

Bighorn sheep and mountain lions: a study to better understand their relationships and help guide management decisions

Predation management is a challenging process, and wildlife managers are often faced with making decisions about a complex system. They therefore need information on the influence that mountain lion predation has on bighorn sheep populations relative to other factors affecting population viability. Their decisions also benefit from information about factors that may put bighorn sheep at increased risk of lion predation. In addition, we need to have a better understanding of how predator removal influences predation rates and dynamics of the remaining predator population. The goal of the proposed project is to increase our understanding of the relative influence of lion predation on bighorn sheep populations, the factors that increase bighorn sheep risk of lion predation, management actions that may reduce the risk of lion predation among bighorn sheep, and ultimately, provide data to inform lion and bighorn sheep management decisions.



Objectives

1. Examine which factors put bighorn sheep at increased risk of mortality, with an emphasis on lion predation. These may include habitat characteristics such as topography, vegetation type or cover, and burn history, as well as group size/composition, season, age/sex of sheep and time since release/transplant.
2. Describe bighorn sheep habitat selection to a) describe if and how this changes with time after translocation/reintroduction, and b) to examine whether bighorn sheep select habitat consistent with presumed predator avoidance strategies.
3. Describe lion space use and social structure using characteristics such as density, sex ratio, age structure, and home range characteristics (size, overlap, and temporal shifts), and determine if and how these characteristics change if lion removals occur.
4. Describe mountain lion prey composition, with a focus on (a) proportion of kills comprised of bighorn sheep, (b) proportion of lions killing bighorn sheep, and (c) the relationship between predation rates and lion age/sex.
5. Conduct a quantitative demographic analysis to examine the relative effectiveness of reducing mortality rates, such as through lion removal, on improving population viability, in bighorn sheep populations of varying size, and with varying recruitment and mortality rates, as a management tool for managers.

This project is being conducted at two sites in Arizona. Objectives 1-3 will be addressed in the Santa Catalina Mountains in Region 5, which all objectives will be addressed in the Arrastra Mountains in Region 3. This project is scheduled to take 4 years, with completion in 2017.

Approach

In early November 2013, 40 bighorn sheep were translocated to the Arrastra Mountain study site, 20 of which were fitted with GPS-enabled radio collars. Thirty sheep translocated to the Santa Catalina study site in late November 2013 were also fitted with GPS-enabled radio collars. We are using GPS collar data to observe sheep behavior (such as group size) and identify sheep use sites where we will measure habitat characteristics, including horizontal visibility and topographical features. We will use these data to evaluate which behavioral and habitat factors may influence bighorn sheep mortality, with an emphasis on lion predation. We will also use GPS data to analyze home range characteristics and conduct habitat sampling to evaluate whether bighorn sheep are selecting habitat in accordance with our current understanding of anti-predatory behavior. This will inform management decisions related to land management, such as prescribed fire. We are also collecting data on lamb recruitment, survival, and cause-specific mortality in order estimate the relative importance of cause-specific mortality (including lion predation) in limiting bighorn sheep populations. We will also use this data to conduct a quantified demographic analysis to determine which demographic parameters (e.g. ewe survival, reproduction rates) most influence population viability.

In addition to the GPS-collared bighorn sheep at the Arrastra Mountain study site, we are also trapping and fitting mountain lions with GPS-enabled radio collars. We are using this GPS data to investigate mountain lion kill sites to determine proportion of kills comprised of bighorn sheep, proportion of lions killing bighorn sheep, and relationships between predation rates and lion age/ sex. Additionally, we will use the GPS data to estimate mountain lion density, sex ratio, age structure, and home range characteristics on the study site.

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More Information

Additional information and biweekly updates on the bighorn sheep in the Santa Catalina Mountains can be obtained by visiting the Arizona Game and Fish Department Facebook page at <https://www.facebook.com/azgafd#!/CatalinaBighorns>, the Arizona Game and Fish Department webpage at <http://www.azgfd.gov/catalinabighorn>, the Arizona Desert Bighorn Sheep Society webpage at <http://www.adbss.org> or by visiting the Catalina Bighorn Advisory Committee webpage at <http://www.catalinabighornrestoration.org/>.

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