

Project Summary

Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Understanding the Genetic Composition of the Rocky Mountain NP Bighorn Sheep Herds

Discipline: Natural Resources

Type of Project: Research

Funding Agency: National Park Service

Other Partners/Cooperators: University of Colorado at Boulder

Effective Dates: 4/15/2007 - 12/31/2009

Funding Amount: \$22,660

Investigators and Agency Representative:

NPS Contact: Judy Visty, National Park Service, Rocky Mountain National Park, 1000 Highway 36, Estes Park, Colorado 80517, (970) 586-1302, judy_visty@nps.gov

Investigator: Jeffrey Mitton, Department of Ecology and Evolutionary Biology, University of Colorado at Boulder, Campus Box 334, Boulder, CO 80309; (303) 492-8956; mitton@colorado.edu

Researcher: Catherine Driscoll, University of Colorado at Boulder, Department of Ecology and Evolutionary Biology, Campus Box 334, Boulder, CO 80309; 415-505-1522; catherine.driscoll@colorado.edu

Project Abstract:

Rocky Mountain Bighorn Sheep (*Ovis canadensis*) have long been considered the emblematic animal of Rocky Mountain National Park, appearing as a logo on park brochures and entrance stickers almost from its founding in 1915. Three bighorn herds are generally described for the park, one on the east side of the park (Mummy Range) and two on the west (Never Summer and Continental Divide). This project will result in a solid understanding of several aspects of the genetic structure in and among the three herds. Using genetic material extracted from previously gathered bighorn pellets the project will result in genotyping a minimum of 72 new sheep, corresponding to 20% of the estimated population size of all three herds.

This project will answer the following questions:

- 1) Using data from 14 micro-satellite loci: How much genetic variation exists in non-coding (evolutionarily neutral) DNA in the herds? This part of the project will compare data already analyzed for the Mummy herd with west slope herds to provide an overall picture of genetic variation in park bighorn. Low genetic variation may be a factor in the decline of the herds.
- 2) Using evidence from mitochondrial DNA cytochrome oxidase region (COI), inherited only through the mother: Do females migrate between herds?
- 3) Using evidence from the exon 2 of the DRB gene, a gene in the histocompatibility complex (HMC) known to be involved in the immune response system: Is there evidence that these herds are experiencing or have recently been subject to strong selection pressure that might ultimately contribute to the decline or extinction of these herds?
- 4) Using data from a region of the Y-Chromosome: Are males moving and breeding between herds? The answers from 2, 3 and 4 combined will give a definitive answer on whether the three herds are in fact two populations (if west side interbreeds) or one meta-population (if there is evidence of interbreeding among all three herds).

Outcomes with Completion Dates: Due by May 31, 2009

- Genotypes for a minimum of 72 previously un-genotyped bighorn sheep.
- A final report addressing the four hypotheses stated in Scope of Work.
- A presentation to park staff at the 2008 ROMO Research Conference.

- Assistance with the development of a one-page, non-technical publication outlining results.
- One bound copy of dissertation based on this work for park library.
- One printed copy of dissertation based on this work for park files.
- Electronic copies of final report and all related data to the park's Research Administrator and to the NPS Research Coordinator at the RM-CESU.

Keywords: bighorn sheep, genetics, Rocky Mountain National Park, Colorado State University

For Administrative Use Only:

Date Annual Report Received:

Date Final Report Received:

Publications, etc. on file: