</i>	Bobolink	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of open lands within the Inner Bluegrass region would be particularly beneficial. When utilizing permanent easements, ensure a commitment to the completion of long term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	65.625
<i>Dolichonyx oryzivorus</i>	Bobolink	Work with partners to improve quality of grassland habitat on public lands	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	96.875	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Dryobates borealis</i>	Red-cockaded Woodpecker	Restore open pine habitat within the historic range of this species	Coordinate with state and federal biologists and foresters to look for opportunities for open pine habitat restoration within the historic range of this species (western Cumberland Plateau).	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	34.375
<i>Empidonax minimus</i>	Least Flycatcher	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Empidonax minimus</i>	Least Flycatcher	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Empidonax minimus</i>	Least Flycatcher	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25
<i>Empidonax minimus</i>	Least Flycatcher	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Empidonax traillii</i>	Willow Flycatcher	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Empidonax traillii</i>	Willow Flycatcher	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	Moderate	Consider	6.25	0
<i>Empidonax traillii</i>	Willow Flycatcher	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Empidonax traillii</i>	Willow Flycatcher	Educate private landowners and the public on the importance of shrubland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, shrubs near ponds, riparian buffers and other types of shrubby habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Promote native shrubs. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	50	0
<i>Empidonax traillii</i>	Willow Flycatcher	Improve shrubland habitat structure on public lands	Engage with local county and municipal parks, universities, etc. to improve shrubland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	External Capacity Building- Other	Moderate	Investigate	65.625	62.5
<i>Empidonax traillii</i>	Willow Flycatcher	Train resource managers on proper shrubland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shrubland birds and best management practices through workshops and regular communications.	Education and Awareness	Training	Moderate	Consider	21.875	0

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Empidonax traillii</i>	Willow Flycatcher	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25
<i>Empidonax traillii</i>	Willow Flycatcher	Improve shrubland habitat structure on KDFWR Wildlife Management Areas.	Work with site manager to improve shrubland habitat structure and quality on WMAs.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	62.5
<i>Empidonax traillii</i>	Willow Flycatcher	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Euphagus carolinus</i>	Rusty Blackbird	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Euphagus carolinus</i>	Rusty Blackbird	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to offset habitat fragmentation and loss on private lands. For this species, the protection of bottomland hardwood forest and forest near sloughs and major rivers would be particularly beneficial. Forested areas near to Sloughs Wildlife Management Area (WMA), Ballard WMA, Doug Travis WMA, Obion Creek WMA, Green River State Forest and Bottomland Forest in Hopkins and Mühlenberg County should be prioritized. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	65.625
<i>Euphagus carolinus</i>	Rusty Blackbird	Improve habitat quality in bottomland hardwood and riparian forests	Promote oak regeneration with a focus on small mast species. Plant shrubs along field/bottomland forest edges which include fall berry producing species (e.g. dogwoods, viburnum, swamp holly).	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Euphagus carolinus</i>	Rusty Blackbird	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Falco peregrinus</i>	Peregrine Falcon	Reduce human disturbance on nesting peregrine falcons	Work with facility and building managers to prevent disturbance of nesting falcons.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	0
<i>Falco peregrinus</i>	Peregrine Falcon	Evaluate or support potential policy changes to reduce lead exposure in raptors	Evaluate the feasibility of policies to reduce the amount of lead in the environment, including the implementation of Best Management Practices for KDFWR-owned outdoor shooting ranges.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Falco peregrinus</i>	Peregrine Falcon	Public outreach and communication	Raise public awareness of disease symptoms, reporting, and best management practices to reduce disease transmission.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	0
<i>Falco peregrinus</i>	Peregrine Falcon	Reduce fishing line entanglement and lead exposure	Launch educational campaign on the importance of reducing lead exposure and fishing line entanglement. Provide signage and fishing line recycling receptacles at public areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	68.75	0
<i>Falco sparverius</i>	American Kestrel	Create and preserve cavities for nesting	This species requires cavities for nesting. Work with public and private lands programs to increase the availability of nest boxes.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Investigate	53.125	65.625
<i>Falco sparverius</i>	American Kestrel	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of native grasslands, wet prairies, reclaimed surface mines and unmowed non-native grasslands would be particularly beneficial. Areas near to quail focal areas as designated in KDFWR's 2020 Quail Report should be prioritized to reduce habitat fragmentation. Additional areas near remnant native grasslands in Hardin, Grayson, Warren, Barren counties, as identified by KSNPC (2010) are high priority for protections as well. In addition, areas in Christian, Todd and Logan Counties, which were identified through a model of ecological potential developed by the Central Hardwoods Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	62.5
<i>Falco sparverius</i>	American Kestrel	Educate the public on the effects of secondary rodenticide exposure	Create and implement an educational campaign on the effects of secondary rodenticide exposure in this and other species.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	0

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Falco sparverius</i>	American Kestrel	Incentivize management for grassland birds on private lands	Work through KDFWR's private lands program and the Natural Resource Conservation Service (NRCS) to increase habitat quality and availability on private lands. Utilize federal programs to implement native grass restoration, field borders, prescribed grazing, woody stem removal, delayed haying, and prescribed fire on both working and recreational private lands. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	31.25
<i>Falco sparverius</i>	American Kestrel	Educate private landowners and the public on the importance of grassland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass, native grass and other types of grassy/shrubby habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	50	0
<i>Falco sparverius</i>	American Kestrel	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Falco sparverius</i>	American Kestrel	Develop grassland training opportunities	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	Moderate	Investigate	53.125	62.5
<i>Falco sparverius</i>	American Kestrel	Work with partners to improve quality of grassland habitat on public lands	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	96.875	0
<i>Gallinago delicata</i>	Wilson's Snipe	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	65.625
<i>Gallinago delicata</i>	Wilson's Snipe	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Gallinago delicata</i>	Wilson's Snipe	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Gallinago delicata</i>	Wilson's Snipe	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125
<i>Gallinago delicata</i>	Wilson's Snipe	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Gallinago delicata</i>	Wilson's Snipe	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Gallinago delicata</i>	Wilson's Snipe	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Gallinago delicata</i>	Wilson's Snipe	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Geothlypis formosa</i>	Kentucky Warbler	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Geothlypis formosa</i>	Kentucky Warbler	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Geothlypis formosa</i>	Kentucky Warbler	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Geothlypis formosa</i>	Kentucky Warbler	Work with forest industries and large industrial private landowners to promote sustainable forestry	Promote participation in the Sustainable Forestry Initiative, The White Oak Initiative, and the Kentucky Forest Stewardship Program. Hold workshops to train foresters on the habitat needs of forest birds and sustainable forestry in general. Collaborate with the Kentucky Division of Forestry and conservation organizations to better engage with this group.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	18.75	0
<i>Geothlypis formosa</i>	Kentucky Warbler	Facilitate habitat management for this species on state and federal lands such as the Daniel Boone National Forest (DBNF) and Land Between the Lakes NRA.	Coordinate with state and federal biologists and foresters to ensure management needs are incorporated into forest management prescriptions.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Consider	34.375	31.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Geothlypis formosa</i>	Kentucky Warbler	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat fragmentation and loss on private lands. For this species, the protection of mature forest with a diverse structure would be particularly beneficial. Forested areas near to Mammoth Cave National Park, Land Between the Lakes NRA, and Daniel Boone National Forest should be prioritized. In addition, areas within the Cumberland Focal Landscape as designated by the Appalachian Mountains Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	62.5
<i>Geothlypis formosa</i>	Kentucky Warbler	Manage invasive species in forested areas to avoid further habitat degradation	Work through KDFWR's private lands program to manage invasive species on private lands. Utilize Environmental Quality Incentives Program (EQIP) contracts with NRCS, to manage kudzu, bush honeysuckle, winter creeper, etc. Work with KDFWR's public lands program and federal agencies to manage invasive species on public lands.	Land/Water Management	Invasive/Problematic Species Control	Moderate	Re-Evaluate	100	31.25
<i>Geothlypis formosa</i>	Kentucky Warbler	Train resource managers on proper forest management techniques	Train staff from state and federal natural resource agencies on the habitat needs of forest birds and best management practices through workshops and regular communications.	Education and Awareness	Training	Moderate	Consider	21.875	0
<i>Geothlypis formosa</i>	Kentucky Warbler	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25
<i>Geothlypis formosa</i>	Kentucky Warbler	Manage invasive species in forested areas through trainings	Hold workshops with land managers to discuss techniques for invasive plant eradication.	Education and Awareness	Training	Moderate	Consider	21.875	0
<i>Geothlypis formosa</i>	Kentucky Warbler	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Grus americana</i>	Whooping Crane	Reduce Powerline Electrocutions	Work with utility companies and private lands programs to encourage increased implementation of guidance set forth by the Avian Power Line Interaction Committee. Encourage better tracking of mortalities within the state and US.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Grus americana</i>	Whooping Crane	Hunter education	Develop and implement hunter education courses and material to aid in positive identification of whooping cranes vs. game species.	Education and Awareness	Training	Moderate	Consider	6.25	0
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Reduce powerline electrocutions	Work with utility companies, KDFWR enforcement and private lands programs to encourage increased implementation of guidance set forth by the Avian Power Line Interaction Committee.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Reduce nest disturbance	Work with private landowners, KDFWR enforcement and private lands programs to encourage increased implementation of guidance set forth by the National Bald Eagle Management Guidelines.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	31.25
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via long term easements to ensure resiliency of populations to habitat loss on private lands and climate change. For this species, the protection of river islands, oxbow lakes near major rivers and bottomland hardwood forest would be particularly beneficial.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	62.5
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Evaluate or support potential policy changes to reduce lead exposure in raptors	Evaluate the feasibility of policies to reduce the amount of lead in the environment, including the implementation of Best Management Practices for KDFWR-owned outdoor shooting ranges.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Reduce fishing line entanglement and lead exposure	Launch educational campaign on the importance of reducing lead exposure and fishing line entanglement. Provide signage and fishing line recycling receptacles at public areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	68.75	0
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Public outreach and communication	Raise public awareness of disease symptoms, reporting, and best management practices to reduce disease transmission.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	0

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Hylocichla mustelina</i>	Wood Thrush	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	High	Re-Evaluate	93.75	46.875
<i>Hylocichla mustelina</i>	Wood Thrush	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFW's Environmental Program.	Education and Awareness	Awareness and Communications	High	Consider	37.5	15.625
<i>Hylocichla mustelina</i>	Wood Thrush	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	High	Consider	37.5	15.625
<i>Hylocichla mustelina</i>	Wood Thrush	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	High	Consider	6.25	15.625
<i>Hylocichla mustelina</i>	Wood Thrush	Work with forest industries and large industrial private landowners to promote sustainable forestry	Promote participation in the Sustainable Forestry Initiative, The White Oak Initiative, and the Kentucky Forest Stewardship Program. Hold workshops to train foresters on the habitat needs of forest birds and sustainable forestry in general. Collaborate with the Kentucky Division of Forestry and conservation organizations to better engage with this group.	Education and Awareness	Education and Awareness- Other	High	Consider	18.75	15.625
<i>Hylocichla mustelina</i>	Wood Thrush	Facilitate habitat management for this species on state and federal lands such as the Daniel Boone National Forest (DBNF) and Land Between the Lakes NRA.	Coordinate with state and federal biologists and foresters to ensure management needs are incorporated into forest management prescriptions.	Land/Water Management	Habitat and Natural Process Restoration	High	Consider	34.375	46.875
<i>Hylocichla mustelina</i>	Wood Thrush	Train resource managers on proper forest management techniques	Train staff from state and federal natural resource agencies on the habitat needs of forest birds and best management practices through workshops and regular communications.	Education and Awareness	Training	High	Consider	21.875	15.625
<i>Hylocichla mustelina</i>	Wood Thrush	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Re-Evaluate	100	46.875
<i>Hylocichla mustelina</i>	Wood Thrush	Aquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat fragmentation and loss on private lands. For this species, the protection of mature forest with a diverse structure would be particularly beneficial. Forested areas near to Mammoth Cave National Park, Ballard Wildlife Management Area, Daniel Boone National Forest should be prioritized. In addition, areas within the Cumberlands Focal Landscape as designated by the Appalachian Mountains Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	78.125
<i>Hylocichla mustelina</i>	Wood Thrush	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Ixobrychus exilis</i>	Least Bittern	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements. For this species, the protection of emergent marshes dominated by herbaceous aquatic vegetation would be particularly beneficial. Areas near to or within the Highland Rim and Shawnee Hills (Green River region), especially those near Sloughs WMA, Green River Lake WMA, and in Muhlenberg, Hopkins and Ohio County should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for marshbird species.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	81.25
<i>Ixobrychus exilis</i>	Least Bittern	Train resource managers on proper wetland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of marshbirds and best management practices through workshops and regular communications.	Education and Awareness	Training	High	Consider	21.875	18.75
<i>Ixobrychus exilis</i>	Least Bittern	Incentivize management for marshbird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts near to or within the Highland Rim and Shawnee Hills (Green River region). Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	53.125
<i>Ixobrychus exilis</i>	Least Bittern	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	High	Consider	21.875	46.875
<i>Ixobrychus exilis</i>	Least Bittern	Educate private landowners and the public on the importance of wetland habitat	Launch educational campaigns to promote the importance of wetland habitat. Create and promote demonstration areas on public lands.	Education and Awareness	Awareness and Communications	High	Re-Evaluate	81.25	18.75
<i>Ixobrychus exilis</i>	Least Bittern	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	3.125	18.75
<i>Ixobrychus exilis</i>	Least Bittern	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	81.25
<i>Ixobrychus exilis</i>	Least Bittern	Collaborate with partners to improve habitat availability on public lands	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve marshbird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	High	Proceed	21.875	50
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	High	Consider	6.25	15.625
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Educate private landowners and the public on the importance of grassland and shrubland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass, native grass and other types of grassy/shrubby habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	High	Re-Evaluate	50	18.75
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	High	Proceed	21.875	50

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGON.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Limnodromus griseus</i>	Short-billed Dowitcher	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Limnithyris swainsonii</i>	Swainson's Warbler	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers (https://fws.gov/media/recommended-best-practices-communication-tower-design-signing-construction-operation) through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	High	Consider	37.5	15.625
<i>Limnithyris swainsonii</i>	Swainson's Warbler	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	High	Consider	37.5	15.625

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Limnothlypis swainsonii</i>	Swainson's Warbler	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	High	Re-Evaluate	93.75	46.875
<i>Limnothlypis swainsonii</i>	Swainson's Warbler	Facilitate habitat management for this species on state lands.	Conduct and support management that promotes maintenance and expansion of dense understory habitats including Giant Cane.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Limnothlypis swainsonii</i>	Swainson's Warbler	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat fragmentation and loss on private lands. For this species, the protection of forest with a diverse structure, including rhododendron or other dense understories would be particularly beneficial. Forested areas near to Daniel Boone National Forest should be prioritized. In addition, areas within the Cumberland Focal Landscape as designated by the Appalachian Mountains Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	78.125
<i>Limnothlypis swainsonii</i>	Swainson's Warbler	Train resource managers on proper forest management techniques	Train staff from state and federal natural resource agencies on the habitat needs of this species and best management practices through workshops and regular communications.	Education and Awareness	Training	High	Consider	21.875	18.75
<i>Limnothlypis swainsonii</i>	Swainson's Warbler	Incentivize bird-friendly building construction and renovation	Work with tail building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Re-Evaluate	100	46.875
<i>Limnothlypis swainsonii</i>	Swainson's Warbler	Facilitate habitat management for this species on federal lands including Daniel Boone National Forest (DBNF) and Land Between the Lakes NRA.	Coordinate federal biologists and foresters to ensure management needs are incorporated into forest management prescriptions. Conduct and support management that promotes maintenance and expansion of dense understory habitats including Giant Cane.	External Capacity Building	Alliance and Partnership Development	High	Proceed	21.875	50
<i>Limnothlypis swainsonii</i>	Swainson's Warbler	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGON habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Facilitate habitat management for this species on state and federal lands	Coordinate with state and federal biologists and foresters to ensure open woodlands and open pine forest are incorporated into forest management prescriptions.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Consider	34.375	31.25
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Improve frequency of prescribed fire on public lands through partnerships	Prioritize partner collaboration with the Kentucky Prescribed Fire Council (KPFC), Kentucky Division of Forestry (KDF), Office of Kentucky Nature Preserves (OKNP), and private contractors to increase the capacity of prescribed fire use on both public lands.	External Capacity Building	Alliance and Partnership Development	Moderate	Proceed	34.375	62.5
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Train resource managers on proper woodland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of woodland and open pine birds and best management practices through workshops and regular communications.	Education and Awareness	Training	Moderate	Consider	21.875	0
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Increase access to prescribed fire educational opportunities	Host prescribed fire workshops. Invest monetary or in-kind resources for a KPFC training coordinator for statewide logistic support, and partner collaboration aimed at increasing the amount of prescribed fire in the Commonwealth.	Education and Awareness	Education and Awareness- Other	Moderate	Re-Evaluate	96.875	31.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	Acquisition and protection of habitat	Acquire nesting habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of riparian forest where rookeries are known to occur would be particularly beneficial. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for this species.	Land/Water Protection	Site/Area Protection	High	Investigate	96.875	81.25
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGON habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	3.125	18.75
<i>Nyctanassa violacea</i>	Yellow-crowned Night-heron	Raise public awareness about nest disturbance	Improve public understanding about harm of disturbing rookeries.	Education and Awareness	Education and Awareness- Other	High	Consider	6.25	15.625
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Acquisition and protection of habitat	Acquire nesting habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of riparian forest where rookeries are known to occur would be particularly beneficial. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for this species.	Land/Water Protection	Site/Area Protection	Moderate	Investigate	96.875	68.75
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGON habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	3.125	3.125
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Raise public awareness about nest disturbance	Improve public understanding about harm of disturbing rookeries.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	6.25	0
<i>Pandion haliaetus</i>	Osprey	Reduce fishing line entanglement and lead exposure	Launch educational campaign on the importance of reducing lead exposure and fishing line entanglement. Provide signage and fishing line recycling receptacles at public areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	68.75	0
<i>Pandion haliaetus</i>	Osprey	Manage conflicts with utility and communications infrastructure	Work with utility companies, KDFWR enforcement and private lands programs to encourage increased implementation of guidance set forth by KDFWR's "Guide to Managing Ospreys in Kentucky" and the Avian Power Line Interaction Committee.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	0
<i>Pandion haliaetus</i>	Osprey	Evaluate or support potential policy changes to reduce lead exposure in raptors	Evaluate the feasibility of policies to reduce the amount of lead in the environment, including the implementation of Best Management Practices for KDFWR-owned outdoor shooting ranges.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to offset habitat fragmentation and loss on private lands. For this species, the protection of bottomland hardwood forest and riparian forest would be particularly beneficial. Forested areas near to the Licking River, the Barren River and near to Mammoth Cave National Park should be prioritized. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Work with forest industries and large industrial private landowners to promote sustainable forestry	Promote participation in the Sustainable Forestry Initiative, The White Oak Initiative, and the Kentucky Forest Stewardship Program. Hold workshops to train foresters on the habitat needs of forest birds and sustainable forestry in general. Collaborate with the Kentucky Division of Forestry and conservation organizations to better engage with this group.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	18.75	3.125
<i>Parkesia motacilla</i>	Louisiana Waterthrush	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	Moderate	Consider	6.25	0
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Educate private landowners and the public on the importance of grassland and shrubland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass, native grass and other types of grassy/shrubby habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping and emphasizing need for habitat during fall and winter in addition to breeding habitat. Create and promote demonstration areas on public areas. Collaborate with the University of Kentucky Cooperative Extension Service and the Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	50	3.125
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Work with agricultural trade organizations and the agricultural industry to promote grassland bird habitat on private lands	Consider the creation of grassland bird friendly certification programs. Continue to facilitate research on native forages and grazing for horses, beef, etc. Hold workshops to train producers and growers on bird-friendly management actions compatible with working lands. Partner with personnel from local conservation districts and local production organizations (Cattlemen's Association, Soybean Association, etc.)	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	65.625	34.375
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Incentivize management for grassland birds on private lands	Work through KDFWR's private lands program and the Natural Resource Conservation Service (NRCS) to increase habitat quality and availability on private lands. Utilize federal programs to implement native grass restoration (short species), field borders, prescribed grazing, woody stem removal, delayed haying, and prescribed fire on both working and recreational private lands. Target efforts within the inner bluegrass region for this species (nesting range) or statewide for migration range. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Train resource managers on proper grassland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	3.125
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Work with partners to improve quality of grassland habitat on public lands	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	96.875	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Peuceea aestivalls</i>	Bachman's Sparrow	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations. Grassland and open pine areas near to Fort Campbell in Trigg and Christian Counties should be prioritized to reduce habitat fragmentation. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring.	Land/Water Protection	Site/Area Protection	Highest	Investigate	96.875	93.75
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGON.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGON habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Pluvialis dominica</i>	American Golden-plover	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Pluvialis dominica</i>	American Golden-plover	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands. Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	External Capacity Building- Other	Moderate	Investigate	96.875	65.625

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Pluvialis dominica</i>	American Golden-plover	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Pluvialis dominica</i>	American Golden-plover	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125
<i>Pluvialis dominica</i>	American Golden-plover	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds aim to curb threats. Efforts include the acquisition and protection of lands used as migratory pathways and nonbreeding sites and the education of landowners on regenerative agricultural and ranching practices.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Pluvialis dominica</i>	American Golden-plover	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Pluvialis dominica</i>	American Golden-plover	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Pluvialis dominica</i>	American Golden-plover	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Pluvialis squatarola</i>	Black-bellied Plover	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Pluvialis squatarola</i>	Black-bellied Plover	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Pluvialis squatarola</i>	Black-bellied Plover	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Pluvialis squatarola</i>	Black-bellied Plover	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125
<i>Pluvialis squatarola</i>	Black-bellied Plover	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds aim to curb threats. Efforts include the acquisition and protection of lands used as migratory pathways and nonbreeding sites and the education of landowners on regenerative agricultural and ranching practices.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	34.375
<i>Pluvialis squatarola</i>	Black-bellied Plover	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Pluvialis squatarola</i>	Black-bellied Plover	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Pluvialis squatarola</i>	Black-bellied Plover	Collaborate with partners on proper habitat management	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Pluvialis squatarola</i>	Black-bellied Plover	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Podiceps auritus</i>	Horned Grebe	Raise awareness of the importance and diversity of birds in Kentucky	Inform citizens of the impacts recreational activities can have on birds and provide suitable alternatives.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	0
<i>Podiceps auritus</i>	Horned Grebe	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide nesting habitat. For this species, the protection of emergent marshes dominated by herbaceous aquatic vegetation would be particularly beneficial. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for wetland species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	65.625
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Raise awareness of the importance and diversity of birds in Kentucky	Inform citizens of the impacts recreational activities can have on birds and provide suitable alternatives.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	0
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Porzana carolina</i>	Sora	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements. For this species, the protection of emergent marshes dominated by herbaceous aquatic vegetation would be particularly beneficial. Areas near to or within the Highland Rim and Shawnee Hills (Green River region), especially those near Sloughs WMA, Green River Lake WMA, and in Muhlenberg, Hopkins and Ohio County should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for marshbird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Porzana carolina</i>	Sora	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	68.75
<i>Porzana carolina</i>	Sora	Incentivize management for marshbird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts near to or within the Highland Rim and Shawnee Hills (Green River region). Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Porzana carolina</i>	Sora	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Porzana carolina</i>	Sora	Educate private landowners and the public on the importance of wetland habitat	Launch educational campaigns to promote the importance of wetland habitat. Create and promote demonstration areas on public lands.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	81.25	3.125
<i>Porzana carolina</i>	Sora	Train resource managers on proper wetland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of marshbirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for this and other marshbird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Porzana carolina</i>	Sora	Collaborate with partners on proper wetland management for marshbird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve marshbird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	37.5
<i>Porzana carolina</i>	Sora	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Protonotaria citrea</i>	Prothonotary Warbler	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	High	Re-Evaluate	93.75	46.875

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Protonotaria citrea</i>	Prothonotary Warbler	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	High	Consider	37.5	15.625
<i>Protonotaria citrea</i>	Prothonotary Warbler	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	High	Consider	37.5	15.625
<i>Protonotaria citrea</i>	Prothonotary Warbler	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to offset habitat fragmentation and loss on private lands. For this species, the protection of bottomland hardwood forest riparian forest and forest near sloughs would be particularly beneficial. Forested areas near to Sloughs Wildlife Management Area (WMA), Ballard WMA, Doug Travis WMA, Obion Creek WMA, and near the Green River should be prioritized. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	81.25
<i>Protonotaria citrea</i>	Prothonotary Warbler	Provide artificial nesting structures where appropriate	Provide artificial nesting structures for this species, when needed due to limited nest sites in suitable habitat.	Species Management	Species Management	High	Proceed	21.875	78.125
<i>Protonotaria citrea</i>	Prothonotary Warbler	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Re-Evaluate	100	46.875
<i>Protonotaria citrea</i>	Prothonotary Warbler	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Rallus elegans</i>	King Rail	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements. For this species, the protection of emergent marshes dominated by herbaceous aquatic vegetation would be particularly beneficial. Areas near to or within the Highland Rim and Shawnee Hills (Green River region), especially those near Sloughs WMA, Green River Lake WMA, and in Muhlenberg, Hopkins and Ohio County should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for marshbird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Rallus elegans</i>	King Rail	Improve habitat availability on public lands	Utilize internal and external partnerships to manage and restore wetlands.	External Capacity Building	Alliance and Partnership Development	Moderate	Investigate	96.875	68.75
<i>Rallus elegans</i>	King Rail	Incentivize management for marshbird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts near to or within the Highland Rim and Shawnee Hills (Green River region). Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Rallus elegans</i>	King Rail	Educate private landowners and the public on the importance of wetland habitat	Launch educational campaigns to promote the importance of wetland habitat. Create and promote demonstration areas on public lands.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	81.25	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Rallus elegans</i>	King Rail	Train resource managers on proper wetland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of marshbirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for this and other marshbird SGCN. Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Rallus elegans</i>	King Rail	Collaborate with partners on proper wetland management for marshbird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve marshbird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	37.5
<i>Rallus elegans</i>	King Rail	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Rallus limicola</i>	Virginia Rail	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements. For this species, the protection of emergent marshes dominated by herbaceous aquatic vegetation would be particularly beneficial. Areas near to or within the Highland Rim and Shawnee Hills (Green River region), especially those near Sloughs WMA, Green River Lake WMA, and in Muhlenberg, Hopkins and Ohio County should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for marshbird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Rallus limicola</i>	Virginia Rail	Improve habitat availability on public lands	Work with internal and external partners to manage and restore wetlands.	External Capacity Building	Alliance and Partnership Development	Moderate	Investigate	96.875	68.75
<i>Rallus limicola</i>	Virginia Rail	Incentivize management for marshbird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts near to or within the Highland Rim and Shawnee Hills (Green River region). Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Rallus limicola</i>	Virginia Rail	Educate private landowners and the public on the importance of wetland habitat	Launch educational campaigns to promote the importance of wetland habitat. Create and promote demonstration areas on public lands.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	81.25	3.125
<i>Rallus limicola</i>	Virginia Rail	Collaborate with partners on proper wetland management for marshbird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve marshbird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	37.5
<i>Rallus limicola</i>	Virginia Rail	Train internal and external partners on proper wetland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of marshbirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for this and other marshbird SGCN.	Education and Awareness	Training	Moderate	Proceed	37.5	68.75
<i>Rallus limicola</i>	Virginia Rail	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Riparia riparia</i>	Bank Swallow	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Riparia riparia</i>	Bank Swallow	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Scolopax minor</i>	American Woodcock	Improve habitat availability on public lands	Train staff from state and federal natural resource agencies on the habitat needs of this species and best management practices through workshops and regular communications.	Education and Awareness	Education and Awareness- Other	Moderate	Re-Evaluate	53.125	34.375
<i>Scolopax minor</i>	American Woodcock	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Setophaga cerulea</i>	Cerulean Warbler	Facilitate habitat management for this species on state and federal lands such as the Daniel Boone National Forest (DBNF) and Land Between the Lakes NRA	Coordinate with state and federal biologists and foresters to ensure management needs are incorporated into forest management prescriptions.	Land/Water Management	Habitat and Natural Process Restoration	High	Consider	34.375	46.875
<i>Setophaga cerulea</i>	Cerulean Warbler	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	High	Re-Evaluate	93.75	46.875
<i>Setophaga cerulea</i>	Cerulean Warbler	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	High	Consider	37.5	15.625
<i>Setophaga cerulea</i>	Cerulean Warbler	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDEWR's Environmental Program.	Education and Awareness	Awareness and Communications	High	Consider	37.5	15.625
<i>Setophaga cerulea</i>	Cerulean Warbler	Work with forest industries and large industrial private landowners to promote sustainable forestry	Promote participation in the Sustainable Forestry Initiative, The White Oak Initiative, and the Kentucky Forest Stewardship Program. Hold workshops to train foresters on the habitat needs of forest birds and sustainable forestry in general. Collaborate with the Kentucky Division of Forestry and conservation organizations to better engage with this group.	Education and Awareness	Education and Awareness- Other	High	Consider	18.75	15.625
<i>Setophaga cerulea</i>	Cerulean Warbler	Educate the public on the benefits of diverse forest structure	Create or revamp educational campaigns to educate the public about the benefits of forest management and the importance of a diverse forest structure, including mature forest, early successional forest and open woodlands. Create and promote demonstration areas on public areas.	Education and Awareness	Awareness and Communications	High	Re-Evaluate	65.625	15.625

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Setophaga cerulea</i>	Cerulean Warbler	Manage invasive species in forested areas to avoid further habitat degradation	Work through KDFWR's private lands program to manage invasive species on private lands. Utilize Environmental Quality Incentives Program (EQIP) contracts with NRCS, to manage kudzu, bush honeysuckle, winter creeper, etc. Work with KDFWR's public lands program and federal agencies to manage invasive species on public lands.	Land/Water Management	Invasive/Problematic Species Control	High	Re-Evaluate	100	46.875
<i>Setophaga cerulea</i>	Cerulean Warbler	Incentivize management for diverse forest structure on private lands	Work through KDFWR's private lands program to increase habitat quality and availability on private lands. Utilize Environmental Quality Incentives Program (EQIP) contracts with NRCS. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Re-Evaluate	96.875	46.875
<i>Setophaga cerulea</i>	Cerulean Warbler	Train resource managers on proper forest management techniques	Train staff from state and federal natural resource agencies on the habitat needs of forest birds and best management practices through workshops and regular communications.	Education and Awareness	Training	High	Consider	21.875	15.625
<i>Setophaga cerulea</i>	Cerulean Warbler	Incentivize bird-friendly building construction and renovation	Work with tail building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Re-Evaluate	100	46.875
<i>Setophaga cerulea</i>	Cerulean Warbler	Manage invasive species in forested areas	Hold workshops with land managers to discuss techniques for invasive plant eradication.	Education and Awareness	Training	High	Consider	21.875	15.625
<i>Setophaga cerulea</i>	Cerulean Warbler	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Setophaga discolor</i>	Prairie Warbler	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Setophaga discolor</i>	Prairie Warbler	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Setophaga discolor</i>	Prairie Warbler	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Setophaga discolor</i>	Prairie Warbler	Facilitate habitat management for this species on state and federal lands such as the Daniel Boone National Forest (DBNF) and Land Between the Lakes NRA.	Coordinate with state and federal biologists and foresters to ensure open woodlands and shrublands are incorporated into management prescriptions. Engage with local county and municipal parks, universities, etc. to improve shrubland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Consider	34.375	31.25
<i>Setophaga discolor</i>	Prairie Warbler	Educate private landowners and the public on the importance of shrubland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, riparian buffers and other types of shrubby habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Promote native shrubs. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	50	0

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Setophaga discolor</i>	Prairie Warbler	Train resource managers on proper shrubland and woodland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of woodland/shrubland birds and best management practices through workshops and regular communications.	Education and Awareness	Training	Moderate	Consider	21.875	0
<i>Setophaga discolor</i>	Prairie Warbler	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25
<i>Setophaga discolor</i>	Prairie Warbler	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGON habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Setophaga striata</i>	Blackpoll Warbler	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Setophaga striata</i>	Blackpoll Warbler	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Setophaga striata</i>	Blackpoll Warbler	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Setophaga striata</i>	Blackpoll Warbler	Work with partners to educate the public on the importance of stopover habitat including patches in urban areas	Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes within parks. Restore shrubland and forest habitat in and near urban areas and promote select locations as demonstration areas.	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	96.875	0
<i>Setophaga striata</i>	Blackpoll Warbler	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25
<i>Setophaga striata</i>	Blackpoll Warbler	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGON habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Setophaga tigrina</i>	Cape May Warbler	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Setophaga tigrina</i>	Cape May Warbler	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Setophaga tigrina</i>	Cape May Warbler	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Setophaga tigrina</i>	Cape May Warbler	Work with partners to educate the public on the importance of stopover habitat including patches in urban areas	Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes within parks. Restore shrubland and forest habitat in and near urban areas and promote select locations as demonstration areas.	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	96.875	0
<i>Setophaga tigrina</i>	Cape May Warbler	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25
<i>Setophaga tigrina</i>	Cape May Warbler	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Setophaga virens</i>	Black-throated Green Warbler	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Setophaga virens</i>	Black-throated Green Warbler	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Setophaga virens</i>	Black-throated Green Warbler	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Setophaga virens</i>	Black-throated Green Warbler	Manage Tree Loss due to Hemlock Woolly Adelgid	Support continued chemical and biological treatment of Eastern Hemlocks on WMAs and at broader landscape extent to control Hemlock Woolly Adelgid and maintain populations of healthy hemlock trees.	Land/Water Management	Invasive/Problematic Species Control	Moderate	Re-Evaluate	100	31.25
<i>Setophaga virens</i>	Black-throated Green Warbler	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Spiza americana</i>	Dickcissel	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of native grasslands, reclaimed surface mines and unmowed non-native grasslands would be particularly beneficial. Areas near to quail focal areas as designated in KDFWR's 2020 Quail Report should be prioritized to reduce habitat fragmentation. Additional areas near remnant native grasslands in Hardin, Grayson, Warren, Barren counties, as identified by KSNPC (2010) are high priority for protections as well. In addition, areas in Christian, Todd and Logan Counties, which were identified through a model of ecological potential developed by the Central Hardwoods Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	65.625
<i>Spiza americana</i>	Dickcissel	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	Moderate	Consider	6.25	0
<i>Spiza americana</i>	Dickcissel	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Spiza americana</i>	Dickcissel	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Spiza americana</i>	Dickcissel	Train resource managers on proper grassland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Spiza americana</i>	Dickcissel	Incentivize management for grassland birds on private lands	Work through KDFWR's private lands program and the Natural Resource Conservation Service (NRCS) to increase habitat quality and availability on private lands. Utilize federal programs to implement native grass restoration, field borders, prescribed grazing, woody stem removal, delayed haying, and prescribed fire on both working and recreational private lands. Target efforts near to or within the previous Conservation Reserve Enhancement Program (CREP) Area and quail focal areas as designated in KDFWR's 2020 Quail Report. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Spiza americana</i>	Dickcissel	Educate private landowners and the public on the importance of grassland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass, native grass and other types of grassy/shrubby habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Promote native grasses for hayfields and livestock grazing. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	50	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Spiza americana</i>	Dickcissel	Improve frequency of prescribed fire on public lands through partnerships	Prioritize partner collaboration with the Kentucky Prescribed Fire Council (KPFC), Kentucky Division of Forestry (KDF), Office of Kentucky Nature Preserves (OKNP), and private contractors to increase the capacity of prescribed fire use on both public lands.	External Capacity Building	Alliance and Partnership Development	Moderate	Proceed	34.375	68.75
<i>Spiza americana</i>	Dickcissel	Work with agricultural trade organizations and the agricultural industry to promote grassland bird habitat on private lands	Consider the creation of grassland bird friendly certification programs. Continue to facilitate research on native forages and grazing for horses, beef, etc. Partner with personnel from local conservation districts and local production organizations (Cattlemen's Association, Soybean Association, etc.)	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	65.625	34.375
<i>Spiza americana</i>	Dickcissel	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Spiza americana</i>	Dickcissel	Work with partners to improve quality of grassland habitat on public lands	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	96.875	3.125
<i>Spiza americana</i>	Dickcissel	Increase access to prescribed fire educational opportunities	Host prescribed fire workshops. Invest monetary or in-kind resources for a KPFC training coordinator for statewide logistic support, and partner collaboration aimed at increasing the amount of prescribed fire in the Commonwealth.	Education and Awareness	Education and Awareness- Other	Moderate	Re-Evaluate	96.875	34.375
<i>Spizella pusilla</i>	Field Sparrow	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	Moderate	Consider	6.25	0
<i>Spizella pusilla</i>	Field Sparrow	Work with agricultural trade organizations and the agricultural industry to promote grassland bird habitat on private lands	Consider the creation of grassland bird friendly certification programs. Continue to facilitate research on native forages and grazing for horses, beef, etc. Partner with personnel from local conservation districts and local production organizations (Cattlemen's Association, Soybean Association, etc.)	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	65.625	34.375
<i>Spizella pusilla</i>	Field Sparrow	Educate private landowners and the public on the importance of grassland and shrubland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass, native grass and shrubs and other types of grassy/shrubby habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	50	3.125
<i>Spizella pusilla</i>	Field Sparrow	Incentivize management for grassland birds on private lands	Work through KDFWR's private lands program and the Natural Resource Conservation Service (NRCS) to increase habitat quality and availability on private lands. Utilize federal programs to implement native grass restoration, field borders, prescribed grazing, woody stem removal, delayed haying, and prescribed fire on both working and recreational private lands. Target efforts near to or within the previous Conservation Reserve Enhancement Program (CREP) Area and quail focal areas as designated in KDFWR's 2020 Quail Report. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Spizella pusilla</i>	Field Sparrow	Train resource managers on proper grassland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Spizella pusilla</i>	Field Sparrow	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of native grasslands, wet prairies, reclaimed surface mines and unowned non-native grasslands would be particularly beneficial. Areas near to quail focal areas as designated in KDFWR's 2020 Quail Report should be prioritized to reduce habitat fragmentation. Additional areas near remnant native grasslands in Hardin, Grayson, Warren, Barren counties, as identified by KSNPC (2010) are high priority for protections as well. In addition, areas in Christian, Todd and Logan Counties, which were identified through a model of ecological potential developed by the Central Hardwoods Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	62.5
<i>Spizella pusilla</i>	Field Sparrow	Work with partners to improve quality of grassland habitat on public lands	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	96.875	3.125
<i>Spizella pusilla</i>	Field Sparrow	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Sturnella magna</i>	Interior Least Tern	Minimize disturbance to nesting least terns at nesting areas	Work with KDFWR's Law Enforcement division to minimize disturbance at known nesting areas with enhanced monitoring and patrol.	Law and Policy	Compliance and Enforcement	High	Proceed	37.5	50
<i>Sturnella magna</i>	Interior Least Tern	Public education on nest disturbance	Use community outreach as appropriate to inform the public about the need to minimize disturbance.	Education and Awareness	Awareness and Communications	High	Consider	21.875	18.75
<i>Sturnella magna</i>	Eastern Meadowlark	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	High	Consider	6.25	15.625
<i>Sturnella magna</i>	Eastern Meadowlark	Work with agricultural trade organizations and the agricultural industry to promote grassland bird habitat on private lands	Consider the creation of grassland bird friendly certification programs. Continue to facilitate research on native forages and grazing for horses, beef, etc. Partner with personnel from local conservation districts and local production organizations (Cattlemen's Association, Soybean Association, etc.)	External Capacity Building	Alliance and Partnership Development	High	Investigate	65.625	50
<i>Sturnella magna</i>	Eastern Meadowlark	Educate private landowners and the public on the importance of grassland habitat	Boost and diversify educational campaigns to promote the importance of field borders, fence rows, unmowed grass, and other types of grassy habitat. Educational efforts should be aimed at changing long term behaviors pertaining to clean farming and unnecessary mowing/landscaping. Create and promote demonstration areas on public areas. Collaborate with the University of Kentucky Cooperative Extension Service and Kentucky State University to better engage with private landowners.	Education and Awareness	Awareness and Communications	High	Re-Evaluate	50	18.75
<i>Sturnella magna</i>	Eastern Meadowlark	Incentivize management for grassland birds on private lands	Work through KDFWR's private lands program and the Natural Resource Conservation Service (NRCS) to increase habitat quality and availability on private lands. Utilize federal programs to implement field borders, prescribed grazing, woody stem removal, delayed haying, and conservation cover on both working and recreational private lands. Target efforts near to or within the previous Conservation Reserve Enhancement Program (CREP) Area and quail focal areas as designated in KDFWR's 2020 Quail Report. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	50
<i>Sturnella magna</i>	Eastern Meadowlark	Train resource managers on proper grassland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	High	Consider	21.875	15.625

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Sturnella magna</i>	Eastern Meadowlark	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of non-native grasslands, mowed once annually in late summer/early fall would be particularly beneficial. Areas near to quail focal areas as designated in KDFWR's 2020 Quail Report should be prioritized to reduce habitat fragmentation. In addition, areas in Christian, Todd and Logan Counties, which were identified through a model of ecological potential developed by the Central Hardwoods Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long term monitoring.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	78.125
<i>Sturnella magna</i>	Eastern Meadowlark	Work with partners to improve quality of grassland habitat on public lands	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	Alliance and Partnership Development	High	Re-Evaluate	96.875	18.75
<i>Sturnella magna</i>	Eastern Meadowlark	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Thryomanes bewickii</i>	Bewick's Wren	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	31.25
<i>Tringa flavipes</i>	Lesser Yellowlegs	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Tringa flavipes</i>	Lesser Yellowlegs	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Tringa flavipes</i>	Lesser Yellowlegs	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Tringa flavipes</i>	Lesser Yellowlegs	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Tringa flavipes</i>	Lesser Yellowlegs	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds aim to curb threats. Efforts include the acquisition and protection of lands used as migratory pathways and nonbreeding sites and the education of landowners on regenerative agricultural and ranching practices.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Tringa flavipes</i>	Lesser Yellowlegs	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Tringa flavipes</i>	Lesser Yellowlegs	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Tringa flavipes</i>	Lesser Yellowlegs	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Tringa flavipes</i>	Lesser Yellowlegs	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Tringa solitaria</i>	Solitary Sandpiper	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to provide stop over habitat. For this species, the protection of shallow water wetlands, and shoreline, mudflat and sandbar habitat of lakes and rivers would be particularly beneficial. Areas near to transient lakes in Warren and Christian Counties, Ballard Wildlife Management Area, Land Between the Lakes NRA and mudflat and sandbar habitats along the Green, Tennessee, Ohio, Mississippi and Cumberland Rivers should be prioritized. Work with KDFWR's Wetland and Stream Fees in-lieu-of Mitigation Program to acquire and permanently protect large tracts of habitat. When utilizing permanent easements, ensure a commitment to the completion of long-term monitoring and management for shorebird species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Tringa solitaria</i>	Solitary Sandpiper	Improve habitat availability on public lands	Utilize federal programs, including the North American Wetlands Conservation Act Grants Program to implement wetland restoration on public lands.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	68.75
<i>Tringa solitaria</i>	Solitary Sandpiper	Incentivize management for shorebird habitat on private lands	Work through KDFWR's private lands program and Wetland and Stream Fees in-lieu-of Mitigation Program, as well as the Natural Resource Conservation Service (NRCS) to increase wetland habitat quality and moist soil unit availability on private lands. Utilize federal programs, including the Agricultural Conservation Easement Program's Wetland Reserve Easements and North American Wetlands Conservation Act Grants Program to implement wetland restoration and easements on private lands. Target efforts within the Green River and Purchase regions. Consider adding additional incentives for landowners to participate in conservation programs and develop creative strategies for increasing habitat availability on working lands during the shorebird migration season.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Tringa solitaria</i>	Solitary Sandpiper	Educate the public on the importance of stopover habitat including patches in urban areas	Launch educational campaigns to promote the importance of wetland habitat. Work with local county and municipal parks, zoos, nature centers, universities, etc. to launch educational campaigns to promote the benefits of stopover habitat availability. Restore habitat in and near urban areas and promote select locations as demonstration areas.	Education and Awareness	Awareness and Communications	Moderate	Re-Evaluate	96.875	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Tringa solitaria</i>	Solitary Sandpiper	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds aim to curb threats. Efforts include the acquisition and protection of lands used as migratory pathways and nonbreeding sites and the education of landowners on regenerative agricultural and ranching practices.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Tringa solitaria</i>	Solitary Sandpiper	Train resource managers on proper water level management techniques	Train staff from state and federal natural resource agencies on the habitat needs of shorebirds and best management practices through workshops and regular communications. Emphasize the specific habitat structure and water level management/timing needed for shorebird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125
<i>Tringa solitaria</i>	Solitary Sandpiper	Water level management for habitat availability	Work with partners to manage water levels to optimize stopover habitat during shorebird migration or develop habitat at appropriate water level/elevation.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	21.875	3.125
<i>Tringa solitaria</i>	Solitary Sandpiper	Collaborate with partners on proper wetland management for shorebird habitat	Engage with the Division of Water, Kentucky Natural Lands Trust, Kentucky State Nature Preserves, Nature Conservancy and US Army Corps of Engineers to improve shorebird habitat quality on a diversity of public land holdings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	21.875	34.375
<i>Tringa solitaria</i>	Solitary Sandpiper	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Tyto alba</i>	Barn Owl	Support a long-term organization to manage this species on private lands	KDFWR's statewide barn owl project has been successful at increasing the population of this bird, especially in western KY, over the past 12 years. Support of an organization to manage barn owls on private lands in KY is needed on the long term to maintain population stability in the state. The organization will take care of nest box maintenance and working with landowners on providing nest locations that work for the landowner and the owls.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	100	31.25
<i>Tyto alba</i>	Barn Owl	Improve grassland habitat structure on public lands	Engage with local county and municipal parks, universities, etc. to improve grassland habitat quality on a diversity of public land holdings. Work with park maintenance supervisors to promote more naturalized, less manicured landscapes.	External Capacity Building	External Capacity Building- Other	Moderate	Investigate	65.625	65.625
<i>Tyto alba</i>	Barn Owl	Acquisition and protection of habitat	Acquire high quality suitable habitat under public ownership or protect via permanent easements to ensure resiliency of populations to habitat loss on private lands. For this species, the protection of native grasslands, wet prairies, reclaimed surface mines and unowned non-native grasslands would be particularly beneficial. Areas near to known populations as specified in KDFWR's 2018 Barn Owl Report should be prioritized to reduce habitat fragmentation. Additional areas near remnant native grasslands in Hardin, Grayson, Warren, Barren counties, as identified by KSNPC (2010) are high priority for protections as well. In addition, areas in Christian, Todd and Logan Counties, which were identified through a model of ecological potential developed by the Central Hardwoods Joint Venture are high priority for protection. When utilizing permanent easements, ensure a commitment to the completion of long term monitoring.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	65.625
<i>Tyto alba</i>	Barn Owl	Educate the public on the effects of secondary rodenticide exposure	Create and implement an educational campaign on the effects of secondary rodenticide exposure in this and other species.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	3.125
<i>Tyto alba</i>	Barn Owl	Reduce Powerline Electrocutions (Raptors)	Work with utility companies, KDFWR enforcement and private lands programs to encourage increased implementation of guidance set forth by the Avian Power Line Interaction Committee. Encourage better tracking of mortalities within the state and US.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Tyto alba</i>	Barn Owl	Train resource managers on proper grassland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other grassland bird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Tyto alba</i>	Barn Owl	Raise awareness of the importance and diversity of birds in Kentucky	Inform citizens of the impacts recreational activities can have on birds and provide suitable alternatives.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	0
<i>Tyto alba</i>	Barn Owl	Improve grassland habitat structure on KDFWR WMAs	Work with site manager to improve grassland habitat structure and quality on WMAs.	Land/Water Management	Site/Area Management	Moderate	Investigate	100	65.625
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Promote early successional habitat restoration at high elevation sites in eastern Kentucky	Promote early successional habitat restoration at high elevation sites through herbicide application and prescribed fire. Implement BMPs set forth in Golden-winged Warbler Habitats in the Appalachian Region. Areas in Bell, Harlan, Letcher Counties are of highest priority.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	31.25
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Work with private landowners to increase habitat	Partner with reclaimed surface mine landowners in southeastern Kentucky to promote habitat structure for GWWA.	External Capacity Building	Alliance and Partnership Development	Moderate	Re-Evaluate	100	0
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Feral hog educational campaign	Inform and provide mitigation strategies about the impacts of feral hogs to ground nesting songbirds and other wildlife.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	31.25
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Feral hog eradication on public lands	Provide resources for feral hog eradication.	Land/Water Management	Invasive/Problematic Species Control	Moderate	Re-Evaluate	100	31.25
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Reduce the threat of tower collisions on migratory birds	Promote the implementation of the guidance set forth by the USFWS in the Recommended Best Practices for Communication Towers through KDFWR's Environmental Program.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Incentivize management for diverse forest structure, including early successional forest on private lands	Work through KDFWR's private lands program to increase habitat quality and availability on private lands. Utilize Environmental Quality Incentives Program (EQIP) contracts with NRCS, including the Southeast Kentucky Early Successional Habitat Initiative (SEKESH), devoted specifically to young forest habitat. Consider adding additional incentives for landowners to participate in conservation programs.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	31.25
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Manage invasive species in forested areas to avoid further habitat degradation	Work through KDFWR's private lands program to manage invasive species on private lands. Utilize Environmental Quality Incentives Program (EQIP) contracts with NRCS, to manage kudzu, bush honeysuckle, winter creeper, etc. Work with KDFWR's public lands program and federal agencies to manage invasive species on public lands.	Land/Water Management	Invasive/Problematic Species Control	Moderate	Re-Evaluate	100	31.25
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	Manage invasive species in forested areas through trainings	Hold workshops with land managers to discuss techniques for invasive plant eradication.	Education and Awareness	Training	Moderate	Consider	21.875	0
<i>Vireo bellii</i>	Bell's Vireo	Fund conservation efforts on the winter grounds (outside of the US)	Conservation efforts, funded and coordinated through Southern Wings on migratory stopover sites and the nonbreeding grounds work to curb threats through the acquisition and protection of lands used as migratory pathways and nonbreeding sites, education of landowners on regenerative agricultural and ranching practices including shade-grown coffee farming, and the creation and maintenance of native tree nurseries to support reforestation efforts, etc. These efforts will be targeted to known wintering areas for Kentucky neotropical migrants to boost non-breeding survival and hence, increase Kentucky populations.	External Capacity Building	Conservation Finance	Moderate	Re-Evaluate	93.75	31.25
<i>Vireo bellii</i>	Bell's Vireo	Reduce mortality from window collisions	Create an educational campaign to inform landowners, small building owners and government building managers what they can do to prevent bird window strikes. Work with large Kentucky cities on "lights out" programs to reduce window collisions in urban areas. Encourage policy change for bird friendly new construction and renovation of government buildings.	Education and Awareness	Awareness and Communications	Moderate	Consider	37.5	0
<i>Vireo bellii</i>	Bell's Vireo	Reduce mortality caused by feral cats	Develop and implement education and outreach programs about the ecological impacts of feral cats.	Education and Awareness	Awareness and Communications	Moderate	Consider	6.25	0
<i>Vireo bellii</i>	Bell's Vireo	Train resource managers on proper shrubland management techniques	Train staff from state and federal natural resource agencies on the habitat needs of grassland birds and best management practices through workshops and regular communications. Emphasize the specific habitat structure needed for this and other shrubland bird SGCN.	Education and Awareness	Training	Moderate	Consider	21.875	0
<i>Vireo bellii</i>	Bell's Vireo	Incentivize bird-friendly building construction and renovation	Work with tall building owners and relevant industries to incentivize bird friendly new construction and renovation.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	31.25

APX 7.1c Actions Identified for Crustacean SGCN

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Barbicambarus cornutus</i>	Bottlebrush Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Barbicambarus cornutus</i>	Bottlebrush Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	High	Proceed	21.875	81.25
<i>Barbicambarus cornutus</i>	Bottlebrush Crayfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Cambarus adustus</i>	Dusky Mudbug	Acquisition of occupied habitat throughout the species range	Identify and acquire, via fee simple acquisition or conservation easement, occupied habitat for the species.	Land/Water Protection	Site/Area Protection	Highest	Investigate	96.875	93.75
<i>Cambarus adustus</i>	Dusky Mudbug	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Cambarus batchi</i>	Bluegrass Crayfish	Acquisition of occupied habitat throughout the species range	Identify and acquire, via fee simple acquisition or conservation easement, occupied habitat for the species.	Land/Water Protection	Site/Area Protection	High	Investigate	96.875	78.125
<i>Cambarus batchi</i>	Bluegrass Crayfish	Habitat management on public lands	Maintain open grasslands and wet meadows on current and future public tracts throughout the species range. Monitor impacts to populations resulting from pesticide use in agricultural settings.	Land/Water Management	Site/Area Management	High	Investigate	68.75	81.25
<i>Cambarus batchi</i>	Bluegrass Crayfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Cambarus bouchardi</i>	Big South Fork Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	Highest	Proceed	21.875	96.875
<i>Cambarus bouchardi</i>	Big South Fork Crayfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Cambarus callainus</i>	Big Sandy Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Cambarus callainus</i>	Big Sandy Crayfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Cambarus callainus</i>	Big Sandy Crayfish	Reduce potential for bait-bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	Highest	Proceed	21.875	68.75
<i>Cambarus friaufi</i>	Hairy Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	50
<i>Cambarus friaufi</i>	Hairy Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	High	Proceed	21.875	53.125
<i>Cambarus guenterti</i>	Redbird Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	53.125
<i>Cambarus guenterti</i>	Redbird Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	High	Proceed	21.875	53.125
<i>Cambarus hatfieldi</i>	Tug Valley Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Cambarus hatfieldi</i>	Tug Valley Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	High	Proceed	21.875	53.125
<i>Cambarus hazardi</i>	Brawny Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	50
<i>Cambarus hazardi</i>	Brawny Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	High	Proceed	21.875	81.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Cambarus taylori</i>	Cutshin Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Cambarus taylori</i>	Cutshin Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	High	Proceed	21.875	81.25
<i>Faxonius bisectus</i>	Crittenden Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	Highest	Proceed	21.875	96.875
<i>Faxonius bisectus</i>	Crittenden Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Faxonius bisectus</i>	Crittenden Crayfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Faxonius burri</i>	Blood River Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Faxonius burri</i>	Blood River Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	Highest	Proceed	21.875	96.875
<i>Faxonius burri</i>	Blood River Crayfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Faxonius elix</i>	Mowild Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	Highest	Proceed	21.875	96.875
<i>Faxonius elix</i>	Mowild Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Faxonius elix</i>	Mowild Crayfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Faxonius jeffersoni</i>	Louisville Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	Highest	Proceed	21.875	96.875
<i>Faxonius jeffersoni</i>	Louisville Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Faxonius jeffersoni</i>	Louisville Crayfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Faxonius kentuckiensis</i>	Kentucky Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	High	Proceed	21.875	81.25
<i>Faxonius kentuckiensis</i>	Kentucky Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Faxonius kentuckiensis</i>	Kentucky Crayfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Faxonius margorectus</i>	Livingston Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Faxonius margorectus</i>	Livingston Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	Highest	Proceed	21.875	96.875
<i>Faxonius margorectus</i>	Livingston Crayfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Faxonius rafinesquei</i>	Rough River Crayfish	Reduce potential for bait bucket introduction of non-native crayfish species	Amend state regulations to reduce potential introduction of non-native species via bait-bucket releases.	Law and Policy	Policies and Regulations	High	Proceed	21.875	81.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Faxonius rafinesquei</i>	Rough River Crayfish	Incorporate erosion control and bank stabilization on private tracts	Reduce sedimentation and loss of interstitial habitat by incentivizing erosion control practices in occupied watersheds.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Faxonius rafinesquei</i>	Rough River Crayfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Orconectes barri</i>	Cumberland Plateau Cave Crayfish	Acquisition of cave entrances and surrounding watershed	Acquisition of fee simple or conservation easement at occupied sites and surrounding karst recharge areas.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	96.875
<i>Orconectes inermis inermis</i>	Ghost Crayfish	Acquisition of cave entrances and surrounding watershed	Acquisition of fee simple or conservation easement at occupied sites and surrounding karst recharge areas.	Land/Water Protection	Site/Area Protection	High	Investigate	100	81.25
<i>Orconectes packardii</i>	Appalachian Cave Crayfish	Acquisition of cave entrances and surrounding watershed	Acquisition of fee simple or conservation easement at occupied sites and surrounding karst recharge areas.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	96.875
<i>Orconectes pellucidus</i>	Mammoth Cave Crayfish	Acquisition of cave entrances and surrounding watershed	Acquisition of fee simple or conservation easement at occupied sites and surrounding karst recharge areas.	Land/Water Protection	Site/Area Protection	High	Investigate	100	81.25
<i>Palaemonias ganteri</i>	Mammoth Cave Shrimp	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Palaemonias ganteri</i>	Mammoth Cave Shrimp	Acquisition of cave entrances and surrounding watershed	Acquisition of fee simple or conservation easement at occupied sites and surrounding karst recharge areas.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	96.875

APX 7.1d Actions Identified for Fishes and Lamprey SGCN

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Acipenser fulvescens</i>	Lake Sturgeon	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	18.75	34.375
<i>Acipenser fulvescens</i>	Lake Sturgeon	Improve fish passage at hydropower dams	Eliminate or reduce barriers to fish passage.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	34.375
<i>Acipenser fulvescens</i>	Lake Sturgeon	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Acipenser fulvescens</i>	Lake Sturgeon	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	6.25	3.125
<i>Acipenser fulvescens</i>	Lake Sturgeon	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	34.375
<i>Acipenser fulvescens</i>	Lake Sturgeon	Implement strategies to prevent or minimize entrainment	Work with partners to develop and incorporate entrainment minimization measures as needed.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	34.375	34.375
<i>Acipenser fulvescens</i>	Lake Sturgeon	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Acipenser fulvescens</i>	Lake Sturgeon	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	6.25
<i>Acipenser fulvescens</i>	Lake Sturgeon	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Acipenser fulvescens</i>	Lake Sturgeon	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Acipenser fulvescens</i>	Lake Sturgeon	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Acipenser fulvescens</i>	Lake Sturgeon	Improve coordinated efforts with the public and law enforcement to prevent illegal harvest	Eliminate or minimize illegal harvest of Lake Sturgeon in Kentucky and maintain strong public support for the Lake Sturgeon recovery program.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	34.375	3.125
<i>Acipenser fulvescens</i>	Lake Sturgeon	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Allohistium maydeni</i>	Redlips Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Allohistium maydeni</i>	Redlips Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Allohistium maydeni</i>	Redlips Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Allohistium maydeni</i>	Redlips Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Allohistium maydeni</i>	Redlips Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Allohistium maydeni</i>	Redlips Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Allohistium maydeni</i>	Redlips Darter	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Highest	Proceed	18.75	65.625
<i>Allohistium maydeni</i>	Redlips Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Allothistium maydeni</i>	Redlips Dartler	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	65.625
<i>Allothistium maydeni</i>	Redlips Dartler	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625
<i>Allothistium maydeni</i>	Redlips Dartler	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Alosa alabamae</i>	Alabama Shad	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Alosa alabamae</i>	Alabama Shad	Improve fish passage at hydropower dams	Eliminate or reduce barriers to fish passage.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Alosa alabamae</i>	Alabama Shad	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Alosa alabamae</i>	Alabama Shad	Implement strategies to prevent or minimize entrainment	Work with partners to develop and incorporate entrainment minimization measures as needed.	External Capacity Building	Alliance and Partnership Development	Highest	Proceed	34.375	65.625
<i>Alosa alabamae</i>	Alabama Shad	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Alosa alabamae</i>	Alabama Shad	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Alosa alabamae</i>	Alabama Shad	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Alosa alabamae</i>	Alabama Shad	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Alosa alabamae</i>	Alabama Shad	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Alosa alabamae</i>	Alabama Shad	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Amblyopsis spelaea</i>	Northern Cavefish	Acquisition and conservation easements of cave entrances and surrounding land within recharge zones	Prevent loss or degradation of subterranean aquatic habitats.	Land/Water Protection	Site/Area Protection	Highest	Investigate	96.875	100
<i>Amblyopsis spelaea</i>	Northern Cavefish	Implement a public awareness program to inform landowners and others of the harmful impacts of dumping into sinkholes on groundwater and life it contains	Prevent groundwater contamination and water quality degradation in subterranean systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	18.75	34.375
<i>Amblyopsis spelaea</i>	Northern Cavefish	Ensure that protection zones or other mitigation measures recommended by a management prescription will be established around cave entrances, sinkholes, and swallow holes	Prevent loss or degradation of subterranean aquatic habitats.	Land/Water Protection	Land/Water Protection- Other	Highest	Investigate	100	68.75
<i>Amblyopsis spelaea</i>	Northern Cavefish	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	External Capacity Building- Other	Highest	Consider	37.5	34.375
<i>Amblyopsis spelaea</i>	Northern Cavefish	Provide incentives to protect riparian corridors and watersheds, including cave entrances and recharge zones	Protect riparian corridors and cave entrances and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Amblyopsis spelaea</i>	Northern Cavefish	Expand implementation of existing Best Management Practices, including reforestation around cave entrances, sinkholes, and recharge zones	Prevent loss or degradation of subterranean aquatic habitats.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Amblyopsis spelaea</i>	Northern Cavefish	Work with partners to maintain compliance with state and federal laws aimed at protecting caves, karst windows, and groundwater resources	Prevent loss or degradation of subterranean aquatic habitats.	External Capacity Building	Alliance and Partnership Development	Highest	Proceed	34.375	68.75
<i>Amblyopsis spelaea</i>	Northern Cavefish	Inform and educate the public on negative impacts of overcollecting unique and sensitive species	Prevent overcollection of species that are sensitive or vulnerable to overharvest.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	34.375
<i>Amblyopsis spelaea</i>	Northern Cavefish	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	65.625
<i>Amblyopsis spelaea</i>	Northern Cavefish	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625
<i>Amblyopsis spelaea</i>	Northern Cavefish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Ammocrypta clara</i>	Western Sand Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Ammocrypta clara</i>	Western Sand Darter	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	High	Proceed	18.75	50
<i>Ammocrypta clara</i>	Western Sand Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Ammocrypta clara</i>	Western Sand Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Ammocrypta clara</i>	Western Sand Darter	Restoration of degraded aquatic habitat through financial and technical assistance programs	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Ammocrypta clara</i>	Western Sand Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Ammocrypta clara</i>	Western Sand Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Ammocrypta clara</i>	Western Sand Darter	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	50
<i>Ammocrypta clara</i>	Western Sand Darter	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	High	Proceed	34.375	50
<i>Ammocrypta clara</i>	Western Sand Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Ammocrypta clara</i>	Western Sand Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Atractosteus spatula</i>	Alligator Gar	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	18.75	34.375
<i>Atractosteus spatula</i>	Alligator Gar	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Moderate	Investigate	96.875	65.625
<i>Atractosteus spatula</i>	Alligator Gar	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Atractosteus spatula</i>	Alligator Gar	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Atractosteus spatula</i>	Alligator Gar	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Atractosteus spatula</i>	Alligator Gar	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Atractosteus spatula</i>	Alligator Gar	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Atractosteus spatula</i>	Alligator Gar	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Chrosomus cumberlandensis</i>	Blackside Dace	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Clinostomus elongatus</i>	Redside Dace	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Clinostomus elongatus</i>	Redside Dace	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Clinostomus elongatus</i>	Redside Dace	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Clinostomus elongatus</i>	Redside Dace	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Clinostomus elongatus</i>	Redside Dace	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Clinostomus elongatus</i>	Redside Dace	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Clinostomus elongatus</i>	Redside Dace	Refrain from stocking non-native piscivorous sportfish species in streams inhabited by Redside Dace	Prevent predation impacts to Redside Dace from non-native piscivorous species.	Land/Water Management	Invasive/Problematic Species Control	High	Consider	6.25	46.875
<i>Clinostomus elongatus</i>	Redside Dace	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Cyprinella camura</i>	Bluntnose Shiner	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Cyprinella camura</i>	Bluntnose Shiner	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Cyprinella camura</i>	Bluntnose Shiner	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Cyprinella camura</i>	Bluntnose Shiner	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Cyprinella camura</i>	Bluntnose Shiner	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Cyprinella camura</i>	Bluntnose Shiner	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Moderate	Re-Evaluate	96.875	34.375
<i>Cyprinella camura</i>	Bluntnose Shiner	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	34.375
<i>Cyprinella camura</i>	Bluntnose Shiner	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	6.25	0
<i>Cyprinella camura</i>	Bluntnose Shiner	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	31.25
<i>Cyprinella camura</i>	Bluntnose Shiner	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Cyprinella camura</i>	Bluntnose Shiner	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Moderate	Investigate	96.875	65.625
<i>Cyprinella camura</i>	Bluntnose Shiner	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Cyprinella venusta</i>	Blacktail Shiner	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Cyprinella venusta</i>	Blacktail Shiner	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Cyprinella venusta</i>	Blacktail Shiner	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Cyprinella venusta</i>	Blacktail Shiner	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Cyprinella venusta</i>	Blacktail Shiner	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Cyprinella venusta</i>	Blacktail Shiner	Implement actions to improve habitat and water quality conditions	Reduce potential for invasion of non-native tolerant species and hybridization through improvements to habitat conditions and water quality.	Land/Water Management	Land/Water Management- Other	Moderate	Investigate	96.875	65.625
<i>Cyprinella venusta</i>	Blacktail Shiner	Adjust live bait regulations to ban the sale or use of bait originating from outside of Kentucky waters	Prevent introduction and spread of non-native species or populations used as bait.	Law and Policy	Policies and Regulations	Moderate	Proceed	21.875	65.625
<i>Cyprinella venusta</i>	Blacktail Shiner	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Erimystax insignis</i>	Blotched Chub	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Erimystax insignis</i>	Blotched Chub	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Erimystax insignis</i>	Blotched Chub	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Erimystax insignis</i>	Blotched Chub	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Erimystax insignis</i>	Blotched Chub	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Erimystax insignis</i>	Blotched Chub	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Erimystax insignis</i>	Blotched Chub	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	High	Proceed	18.75	50
<i>Erimystax insignis</i>	Blotched Chub	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	50
<i>Erimystax insignis</i>	Blotched Chub	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	High	Proceed	34.375	50
<i>Erimystax insignis</i>	Blotched Chub	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Erimystax insignis</i>	Blotched Chub	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Erimyzon sucetta</i>	Lake Chubsucker	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Erimyzon sucetta</i>	Lake Chubsucker	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Erimyzon sucetta</i>	Lake Chubsucker	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Erimyzon sucetta</i>	Lake Chubsucker	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Erimyzon sucetta</i>	Lake Chubsucker	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Erimyzon sucetta</i>	Lake Chubsucker	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Erimyzon sucetta</i>	Lake Chubsucker	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Erimyzon sucetta</i>	Lake Chubsucker	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Esox niger</i>	Chain Pickerel	Review recreational fishing regulations and adjust as needed to ensure population sustainability	Prevent overharvest that could result in population extirpations.	Law and Policy	Policies and Regulations	Moderate	Proceed	21.875	62.5
<i>Esox niger</i>	Chain Pickerel	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Esox niger</i>	Chain Pickerel	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Esox niger</i>	Chain Pickerel	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Esox niger</i>	Chain Pickerel	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Esox niger</i>	Chain Pickerel	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Esox niger</i>	Chain Pickerel	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Etheostoma barbouri</i>	Teardrop Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Etheostoma barbouri</i>	Teardrop Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Etheostoma barbouri</i>	Teardrop Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Etheostoma barbouri</i>	Teardrop Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Etheostoma barbouri</i>	Teardrop Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Etheostoma barbouri</i>	Teardrop Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Etheostoma barbouri</i>	Teardrop Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Etheostoma chienense</i>	Relict Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Etheostoma chienense</i>	Relict Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Etheostoma chienense</i>	Relict Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Etheostoma chienense</i>	Relict Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Etheostoma chienense</i>	Relict Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Etheostoma chienense</i>	Relict Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Etheostoma chienense</i>	Relict Darter	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	65.625
<i>Etheostoma chienense</i>	Relict Darter	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625
<i>Etheostoma chienense</i>	Relict Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Etheostoma derivativum</i>	Stone Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Etheostoma derivativum</i>	Stone Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Etheostoma derivativum</i>	Stone Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Etheostoma derivativum</i>	Stone Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Etheostoma derivativum</i>	Stone Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Etheostoma derivativum</i>	Stone Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Etheostoma derivativum</i>	Stone Darter	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625
<i>Etheostoma derivativum</i>	Stone Darter	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	65.625
<i>Etheostoma derivativum</i>	Stone Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Etheostoma fusiforme</i>	Swamp Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Etheostoma fusiforme</i>	Swamp Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Etheostoma fusiforme</i>	Swamp Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Etheostoma fusiforme</i>	Swamp Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Etheostoma fusiforme</i>	Swamp Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Etheostoma fusiforme</i>	Swamp Darter	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	6.25	0
<i>Etheostoma fusiforme</i>	Swamp Darter	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	31.25
<i>Etheostoma fusiforme</i>	Swamp Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Etheostoma fusiforme</i>	Swamp Darter	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	34.375
<i>Etheostoma fusiforme</i>	Swamp Darter	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Moderate	Re-Evaluate	96.875	34.375
<i>Etheostoma fusiforme</i>	Swamp Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Highest	Proceed	18.75	65.625
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	6.25	34.375
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Adjust live bait regulations to ban the sale or use of bait originating from outside of Kentucky waters	Prevent introduction and spread of non-native species or populations used as bait.	Law and Policy	Policies and Regulations	Highest	Proceed	21.875	96.875
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	65.625
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Etheostoma lemniscatum</i>	Tuxedo Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Etheostoma lynceum</i>	Brighteye Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Etheostoma lynceum</i>	Brighteye Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Etheostoma lynceum</i>	Brighteye Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Etheostoma lynceum</i>	Brighteye Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Etheostoma lynceum</i>	Brighteye Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Etheostoma lynceum</i>	Brighteye Darter	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Moderate	Re-Evaluate	96.875	34.375

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Etheostoma lynceum</i>	Brighteye Darter	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	34.375
<i>Etheostoma lynceum</i>	Brighteye Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Etheostoma lynceum</i>	Brighteye Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Moderate	Investigate	96.875	65.625
<i>Etheostoma lynceum</i>	Brighteye Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Etheostoma nebra</i>	Buck Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Etheostoma nebra</i>	Buck Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Etheostoma nebra</i>	Buck Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Etheostoma nebra</i>	Buck Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Etheostoma nebra</i>	Buck Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Etheostoma nebra</i>	Buck Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Etheostoma nebra</i>	Buck Darter	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	65.625
<i>Etheostoma nebra</i>	Buck Darter	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625
<i>Etheostoma nebra</i>	Buck Darter	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	6.25	34.375
<i>Etheostoma nebra</i>	Buck Darter	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625
<i>Etheostoma nebra</i>	Buck Darter	Adjust live bait regulations to ban the sale or use of bait originating from outside of Kentucky waters	Prevent introduction and spread of non-native species or populations used as bait.	Law and Policy	Policies and Regulations	Highest	Proceed	21.875	96.875
<i>Etheostoma nebra</i>	Buck Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Etheostoma nebra</i>	Buck Darter	Establish a water resource management plan for watersheds supporting cave and spring-adapted aquatic species	Maintain sufficient spring flow and minimum water levels in spring pools.	Land/Water Management	Land/Water Management- Other	Highest	Consider	21.875	34.375
<i>Etheostoma nebra</i>	Buck Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Establish a water resource management plan for watersheds supporting cave and spring-adapted aquatic species	Maintain sufficient spring flow and minimum water levels in spring pools.	Land/Water Management	Land/Water Management- Other	High	Consider	21.875	18.75
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Etheostoma proellare</i>	Cypress Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Etheostoma proellare</i>	Cypress Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Etheostoma proellare</i>	Cypress Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Etheostoma proellare</i>	Cypress Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Etheostoma proellare</i>	Cypress Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Etheostoma proellare</i>	Cypress Darter	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	6.25	15.625
<i>Etheostoma proellare</i>	Cypress Darter	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	High	Consider	34.375	46.875
<i>Etheostoma proellare</i>	Cypress Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Etheostoma proellare</i>	Cypress Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	65.625
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Restoration of degraded aquatic habitat through financial and technical assistance programs	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Etheostoma susanae</i>	Cumberland Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Etheostoma susanae</i>	Cumberland Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Etheostoma susanae</i>	Cumberland Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Etheostoma susanae</i>	Cumberland Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Etheostoma susanae</i>	Cumberland Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Etheostoma susanae</i>	Cumberland Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Etheostoma susanae</i>	Cumberland Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	34.375	34.375
<i>Etheostoma susanae</i>	Cumberland Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Etheostoma swaini</i>	Gulf Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Etheostoma swaini</i>	Gulf Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Etheostoma swaini</i>	Gulf Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Etheostoma swaini</i>	Gulf Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Etheostoma swaini</i>	Gulf Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Etheostoma swaini</i>	Gulf Darter	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Moderate	Re-Evaluate	96.875	34.375
<i>Etheostoma swaini</i>	Gulf Darter	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	34.375
<i>Etheostoma swaini</i>	Gulf Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Etheostoma swaini</i>	Gulf Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Moderate	Investigate	96.875	65.625
<i>Etheostoma swaini</i>	Gulf Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Etheostoma tecumsehii</i>	Shawnee Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Etheostoma tecumsehi</i>	Shawnee Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Etheostoma tecumsehi</i>	Shawnee Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Etheostoma tecumsehi</i>	Shawnee Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Etheostoma tecumsehi</i>	Shawnee Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Etheostoma tecumsehi</i>	Shawnee Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Etheostoma tecumsehi</i>	Shawnee Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Fundulus chrysotus</i>	Golden Topminnow	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Fundulus chrysotus</i>	Golden Topminnow	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Fundulus chrysotus</i>	Golden Topminnow	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Fundulus chrysotus</i>	Golden Topminnow	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Fundulus chrysotus</i>	Golden Topminnow	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Fundulus chrysotus</i>	Golden Topminnow	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	6.25	0
<i>Fundulus chrysotus</i>	Golden Topminnow	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	31.25
<i>Fundulus chrysotus</i>	Golden Topminnow	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Fundulus chrysotus</i>	Golden Topminnow	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Fundulus dispar</i>	Starhead Topminnow	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Fundulus dispar</i>	Starhead Topminnow	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Fundulus dispar</i>	Starhead Topminnow	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Fundulus dispar</i>	Starhead Topminnow	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Fundulus dispar</i>	Starhead Topminnow	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Fundulus dispar</i>	Starhead Topminnow	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	6.25	15.625
<i>Fundulus dispar</i>	Starhead Topminnow	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	High	Consider	34.375	46.875
<i>Fundulus dispar</i>	Starhead Topminnow	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Fundulus dispar</i>	Starhead Topminnow	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Hemitemra flammee</i>	Flame Chub	Establish a water resource management plan for watersheds supporting cave and spring-adapted aquatic species	Maintain sufficient spring flow and minimum water levels in spring pools.	Land/Water Management	Land/Water Management- Other	Highest	Consider	21.875	34.375
<i>Hemitemra flammee</i>	Flame Chub	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Hemitemra flammee</i>	Flame Chub	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Hemitemra flammee</i>	Flame Chub	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Hemitemra flammee</i>	Flame Chub	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Hemitemra flammee</i>	Flame Chub	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Hemitemra flammee</i>	Flame Chub	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Hemitemra flammee</i>	Flame Chub	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	65.625
<i>Hemitemra flammee</i>	Flame Chub	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625
<i>Hemitemra flammee</i>	Flame Chub	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Hybognathus hayi</i>	Cypress Minnow	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Hybognathus hayi</i>	Cypress Minnow	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Hybognathus hayi</i>	Cypress Minnow	Restoration of degraded aquatic habitat through financial and technical assistance programs	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Hybognathus hayi</i>	Cypress Minnow	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Hybognathus hayi</i>	Cypress Minnow	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Hybognathus hayi</i>	Cypress Minnow	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	6.25	15.625
<i>Hybognathus hayi</i>	Cypress Minnow	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	High	Consider	34.375	46.875
<i>Hybognathus hayi</i>	Cypress Minnow	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Hybognathus hayi</i>	Cypress Minnow	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Hybognathus placitus</i>	Plains Minnow	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Hybognathus placitus</i>	Plains Minnow	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	High	Proceed	18.75	50
<i>Hybognathus placitus</i>	Plains Minnow	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Hybognathus placitus</i>	Plains Minnow	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Hybognathus placitus</i>	Plains Minnow	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Hybognathus placitus</i>	Plains Minnow	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Hybognathus placitus</i>	Plains Minnow	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Hybognathus placitus</i>	Plains Minnow	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Hybognathus placitus</i>	Plains Minnow	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	6.25	18.75
<i>Hybognathus placitus</i>	Plains Minnow	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	High	Proceed	34.375	50
<i>Hybognathus placitus</i>	Plains Minnow	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Hybopsis amnis</i>	Pallid Shiner	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Hybopsis amnis</i>	Pallid Shiner	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Hybopsis amnis</i>	Pallid Shiner	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Hybopsis amnis</i>	Pallid Shiner	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Hybopsis amnis</i>	Pallid Shiner	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Hybopsis amnis</i>	Pallid Shiner	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Hybopsis amnis</i>	Pallid Shiner	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	High	Proceed	18.75	50
<i>Hybopsis amnis</i>	Pallid Shiner	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	50
<i>Hybopsis amnis</i>	Pallid Shiner	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	High	Proceed	34.375	50
<i>Hybopsis amnis</i>	Pallid Shiner	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	High	Proceed	34.375	50
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	50
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Lepomis marginatus</i>	Dollar Sunfish	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Lepomis marginatus</i>	Dollar Sunfish	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Lepomis marginatus</i>	Dollar Sunfish	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Lepomis marginatus</i>	Dollar Sunfish	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Lepomis marginatus</i>	Dollar Sunfish	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Lepomis marginatus</i>	Dollar Sunfish	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Lepomis marginatus</i>	Dollar Sunfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Lepomis miniatus</i>	Redspotted Sunfish	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Lepomis miniatus</i>	Redspotted Sunfish	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Lepomis miniatus</i>	Redspotted Sunfish	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Lepomis miniatus</i>	Redspotted Sunfish	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Lepomis miniatus</i>	Redspotted Sunfish	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Lepomis miniatus</i>	Redspotted Sunfish	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Lepomis miniatus</i>	Redspotted Sunfish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Lethenteron appendix</i>	American Brook Lamprey	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Lethenteron appendix</i>	American Brook Lamprey	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Lethenteron appendix</i>	American Brook Lamprey	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Lethenteron appendix</i>	American Brook Lamprey	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Lethenteron appendix</i>	American Brook Lamprey	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Lethenteron appendix</i>	American Brook Lamprey	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Lethenteron appendix</i>	American Brook Lamprey	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Lota lota</i>	Burbot	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Moderate	Investigate	96.875	65.625
<i>Lota lota</i>	Burbot	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	18.75	34.375
<i>Lota lota</i>	Burbot	Improve fish passage at hydropower dams	Eliminate or reduce barriers to fish passage.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	34.375
<i>Lota lota</i>	Burbot	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Macrhybopsis gelida</i>	Surgeon Chub	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	18.75	34.375
<i>Macrhybopsis gelida</i>	Surgeon Chub	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Macrhybopsis gelida</i>	Surgeon Chub	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Machrybopsis gelida</i>	Sturgeon Chub	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Machrybopsis gelida</i>	Sturgeon Chub	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Machrybopsis gelida</i>	Sturgeon Chub	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Machrybopsis gelida</i>	Sturgeon Chub	Protect shallow, shoal and sand bar habitat in areas where Sturgeon Chub populations have been located	Prevent loss or degradation of existing habitat essential to the survival of the species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	65.625
<i>Machrybopsis gelida</i>	Sturgeon Chub	Habitat enhancement projects that focus on restoring shallow shoals and sand bars in strategically located areas that could benefit the Sturgeon Chub	Restore lost habitat and enhance population connectivity.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Machrybopsis gelida</i>	Sturgeon Chub	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Machrybopsis gelida</i>	Sturgeon Chub	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Machrybopsis hyostoma</i>	Shoal Chub	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Moderate	Investigate	96.875	65.625
<i>Machrybopsis hyostoma</i>	Shoal Chub	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	18.75	34.375
<i>Machrybopsis hyostoma</i>	Shoal Chub	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Machrybopsis hyostoma</i>	Shoal Chub	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Machrybopsis hyostoma</i>	Shoal Chub	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Machrybopsis hyostoma</i>	Shoal Chub	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Machrybopsis hyostoma</i>	Shoal Chub	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Machrybopsis hyostoma</i>	Shoal Chub	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Machrybopsis meeki</i>	Sicklefin Chub	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	18.75	34.375
<i>Machrybopsis meeki</i>	Sicklefin Chub	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Machrybopsis meeki</i>	Sicklefin Chub	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Machrybopsis meeki</i>	Sicklefin Chub	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Machrybopsis meeki</i>	Sicklefin Chub	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Machrybopsis meeki</i>	Sicklefin Chub	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Machybopsis meeki</i>	Sicklefin Chub	Protect shallow, shoal and sand bar habitat in areas where Sicklefin Chub populations have been located	Prevent loss or degradation of existing habitat essential to the survival of the species.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	65.625
<i>Machybopsis meeki</i>	Sicklefin Chub	Habitat enhancement projects that focus on restoring shallow shoals and sand bars in strategically located areas that could benefit the Sicklefin Chub	Restore lost habitat and enhance population connectivity.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Machybopsis meeki</i>	Sicklefin Chub	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Machybopsis meeki</i>	Sicklefin Chub	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Moderate	Re-Evaluate	96.875	34.375
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	34.375
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Moderate	Investigate	96.875	65.625
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Nothonotus maculatus</i>	Spotted Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Nothonotus maculatus</i>	Spotted Darter	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Highest	Proceed	18.75	65.625
<i>Nothonotus maculatus</i>	Spotted Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Nothonotus maculatus</i>	Spotted Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Nothonotus maculatus</i>	Spotted Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Nothonotus maculatus</i>	Spotted Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Nothonotus maculatus</i>	Spotted Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Nothonotus maculatus</i>	Spotted Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Nothonotus maculatus</i>	Spotted Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building-Other	Highest	Consider	34.375	34.375
<i>Nothonotus microlepidus</i>	Smallscale Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Nothonotus microlepidus</i>	Smallscale Darter	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Highest	Proceed	18.75	65.625
<i>Nothonotus microlepidus</i>	Smallscale Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Nothonotus microlepidus</i>	Smallscale Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Nothonotus microlepidus</i>	Smallscale Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Nothonotus microlepidus</i>	Smallscale Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Nothonotus microlepidus</i>	Smallscale Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Nothonotus microlepidus</i>	Smallscale Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Nothonotus microlepidus</i>	Smallscale Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Notropis albizonatus</i>	Palezone Shiner	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Notropis albizonatus</i>	Palezone Shiner	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Notropis albizonatus</i>	Palezone Shiner	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Notropis albizonatus</i>	Palezone Shiner	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Notropis albizonatus</i>	Palezone Shiner	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Notropis albizonatus</i>	Palezone Shiner	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Notropis albizonatus</i>	Palezone Shiner	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	65.625
<i>Notropis albizonatus</i>	Palezone Shiner	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Notropis albigzonatus</i>	Palezone Shiner	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Notropis albigzonatus</i>	Palezone Shiner	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Notropis dorsalis</i>	Bigmouth Shiner	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Moderate	Re-Evaluate	96.875	34.375
<i>Notropis dorsalis</i>	Bigmouth Shiner	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	34.375
<i>Notropis dorsalis</i>	Bigmouth Shiner	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Notropis dorsalis</i>	Bigmouth Shiner	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Notropis dorsalis</i>	Bigmouth Shiner	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Notropis dorsalis</i>	Bigmouth Shiner	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Notropis dorsalis</i>	Bigmouth Shiner	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Notropis dorsalis</i>	Bigmouth Shiner	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Notropis maculatus</i>	Taillight Shiner	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Notropis maculatus</i>	Taillight Shiner	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Notropis maculatus</i>	Taillight Shiner	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Notropis maculatus</i>	Taillight Shiner	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Notropis maculatus</i>	Taillight Shiner	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Notropis maculatus</i>	Taillight Shiner	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Notropis maculatus</i>	Taillight Shiner	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	6.25	0
<i>Notropis maculatus</i>	Taillight Shiner	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	31.25
<i>Notropis maculatus</i>	Taillight Shiner	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Notropis sp. cf. spectrunculus</i>	Sawfin Shiner	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Noturus exilis</i>	Slender Madtom	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Noturus exilis</i>	Slender Madtom	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	High	Proceed	18.75	50
<i>Noturus exilis</i>	Slender Madtom	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Noturus exilis</i>	Slender Madtom	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Noturus exilis</i>	Slender Madtom	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Noturus exilis</i>	Slender Madtom	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Noturus exilis</i>	Slender Madtom	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Noturus exilis</i>	Slender Madtom	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Noturus exilis</i>	Slender Madtom	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Noturus hildebrandi</i>	Least Madtom	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Noturus hildebrandi</i>	Least Madtom	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Noturus hildebrandi</i>	Least Madtom	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Noturus hildebrandi</i>	Least Madtom	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Noturus hildebrandi</i>	Least Madtom	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Noturus hildebrandi</i>	Least Madtom	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	50
<i>Noturus hildebrandi</i>	Least Madtom	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	High	Proceed	34.375	50
<i>Noturus hildebrandi</i>	Least Madtom	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Noturus hildebrandi</i>	Least Madtom	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Noturus hildebrandi</i>	Least Madtom	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Noturus phaeus</i>	Brown Madtom	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Noturus phaeus</i>	Brown Madtom	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Noturus phaeus</i>	Brown Madtom	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Noturus phaeus</i>	Brown Madtom	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Noturus phaeus</i>	Brown Madtom	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Noturus phaeus</i>	Brown Madtom	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	50
<i>Noturus phaeus</i>	Brown Madtom	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	High	Proceed	34.375	50
<i>Noturus phaeus</i>	Brown Madtom	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Noturus phaeus</i>	Brown Madtom	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Noturus phaeus</i>	Brown Madtom	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Noturus stigmosus</i>	Northern Madtom	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Noturus stigmosus</i>	Northern Madtom	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	High	Proceed	18.75	50
<i>Noturus stigmosus</i>	Northern Madtom	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Noturus stigmosus</i>	Northern Madtom	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Noturus stigmosus</i>	Northern Madtom	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Noturus stigmosus</i>	Northern Madtom	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Noturus stigmosus</i>	Northern Madtom	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Noturus stigmosus</i>	Northern Madtom	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Noturus stigmosus</i>	Northern Madtom	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Percina macrocephala</i>	Longhead Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Percina macrocephala</i>	Longhead Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Percina macrocephala</i>	Longhead Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Percina macrocephala</i>	Longhead Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Percina macrocephala</i>	Longhead Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Percina macrocephala</i>	Longhead Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Percina macrocephala</i>	Longhead Darter	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	High	Proceed	18.75	50
<i>Percina macrocephala</i>	Longhead Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Percina macrocephala</i>	Longhead Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Percina squamata</i>	Olive Darter	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Percina squamata</i>	Olive Darter	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Percina squamata</i>	Olive Darter	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Percina squamata</i>	Olive Darter	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Percina squamata</i>	Olive Darter	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Percina squamata</i>	Olive Darter	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Percina squamata</i>	Olive Darter	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Highest	Proceed	18.75	65.625
<i>Percina squamata</i>	Olive Darter	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Percina squamata</i>	Olive Darter	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	65.625
<i>Percina squamata</i>	Olive Darter	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	Highest	Proceed	34.375	65.625
<i>Percina squamata</i>	Olive Darter	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Percopsis omiscomaycus</i>	Trout-perch	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Percopsis omiscomaycus</i>	Trout-perch	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Percopsis omiscomaycus</i>	Trout-perch	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Percopsis omiscomaycus</i>	Trout-perch	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Percopsis omiscomaycus</i>	Trout-perch	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Percopsis omiscomaycus</i>	Trout-perch	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Percopsis omiscomaycus</i>	Trout-perch	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Phenacobius uranops</i>	Stargazing Minnow	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Phenacobius uranops</i>	Stargazing Minnow	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Phenacobius uranops</i>	Stargazing Minnow	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Phenacobius uranops</i>	Stargazing Minnow	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Phenacobius uranops</i>	Stargazing Minnow	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Phenacobius uranops</i>	Stargazing Minnow	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	81.25
<i>Phenacobius uranops</i>	Stargazing Minnow	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	High	Proceed	18.75	50
<i>Phenacobius uranops</i>	Stargazing Minnow	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Phenacobius uranops</i>	Stargazing Minnow	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Platygobio gracilis</i>	Flathead Chub	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	18.75	34.375
<i>Platygobio gracilis</i>	Flathead Chub	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Platygobio gracilis</i>	Flathead Chub	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Platygobio gracilis</i>	Flathead Chub	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Platygobio gracilis</i>	Flathead Chub	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Platygobio gracilis</i>	Flathead Chub	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Platygobio gracilis</i>	Flathead Chub	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Platygobio gracilis</i>	Flathead Chub	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Polyodon spathula</i>	Paddlefish	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	18.75	34.375
<i>Polyodon spathula</i>	Paddlefish	Improve fish passage at hydropower dams	Eliminate or reduce barriers to fish passage.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	34.375
<i>Polyodon spathula</i>	Paddlefish	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Polyodon spathula</i>	Paddlefish	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	6.25	3.125
<i>Polyodon spathula</i>	Paddlefish	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	Moderate	Consider	34.375	34.375
<i>Polyodon spathula</i>	Paddlefish	Implement strategies to prevent or minimize entrainment	Work with partners to develop and incorporate entrainment minimization measures as needed.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	34.375	34.375
<i>Polyodon spathula</i>	Paddlefish	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	68.75
<i>Polyodon spathula</i>	Paddlefish	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	21.875	37.5
<i>Polyodon spathula</i>	Paddlefish	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Polyodon spathula</i>	Paddlefish	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Polyodon spathula</i>	Paddlefish	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Polyodon spathula</i>	Paddlefish	Improve coordinated efforts between fisheries and law enforcement divisions to prevent illegal harvest	Eliminate or minimize illegal harvest of Paddlefish in Kentucky.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Polyodon spathula</i>	Paddlefish	Review recreational and commercial fishing regulations and adjust as needed to ensure population sustainability	Prevent overharvest that could result in population extirpations.	Law and Policy	Policies and Regulations	Moderate	Proceed	21.875	65.625
<i>Polyodon spathula</i>	Paddlefish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Modify current dam operations on large rivers to restore a more natural hydrograph	Meet life history requirements, including successful spawning and larval survival, necessary to promote species recovery.	External Capacity Building	Alliance and Partnership Development	High	Proceed	18.75	50
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	6.25	18.75
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Improve compliance with and enforcement of existing regulations designed to prevent introduction and spread of aquatic nuisance species	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Law and Policy	Compliance and Enforcement	High	Proceed	34.375	50
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Implement strategies to prevent or minimize entrainment	Work with partners to develop and incorporate entrainment minimization measures as needed.	External Capacity Building	Alliance and Partnership Development	High	Proceed	34.375	50
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Improve coordinated efforts with federal and state partners to prevent illegal harvest	Eliminate or minimize illegal harvest of Pallid Sturgeon in Kentucky.	External Capacity Building	Alliance and Partnership Development	High	Consider	34.375	18.75
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	Highest	Proceed	21.875	68.75
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Refrain from stocking non-native piscivorous sportfish species in streams inhabited by the Blackfin Sucker	Prevent predation impacts to the Blackfin Sucker from non-native piscivorous species.	Land/Water Management	Invasive/Problematic Species Control	Highest	Proceed	6.25	65.625
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Identify locations of physical barriers and remove them or provide mitigation alternatives to removal	Eliminate or reduce barriers to fish passage.	Land/Water Management	Land/Water Management- Other	Highest	Investigate	96.875	96.875
<i>Thoburnia atripinnis</i>	Blackfin Sucker	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Typlichthys subterraneus</i>	Southern Cavefish	Acquisition and conservation easements of cave entrances and surrounding land within recharge zones	Prevent loss or degradation of subterranean aquatic habitats.	Land/Water Protection	Site/Area Protection	High	Investigate	96.875	84.375

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Implement a public awareness program to inform landowners and others of the harmful impacts of dumping into sinkholes on groundwater and life it contains	Prevent groundwater contamination and water quality degradation in subterranean systems.	Education and Awareness	Education and Awareness- Other	High	Consider	18.75	18.75
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Ensure that protection zones or other mitigation measures recommended by a management prescription will be established around cave entrances, sinkholes, and swallow holes	Prevent loss or degradation of subterranean aquatic habitats.	Land/Water Protection	Land/Water Management- Other	High	Investigate	100	53.125
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Work with municipalities, industries, and government agencies to reduce impacts of non-point and storm water runoff	Reduce waste effluents and runoff into aquatic systems.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Provide incentives to protect riparian corridors and watersheds, including cave entrances and recharge zones	Protect riparian corridors and cave entrances and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Expand implementation of existing Best Management Practices, including reforestation around cave entrances, sinkholes, and recharge zones	Prevent loss or degradation of subterranean aquatic habitats.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	53.125
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Work with partners to maintain compliance with state and federal laws aimed at protecting caves, karst windows, and groundwater resources	Prevent loss or degradation of subterranean aquatic habitats.	External Capacity Building	Alliance and Partnership Development	High	Proceed	34.375	53.125
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Inform and educate the public on negative impacts of overcollecting unique and sensitive species	Prevent overcollection of species that are sensitive or vulnerable to overharvest.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	18.75
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Improve mitigation and containment of major effluent spills of toxic or hazardous waste	Reduce impacts of acute pollution incidents.	Land/Water Management	Land/Water Management- Other	High	Investigate	96.875	50
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Improve compliance and enforcement of regulations aimed at preventing major effluent spills of toxic or hazardous waste	Prevent acute pollution incidents.	Law and Policy	Compliance and Enforcement	High	Proceed	34.375	50
<i>Typhlichthys subterraneus</i>	Southern Cavefish	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Umbr a limi</i>	Central Mudminnow	Acquisition and conservation easements of critical aquatic habitat	Protect riparian corridor habitat and maintain good water quality.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Umbr a limi</i>	Central Mudminnow	Encourage and assist in development and implementation of Best Management Practices for aquatic systems	Prevent habitat loss and water quality degradation.	Land/Water Management	Land/Water Management- Other	High	Proceed	21.875	53.125
<i>Umbr a limi</i>	Central Mudminnow	Restoration of degraded aquatic habitat	Restore stream and wetland habitat and improve water quality.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Umbr a limi</i>	Central Mudminnow	Inform and educate user groups on importance of riparian corridors and watersheds	Prevent habitat loss and water quality degradation.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Umbr a limi</i>	Central Mudminnow	Provide incentives to protect riparian corridors and watersheds	Protect riparian corridor habitat and maintain good water quality.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Umbr a limi</i>	Central Mudminnow	Implement strategies to prevent and control aquatic nuisance species, as outlined in the Kentucky Aquatic Nuisance Species Management Plan	Prevent introduction and mitigate impacts of nonindigenous and exotic species in aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	6.25	18.75
<i>Umbr a limi</i>	Central Mudminnow	Refrain from stocking non-native piscivorous sportfish species in streams inhabited by fish SGCN	Prevent predation impacts to fish SGCN from non-native piscivorous species.	Land/Water Management	Invasive/Problematic Species Control	High	Proceed	6.25	50
<i>Umbr a limi</i>	Central Mudminnow	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75

APX 7.1e Actions Identified for Freshwater Mussel and Snail SGCN

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Actinonaias pectorosa</i>	Pheasantshell	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Actinonaias pectorosa</i>	Pheasantshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Re-Evaluate	100	46.875
<i>Actinonaias pectorosa</i>	Pheasantshell	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines.	Education and Awareness	Awareness and Communications	High	Consider	21.875	18.75
<i>Actinonaias pectorosa</i>	Pheasantshell	Species Management	Culturing individuals for the purpose of augmentation and/or reintroduction to optimize populations in the Upper Cumberland River tribs in Kentucky.	Species Management	Species Management- Other	High	Investigate	68.75	81.25
<i>Alasmidonta atropurpurea</i>	Cumberland Elktoe	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	96.875	68.75
<i>Alasmidonta atropurpurea</i>	Cumberland Elktoe	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	31.25
<i>Alasmidonta atropurpurea</i>	Cumberland Elktoe	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	Highest	Investigate	68.75	68.75
<i>Alasmidonta marginata</i>	Elktoe	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	53.125
<i>Alasmidonta marginata</i>	Elktoe	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Alasmidonta marginata</i>	Elktoe	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	High	Consider	34.375	21.875
<i>Alasmidonta viridis</i>	Slippershell Mussel	Economic and Other Incentives	Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	50
<i>Alasmidonta viridis</i>	Slippershell Mussel	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	18.75
<i>Alasmidonta viridis</i>	Slippershell Mussel	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	50
<i>Alasmidonta viridis</i>	Slippershell Mussel	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Anodontoides denigrata</i>	Cumberland Papershell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	65.625
<i>Anodontoides denigrata</i>	Cumberland Papershell	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	34.375

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Anodontoides denigrata</i>	Cumberland Papershell	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	37.5
<i>Anodontoides denigrata</i>	Cumberland Papershell	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	65.625
<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	34.375
<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Cumberlandia monodonta</i>	Spectaclecase	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	53.125
<i>Cumberlandia monodonta</i>	Spectaclecase	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Cumberlandia monodonta</i>	Spectaclecase	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Cumberlandia monodonta</i>	Spectaclecase	Augmentation and Reintroduction	Augmentation of existing populations and reintroduction of the species into historic range.	Species Management	Species Reintroduction	high	Investigate	53.125	84.375
<i>Cyprogenia stegaria</i>	Fanshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Re-Evaluate	96.875	46.875
<i>Cyprogenia stegaria</i>	Fanshell	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	18.75
<i>Cyprogenia stegaria</i>	Fanshell	Species Management	Culturing individuals for the purpose of augmentation and/or reintroduction to optimize populations in Kentucky.	Species Management	Species Management- Other	High	Investigate	68.75	81.25
<i>Cyprogenia stegaria</i>	Fanshell	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Dromus dromas</i>	Drummedary Pearlymussel	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	50

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Dromus dromas</i>	Dromedary Pearlmussel	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	High	Consider	21.875	18.75
<i>Dromus dromas</i>	Dromedary Pearlmussel	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Ellipsaria lineolata</i>	Butterfly	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	53.125
<i>Ellipsaria lineolata</i>	Butterfly	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	37.5	37.5
<i>Ellipsaria lineolata</i>	Butterfly	Partnership Development	Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Elliptio crassidens</i>	Elephantear	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	50
<i>Elliptio crassidens</i>	Elephantear	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Elliptio crassidens</i>	Elephantear	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Elliptio crassidens</i>	Elephantear	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGON habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Epioblasma brevidens</i>	Cumberlandian Combshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	96.875	68.75
<i>Epioblasma brevidens</i>	Cumberlandian Combshell	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Epioblasma brevidens</i>	Cumberlandian Combshell	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	Highest	Investigate	68.75	68.75
<i>Epioblasma brevidens</i>	Cumberlandian Combshell	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Epioblasma capsaeformis</i>	Oyster Mussel	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	96.875	65.625
<i>Epioblasma capsaeformis</i>	Oyster Mussel	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	34.375
<i>Epioblasma capsaeformis</i>	Oyster Mussel	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Epioblasma capsaeformis</i>	Oyster Mussel	Reintroduction	Reintroducing the species into historic range.	Species Management	Species Reintroduction	Highest	Investigate	68.75	96.875
<i>Epioblasma obliquata</i>	Catspaw	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	96.875	68.75
<i>Epioblasma obliquata</i>	Catspaw	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Epioblasma obliquata</i>	Catspaw	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	Highest	Investigate	68.75	68.75
<i>Epioblasma obliquata</i>	Catspaw	Partnership Development	Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	37.5
<i>Epioblasma rangiana</i>	Northern Riffleshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	96.875	68.75
<i>Epioblasma rangiana</i>	Northern Riffleshell	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Epioblasma rangiana</i>	Northern Riffleshell	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	Highest	Investigate	68.75	68.75
<i>Epioblasma rangiana</i>	Northern Riffleshell	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	37.5
<i>Epioblasma triquetra</i>	Snuffbox	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Epioblasma triquetra</i>	Snuffbox	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Epioblasma triquetra</i>	Snuffbox	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	53.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Epioblasma triquetra</i>	Snuffbox	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Epioblasma triquetra</i>	Snuffbox	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	21.875
<i>Epioblasma triquetra</i>	Snuffbox	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Epioblasma walkeri</i>	Tan Riffleshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	65.625
<i>Epioblasma walkeri</i>	Tan Riffleshell	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	34.375
<i>Epioblasma walkeri</i>	Tan Riffleshell	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	Highest	Investigate	68.75	65.625
<i>Epioblasma walkeri</i>	Tan Riffleshell	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Epioblasma walkeri</i>	Tan Riffleshell	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	37.5
<i>Epioblasma walkeri</i>	Tan Riffleshell	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Fusconaia subrotunda</i>	Longsolid	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	50
<i>Fusconaia subrotunda</i>	Longsolid	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Fusconaia subrotunda</i>	Longsolid	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Hemistena lata</i>	Cracking Pearlymussel	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Hemistena lata</i>	Cracking Pearlymussel	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	6.25
<i>Hemistena lata</i>	Cracking Pearlymussel	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Hemistena lata</i>	Cracking Pearlymussel	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	6.25	3.125
<i>Lampsilis abrupta</i>	Pink Mucket	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	50
<i>Lampsilis abrupta</i>	Pink Mucket	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	18.75
<i>Lampsilis abrupta</i>	Pink Mucket	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	53.125
<i>Lampsilis abrupta</i>	Pink Mucket	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Lampsilis hydlana</i>	Louisiana Fatmucket	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	50
<i>Lampsilis hydlana</i>	Louisiana Fatmucket	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	18.75
<i>Lampsilis hydlana</i>	Louisiana Fatmucket	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	50
<i>Lampsilis hydlana</i>	Louisiana Fatmucket	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Lampsilis hydlana</i>	Louisiana Fatmucket	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	21.875
<i>Lampsilis hydlana</i>	Louisiana Fatmucket	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Lampsilis ovata</i>	Pockelbook	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	50
<i>Lampsilis ovata</i>	Pockelbook	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	18.75
<i>Lampsilis ovata</i>	Pockelbook	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	53.125
<i>Lampsilis ovata</i>	Pockelbook	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Lampsilis ovata</i>	Pocketbook	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Lasmigona compressa</i>	Creek Heelsplitter	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	50
<i>Lasmigona compressa</i>	Creek Heelsplitter	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	18.75
<i>Lasmigona compressa</i>	Creek Heelsplitter	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Leaunio lenosus</i>	Little Spectaclecase	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	34.375
<i>Leaunio lenosus</i>	Little Spectaclecase	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	3.125
<i>Leaunio lenosus</i>	Little Spectaclecase	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	6.25
<i>Leaunio lenosus</i>	Little Spectaclecase	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Leaunio ortmanni</i>	Kentucky Creekshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	96.875	65.625
<i>Leaunio ortmanni</i>	Kentucky Creekshell	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	Highest	Consider	21.875	34.375
<i>Leaunio ortmanni</i>	Kentucky Creekshell	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	Highest	Investigate	68.75	68.75
<i>Leaunio ortmanni</i>	Kentucky Creekshell	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	37.5
<i>Leaunio ortmanni</i>	Kentucky Creekshell	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Leaunio pataecus</i>	Dwarf Rainbow	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Leaunio pataecus</i>	Dwarf Rainbow	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	Highest	Consider	21.875	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Leaunia pataecus</i>	Dwarf Rainbow	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Leaunia pataecus</i>	Dwarf Rainbow	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	37.5
<i>Leaunia pataecus</i>	Dwarf Rainbow	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Leaunia vanuxemensis</i>	Mountain Creekshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	65.625
<i>Leaunia vanuxemensis</i>	Mountain Creekshell	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	Highest	Consider	21.875	37.5
<i>Leaunia vanuxemensis</i>	Mountain Creekshell	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	Highest	Investigate	68.75	68.75
<i>Leaunia vanuxemensis</i>	Mountain Creekshell	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Leaunia vanuxemensis</i>	Mountain Creekshell	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	37.5
<i>Leaunia vanuxemensis</i>	Mountain Creekshell	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Leptodea leptodon</i>	Scaleshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Leptodea leptodon</i>	Scaleshell	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	3.125
<i>Leptodea leptodon</i>	Scaleshell	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	6.25
<i>Leptodea leptodon</i>	Scaleshell	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Ligumia recta</i>	Black Sandshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	50
<i>Ligumia recta</i>	Black Sandshell	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	50
<i>Ligumia recta</i>	Black Sandshell	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	High	Consider	21.875	21.875

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Ligumia recta</i>	Black Sandshell	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Ligumia recta</i>	Black Sandshell	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Medionidius conradicus</i>	Cumberland Moccasinshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Medionidius conradicus</i>	Cumberland Moccasinshell	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	Highest	Consider	21.875	37.5
<i>Medionidius conradicus</i>	Cumberland Moccasinshell	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	Highest	Investigate	68.75	68.75
<i>Medionidius conradicus</i>	Cumberland Moccasinshell	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Medionidius conradicus</i>	Cumberland Moccasinshell	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	37.5
<i>Medionidius conradicus</i>	Cumberland Moccasinshell	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Obovaria olivaria</i>	Hickorynut	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	53.125
<i>Obovaria olivaria</i>	Hickorynut	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	37.5	21.875
<i>Obovaria olivaria</i>	Hickorynut	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	84.375
<i>Obovaria olivaria</i>	Hickorynut	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Obovaria retusa</i>	Ring Pink	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	96.875	68.75
<i>Obovaria retusa</i>	Ring Pink	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Obovaria retusa</i>	Ring Pink	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	37.5
<i>Obovaria retusa</i>	Ring Pink	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Obovaria subrotunda</i>	Round Hickorynut	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	50
<i>Obovaria subrotunda</i>	Round Hickorynut	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	18.75
<i>Obovaria subrotunda</i>	Round Hickorynut	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	53.125
<i>Obovaria subrotunda</i>	Round Hickorynut	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Obovaria subrotunda</i>	Round Hickorynut	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Paetulunio fabalis</i>	Rayed Bean	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Paetulunio fabalis</i>	Rayed Bean	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Paetulunio fabalis</i>	Rayed Bean	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	Moderate	Re-Evaluate	68.75	37.5
<i>Paetulunio fabalis</i>	Rayed Bean	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Paetulunio fabalis</i>	Rayed Bean	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Pegias fabula</i>	Littletwing Pearlymussel	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Pegias fabula</i>	Littletwing Pearlymussel	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Pegias fabula</i>	Littletwing Pearlymussel	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	37.5
<i>Pegias fabula</i>	Littletwing Pearlymussel	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Plethobasus cicatricosus</i>	White Wartyback	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	37.5
<i>Plethobasus cicatricosus</i>	White Wartyback	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	3.125
<i>Plethobasus cicatricosus</i>	White Wartyback	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative. Develop mitigation plan for impacted aquatic systems.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	6.25
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	53.125
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Develop mitigation plan for impacted aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Plethobasus cyphyus</i>	Sheepnose	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	53.125
<i>Plethobasus cyphyus</i>	Sheepnose	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Plethobasus cyphyus</i>	Sheepnose	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's).	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Pleurobema clava</i>	Clubshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	53.125
<i>Pleurobema clava</i>	Clubshell	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	High	Consider	21.875	21.875
<i>Pleurobema clava</i>	Clubshell	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	53.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Pleurobema clava</i>	Clubshell	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Pleurobema clava</i>	Clubshell	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	84.375
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	High	Consider	37.5	21.875
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Pleurobema cordatum</i>	Ohio Pigtoe	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	68.75
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	37.5
<i>Pleurobema oviforme</i>	Tennessee Clubshell	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75
<i>Pleurobema plenum</i>	Rough Pigtoe	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	96.875	68.75
<i>Pleurobema plenum</i>	Rough Pigtoe	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Pleurobema plenum</i>	Rough Pigtoe	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Pleurobema plenum</i>	Rough Pigtoe	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	96.875	68.75
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Highest	Consider	21.875	37.5
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	37.5
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Pleuroaia dolabelloides</i>	Slabside Pearlymussel	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	100	37.5
<i>Pleuroaia dolabelloides</i>	Slabside Pearlymussel	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	21.875	6.25
<i>Pleuroaia dolabelloides</i>	Slabside Pearlymussel	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Pleuroaia dolabelloides</i>	Slabside Pearlymussel	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	6.25
<i>Pleuroaia dolabelloides</i>	Slabside Pearlymussel	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Potamilus capax</i>	Fat Pocketbook	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	50
<i>Potamilus capax</i>	Fat Pocketbook	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Potamilus capax</i>	Fat Pocketbook	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Potamilus purpuratus</i>	Bleufer	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	53.125
<i>Potamilus purpuratus</i>	Bleufer	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Potamilus purpuratus</i>	Bleufer	Partnership Development	Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Potamilus purpuratus</i>	Bleufer	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Pychobranchus subtentus</i>	Fluted Kidneyshell	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	53.125
<i>Pychobranchus subtentus</i>	Fluted Kidneyshell	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Pychobranchus subtentus</i>	Fluted Kidneyshell	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	53.125
<i>Pychobranchus subtentus</i>	Fluted Kidneyshell	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Quadrula fragosa</i>	Winged Mapleleaf	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Quadrula fragosa</i>	Winged Mapleleaf	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	6.25
<i>Quadrula fragosa</i>	Winged Mapleleaf	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	6.25
<i>Quadrula fragosa</i>	Winged Mapleleaf	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Sagittunio subrostratus</i>	Pondmussel	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Sagittunio subrostratus</i>	Pondmussel	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	37.5	18.75
<i>Sagittunio subrostratus</i>	Pondmussel	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	21.875
<i>Sagittunio subrostratus</i>	Pondmussel	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Simpsonia ambigua</i>	Salamander Mussel	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	53.125
<i>Simpsonia ambigua</i>	Salamander Mussel	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	21.875
<i>Simpsonia ambigua</i>	Salamander Mussel	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	53.125
<i>Simpsonia ambigua</i>	Salamander Mussel	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Simpsonia ambigua</i>	Salamander Mussel	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Theileria cylindrica</i>	Rabbitsfoot	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	96.875	53.125
<i>Theileria cylindrica</i>	Rabbitsfoot	Education and Awareness	Develop public aquatic education programs to inform and educate user groups about mussel conservation, diversity, and causes of declines. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	High	Consider	21.875	21.875
<i>Theileria cylindrica</i>	Rabbitsfoot	Species Management	Reintroducing and enhancing aquatic populations using propagation and culture as well as augmentation from wild sources.	Species Management	Species Management- Other	High	Investigate	68.75	53.125
<i>Theileria cylindrica</i>	Rabbitsfoot	Partnership Development	Work with dam and hydroelectric operators to enhance and protect aquatic habitat. Work with municipalities, industries, and government agencies to reduce physical impacts of non-point and storm water runoff including Total Maximum Daily Loads (TMDL's). Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	21.875
<i>Theileria cylindrica</i>	Rabbitsfoot	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Toxolasma lividum</i>	Purple Liliiput	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	50
<i>Toxolasma lividum</i>	Purple Liliiput	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	High	Consider	21.875	21.875
<i>Toxolasma lividum</i>	Purple Liliiput	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	High	Investigate	68.75	53.125
<i>Toxolasma lividum</i>	Purple Liliiput	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Toxolasma lividum</i>	Purple Liliiput	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	21.875
<i>Toxolasma lividum</i>	Purple Liliiput	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Toxolasma texasense</i>	Texas Lilliput	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	High	Investigate	100	50
<i>Toxolasma texasense</i>	Texas Lilliput	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Education and Awareness- Other	High	Consider	21.875	18.75
<i>Toxolasma texasense</i>	Texas Lilliput	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	21.875
<i>Toxolasma texasense</i>	Texas Lilliput	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Venustaconcha troostensis</i>	Cumberland Bean	Economic and Other Incentives	Financial incentives to protect riparian corridors and watersheds. Coordinate and implement existing Farm Bill programs, or other federal incentive programs as applied to aquatic systems.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	65.625
<i>Venustaconcha troostensis</i>	Cumberland Bean	Education and Awareness	Inform and educate user groups on significance and importance of riparian corridors and watersheds. Educate user groups about the proper implementation of Best Management Practices as applied to aquatic systems.	Education and Awareness	Awareness and Communications	Highest	Consider	21.875	34.375
<i>Venustaconcha troostensis</i>	Cumberland Bean	Species Management	Develop priorities and technology for reintroducing and enhancing aquatic populations.	Species Management	Species Management- Other	Highest	Investigate	68.75	68.75
<i>Venustaconcha troostensis</i>	Cumberland Bean	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Venustaconcha troostensis</i>	Cumberland Bean	Partnership Development	Develop, encourage, and initiate local watershed improvement initiative.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	37.5
<i>Venustaconcha troostensis</i>	Cumberland Bean	Habitat restoration	Restoration of degraded aquatic habitat through use of programs such as Fees in Lieu, or other federal grants.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	68.75

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Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Acroneuria covelli</i>	River Stone	Evaluate the potential for restoration	Develop a management plan and implement habitat and natural process restoration, if applicable.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Acroneuria covelli</i>	River Stone	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Acroneuria covelli</i>	River Stone	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Acroneuria hitchcocki</i>	Kentucky Stone	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Acroneuria hitchcocki</i>	Kentucky Stone	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Acroneuria hitchcocki</i>	Kentucky Stone	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Agapetus gelbae</i>		Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	34.375
<i>Agapetus gelbae</i>		Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	3.125
<i>Agapetus kirchneri</i>		Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Agapetus kirchneri</i>		Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Agapetus kirchneri</i>		Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Allocapnia cunninghami</i>	Karst Snowfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Allocapnia cunninghami</i>	Karst Snowfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Allocapnia cunninghami</i>	Karst Snowfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Amphiagrion saucium</i>	Eastern Red Damselfly	Wetland Restoration	Restore and manage wetland habitat to meet habitat requirements, such as by controlling overgrowth of aquatic weeds caused by pollutants.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Amphiagrion saucium</i>	Eastern Red Damselfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	34.375
<i>Amphiagrion saucium</i>	Eastern Red Damselfly	Acquisition and protection of habitat	Facilitate purchase of high-quality bog and seep habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	96.875	65.625
<i>Amphiagrion saucium</i>	Eastern Red Damselfly	Develop logging best management practices	Develop best management practices for logging to prevent erosion and siltation.	Land/Water Management	Land/Water Management- Other	Moderate	Consider	18.75	0
<i>Amphiagrion saucium</i>	Eastern Red Damselfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	3.125
<i>Argemphus maxwelli</i>	Bayou Clubtail	Wetland Restoration	Restore and manage wetland habitat to meet habitat requirements, such as by controlling overgrowth of aquatic weeds caused by pollutants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Argemphus maxwelli</i>	Bayou Clubtail	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Argomphus maxwelli</i>	Bayou Cluetail	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Bombus pensylvanicus</i>	American Bumble Bee	Minimize pathogen exposure	Provide guidance to commercial bumblebee importers informing them of best management practices to minimize exposure of wild bees to managed bees.	Education and Awareness	Awareness and Communications	High	Consider	0	15.625
<i>Bombus pensylvanicus</i>	American Bumble Bee	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	High	Proceed	21.875	50
<i>Bombus pensylvanicus</i>	American Bumble Bee	Provide pollinator planting resources for private lands	Work with Private Lands Biologists to establish seed resources, planting guides and financial incentives for landowners willing to plant and maintain diverse, native, pollinator plots.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Bombus pensylvanicus</i>	American Bumble Bee	Establish best management practices for developers	Work with developers to mitigate impacts of construction, establish best management practices to ensure pollinator habitat is preserved or created during the development process.	External Capacity Building	Alliance and Partnership Development	High	Consider	34.375	15.625
<i>Bombus pensylvanicus</i>	American Bumble Bee	Promote reduced mowing initiatives	Provide education and outreach encouraging farmers and landowners to reduce mowing and leave sections of native species where possible.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Bombus pensylvanicus</i>	American Bumble Bee	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Calephelis borealis</i>	Northern Metalmark	Provide pollinator planting resources for private lands	Work with Private Lands Biologists to establish seed resources, planting guides and financial incentives for landowners willing to plant and maintain diverse, native, pollinator plots.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	53.125
<i>Calephelis borealis</i>	Northern Metalmark	Establish best management practices for developers	Work with developers to mitigate impacts of construction, establish best management practices to ensure pollinator habitat is preserved or created during the development process.	External Capacity Building	Alliance and Partnership Development	High	Consider	34.375	18.75
<i>Calephelis borealis</i>	Northern Metalmark	Promote reduced mowing initiatives	Provide education and outreach encouraging farmers and landowners to reduce mowing and leave sections of native species where possible.	Education and Awareness	Awareness and Communications	High	Consider	3.125	21.875
<i>Calephelis borealis</i>	Northern Metalmark	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Calephelis multicum</i>	Swamp Metalmark	Acquisition and protection of habitat	Identify, acquire, and maintain high quality wetland habitat.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Calephelis multicum</i>	Swamp Metalmark	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Callophrys irus</i>	Frosted Elfin	Pine barrens restoration	Develop and implement management plans to enhance pine barrens, emphasizing the importance of prescribed fire and its impacts on the target species.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	53.125
<i>Callophrys irus</i>	Frosted Elfin	Wildfire prevention and control	Develop management plans to reduce wildfire impact on populations. Establish long term fire breaks and other fire control measures across Pine Mountain region.	Land/Water Management	Land/Water Management- Other	High	Proceed	18.75	50
<i>Callophrys irus</i>	Frosted Elfin	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Calopteryx dimidiata</i>	Sparkling Jewelwing	Stream Restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50

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<i>Calopteryx dimidiata</i>	Sparkling Jewelwing	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Calopteryx dimidiata</i>	Sparkling Jewelwing	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Celithemis verna</i>	Double-ringed Pennant	Wetland Restoration	Restore and manage wetland habitat to meet habitat requirements, such as by controlling overgrowth of aquatic weeds caused by pollutants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Celithemis verna</i>	Double-ringed Pennant	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Celithemis verna</i>	Double-ringed Pennant	Acquisition and protection of habitat	Facilitate purchase of high-quality bog and seep habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Celithemis verna</i>	Double-ringed Pennant	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Celithemis verna</i>	Double-ringed Pennant	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Chlosyne gorgone</i>	Gorgone Checkerspot	Provide pollinator planting resources for private lands	Work with Private Lands Biologists to establish seed resources, planting guides and financial incentives for landowners willing to plant and maintain diverse, native, pollinator plots.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	37.5
<i>Chlosyne gorgone</i>	Gorgone Checkerspot	Implement prescribed fire	Work with partners to maintain and enhance habitat through appropriate prescribed fire regimes.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	34.375	34.375
<i>Chlosyne gorgone</i>	Gorgone Checkerspot	Promote reduced mowing initiatives	Provide education and outreach encouraging farmers and landowners to reduce mowing and leave sections of native species where possible.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	6.25
<i>Chlosyne gorgone</i>	Gorgone Checkerspot	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Danaus plexippus plexippus</i>	Monarch	Increase the number of Monarch Waystations throughout Kentucky	Promote Monarch Waystations and increase understanding of the public of the habitat needs of the monarch butterfly. Educate landowners on what they can do in their own backyard to provide habitat for monarchs.	Education and Awareness	Awareness and Communications	Moderate	Consider	18.75	6.25
<i>Danaus plexippus plexippus</i>	Monarch	Encourage private landowner participation in pollinator enhancement initiatives	Provide education and outreach encouraging farmers and landowners to reduce mowing and leave sections of native species where possible.	Education and Awareness	Awareness and Communications	moderate	Consider	3.125	6.25
<i>Danaus plexippus plexippus</i>	Monarch	Establish best management practices for developers	Work with developers to mitigate impacts of construction, establish best management practices to ensure pollinator habitat is preserved or created during the development process.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	34.375	3.125
<i>Danaus plexippus plexippus</i>	Monarch	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect insects on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	Moderate	Consider	21.875	34.375
<i>Danaus plexippus plexippus</i>	Monarch	OE Educational Campaign	Create an educational campaign to inform on the risks of indoor monarch rearing and OE transmission. Provide information on proper rearing protocols encouraging sanitation and Educate the public about the risks of planting tropical milkweed and the link to increased OE presence.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	3.125

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<i>Danaus plexippus plexippus</i>	Monarch	Incentivize pollinator habitat creation on private lands	Work with Private Lands Biologists to establish seed resources, planting guides and financial incentives for landowners willing to plant diverse, native, pollinator plots.	Livelihood, Economic and Other Incentives	Conservation Payments	Moderate	Re-Evaluate	96.875	34.375
<i>Danaus plexippus plexippus</i>	Monarch	Create monarch habitat demonstration sites around the state	Develop one demonstration site per county to show examples of high quality monarch habitat for the public to learn from. Create signage explaining the need for monarch conservation and where to obtain more information.	Education and Awareness	Awareness and Communications	Moderate	Investigate	50	68.75
<i>Danaus plexippus plexippus</i>	Monarch	Implement pollinator plantings at all WMAs in Kentucky	Purchase and provide seed and necessary equipment for public lands biologists and managers to plant pollinator plantings including milkweed seed at every Wildlife Management Area in Kentucky.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Investigate	84.375	68.75
<i>Danaus plexippus plexippus</i>	Monarch	Encourage pollinator plantings on rights-of-way	Work with right-of-way stakeholders to encourage habitat conversion on un-used right-of-ways. Discuss the possibilities of using these restoration areas to harvest seed for future plantings.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	18.75	37.5
<i>Danaus plexippus plexippus</i>	Monarch	Monitor monarch migration and summer breeding populations in Kentucky	Train volunteers, stakeholders, and agency partners on monarch monitoring methods. Increase public interest in tracking and monitoring monarchs through established programs (Journey North, Monarch Watch, Monarch Larva Monitoring Program, Integrated Monarch Monitoring Program).	Education and Awareness	Training	Moderate	Consider	34.375	37.5
<i>Danaus plexippus plexippus</i>	Monarch	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Enallagma dacekii</i>	Attenuated Bluet	Wetland Restoration	Restore and manage wetland habitat to meet habitat requirements, such as by controlling overgrowth of aquatic weeds caused by pollutants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Enallagma dacekii</i>	Attenuated Bluet	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Enallagma dacekii</i>	Attenuated Bluet	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Erora laeta</i>	Early Hairstreak	Acquisition and protection of habitat	Identify, acquire, and maintain high quality habitat.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	96.875
<i>Erora laeta</i>	Early Hairstreak	Develop best management practices	Develop best management practices for logging to reduce impact on populations and maintain appropriate habitat structure.	Education and Awareness	Awareness and Communications	Highest	Proceed	3.125	65.625
<i>Erynnis martialis</i>	Mottled Duskywing	Restore native prairie and barrens habitats	Develop and implement management plans to enhance barrens and prairie remnant habitats, emphasizing the importance of prescribed fire and its impacts on the target species.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	68.75	84.375
<i>Erynnis martialis</i>	Mottled Duskywing	Site/area protection	Facilitate purchase of high-quality barrens and prairie remnant habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	93.75	84.375
<i>Erynnis martialis</i>	Mottled Duskywing	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Euphyes dukesi</i>	Dukes' Skipper	Purchase high-quality habitat	Facilitate purchase of high-quality wetland habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Euphyes dukesi</i>	Dukes' Skipper	Develop best management practices	Develop best management practices for logging to reduce impact on populations and maintain appropriate habitat structure.	Education and Awareness	Awareness and Communications	High	Proceed	3.125	50

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<i>Euphyes dukesi</i>	Dukes' Skipper	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Gomphurus hybridus</i>	Cocoa Clubtail	Evaluate the potential for restoration	Develop a management plan and implement habitat and natural process restoration, if applicable.	Land/Water Management	Habitat and Natural Process Restoration	High	Re-Evaluate	96.875	46.875
<i>Gomphurus hybridus</i>	Cocoa Clubtail	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Gomphurus hybridus</i>	Cocoa Clubtail	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Hansonoferla hokolesqua</i>	Splendid Stone	Encourage private landowner participation in nonpoint source pollution prevention	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Hansonoferla hokolesqua</i>	Splendid Stone	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Hansonoferla hokolesqua</i>	Splendid Stone	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Hydroptila covei</i>	A Hydroptilid Caddisfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Hydroptila covei</i>	A Hydroptilid Caddisfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Hydroptila covei</i>	A Hydroptilid Caddisfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Hydroptila decia</i>	Knoxville Hydroptilid Micro Caddisfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Hydroptila decia</i>	Knoxville Hydroptilid Micro Caddisfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Hydroptila decia</i>	Knoxville Hydroptilid Micro Caddisfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Hydroptila howelli</i>	A Hydroptilid Caddisfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Hydroptila howelli</i>	A Hydroptilid Caddisfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Hydroptila howelli</i>	A Hydroptilid Caddisfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Hydroptila kuehnei</i>	A Hydroptilid Caddisfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Hydroptila kuehnei</i>	A Hydroptilid Caddisfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Site/Area Management	Highest	Investigate	96.875	65.625
<i>Hydroptila kuehnei</i>	A Hydroptilid Caddisfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Hystriophora loricana</i>	An Olethreutine Moth	Restore native prairie and barrens habitats	Develop and implement management plans to enhance barrens and prairie remnant habitats, emphasizing the importance of prescribed fire and its impacts on the target species.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	68.75	84.375

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<i>Hystriochophora loricana</i>	An Olethreutine Moth	Purchase high-quality habitat	Facilitate purchase of high-quality barrens and prairie remnant habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	84.375
<i>Hystriochophora loricana</i>	An Olethreutine Moth	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Lepidostoma etnieri</i>	A Lepidostomatid Caddisfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Lepidostoma etnieri</i>	A Lepidostomatid Caddisfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Lepidostoma etnieri</i>	A Lepidostomatid Caddisfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Leuctra schusteri</i>	Karst Needlfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Leuctra schusteri</i>	Karst Needlfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Leuctra schusteri</i>	Karst Needlfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Liobrancha recurvata</i>	A Burrowing Mayfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	34.375
<i>Liobrancha recurvata</i>	A Burrowing Mayfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Liobrancha recurvata</i>	A Burrowing Mayfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	3.125
<i>Maccaffertium bednarki</i>	A Heptageniid Mayfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Maccaffertium bednarki</i>	A Heptageniid Mayfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Maccaffertium bednarki</i>	A Heptageniid Mayfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Manophylax butleri</i>	Bottle Cap Caddisfly	Reduce recreation impacts on rockshelters	Provide education and outreach encouraging recreationists to minimize disturbance when hiking or climbing.	Education and Awareness	Awareness and Communications	Highest	Consider	6.25	34.375
<i>Manophylax butleri</i>	Bottle Cap Caddisfly	Acquisition and protection of habitat	Identify, acquire, and maintain high quality habitat.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	96.875	100
<i>Manophylax butleri</i>	Bottle Cap Caddisfly	Develop best management practices	Develop best management practices for logging to reduce impact on populations and maintain appropriate habitat structure.	Land/Water Management	Land/Water Management- Other	Highest	Consider	18.75	31.25
<i>Manophylax butleri</i>	Bottle Cap Caddisfly	Develop incentives to discourage illegal trash disposal	Work with Private Lands Biologists to develop an incentive program encouraging landowners to reduce illegal dumping and trash disposal in rockshelters or sinkholes.	Livelihood, Economic and Other Incentives	Conservation Payments	Highest	Investigate	100	65.625
<i>Mesamia straminea</i>	Hellanthus Leafhopper	Restore native prairie and barrens habitats	Develop and implement management plans to enhance barrens and prairie remnant habitats, emphasizing the importance of prescribed fire and its impacts on the target species.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	68.75	84.375

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Mesamia straminea</i>	Helianthus Leafhopper	Purchase high-quality habitat	Facilitate purchase of high-quality barrens and prairie remnant habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	84.375
<i>Mesamia straminea</i>	Helianthus Leafhopper	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Nannothermis bella</i>	Elfin Skimmer	Wetland Restoration	Restore and manage wetland habitat to meet habitat requirements, such as by controlling overgrowth of aquatic weeds caused by pollutants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Nannothermis bella</i>	Elfin Skimmer	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Nannothermis bella</i>	Elfin Skimmer	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Nehalennia gracilis</i>	Sphagnum Sprite	Wetland Restoration	Restore and manage wetland habitat to meet habitat requirements, such as by controlling overgrowth of aquatic weeds caused by pollutants.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Nehalennia gracilis</i>	Sphagnum Sprite	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	34.375
<i>Nehalennia gracilis</i>	Sphagnum Sprite	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	3.125
<i>Nehalennia integricolis</i>	Southern Sprite	Wetland Restoration	Restore and manage wetland habitat to meet habitat requirements, such as by controlling overgrowth of aquatic weeds caused by pollutants.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Nehalennia integricolis</i>	Southern Sprite	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Nehalennia integricolis</i>	Southern Sprite	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Nehalennia irene</i>	Sedge Sprite	Wetland Restoration	Restore and manage wetland habitat to meet habitat requirements, such as by controlling overgrowth of aquatic weeds caused by pollutants.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Nehalennia irene</i>	Sedge Sprite	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	34.375
<i>Nehalennia irene</i>	Sedge Sprite	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	3.125
<i>Neophytax lewisae</i>		Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Neophytax lewisae</i>		Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Neophytax lewisae</i>		Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Ophiogomphus howei</i>	Pygmy Snaketail	Evaluate the potential for restoration	Develop a management plan and implement habitat and natural process restoration, if applicable.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Ophiogomphus howei</i>	Pygmy Snaketail	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Ophiogomphus howei</i>	Pygmy Snaketail	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Ophiogomphus mainensis</i>	Maine Snaketail	Stream Restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Ophiogomphus mainensis</i>	Maine Snaketail	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Ophiogomphus mainensis</i>	Maine Snaketail	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Papaiperna beeriana</i>	Blazing Star Stem Borer	Restore native prairie and barrens habitats	Develop and implement management plans to enhance barrens and prairie remnant habitats, emphasizing the importance of prescribed fire and its impacts on the target species.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	68.75	100
<i>Papaiperna beeriana</i>	Blazing Star Stem Borer	Purchase high-quality habitat	Facilitate purchase of high-quality barrens and prairie remnant habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	100	96.875
<i>Papaiperna beeriana</i>	Blazing Star Stem Borer	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Papaiperna eryngii</i>	Rattlesnake-master Borer Moth	Restore native prairie and barrens habitats	Develop and implement management plans to enhance barrens and prairie remnant habitats, emphasizing the importance of prescribed fire and its impacts on the target species.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	68.75	100
<i>Papaiperna eryngii</i>	Rattlesnake-master Borer Moth	Continue management of occupied habitat	Continue application of prescribed fire and other management techniques to maintain or enhance habitat known to be used by the target species.	Land/Water Management	Site/Area Management	Highest	Investigate	96.875	100
<i>Papaiperna eryngii</i>	Rattlesnake-master Borer Moth	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Highest	Consider	34.375	34.375
<i>Papaiperna leucostigma</i>	Columbine Borer Moth	Develop best management practices	Develop best management practices for logging to reduce impact on populations and maintain appropriate habitat structure.	Education and Awareness	Awareness and Communications	High	Consider	18.75	18.75
<i>Papaiperna leucostigma</i>	Columbine Borer Moth	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Papaiperna silphii</i>	Silphium Borer Moth	Restore native prairie and barrens habitats	Develop and implement management plans to enhance barrens and prairie remnant habitats, emphasizing the importance of prescribed fire and its impacts on the target species.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	68.75	84.375
<i>Papaiperna silphii</i>	Silphium Borer Moth	Purchase high-quality habitat	Facilitate purchase of high-quality barrens and prairie remnant habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	84.375
<i>Papaiperna silphii</i>	Silphium Borer Moth	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Papaiperna sp. 5</i>	Rare Cane Borer Moth	Preserve high quality habitat	Facilitate conservation of high-quality riparian corridors by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	93.75	68.75
<i>Papaiperna sp. 5</i>	Rare Cane Borer Moth	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Papaiperna speciosissima</i>	Osmunda Borer Moth	Purchase high-quality habitat	Facilitate purchase of high-quality seep and bog habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Papalberna speciosissima</i>	Osmunda Borer Moth	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Poanes viator</i>	Broad-winged Skipper	Reduced mowing campaign	Work with partner agencies and organizations to reduce mowing of larval host plants.	External Capacity Building	Alliance and Partnership Development	Moderate	Consider	37.5	3.125
<i>Poanes viator</i>	Broad-winged Skipper	Purchase high-quality habitat	Facilitate purchase of high-quality wetland habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	65.625
<i>Poanes viator</i>	Broad-winged Skipper	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	Moderate	Consider	34.375	3.125
<i>Polycentropus neiswanderi</i>	A Polycentropodid Caddisfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Polycentropus neiswanderi</i>	A Polycentropodid Caddisfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Polycentropus neiswanderi</i>	A Polycentropodid Caddisfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Prairiana kansana</i>	A Cicadellid Leafhopper	Purchase high-quality habitat	Facilitate purchase of high-quality barrens and prairie remnant habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	84.375
<i>Prairiana kansana</i>	A Cicadellid Leafhopper	Restore native prairie and barrens habitats	Develop and implement management plans to enhance barrens and prairie remnant habitats, emphasizing the importance of prescribed fire and its impacts on the target species.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	68.75	84.375
<i>Prairiana kansana</i>	A Cicadellid Leafhopper	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Pseudanophthalmus cnephosus</i>	A Cave Obligate Beetle	Purchase caves for conservation	Facilitate purchase of cave by an agency, organization, or other entity able to ensure conservation of the cave habitat and organisms.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	100
<i>Pseudanophthalmus conditus</i>	Hidden Cave Beetle	Purchase caves for conservation	Facilitate purchase of cave by an agency, organization, or other entity able to ensure conservation of the cave habitat and organisms.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	100
<i>Pseudanophthalmus globiceps</i>	Round-headed Cave Beetle	Purchase caves for conservation	Facilitate purchase of cave by an agency, organization, or other entity able to ensure conservation of the cave habitat and organisms.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	100
<i>Pseudanophthalmus horni</i>	Garman's Cave Beetle	Purchase caves for conservation	Facilitate purchase of cave by an agency, organization, or other entity able to ensure conservation of the cave habitat and organisms.	Land/Water Protection	Site/Area Protection	High	Investigate	100	84.375
<i>Pseudanophthalmus hypolithos</i>	Ashcamp Cave Beetle	Purchase caves for conservation	Facilitate purchase of cave by an agency, organization, or other entity able to ensure conservation of the cave habitat and organisms.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	100
<i>Pseudanophthalmus inexpectatus</i>	Surprising Cave Beetle	Purchase caves for conservation	Facilitate purchase of cave by an agency, organization, or other entity able to ensure conservation of the cave habitat and organisms.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	100
<i>Pseudanophthalmus major</i>	Beaver Cave Beetle	Purchase caves for conservation	Facilitate purchase of cave by an agency, organization, or other entity able to ensure conservation of the cave habitat and organisms.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	100
<i>Pseudanophthalmus pubescens inreptus</i>	A Cave Obligate Beetle	Purchase caves for conservation	Facilitate purchase of cave by an agency, organization, or other entity able to ensure conservation of the cave habitat and organisms.	Land/Water Protection	Site/Area Protection	High	Investigate	100	84.375
<i>Pseudanophthalmus pufeanus</i>	Old Well Cave Beetle	Purchase caves for conservation	Facilitate purchase of cave by an agency, organization, or other entity able to ensure conservation of the cave habitat and organisms.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	100
<i>Pseudanophthalmus troglodytes</i>	Louisville Cave Beetle	Purchase caves for conservation	Facilitate purchase of cave by an agency, organization, or other entity able to ensure conservation of the cave habitat and organisms.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	93.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Rasveta terna</i>	Vermont Salifly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Rasveta terna</i>	Vermont Salifly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Rasveta terna</i>	Vermont Salifly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Rhyacophila appalachia</i>	A Rhyacophilid Caddisfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Rhyacophila appalachia</i>	A Rhyacophilid Caddisfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Rhyacophila appalachia</i>	A Rhyacophilid Caddisfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Satyrium favonius ontario</i>	Northern Oak Hairstreak	Acquisition and protection of habitat	Identify, acquire, and maintain high quality prairie and barrens remnant habitat.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	96.875	84.375
<i>Satyrium favonius ontario</i>	Northern Oak Hairstreak	Evaluate potential policy changes in pesticide and fungicide use on public areas	Investigate the feasibility of restricting the use of certain pesticides and fungicides known to negatively affect birds on state WMAs. Seek alternative seed sources, free from neonicotinoids, for use on areas leased or planted for wildlife on WMAs.	Law and Policy	Policies and Regulations	High	Proceed	21.875	50
<i>Satyrium favonius ontario</i>	Northern Oak Hairstreak	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Soyedina calcareo</i>	Karst Forestfly	Stream restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	65.625
<i>Soyedina calcareo</i>	Karst Forestfly	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	96.875	65.625
<i>Soyedina calcareo</i>	Karst Forestfly	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Highest	Consider	3.125	34.375
<i>Speyeria diana</i>	Diana Fritillary	Mine site reclamation	Ensuring reclamation plantings contain native vegetation and benefit the target species.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Consider	3.125	34.375
<i>Speyeria diana</i>	Diana Fritillary	Reduced mowing campaign	Work with partner agencies and organizations to encourage reduced mowing schedules, allowing for the preservation of roadside nectar plants during flight season.	External Capacity Building	Alliance and Partnership Development	Highest	Consider	37.5	34.375
<i>Speyeria diana</i>	Diana Fritillary	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SCGN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Speyeria diana</i>	Diana Fritillary	Develop best management practices	Develop best management practices for logging to reduce impact on populations and maintain appropriate habitat structure.	Education and Awareness	Awareness and Communications	Highest	Proceed	3.125	65.625
<i>Stylurus notatus</i>	Elusive Clubtail	Evaluate the potential for restoration	Develop a management plan and implement habitat and natural process restoration, if applicable.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Stylurus notatus</i>	Elusive Clubtail	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	50
<i>Stylurus notatus</i>	Elusive Clubtail	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	High	Consider	3.125	18.75
<i>Stylurus scudderii</i>	Zebra Clubtail	Stream Restoration	Restore channelized or unstable stream reaches where the species occurs.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Stylurus scudderii</i>	Zebra Clubtail	Establish private lands riparian restoration program	Work with Private Lands Biologists to establish riparian vegetation and reduce nonpoint source pollutants on private property.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	96.875	34.375
<i>Stylurus scudderii</i>	Zebra Clubtail	Provide pollution reduction outreach to landowners	Provide education and outreach encouraging farmers and landowners to reduce pollutants from agricultural practices.	Education and Awareness	Awareness and Communications	Moderate	Consider	3.125	3.125
<i>Telegonus cellus</i>	Gold-banded Skipper	Purchase high-quality habitat	Facilitate purchase of high-quality woodland habitats by agencies, organizations, or other entities able to ensure the preservation and appropriate management of the habitat.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Telegonus cellus</i>	Gold-banded Skipper	Reduced mowing campaign	Work with partner agencies and organizations to encourage reduced mowing schedules, allowing for the preservation of roadside nectar plants during flight season.	External Capacity Building	Alliance and Partnership Development	High	Consider	37.5	18.75
<i>Telegonus cellus</i>	Gold-banded Skipper	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building - Other	High	Consider	34.375	18.75
<i>Tomocerus missus</i>	A Cave Obligate Springtail	Purchase caves for conservation	Facilitate purchase of cave by an agency, organization, or other entity able to ensure conservation of the cave habitat and organisms.	Land/Water Protection	Site/Area Protection	High	Investigate	100	78.125

APX 7.1g Actions Identified for Mammal SGCN

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Protection of priority roosting habitat	Identify and acquire priority hibernacula on private land to allow for long term management and site access.	Land/Water Protection	Site/Area Protection	High	Investigate	100	84.375
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Cave gating	Design and install bat friendly cave gates at important roost sites.	Land/Water Protection	Site/Area Protection	High	Proceed	34.375	84.375
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Creation of upland water sources	Design and create upland water sources for as a part of forest management practices.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	81.25
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Develop bats and climbers educational program	Develop and deliver training to climbing community regarding potential impacts to bats by climbing, proper minimization measures, and reporting.	Education and Awareness	Awareness and Communications	High	Consider	3.125	46.875
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Encourage proper forest management	Develop forest management strategies to encourage maternity roost availability and foraging areas.	Education and Awareness	Training	High	Consider	6.25	18.75
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75
<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Protection of priority roosting habitat	Identify and acquire priority hibernacula on private land to allow for long term management and site access.	Land/Water Protection	Site/Area Protection	Highest	Investigate	100	100
<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Cave gating	Design and install bat friendly cave gates at important roost sites.	Land/Water Protection	Site/Area Protection	Highest	Proceed	34.375	100
<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Creation of upland water sources	Design and create upland water sources for as a part of forest management practices.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	96.875
<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Develop bats and climbers educational program	Develop and deliver training to climbing community regarding potential impacts to bats by climbing, proper minimization measures, and reporting.	Education and Awareness	Awareness and Communications	Highest	Proceed	3.125	62.5
<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Encourage proper forest management	Develop forest management strategies to encourage maternity roost availability and foraging areas.	Education and Awareness	Training	Highest	Consider	6.25	34.375
<i>Corynorhinus townsendii virginianus</i>	Virginia Big-eared Bat	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Highest	Consider	34.375	34.375
<i>Myodes gapperi maurus</i>	Kentucky Red-backed Vole	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	Highest	Investigate	100	93.75
<i>Myodes gapperi maurus</i>	Kentucky Red-backed Vole	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover, especially within the species range in eastern Kentucky.	Land/Water Management	Habitat and Natural Process Restoration	Highest	Investigate	100	62.5
<i>Myotis austroriparius</i>	Southeastern Myotis	Protect natural wetland systems	Protect existing natural forested wetlands within the species range in western Kentucky.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Myotis austroriparius</i>	Southeastern Myotis	Restore degraded wetland habitats	Restore forested wetland habitats within the species range in western Kentucky.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Myotis grisescens</i>	Gray Myotis	Protection of priority roosting habitat	Identify and acquire priority hibernacula on private land to allow for long term management and site access.	Land/Water Protection	Site/Area Protection	High	Investigate	100	81.25
<i>Myotis leibii</i>	Eastern Small-footed Myotis	Protection of priority roosting habitat	Identify and acquire priority hibernacula on private land to allow for long term management and site access.	Land/Water Protection	Site/Area Protection	High	Investigate	100	81.25
<i>Myotis leibii</i>	Eastern Small-footed Myotis	Cave gating	Design and install bat friendly cave gates at important roost sites.	Land/Water Protection	Site/Area Protection	High	Proceed	34.375	81.25
<i>Myotis leibii</i>	Eastern Small-footed Myotis	Develop bats and climbers educational program	Develop and deliver training to climbing community regarding potential impacts to bats by climbing, proper minimization measures, and reporting.	Education and Awareness	Awareness and Communications	High	Consider	3.125	46.875
<i>Myotis lucifugus</i>	Little Brown Bat	Protection of priority roosting habitat	Identify and acquire priority roost sites on private land to allow for long term management and site access.	Land/Water Protection	Site/Area Protection	Moderate	Investigate	100	68.75
<i>Myotis lucifugus</i>	Little Brown Bat	Cave gating	Design and install bat friendly cave gates at important roost sites.	Land/Water Protection	Site/Area Protection	Moderate	Proceed	6.25	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Myotis lucifugus</i>	Little Brown Bat	Encourage proper forest management	Develop and provide forest management strategies to private landowners that encourage maternity roost availability and foraging areas.	Education and Awareness	Education and Awareness- Other	Moderate	Consider	6.25	3.125
<i>Myotis lucifugus</i>	Little Brown Bat	Creation of upland water sources	Design and create upland water sources for as a part of forest management practices.	Land/Water Management	Land/Water Management- Other	Moderate	Investigate	100	65.625
<i>Myotis septentrionalis</i>	Northern Long-Eared Bat	Creation of upland water sources	Design and create upland water sources for as a part of forest management practices.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	81.25
<i>Myotis septentrionalis</i>	Northern Long-Eared Bat	Encourage proper forest management	Develop forest management strategies to encourage maternity roost availability and foraging areas.	Education and Awareness	Training	High	Consider	6.25	18.75
<i>Myotis sodalis</i>	Indiana Bat	Protection of priority roosting habitat	Identify and acquire priority roost sites on private land to allow for long term management and site access.	Land/Water Protection	Site/Area Protection	High	Investigate	100	84.375
<i>Myotis sodalis</i>	Indiana Bat	Cave gating	Design and install bat friendly cave gates at important roost sites.	Land/Water Protection	Site/Area Protection	High	Proceed	6.25	84.375
<i>Myotis sodalis</i>	Indiana Bat	Encourage proper forest management	Develop and provide forest management strategies to private landowners that encourage maternity roost availability and foraging areas.	Education and Awareness	Education and Awareness- Other	High	Consider	6.25	18.75
<i>Myotis sodalis</i>	Indiana Bat	Creation of upland water sources	Design and create upland water sources for as a part of forest management practices.	Land/Water Management	Land/Water Management- Other	High	Investigate	100	81.25
<i>Neotoma magister</i>	Allegheny Woodrat	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Neotoma magister</i>	Allegheny Woodrat	Restore and maintain sites with good forest cover.	Restore degraded forested sites and maintain good forest cover, especially within the species range in eastern Kentucky.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Peromyscus subflavus</i>	Tricolored Bat	Protection of priority roosting habitat	Identify and acquire priority roost sites on private land to allow for long term management and site access.	Land/Water Protection	Site/Area Protection	Moderate	Investigate	100	68.75
<i>Peromyscus subflavus</i>	Tricolored Bat	Cave gating	Design and install bat friendly cave gates at important roost sites.	Land/Water Protection	Site/Area Protection	Moderate	Proceed	6.25	68.75
<i>Peromyscus gossypinus</i>	Cotton Mouse	Protect natural wetland systems	Protect existing natural forested wetlands within the species range in western Kentucky.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	65.625
<i>Peromyscus gossypinus</i>	Cotton Mouse	Restore degraded wetland habitats	Restore forested wetland habitats within the species range in western Kentucky.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Peromyscus maniculatus rubiterrae</i>	Cloudland Deer Mouse	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Peromyscus maniculatus rubiterrae</i>	Cloudland Deer Mouse	Restore and maintain sites with good forest cover.	Restore degraded forested sites and maintain good forest cover, especially within the species range in eastern Kentucky.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Sorex cinereus</i>	Cinereus Shrew	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	65.625
<i>Sorex cinereus</i>	Cinereus Shrew	Protect existing forested areas	Protect existing areas of good forest cover.	Species Management	Species Management	Moderate	Investigate	100	65.625
<i>Sorex cinereus</i>	Cinereus Shrew	Restore and maintain sites with good forest cover.	Restore degraded forested sites and maintain good forest cover, especially within the species range in eastern Kentucky.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Sorex cinereus</i>	Cinereus Shrew	Protect natural wetland systems	Protect existing natural forested wetlands within the species range in western Kentucky.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	68.75
<i>Sorex cinereus</i>	Cinereus Shrew	Restore degraded wetland habitats	Restore forested wetland habitats within the species range in western Kentucky.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	37.5
<i>Sorex cinereus</i>	Cinereus Shrew	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	Moderate	Consider	34.375	3.125
<i>Sorex dispar blitchi</i>	Long-tailed Shrew	Protect existing forested areas	Protect existing areas of good forest cover along high elevation talus slopes in eastern Kentucky.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Sorex dispar blitchi</i>	Long-tailed Shrew	Restore and maintain sites with good forest cover.	Restore degraded forested sites and maintain good forest cover within the species range in eastern Kentucky.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Sorex dispar blitchi</i>	Long-tailed Shrew	Land acquisition	Acquire high elevation north facing slopes along Pine Mountain, Stone Mountain, and Cumberland Mountain.	Land/Water Protection	Site/Area Protection	High	Investigate	96.875	50
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Trapper and landowner education	Produce materials and programs to educate trappers and land owners on spotted skunk distribution and impacts.	Education and Awareness	Education and Awareness- Other	High	Consider	6.25	46.875
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Land acquisition for habitat protection	Acquisition of habitat (particularly to facilitate habitat connectivity) near recent records of the species.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	93.75	84.375
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Trail camera data sharing initiative	Develop a central hub for citizen scientists and professionals to share data collected from remote camera surveys to better elucidate species distribution.	External Capacity Building	External Capacity Building- Other	High	Consider	21.875	18.75
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Restore and maintain sites with good forest cover.	Restore degraded forested sites and maintain good forest cover, especially within the species range in eastern Kentucky.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Sylvilagus aquaticus</i>	Swamp Rabbit	Protect natural wetland systems	Protect existing natural forested wetlands within the species range in western Kentucky.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	65.625
<i>Sylvilagus aquaticus</i>	Swamp Rabbit	Restore degraded wetland habitats	Restore forested wetland habitats within the species range in western Kentucky.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	34.375
<i>Sylvilagus aquaticus</i>	Swamp Rabbit	Develop public disease monitoring program	Develop training material and provide portal to gather reports of potential disease spread in Kentucky.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	34.375
<i>Sylvilagus obscurus</i>	Appalachian Cottontail	Develop public disease monitoring program	Develop training material and provide portal to gather reports of potential disease spread in Kentucky.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	34.375

APX 7.1h Actions Identified for Plant SGCN

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Abdia aprica</i>	Open-ground Whitlow-grass	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Abdia aprica</i>	Open-ground Whitlow-grass	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Abdia aprica</i>	Open-ground Whitlow-grass	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Actaea rubifolia</i>	Appalachian Bugbane	Manage protected populations	Manage protected populations by prohibiting logging and removing invasive species.	Land/Water Management	Site/Area Management	Plant	Investigate	93.75	68.75
<i>Actaea rubifolia</i>	Appalachian Bugbane	Site/area protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Site/Area Protection	Plant	Investigate	93.75	100
<i>Actaea rubifolia</i>	Appalachian Bugbane	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Actaea rubifolia</i>	Appalachian Bugbane	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Actaea rubifolia</i>	Appalachian Bugbane	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Actaea rubifolia</i>	Appalachian Bugbane	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Investigate	62.5	68.75
<i>Actaea rubifolia</i>	Appalachian Bugbane	Invasive species management	Manage invasive species at extant sites, especially populations on protected natural areas.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	65.625
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Managing protected populations	Managing protected populations with fire and other disturbances.	Land/Water Management	Site/Area Management	Plant	Investigate	62.5	100
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Invasive/problematic species control	Manage invasive species at extant sites.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	65.625
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Investigate	62.5	68.75
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Agalinis auriculata</i>	Earleaf False Foxglove	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Managing protected populations	Managing protected populations with fire and other disturbances.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	100
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat, including transportation department and utility companies.	External Capacity Building	Alliance and Partnership Development	Plant	Investigate	62.5	68.75
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Agalinis decemloba</i>	Ten-lobed False Foxglove	Site/area protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Other	Plant	Investigate	93.75	65.625
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Invasive/problematic species control	Remove invasive species.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	65.625
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Alliance and partnership development	Continue building community science rockhouse monitoring program with agencies, partner and volunteers.	External Capacity Building	Alliance and Partnership Development	Plant	Investigate	62.5	68.75
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Trainings and workshops	Develop and teach workshops and trainings for resource professionals, general public, partners and private landowners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Ex situ conservation	Seed banking and living collection.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Ageratina lucy-brauniae</i>	Lucy Braun's White Snakeroot	manage protected populations	Manage protected populations by removing invasive species and reducing recreational impacts.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Apios priceana</i>	Price's Potato-bean	Site/area protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Site/Area Protection	Plant	Investigate	93.75	100
<i>Apios priceana</i>	Price's Potato-bean	Manage protected populations	Managing protected populations for invasive species and creating canopy openings/disturbances.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Apios priceana</i>	Price's Potato-bean	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat. Continue working with the forest service on monitoring and management studies.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Apios priceana</i>	Price's Potato-bean	Species introduction and recovery	Reintroducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Apios priceana</i>	Price's Potato-bean	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Apios priceana</i>	Price's Potato-bean	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Arabis patens</i>	Spreading Rockcress	Manage protected populations	Manage protected populations by prohibiting logging and removing invasive species.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	68.75
<i>Arabis patens</i>	Spreading Rockcress	Alliance and partnership development	Work with land trusts, landowners, universities, plant conservation alliances, and state and federal partners on the conservation of this species, especially land acquisition.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Arabis patens</i>	Spreading Rockcress	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Arabis patens</i>	Spreading Rockcress	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Arabis patens</i>	Spreading Rockcress	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Aureolaria patula</i>	Spreading False Foxglove	manage protected populations	Manage protected populations by removing invasive species and reducing recreational impacts.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	65.625
<i>Aureolaria patula</i>	Spreading False Foxglove	Alliance and partnership development	Partnerships with major landowners of habitat such as the National Park Service (Big South Fork, Mammoth Cave National Park) and United States Forest Service (Daniel Boone National Forest) are crucial to protecting this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Aureolaria patula</i>	Spreading False Foxglove	Species introduction and recovery	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Aureolaria patula</i>	Spreading False Foxglove	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Aureolaria patula</i>	Spreading False Foxglove	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Aureolaria patula</i>	Spreading False Foxglove	Land acquisition for watershed protection	Protecting wild rivers and streams in the plateau region, landscapes and corridors.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Managing protected populations	Managing protected populations with fire and other disturbances.	Land/Water Management	Habitat and Natural Process Restoration	Plant	Investigate	62.5	100
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Invasive/problematic species control	Manage invasive species at extant sites.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	65.625
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Ex situ conservation	Seed banking and living collections.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Baptisia aberrans</i>	Eastern Prairie Blue Wild Indigo	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Borodinia persteliata</i>	Braun's Rockcress	Manage protected populations	Manage protected populations by prohibiting logging and removing invasive species.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	68.75
<i>Borodinia persteliata</i>	Braun's Rockcress	Land acquisition for habitat protection	Purchase and protect populations on private land in partnership with state, federal, land trusts, and universities. Work with USFS partners on site management and monitoring.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Borodinia persteliata</i>	Braun's Rockcress	Alliance and partnership development	Work with land trusts, landowners, universities, plant conservation alliances, and state and federal partners on the conservation of this species.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Borodinia persteliata</i>	Braun's Rockcress	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Borodinia persteliata</i>	Braun's Rockcress	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Borodinia persteliata</i>	Braun's Rockcress	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Land acquisition for watershed protection	Protecting wild rivers and streams in the Plateau, landscapes and corridor.	Land/Water Protection	Resource and Habitat Protection	Plant	Investigate	93.75	100
<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Ex situ conservation	Seed banking and living collection.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Species translocations	Species translocations.	Species Management	Species Reintroduction	Plant	Investigate	62.5	68.75
<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Alliance and partnership development	Partnerships with major landowners of riverscours habitat such as the National Park Service (Big South Fork), and United States Forest Service (Daniel Boone National Forest) is crucial to protecting this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Calamovilfa arcuata</i>	Cumberland sandgrass	Invasive/problematic species control	Invasive species removal from riparian areas is needed to reduce competition and habitat loss.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	68.75
<i>Carex decomposita</i>	Epiphytic Sedge	Ex situ conservation	Seed collection and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Carex decomposita</i>	Epiphytic Sedge	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Carex decomposita</i>	Epiphytic Sedge	Land acquisition for habitat protection	Protecting populations on private lands from extirpation through land acquisition.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Carex decomposita</i>	Epiphytic Sedge	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Carex decomposita</i>	Epiphytic Sedge	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat, including transportation department and utility companies.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Carex decomposita</i>	Epiphytic Sedge	Managing protected populations	Managing protected populations by removing invasive species and maintaining hydrologic conditions.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Carex juniperorum</i>	Juniper Sedge	Managing protected populations	Managing protected populations with fire and other disturbances.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	100
<i>Carex juniperorum</i>	Juniper Sedge	Invasive/problematic species control	Manage invasive species at extant sites.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	65.625
<i>Carex juniperorum</i>	Juniper Sedge	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Carex juniperorum</i>	Juniper Sedge	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Carex juniperorum</i>	Juniper Sedge	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Carex juniperorum</i>	Juniper Sedge	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Carex roanensis</i>	Roan Mountain Sedge	Manage protected populations	Manage protected populations by prohibiting logging and removing invasive species.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	68.75
<i>Carex roanensis</i>	Roan Mountain Sedge	Alliance and partnership development	Work with land trusts, landowners, universities, plant conservation alliances, and state and federal partners on the conservation of this species.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Carex roanensis</i>	Roan Mountain Sedge	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Carex roanensis</i>	Roan Mountain Sedge	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Carex roanensis</i>	Roan Mountain Sedge	Land acquisition for habitat protection	Purchase and protect populations on private land in partnership with state, federal, land trusts, and universities. Work with USFS partners on site management and monitoring.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Carex roanensis</i>	Roan Mountain Sedge	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Carex timida</i>	Timid Sedge	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Carex timida</i>	Timid Sedge	Ex situ conservation	Seed banking and living collections. Work with conservation horticulturalists to propagate plants from various populations in order to reintroduce and restore populations.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Carex timida</i>	Timid Sedge	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Carex timida</i>	Timid Sedge	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Carex timida</i>	Timid Sedge	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Carex timida</i>	Timid Sedge	Manage protected populations	Manage protected populations by removing invasive species.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	65.625
<i>Conradina verticillata</i>	Cumberland Rosemary	Alliance and partnership development	Partnerships with major landowners of riverscours habitat such as the National Park Service (Big South Fork), and the United States Forest Service (Daniel Boone National Forest) are crucial to protecting this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Conradina verticillata</i>	Cumberland Rosemary	Manage protected populations	Manage protected populations by removing invasive species and woody encroachment.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Conradina verticillata</i>	Cumberland Rosemary	Species translocations	Introduce populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	100
<i>Conradina verticillata</i>	Cumberland Rosemary	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Conradina verticillata</i>	Cumberland Rosemary	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Conradina verticillata</i>	Cumberland Rosemary	Land acquisition for watershed protection	Protecting wild rivers and streams in the plateau region, landscapes and corridors.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Manage protected populations	Manage protected populations by removing invasive species and reducing recreational impacts.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Ex situ conservation	Seed banking and living collections. Work with conservation horticulturalists to propagate plants from various populations in order to reintroduce and restore populations.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Cypripedium kentuckiense</i>	Kentucky Lady's-slipper	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Training	Plant	Consider	0	37.5
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Site/area protection	Working with private landowners on population and site protection through land acquisition or other conservation methods. working with federal partners on monitoring and management and recovery of populations.	Land/Water Protection	Site/Area Protection	Plant	Investigate	93.75	100
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Managing protected populations	Work with partners on managing protected populations with fire and other disturbances.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	100
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Species translocations	Introducing populations into suitable managed habitat within the species range in order to increase protected/managed populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Desmodium ochroleucum</i>	Cream Tick-trefoil	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Eriogonum harperi</i>	Harper's Wild Fleabane	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Eriogonum harperi</i>	Harper's Wild Fleabane	Species translocations	Species translocations.	Species Management	Species Reintroduction	Plant	Investigate	62.5	68.75
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Invasive/problematic species control	Invasive species removal from riparian areas is needed to reduce competition and habitat loss.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	65.625
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Alliance and partnership development	Partnerships with major landowners of riverscours habitat such as the National Park Service (Big South Fork), United States Forest Service (Daniel Boone National Forest), and Kentucky State Parks is crucial to protecting this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Land acquisition for watershed protection	Protecting wild rivers and streams in the plateau region, landscapes and corridors.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Ex situ conservation	Seed banking and living collection.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Eurybia saxicastellii</i>	Rockcastle Aster	Species translocations	Species translocations.	Species Management	Species Reintroduction	Plant	Investigate	62.5	68.75
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Land acquisition for watershed protection	Increased land protection/aquisition within critical watersheds.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Ex situ conservation	Seed banking and living collection.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Alliance and partnership development	Partnerships with forest service agencies that own and manage habitat for this species is needed.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Species translocations	translocation into protected and managed habitat is needed in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Investigate	62.5	68.75
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Fimbristylis perpusilla</i>	Harper's fimbry	Invasive/problematic species control	Assess and manage invasive species at extant populations.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	65.625
<i>Glandularia canadensis</i>	Rose Mock-vervain	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Glandularia canadensis</i>	Rose Mock-vervain	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Glandularia canadensis</i>	Rose Mock-vervain	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Glandularia canadensis</i>	Rose Mock-vervain	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Glandularia canadensis</i>	Rose Mock-vervain	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Gratiola quartermantiae</i>	Quarterman's Hedge-hyssop	Managing protected populations	Managing protected populations with fire and other disturbances.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	100
<i>Gratiola quartermantiae</i>	Quarterman's Hedge-hyssop	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Gratiola quartermantiae</i>	Quarterman's Hedge-hyssop	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Gratiola quartermantiae</i>	Quarterman's Hedge-hyssop	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Gratiola quartermantiae</i>	Quarterman's Hedge-hyssop	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Gratiola quartermantiae</i>	Quarterman's Hedge-hyssop	Site/area protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Site/Area Protection	Plant	Investigate	93.75	100
<i>Helianthus eggertii</i>	Eggert's Sunflower	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Helianthus eggertii</i>	Eggert's Sunflower	Managing protected populations	Managing protected populations with fire and other disturbances. Remove invasive species.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	100
<i>Helianthus eggertii</i>	Eggert's Sunflower	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Helianthus eggertii</i>	Eggert's Sunflower	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Helianthus eggertii</i>	Eggert's Sunflower	Trainings and workshops	Develop and teach workshops and trainings for resource professionals, partners and private landowners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Helianthus eggertii</i>	Eggert's Sunflower	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat, including transportation department, utility companies, national park service, and plant conservation alliances.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Hexastylis contracta</i>	Southern Heartleaf	manage protected populations	Manage protected populations by removing invasive species and reducing recreational impacts.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Hexastylis contracta</i>	Southern Heartleaf	Site/area protection	Several populations occur on private lands. Protecting remaining populations through land acquisition and working with landowners is a priority.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Hexastylis contracta</i>	Southern Heartleaf	Alliance and partnership development	Partnerships with major landowners of protected habitat such as the National Park Service (Big South Fork), and the United States Forest Service (Daniel Boone National Forest) are crucial to protecting this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Hexastylis contracta</i>	Southern Heartleaf	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Hexastylis contracta</i>	Southern Heartleaf	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Hexastylis contracta</i>	Southern Heartleaf	Species introduction and recovery	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Leavenworthia exigua</i> var. <i>lacinata</i>	Kentucky Gladecress	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Leavenworthia exigua</i> var. <i>lacinata</i>	Kentucky Gladecress	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Leavenworthia exigua</i> var. <i>lacinata</i>	Kentucky Gladecress	Manage protected populations	Manage protected populations with fire and other disturbances. Remove invasive species.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Leavenworthia exigua</i> var. <i>lacinata</i>	Kentucky Gladecress	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat, including transportation department and utility companies.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Leavenworthia exigua</i> var. <i>lacinata</i>	Kentucky Gladecress	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Leavenworthia exigua</i> var. <i>lacinata</i>	Kentucky Gladecress	Trainings and workshops	Develop and teach workshops and trainings for resource professionals, partners and private landowners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Marshallia pulchra</i>	Barbara's Buttons	Invasive/problematic species control	Invasive species removal from riparian areas is needed to reduce competition and habitat loss.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	65.625
<i>Marshallia pulchra</i>	Barbara's Buttons	Alliance and partnership development	Partnerships with major landowners of riverscours habitat such as the National Park Service (Big South Fork), and United States Forest Service (Daniel Boone National Forest) is crucial to protecting this species and habitat. Work with partners in the plant conservation alliance community on conservation action.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Marshallia pulchra</i>	Barbara's Buttons	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Marshallia pulchra</i>	Barbara's Buttons	Land acquisition for watershed protection	Protecting wild rivers and streams in the plateau region, landscapes and corridors.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Marshallia pulchra</i>	Barbara's Buttons	Ex situ conservation	Seed banking and living collection.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Marshallia pulchra</i>	Barbara's Buttons	Species translocations	Species translocations.	Species Management	Species Reintroduction	Plant	Investigate	62.5	68.75
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Invasive/problematic species control	Remove invasive species.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	68.75
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Species translocations	Increase introductions into suitable habitat on protected lands.	Species Management	Species Reintroduction	Plant	Proceed	15.625	68.75
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Alliance and partnership development	Work with partners such and the forest service, national park service and plant conservation alliances on monitoring and restoration efforts.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Ex situ conservation	Seed banking and living collection.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Trainings and workshops	Develop and teach workshops and trainings for resource professionals, general public, partners and private landowners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Mononeuria cumberlandensis</i>	Cumberland Sandwort	Land acquisition for habitat protection	Protecting additional cliffline and rockhouse habitat within the Cumberland Plateau region.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Monotropsis odorata</i>	Sweet Pinesap	manage protected populations	Manage protected populations by removing invasive species and utilizing prescribed fire.	Land/Water Management	Land	Plant	Investigate	93.75	68.75
<i>Monotropsis odorata</i>	Sweet Pinesap	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Monotropsis odorata</i>	Sweet Pinesap	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Other	Plant	Consider	0	37.5
<i>Monotropsis odorata</i>	Sweet Pinesap	Ex situ conservation	Seed banking and living collections. Work with conservation horticulturalists to propagate plants from various populations in order to reintroduce and restore populations.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Site/area protection	Protecting the one known population that occurs on a roadside by working with transportation managers and working with adjacent landowners on barrens and grassland management in order to expand the population.	Land/Water Protection	Site/Area Protection	Plant	Investigate	93.75	96.875
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Species introductions	Introducing populations into suitable managed habitat within the species range in order to increase protected/managed populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat, including transportation department and utility companies.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Managing protected populations	Managing protected populations with fire and other disturbances.	Species Management	Species Management	Plant	Investigate	62.5	100
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Nabalus barbatus</i>	Barbed Rattlesnake-root	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Manage protected populations	Managing protected populations such as invasive species removal.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	65.625
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Managing protected populations	Manage populations on federal partner lands by removing invasive plants and controlling Euonymus scale (<i>Unaspis euonymi</i>) infestations.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	65.625
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Paxistima canbyi</i>	Canby's Mountain-lover	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Managing protected populations	Managing protected populations with fire and other disturbances.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	100
<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat, including state, federal, private lands and utility companies.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Phemeranthus calcaricus</i>	Limestone Fameflower	Site/area protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Physaria globosa</i>	Globe Bladderpod	Invasive/problematic species control	Invasive species removal from critical habitat is needed to reduce competition and habitat loss.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	65.625
<i>Physaria globosa</i>	Globe Bladderpod	Managing protected populations	Managing protected populations for invasive species and animal mimicking disturbances. Experimentation with fire as a management tool.	Land/Water Management	Site/Area Management	Plant	Investigate	93.75	68.75
<i>Physaria globosa</i>	Globe Bladderpod	Land acquisition for habitat protection	Purchase and protect populations on private land.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Physaria globosa</i>	Globe Bladderpod	trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Physaria globosa</i>	Globe Bladderpod	Alliance and partnership development	Work with land trusts, landowners, universities, plant conservation alliances, and state and federal partners on the conservation of this species.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Physaria globosa</i>	Globe Bladderpod	ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Physaria globosa</i>	Globe Bladderpod	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Site/area management	Removing woody species from the seep habitats in order to increase water table, reduce evapotranspiration, and increase canopy gaps. Also, reintroducing prescribed fire into the adjacent upland forests will have positive impacts on seep habitat quality.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	62.5
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Site/area protection	Purchase and protect populations on private land. Work with USFS partners on site management and monitoring.	Land/Water Protection	Site/Area Protection	Plant	Investigate	93.75	100
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Species reintroduction	In order to restore extirpated sites, introducing seedlings, plants, seed, and mycorrhizal symbionts. Preparation/management of the site prior to reintroduction will need to occur in order to reintroduce plants and fungi into suitable habitat. Creating new extant populations will mitigate the loss of several sites due to development, logging, and habitat alteration.	Species Management	Species Reintroduction	Plant	Investigate	62.5	68.75
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Ex situ conservation	Seed banking, mycorrhizal symbiont banking, and living collections with conservation horticultural organizations is necessary for added conservation measures.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Alliance and partnership development	Partnerships with private landowners, USFS/DBNF, local and regional plant conservation alliances, and conservation horticulturalists is needed in order to recover this species.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Platanthera integrilabia</i>	White Fringeless Orchid	Habitat and natural process restoration	Restoring prescribed fire in the adjacent uplands can assist in restoring the wetlands. Reducing invasive species within the wetlands and adjacent forests is needed. Controlling deer populations to reduce herbivory.	Land/Water Management	Habitat and Natural Process Restoration	Plant	Investigate	62.5	68.75
<i>Polymnia laevigata</i>	Tennessee Leafcup	Manage protected populations	Manage protected populations by prohibiting logging and removing invasive species.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	68.75
<i>Polymnia laevigata</i>	Tennessee Leafcup	Site/area protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Polymnia laevigata</i>	Tennessee Leafcup	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Polymnia laevigata</i>	Tennessee Leafcup	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Polymnia laevigata</i>	Tennessee Leafcup	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Polymnia laevigata</i>	Tennessee Leafcup	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Land acquisition for habitat protection	Protecting wild rivers and streams in the Appalachian region, landscapes and corridors.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Species translocations	Introduce populations into watersheds protected from mining, logging, rural development, or urban development to ensure long term viability.	Species Management	Species Reintroduction	Plant	Proceed	31.25	100
<i>Potamogeton tennesseensis</i>	Tennessee Pondweed	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Primula frenchii</i>	French's Shooting Star	Managing protected populations	Managing protected populations, such as invasive species removal and trail rerouting.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	68.75
<i>Primula frenchii</i>	French's Shooting Star	Land acquisition for habitat protection	Purchase and protect populations on private land in partnership with state, federal, land trusts, and universities.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Primula frenchii</i>	French's Shooting Star	Alliance and partnership development	Work with land trusts, landowners, universities, plant conservation alliances, and state and federal partners on the conservation of this species.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Primula frenchii</i>	French's Shooting Star	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Primula frenchii</i>	French's Shooting Star	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Primula frenchii</i>	French's Shooting Star	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Managing protected populations	Managing protected populations with fire and other disturbances. Remove invasive species.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	100
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	100
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Trainings and workshops	Develop and teach workshops and trainings for resource professionals, partners and private landowners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Proceed	0	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Pycnanthemum torreyi</i>	Whorled Mountain-mint	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	68.75
<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	6.25
<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Training	Plant	Consider	0	6.25
<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Invasive/problematic species control	Remove invasive species from extant sites.	Land/Water Management	Invasive/Problematic Species Control	Plant	Re-Evaluate	93.75	37.5
<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Ex situ conservation	Seed banking and living collections. Work with conservation horticulturalists to propagate plants from various populations in order to reintroduce and restore populations.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Ripariosida hermaphrodita</i>	Virginia Mallow	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Consider	31.25	37.5
<i>Sabulina fontinalis</i>	Water Stitchwort	Invasive/problematic species control	Invasives plants need to be managed on existing populations.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	65.625
<i>Sabulina fontinalis</i>	Water Stitchwort	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Sabulina fontinalis</i>	Water Stitchwort	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Sabulina fontinalis</i>	Water Stitchwort	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Sabulina fontinalis</i>	Water Stitchwort	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Sabulina fontinalis</i>	Water Stitchwort	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Schisandra glabra</i>	Bay Starvine	Manage protected populations	Manage protected populations by prohibiting logging and removing invasive species.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	68.75
<i>Schisandra glabra</i>	Bay Starvine	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Schisandra glabra</i>	Bay Starvine	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Schisandra glabra</i>	Bay Starvine	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Schisandra glabra</i>	Bay Starvine	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Schoenoplectiella hallii</i>	Hall's Bulrush	Ex situ conservation	Seed collection is needed in order to add additional conservation measures in case our private land populations become extirpated.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Schoenoplectiella hallii</i>	Hall's Bulrush	Species translocations	If private land populations cannot be protected and managed, translocation into protected and managed habitat will be necessary.	Species Management	Species Reintroduction	Plant	Proceed	0	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Schoenoplectella halii</i>	Hall's Bulrush	Land acquisition for habitat protection	All Kentucky populations are on private land in agricultural and grazing lands. Site protection through acquisition is a priority action in order to protect the remaining populations in Kentucky.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Schoenoplectella halii</i>	Hall's Bulrush	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Schoenoplectella halii</i>	Hall's Bulrush	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat, including transportation department and utility companies.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Schoenoplectella halii</i>	Hall's Bulrush	Invasive non-native/alien species	Invasive species management is needed at extant sites.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	65.625
<i>Schwalbea americana</i>	Chaffseed	Managing high quality grassland habitat	Managing protected high quality grassland habitat with fire and other disturbances.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	100
<i>Schwalbea americana</i>	Chaffseed	Species reintroduction	Reintroducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Schwalbea americana</i>	Chaffseed	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat, including transportation department, utility companies, and federal agencies.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Schwalbea americana</i>	Chaffseed	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Schwalbea americana</i>	Chaffseed	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Schwalbea americana</i>	Chaffseed	Site/area protection	Protecting existing habitat through land acquisition and working with landowners.	Land/Water Protection	Site/Area Protection	Plant	Investigate	93.75	100
<i>Scutellaria saxatilis</i>	Rock Skullcap	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Site/Area Protection	Plant	Investigate	93.75	100
<i>Scutellaria saxatilis</i>	Rock Skullcap	Managing protected populations	Managing protected populations with fire and other disturbances. Remove invasive species.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	62.5	100
<i>Scutellaria saxatilis</i>	Rock Skullcap	Managing protected populations	Managing protected populations with fire and other disturbances. Remove invasive species.	Species Management	Species Management	Plant	Investigate	62.5	100
<i>Scutellaria saxatilis</i>	Rock Skullcap	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Scutellaria saxatilis</i>	Rock Skullcap	Trainings and workshops	Develop and teach workshops and trainings for resource professionals, partners and private landowners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Proceed	0	68.75
<i>Scutellaria saxatilis</i>	Rock Skullcap	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Silene ovata</i>	Ovate Catchfly	managing protected populations	Managing protected populations by removing invasive species and woody encroachment.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Silene ovata</i>	Ovate Catchfly	Alliance and partnership development	Partnerships with major landowners. of populations such as the United States Forest Service (Daniel Boone National Forest) and the transportation cabinet are crucial to protecting this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Silene ovata</i>	Ovate Catchfly	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Silene ovata</i>	Ovate Catchfly	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Silene ovata</i>	Ovate Catchfly	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Silene ovata</i>	Ovate Catchfly	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Silene regia</i>	Royal Catchfly	Site/area protection	All populations occur on private lands. Protecting remaining populations through land acquisition and working with landowners is a priority.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Silene regia</i>	Royal Catchfly	Invasive/problematic species control	Manage invasive species at extant sites.	Land/Water Management	Invasive/Problematic Species Control	Plant	Investigate	93.75	68.75
<i>Silene regia</i>	Royal Catchfly	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Silene regia</i>	Royal Catchfly	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Silene regia</i>	Royal Catchfly	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Silene regia</i>	Royal Catchfly	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Silphium lasiocarpum</i>	Appalachian Rosinweed	manage protected populations	Manage protected populations by removing invasive species, prescribed fire and other disturbances.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Silphium lasiocarpum</i>	Appalachian Rosinweed	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Silphium lasiocarpum</i>	Appalachian Rosinweed	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Silphium lasiocarpum</i>	Appalachian Rosinweed	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Silphium lasiocarpum</i>	Appalachian Rosinweed	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Silphium lasiocarpum</i>	Appalachian Rosinweed	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Solidago alba</i>	White-haired Goldenrod	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	96.875
<i>Solidago alba</i>	White-haired Goldenrod	Invasive/problematic species control	Remove invasive species and monitor/manage rust levels.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	65.625
<i>Solidago alba</i>	White-haired Goldenrod	Alliance and partnership development	Continue building community science rockhouse monitoring program with agencies, partner and volunteers.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Solidago alba</i>	White-haired Goldenrod	Trainings and workshops	Develop and teach workshops and trainings for resource professionals, general public, partners and private landowners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Solidago alba</i>	White-haired Goldenrod	Ex situ conservation	Seed banking and living collection.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Solidago alboblosa</i>	White-haired Goldenrod	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Alliance and partnership development	Partnerships with major landowners of riverscours habitat such as the National Park Service (Big South Fork), and the United States Forest Service (Daniel Boone National Forest) are crucial to protecting this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Manage protected populations	Manage protected populations by removing invasive species and woody encroachment.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Species translocations	Introduce populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	100
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Training	Plant	Consider	0	37.5
<i>Solidago arenicola</i>	Southern Racemose Goldenrod	Land acquisition for watershed protection	Protecting wild rivers and streams in the plateau region, landscapes and corridors.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Solidago faucibus</i>	Gorge Goldenrod	Manage protected populations	Manage protected populations by prohibiting logging and removing invasive species.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	65.625
<i>Solidago faucibus</i>	Gorge Goldenrod	Site/area protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Solidago faucibus</i>	Gorge Goldenrod	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Solidago faucibus</i>	Gorge Goldenrod	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Solidago faucibus</i>	Gorge Goldenrod	Trainings and workshops	Develop and teach workshops and trainings for private land biologists, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Solidago faucibus</i>	Gorge Goldenrod	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Solidago shortii</i>	Short's Goldenrod	Site/area protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Site/Area Protection	Plant	Investigate	93.75	100
<i>Solidago shortii</i>	Short's Goldenrod	Managing protected populations	Managing protected populations with fire and other disturbances.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	100
<i>Solidago shortii</i>	Short's Goldenrod	Species introduction	Species translocations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Investigate	62.5	68.75
<i>Solidago shortii</i>	Short's Goldenrod	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat, including transportation department, state and federal agencies.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Solidago shortii</i>	Short's Goldenrod	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Solidago shortii</i>	Short's Goldenrod	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Spiraea virginiana</i>	Virginia Spiraea	Alliance and partnership development	Partnerships with major landowners of riverscours habitat such as the National Park Service (Big South Fork), and the United States Forest Service (Daniel Boone National Forest) are crucial to protecting this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Spiraea virginiana</i>	Virginia Spiraea	managing protected populations	Managing protected populations by removing invasive species and woody encroachment.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	96.875

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Spiraea virginiana</i>	Virginia Spiraea	species introduction	Reintroducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Spiraea virginiana</i>	Virginia Spiraea	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Spiraea virginiana</i>	Virginia Spiraea	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Spiraea virginiana</i>	Virginia Spiraea	Land acquisition for watershed protection	Protecting wild rivers and streams in the plateau region, landscapes and corridors.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	manage protected populations	Manage protected populations by removing invasive species and prescribed fire.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Ex situ conservation	Seed banking and living collections. Work with conservation horticulturalists to propagate plants from various populations in order to reintroduce and restore populations.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Thaspium pinnatifidum</i>	Cutleaf Meadow-parsnip	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Training	Plant	Consider	0	37.5
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Manage protected populations	Manage protected populations by careful logging and removing invasive species.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	62.5	65.625
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Alliance and partnership development	Work with land trusts, landowners, universities, plant conservation alliances, and state and federal partners on the conservation of this species.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Training	Plant	Consider	0	37.5
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Thermopsis mollis</i>	Soft-haired Thermopsis	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Trifolium kentuckiense</i>	Kentucky Clover	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100
<i>Trifolium kentuckiense</i>	Kentucky Clover	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Trifolium kentuckiense</i>	Kentucky Clover	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Trifolium kentuckiense</i>	Kentucky Clover	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Trifolium kentuckiense</i>	Kentucky Clover	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Trifolium reflexum</i>	Buffalo Clover	Land acquisition for habitat protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Trifolium reflexum</i>	Buffalo Clover	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Trifolium reflexum</i>	Buffalo Clover	Species translocations	Introducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Trifolium reflexum</i>	Buffalo Clover	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Trifolium reflexum</i>	Buffalo Clover	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Trifolium reflexum</i>	Buffalo Clover	manage protected populations	Manage protected populations by removing invasive species, prescribed fire and other disturbances.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Site/area protection	Protecting remaining populations through land acquisition and working with landowners.	Land/Water Protection	Site/Area Protection	Plant	Investigate	93.75	100
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Species introduction	Reintroducing populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	68.75
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Managing protected populations	Managing protected populations for invasive species and animal mimicking disturbances.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Alliance and partnership development	Work with landowners and partners on conservation and management of this species and habitat. Work with landowners on cooperative management agreements.	External Capacity Building	Alliance and Partnership Development	Plant	Consider	31.25	37.5
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Vitis rupestris</i>	Sand Grape	Alliance and partnership development	Partnerships with major landowners of riverscours habitat such as the National Park Service (Big South Fork), and the United States Forest Service (Daniel Boone National Forest) are crucial to protecting this species and habitat.	External Capacity Building	Alliance and Partnership Development	Plant	Proceed	31.25	68.75
<i>Vitis rupestris</i>	Sand Grape	Manage protected populations	Manage protected populations by removing invasive species and woody encroachment.	Land/Water Management	Land/Water Management- Other	Plant	Investigate	93.75	68.75
<i>Vitis rupestris</i>	Sand Grape	Species translocations	Introduce populations into suitable managed habitat within the range in order to increase protected populations.	Species Management	Species Reintroduction	Plant	Proceed	31.25	100
<i>Vitis rupestris</i>	Sand Grape	Ex situ conservation	Seed banking and living collections.	Species Management	Ex Situ Conservation	Plant	Proceed	31.25	68.75
<i>Vitis rupestris</i>	Sand Grape	Trainings and workshops	Develop and teach workshops and trainings for natural resource professionals, landowners and other partners on species and community ecology and management.	Education and Awareness	Education and Awareness- Other	Plant	Consider	0	37.5
<i>Vitis rupestris</i>	Sand Grape	Land acquisition for watershed protection	Protecting wild rivers and streams in the plateau region, landscapes and corridors.	Land/Water Protection	Land/Water Protection- Other	Plant	Investigate	93.75	100

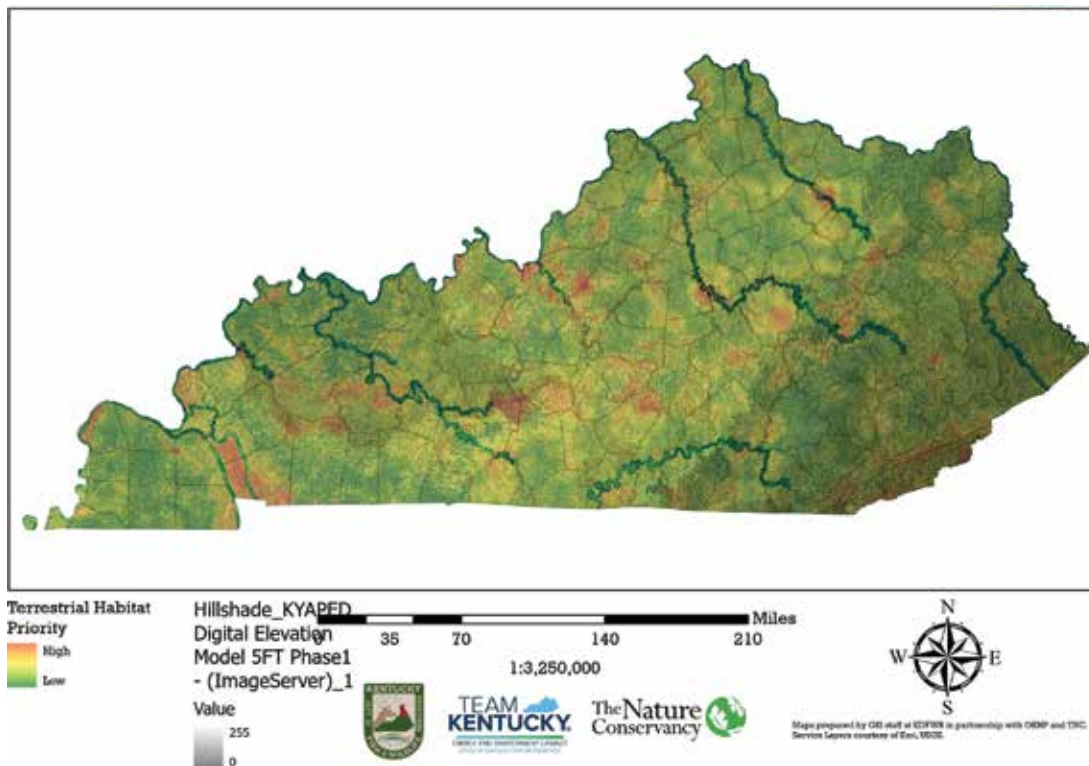
APX 7.1i Actions Identified for Reptile SGCN

Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Restore and maintain sites with good forest cover	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Protect natural stream channels, bayous, swamps, and wetlands	Protect existing natural stream channels, bayous, swamps and wetlands.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Restore degraded wetland habitats	Restore existing natural stream channels, bayous, swamps and wetlands.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Protect known hibernacula	Protect known hibernacula in uplands adjacent to wetlands.	Land/Water Protection	Site/Area Protection	High	Investigate	100	81.25
<i>Agkistrodon piscivorus</i>	Northern Cottonmouth	Raise awareness of the importance and diversity of snakes in Kentucky	Inform the public of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.	Education and Awareness	Awareness and Communications	High	Consider	21.875	18.75
<i>Crotalus horridus</i>	Timber Rattlesnake	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	Moderate	Investigate	100	62.5
<i>Crotalus horridus</i>	Timber Rattlesnake	Restore and maintain sites with good forest cover.	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Re-Evaluate	100	31.25
<i>Crotalus horridus</i>	Timber Rattlesnake	Prescribed fire management	Use prescribed fire to manage forest habitat.	Land/Water Management	Habitat and Natural Process Restoration	Moderate	Investigate	65.625	65.625
<i>Crotalus horridus</i>	Timber Rattlesnake	Public outreach on proper ATV use areas	Raise public awareness of the importance of keeping ATV traffic to approved trails and hardened stream crossings.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	0
<i>Crotalus horridus</i>	Timber Rattlesnake	Raise awareness of the importance and diversity of snakes in Kentucky	Inform the public of the harm of killing snakes or collecting for the pet trade. Encourage proper identification of snakes to prevent unnecessary mortality.	Education and Awareness	Awareness and Communications	Moderate	Consider	21.875	3.125
<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Restore and maintain sites with good forest cover.	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Protect and restore natural stream channels, bayous, swamps, and wetlands	Protect existing natural stream channels, bayous, swamps and wetlands.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Restore degraded wetland habitats	Restore existing natural stream channels, bayous, swamps and wetlands.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Raise awareness of the importance and diversity of snakes in Kentucky	Inform the public of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.	Education and Awareness	Awareness and Communications	High	Consider	21.875	18.75
<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Protect natural stream channels, bayous, swamps, and wetlands	Protect existing natural stream channels, bayous, swamps and wetlands.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Restore degraded wetland habitats	Restore existing natural stream channels, bayous, swamps and wetlands.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Protect turtle nesting areas	Protect turtle nesting areas on sandbars, islands, and beaches along large rivers and reservoir shorelines to stop threats of ATV & OHV traffic and general human disturbance.	Land/Water Protection	Site/Area Protection	High	Re-Evaluate	100	46.875
<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Restore and maintain turtle nesting areas	Restore and maintain open turtle nesting areas (sandbars, islands, and beaches) along large rivers and reservoir shorelines by controlling vegetative succession.	Land/Water Management	Land/Water Management-Other	High	Investigate	68.75	53.125
<i>Graptemys pseudogeographica kohnii</i>	Mississippi Map Turtle	Provide patches of open habitat adjacent to wetlands	Provide patches of open land/grassland adjacent to wetlands for egg-laying or foraging.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	96.875	53.125
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Protect existing forested areas	Protect existing areas of good forest cover.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	84.375

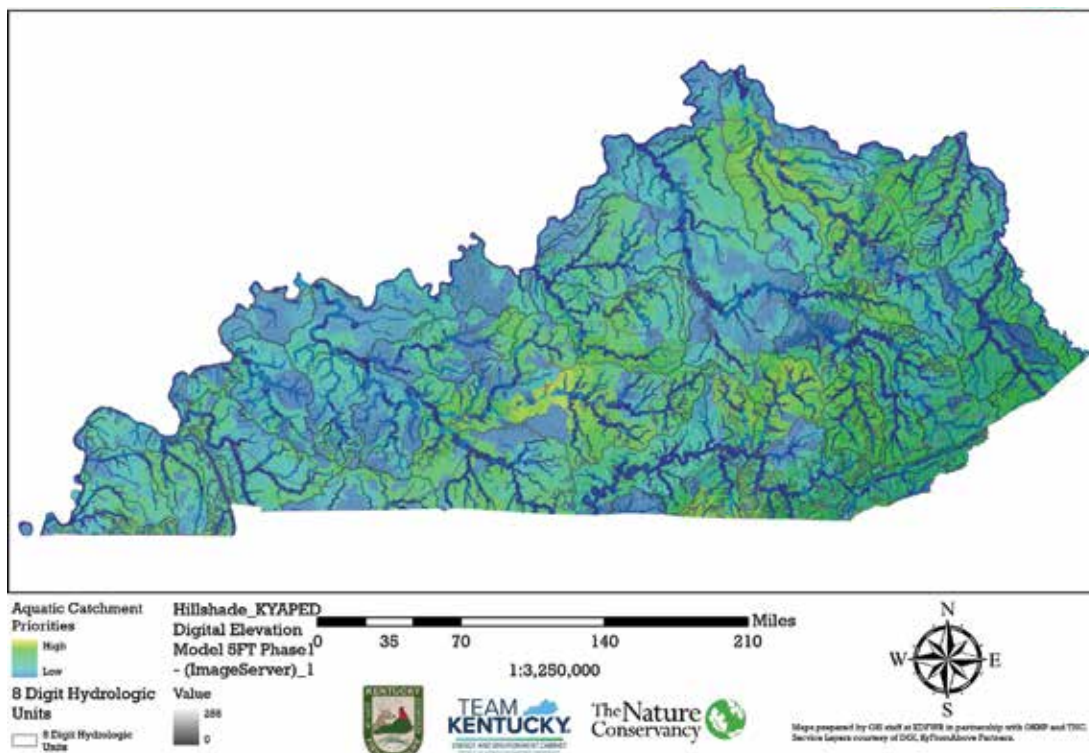
Scientific Name	Common Name	Action Title	Action Description	Action Category	Action Subcategory	Species Priority Group	Action Priority	Scaled Effort	Scaled Action
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Restore and maintain sites with good forest cover.	Restore degraded forested sites and maintain good forest cover.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Protect natural stream channels, bayous, swamps, and wetlands	Protect existing natural stream channels, bayous, swamps and wetlands.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	84.375
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Restore degraded wetland habitats	Restore existing natural stream channels, bayous, swamps and wetlands.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Restore and/or create wetland habitat	Restore degraded wetland habitat and/or create open to semi-open wetland habitat for breeding or foraging.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	53.125
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Protect known hibernacula	Protect known hibernacula in uplands adjacent to wetlands.	Land/Water Protection	Site/Area Protection	High	Investigate	100	84.375
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Watersnake	Raise awareness of the importance and diversity of snakes in Kentucky	Inform the public of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.	Education and Awareness	Awareness and Communications	High	Consider	21.875	18.75
<i>Nerodia fasciata confluens</i>	Broad-banded Watersnake	Protect natural stream channels, bayous, swamps, and wetlands	Protect and restore natural stream channels, bayous, swamps, and wetlands.	Land/Water Protection	Resource and Habitat Protection	High	Investigate	100	81.25
<i>Nerodia fasciata confluens</i>	Broad-banded Watersnake	Restore degraded wetland habitats	Restore existing natural stream channels, bayous, swamps and wetlands.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Nerodia fasciata confluens</i>	Broad-banded Watersnake	Restore and/or create wetland habitat	Restore degraded wetland habitat and/or create open to semi-open wetland habitat for breeding or foraging.	Land/Water Management	Habitat and Natural Process Restoration	High	Investigate	100	50
<i>Nerodia fasciata confluens</i>	Broad-banded Watersnake	Raise awareness of the importance and diversity of snakes in Kentucky	Inform the public of the harm of killing or collecting snakes. Encourage proper identification of snakes to prevent unnecessary mortality.	Education and Awareness	Awareness and Communications	High	Consider	21.875	18.75
<i>Nerodia fasciata confluens</i>	Broad-banded Watersnake	Incorporating SWAP into local development plans	Engage with local government to encourage consideration of SGCN habitat in county development plans.	External Capacity Building	External Capacity Building- Other	High	Consider	34.375	18.75

APX 7.2 Regional COA Perspective

Terrestrial Habitat Prioritization



Aquatic Habitat Prioritization





KENTUCKY'S STATE WILDLIFE ACTION PLAN

A Plan of this magnitude is simply not possible without the help of a large group of professionals. We would like to give one last “THANK YOU” to the many staff and partners who contributed their time and expertise over the last two years to craft a conservation vision for the next decade. Though the Plan is complete, the work is just beginning. Strong partnerships are essential as we shift from development to plan implementation. It is our hope that Kentucky’s Plan is not one that sits on a shelf, but is fully utilized as it is intended. We look forward to collaborating with our conservation partners and citizens to recover and maintain the many species and habitats that have been entrusted to our care. Together we can make a difference.

“A true conservationist is a man who knows the world is not given by fathers, but borrowed from his children.”

- John James Audubon