PICEANCE BASIN PREDATOR CONTROL PLAN
SELECTIVE PREDATOR REMOVAL
TO INCREASE EARLY MULE DEER FAWN SURVIVAL IN GAME MANAGEMENT UNIT (GMU) 22

November 29, 2016

Colorado Parks and Wildlife (CPW) is requesting approval from the Parks and Wildlife Commission for this research project according to the Commission’s Mammalian Predator Management Policy (revised October 11, 2007).

Background and Need
The Colorado mule deer strategy adopted in 2014 identifies predation as one of the potential factors limiting Colorado mule deer populations. Since the adoption of the mule deer strategy by the Parks and Wildlife Commission, CPW developed a plan for the implementation of the strategy. As part of the implementation strategy, staff examined existing predator and deer research and monitoring data to identify areas where predation may be most limiting to mule deer, which in turn could be used to inform predator harvest/management decisions.

The Piceance Basin in northwest Colorado (GMU 22) represents winter range supporting the largest migratory mule deer population in Colorado. This area has been the focus of research and monitoring efforts since the late 1940’s and represents one of the best documented mule deer populations in North America. Previous CPW Research efforts conducted during the 1980s through mid-1990s documented a high density population (mean winter density = 24/mi²) that appeared to be primarily limited by winter severity and forage conditions on winter range. During the early 1990s, this population declined to about 1/3 of the previous winter range density (mean winter density = 9/mi²), likely due to exceeding the forage capacity on winter range to support the previously high deer densities. Due to historic mule deer population declines, total mule deer licenses in the area have been reduced by 85% since 2007 and female licenses specifically have been reduced by about 99%; current license allocation in GMU 22 consists of 590 antlered deer and 20 antlerless deer licenses.

Thirteen years later (January 2008), another CPW research effort was initiated to address mule deer/energy development interactions in the Piceance Basin, where similar information is now being collected to provide comparisons to mule deer demographic data from the 1980s and early 1990s. In comparing data between the 2 time periods (1982-1990 before the decline and 2008-present), December fawn weights have increased (averaging 8.6 lbs. heavier), winter fawn survival (December - June) has more than doubled (averaging 0.716 versus 0.351), and winter starvation has become rare (<3% of collared fawns). Winter starvation was common during the 1980s (averaging 33% annually). However, early winter fawn recruitment (December fawn counts) has declined from about 73 fawns/100 does to 49 fawns/100 does. Higher winter fawn weights, survival, and low starvation frequency suggests mule deer in the Piceance Basin are no longer habitat limited on winter range, but lower December fawn counts have limited this population’s ability to recover to historic levels.

Approach
CPW proposes to monitor fawn survival on two adjacent birthing (parturition) areas over the next 3 years, one receiving predator reduction and the other without any predator reduction efforts (Figure 1). To be most effective in applying predator reduction to sufficiently reduce predation rates, the Western Association of Fish and Wildlife Agencies Mule Deer Working
Group (2012) suggests focusing on relatively small areas during critical survival periods when habitat and climate factors are non-limiting. CPW’s proposal to focus predator control efforts on a relatively small summer range parturition area on the Roan Plateau (493 mi²; Figure 1 during May and June just prior to and during the fawn birthing period is consistent with this suggestion. CPW will compare survival rates to an un-manipulated parturition area (511 mi²) to the east between Meeker and Rifle; newborn mule deer fawn survival in the absence of predator control has been documented in both areas from 2011 - 2013 and continued in the predator treatment area through 2016. Because the predator reduction area consists primarily of private lands (mostly energy companies) and hunting seasons are not available during the spring, specialized contractors will conduct predator control efforts. Predator control efforts will focus on black bears and mountain lions because these species have been connected to predation of at least 25% of the collared fawns monitored since 2011; predation from all other predators is typically ≤5%/species (coyotes, bobcats, golden eagles). Control efforts will also focus on specific areas of lion and bear predation documented since 2011 (Figure 1). Mountain lion and black bear removal methods employed will consist of cage traps, culvert traps, foot snares, and trailing hounds for capture and a firearm will be used for euthanasia. Predator control personnel will make every effort to salvage all black bear and mountain lion carcasses for CPW disposal (gall bladders, skulls, claws and hides) or distribution (meat). CPW anticipates predator removal levels to range between 5-10 mountain lions and 10-20 black bears annually. Higher removal levels are possible; for black bears the number removed could be as high as 25. While the objective is to reduce mountain lion and black bear densities in this focal area, overall densities at the Data Analysis Unit scale should be minimally influenced; the predator treatment summer range area (Figure 1) represents 6% of mountain lion DAU L-7 and 16% of black bear DAU B-1. The proposed reductions are consistent with the current mountain lion management objective in this rural area - to maintain relatively low predator densities for reducing livestock conflicts. This area is 1 of 4 DAUs (out of 19 lion units statewide) managed to minimize livestock conflicts.

Is the Project Confined to a Specific and Well-Defined Geographical Area?
Yes. CPW proposes to focus predator control efforts on a relatively small summer range parturition area on the Roan Plateau (493 mi²) in GMUs 22, 31 and 32 in northwest Colorado.

Is the Proposal Targeted Toward Specific Species and, Whenever Practical, the Offending Animal(s)?
Yes. The proposal specifically targets black bears and mountain lions in specific locations within the study area at the time that fawn depredation is occurring (Figure 1).

Explanation of Why Control Efforts May be Necessary.
Neonate (new born fawn) survival has been relatively low (~35-40%) and largely due to predation (at least 50% of collared fawns), but managers have been unable to confirm if predation is limiting overall fawn survival or whether fawns dying from predation are weaker, on average, and would otherwise likely have died prior to adulthood. Recent investigations addressing newborn fawn survival suggest predation (primarily from black bears and mountain lions) is the largest mortality factor inhibiting early fawn survival. CPW proposes to reduce black bear and mountain lion densities during May and June in the birthing area for 3 years to evaluate whether or not lowering predation rates will increase early fawn survival and ultimately adult recruitment.

Is the Plan within the Authority of the Parks and Wildlife Commission?
Yes.
Proposed Objectives and Expected Results, including Criteria to Determine when the Proposal will be Discontinued (both by Failure and Success).
To address the reason for lower December fawn counts in the Piceance Basin and identify potential management options, CPW proposes to reduce predator numbers (black bears and mountain lions) during the spring fawning period specifically in areas of previous predation activity (Figure 1), and to continue monitoring newborn fawn survival for another 3 years to evaluate this approach for increasing early fawn survival. This information will indicate if predation is most limiting or if maternal or fetal condition predisposes fawns to lower survival and ultimately reduces their recruitment as adults.

CPW will consider predator reduction effective if fawn predation rates from black bears and mountain lions is reduced $\geq 20\%$ (from $-50\%$ to $\leq 30\%$) and a subsequent increase of $\geq 15\%$ fawn survival is documented.

A Discussion of Potential Non-lethal Methods and Why They Would or Would Not be Effective.
Translocation of independent adult mountain lions and black bears would require considerable effort and expense and may create additional challenges for landowners and wildlife managers in release areas.

However, all known bear and lion family groups caught during removal efforts will be translocated. Remote cameras will be placed at trap sites to enhance detection of carnivore family groups prior to handling. CPW expects to encounter family groups rarely during predator reduction efforts. However, one to a few family groups could be encountered during the 3-year project. Translocation of family groups may be effective in reducing predation, while alleviating the loss of young carnivores and maintain carnivore population resiliency. CPW plans to translocate black bear and lion family groups at least 30 miles distant; translocation sites will be chosen to minimize potential conflicts with other human activities (e.g., livestock, close proximity to human foods). This distance should be adequate to provide enough time for fawns to grow and become sufficiently agile to avoid bear predation and be less susceptible to lion predation if the family group returns.

Total Estimated Cost and Funding Source for Implementation of the Plan.
This project will begin spring 2017 and continue through December 2019. Annual expenses will average $210,247 with $157,685 (75%) expected to come from federal aid (Pittman-Robertson) grants and $52,562 (25%) from CPW matching funds (Wildlife Cash).

Discussion of Public Participation and Input Received from Interested Constituencies and Analysis of the Public Support for the Plan.
The Northwest Region invited the public to learn about the Piceance Basin Predator Research Proposal/Management Plan during an evening meeting on August 16, 2016 at the Garfield County Fairgrounds in Rifle, Colorado. The featured presenter was Dr. Chuck Anderson, leader of CPW’s Mammals Research unit. Dr. Anderson explained the proposed study and answered questions. Thirty-seven members of the public signed the attendance sheet. They represented various backgrounds and opinions regarding the proposal. Although no formal questionnaire was provided at the meeting, most in attendance supported the plan or indicated they understood CPW’s position.
Of the 37 attendees, approximately 6 expressed opposition to the plan. One person challenged CPW’s information, citing research they believed contradicted CPW’s data. Staff attempted to clarify the scientific literature. Several members of the media attended, including the Grand Junction Daily Sentinel, KDNK Radio from Carbondale, and the Glenwood Post/Rifle Citizen Telegram. Overall, the meeting was cordial and polite.

On the evening of September 19, 2016, another public meeting was held at CPW’s 6060 Broadway office in the Hunter Education building (see the Meridian Institute report appended to this plan).

Impact of the Proposed Plan on Threatened and Endangered Species.
The work in this proposal does not include any ground disturbing activities and therefore will not disturb any sensitive plant species in the area. Trapping activities could influence medium to large mammal species. Sensitive mammal species in Colorado that potentially could be impacted by trapping efforts include Canada lynx, wolverine, and gray wolf. However, occurrence of these species in the predator reduction study area is extremely low given that the area represents low quality lynx habitat and that no recent records of these species have been documented in this area. In the unlikely event that one of these species is caught during trapping efforts, the trapping methods employed are non-lethal and captured animals will be immediately released. Thus, no impact on threatened and endangered species is anticipated.

Whether Implementation of the Plan May Impact Associated Species or the Re/introduction of Any Species in the Area.
The small size of the predator reduction area (493 mi²) should have minimal influence on mountain lion and black bears densities at the DAU level; the predator treatment summer range area represents 6% of mountain lion DAU L-7 and 16% of black bear DAU B-1. Furthermore, corresponding influences on predation rates of prey species (primarily deer and elk) should also be local and limited at the larger DAU scale. No impact on introduced or reintroduced species is anticipated.

Whether the Plan will Impact or be Part of a Research Project.
This is a research project.

Whether the Plan will Jeopardize Pittman-Robertson or Dingell-Johnson Funding.
Pittman-Robertson funds are expected to be available to financially support this project.
Figure 1. Mule deer winter and summer ranges, Piceance Basin, northwest Colorado. Pregnant adult females on winter range (orange boundary) will receive vaginal implant transmitters to facilitate neonate capture and collaring efforts in the predator treatment area (green boundary). Neonates in the control area (blue boundary) will be opportunistically captured to provide survival rate comparisons between summer ranges with and without focused predator reduction. Circles represent neonate mule deer predation site locations from bears (red) and mountain lions (blue) from 2011-2016 in the predator treatment summer range. Black lines depict mule deer Game Management Unit boundaries.
Colorado Parks & Wildlife
Predator Management Listening Session

Summary of Public Comments

Date:  September 19, 2016
Location:  6060 Broadway, Hunter Education Building, Denver, Colorado

Meeting Overview

Colorado Parks & Wildlife (CPW) held a public listening session from 6:30-8:30 pm on September 19, 2016 at the CPW Hunter Education Building in Denver, Colorado. The purpose of the meeting was to gather comments on two proposed Predator Management Plans. The plans seek to determine how lowering predator density in the two study areas affects mule deer survival and recruitment. The two studies are:

   The Piceance Basin Predator Management Plan; and
   The Upper Arkansas River Predator Management Plan

The objective of the meeting was for CPW to gather input from the public on the proposals. Fifty-seven members of the public attended the meeting and twenty-eight individuals provided public comments during the listening session.

Introductory Remarks

Dan Prenzlow, CPW Southeast Regional Manager, provided opening remarks, welcomed participants and provided some background on the plans. Mr. Prenzlow summarized the public outreach CPW has previously done on these plans, including public meetings in Salida and Rifle, Colorado. Additional public comment is being collected by email (dnr_cpwcommission@state.co.us). All public comment, including those from this Denver listening session, the two regional public meetings, and those sent by email will be presented to the Colorado Parks and Wildlife Commission for consideration at its December 14-15, 2016 Commission Meeting. Mr. Prenzlow introduced the moderator for the meeting, Robyn Paulekas.

Ms. Paulekas, a Mediator and Program Manager for Meridian Institute, provided an overview of the public comment format. Meeting participants signed up to provide public comment as they arrive. Each speaker was limited to a maximum three minute statement. Everyone that registered for public comment was provided an opportunity to speak.
Summary of Comments

Twenty eight people provided comments to CPW, representing a diversity of perspectives. Among those that shared comments, six expressed support or commended CPW for undertaking the proposed studies. Twenty two people raised concerns with the proposed studies, with concerns ranging from general opposition to predator reduction to specific concerns about the study methodology or available information.

Below is a summary of the major themes and perspectives that were shared during the meeting. They are organized into three groups: 1) comments that raise concerns or express opposition to the management plans; 2) comments or feedback in support of the proposed management plans; and 3) suggestions related to the public information and engagement process. Within each group, the key discussion points that were raised frequently or expressed by many participants appear at the top.

Concerns with the Predator Management Plans

Other factors influencing mule deer populations
Many speakers raised questions about the relative significance of predator impacts on mule deer populations compared to other factors that have been identified as contributing, or potentially contributing to mule deer decline. Potential other factors include oil and gas development, including fracking; malnutrition and lack of food resources; infrastructure, population growth, and encroachment; competition with elk, moose, and white-tailed deer; climate change and extreme weather conditions; pollution; and other habitat loss. The impacts of these other factors should be more thoroughly studied, with predator management being a last resort or entirely unacceptable. Several speakers raised the question of current carrying capacity, given these other impacts, suggesting that the target mule deer populations may be based on historic data and are unreasonable.

Scientific necessity of study and alternatives
Many commenters raised questions about the scientific necessity of the proposed plans/studies. There were concerns that previous studies have shown killing predators is ineffective in impacting ungulate population growth. Several cited a CPW study conducted in 1999. Speakers emphasized that conclusions from previous studies, including those done by CPW, show that habitat, migration corridors, weather, and malnutrition are key contributors to population decline. Commenters expressed concerns that agencies are not always driven by science and that the study is “selective science.”

1 In this summary, we use the term “many” when more than 10 commenters expressed this perspective; “several” when a perspective was shared by 4-10 commenters; “multiple” and “a few” for 2-3 commenters; and “one” or “a” when a single commenter expressed a perspective.
with a bias towards increasing hunting. CPW should consider alternative methods for the studies that do not require predator control, such as analyzing predator scat or postponing the management studies to see if mule deer populations increase without active predator management.

**Influence of hunting revenue**
Many speakers raised concerns about how hunting revenue (via mule deer licenses) might be influencing decision-making for the plans. In a few cases, the public voiced concerns that the proposed predator management plans may have been prioritized over other threats to mule deer, such as climate change and human encroachment because these studies/management actions would be well received by the sportsmen communities. Public comments emphasized that CPW has a responsibility to effectively manage all wildlife, including predators, for generations to come and not solely for hunters. Speakers suggested that CPW reduce the number of hunting licenses, rather than continue with the proposed management plans. It was also suggested that in both the short and long-term, CPW identify sustainable funding sources that do not rely on hunting licenses.

**Ecological significance of predators**
Several participants shared concerns about the damage and disruption that predator control can have on an ecosystem. Specific concerns were raised about negative consequences resulting from trophic cascading and the magnitude of a relatively small reduction of bears and mountain lions, with significant and long-lasting impacts. Comments addressed the importance of predators in balancing an ecosystem and maintaining biodiversity. There were concerns that hunters take the strongest adult males from the herd which results in decreased health of the overall population whereas predators create a healthier population by removing weak and sick animals. When predators are allowed to hunt, this can result in a healthier herd for both hunters and the overall ecosystem.

**Value of predators**
Several speakers emphasized the ecological necessity and overall importance of predators in Colorado, including cultural and existence value. A few people shared stories from their personal experiences of moving to Colorado specifically for the wildlife, including mountain lions and bears. Others talked about the iconic nature of lions and bears in the state and value that they provide to all citizen. Multiple participants added anecdotal evidence that while they had seen many wild mule deer, they had seen few to no mountain lions and bears in Colorado.

**Ethical considerations**
A few speakers raised concerns with killing animals based on ethical and religious grounds. Some felt that humans should not take part in choosing which animals are killed and which are not. Other expressed that it is not appropriate to intervene in natural predator/prey relationships.

Positive Feedback on the Predator Management Plans

Value of mule deer
Several commenters spoke about the importance of mule deer to multiple stakeholders in Colorado, including their ecological significance and also the human and cultural value to both hunters and the general public.

Predators are a Concern
A few speakers encouraged the CPW proposed management plans, expressing that predators have robust populations and should not be regarded as untouchables in a management plan. They encouraged predator management control studies and management actions. Another commenter raised their concern that they have seen the number of mountain lions in their area increase while the number of mule deer has decreased.

Building on the Mule Deer Strategy
One speaker emphasized that predator management, where predation may be limiting deer survival, was identified as a strategic priority as part of CPWs Mule Deer Strategy. The Mule Deer strategy was developed with extensive public engagement. The commenter commended CPW for taking follow up action on this priority.

Process Suggestions and Public Engagement

CPW’s public engagement
Participants expressed appreciation for CPW’s approach to wildlife management and/or the opportunity to comment on these Plans. Many commenters encouraged the CPW staff and Commission to give the public input serious consideration before finalizing plans for the study. One noted that CPW is an informed and educated manager of wildlife. Another stated that CPW is thoughtful, smart, and committed to wildlife.

Request for additional information
Several participants were concerned about the lack of specific details on the proposed management plans and requested additional information be made public. There were also some specific questions about the management plan and study methodology, which are included below. The presenter requested that CPW review those questions and provide a public response.
Questions About the Management Plan and Study Methodology

Below is a summary of questions raised during the public comment:

**Study design**
- How many lions and bears does CPW propose to kill?
- How many predators are in the proposed study area, and how long would it take to repopulate the area?
- Considering Wildlife Service’s involvement, who is funding the study?
- How will the agency account for the slow reproductive rate of black bears during the study?
- If bears and mountain lions are shot, will others move into the study area? And if CPW continues to shoot them to prevent that, will it not lead to more significant population decline in predators? If they do not shoot them, will it interfere with the study results?
- Does CPW plan to assess habitat conditions following the study?
- Does the target number reflect the current habitat conditions, including habitat destruction and fragmentation from oil and gas extraction and urban development?
- Are the populations of cougars and bears equal in the study areas of the Piceance Basin Study?
- Are the available food and water sources comparable in the Piceance Basin Study?
- How is the Piceance Basin Study a truly controlled study?
- What is CPW’s plan if an unexpected event occurs (i.e., wildlife, etc.) in the Piceance Basin Study area?
- How does CPW know what is 50% of the harvest population in the Upper Arkansas River Study?
- Does CPW have current scientifically-based population estimates for cougars in the Upper Arkansas River region?

**Background literature and scientific basis**
- Has CPW analyzed the current carrying capacity of mule deer for the available habitat?
- Studies have shown that killing coyotes and wolves results in increased predation on ungulate populations. Does CPW have reason to believe bears and cougars will behave different?
- Do these studies need to be done at all?
- What scientific basis does CPW have for the hypothesis that black bear predation is an important factor in mule deer fawn mortality?
Does CPW have current scientifically-based population estimates for cougars and bears in both the study and control regions?
When is the last time CPW adjusted its target for the mule deer population?

Other factors influencing mule deer populations
Why is the emphasis on predators rather than habitat quality, which CPW has done a number of studies on that show it has a significant impact on mule deer?
Is the agency taking into account the increased mortality that conducting indiscriminant trapping during the cub-rearing season would have on slow-reproducing populations?
How will CPW control for other factors in the Piceance Basin Study?
Are the habitat impacts of development, including fossil fuel extraction, equal in the study areas of the Piceance Basin Study?

Predator control methods
How will the agency prevent the killing of mountain lion mothers with dependent young?
How will CPW prevent trapping of female bears and cougars with dependent young?
In the event that cougars or bears are trapped with young in the vicinity, how will CPW handle the dependent young?
How will CPW prevent trapping of non-target animals, including companion animals (i.e., dogs)?
How often will traps be checked?
How will non-target animals caught in traps be treated?
Has CPW considered the risk of capturing federally protected species?

Who are the “specialized contractors” that CPW intends to hire to kill these animals?
In the event that CPW does not sell the target number of cougar tags and/or that hunters are unsuccessful, how will CPW proceed with the Upper Arkansas River Study?

Public engagement
Coloradans voted against a spring bear hunt—how will this study sit with Coloradan citizens?
Will the study be peer reviewed upon completion?
Participants

**Speaking Participants**
The following people provided public comment during the meeting. Organizational affiliations are included when they were specified on the registration form. They are listed alphabetically by last name.

Andrew Currie  
Alexandra Davis  
Helen Davis  
Courtney Euker  
Humans Society of the United States  
Ethan Gates  
Colorado Trappers and Predator Hunters Association  
Caitlin Grant  
Humane Society of the United States  
Rev. Roland Halpern  
Joe Herrman  
Sportsman  
Marty Holmes  
Mule Deer Foundation  
Taylor Jones  
WildEarth Guardians  
Mara Kahn  
Center for Biological Diversity  
Karen Kalavity  
Sierra Club  
Dillon Kujak  
Outfitter  
Kane Little  
Steve Lohr  
Big Game Forever  
Anthony Martin  
Jack Murphy  
Brett Ochr  
Naturalist/Hunter  
Andrea Rose  
Livingwithharmony.org  
Aubyn Royall  
Human Society of the United States  
Dave Ruane  
Johnathan Savfar  
Nicole Spicher  
Nancy Stalker  
Audubon Society of Greater Denver  
Haley Stewart  
Humane Society of the United States  
Debra Taylor  
Humane Society of the United States  
Stuart Wilcox  
WildEarth Guardians  
Chris Wiseman  
Colorado Department of Agriculture
**Listening Participants**
The following participants attended the meeting and listened to public comment, but did not speak.

- Mitch Arnold  
  Sportsman
- Laura Bouettá
- Charles Bram  
  Sportsman
- Chris Breidenbach
- Scott Cisco  
  Colorado Trappers and Predator Hunters Association
- Steve Cisco  
  Colorado Trappers and Predator Hunters Association
- Gary Crawford  
  Wild Turkey Federation
- Cathrine Dougherty
- Wayne East  
  Colorado Department of Agriculture
- Ed Field
- Noelle Guernsey
- Hailey Hawkins  
  Endangered Species Coalition
- Kevin Herrman  
  Sportsman
- Otto Jose
- Tracy Kennuer  
  CU Boulder
- Patrick Lehner
- Erin Lomax  
  Sierra Club
- Brandon Mattson
- Lisa Nelson
- Armando Penicla
- Andrew Quezada
- Carol Silvas
- Mary Smith
- Randy Smith
- Roarinbrook Smith
- J. Spence
- Michelle Thompson
- Susan Watson
- Sierra Club
Colorado Parks and Wildlife is requesting approval from the Parks and Wildlife Commission for this research project according to the Commission’s Mammalian Predator Management Policy (revised October 11, 2007).

**Background and Need**
The Colorado mule deer strategy adopted in 2014 identifies predation as one of the potential factors limiting Colorado mule deer populations. Since the adoption of the mule deer strategy by the Parks and Wildlife Commission, CPW developed a plan for the implementation of the strategy. As part of the implementation strategy, staff examined existing predator and deer research and monitoring data to identify areas where predation may be most limiting to mule deer, which in turn could be used to inform predator harvest/management decisions. In June 2015, CPW personnel met to explore the concept for a project that examines how deer populations may respond to mountain lion suppression.

Deer data analysis unit (DAU) D-16 (2,370 mi² area in south central Colorado; Figure 1) was identified as an area where mountain lion suppression could be beneficial to the deer population. Beginning in 1999, D-16 was added as one of 5 intensive deer monitoring DAUs in the state. From 1999-present, averaging across all years, the leading known cause of both doe (6.4%) and fawn (7.5%) mortality has been mountain lion predation. Mountain lion predation has averaged 28% of the total mortality for does and 32% of the total mortality for fawns. Currently, the population is below the long-term population objective (current objective 16,000-20,000 deer) and based on survival data, population growth may be limited in part by mountain lion predation on fawns and adult does.

A research project is proposed, beginning in the winter of 2016/2017, to examine the mule deer population response to mountain lion suppression. The study would be conducted in D-16 and the adjacent DAU, D-34 (2,517 mi² area to the south of D-16; Figure 1). Harvest levels in these two DAUs would be used to create different mountain lion densities to examine the effects of mountain lion suppression in three stages. In stage one (years 1-3), mountain lion populations in D-16 will be suppressed (~50% harvest and human caused mortality), while mountain lion populations in D-34 will be allowed to increase towards habitat potential (~10% harvest). Stage 2 (years 4-6) represents a recovery stage where both populations will be allowed to increase towards habitat potential (10% harvest). The final stage (years 7-9) represents the crossover where D-34 mountain lion populations will be suppressed (~50% harvest and human caused mortality), while D-16 will continue to be allowed to increase towards habitat potential (~10% harvest). CPW estimates the total off-take of mountain lions over the course of this study will not differ significantly from the number that would normally be removed by hunting during the same time period in the absence of the research project.

CPW believes this is the first study that will examine the mule deer response to mountain lion population density in such a controlled experiment with significantly different mountain lion densities. These two disparate mountain lion densities should result in significantly different levels of predation mortality and an understanding of how predation impacts survival within
the mule deer population. Through this manipulation we will also gain a better understanding of mountain lion harvest management and potential impacts on mountain lion populations.

The impact of mountain lion hunting on mountain lion populations, especially high levels of removal designed to suppress populations, can be varied and is not well understood. A Wyoming study demonstrated that a mountain lion population could be significantly suppressed through 2 years of heavy harvest. Human-caused mortality (primarily harvest) rates in excess of approximately 20-30% of the population or 20-25% of the adult female population have generally been demonstrated as the point where populations start declining (Anderson and Lindzey 2005, CMG 2005). However, population change is sensitive to the adult female portion of the population, therefore, the percent of adult females in the harvest is the most important factor to monitor in relation to population performance (Anderson and Lindzey 2005). Understanding harvest structure as populations are manipulated throughout the experiment will provide critical information for management in the future as decisions are made about suppressing, maintaining or increasing mountain lion populations.

One aspect of this study will be to closely examine cause-specific mortality of mountain lions and develop a thorough understanding of levels of mortality in relation to population size and hunting pressure. The progression of this study will enable us to directly measure cause-specific survival during declining and increasing phases of a mountain lion population and under heavy and light harvest scenarios. This will allow a clear examination of non-hunting mortality rates, such as disease, intra-specific strive, or other natural mortality.

Similarly, cause-specific survival of kittens throughout the stages of the project will provide essential information for management as this directly relates to population growth and recovery. Past research has suggested that increased harvest has actually led to decreased kitten survival because of infanticide (kittens being killed by other mountain lions). Increased infanticide has been suggested to relate to high male harvest as this leads to an increase in subadult males in the population and territorial instability. However, recent mountain lion research in Colorado has shown higher infanticide rates during a 5-year non-hunting period than the subsequent 5-year hunting phase of the study.

There is also the perception that high immigration rates of subadult males will lead to increases in human conflict and livestock depredation. Some studies have indicated that harvest and subsequent increases in subadult males have correlated with human-mountain lion conflict. However, others have found that demographic class did not relate to human-mountain lion interaction. This management experiment will provide direct information on human-mountain lion interactions with respect to changes in mountain lion populations, age structure, and immigration rates.

The objectives of this study are first to evaluate the effects of mountain lion population density on mule deer populations. In conjunction with this, CPW hopes to evaluate the effectiveness of sport hunting to achieve high rates of mountain lion harvest. In addition to evaluating the mule deer response, we will also examine the structure of the mountain lion harvest and the mountain lion population responses to harvest levels. Mountain lion demographic rates (cause-specific mortality, reproduction, immigration/emigration) will be estimated relative to population density and harvest level.

CPW is proposing this research project to examine deer population response to changes in mountain lion density to gain an understanding of how mountain lion harvest could be used as
a deer management tool. However, a critical component of the study also includes understanding how the mountain lion population responds to various harvest levels so that CPW can balance deer management with mountain lion management.

**Is the Project Confined to a Specific and Well-Defined Geographical Area?**
Yes. The study area for this project will include 2 different deer DAU’s in south central Colorado (Figure 1). Deer DAU D-16 is approximately 2,370 mi² and includes GMUs 49, 57, 58 and 581. Deer DAU D-34 is approximately 2,517 mi² and includes GMUs 69, 84, 86, 691 and 861.

**Is the Proposal Targeted Toward Specific Species and, Whenever Practical, the Offending Animal(s)?**
Yes; specifically towards mountain lions in the study area.

**Explanation of Why Control Efforts May be Necessary.**
From 1999-present in deer DAU 16, averaging across all years, the leading known cause of both doe and fawn mortality has been mountain lion predation. Mountain lion predation has averaged 28% of the total mortality for does and 32% of the total mortality for fawns. Currently, the population is approximately 4,200 deer below the long-term population objective (the current objective is 16,000-20,000 deer) and based on past survival data, population growth may be partially limited by mountain lion predation on fawns and adult does.

Predation on mule deer is often identified as one of the potential reasons that populations are below the long-term objectives (Colorado West Slope Mule Deer Strategy [http://cpw.state.co.us/Documents/MuleDeer/MuleDeerStrategy.pdf](http://cpw.state.co.us/Documents/MuleDeer/MuleDeerStrategy.pdf), Ballard et al. 2001). In D-16, the adult survival data and relatively high predation rates from 2008-2012 suggests that mountain lion predation could be contributing to this lower-than-objective mule deer population. CPW is proposing a research study to examine the effects of mountain lion predation on deer populations in this area and some predator control above current hunting quotas will be necessary.

**Is the Plan within the Authority of the Parks and Wildlife Commission?**
Yes.

**Proposed Objectives and Expected Results, including Criteria to Determine when the Proposal will be Discontinued (both by Failure and Success).**
The primary objective of this study is to evaluate the effects of mountain lion population density on mule deer populations. In conjunction with this, CPW plans to evaluate the effectiveness of sport hunting to achieve high rates of mountain lion harvest. In addition to evaluating the mule deer response, we will also examine the structure of the mountain lion harvest and the mountain lion population responses to different harvest levels. Mountain lion demographic rates (cause-specific mortality, reproduction, immigration/emigration) will be estimated relative to population density and harvest level.

This study will provide information on the potential for and level of mountain lion harvest necessary to produce desired responses in deer populations. CPW will also determine the feasibility of reducing mountain lion populations by using hunter effort. In addition, CPW will gain a better understanding of how intensive mountain lion harvest can impact the mountain lion population and any detrimental effects that such harvest could have.
This research study is designed to manipulate two adjacent mountain lion populations over a 9-year period. In order to examine the impact on deer populations it is necessary to manipulate two mountain lion populations to achieve two significantly different densities and the concomitant effects on the deer populations. A 9-year period is the minimum time required to obtain the desired population densities of mountain lions and determine the response from the deer population.

Predator control is often raised as a management option to attain management goals for prey populations. Past research has not produced definitive results, especially at large scales (Ballard 2001, Forrester and Wittmer 2013, Bergman et al. 2015). This study is designed to directly assess management strategies in a predator-prey system and the feasibility of such strategies as well as the potential impacts on the mountain lion population. The primary results and benefits are:

1. Understanding the effects on mule deer population demographics relative to changes in mountain lion density.
2. Determination of our ability to manipulate mountain lion populations through harvest.
3. Harvest information that can be used for future management of mountain lions.
   a. Evaluation of harvest structure relative to mountain lion population density and harvest levels during decreasing and increasing phases.
   b. Examination of population recovery following heavy harvest.
4. Demographic information on mountain lion populations relative to mountain lion density and harvest regime.
   a. Density-dependence of mountain lion harvest.
   b. Cause specific mortality of adults and subadults.
   c. Cause specific mortality of kittens, including infanticide rates.
   d. Reproductive rates.
   e. Immigration/emigration rates.
   f. Movement patterns.
   g. Diet composition.
   h. Nuisance behavior.

A Discussion of Potential Non-lethal Methods and Why They Would or Would Not be Effective.
The only non-lethal alternative for this project would be relocation of mountain lions to other areas of the state. This is logistically unfeasible and cost prohibitive. Past research has indicated that for relocations to be successful, the relocation distance should exceed 300 miles and survival of relocated animals tends to be low (Ruth et al. 1998). In addition to this, the total harvest in D-16 and D-34 over the 9-year study will not exceed current harvest levels over the corresponding time period.

Total Estimated Cost and Funding Source for Implementation of the Plan.
The average cost per year of this project for the 9-year study is approximately $435,000 per year. Of the project cost, 25% will come from wildlife cash ($108,786 per year) and 75% will come from Pittman-Robertson federal aid ($326,358 per year).
Discussion of Public Participation and Input Received from Interested Constituencies and Analysis of the Public Support for the Plan.
The Parks and Wildlife Commission first heard a staff predator management plan proposal for the upper Arkansas on September 10, 2015 in Craig, Colorado. As a result of public testimony at that meeting, CPW withdrew the proposal in order to further refine the project based on public input. A second public meeting was held at the Salida Senior Resource Center from 6:30 pm to 8:00 pm on August 15, 2016. Prior to the meeting, a press released was sent to the local papers including: The Mountain Mail, Pueblo Chieftain, Leadville Democrat and Canon City Daily Herald. The Mountain Mail ran a meeting announcement on August 12th. The meeting was attended by 5 members of the public. After a presentation on the proposed project, two individuals provided verbal support for the project, no one expressed opposition and the group thanked Colorado Parks and Wildlife for its efforts. No written comments were submitted at the meeting.

On the evening of September 19, 2016, a public meeting was held at CPW’s 6060 Broadway office in the Hunter Education building (see the Meridian Institute report appended to this plan).

Impact of the Proposed Plan on Threatened and Endangered Species.
This study is not expected to negatively impact any T&E species. Mountain lions are obligate carnivores, preying primarily on native ungulates. Manipulating mountain lion densities and research activities should not have any detrimental effects to any species within the study areas.

Whether Implementation of the Plan May Impact Associated Species or the Re/introduction of Any Species in the Area.
Altering mountain lion densities within this study will affect overall big game predation rates. As mountain lions prey primarily on ungulates, the impact of this study should be limited to deer, elk and bighorn sheep residing in the area. The objective of the study is to demonstrate this impact on the deer population. Any impact on local elk populations should be similar to that seen for the deer population. Increases in mountain lion densities could have local impacts on bighorn sheep populations, but this will be limited in duration and, depending on habitat, likely minimal.

Whether the Plan will Impact or be Part of a Research Project.
Yes, it is a research project.

Whether the Plan will Jeopardize Pittman-Robertson or Dingell-Johnson Funding.
Pittman-Robertson funds are expected to be available to help support this project financially.
Figure 1. Deer data analysis units D-16 and D-34 located in south central Colorado.
Colorado Parks & Wildlife
Predator Management Listening Session

Summary of Public Comments

Date: September 19, 2016

Location: 6060 Broadway, Hunter Education Building, Denver, Colorado

Meeting Overview

Colorado Parks & Wildlife (CPW) held a public listening session from 6:30-8:30 pm on September 19, 2016 at the CPW Hunter Education Building in Denver, Colorado. The purpose of the meeting was to gather comments on two proposed Predator Management Plans. The plans seek to determine how lowering predator density in the two study areas affects mule deer survival and recruitment. The two studies are:

- The Piceance Basin Predator Management Plan
- The Upper Arkansas River Predator Management Plan

The objective of the meeting was for CPW to gather input from the public on the proposals. Fifty-seven members of the public attended the meeting and twenty-eight individuals provided public comments during the listening session.

Introductory Remarks

Dan Prenzlow, CPW Southeast Regional Manager, provided opening remarks, welcomed participants and provided some background on the plans. Mr. Prenzlow summarized the public outreach CPW has previously done on these plans, including public meetings in Salida and Rifle, Colorado. Additional public comment is being collected by email (dnr_cpwcommission@state.co.us). All public comment, including those from this Denver listening session, the two regional public meetings, and those sent by email will be presented to the Colorado Parks and Wildlife Commission for consideration at its December 14-15, 2016 Commission Meeting. Mr. Prenzlow introduced the moderator for the meeting, Robyn Paulekas.

Ms. Paulekas, a Mediator and Program Manager for Meridian Institute, provided an overview of the public comment format. Meeting participants signed up to provide public comment as they arrive. Each speaker was limited to a maximum three minute statement. Everyone that registered for public comment was provided an opportunity to speak.
Summary of Comments

Twenty eight people provided comments to CPW, representing a diversity of perspectives. Among those that shared comments, six expressed support or commended CPW for undertaking the proposed studies. Twenty two people raised concerns with the proposed studies, with concerns ranging from general opposition to predator reduction to specific concerns about the study methodology or available information.

Below is a summary of the major themes and perspectives that were shared during the meeting. They are organized into three groups: 1) comments that raise concerns or express opposition to the management plans; 2) comments or feedback in support of the proposed management plans; and 3) suggestions related to the public information and engagement process. Within each group, the key discussion points that were raised frequently or expressed by many participants appear at the top.

Concerns with the Predator Management Plans

Other factors influencing mule deer populations
Many speakers raised questions about the relative significance of predator impacts on mule deer populations compared to other factors that have been identified as contributing, or potentially contributing to mule deer decline. Potential other factors include oil and gas development, including fracking; malnutrition and lack of food resources; infrastructure, population growth, and encroachment; competition with elk, moose, and white-tailed deer; climate change and extreme weather conditions; pollution; and other habitat loss. The impacts of these other factors should be more thoroughly studied, with predator management being a last resort or entirely unacceptable. Several speakers raised the question of current carrying capacity, given these other impacts, suggesting that the target mule deer populations may be based on historic data and are unreasonable.

Scientific necessity of study and alternatives
Many commenters raised questions about the scientific necessity of the proposed plans/studies. There were concerns that previous studies have shown killing predators is ineffective in impacting ungulate population growth. Several cited a CPW study conducted in 1999. Speakers emphasized that conclusions from previous studies, including those done by CPW, show that habitat, migration corridors, weather, and malnutrition are key contributors to population decline. Commenters expressed concerns that agencies are not always driven by science and that the study is “selective science.”

1 In this summary, we use the term “many” when more than 10 commenters expressed this perspective; “several” when a perspective was shared by 4-10 commenters; “multiple” and “a few” for 2-3 commenters; and “one” or “a” when a single commenter expressed a perspective.
with a bias towards increasing hunting. CPW should consider alternative methods for the studies that do not require predator control, such as analyzing predator scat or postponing the management studies to see if mule deer populations increase without active predator management.

**Influence of hunting revenue**

Many speakers raised concerns about how hunting revenue (via mule deer licenses) might be influencing decision-making for the plans. In a few cases, the public voiced concerns that the proposed predator management plans may have been prioritized over other threats to mule deer, such as climate change and human encroachment because these studies/management actions would be well received by the sportsmen communities. Public comments emphasized that CPW has a responsibility to effectively manage all wildlife, including predators, for generations to come and not solely for hunters. Speakers suggested that CPW reduce the number of hunting licenses, rather than continue with the proposed management plans. It was also suggested that in both the short and long-term, CPW identify sustainable funding sources that do not rely on hunting licenses.

**Ecological significance of predators**

Several participants shared concerns about the damage and disruption that predator control can have on an ecosystem. Specific concerns were raised about negative consequences resulting from trophic cascading and the magnitude of a relatively small reduction of bears and mountain lions, with significant and long-lasting impacts. Comments addressed the importance of predators in balancing an ecosystem and maintaining biodiversity. There were concerns that hunters take the strongest adult males from the herd which results in decreased health of the overall population whereas predators create a healthier population by removing weak and sick animals. When predators are allowed to hunt, this can result in a healthier herd for both hunters and the overall ecosystem.

**Value of predators**

Several speakers emphasized the ecological necessity and overall importance of predators in Colorado, including cultural and existence value. A few people shared stories from their personal experiences of moving to Colorado specifically for the wildlife, including mountain lions and bears. Others talked about the iconic nature of lions and bears in the state and value that they provide to all citizen. Multiple participants added anecdotal evidence that while they had seen many wild mule deer, they had seen few to no mountain lions and bears in Colorado.

**Ethical considerations**
A few speakers raised concerns with killing animals based on ethical and religious grounds. Some felt that humans should not take part in choosing which animals are killed and which are not. Other expressed that it is not appropriate to intervene in natural predator/prey relationships.

Positive Feedback on the Predator Management Plans

Value of mule deer
Several commenters spoke about the importance of mule deer to multiple stakeholders in Colorado, including their ecological significance and also the human and cultural value to both hunters and the general public.

Predators are a Concern
A few speakers encouraged the CPW proposed management plans, expressing that predators have robust populations and should not be regarded as untouchables in a management plan. They encouraged predator management control studies and management actions. Another commenter raised their concern that they have seen the number of mountain lions in their area increase while the number of mule deer has decreased.

Building on the Mule Deer Strategy
One speaker emphasized that predator management, where predation may be limiting deer survival, was identified as a strategic priority as part of CPWs Mule Deer Strategy. The Mule Deer strategy was developed with extensive public engagement. The commenter commended CPW for taking follow up action on this priority.

Process Suggestions and Public Engagement

CPW’s public engagement
Participants expressed appreciation for CPW’s approach to wildlife management and/or the opportunity to comment on these Plans. Many commenters encouraged the CPW staff and Commission to give the public input serious consideration before finalizing plans for the study. One noted that CPW is an informed and educated manager of wildlife. Another stated that CPW is thoughtful, smart, and committed to wildlife.

Request for additional information
Several participants were concerned about the lack of specific details on the proposed management plans and requested additional information be made public. There were also some specific questions about the management plan and study methodology, which are included below. The presenter requested that CPW review those questions and provide a public response.
Questions About the Management Plan and Study Methodology

Below is a summary of questions raised during the public comment:

**Study design**
How many lions and bears does CPW propose to kill?
How many predators are in the proposed study area, and how long would it take to repopulate the area?
Considering Wildlife Service’s involvement, who is funding the study?
How will the agency account for the slow reproductive rate of black bears during the study?
If bears and mountain lions are shot, will others move into the study area? And if CPW continues to shoot them to prevent that, will it not lead to more significant population decline in predators? If they do not shoot them, will it interfere with the study results?
Does CPW plan to assess habitat conditions following the study?
Does the target number reflect the current habitat conditions, including habitat destruction and fragmentation from oil and gas extraction and urban development?
Are the populations of cougars and bears equal in the study areas of the Piceance Basin Study?
Are the available food and water sources comparable in the Piceance Basin Study?
How is the Piceance Basin Study a truly controlled study?
What is CPW’s plan if an unexpected event occurs (i.e., wildlife, etc.) in the Piceance Basin Study area?
How does CPW know what is 50% of the harvest population in the Upper Arkansas River Study?
Does CPW have current scientifically-based population estimates for cougars in the Upper Arkansas River region?

**Background literature and scientific basis**
Has CPW analyzed the current carrying capacity of mule deer for the available habitat?
Studies have shown that killing coyotes and wolves results in increased predation on ungulate populations. Does CPW have reason to believe bears and cougars will behave different?
Do these studies need to be done at all?
What scientific basis does CPW have for the hypothesis that black bear predation is an important factor in mule deer fawn mortality?
Does CPW have current scientifically-based population estimates for cougars and bears in both the study and control regions?

When is the last time CPW adjusted its target for the mule deer population?

Other factors influencing mule deer populations

Why is the emphasis on predators rather than habitat quality, which CPW has done a number of studies on that show it has a significant impact on mule deer?

Is the agency taking into account the increased mortality that conducting indiscriminant trapping during the cub-rearing season would have on slow-reproducing populations?

How will CPW control for other factors in the Piceance Basin Study?

Are the habitat impacts of development, including fossil fuel extraction, equal in the study areas of the Piceance Basin Study?

Predator control methods

How will the agency prevent the killing of mountain lion mothers with dependent young?

How will CPW prevent trapping of female bears and cougars with dependent young?

In the event that cougars or bears are trapped with young in the vicinity, how will CPW handle the dependent young?

How will CPW prevent trapping of non-target animals, including companion animals (i.e., dogs)?

How often will traps be checked?

How will non-target animals caught in traps be treated?

Has CPW considered the risk of capturing federally protected species?

Who are the “specialized contractors” that CPW intends to hire to kill these animals?

In the event that CPW does not sell the target number of cougar tags and/or that hunters are unsuccessful, how will CPW proceed with the Upper Arkansas River Study?

Public engagement

Coloradans voted against a spring bear hunt—how will this study sit with Coloradan citizens?

Will the study be peer reviewed upon completion?
Speaking Participants
The following people provided public comment during the meeting. Organizational affiliations are included when they were specified on the registration form. They are listed alphabetically by last name.

Andrew Currie
Alexandra Davis
Helen Davis
Courtney Euker
Humans Society of the United States
Ethan Gates
Colorado Trappers and Predator Hunters Association
Caitlin Grant
Humane Society of the United States
Rev. Roland Halpern
Joe Herrman
Sportsman
Marty Holmes
Mule Deer Foundation
Taylor Jones
WildEarth Guardians
Mara Kahn
Center for Biological Diversity
Karen Kalavity
Sierra Club
Dillon Kujak
Outfitter
Kane Little
Steve Lohr
Big Game Forever
Anthony Martin
Jack Murphy
Brett Ochr
Naturalist/Hunter
Andrea Rose
Livingwithharmony.org
Aubyn Royall
Human Society of the United States
Dave Ruane
Johnathan Savfar
Nicole Spicher
Nancy Stalker
Audubon Society of Greater Denver
Haley Stewart
Humane Society of the United States
Debra Taylor
Humane Society of the United States
Stuart Wilcox
WildEarth Guardians
Chris Wiseman
Colorado Department of Agriculture
**Listening Participants**
The following participants attended the meeting and listened to public comment, but did not speak.

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<th>Mitch Arnold</th>
<th>Kevin Herrman</th>
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<td>Sportsman</td>
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<td>Steve Cisco</td>
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<td>Colorado Trappers and Predator Hunters Association</td>
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<td>Gary Crawford</td>
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<td>Wild Turkey Federation</td>
<td>Armando Penicla</td>
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<td>Wayne East</td>
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<td>Colorado Department of Agriculture</td>
<td>Randy Smith</td>
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<td>Ed Field</td>
<td>Roarinbrook Smith</td>
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<td>Noelle Guernsey</td>
<td>J. Spence</td>
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<tr>
<td>Hailey Hawkins</td>
<td>Michelle Thompson</td>
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<tr>
<td>Endangered Species Coalition</td>
<td>Susan Watson</td>
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<td>Sierra Club</td>
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