

## 22 Questions from WildEarth Guardians - September 19, 2016

### Piceance Basin Study Area Questions:

1. *What scientific basis does CPW have for the hypothesis that black bear predation is an important factor in mule deer fawn mortality?*

See Predator Control Plan. Montieth et al. (2014) documented high black bear predation rates of neonate mule deer in California and that a proportion of this mortality was additive, suggesting that some fawns dying from predation would likely have survived otherwise.

Bergman et al. (2015) investigated the role of density dependence in mule deer populations and suggested that the population-level effects of bear predation on mule deer neonates remains unclear and likely influences the rate of population growth (per capita rate of change - varies with density). They supported focused experiments that address the roles of mountain lion predation, black bear predation, and disease in mule deer population dynamics.

Ongoing CPW research from 2011-15 has documented a minimum annual rate of 14% bear predation on mule deer neonates in the proposed study area and another 8% when lion predation is included. This estimate is conservative because some (likely large) percentage of unknown predation (11%) and unknown mortality (9%) is also related to bear and lion predation. After 8 years of research addressing mule deer demographic factors in the Piceance Basin, the most likely factor limiting mule deer population growth appears to be neonate survival (0-2 months). If black bear and lion predation is largely additive to this segment of the population, fawn recruitment and population growth rates can be increased by short term and focused predator reduction during the spring birthing period. If predation is largely compensatory, spring predator control can be disregarded as viable management option.

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

See Predator Control Plan. Trapping methods used will be non-lethal and any non-target species captured will be immediately released during daily trapping efforts. Snares can be set so that smaller, non-target animals will not be caught and ungulates can be completely avoided using cage traps.

3. *Has CPW considered the risk of capturing federally protected species?*

See Predator Control Plan. Yes, and this has also been addressed in the Research Study Proposal submitted to the Commission.

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

See Predator Control Plan. "Mountain lion and black bear removal methods employed will consist of cage traps, culvert traps, foot snares ...." These methods are nonlethal and allow for the release of any non-target animals captured.

5. *How often will traps be checked?*

Traps will be checked daily (each morning).

**6. Will the “study” be peer reviewed upon completion?**

Yes. All research conducted by CPW research sections are subjected to internal peer review and then submitted to peer-reviewed outlets for publication in scientific journals.

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

See Predator Control Plan. Trapping of bear and cougar family groups may be unavoidable, but trapping methods are non-lethal and all family groups captured will be translocated at least 30 miles from the parturition study areas. We anticipate a low number of family groups to occupy the relatively small area where predator reduction will occur. Remote cameras will be placed at all trap sites to ensure detection of family groups. CPW personnel often capture and relocate family groups with success.

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

Trailing hounds will be used (on leash if necessary) to tree cubs or kittens where one or more family group members are not trapped. Traps will be deployed to enhance the probability of catching all family group members (multiple traps/site).

**9. Does CPW have current scientifically-based population estimates for cougars and bears in both the study and control regions?**

The Predator Control Plan notes that “*The small size of the predator reduction area (1,277 km<sup>2</sup>, 493 mi<sup>2</sup>) 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.*” As noted in the 7<sup>th</sup> edition of *The Wildlife Techniques Manual, Volume 1, Research* (2012) “*... in real wildlife populations the true population abundance is never known.*” In other words, wildlife managers rarely have actual counts of the number of individual animals in a managed population (even for such economically important species like mule deer and elk). Therefore, managers must rely on a variety of techniques to estimate population size. Because of their relatively low population densities and cryptic behavior (compared to many ungulates), rigorous carnivore population estimates are especially difficult and expensive to obtain and are therefore not commonly generated for routine management purposes. However, bear densities have been estimated from several regions of Colorado (bear densities in Pinion-Juniper habitat ~7-14/100 km<sup>2</sup>) and cougar research projects have provided reasonably consistent cougar density estimates (~2.5-3.5 independent-age cougars/100 km<sup>2</sup>) from the western US (including Colorado). Approximating cougar and bear densities from this information suggests about 38 independent-age cougars and about 134 black bears occupy the specific 1,277 km<sup>2</sup> (493 mi<sup>2</sup>) predator reduction area. Using the same technique, the population of bears in the entire bear management unit involved in the study has been estimated to be about 850. Therefore, the number of bears predicted for removal represents approximately 2% of this population. With regard to lions, the estimated population in the management unit involved in the study is slightly more than 800, resulting in a lion removal number representing about 1% of the entire population.

***10. Has CPW taken into account the low reproductive rate of black bears and the possibility for significant negative impact on the black bear population?***

See the [Predator Control Plan](#) and answer to question 9. The geographic extent of the area where predator removal will occur is small in comparison to the black bear Data Analysis Unit, which represents the biological unit or black bear population. CPW will focus reduction efforts in areas where predation has been documented since 2012, which is about half of the 1,277 km<sup>2</sup> mule deer parturition area. Thus, the geographic extent of predator reduction represents about 8% of the black bear Data Analysis Unit and bear removal from this small area should have minimal influence at the population scale. Assuming about 7-14 black bears/100 km<sup>2</sup> within black bear DAU B-1 (8,128 km<sup>2</sup>), we anticipate the population to consist of approximately 850 black bears (range ~570-1,100). The removal of 20 bears from this population is considered biologically insignificant (estimated at 2%).

Applying the same approach to address cougar population impacts, Lion DAU L-7 consists of 21,054 km<sup>2</sup> and applying 2.5-3.5 independent-age cougars/100 km<sup>2</sup> (based on the scientific literature) suggests a population of ~520-730 (~840 individuals when all lions in the population are included, including dependent young). The removal of 10 cougars is considered biologically insignificant (estimated at 1%).

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

The intent of this research is to understand the dynamic relationship between predators and prey and therefore the target mule deer population has no bearing on this research project. CPW attempts to update deer population plans every 10 years, though some plans have gone longer without updates.

***12. Does that target number reflect the current habitat conditions, including habitat destruction and fragmentation from oil and gas extraction and urban development?***

See [Predator Control Plan](#). Research addressing mule deer population dynamics in the study area the past 8 years has assessed habitat conditions and the relationship between deer and habitat. Indicators suggest that the deer population is below carrying capacity based on animal-indicated nutritional carrying capacity, survival, reproduction and cause-specific mortality. These data suggest this population is not currently limited by vegetation quantity or quality on developed or undeveloped study portions of the study areas. Investigations addressing mule deer-energy development interactions have demonstrated that deer in this system given the current deer and well pad densities, are able to behaviorally offset demographic influences of energy development disturbance.

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

USDA APHIS Wildlife Services.

***14. How will CPW control for other factors?***

See [Predator Control Plan](#) and [detailed draft study plan](#) on Commission webpage. This study will follow a Before-After-Control-Impact (BACI) design, where bear and cougar reduction will represent the treatment effect. Pre-treatment data were collected in the treatment and control/reference areas from 2012-2014 and demonstrated very similar probabilities of mortality among predation, malnutrition and unknown mortality (Figure 1). We propose to reduce predation rates in the treatment area by

≥20% to determine whether or not predation is additive or compensatory. This will be evident by comparing predation and malnutrition probabilities between the treatment and control/reference areas during the 3-year treatment period. Relevant covariates will be included in statistical models to account for other factors influencing neonate survival, such as environmental variables, weather, and study area effects.

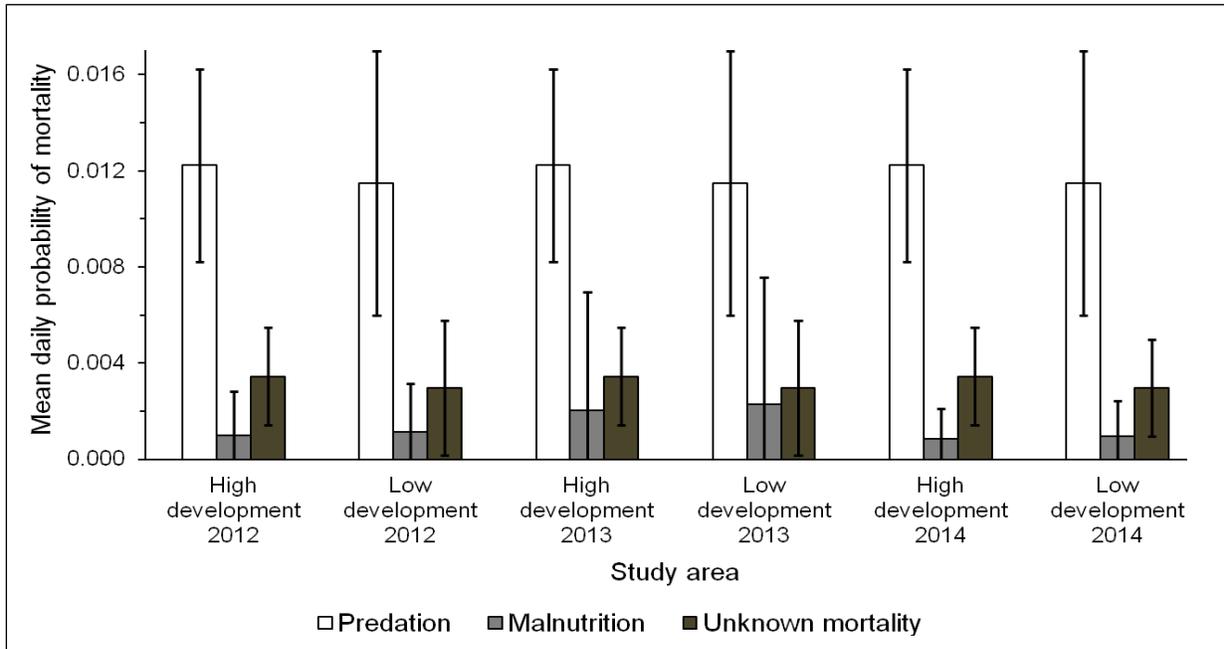


Figure 1. Mean daily probability of death by predation, malnutrition, or unknown mortality ( $\pm$  95% CI) of mule deer neonates from 0-6 months old in the high and low development study areas in northwest Colorado, USA, 2012-2014 (from Peterson et al. in review).

**15. Are the habitat impacts of development, including fossil fuel extraction, equal in the study areas?**

During our evaluations of neonate survival in developed and undeveloped parturition areas (2012-14), we were unable to detect differences in survival and documented very similar mortality factors between areas (Figure 1). Study area differences can be accounted for with covariates in statistical models, especially using before and after treatment data across the control and treatment areas.

**16. Are the populations of cougars and bears equal in the study areas?**

Cougar populations are generally driven by intraspecific factors and not by environmental factors or prey densities and therefore are generally similar among areas. Population estimates for cougars in the literature show relatively little variation across broad geographic areas.

Black bear populations are largely driven by food resources and movement patterns relative to those resources. Bear foraging during this time of year will consist of spring green-up, available carrion, and neonates. These areas have similar habitat characteristics, so available forage and neonates will be similar and we would expect similar bear densities.

***17. Are the available food and water sources comparable?***

Water and vegetation are relatively abundant in both areas and deer in these systems are not limited by forage or water during spring/early summer when spring green-up provides lush forage in Colorado's high country.

***18. How is this a truly controlled study?***

No studies in nature are truly controlled, which is why reference areas are used and BACI designs can be informative in wildlife research. Having pre-treatment data that provided similar results on both areas (Figure 1) and then monitoring both the treatment and reference areas during the treatment phase is a powerful study design in natural systems, especially compared to standard approaches without pretreatment data. Pretreatment and reference area data allows for an assessment of natural fluctuations within the system so that these confounding effects can be separated from the effect of interest in the treatment area.

***19. What is CPW's plan if an unexpected event occurs (i.e., wildfire, etc.)?***

CPW cannot plan for all unexpected events (by their nature they are unpredictable), but we acknowledge that these events can happen and would require adaption as they arise. Using a reference and treatment area is part of this preparation as we can account for broad geographic events. However, localized events within a single area could impact the study and we would have to assess this as it occurs and evaluate the extent to which the study approach would need to be modified to compensate. That is a normal part of CPW field research.

**Arkansas River Study Area Questions:**

***20. How does CPW know what is 50% of the harvest population?***

CPW does not currently have a precise population estimate of cougars in D-16. Therefore, we used spatial analysis and extrapolation of cougar density estimates found in the literature to derive a potential population estimate. We first used spatial analysis to determine the amount of available lion habitat within the DAU which is estimated at 4,096 km<sup>2</sup> for D-16. We then extrapolated an average of 30 *independent adult* cougars per 1,000 km<sup>2</sup> of available cougar habitat (CMG 2005). This derived a potential population of 123 independent cougars in D-16 (164 including all age groups). We then determined that we would require a harvest of 61 independent-age cougars to achieve a 50% reduction in that portion of the population of interest.

One objective of this study is to generate more precise cougar population estimates in these study areas using mark-resight techniques. The improved estimates will help to better manage this population in the future.

***21. Does CPW have current scientifically-based population estimates for cougars in this region?***

See above. We have an estimate of population size based on the scientific literature and our evaluation of habitat quality in the study areas. The proposed study design will allow us to refine that

estimate through the duration of the study using electronic calls and camera traps. Mark-resight models (McClintock and White 2012) will be used to produce statistically valid population estimates.

**22. *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 “study”?***

One of the objectives of the study is to evaluate the effectiveness of sport harvest in achieving sufficient rates of cougar harvest to reach the level of harvest proposed for this study. In the event that harvest rates are insufficient, CPW will consider the use of contractors to achieve the desired level of harvest.

**References**

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