# INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior

National Park Service

All or some of the information you provide may become available to the public.

OMB # (1024-0236)
Exp. Date (11/30/2010)
Form No. (10-226)

| **Reporting Year:** | **Park:** | **Select the type of permit this report addresses:** |
|---|---|---|
| 2008 | Yellowstone NP | Scientific Study |

| **Name of principal investigator or responsible official:** | **Office Phone:** |
|---|---|
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**Project Title (maximum 300 characters):**

Evaluating the influence of bottom up and top down control of Shiras moose demography in the Jackson Herd Unit

| **Park-assigned Study or Activity #:** | **Park-assigned Permit #:** | **Permit Start Date:** | **Permit Expiration Date:** |
|---|---|---|---|
| YELL-05762 | YELL-2008-SCI-5762 | Jan 01, 2008 | Dec 31, 2008 |

| **Scientific Study Starting Date:** | **Estimated Scientific Study Ending Date:** |
|---|---|
| Jan 01, 2008 | Dec 31, 2010 |

| **For either a Scientific Study or a Science Education Activity, the status is:** | **For a Scientific Study that is completed, please check each of the following that applies:** |
|---|---|
| Continuing | __ A final report has been provided to the park or will be provided to the park within the next two years<br>__ Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park<br>__ All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed |

**Activity Type:**

Research

**Subject/Discipline:**

Ecology (Aquatic, Marine, Terrestrial)

**Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters):**

Shiras moose (Alces alces shirasi) in northwest Wyoming have been experiencing population declines for the last 11-16 years. Research has shown that these animals are highly migratory and some moose summer in southern portions of Yellowstone National Park (YNP) and the Absaroka Herd Unit. Recent research has identified the seasonal habitats and home range characteristics of adult female moose in the Jackson herd unit, characterized the physiological health of captured moose, and concluded that habitat condition and quality are most likely limiting this population. Although habitat was implicated in the current decline, no direct measures of habitat condition or quality were conducted. To follow up on these findings, this study will evaluate seasonal moose habitat. To

directly evaluate the effects of habitat condition on Jackson moose, we are monitoring browse condition in seasonal home ranges, determining seasonal diet compositions, and are analyzing preferred browse species for nutritional quality (winter and summer). This study will provide a more mechanistic understanding of the effects of habitat condition on cow survival, calf production and survival, population growth, and clarify the role habitat has in causing this population decline.

The overall goal of this work is to increase our current understanding of Shiras moose and determine the cause of the population decline observed in the Jackson Herd Unit by characterizing the condition and nutritional quality of seasonal habitats in the north Jackson Herd Unit, and determining if moose demographic performance (i.e., survival and reproductive success) is reduced in areas of poor habitat condition or quality. The specific objectives are: (1) characterize moose habitat condition (i.e., browsing intensity) in winter and summer, (2) compare the nutritional quality of winter and summer browse, and evaluate the factors that influence forage quality (i.e., wildfires). (3) evaluate the influence of habitat condition and forage quality on cow survival, pregnancy, parturition, and calf survival of collared moose from both phases of the study, and (4) characterize the timing of moose calf mortality and develop indices of predator use and diet in order to inform our knowledge of the potential influence of wolf and bear predation on calf survival.

Multiple activities were conducted on the GTNP during summer 2008. During winter 2008, no activities were conducted within YNP. However, during summer 2008, we monitored 4/29 Keigley transects, conducted neonate survival surveys, and collected vegetation samples for analysis of nutritional quality within YNP. No moose fecal samples were located nor collected within YNP.

**Findings and status of Scientific Study or accomplishments of Science Education Activity during the reporting year (maximum 4000 characters):**

Overall Study Findings: In mid-February, with the aid of personnel from Wyoming Game and Fish Department and Grand Teton National Park, 32 adult female moose were captured on winter range and fitted with radio collars (19 GPS and 13 VHF). In 2008, to address decreased parturition rates of captured moose observed during past research, all moose were captured via helicopter net-gunning, without the use of immobilization agents. No capture related mortalities occurred in 2008.

Mean rump fat measurements for adult female moose were higher than in previous years. The mean pregnancy rate of captured moose was 16% lower than the average of the past 3 years. During winter 2008, all moose experienced decreased parturition. Non handled moose exhibited decreased parturition rates to the extent of those previously observed in only handled moose. Both twinning rates and neonate survival remained consistent with those observed in previous years. Winter 2008, experienced the highest number of moose losses due to mortality than any previous year. During 2008 (up to November 10), we lost 23 collars (20 cow: 3 bull). Of these, 18 were confirmed mortalities, 3 were dropped collars and 2 have not been investigated. Eleven bone marrow samples were collected and upon drying 9/10 useable samples indicated that moose were in poor to starvation condition at time of death.

To assess habitat condition, surveys were conducted during both winter and summer. We monitored 45 Keigley transects in winter and 29 in summer. In addition, 10 biomass plots were sampled in winter 2008 along selected Keigley transects, as a comparison method to assess habitat condition. Snow depths and weights (snow-water equivalents) were also measured at the start and end of each transect.

Fecal samples, to determine diet compositions, were collected in 6 and 5 sampling areas in winter and summer, respectively. To assess the nutritional quality of forages across seasonsâ , collections of forage species from each of the sampling areas were obtained in winter and summer. Fecal composite samples from each of the sampling areas and winter forage has been sent to the Washington State Wildlife Habitat Nutrition Lab and Colorado State University Soil, Water and Plant Testing Lab, for analysis.

Future analyses will include continued characterization of habitat condition, diet composition, nutritional quality of forage, and monitoring of demography. These data will be analyzed to assess the effects of habitat condition and quality on cow survival, calf production and survival, population growth, and clarify the role habitat has in causing this population decline. The information obtained from this study will increase the understanding of moose ecology and will assist state and federal agencies in developing effective management strategies for moose in northwest Wyoming.

**For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?**

No

| **Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):** | **Funding specifically used in this park this reporting year that was provided by all other sources (enter dollar amount):** |
|---|---|
| $0 | $20000 |

**List any other U.S. Government Agencies supporting this study or activity and the funding each provided this reporting year:**

Wyoming Game and Fish [$100000]
WY Big Game License Coalition [$20000]
Animal Damage Management Board [$17000]
Teton Conservation District [$25000]

**Paperwork Reduction Act Statement:** A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average 1.625 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding this burden estimate or any aspect of this form to Dr. John G. Dennis, Natural Resources (3127 MIB), National Park Service, 1849 C Street, N.W., Washington, DC 20240.