FEDERAL AID
ANNUAL PROGRESS REPORT

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
Juneau, AK 99811-5526

Grant Number: **W-33-9** **Segment Number: 1**

Project Number: 6.17

Project Title: A direct investigation of the full curl harvest system: 1) Ram survival and energetics, and 2) ewe survival and productivity.

Project Duration: July 1, 2009 – June 30, 2011

Report Period: July 1, 2010 – June 30, 2011

Report Due Date: September 1, 2011

PRINCIPAL INVESTIGATORS: Tom Lohuis, ADF&G

WORK LOCATION: Kenai Peninsula, GMU 7

1. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH

Alaskan Dall's sheep *(Ovis dalli dalli)* are highly valued by sport and subsistence hunters, and wildlife viewers. Statewide, 700 to 1000 rams are harvested annually under sport hunts managed by the Department of Fish and Game, with a smaller number taken under subsistence hunts administered by federal agencies. Since 1989, with the exception of a small number of easily accessible and/or highly desirable areas that limit participation by awarding permits through a lottery, most sport hunts have been conducted under a general harvest, full curl regulation. This management strategy allows an unlimited number of hunters to go afield but restricts harvest to the segment of the population defined by horn growth characteristics presumably representing mature rams.

At the most recent (March 2008) State of Alaska Board of Game meeting dealing with issues in Southcentral Alaska, 27 out of 246 proposals before the board were related to Dall's sheep hunting. This number is anticipated to grow in future, due to a combination of low sheep numbers and heavy harvest pressure. In some areas, hunts have already been changed from the general harvest, full-curl regulation to limited entry hunts, where a small number of hunters selected through a lottery process are allowed the opportunity to take any ram. These are controversial changes as they greatly restrict hunter opportunity. While on the record at the March 2008 Board of Game meeting, Chairman Cliff Judkins specifically asked the PI (Lohuis) to design research to "evaluate the full curl harvest system".

Although the full curl regulation was based primarily on Geist's (1971) dominance related mortality hypothesis, there is limited empirical evidence to support harvest regimes based on horn curl. Yet, many biologists assumed that under the full curl regulation, sheep populations were self-managing. This hands-off approach, compounded by limited agency-wide funding, focused research on other big game species, and resulted in several major knowledge gaps in sheep biology. We will attempt to address two of these shortfalls with the current study.

First, we do not have precise data on natural—non hunting—ram mortality rates. While Nichols (1984) reported that 14-43% of juvenile rams died prior to reaching full curl, this report is a compilation of data from several mountain ranges and is not a sufficiently precise estimate upon which to base management actions. And, these conclusions were primarily drawn from historical skull collections which assumed an equal probability of detection and recovery for skulls from rams of all age classes. Natural mortality rates are critical information because in order to harvest so-called 'surplus' animals, or animals that would otherwise succumb to starvation, predation, or other non-human factors, hunting harvest should presumably mirror natural mortality patterns as closely as possible.

Second, it is a given that different harvest strategies and levels of hunting pressure will result in varying numbers and proportions of mature rams in a population. Although several investigators have attempted to correlate ram population structure, generated by different harvest strategies, with demographic parameters indicative of productivity or recruitment, the evidence is not conclusive. Much of this research was conducted prior to the advent of even rudimentary VHF radio collar technology, relied on aerial survey data, and/or did not utilize individually marked animals. Many of these studies were conducted without control areas, instead comparing population ratios in the same area over a period of several years, spanning alterations in harvest systems. Aerial survey data is sometimes difficult to interpret, and can be compromised by several potential variables including differing sightability between animal sex and age classes and inter-observer differences in animal classification. As a result of those complications, it was often difficult to differentiate the effects of regulatory change from long term population trends that might have been additionally influenced by weather patterns, predation, or population density.

As a result, we have only limited information on the effects that ram numbers and age structure have on sheep population dynamics, and research investigating the full curl harvest scheme is equivocal.

This project is intended to directly address this lack of knowledge.

2. REVIEW OF PRIOR RESEARCH AND STUDIES IN PROGRESS ON THE PROBLEM OR NEED

Geist's (1971) dominance related mortality hypothesis predicted that the presence of mature rams ensures an orderly rut. If most mature rams are removed by hunting, juvenile ram participation in the rut will purportedly be increased, leading to competition among juvenile rams for ewes, increased harassment of ewes, and a prolonged rut period. Accordingly, the net result of increased juvenile ram participation is hypothesized to be greater energy expenditure by both ewes and rams, and overall depletion of body stores of fat and protein. Extensive catabolism of body reserves during rut is then predicted to lead to higher overwinter mortality rates among all cohorts, as well as compromised pregnancy and parturition rates in ewes.

However, the DRM hypothesis has never been directly tested. The initial dataset used to support the full curl harvest scheme was collected prior to the advent of even the most rudimentary VHF radio collar technology and relied solely upon observations of marked individuals at mineral lick

sites to determine annual survival and reproductive status (Heimer and Watson 1986). However, different demographic groups use mineral licks at different seasons, rates, and frequencies (Tankersly 1984), so observations of a particular age or sex class at a lick may not accurately represent their presence in a population. In many cases, ewes with lambs do not appear at lick until approximately one month postpartum (Tankersly 1984). However, this is precisely the period during which the greatest lamb mortality occurs (Scotton 1998, Arthur 2003, Lohuis, unpublished data). Thus, population level conclusions, specifically those addressing ewe productivity, drawn from lick observations must be interpreted with caution.

Further work in the late 1980s and early to mid-1990s attempted to evaluate the full curl harvest regulation by measuring population parameters such as the ratio of lambs per number of ewe-like animals observed or the ratio of mature and immature rams per total number of ewe-like animals and then attempting to relate these ratios to harvest strategy or hunting pressure (Singer and Nichols 1992; Murphy et al 1990). While no overt differences in population structure due to harvest regime were detected, conclusions drawn from these techniques are again of limited utility as aerial surveys provide only a snapshot of a population at a point in time. Further, aerial sightability of sheep is approximately 80-85% in the best of conditions (Udevitz et al 2004), and it is highly likely that aerial surveys do not detect all animals with equal probability (Becker pers comm.) as ram groups are typically smaller than ewe/nursery groups. And, because sheep are a species that exhibit sexual segregation, ewes and lambs tend to occupy lower elevation, more open habitat with rams in higher elevation sites that may be steeper and rockier with vastly different sightability. Finally, aerial surveys cannot consistently differentiate adult ewes from subadult rams that remain with nursery groups, nor can yearlings –a necessary indicator of recruitment rates—be consistently classified from the air. Thus, survey data may not accurately depict population ratios, nor does it provide insight into the demographic processes that shape population structure.

While investigations of the ram abundance have indeed shown increased courtship activity by young rams in heavily hunted populations of Dall's sheep (Singer and Ziegenfuss (2002) it is not clear if increased ram activity levels during the rut in fact have broader implications with respect to their survival, to ewe productivity, or to lamb recruitment rates.

Detailed, long term investigation of these parameters utilizing individually marked animals, while controlling for weather effects and harvest regime is required to address questions about pregnancy and productivity in ewes, juvenile ram survival to full curl, and the individual and population energetic implications of ram population structure.

3. APPROACHES USED AND FINDINGS RELATED TO THE OBJECTIVES AND TO PROBLEM OR NEED

The Kenai is the ideal venue for this research as it offers road access and a centrally located airstrip. Three mountain blocks, each managed under a different harvest strategy, are in close proximity, with similar weather patterns, ambient temperatures, and snowfall. They are briefly described as follows: The Cooper Landing Closed Area (CLCA) has been closed to sheep hunting since 1953. The Grant Lake area is open to hunting under a general access, full curl harvest scheme, and, typically, all full curl rams have been harvested from this area annually. Lastly, the Crescent Lake area is currently administered as a drawing hunt, with 0-3 full curl

rams harvested by 6 permit winners annually. Aerial surveys typically show a limited number of full curl rams in this area each year.

A total sample of 40 juvenile Dall's sheep rams and 30 ewes will be required for this five year project.

During the first year of study, ten juvenile rams, ages 3-6, as determined by horn curl between ¼ and ¾, will be captured by helicopter netgunning and fitted with GPS radio collars. These collars will be distributed across the study area and will allow us to determine if sheep are traveling between treatment areas.

In years two through five, ten rams, ages 3-6, will be captured twice annually for two years beginning in November 2011. One-half of the rams captured in each area will be fitted with a Telonics GPS collar, while the other half will be fitted with a traditional VHF radio collar. Ten adult ewes will be captured once annually for two years in each treatment area beginning in March 2012 and fitted with traditional VHF radiocollars.
All collars will contain a mortality sensor and will be fitted with a programmable release mechanism to ensure that collars do not remain on animals beyond the end of the study.

Capture operations will take place for the first three years of the study; monitoring collared animals to determine mortality rates will continue for an additional two years after the cessation of capture operations.

IV. MANAGEMENT IMPLICATIONS

Decisions regarding current and future management direction and harvest strategy for sheep are challenging due to low sheep populations and increased harvest pressure in some areas. These difficulties will be compounded by close public scrutiny. This project will provide critically needed research addressing the population level effects of ram population composition and structure that can result from different harvest strategies.

V. SUMMARY OF WORK COMPLETED ON JOBS <u>FOR LAST SEGMENT PERIOD ONLY</u>

JOB/ACTIVITY 1: Pilot study. Ensure that rams do not move back and forth between treatment areas, obtain measures of home ranges, movements, and dispersal movements. Obtain population estimates and sex and age composition.

Accomplishments:
Captures, Sample composition:
Ten juvenile rams were captured by helicopter netgunning and fitted with a GPS-store on board collar in April 2010

Ram movement, dispersal, and home range size

Collars were programmed to record one location every hour. Collars remotely released from the animal and were recovered in May 2011. We are currently analyzing the distribution and movement data collected with these collars.

JOB/ACTIVITY 2: Obtain measurement of rates, causes, and timing of mortality for sheep in this study population.

Accomplishments: Sheep were monitored monthly from fixed wing aircraft between April 2010 and May 2011. No animals died during the most recent reporting period.

JOB/ACTIVITY 3: Obtain measures of ewe pregnancy rates and estimate lamb recruitment for this population.

Accomplishments: This job was not active during the most recent reporting period.

JOB/ACTIVITY 4: Assess the energetic costs incurred by juvenile rams during the rut as a function of ram population composition in each treatment area.

Accomplishments: This job was not active during the most recent reporting period.

ANCILLARY INFORMATION
After the 2010 capture session, blood sera from rams were tested for exposure to viral diseases known to affect sheep populations. Samples were screened for titers to Parainfluenza-3, Malignant catarrhal fever, Bovine viral diarrhea, Episodic hemmorhagic disease, Ovine progressive pneumonia, Respiratory syncitial virus, and Infectious bovine rhinotrachieitis. No exposure was detected to any of these diseases.

Nasal and pharangeal swabs from these rams were sent to the Washington Animal Disease Diagnostic laboratory and cultured to ascertain if these animals carried bacteria associated with respiratory disease and pneumonia in other wild sheep populations. 7/10 animals tested positive for bacteria of the genus Pasturella, and 4/10 were positive for bacteria of the species Mannheimia hemolytica. Work is ongoing to determine how pathogenic these bacteria are and what effect they might be having on the study population.

VI. LITERATURE CITED

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VII. PUBLICATIONS:

At this time, we have not analyzed the movement and distribution data to sufficient detail write and submit manuscripts for peer-reviewed scientific journals. We plan to do so in the next one to three years.

RECOMMENDATIONS FOR THIS PROJECT

We have decided to suspend work on this project in favor of additional sheep demographic work in GMU 14C. We will resume this project at a later, as yet undetermined date.

Prepared by: Tom Lohuis, WB III

6.17 Dall's sheep ram movement, dispersal, and home range size, Kenai Peninsula, Alaska
FY11 Progress Annual Report

Date: September 1, 2011