Kentucky Elk Program Plan of Work for 2020-2024

Introduction

This document outlines the questions and projects of greatest need for the Kentucky elk project in the five-year period of 2020-2024. The projects identified within this Plan, as well as those proposed in previous and future Plans, were chosen to meet the Goals, Objectives, and Strategies laid out in the 2015 - 2030 Kentucky Elk Management Plan . While the Kentucky Elk Management Plan is a long-term guiding document, this Plan of Work is intended to provide a concrete collection of projects that can be implemented to fulfill the vision provided by the Management Plan.

This Plan of Work was developed by Kentucky Department of Fish and Wildlife Resources (KDFWR) Elk Program staff with input from Wildlife Division leadership, Southeast and Northeast Regional Programs, Wildlife Health Program, and Law Enforcement Division. Public input was not gathered for specific project development, but Kentucky citizens had opportunity to participate in the creation of the Management Plan that provided guidance for this Plan of Work.

2015 – 2019 Plan of Work Summary

For the ease of the reader, Elk Program staff opted to create an additional document detailing the results of the recently completed 2015-2019 Plan of Work. Please refer to the 2015-2019 Plan of Work Summary Report at fw.ky.gov/elk for a thorough analysis of the previous 5-year cycle.

Identification of Greatest Needs

Many projects from the original plan (2015-2019) remain in varying levels of completion, and often involve numerous collaborators, pose unique challenges, or are projects with a significance or timeline that spans multiple reporting periods. Furthermore, as these are broad needs, many of the previous projects have been completed, but new ones fall under the purview of an existing need. As such, many of the projects presented here are continuations of the 2015-2019 Plan of Work. Continuation of projects from 2015-2019 are denoted with an asterisk (*).

KDFWR staff identified seven broad needs for the 2020-2024 project cycle. These needs are:

- Refine our baseline knowledge of Kentucky elk population demographics and vital rates*
- Improve the understanding of Kentucky elk population distribution and herd size across the management zone*
- Improve opportunities for elk-related recreation*
- Standardize KDFWR response to negative elk-human interactions*

- Promote habitat enhancement within the management zone to benefit elk and other grassland species
- Determine disease prevalence and abundance within the elk population
- Understand consumer satisfaction of Kentucky elk management

The following sections examine the rationale for each of these broad needs, suggests specific projects that can address these needs, and frames these projects within the wider context of the Kentucky Elk Management Plan.

It is important to note that a variety of potential projects are suggested under each of the broad needs. This does not necessarily mean that each of these projects must be implemented to successfully address the challenges and/or opportunities inherent to that need. Instead, the listed projects should be viewed as providing KDFWR Elk Program staff with a variety of options in answering the questions at hand. This will provide Elk Program staff with the flexibility to select the most appropriate projects as conditions evolve.

Project Discussion

Refine the baseline knowledge of Kentucky elk population demographics and vital rates

To adequately manage Kentucky's elk herd, KDFWR staff require current information regarding trends in population growth. These data can be used in direct analyses of specific population metrics, as well as for development of overall population abundance models. Specific projects to address this need may include:

Use of cementum annuli age-at-harvest data to improve our understanding of Kentucky elk age structure

Project overview

KDFWR staff will collect incisors from research animals (i.e., any free-ranging elk captured for scientific study) and hunter-harvested elk through a voluntary mail-in program. Following collection, incisors will be sent to a lab for cementum annuli analysis, which allow Elk Program staff to develop a robust age-at-harvest structure for Kentucky elk. Data sheets used for incisor collection also allow KDFWR staff to note the general area in which the animal was harvested. Elk Program staff can use this information to compare age-at-harvest trends between different parts of the elk management zone and to inform population models. These comparisons may have utility in exploring the intensity of harvest rates in different areas and/or management units.

Additional points of discussion

Elk Program staff have collected incisors from research animals for over a decade and developed a voluntary tooth submission program in 2016 to bolster sample sizes. Hunters have been

exceptionally compliant with the tooth submission program and staff seek to continue both methods of tooth collection in the future. However, a primary objective of this project was to examine potential differences in age-at-harvest trends amongst different elk management units through time. The elk management units in Kentucky were altered prior to the 2019 season which inhibits staff's ability to compare age-at-harvest trends between management units through time, thus necessitating further data collection.

Justification within the 2015-2030 Kentucky Elk Management Plan

Strategy I.1c; Strategy I.1e; Strategy I.1h; Strategy V.2a

Investigation of mid-winter pregnancy rates to improve understanding of adult female elk reproductive capacity

Project overview

KDFWR staff will bolster cow reproductive data by opportunistically sampling postmortem females (e.g., hunter-harvested elk, elk involved in vehicle collisions, etc.) and adult females captured for scientific study. This sampling approach will serve to increase the sample size, as well as diversify the geographic representativeness of the project.

Additional points of discussion

Pregnancy sampling of postmortem females will most often be conducted via visual observation of a fetus or other signs of pregnancy. Elk Program staff, in collaboration with local elk outfitters and law enforcement officers, examine the reproductive organs of hunter-harvested or other dead female elk opportunistically. If a fetus is observed, Elk Program staff can calculate the approximate conception date. KDFWR initiated a pilot project in 2019 to attempt to increase sample sizes for hunter-harvested cows. Cow rifle hunters are provided with a data sheet containing detailed instructions and sampling and submission materials. Results from the initial pilot project have been limited, but modifications (e.g., better instructions, incentives, awareness, etc.) are planned for future elk hunting seasons to increase participation.

Elk Program staff may also collect a blood sample from a postmortem female if the carcass is fresh. When this occurs, reproductive testing will be conducted with BioPryn, a blood-based pregnancy test the Elk Program has successfully utilized for past projects.

Elk Program staff, in close collaboration with University of Kentucky (UK) researchers, have recently initiated a multi-year research project aimed at investigating the reproductive status of Kentucky elk which began January 2020. All females ≥ 1.5-years-old will be tested for pregnancy via BioPryn analysis and ultrasonography.

Justification within the 2015-2030 Kentucky Elk Management Plan

Strategy I.1a; Strategy I.1c; Strategy I.1h; Strategy V.2b

Investigation of mid-winter pregnancy rates to improve understanding of yearling female elk reproductive capacity

Project overview

KDFWR staff will gather yearling reproductive data using the sampling approach described within the "Improved knowledge of adult cow reproductive rates project" overview. KDFWR elk managers previously assumed that very few yearling elk successfully breed, but recent KDFWR data suggests that yearlings have relatively high pregnancy rates.

To determine the effect yearling pregnancies have on herd reproductive output, this project will deploy collars on yearling elk so researchers could monitor calf production in subsequent years. Postmortem sampling and blood analysis of elk captured for scientific study could help establish a baseline for overall yearling pregnancy rates, while only individuals captured specifically for this project would be used to determine impacts of yearling pregnancies on overall herd reproductive output.

Additional points of discussion

Simulations conducted within the current Kentucky Elk Population Model have demonstrated that yearling reproductive rates are one of the driving factors behind population maintenance and increases. Recent observations suggests that yearling pregnancies occur at a higher rate than previously thought, however. Despite potentially higher yearling pregnancy rates than previously thought, there is some concern that yearling females may not re-breed the following year due to the physical stress of maintaining a pregnancy before reaching full reproductive maturity. KDFWR currently lacks evidence to determine which of these scenarios is occurring within the Kentucky elk population. This project would help answer that question, and should be regarded as high-priority.

Justification within the 2015-2030 Kentucky Elk Management Plan

Strategy I.1a; Strategy I.1c; Strategy I.1h; Strategy V.2b

Use of vaginal implant transmitters to update estimates of elk calf survival rates

Project overview

KDFWR staff will measure elk calf survival by collaring elk calves as soon as possible following birth and then monitoring their survival through recruitment. Elk Program staff will accomplish this by outfitting pregnant elk captured for complimentary projects (Investigation of mid-winter pregnancy rates to improve understanding of adult and yearling female reproductive capacity) with vaginal implant transmitters (VITs). Following VIT expulsion, researchers will locate the birth site with radio telemetry and outfit the calf with a radio collar. KDFWR and UK staff will monitor calf survival until the beginning of the elk hunting season, at which point all surviving calves will be considered successfully recruited into the population.

Additional points of discussion

KDFWR and collaborators conducted two calf survival studies in the early- and mid-2000's. Although they incorporated the best science available at the time, the applicability of their results has likely diminished given the numerous changes observed in the elk management zone since their conclusion. Potential predators (e.g., bears, bobcats, and coyotes) have increased in distribution and abundance over the last decade, and habitat conditions are noticeably different with decreasing mining activity. Furthermore, many of the calves captured for study in the 2009 study were an average of 8-days-old at capture and almost exclusively in grassland habitats. It is possible that this study may include biased survival estimates given that few calves were captured on the day of their birth, and largely in a single habitat type. A 2013-2014 pilot study suggests that a high percentage of calves are born in closed habitats.

Furthermore, KDFWR has collected numerous data on mid-winter pregnancy rates, but pregnancy confirmed via BioPryn analysis may not always correlate with a successful birthing event. VIT technology will allow KDFWR to determine the proportion of individuals within the study that carry a fetus to term, and elucidate factors that may influence any pregnancy terminations.

Justification within the 2015-2030 Kentucky Elk Management Plan

Strategy I.1a; Strategy I.1c; Strategy V.2b

Improve the understanding of Kentucky elk distribution and herd size across the management zone

To best manage the Kentucky elk herd, KDFWR staff require ongoing knowledge of elk distribution throughout the management zone, as well as estimates of abundance at both local and landscape scales.

Refine data collection efforts to improve the effectiveness of the Statistical Population Reconstruction model

Project overview

KDFWR staff will continue to collaborate with University of Montana researchers to improve upon our recently developed statistical population reconstruction (SPR) model. University of Montana researchers have developed a list of guidelines that KDFWR should follow to improve upon the SPR model: deploy and maintain 100 GPS collars on elk dispersed across the management zone, increase collection of hunter effort data, increase collection of age-at-harvest data, and reassess reproductive potential and calf survival estimates.

The SPR model was developed when the At-large and Limited Entry area system was in effect, so the change to an elk hunting unit system (prior to the 2019 season) alters varying components of the model such as mortality risks and hunter effort, among others. KDFWR will collaborate

with University of Montana researchers and make the financial investment to update the SPR model as a result of these changes.

Additional points of discussion

The current SPR model is a valuable tool that provides Elk Program staff with estimates on a variety of population parameters. However, current statistical confidence in these estimates is lower than desired due to the limited years of consistent data within the model. KDFWR will continue to follow the data collection guidelines established by the model developers, and make the financial investments necessary to continue its use.

Justification within the 2015-2030 Kentucky Elk Management Plan

Strategy I.1a; Strategy I.1c; Strategy I.1h; Strategy I.2c

Using mark-resight techniques to estimate elk abundance

Project overview

Elk Program staff will utilize mark-resight techniques to generate estimates of elk abundance throughout the management zone, both wholly and within individual elk hunting units. Staff will use a variety of non-invasive methods to generate these estimates including genetic sampling, camera trapping, and ground or aerial survey routes.

Genetic sampling involves the use of next-generation DNA sequencing to analyze DNA collected from elk fecal samples within a mark-resight framework to develop local elk population density estimates. This technique is similar to the genetic mark-resight sampling currently used to assess black bear population densities and distribution by other KDFWR Wildlife Division staff.

KDFWR will develop a study design for camera traps and survey routes in areas with marked (i.e., animals captured for study and given a radio-collar) individuals to estimate local populations. These surveys generate estimates based on the proportion of marked and unmarked individuals within a predetermined geographic distribution. These projects could help estimate local population densities at different areas within the elk zone, and provides additional methods of comparing estimates from our two existing elk population models.

Additional points of discussion

Biologists from the Eastern Band of Cherokee Indians, the North Carolina Wildlife Resources Commission, and the Great Smokey Mountains National Park are currently conducting an elk density study on the North Carolina elk population using fecal DNA. KDFWR staff will have the opportunity to observe their results and seek their advice prior to attempting to replicate this method in Kentucky. The determination of whether the KDFWR Elk Program pursues this project will largely hinge on the success of the North Carolina genetic mark-resight project.

Historic survey routes conducted by Elk Program staff were only able to provide a minimum count of the elk population, and without known individuals on the landscape, little else can be learned from those observations. However, the high number of marked individuals distributed throughout the elk zone (up to 300 animals by 2022 captured via the KDFWR/ UK research project) may allow biologists to generate estimates based on the proportion of marked and unmarked animals within a set population, which provides useful context to these survey routes.

KDFWR and UK researchers have utilized mark-resight analysis for numerous other projects in the past when sufficient numbers of marked individuals exist within a given population. However, these methods were most successful when we had a large number of marked animals within a relatively small geographic area. The largest potential pitfall to generating abundance estimates by survey routes will be collaring/ marking a sufficient percentage of the population within a given study area. For example, the Lincoln-Peterson estimator, which is a method used by Elk Program and UK staff in the past, requires approximately 10% or more of a population to be collared before it can generate reliable estimates.

Justification within the 2015-2030 Elk Management Plan

Strategy I.1b; Strategy I.1c; Strategy I.1h; Strategy I.2c

Improve opportunities for elk-related recreation

Elk are highly esteemed for their recreational value in Kentucky and other states. KDFWR seeks to provide a wide range of recreational opportunities to citizens of the Commonwealth and other states. To meet this demand, KDFWR explores a range of management options that include coordination with other public agencies as well as partnerships with private landowners.

Establishment and enhancement of elk populations in the Kentucky Elk Management Zone through active translocation

Project overview

KDFWR staff will trap elk from existing herds within the management zone and transfer them to new areas to facilitate the dispersion and overall distribution of elk within the management zone. Initial focal areas should include large amounts of public land with vacant habitat and/ or low elk population densities. Trapping efforts will occur from the end of elk hunting season until mid - spring. Helicopter capture will be the primary capture method as this technique allows for a safer and more time and cost-efficient means to trap elk, but elk may be captured via corral traps as well. This serves to minimize staff time per elk moved, as well as increase animal welfare by ensuring that translocated animals have an immediate herd within their new territory.

Additional points of discussion

KDFWR Elk Program has substantial experience capturing elk for restoration projects. Elk Program staff have successfully trapped animals for translocation to Missouri, Virginia, and Wisconsin in recent years. Perhaps more substantive, however, are past translocation projects to

Corrigan Wildlife Management Area (WMA), Fishtrap WMA, and the future home of the Boone Center which is a wildlife and education facility in Bell County. These projects involved the transfer of elk to vacant habitat within Kentucky, and all three have resulted in thriving elk herds. These successes suggest that future in-state translocations could also prove effective at increasing recreational opportunities across the elk management zone.

KDFWR staff from the Wildlife Division will collaborate to identify areas with suitable habitat via ArcGIS and perform ground surveys to verify results to ensure the habitat the elk are translocated on will sustain a healthy population. This project will be considered successful if staff are able to create a new population of elk on public land.

Justification within the 2015-2030 Elk Management Plan

Strategy I.1e; Strategy I.1f; Strategy I.1g; Strategy I.1i; Strategy IV.1a; Strategy IV.1d; Strategy V.2a

Partner with other agencies and/or organizations to facilitate the development of elk viewing areas for non-consumptive users

Project overview

KDFWR elk program staff will provide technical guidance to groups/entities who are establishing opportunities for non-consumptive elk recreation. KDFWR Elk Program staff may provide information regarding elk biology and ecology, habitat improvement to increase elk presence and visibility, best management practices for maintaining public safety around large mammals, and development of collaborative efforts between other agencies, organizations, and entities. At present, KDFWR is working with representatives from the Boone Center, the University of Kentucky, and the Pike County local government.

Additional points of discussion

Opportunities for non-consumptive elk recreation have been relatively underdeveloped in Kentucky, despite the fact that Kentucky has the largest elk herd in the eastern United States. Further development of this sector could help KDFWR achieve its Mission by increasing public knowledge of the Commonwealth's wildlife resources.

Justification within the 2015-2030 Elk Management Plan

Strategy IV.1a; Strategy IV.1b; Strategy IV.1d; Strategy IV.1e; Strategy IV.3a; Strategy IV.3b; Strategy V.1e

Establish a permit turn in program to allow more opportunity for elk hunting

Project overview

KDFWR will develop a program which will allow drawn elk hunters the ability to turn their permit back in to KDFWR if they are unable/ unwilling to hunt that season, or if they fail to purchase their permit. Any hunter who notifies KDFWR in writing, or fails to purchase their

permit by a set date, would release their permit back to KDFWR to offer in a secondary drawing. Any hunter who releases their permit would not be required to sit out the three year waiting period that drawn hunters are currently required to after being selected for the hunt.

This permit turn in program is its inception phase, but preference will most likely be given to applicants who have never drawn a Kentucky elk permit before. It may also include some sort of retroactive language that rewards applicants who have applied for the longest periods of time without successfully drawing a permit. KDFWR will conduct the secondary drawing given the associated costs of partnering with the Commonwealth Office of Technology and the low number of permits anticipated to be available.

Additional points of discussion

There is a high demand for elk hunting permits amongst Kentucky's hunters, but there are currently more applicants who wish to hunt elk than available permits. However, current and projected population growth rates, when coupled with the limited size of the elk management zone, will likely keep the overall number of elk permits at a level where not every applicant will receive a permit in their lifetime especially for the high demand hunts (e.g., bull firearm). Many hunters realize this and argue for a points system where their loyalty in the application process would be awarded so their odds of drawing a permit increase with each year of unsuccessful applications. KDFWR does not currently offer a point system for the quota elk hunt so all hunters (i.e., current and future) will have an equal opportunity to receive a permit, and continue to make changes to increase applicants' odds each year.

Between 5-10% of the elk permits go unused annually, although this percentage of unused permits varies drastically amongst permit type. Offering these unused permits in a secondary drawing for hunters who have never been selected to hunt elk in Kentucky would minimally increase their odds, but is a way to offer additional hunting opportunity without damaging the resource.

Justification within the 2015-2030 Elk Management Plan

Strategy I.1e, Strategy IV.2a, Strategy IV.2b, Strategy IV.2c

Standardize KDFWR response to negative elk-human interactions

KDFWR staff receive relatively few annual reports of elk-human conflict. However, it is important that agency staff provide a consistent message to the public who are experiencing these issues. Development and adoption of a Standard Operating Procedure (SOP) for elk nuisance would fulfill this need.

Develop an Elk Damage Standard Operating Procedure for the KDFWR Wildlife and Law Enforcement Divisions

Project overview

KDFWR Elk Program staff will draft a SOP for addressing elk nuisance issues. This SOP will be provided to the leadership of the Wildlife and Law Enforcement Divisions for review. Following any necessary revisions, KDFWR leadership will adopt the Elk Damage SOP and disseminate it to the appropriate staff.

Additional points of discussion

KDFWR currently lacks an official SOP for dealing with negative elk-human interactions. To date, the low occurrence of elk nuisance complaints has meant that relatively few KDFWR staff have been able to respond to these complaints, thus maintaining consistency in how these issues were handled. As elk herds increase and veteran KDFWR staff retire, however, it will be important to ensure that all damage complaints are handled in a consistent manner. The Elk Damage SOP will also provide a consistent framework to deal with elk that are infected with meningeal worm, since landowners often view neurologically-impaired elk as a nuisance issue.

Justification within the 2015-2030 Elk Management Plan

Strategy I.1e; Strategy I.1f; Strategy I.1g; Strategy I.1h; Strategy III.2a; Strategy III.2b; Strategy III.2c

Promote habitat enhancement within the management zone to benefit elk and other species

Changes to global markets and regulatory pressures have led to a precipitous drop in coal mining activities in eastern Kentucky. This drop in active mining efforts means there is little desirable elk habitat being created and has resulted in many of the reclaimed grassland habitats succumbing to woody encroachment, the majority of which is invasive or provides little wildlife benefit. A 2011 – 2014 bull mortality project suggests that open grasslands of 10 acres or more are a critical habitat component, so this loss of forage dictates that other methods of providing sufficient habitat be pursued.

Create multi-agency collaborations to improve habitat in eastern Kentucky

Project overview

KDFWR has a long history of collaborating with various other organizations to promote better habitat, and seek to build upon this history to increase our capacity for future work. We are currently collaborating with nationwide non-governmental organizations, sister agencies within Kentucky state government, USFS staff, and numerous private partners to fund and implement habitat management practices in eastern Kentucky. We will continue to foster these relationships, and continually seek out additional partners whose interests align closely with our own.

Additional points of discussion

Global climate change proponents have produced computer models that show an increased risk of species' ranges shrinking or shifting to include more of the Appalachian ecosystems. As such, numerous state, federal, and non-governmental agencies have taken an increased interest in promoting sound habitat management practices in eastern Kentucky in response to these projections. Each of these organizations has a particular agenda, or specific end goal in mind, and thus promote various management strategies to meet their objectives. However, each organization also has its own limitations be it financial, manpower, or otherwise. Given that each organization can benefit from the habitat management practices that another employs, it is imperative moving forward to collaborate with other organizations to maximize resources and achieve optimal results.

Justification within the 2015-2030 Elk Management Plan

Strategy II.1b, Strategy II.1c

Explore the creation of tax incentive program to promote habitat management

Project overview

KDFWR will explore the potential to create a tax incentive for landholding companies of eastern Kentucky that partake in KDFWR certified habitat management activities. This project is in its inception phase, but initial thoughts are to offer financial incentives for landowners willing to follow the management practices detailed within a KDFWR administered management plan. The management plan should be property-specific, prescribe management practices conducive to the land cover type, and prescribe management practices for a specified amount of time. The landowner would provide matching funds which may include working time, equipment, seed cost, etc. A KDFWR biologist would perform an annual site visit to ensure practices have been conducted in a satisfactory manner. The landowner would receive a reduction on their property tax at a predetermined rate, perhaps based on the number of acres treated or some other KDFWR-approved metric. Tax rate decrease would only be applicable in the county in which the habitat management was performed.

When mining companies are involved, preference should be given to properties at phase 3 of bond release, although options could exist for areas at earlier phases (e.g., plant native seed mixes, perform prescribed fire or herbicide application in phase 2 properties, etc.). In no way should the management plan, or any activities described within it, prohibit mining or other activities (e.g., oil or gas extraction, farming, logging operations, etc.) on the property, although it should provide strategies to conduct those practices in a wildlife friendly manner.

This will be a multi-year endeavor and will require action and buy-in by numerous entities to complete. KDFWR and its partners will need to lobby and generate support within the legislature, and the success of this project hinges on the willingness of outside stakeholders' support.

Additional points of discussion

Many of the largest landholding companies in eastern Kentucky derive their profits from royalties associated with natural resource extraction. A majority of these companies are unwilling to assume the liability (either real or perceived) of conducting large scale habitat management practices on their properties- especially if there is a financial cost- when promoting better wildlife habitat isn't in their business model. As such, it is challenging to effect significant habitat change in eastern Kentucky because many of the large landowners don't want to allow access when there is no tangible benefit to them. Furthermore, many of the programs that are currently offered (e.g., USDA programs offered through the Farm Bill) don't apply to the landholding companies, so KDFWR has no way to offer a financial incentive.

Justification within the 2015-2030 Elk Management Plan

Strategy II.1b, Strategy II.4a, Strategy II.4b, Strategy II.4c, Strategy II.4e, Strategy II.4f

Develop a Habitat Improvement Permit to incentivize landowners to promote habitat management

Project overview

This project would be implemented utilizing guidelines similar to those listed in the "Explore the creation of a tax incentive program to promote habitat management" overview and is also in its inception phase. KDFWR has the statutory authority to create an elk permit under this premise, which would provide KDFWR additional opportunities to incentivize participating landowners without significant legislative action (other than the Legislative Review Committee which approves regulations). Participating landowners that meet the guidelines above would be eligible to receive an either-sex elk permit. Permits would be awarded based on the number of acres treated, either on an annual basis or over the duration of the management plan once a standardized threshold has been reached. To promote management activities on properties that didn't currently have elk, but could provide much needed habitat for species of high conservation need (e.g., grouse or quail), the elk permits should be valid for the entire elk hunting unit in which the property is located.

Additional points of discussion

KDFWR realizes that a tax incentive program is going to be a multi-year endeavor, and one that will likely span multiple Plan of Work documents. The concept for a Habitat Improvement Permit was developed to provide a means to effect meaningful habitat change more quickly, and to provide an alternative option to promote habitat management. The tax incentive program is aimed more towards larger landholding companies, whereas this project will benefit smaller landowners as well given they can work on habitat management practices over the course of their agreement.

Justification within the 2015-2030 Elk Management Plan

Strategy II.1b, Strategy II.4a, Strategy II.4b, Strategy II.4c, Strategy II.4e, Strategy II.4f

Increase prescribed fire practices in the elk management zone

Project overview

Prescribed fire is one of the cheapest, most readily available tools managers have at their disposal when trying to promote better grassland habitats. KDFWR will seek to use this technique to improve/ treat a total of 15,000 new acres in the elk management zone within the life of this Elk Plan of Work.

Additional points of discussion

All of the projects detailed in this section will likely utilize prescribed fire to meet the individual objectives associated with each project. However, two projects ("Develop a habitat improvement program to incentivize landowners to promote habitat management" and "Explore the creation of a tax incentive program to promote habitat management") are purely conceptual, while the third ("Create multi-agency collaborations to improve habitat in eastern Kentucky") is largely dependent on other partners. The common thread is improving habitat, but there are no measurable goals or guaranteed deliverables amongst the three projects to determine success.

Prescribed fire practices already occur in the elk management zone on an almost annual basis, but little work had been conducted prior to 2017 on reclaimed mine lands where it is most needed. KDFWR has proven its ability to implement this practice in a manner that promotes better habitat without interfering with mining and/ or reclamation practices and bond release. With over 300,000 acres enrolled in public access agreements (in various stages of habitat composition), elk program staff believe that 15,000 acres is an attainable goal. If KDFWR can continue to utilize this practice in a mine –friendly manner, and particularly if the incentive programs are successful, a more realistic future goal may be to strive for ~1 % of the available acres enrolled in agreement areas over a 5-year period.

Potential pitfalls and limitations to this project are weather, available staff, sufficient properties to work on, and unforeseen circumstances (e.g., the coronavirus pandemic) that may prohibit this practice.

Justification within the 2015-2030 Elk Management Plan

Strategy II.1b

Determine disease prevalence and abundance within the elk population

The rapid spread of Chronic Wasting Disease (CWD) and introduction of additional disease vectors (and their associated diseases) across much of the United States have spurred many questions regarding the current and future safety of Kentucky's elk populations, and have ramifications for public health as well.

Employ local businesses to assist with Chronic Wasting Disease monitoring and prevention

Project overview

KDFWR filed an amended regulation with the Kentucky Legislative Review committee in December 2019 which will require cervid meat processors (deer and elk) to register for a permit with KDFWR at no charge. The purpose for the creation of the permit is for tracking purposes as it was previously unknown how many cervid meat processors exist, or where they are located.

Elk Program staff will contact all cervid meat processors and taxidermists within the state to inform them of the risks of CWD and the need for increased sampling intensity of elk. If a cervid meat processor or taxidermist is willing to collaborate, KDFWR will provide training on sample collection, sampling materials, and $8 per sample collected to offset costs. If they are unwilling to physically collect the samples, KDFWR will provide contact information for local staff to collect samples when animals are brought in.

Additional points of discussion

Eastern Kentucky has historically been a challenging area to obtain sufficient samples given the relatively low number of staff, and the current restrictions on seasons and bag limits for elk and white-tailed deer (i.e., intentionally lower harvest rates compared to the remainder of the state). The current CWD monitoring plan assigns individual counties a sample quota based on each county's risk with the goal of detecting CWD on the landscape at a prevalence of ≤1%. KDFWR has traditionally allowed samples from either deer or elk to count to this quota, but there is evidence to suggest that the two species may have different susceptibility to the disease. KDFWR does not often reach the required number of samples to detect CWD in the elk herd at a prevalence of ≤1% and should increase the intensity of CWD sampling for elk to meet that objective.

Numerous methods have been utilized over the years to collect additional CWD samples in eastern Kentucky, particularly from elk, with minor results. Staff have held mandatory check stations, performed random sampling along major roadways, and opportunistic sampling at guide/ outfitter camps, or in the field. However, it is challenging to collect samples from hunter-harvested elk because many successful hunters wish to have their elk mounted, or simply do not want the head removed so the animal can be displayed prior to processing.

Collecting samples from male elk is especially challenging as their hunting seasons occur in warmer months, which increases the chance for meat spoilage. Given these challenges, and the fact that a large percentage of hunters live outside the elk zone, many hunters opt to leave with their elk and have their local taxidermist or processor handle it, which results in the majority of hunter-harvested elk never being tested. Identifying these processors is a critical first step in collecting additional CWD samples from elk to continue much-needed monitoring for CWD, with an added economic benefit to numerous local businesses across the state.

Justification within the 2015-2030 Elk Management Plan

Strategy I.4a, Strategy I.4b, Strategy I.4c, Strategy I.3a

Improve our understanding of disease vector abundance and distribution

Project overview

KDFWR will collaborate with researchers at the Southeastern Cooperative Wildlife Disease Study (SCWDS) as part of a larger multi-state tick surveillance effort. SCWDS staff provide sampling vials containing isopropyl alcohol for tick collection and storage purposes. Samples will be collected from elk captured for other research purposes, and opportunistically throughout the remainder of the year. It will be important to collect samples throughout the year as the various tick species exhibit seasonal shifts in activity. SCWDS will identify the ticks to the species level, update tick distribution maps, and analyze ticks for potential pathogens.

Additional points of discussion

An improved understanding of disease vector abundance and distribution has important ramifications for wildlife populations and public health. Some species of ticks, for example, are known to congregate in extremely high numbers on individual animals which may lead to anemia, metabolic imbalance, death, or susceptibility to other disease via immunosuppression. Likewise, many ticks are carriers of zoonotic diseases such as Lyme disease which pose risks to human health. Numerous Kentuckians are infected with Lyme disease annually, however many cases are left untreated for prolonged periods of time because it is not a well-known disease in Kentucky and many of the published tick distribution maps are not accurate.

New disease vector introductions occur frequently with global trade markets, interstate travel, and translocations of animals, and often little is known about the new species' influence on native fauna. Elk program staff recently documented the presence of a new tick species in Kentucky, the Asian longhorned tick (*Haemaphysalis longicornus*), which is a known carrier of zoonotic disease. Staff have found Asian longhorned ticks on Kentucky elk, but little is known regarding the potential impact this tick could have on North American wildlife. It will be important to continue to monitor for this new species (and others) as there have been reports from Virginia where Asian longhorned ticks have caused mortality in domestic cattle.

Justification within the 2015-2030 Elk Management Plan

Strategy I.3a, Strategy I.4e

Characterize the relationship between trace minerals and *P. tenuis* infection

Project overview

KDFWR will conduct a series of tests to determine baseline levels of trace minerals in healthy elk so a reference range may be established to interpret test results from sick elk. Blood samples are collected from elk captured for other purposes, placed in a centrifuge to separate out the

serum, and then sent along with other tissue samples to UK for analysis. Results of these tests provide levels of cobalt, copper, iron, manganese, molybdenum, selenium, and zinc.

When conditions permit during capture, KDFWR staff also seek to perform liver biopsies on apparently healthy individuals. Liver biopsies are conducted on healthy living elk primarily to assess long term copper storage levels in apparently healthy individuals. Additionally, we hope to collect livers from hunter-harvested animals. Quantifying copper from liver is better than serum because it provides a better idea about long-term copper levels. Sulfur is difficult to measure from postmortem samples due to decomposition potentially artificially increasing levels. To address whether sulfur is artificially increased staff have been pulling ocular fluid at the time of necropsy and submitting that for analysis.

Additional points of discussion

Other than Tule elk in California, the only baseline information currently available to interpret the results of trace mineral analysis is from domestic cattle. Tule elk are physiologically similar to the Rocky Mountain elk found in Kentucky, but they inhabit a vastly different ecosystem. Furthermore, Kentucky elk live in an area characterized by heavy mining activities, which exposes them to unnatural levels of various minerals, thus precluding comparisons between the two areas' elk.

The majority of elk with confirmed or suspected *P. tenuis* infections submitted to SCWDS also had copper deficiencies and elevated sulfur levels. Establishing a reliable baseline of trace mineral levels in healthy elk may help determine whether animals with altered levels of copper or sulfur are more susceptible the *P. tenuis* infections. Additionally, trace mineral diagnostics will provide more information regarding the prevalence of elk suffering from dietary trace mineral imbalances and whether there is a difference in distribution across the elk management zone associated with habitat quality.

Justification within the 2015-2030 Elk Management Plan

Strategy I.3a, Strategy I.4d, Strategy I.4e

Establish baseline levels of endoparasite and blood borne pathogen burdens in apparently healthy elk

Project overview

KDFWR will collect blood samples from apparently healthy elk to establish baseline levels of blood borne pathogens. This is achieved by creating a blood smear using whole blood (i.e., raw, unmolested blood) and manually examining the slides under a microscope. Staff will also draw blood samples to conduct hematocrit and transferrin saturation tests which are used to measure potential anemia associated with heavy parasite burdens via endo- or ectoparasites.

Elk Program staff will also collect abomasums from hunter-harvested elk, as well as all opportunistic elk throughout the year. Staff are collecting abomasums to perform abomasum

parasite counts (APCs), which is one measure of the endoparasite burden in an elk, and provide some insight into the overall health of the animal in relation to its habitat.

Additional points of discussion

APCs are routinely conducted on deer annually in Kentucky, but rarely on elk. They are primarily conducted during a seasonal period of high stress to determine what the health of a population is when the habitat is at its worst. Higher stress often leads to increased parasite burdens. There is not currently a framework in effect to euthanize elk for the purpose of herd health monitoring, so other options must be employed to collect samples. However, given the challenges presented in previous sections, it may be difficult to collect sufficient samples solely from hunter-harvested elk. Thus, all opportunistic elk should be sampled indiscriminately throughout the year to eventually create a range of expected or predicted APCs.

In combination with conducting APCs on euthanized elk, blood is also collected at the time of euthanasia. Whole blood is used to determine the Pack Cell Volume (PCV) which is highly correlated to the hematocrit or the red blood cell count in blood. Staff are interested in determining if animals with high parasite burdens are also suffering from an anemia. The goal is to determine if there are metric we can collect from live animals that could be used as positive predictors for health and disease status. There has also been little-to-no investigation in blood borne pathogens in Kentucky elk, which may have ramifications for elk and human health.

Justification within the 2015-2030 Elk Management Plan

Strategy I.3a, Objective I.4, Objective II.1

Understand consumer satisfaction of Kentucky elk management

KDFWR is the state agency entrusted to manage wildlife populations in Kentucky. Given that wildlife are a public resource, it is important for the public to have the ability to provide their input on how those resources are managed.

Utilize surveys to gather stakeholder input

Project overview

KDFWR will use a variety of surveys to gather public opinion on Kentucky elk management. Where applicable, there will primarily be three types of surveys used to gather these data: 1) a postseason survey of drawn hunters, 2) a survey of elk hunt applicants, and 3) a survey of licensed elk guides. The postseason survey will be administered annually as it is mandatory per regulation. The other two surveys will be administered once every three years, but more frequently if there are any significant changes proposed for the elk hunting structure. Data derived from these surveys will be used to influence elk management decisions.

Additional points of discussion

It is important for KDFWR to understand the level of satisfaction that its constituents have regarding elk management because the public's opinion often changes. Whether it be in response

to a specific management strategy or a societal change, KDFWR should be aware and adopt an adaptive management scheme that incorporates the desires of the public when applicable. It is important to note, however, that not every constituent will be satisfied with each management decision.

Justification within the 2015-2030 Elk Management Plan

Strategy I.1d, Strategy I.1h, Strategy IV. 4b, Strategy IV 4c, Strategy IV. 4d