MAMMAL CWCS SPECIES (16 SPECIES)

Common name	Scientific name
Allegheny Woodrat	*Neotoma magister*
American Black Bear	*Ursus americanus*
Appalachian Cottontail	*Sylvilagus obscurus*
Cinereus Shrew	*Sorex cinereus*
Cotton Mouse	*Peromyscus gossypinus*
Eastern Small-footed Myotis	*Myotis leibii*
Eastern Spotted Skunk	*Spilogale putorius*
Evening Bat	*Nycticeius humeralis*
Gray Myotis	*Myotis grisescens*
Indiana Bat	*Myotis sodalis*
Kentucky Red-backed Vole	*Clethrionomys gapperi maurus*
Long-tailed or Rock Shrew	*Sorex dispar blitchi*
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*
Southeastern Myotis	*Myotis austroriparius*
Swamp Rabbit	*Sylvilagus aquaticus*
Virginia Big-eared Bat	*Corynorhinus townsendii virginianus*

CLASS MAMMALIA

Allegheny Woodrat ***Neotoma magister***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	N	G3G4	S4	G3	S4

G-Trend Decreasing

G-Trend Populations in the northeastern U.S. have declined (NatureServe 2004).

Comment Populations in New York began a precipitous decline in the mid-1960's and

apparently were extirpated by 1987 (Hayes 1990) and only a single population along the Hudson River Palisades remains in New Jersey (J. C. Sciascia, New Jersey Division of Fish, Game, and Wildlife, pers. comm. in Castleberry 2000). In Indiana, Maryland, Ohio, and Pennsylvania, woodrats have been extirpated from many sites where they were known historically (Hall 1985, Johnson and Marmer 1995; D. Feller, Maryland Natural Heritage Program, pers. comm. in Castleberry 2000).

S-Trend Stable

S-Trend Comment Thomas (2003) found that longer-term monitoring sites were mostly stable to increasing, with the exception of Mammoth Cave National Park, which showed a dramatic decline one year, and then stable numbers at a depressed level the remaining years.

Habitat / Life History Rocky cliffs and talus slopes. Makes midden mounds and stick piles among rocks, but secluded nest sites generally are not within stick houses (see Hayes and Harrison 1992). In Kentucky, "cliffs with deep crevices, caves, or large boulders piled in such a way as to form numerous retreats and shelters are favored" (Barbour and Davis 1974).

Key Habitat Habitat throughout Kentucky distribution: Cliffline habitat throughout Daniel Boone National Forest is GOOD, other areas (besides those listed below) are UNKNOWN.

Key Habitat Locations (and their condition):

1. Menifee County (Good)

2. McCreary County (Good)

3. Mammoth Cave National Park (Good)

Guilds caves, rock shelters, and clifflines, upland forest.

Statewide Map AlleghenyWoodrat.pdf

CLASS MAMMALIA

Allegheny Woodrat ***Neotoma magister***

Conservation Issues

Biological/ consumptive uses

5H Isolated populations (low gene flow)

5L Parasitism and disease. raccoon roundworm (Baylisascaris procyonis)

Miscellaneous Mortality Factors

6D Human disturbance (spelunking, destruction/disturbance of nest sites)

6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Severe winter weather

Terrestrial habitat degradation

3K Surface mining. Valley fills also

3M Timber harvest

3R Habitat and/or Population Fragmentation

3U Loss, lack and degradation of special and unique microhabitats

3V Long-term loss of hard mast trees (American Chestnut, poor oak regeneration)

CLASS MAMMALIA

American Black Bear ***Ursus americanus***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
PS	S	G5	S2	G5	S2

G-Trend Increasing

G-Trend Comment Populations have increased recently in the northeastern U.S. (NatureServe 2004)

S-Trend Increasing

S-Trend Comment Kentucky Department of Fish and Wildlife Resources data

Habitat / Life History Black bears prefer mixed deciduous-coniferous forests with a thick understory, but may occur in various situations (NatureServe 2004).

Key Habitat Habitat throughout Kentucky distribution: GOOD, other areas (besides those listed below) are UNKNOWN.

Key Habitat Locations (and their condition):

1. Cumberland Gap State Historic Park (good)
2. Kingdom Come State Park (good)
3. Big South Fork National River and Recreational Area (good)

Guilds Cumberland highland forest, upland forest.

Statewide Map AmericanBlackBear.pdf

Conservation Issues

Biological/ consumptive uses

5P Market hunting for human consumption. Actually for "black market" sale of parts

Miscellaneous Mortality Factors

6D Human disturbance (spelunking, destruction/disturbance of nest sites)

6E Illegal killing

CLASS MAMMALIA

Appalachian Cottontail ***Sylvilagus obscurus***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	N	G4	SRF	G4	S2

G-Trend Decreasing

G-Trend Comment Some maintain that the species may be facing extinction (Chapman and Morgan 1973, Feldhamer et al. 1984), whereas others believe recovery may be occurring in certain areas (Bier, pers. comm., 1992 from NatureServe 2004). The discrepancy may arise from two conflicting trends--preferred habitat is restored in parts of the range, but eastern cottontails have expanded their distribution both geographically and in terms of habitat and continue to displace the Appalachian cottontail. Most heritage programs reported that population trend is unknown. (NatureServe 2004)

S-Trend Unknown

S-Trend Comment Trend and abundance are unknown, but a study by Sole (1999) documented Appalachian cottontails in 20 counties scattered throughout eastern Kentucky, and suggested they could be found throughout the Eastern Coalfield physiographic region and in portions of the Knobs and Outer Bluegrass physiographic regions. Sole (1999) found the species more widely distributed and at lower elevations than previously thought.

Habitat / Life History

In Kentucky, Sole (1999) collected Appalachian cottontails from early successional forests only, in contrast to most other studies (e.g., Llewellyn and Handley 1945, Handley and Patton 1947, Chapman and Morgan 1973, Chapman and Stauffer 1981). Early successional forests in Kentucky were created by coal mining, recently harvested forests, or abandoned farms that were reverting to forests, most all of which were hardwood stands (Sole 1999). Many of these habitats also had an ericaceous understory of mountain laurel, blueberries, and/or evergreen species of greenbrier (Sole 1999). Appalachian cottontails in Kentucky were collected from elevations ranging from 260 m to 867 m, much lower than the >610 m limit that Chapman et al. (1992) suggested for this species.

Key Habitat

Habitat throughout Kentucky distribution: FAIR

Key Habitat Locations (and their condition):

1. Letcher County (Good)
2. Pike County (Good)
3. Breathitt County (Good)

CLASS MAMMALIA

Appalachian Cottontail ***Sylvilagus obscurus***

Guilds Cumberland highland forest, emergent and shrub-dominated wetlands, savanna/ shrub-scrub, upland forest.

Statewide Map AppalachianCottontail.pdf

Conservation Issues

Biological/ consumptive uses

- 5D Competition from introduced/invasive or native species. May compete with eastern cottontail (Sylvilagus floridanus)
- 5E Hybridization with closely related species. May hybridize with eastern cottontail (Sylvilagus floridanus)
- 5H Isolated populations (low gene flow)

Terrestrial habitat degradation

- 3R Habitat and/or Population Fragmentation
- 3T Suppression of disturbance regimes. Forest maturation reduces habitat abundance
- 3W Cervid over-abundance. over-grazing or over-browsing may reduce habitat quality

CLASS MAMMALIA

Cinereus Shrew ***Sorex cinereus***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	S	G5	S3	G5	S3

G-Trend Stable

G-Trend Comment Kentucky Department of Fish and Wildlife Resources (J.R. MacGregor)

S-Trend Stable

S-Trend Comment Kentucky Department of Fish and Wildlife Resources (J.R. MacGregor)

Habitat / Life History Occupies most terrestrial habitats excluding areas with very little or no vegetation. Thick leaf litter in damp forests may represent favored habitat, although appears adaptable to major successional disturbances. Nest sites are typically in shallow burrows or above ground in logs and stumps (NatureServe 2004).

Key Habitat Habitat throughout Kentucky distribution: GOOD

Key Habitat Locations (and their condition):

1. Black Mountain (Good)

2. Pine Mountain (Good)

3. Nolansburg Quad (Good)

4. Smith Mills Quad (Good)

Guilds Cumberland highland forest, forested wetland.

Statewide CinereusShrew.pdf

Map

Conservation Issues

Unknown factors/variables

7A Unknown threats

CLASS MAMMALIA

Cotton Mouse ***Peromyscus gossypinus***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
PS	T	G5	S2	G5	S2

G-Trend Stable

G-Trend Comment Kentucky Department of Fish and Wildlife Resources (John MacGregor)

S-Trend Unknown

S-Trend Comment

Habitat / Life History In most areas, prefers bottomland hardwood forests, swamps, and mesic and hydric hammocks but has also been found in margins of cleared fields, old fields, edges of salt savanna, palmetto thickets bordering beaches, dry hammocks, beach dunes, pine flatwoods, upland timber, mixed pine-hardwood forests, pine-turkey oak, sand pine scrub, along rocky bluffs or ledges, in caves, and in little-used buildings (see Wolfe and Linzoy 1977 in NatureServe 2004). The species is probably most common in areas that periodically are inundated. Large logs and stumps are an important habitat component (McCay 2000 in NatureServe 2004).

Key	Habitat throughout Kentucky distribution: FAIR
Habitat	
	Key Habitat Locations (and their condition):
	1. Arlington Quad (Good)
Guilds	forested wetland.
Statewide	CottonMouse.pdf
Map	

Conservation Issues

Unknown factors/variables

7A Unknown threats

CLASS MAMMALIA

Eastern Small-footed Myotis ***Myotis leibii***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	T	G3	S2	G3	S2

G-Trend Stable

G-Trend Comment This bat always has been considered to be relatively rare (Barbour and Davis 1969). Numbers are reduced in a few sites where older counts are available, and a few historic sites are apparently no longer occupied (e.g., see Hall 1979, but compare Dunn and Hall 1989). Many biologists believe that this species is basically stable, having declined little in recent times, but that it is vulnerable, especially in its cave hibernacula (NatureServe 2004). Due to the fact this species generally hibernates in inconspicuous locations (e.g., under rocks, cracks in cave ceilings and floors, and deep crevices), it is often overlooked during cave surveys and may actually be more common in some areas than previously believed (Brown 1997).

S-Trend Stable

S-Trend Comment Kentucky Department of Fish and Wildlife Resources (J.R. MacGregor)

Habitat / Small-footed bats are associated with hilly and mountainous terrain near or in

Life History deciduous or evergreen forest (NatureServe 2004). They roost primarily in rocky habitat (e.g., rock fissures, rock crevices, under rocks). Throughout their range they inhabit caves and mines in the winter (NatureServe 2004). They often roost near the entrances where temperatures can drop below freezing (Barbour and Davis 1969). During the summer, they have been observed roosting in hollow trees and under exfoliating bark, in buildings and in expansion joints of bridges (NatureServe 2004). In Kentucky, winter records of small-footed bats in caves and mines and even quarries exist, but it is highly likely that the bats also are found along clifflines (B. Palmer-Ball, Kentucky State Nature Preserves Commission, pers. comm.). Few summer roost sites are known for the species in Kentucky. Barbour and Davis (1969) observed an individual using a building and the only known maternity site in Kentucky is a bridge where the bats were roosting between the expansion joints. This species forages along streams and ponds (NatureServe 2004).

Key Habitat

Habitat throughout Kentucky distribution: GOOD

Key Habitat Locations (and their condition):

1. Ano Quad (Good)
2. Mammoth Cave National Park (Good)

CLASS MAMMALIA

Eastern Small-footed Myotis ***Myotis leibii***

3. Garfield Quad (Good)

Guilds caves, rock shelters, and clifflines, Cumberland highland forest, upland forest.

Statewide Map EasternSmall-footedMyotis.pdf

Conservation Issues

Terrestrial habitat degradation

3K Surface mining

3L Mine closures

3M Timber harvest

3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain)

3U Loss, lack and degradation of special and unique microhabitats

CLASS MAMMALIA

Eastern Spotted Skunk ***Spilogale putorius***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	S	G5	S2S3	G5	S2

G-Trend Decreasing

G-Trend Comment Formerly abundant in the Midwest, has undergone a large decline; still rather abundant in southern and east-central Florida (Kinlaw 1995).

S-Trend Stable

S-Trend Comment Kentucky Department of Fish and Wildlife Resources (J.R. MacGregor)

Habitat / Life History The species prefers forested areas or habitats with significant cover (Dragoo and Honeycutt in Wilson and Ruff 1999), as well as open and brushy areas, rocky canyons and outcrops in woodlands and prairies. When inactive or bearing young, it occupies a den in a burrow abandoned by other mammal, under brushpile, in hollow log or tree, in rock crevice, under building, or in similar protected site (NatureServe 2004).

Key Habitat Habitat throughout Kentucky distribution: GOOD

Key Habitat Locations (and their condition):

1. Beaver Creek Wildlife Management Area (Good)

2. Cliffline Habitat throughout the Daniel Boone National Forest (Good)

Guilds caves, rock shelters, and clifflines, Cumberland highland forest, upland forest.

Statewide Map EasternSpottedSkunk.pdf

Conservation Issues

Unknown factors/variables

7A Unknown threats

CLASS MAMMALIA

Evening Bat ***Nycticeius humeralis***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	S	G5	S3	G5	S3

G-Trend Unknown

G-Trend Comment This species appears to be decreasing in the northern part of its range as previously known maternity sites are now defunct (Whitaker and Hamilton 1998).

S-Trend Stable

S-Trend Comment Kentucky Department of Fish and Wildlife Resources (J.R. MacGregor)

Habitat / Life History Evening bats utilize deciduous and mixed forest interspersed with cultivated areas. They forage over clearings and farm ponds and along waterways and forest edge (Wilson and Ruff 1999, Choate et al. 1994). Reproductive females have been tracked to species of white oak on Mammoth Cave National Park suggesting maternity colonies were using them. It appeared they were using cavities in both dead and live trees. Most known maternity sites are buildings. Kentucky only has a record of one barn being used, but since states like Indiana and Illinois have several such records (Mumford and Whitaker 1982, Barbour and Davis 1969), it is highly probable more structures are utilized here.

Whitaker and Mumford (1982) note that the species apparently used tree hollows for roosts in the past but have become dependent on manmade structures (because of the scarcity of the large hollow trees).

Though the species is not a "cave bat", it is one of many species that takes part in swarming outside cave entrances in the fall (Barbour and Davis 1969, Whitaker and Hamilton 1998). It has long been assumed that evening bats migrate to the southern part of their range for the winter but it is likely that some overwinter in Kentucky. They have been found during the winter in Arkansas (Baker and Ward 1967, Sealander 1960) as well as Missouri (Lynn Robbins, Southwest Missouri State University, pers. comm.). In Missouri, the evening bats roosted in tree hollows throughout the winter. An evening bat was recently documented roosting alternatively in the cavities of two trees from October into November, indicating that the individual would undoubtedly hibernate in Kentucky (M. Gumbert, pers. comm.).

CLASS MAMMALIA

Evening Bat ***Nycticeius humeralis***

Key Habitat throughout Kentucky distribution: UNKNOWN

Habitat

Key Habitat Locations (and their condition):

1. Barlow Quad (Good)

2. Mammoth Cave National Park (Good)

3. Millport Quad (Good)

Guilds emergent and shrub-dominated wetlands, forested wetland, running water, savanna/ shrub-scrub, upland forest.

Statewide Map EveningBat.pdf

Conservation Issues

Miscellaneous Mortality Factors

6D Human disturbance (spelunking, destruction/disturbance of nest sites).

Whitaker and Hamilton 1998

Terrestrial habitat degradation

3M Timber harvest

3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain)

CLASS MAMMALIA

Gray Myotis ***Myotis grisescens***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
LE	T	G3	S2	G3	S2

G-Trend Increasing

G-Trend Comment Having suffered declines probably since the 19th century, the gray bat population was an estimated 1,575,000 in the early 80s (Brady et al. 1982). By 1991, protection efforts at the most important caves yielded stable to increasing populations (U.S. Fish and Wildlife Service 1992). The Recovery Plan criteria for downlisting (i.e., permanent protection of 90% of Priority 1 hibernacula and stable or increasing populations at 75% of Priority 1 maternity caves during a period of five years) appears to have been met (Southeastern Bat Diversity Network). The U.S. Fish and Wildlife Service is currently evaluating whether the gray bat should be downlisted.

S-Trend Stable

S-Trend Comment The summer population shows an increasing trend while the winter population has shown some fluctuations in size since it started using an additional hibernacula in 1999 (Wethington 2001; Kentucky Department of Fish and Wildlife Resources data).

Habitat / Will use streams (as corridor), rivers, lakes; riparian areas and caves. Must have

Life History forested corridors (i.e., gray bats would not want to use stream without trees because maternity caves are normally found within 1 km. of river or reservoir). Wetlands may be classified as suitable if they are within an undetermined buffer of suitable vegetation. Wetlands may be classified as suitable if they are within an undetermined buffer of suitable vegetation.

Key Habitat Habitat throughout Kentucky distribution: FAIR to GOOD

Key Habitat Locations (and their condition):

1. Barren County (Good)
2. Taylor County (Good)
3. Upton Quad (Good)

Guilds caves, rock shelters, and clifflines, forested wetland, running water.

Statewide Map GrayMyotis.pdf

CLASS MAMMALIA

Gray Myotis ***Myotis grisescens***

Conservation Issues

Aquatic habitat degradation

2C Construction/Operation of impoundments (migration barrier).

Destroys/changes aquatic invertebrate community

Miscellaneous Mortality Factors

6D Human disturbance (spelunking, destruction/disturbance of nest sites)

Terrestrial habitat degradation

3K Surface mining

3M Timber harvest

3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain)

3U Loss, lack and degradation of special and unique microhabitats

CLASS MAMMALIA

Indiana Bat ***Myotis sodalis***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
LE	E	G2	S1S2	G2	S1

G-Trend Decreasing

G-Trend Comment Census data from 1995-1997 indicate an abundance decline of about 60 percent since population surveys began in the 1960s; the most severe declines have occurred in Kentucky and Missouri, where the decline totals 430,000 individuals over the past few decades (Federal Register, 9 April 1999). (NatureServe 2004)

S-Trend Decreasing

S-Trend Comment Kentucky Department of Fish and Wildlife Resources data

Habitat / Life History Special features Indiana bats tend to use include standing snag/hollow tree and trees with a high percentage of exfoliating bark (e.g., Shagbark hickory). Wetlands may be classified as suitable if they are within an undetermined buffer of suitable vegetation. Hibernates in caves; maternity sites are in trees (NatureServe 2004).

Key Habitat Habitat throughout Kentucky distribution: Breeding: UNKNOWN Wintering: GOOD

Key Habitat Locations (and their condition):

1. Grahn Quad and Wesleyville Quad (Good)
2. Mammoth Cave National Park (Good)
3. Lee County (Good)
4. Ballard County (Good)
5. Derby Quad (Good)
6. Hart County (Good)

Guilds caves, rock shelters, and clifflines, Cumberland highland forest, emergent and shrub-dominated wetlands, forested wetland, running water, savanna/ shrub-scrub, upland forest.

Statewide Map IndianaBat.pdf

CLASS MAMMALIA

Indiana Bat ***Myotis sodalis***

Conservation Issues

Miscellaneous Mortality Factors

6D Human disturbance (spelunking, destruction/disturbance of nest sites). Winter caves (Twente 1955, Mohr 1972, Engel et al. 1976)

6E Illegal killing. Winter caves

Terrestrial habitat degradation

3A Row-crop agriculture (conversion to, annual reuse of fields, etc). Herkert 1992, Refsnider, pers. comm., 1992; Currie, pers. comm., 1992, all from NatureServe 2004

3F Urban/residential development

3H Habitat loss outside of Kentucky

3K Surface mining. Herkert 1992, Refsnider, pers. comm., 1992; Currie, pers. comm., 1992, all from NatureServe 2004

3M Timber harvest. Herkert 1992, Refsnider, pers. comm., 1992; Currie, pers. comm., 1992, all from NatureServe 2004

3N Removal of dead trees

3U Loss, lack and degradation of special and unique microhabitats. Commercialization (Mohr 1972), altering microclimate (Matthews and Moseley 1990), and bat-unfriendly structures as formerly at Long's Cave in Mammoth Cave National Park, Kentucky

CLASS MAMMALIA

Kentucky Red-backed Vole ***Clethrionomys gapperi maurus***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	S	G5T3 T4	S3	G3	S3

G-Trend Unknown

G-Trend Comment

S-Trend Stable

S-Trend Comment Kentucky Department of Fish and Wildlife Resources (J.R. MacGregor)

Habitat / Life History Prefers cool, mesic deciduous, coniferous, or mixed forests, especially areas with large amount of ground cover, but also uses second-growth areas. Mossy logs and tree roots in coniferous forests are optimal. In the northern part of its range also found in muskegs, sedge marshes, shrubby habitats, and treed peatlands (Merritt in Wilson and Ruff 1999). Often on rock outcrops in some areas (e.g., Virginia). Often associated with abandoned stone walls (fences) in the northeastern U.S. In Pennsylvania, abundance increased with forest fragmentation (Yahner 1992). Nests under logs, stumps and roots. Unlike Microtus sp., Kentucky red-backed voles do not dig tunnels, but use burrows

of moles and other small mammals (NatureServe 2004).

Key Habitat

Habitat throughout Kentucky distribution: GOOD

Key Habitat Locations (and their condition):

1) Benham and Appalachia Quads (Good)
2) Bledsoe Quad (Good)
3) Nolansburg Quad (Good)
4) Whitesburg Quad (Good)
5) Kayjay Quad (Good)

Guilds

Cumberland highland forest, emergent and shrub-dominated wetlands, savanna/ shrub-scrub.

Statewide Map

KentuckyRed-backedVole.pdf

CLASS MAMMALIA

Kentucky Red-backed Vole ***Clethrionomys gapperi maurus***

Conservation Issues

Unknown factors/variables

7A Unknown threats. Mostly unknown, but maybe mountain top removal mining.

CLASS MAMMALIA

Long-tailed Or Rock Shrew ***Sorex dispar blitchi***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	E	G4T3	S1	G3	S1

G-Trend Unknown

G-Trend Comment

S-Trend Unknown

S-Trend Comment

Habitat / Life History This species uses mountainous, forested areas (deciduous or evergreen) with loose talus. Rocky damp areas with deep crevices covered by leaf mold and roots are preferred. It may occur along small mountain streams and will use artificial talus created by road construction and pit mines. "Sorex dispar is probably the most stenotopic mammal in eastern North America..." (Webster 1987). Nest sites are usually associated with natural subterranean tunnels among boulder crevices (NatureServe 2004).

Key Habitat Habitat throughout Kentucky distribution: GOOD

Key Habitat Locations (and their condition):

1. Bledsoe Quad (Good)

2. Nolansburg Quad (Good)

3. Whitesburg Quad (Good)

4. Benham Quad (Good)

Guilds caves, rock shelters, and clifflines, Cumberland highland forest.

Statewide Map Long-tailedOrRockShrew.pdf

CLASS MAMMALIA

Long-tailed Or Rock Shrew ***Sorex dispar blitchi***

Conservation Issues

Biological/ consumptive uses

5F Low population densities. Kirtland 1986

5H Isolated populations (low gene flow). Kirtland 1986

Miscellaneous Mortality Factors

6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Kirtland 1986

Terrestrial habitat degradation

3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain). Dimond and Sherburne 1969; Churchfield 1992

3R Habitat and/or Population Fragmentation

3W Cervid over-abundance. Brooks and Healy 1988

Unknown factors/variables

7A Unknown threats

CLASS MAMMALIA

Rafinesque's Big-eared Bat ***Corynorhinus rafinesquii***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	S	G3G4	S3	G3	S3

G-Trend Decreasing

G-Trend Comment In summary, the species is known or suspected to be declining in more than half (10 out of 18) of the states within its range (NatureServe 2004).

S-Trend Stable

S-Trend Comment In most other states, data are unavailable to determine trends. Colonies of this bat in Kentucky seem to remain stable in size (John MacGregor).

Habitat / Life History This species sometimes uses suburban/orchard type habitat, and the buildings it uses are usually abandoned and dilapidated. Special features it uses includes cliffline habitat and even some bridge use. Wetlands may be classified as suitable if they are within an undetermined buffer of suitable vegetation. It also inhabits forested regions. Hibernation in the north and in mountainous regions most often occurs in caves or similar sites; small caves are selected, and the bats stay near the entrance (often within 30 m) and are thought to move about in winter (Handley 1959, Barbour and Davis 1969). In Kentucky, shallow caves or rock shelters in sandstone formations of the Cumberland Plateau often are used (J.R. MacGregor).

Key Habitat	Habitat Condition for Kentucky distribution: Good
	Key Habitat Locations (and their condition):
	1. Mammoth Cave Quad and Rhoda Quad (Good)
	2. Rowan County (Good)
	3. Hail Quad (Good)
	4. Pulaski County
Guilds	caves, rock shelters, and clifflines, emergent and shrub-dominated wetlands, forested wetland, savanna/ shrub-scrub, upland forest.
Statewide Map	Rafinesque'sBig-earedBat.pdf

CLASS MAMMALIA

Rafinesque's Big-eared Bat ***Corynorhinus rafinesquii***

Conservation Issues

Miscellaneous Mortality Factors

6D Human disturbance (spelunking, destruction/disturbance of nest sites)

Terrestrial habitat degradation

3L Mine closures

3M Timber harvest

3N Removal of dead trees

3P Pollution/toxicity (e.g., heavy metals, pesticides, herbicides, acid rain)

3U Loss, lack and degradation of special and unique microhabitats

CLASS MAMMALIA

Southeastern Myotis ***Myotis austroriparius***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	E	G3G4	S1S2	G3	S1

G-Trend Decreasing

G-Trend Comment NatureServe 2004

S-Trend Unknown

S-Trend Comment

Habitat / Life History Special habitat features this species uses are snags and hollow trees. Wetlands may be classified as suitable if they are within an undetermined buffer of suitable vegetation. Kentucky populations winter in caves, but are rare in most caves in the summer (J.R. MacGregor). One large maternity colony in a Kentucky cave has been reported (J.R. MacGregor).

Key Habitat Habitat throughout Kentucky distribution: UNKNOWN

Key Habitat Locations (and their condition):

1. Smithland Quad (Poor)

2. Caledonia Quad (Poor)

	3. Boatwright Wildlife Management Area, Ballard Wildlife Management Area, and West Kentucky Wildlife Management Area (Good)
Guilds	caves, rock shelters, and clifflines, forested wetland, running water, savanna/ shrub-scrub.
Statewide Map	SoutheasternMyotis.pdf

CLASS MAMMALIA

Southeastern Myotis ***Myotis austroriparius***

Conservation Issues

Biological/ consumptive uses

5C Biological collection (overharvest). Collecting and banding can cause bats to vacate (Mumford and Whitaker 1982)

Miscellaneous Mortality Factors

6D Human disturbance (spelunking, destruction/disturbance of nest sites). Gore and Hovis 1992

6G Stochastic events (droughts, unusual weather, pine beetle damage, flooding etc.). Flooding of caves; Gore and Hovis 1992

Terrestrial habitat degradation

3M Timber harvest. Around cave entrance; Gore and Hovis 1992

3U Loss, lack and degradation of special and unique microhabitats. Gore and Hovis 1992

CLASS MAMMALIA

Swamp Rabbit ***Sylvilagus aquaticus***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
N	N	G5	S3S4	G5	S3

G-Trend Decreasing

G-Trend Comment Range diminishing rapidly in Oklahoma due primarily to destruction of habitat (draining of swampy areas, clearing of floodplains, damming of rivers; Caire et al. 1989). Has declined in Missouri due to deforestation; apparently locally abundant in some locations (Figg 1991).

S-Trend Decreasing

S-Trend Comment Sole (1994) studied distribution of species, but noted rate of habitat loss for this species through recent decades. Species still widely distributed throughout its historic range, but habitat loss has severely isolated the species and extirpated it from some areas (Sole 1994).

Habitat / Life History Cane brake community (Arundinaria gigantica) should be added as "other" habitat type, should be mapped if possible.

This species is usually restricted to floodplains, bottomlands, riparian areas. Prefers mature forests but is associated with dense, brushy thickets in wooded floodplains along borders of lakes, river, and swamps (NatureServe 2004). In Kentucky, swamp rabbits are often found in giant cane (Arundinaria gigantica) thickets along the edges of mature forests and wetlands.

Key Habitat	Habitat throughout Kentucky distribution: Overall POOR, but GOOD in some sites. Key Habitat Locations (and their condition): 1. Fulton and Hickman Counties (FAIR to GOOD) 2. Ballard, Carlisle, McCracken, and Graves Counties (FAIR) 3. Ohio and Mississippi River bottoms in Fulton, Hickman, Carlisle, and Ballard Counties (FAIR to GOOD) 4. Marshall County (GOOD) 5. Caldwell and Hopkins county line (FAIR) 6. Hopkins/Muhlenberg/McLean county lines (FAIR)
Guilds	Emergent and shrub-dominated wetlands, forested wetland, savanna/ shrub-
Statewide Map	SwampRabbit.pdf

CLASS MAMMALIA

Swamp Rabbit ***Sylvilagus aquaticus***

Conservation Issues

Aquatic habitat degradation

2E Stream channelization/ditching

2F Riparian zone removal (Agriculture/development)

2H Wetland loss/drainage/alteration

Biological/ consumptive uses

5H Isolated populations (low gene flow)

Terrestrial habitat degradation

3A Row-crop agriculture (conversion to, annual reuse of fields, etc)

3E Livestock grazing. Of riparian zones

3R Habitat and/or Population Fragmentation

CLASS MAMMALIA

Virginia Big-eared Bat ***Corynorhinus townsendii virginianus***

Federal Status	Heritage Status	GRank	SRank	GRank (Simplified)	SRank (Simplified)
LE	E	G4T2	S1	G2	S1

G-Trend Increasing

G-Trend Comment U.S. Fish and Wildlife Service (1990) categorized the status as "improving," with the population "stable overall" (NatureServe 2004). Kentucky Department of Fish and Wildlife Resources (J.R. MacGregor and T.A. Hemberger) believes the population is slowly increasing.

S-Trend Stable

S-Trend Comment Kentucky Department of Fish and Wildlife Resources data

Habitat / Life History This species uses caves, sandstone rock shelters, and cliffline habitat. Wetlands may be classified as suitable if they are within an undetermined buffer of suitable vegetation. Caves are typically in limestone karst regions dominated by mature hardwood forests of hickory, beech, maple, and hemlock (Matthews and Moseley 1990). The species prefers cool, well-ventilated caves for hibernation (Matthews and Moseley 1990). In eastern Kentucky, feeding roosts were in cliffs adjacent to two maternity roosts and one bachelor roost (Burford and Lacki 1998).

Key Habitat	Habitat throughout Kentucky distribution: FAIR
	Key Habitat Locations (and their condition):
	1. Lee County (Good)
	2. Jackson County (Good)
	3. Rockcastle County (Good)
Guilds	caves, rock shelters, and clifflines, emergent and shrub-dominated wetlands, grassland/agricultural, savanna/ shrub-scrub, upland forest.
Statewide Map	VirginiaBig-earedBat.pdf

CLASS MAMMALIA

Virginia Big-eared Bat ***Corynorhinus townsendii virginianus***

Conservation Issues

Biological/ consumptive uses

5D Competition from introduced/invasive or native species. potentially gypsy moth (Sample and Whitmore 1993)

Miscellaneous Mortality Factors

6D Human disturbance (spelunking, destruction/disturbance of nest sites)

MAMMAL LITERATURE CITED

Baker, R.J., Ward, C.M., 1967. Distribution of bats in southeast Arkansas. Journal of Mammalogy 48:130-132.

Barbour, R.W., Davis, W.H., 1969. Bats of America. The University of Kentucky Press, Lexington, Kentucky.

Barbour, R.W., Davis, W.H.. Mammals of Kentucky. 1974. Lexington, Kentucky, University Press of Kentucky.

Bellocq, M.I., Bendell, J.F., Cadogan, B.I.. Effects of the insecticide *Bacillus thuringiensis* on *Sorex cinereus* (masked shrew) populations, diet, and prey selection in a jack pine plantation in northern Ontario. Canadian Journal of Zoology 70, 505-510. 1992.

Brady, J., Kunz T.H., Tuttle, M. D, and Wilson, D. Gray Bat Recovery Plan . 140. 1982. U.S. Fish Wildlife Service .

Brooks, R.T., Healy, W.M.. Response of small mammal communities to silviculture treatments in eastern hardwood forests of West Virginia and Massachusetts. Management of amphibians, reptiles and small mammals in North America: Proceedings of the symposium. pages 313-318. 1988. U.S. Forest Service.

Brown, L.N.. A guide to the mammals of the southeastern United States. 1997. Knoxville, Tennessee, The University of Tennessee Press.

Burford, L.S., Lacki, M.J., 1998. Moths consumed by *Corynorhinus townsendii virginianus* in eastern Kentucky. American Midland Naturalist 139:141-146.

Caire, W., Tyler, J.D., Glass, B.P., Mares, M.A.. Mammals of Oklahoma. 1989. Norman, Oklahoma, University of Oklahoma Press.

Castleberry, S.B.. Conservation and management of the Allegheny woodrat in the central Appalachians, PHD dissertation. 2000. Morgantown, West Virginia, West Virginia University. Notes: PHD Dissertation ;thesis

Chapman, J.A., Cramer, K.L., Dippenaar, N.J., Robinson, T.J.. Systematics and biogeography of the New England cottontail, *Sylvilagus transitionalis*, with the description of a new species from the Appalachian Mountains. Proceedings of the Biological Society. 105, pages 841-866. 1992. Biological Society.

Chapman, J.A., Morgan, R.P.. Systematic status of the cottontail complex in western Maryland and nearby West Virginia. Wildlife Monographs No. 36. 1973. Washington, D.C., The Wildlife Society.

Chapman, J.A., Stauffer, J.R.. The status and distribution of the New England cottontail. Myers, K and MacInnes, C. D. editors. Proceedings of the World Lagomorph Conference , 973-983. 1981. Guelph, Ontario, Canada, University of Guelph.

Choate, J.R., Jones Jr., J.K., Jones, C.. Handbook of mammals of the south-central states. 1994. Baton Rouge, Louisiana, Louisiana State University Press.

Churchfield, S.. The Natural History of Shrews. 1992. Ithaca, New York, Cornell University Press.

Clark, D.R.. Environmental contaminants and the management of bat populations in the United States. Management of amphibians, reptiles, and small mammals in North America: proceedings of the symposium. pages 409-413. 1988. U.S. Forest Service, General Technical Report RM166.

Conway, C.H., Pfitzer, D.W.. *Sorex palustris* and *Sorex dispar* from the Great Smoky Mountains National Park. Journal of Mammalogy 33, 106-108. 1952.

DeLorme. Kentucky Atlas and Gazetteer. 1997. DeLorme.

Dimond, J.B., Sherburne, J.A.. Persistence of DDT in wild populations of small mammals. Nature 221, 486-487. 1969.

Dunn, J.P., Hall, J.S.. Status of cave-dwelling bats in Pennsylvania. Journal of Pennsylvania Academy of Sciences 63 (3), 166-172. 1989.

Engel, J.M., Cowresal, F.R., Marin, R.L., Messerli, J.R., Hooper, T.H., Mumford, R.E., Terry, L.E.. Indiana bat recovery plan. 1976. U.S. Fish and Wildlife Service.

Feldhamer, G.A., Gates, J.E., Chapman, J.A.. Threatened and endangered plants and animals of Maryland. Rare, threatened, endangered and extirpated mammals from Maryland. 395-438. 1984. Annapolis, Maryland, Maryland Natural Heritage Program. Nordon, A. W., Forester, D. C., and Fenwich, G. H.

Figg, D.E.. Missouri Department of Conservation Annual Nongame and Endangered Species Report July 1990-June 1991. 1991. Missouri, Missouri Department of Conservation .

Gore, J.A., Hovis, J.A., 1992. The southeastern bat: another cave-roosting species in peril. Bats 10 (2):10-12.

Hall, J.S.. A life history and taxonomic study of the Indiana bat, *Myotis sodalis*. Reading Publication Museum Art Gallery, Science Publication 12 12 , 68 pages. 1962.

Hall, J.S.. Status of the endangered Indiana bat, *Myotis sodalis*, in Pennsylvania. 1979. Notes: Submitted to the Pennsylvania Game Commission, unpublished

Hall, J.S. 1985. Species of special concern in Pennsylvania, Special Publication 11: Eastern woodrat. Pages 362-365 Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, USA.

Handley Jr., C.O.. A revision of American bats of the genera Euderma and Plecotus. Proceedings

U.S. National Museum. 110, pages 95-246. 1959. U.S. National Museum.

Handley Jr., C.O., Patton, C.P.. Wild mammals of Virginia. Wild mammals of Virginia. 1947. Richmond, Virginia, Virginia Commonwealth Game and Inland Fisheries.

Hayes, J.P.. Biogeographic, systematic, and conservation implications of geographic variation in woodrats of the eastern United States. 1990. Ithaca, New York, USA, Cornell University. Notes: Thesis

Hayes, J.P., Harrison, R.G.. Variation in mitochondrial DNA and the biogeographic history of woodrats (*Neotoma*) of the eastern United States. Systematic Biology 41, 331-344. 1992.

Herkert, J. R. Endangered and threatened species of Illinois: status and distribution 2, Animals. 1992. Illinois, Illinois Endangered Species Protection Board.

Johnson, S.A., Marmer, J.R.. 1994 Allegheny woodrat monitoring program. 1995. Bloomington, Indiana, USA, Indiana Division of Fish and Wildlife.

Jones, R.L., 2005. Plant life of Kentucky: an illustrated guide to the vascular flora. The University Press of Kentucky, Lexington, KY.

Kays, R., Wilson, D.E., 2002. Mammals of North America. Princeton University Press, Princeton, NJ.

Kinlaw, A.. *Spilogale putorius*. Mammalian Species 511, 1-7. 1995.

Kirkland Jr., G.J., 1986. Small mammal species of special concern in Pennsylvania and adjacent states: an overview. Pennsylvania Academy of Sciences, Pennsylvania.

Llewellyn, L.M., Handley Jr., C.O.. The cottontail rabbits of Virginia. Journal of Mammalogy 26, 379-390. 1945.

Matthews, J.R., Moseley, C.J., 1990. The Official World Wildlife Fund Guide to Endangered Species of North America, Volume 1: Plants, Mammals. Volume 1. Beacham Publishing, Inc., Washington, D.C.

McCay, T.S.. Use of woody debris by Cotton Mice (*Peromyscus gossypinus*) in a southeastern pine forest. Journal of Mammalogy 81, 527-535. 2000.

Mohr, C.E., 1972. The status of threatened species of cave-dwelling bats. Bulletin of the National Speleological Society 34:33-47.

Mumford, R.E., Whitaker Jr., J.O.. Mammals of Indiana. 1982. Bloomington, Indiana, Indiana University Press.

NatureServe. NatureServe Explorer: An online encyclopedia of life. World Wide Web . 2004. NatureServe, Arlington, Virginia. October 27th, 2004.

Richter, A.R., Humphrey, S.R., Cope, J.B., Brack Jr., V.. Modified cave entrances: thermal effect on body mass and resulting decline of endangered Indiana bats (*Myotis sodalis)*. Conservation Biology 7 (2), 407-415. 1993.

Sample, B.E., Whitmore, R.C.. Food habits of the endangered Virginia big-eared bat in West Virginia. Journal of Mammalogy 74, 428-435. 1993.

Sealander Jr., J.A., 1960. Some noteworthy records of Arkansas mammals. Journal of Mammalogy 41:525-526.

Sole, J.D.. Assessing swamp rabbit distribution in Kentucky. Proceedings of the annual meeting of the Southeastern Association of Fish and Wildlife Agencies. 48, pages 145-151. 1994. Southeastern Association of Fish and Wildlife Agencies.

Sole, J.D.. Distribution and habitat of Appalachian cottontails in Kentucky. Proceedings of the annual meeting of the Southeastern Association of Fish and Wildlife Agencies. 53, Pages 444-448. 1999. Southeastern Association of Fish and Wildlife Agencies.

Thomas, S.C.. Allegheny woodrat monitoring: final report. 2003. Frankfort, Kentucky, KDFWR. Notes: Submitted to KDFWR to fulfill Cooperative Agreement #G5530020001

Tuttle, M.D.. Status, causes of decline, and management of endangered gray bats. Journal of Wildlife Management 43, 1-17. 1979.

Twente, J.W.. Some aspects of habitat selection and other behavior of cavern-dwelling bats. Ecology 36, 706-732. 1955.

U.S. Fish and Wildlife Service. Endangered and threatened species recovery program: report to Congress. 1990. U.S. Fish and Wildlife Service (USFWS).
U.S. Fish and Wildlife Service. Endangered and Threatened Species of the Southeastern United States (The Red Book). 1992. Washington, DC., U.S. Fish and Wildlife Service.

Webster, W. D. *Sorex dispar blitchi* Schwartz, Rock shrew. pages 39-40. 1987. North Carolina, North Carolina Biological Survey. Endangered, threatened and rare fauna of North Carolina, Part I: A re-evaluation of the mammals, Occasional papers of the North Carolina Biological Survey. Clark, M. K.

Wethington, T.A.. Status and management of endangered bats in Kentucky. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies. 55, pages 389-395. 2001.

Whitaker, J.O., Hamilton Jr., W.J.. Mammals of the eastern United States. 1998. Ithaca, New York, USA and London, England, UK, Cornell University Press.

Wilson, D.E., Ruff, S.. The Smithsonian book of North American mammals. 1999. Washington, D.C., Smithsonian Institution Press.

Wolfe, J.L., Linzoy, A.V., 1977. *Peromyscus gossypinus*. American Society of Mammalogy, Mammalian Species 70:5 pages.

Yahner, R.H.. Dynamics of a small mammal community in a fragmented forest. American Midland Naturalist 127, 381-391. 1992.