

Project Summary

Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Non-invasive evaluation of the genetic status and parasite loads of Teton Range bighorn sheep in comparison to adjacent sheep herds in northwest Wyoming

Discipline: Natural Resources
Type of Project: Research
Funding Agency: National Park Service
Other Partners/Cooperators: University of Montana
Effective Dates: 6/1/2008-9/30/2009
Funding Amount: \$18,489

Investigators and Agency Representative:

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Project Abstract: The Teton Range bighorn sheep (*Ovis canadensis*) herd is Wyoming's smallest and most isolated herd, numbering perhaps 100-125 individuals. Because of the herds small size and isolation there is concern that it may suffer from reduced genetic variation (and inbreeding depression), which could reduce the probability of the herd's persistence and its ability to adapt to future environmental change (e.g., disease challenges, parasites or other environmental stresses).

Fortunately, the availability of hypervariable DNA markers and new statistical methods now make it feasible to determine if a population has recently suffered a genetic bottleneck. Furthermore, the DNA samples can be collected non-invasively from feces obtained in the field, without capturing or even disturbing the target animals. From fecal samples, it is also possible to quantify parasite loads, which may be a useful indicator of individual fitness and population level health.

UM researchers will (1) quantify genetic variability and test for recent population bottlenecks and evidence of genetic exchange for the Jackson and Teton Range sheep herds, (2) quantify the parasite loads (e.g., lungworms) for the Jackson and Teton Range sheep herds, (3) quantify stress hormone levels of sheep in the Jackson and Teton Range sheep herds and assess the utility of these data, (4) test for correlations between genotype (e.g., heterozygosity) and parasite loads and stress hormone levels, (5) establish genetic baseline for the Teton and Jackson sheep herds to allow for long term genetic monitoring of herd health; and (6) determine the risk posed to northwest Wyoming sheep populations and recommend actions to be taken to maintain viable herds. Results of this project will help park managers assess: 1) the risk posed to northwest Wyoming sheep populations from their genetic and disease/parasite status, 2) what actions may need to be taken to maintain viable herds and 3) whether or not translocations from other populations are warranted. Baseline data from this project will also allow for long term genetic monitoring of herd health and for forensic detection of bighorn illegally killed or trafficked from these herds.

Outcomes with Completion Dates:

1. January 31, 2009: Annual progress report covering progress-to-date on analysis and interpretation of genetic, parasite, and stress hormone samples collected the previous summer.
2. August 31, 2009: Final Report on analyses and interpretation of data collected during the 2008 - 2009 field seasons regarding genetic, parasite, and stress

hormone samples collected from bighorn Teton and Jackson sheep including management recommendations necessary to maintain the sheep herd from a genetic standpoint.

3. September 30, 2009: All digital databases and analyses related to this research. If data are needed prior to this deadline, NPS personnel may request them from the cooperator.
4. Manuscript submitted to peer-reviewed journal for publication (depending on results), copies of which will be made available to NPS staff.
5. Presentation to park staff on research findings, management implications of the research and future research perspectives.

Keywords: Grand Teton NP, bighorn sheep, parasites, disease, genetic diversity, genetic monitoring, University of Montana