

FEDERAL AID ANNUAL RESEARCH PERFORMANCE REPORT

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

Alaska Department of Fish and Game Wildlife Restoration Grant

GRANT NUMBER: W-33

SEGMENT NUMBER: 10

PROJECT NUMBER: 3.52

PROJECT TITLE: Climatic and nutritional regulators of caribou productivity in western Alaska

PROJECT DURATION: 1 July 2011 to 30 June 2015

REPORTING PERIOD: 1 July 2011 to 30 June 2012

REPORT DUE TO HQ: 1 Sep 2012

PRINCIPAL INVESTIGATOR: William B. Collins

COOPERATORS: Don Spalinger, University of Alaska Anchorage; Nathan Wolf, University of Alaska Anchorage; Andy Aderman, Togiak National Wildlife Refuge; Norm Harris, University of Alaska Fairbanks, Agriculture and Forestry Experiment Station.

WORK LOCATION: Western Alaska, Game Management Units 9, 10, 17, and 19.

I. PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE 1 : Nutritional factors affecting caribou productivity. We made significant progress determining forage availability by season and relative to caribou distribution. We collected and began analyzing forage quality relative to distribution of caribou, focusing on nitrogen and energy availability.

OBJECTIVE 2 : Climatic factors affecting caribou productivity. In our initial effort to identify key mechanisms by which the quality of caribou forage is controlled and to aid in our understanding of the movement and resource selection, we established six study sites within the ranges of the Nushagak and Mulchatna Caribou Herds where we imposed treatments of various snow covers using snow fences. At each snow fence site, and at additional paired sites without snow fences, we installed i-button data loggers to monitor soil temperatures and ion exchange strips to monitor nitrogen mineralization within the soil. In addition, at each of the six sites, we completed a vegetation survey and measured soil water content. In early April 2012 we measured the extent and depth of snow cover and the CO₂ flux through the snow pack. We began similar investigations of soil temperature and nitrogen flux in the range of the Unimak Island Caribou Herd, focusing on naturally occurring differences between vegetation types, since wilderness status of that range prohibits placement of snow fences. In all three caribou ranges we sampled dominant caribou forage plants for nutritional analysis.

II. SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN THIS PERIOD

JOB/ACTIVITY _1_: Despite poor weather conditions and sporadic availability of aircraft, we completed aerial photography and ground-truthing of Unimak Island, and we began developing vegetation maps.

JOB/ACTIVITY _2_:

We collected spring, summer, fall and winter caribou fecal samples, as well as reference plants, from Unimak, Muchatna, and Nushagak ranges and began analysis for determination of diets by season.

JOB/ACTIVITY _3_:

We began evaluating various available methods and data bases for determining historic and current greenup across the study area.

JOB/ACTIVITY _4_:

On the Nushagak and Mulchatna caribou ranges we installed 6 snow fence plots where we began monitoring effects of snow cover on soil temperature, mineralization of nitrogen, and forage quality. We recorded soil temperature by installing i-buttons, and obtained measures of soil nitrogen and phosphorus using resin strips installed within and outside of areas over which snow drifts formed behind snow fencing. The snow fences ensured a range of snow covers and soil temperatures for evaluation of the effects of depth, duration, and degree of freezing on mineralization of nutrients, and subsequent effects on forage quality.

We installed temperature-recording i-buttons and nitrogen and phosphorus accumulating resin strips at 54 locations on Unimak Island for assessment of soil and climatic effects on caribou forage quality. We collected corresponding forage samples and began analyses of forage quality. We were not permitted to install snow fence plots on Unimak due to its wilderness status. However, we were able to take advantage of site differences for evaluating differences in snow cover. Approximately 30% of i-buttons and resin strips were pulled out of the ground by foxes, reducing sample size and necessitating a better system for their placement in the future.

We harvested our first set of samples from 128 *Salix pulchra* (representing upland species) and 128 *Salix alaxensis* (representing riparian species) plants that we cloned, isolated in pots, and subjected to 4 treatments: 2 levels of fertility, 2 soil temperatures, 2 levels of soil moisture, and 2 levels of direct solar radiation. These are being prepared for nitrogen and tannin analyses.

JOB/ACTIVITY _5_:

We have not yet begun mapping and interpretation of ice crust effects on forage availability.

V. PUBLICATIONS

None.

Prepared by: William B. Collins

Date: 8/15/12