



Grant In Aid (GIA) Form

Project Title: Assessing the geographic origin and colonization of nonnative mountain goats in Grand Teton National Park

Project Type: Management/Research

Affiliate: Grand Teton National Park, Yellowstone National Park, Idaho Department of Fish and Game, Montana State University, Wyoming Game and Fish Department, Tabitha Graves (quantitative ecologist), and Wildlife Genetics International Inc.

Location of Project: Northwest Wyoming and adjacent eastern Idaho

Description of Project: Grand Teton National Park is in the process of writing a management plan/environmental assessment for mountain goats that have recently established a breeding population in the Park. The potential threat that nonnative mountain goats pose to the remnant native bighorn sheep population in the Teton Range is the impetus for the Park's mountain goat management plan. Identification of the source population(s) for the Teton Range mountain goats will strengthen the Park's management plan and improve the Park's ability to rapidly implement appropriate management actions. Genetic analysis is the most reliable method to determine the source population(s) of mountain goats in the Teton Range. This proposal seeks funds to conduct genetic analysis on mountain goat samples (blood cards, whole blood, tissue, or fecal pellets) collected from three different populations in the Greater Yellowstone Ecosystem (GYE) in order to determine the origin for mountain goats in the Teton Range.

Problem to be solved: The Teton Range bighorn sheep population (also referred to as the Targhee population by WGFD) is Wyoming's smallest core-native population. This population is unusual in that all of its remaining winter range is at high elevation (>9,000 ft.) and historic low-elevation winter ranges are no longer occupied. Conservation of this remnant bighorn sheep population has been fueled by local resource management agencies and conservation groups, led by the Wyoming Wild Sheep Foundation, which have invested roughly \$500,000 in funding for allotment buyouts, research, and monitoring.

For many years the Teton Range bighorn sheep population was estimated to be 100-125 individuals. However, a total of just 57, 46, and 48 bighorns were counted in the Teton Range during the three most recent helicopter surveys conducted by Wyoming Game and Fish Department (March 2015, February 2016, and March 2017, respectively). Comparatively, the previous helicopter surveys conducted in March 2008 and March 2010 yielded counts of 96 and 81 bighorns, respectively. Accordingly, there is concern that the Teton Range bighorn sheep population is declining and the need for protective management actions is urgent.

The apparent decline of the Teton Range bighorn sheep population coincides with the colonization of mountain goats in the Teton Range. The number of mountain goats residing in the Teton Range is currently estimated at 60-80 individuals and survival and reproductive rates of radio-collared individuals suggest the population is growing at a rapid rate. Mountain goats have potential to threaten the persistence of the small, remnant Teton Range bighorn sheep population through forage competition (particularly if high-elevation winter range is shared) and transmission of pneumonia-causing pathogens. Although there is not currently strong overlap in winter range between bighorn sheep and mountain goats in the Teton Range, the range of the growing mountain goat population is expected to expand into bighorn sheep winter range.

It is strongly suspected that the source of the Teton Range mountain goat population is the Snake River Range of Idaho and Wyoming because it holds the nearest established mountain goat population at about 15 air miles to the south; the three other most likely source populations (Southern Madison Range-Montana, Southern Gallatin Range-Wyoming, Northern Absaroka Range-Wyoming) are all about 60 miles to the north or northeast of the Teton Range. It is plausible, however, that dispersing male mountain goats could have colonized the Teton Range from these northern populations as mountain goats (presumably dispersed males) have been sporadically reported as distant to established populations as the Wind River Range. The source of the Teton Range mountain goat population has not been confirmed and it has not been assessed whether the range was colonized by individuals dispersing from the south, the north, or both.

A primary threat posed to bighorn sheep from mountain goats dispersing to the Teton Range from surrounding ranges is transmission of pneumonia-causing pathogens. Pathogen testing coordinated by this group of agencies on mountain goats and bighorn sheep in the GYE has produced evidence that pneumonia-causing pathogens are transmitted between the two species. Both the Snake River Range and Northern Absaroka Range mountain goat populations are known to carry a full suite of pneumonia-causing pathogens including leukotoxigenic (*LktA+*) *Bibersteinia trehalosi*, *LktA+ Mannheimia haemolytica/glucosida*, *LktA+ Mannheimia spp.*, and *Mycoplasma ovipneumoniae*. Mountain goats in the Madison Range and Gallatin Range have not been tested for these pathogens; however the bighorn sheep they share range with have been tested and also carry these pathogens. Given the available information, future dispersal of mountain goats from the north or south poses a threat to the Teton Range bighorn sheep population.

Describe How You Propose Solving Problem:

As part of a long-term collaborative effort by the affiliated agencies to better understand bighorn sheep and mountain goat ecology in the GYE, genetic samples have already been collected from over 70 individuals from three mountain goat populations in Wyoming and Idaho including the Teton Range, the Snake River Range, and the Northern Absaroka Range. We aim to collect an additional 30 genetic samples from the Teton Range over the summer in the form of fecal pellets so that we have genetic samples from approximately 30 animals in each population. Samples will be submitted to Wildlife Genetics International Inc. for microsatellite genotyping and two statistical approaches (a population assignment analysis and a parentage analysis) will be explored in order to determine the source(s) of the Teton Range mountain goat population. We expect between 10 and 20 microsatellite markers will be assessed in these analyses; however, the exact number will depend on the level of genetic distinctness that is found between the populations. Given the origins of different mountain goat populations in the GYE, we expect the potential sources from the north or the south to be genetically distinct: The Snake River Range mountain goat population was established from animals that were translocated from the

North Fork of the Clearwater River in Idaho and all mountain goat populations in the northern GYE were established from source populations in northwest Montana (Rocky Mountain Front, Swan Range, South Fork Flathead River) and southwest Montana (Pioneer Range).

Grand Teton National Park is preparing a mountain goat management plan that will outline actions to address mountain goats currently in the Park as well as future colonization of mountain goats. Informed strategies to address future mountain goat colonization in the Teton Range are needed prior to implementation of active management of the mountain goats currently in the Park. Understanding from which direction mountain goats have colonized the Teton Range will strengthen Grand Teton National Park’s mountain goat management plan by highlighting where actions and collaborations are needed to minimize future colonization. A stronger, more tenable management plan is also less likely to be slowed by litigation and, as a result, is more likely to be implemented in a reasonable time frame. Given the rapid growth of the Teton Range mountain goat population, any management actions to prevent impact to the native bighorn sheep population must be implemented soon. Thus, the proposed study will aid bighorn sheep conservation by improving Grand Teton National Park’s ability to actively manage mountain goats in a manner that minimizes their impact on the Teton Range bighorn sheep population.

BIOGRAPHY OF APPLICANT

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Are you a current member of WY-WSF? No

Cost to be funded Cost to be funded by WY-WSF Grant by other cooperators

Item		WY-WSF Grant	Other Cooperators In-kind
Equipment		\$0	\$0
Services ¹	Genetic analysis by pay for service lab	\$8,500 ²	\$0
	Source population assignment analysis	\$2,000	\$2,000
	Existing sample preparation		\$500
	Additional sample collection/preparation	\$0	\$4,560 ³
	Project oversight (32 hours for GS-11 wildlife biologist)	\$0	\$1,200
	Mtn goat captures	\$0	\$88,000
Publishing		\$0	\$0
Monitoring		\$0	\$0
Supplies (sampling supplies, shipping, etc.)		\$0	\$500
Other		--	--
Total		\$10,500	\$96,760

¹Fulltime salaries will not be considered

²Genetics lab analysis (Estimated 100 samples @ cost of \$85/sample)

³Collection of additional fecal samples in summer 2017 by Grand Teton National Park wildlife technicians

OTHER ORGANIZATIONS PROVIDING FINANCIAL AID OR SUPPORT OF THE PROJECT (Include any pending amounts applied for.):

Greater Yellowstone Area Mountain Ungulate Project (combined contributions from Grand Teton National Park, Yellowstone National Park, Canon USA, Montana State University, Wyoming Game & Fish Department, Idaho Fish and Game Department)

- Mountain goat captures -- approximately \$88,000 already contributed
- Sample preparation -- \$500 already contributed
- Fecal sample collection and preparation -- \$4,560 to be contributed
- Project oversight -\$1,200 to be contributed

Tabitha Graves—quantitative ecologist

- Statistical analysis to assess source of Teton Range mountain goat population --\$2,000

ENDORSEMENT: I hereby agree to abide by the stated requirements of a WY-WSF grant. I also understand all WY-WSF funding stipulations and will provide all necessary reports if I receive a grant from WY-WSF.

Signature of Applicant Sarah R. Dewey
Title wildlife Biologist Date 5/1/2017

MEDIA CONTACTS: Please list one or more media sources in your area that we may contact with details of your project:

Jackson Hole News and Guide

WyoFile

Buckrail

Casper Star Tribune

WY Wild Sheep Foundation periodical - Rampage

WY-WSF Facebook

Grand Teton National Park Foundation Newsletter

Grand Teton Annual reports