ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
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Alaska Department of Fish and Game
Wildlife Restoration Grant

GRANT NUMBER: AKW-10 Wildlife Restoration FY2016

PROJECT NUMBER: 1.63

PROJECT TITLE: Evaluation and testing of techniques for ungulate management and operation of the Kenai Moose Research Center

PROJECT DURATION: 1 July 2011 – 30 June 2017

REPORT DUE DATE: September 28, 2016

PRINCIPAL INVESTIGATOR: John Crouse

COOPERATORS: USFWS Kenai NWR; Dr. Perry Barboza, Texas A&M University; Drs. John and Rachel Cook (National Council of Air and Stream Improvement); Dr. Tom Stephenson (California Department of Fish and Game); Drs. Véronique St-Louis and Michelle Carstensen (Minnesota DNR)

WORK LOCATION: Kenai Moose Research Center

I. PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE 1: MRC maintenance and operations. We maintained 15 moose during the last reporting period including 3 adult males and 12 adult females. Females were held within Pens 2 and 3; separate from the males in Pen 1. All females were kept separated from males during the entire year and no pregnancies were detected in blood samples collected in April. The 3 adult males were fed 13% Reindeer Ration (22.7 kg/animal/week) 1 November – 15 April to supplement their intake of native vegetation.

OBJECTIVES 2-5: Moose nutrition, physiology, and reproductive research. We weighed and chemically immobilized animals to measure rump fat and loin muscle thickness and collected blood, urine and feces from all 12 female moose in September, December and April to monitor resource allocation to fat and lean mass.

We began collaborative studies with Minnesota DNR (MNDNR) biologists Véronique St-Louis and Michelle Carstensen to evaluate the use of Vectronic (VECTRONIC Aerospace GmbH, Berlin, Germany) GPS collars in combination with the Vectronic Mortality Implant Transmitter (MIT) to determine activity budgets and internal temperature profiles of moose. These studies were designed to 1) examine the relationship between rumen temperature and deep body temperature, 2) determine

whether or not rumen temperature responds to changes in animal behavior, 3) determine whether or not Xact and Yact counts obtained from the motion sensor located in the collar can be used to infer specific animal behaviors (e.g., lying, standing, foraging). GPS collars and MITs have been provided by MNDNR. Access to 8 female moose, assistance in deploying hardware and personnel to observe moose are being provided by the MRC. We assisted Minnesota veterinarian Larissa Minicucci and MNDNR biologist Michelle Carstensen in successful deployment of MITs into the rumen of 10 MRC female moose and fitted 8 of the 10 females with GPS collars during December 2014. MS candidate Andrew Herberg, Univ. Minnesota – St. Paul, was selected by MNDR for the project and began observations at the MRC during January 2015. Observations were conducted during two-week time periods to capture seasonal variability in activity and climate; winter (January), spring (April). Each of the 8 moose were observed for 6 hours, twice per season. MRC personnel were responsible for half of the observations and observed moose to collect activity data 96 hours during January and April.

Daily marker dosing of Cr was provided in 500g of a pelletized feed (0.0015g Cr/g feed) to 9-11 non-lactating females from 05 May – 20 August, 2015. Fecal samples were collected twice weekly on Tuesday and Thursday (fecals, n = 276). Plants and plant parts were collected monthly from 3 areas in each of the 2 enclosures (Pen 2 and Pen3) where moose had been observed browsing to determine dry matter and nutrient content (2 pens x 3 Sites x 5 Species x 30 Plants x 4 sampling periods = 3600 plants total). Analyses to be performed include %CP, %GE, sequential fibers, tannin analysis and total phenolics.

OBJECTIVE 6: Vegetation management. We have classified the existing vegetative cover within each of the MRC enclosures using a combination of aerial photography and satellite imagery to develop a vegetation management plan. We used current vegetation age structure and composition in conjunction with information from historic enhancement efforts to identify areas suitable for treatment to increase forage availability to moose and have treated over 400 acres within the enclosures. We are still short of our initial goal to treat over 500 acres (~ 20% of each enclosure) and our long-term goal to maintain ~ 35% of the forest within each enclosure ≤ 15 years old.

Objective 7: Drug testing. Thiafentanil (A-3080) was purchased but we have been unable to evaluate its efficacy in Alaskan moose. Reasons for not making much progress on this objective include, 1) only a small number of captive animals with which to conduct a controlled study, and 2) only 2 vials of thiafentanil because of its limited availability due to delay in DEA scheduling.

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

JOB/ACTIVITY 1A: We maintained 15 adult moose during this period including 3 males and 12 females. Females were held within Pens 2 and 3; separate from the males in Pen 1 throughout most of the year. Eight females were translocated to Pen 1 with the males for breeding 17 September through 18 October. One male died from injuries sustained during fighting in early October. Seven pregnancies were confirmed using blood samples collected in December and again in April. The remaining 2 adult males were fed 13% Reindeer Ration (22.7 kg/animal/week) 1 November – 15 April to supplement their

intake of native vegetation. The 8 bred females were translocated to Pen 2 in October and held there overwinter and fed a high-quality pelletized ration (10 kg/animal/week) February through parturition in May to supplement their intake of native vegetation.

JOB/ACTIVITY 3B: As part of our collaborative studies with the Minnesota DNR to evaluate whether sensors located in the collar can be used to infer specific animal behaviors (e.g., lying, standing, foraging), observations were conducted during two 2-week time periods during summer and fall. Each of 8 moose were observed 4 times for 6 hour periods for a total of 192 hours. MRC personnel were responsible for half of the observations and observed moose to collect activity data 96 hours during July and October.

During April, we deployed a VHF collar (Telonics Inc., Mesa, AZ, USA) and an intravaginal VHF transmitter (Advanced Telemetry Systems, Isanti, MN, USA), each with imbedded activity and temperature sensors, in 4 non-pregnant moose at the MRC and observed animals for 48 hours to collect activity data.

During May, we fitted a GPS collar with imbedded activity and temperature sensor (Telonics Inc., Mesa, AZ, USA) on 3 pregnant moose and affixed secondary activity (Actical, Phillips Respironics, Bend, OR, USA) and temperature (Thermacron® iButton, Maxim Integrated, San Jose, CA, USA) sensors to all 12 radio-collars on female moose.

JOB/ACTIVITY 4C-F: Daily marker dosing of Cr was provided in 500g of a pelletized feed (0.0015g Cr/g feed) to 7-12 lactating and non-lactating females from 02 May – 25 August, 2016. Fecal samples were collected twice weekly on Tuesday and Thursday (fecals, n = 320). Plants and plant parts were collected monthly from 3 areas in each of the 2 enclosures (Pen 2 and Pen3) where moose had been observed browsing to determine dry matter and nutrient content (2 pens x 3 Sites x 5 Species x 30 Plants x 4 sampling periods = 3600 plants total). Analyses to be performed include %CP, %GE, sequential fibers, tannin analysis and total phenolics.

JOB/ACTIVITY 5A-C: We chemically immobilized all 12 female moose in September, December and April and measured weight, rump fat and loin muscle thickness and collected blood, urine and feces to monitor resource allocation to fat and lean mass relative to reproductive status.

Thirteen calves (6 twins and 1 singleton) were born between 12 May – 01, June 2016. Parturition was detected by daily observation of pregnant females. Calves were handled within 24h of birth to determine mass, collect blood and morphological measures and swab nasals for viral and bacterial pathogens. A male calf, of twins, was not alive when first observed and shipped to pathologists to determine cause. All calves were fitted with an expandable VHF radio collar (ATS, Isanti, MN, USA) and marked with an ear tag (Destron Fearing, Duflex® Sheep and Goat Ear Tag, SKU 140979, http://www.qcsupply.com/). Average calf mass was 13.5 kg.

JOB/ACTIVITY 6B-C: KNWR staff prepared for burning 50 acres of the windrowed sheared forest materials in Pen 4 and began the approval process for their burn plans. Burning is planned to proceed in November 2016.

III. SIGNIFICANT DEVIATIONS AND/OR ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

Research to better understand moose reproduction and survival in the Kenai Peninsula's 2 Intensive Management (IM) areas (GMU15, Subunits A & C) continued. MRC staff contributed to the capture and collaring operations 10 days each during November 2015 and March 2016 to provide assessments of moose body condition and deploy vaginal implant VHF transmitters to detect moose birthing events. In addition, female moose were captured in GMU, Subunit B and fitted with GPS collars to evaluate habitat use in response to the 2014 Funny River Fire.

Collaborative effort to assess caribou body condition and nutritional status through morphometric and physiological indices continued with Drs. John and Rachel Cook (National Council of Air and Stream Improvement) and Dr. Tom Stephenson (California Department of Fish and Game). Animal use protocols, approved by University of Alaska – Fairbanks IACUC, [802299-2] Developing Estimation Equations of Nutritional Condition for Caribou, were developed to utilize 2 intractable caribou scheduled to be culled from a captive herd, maintained at the Matanuska Experiment Farm, for body composition evaluation (these data will supplant a data set we have already compiled for 38 other animals). Index measurements were taken from live animals. The carcasses of dead animals were examined to evaluate condition indices including; kidney fat, bone marrow fat, mass, morphometrics (following the sampling guidelines of CARMA 2008) and carcass score (Kistner 1980; Lanka and Emmerich 1996). Finally, homogenized body tissues were submitted to the Wildlife Habitat Lab at Washington State University (http://cahnrs.wsu.edu/soe/facilities/wildlifehabitat) to determine fat, protein, mineral and water content.

As part of his Graduate Studies Program, Wildlife Biologist Dan Thompson made significant progress on several aspects of his PhD proposed work. Some of the highlights include: deployed 10 temperature/humidity and 13 temperature/light sensors (Onset Hobo loggers, Bourne, MA, USA) in plant communities to examine environmental variability relative to vegetative cover classification; collected approximately 1000 thermographic images (FLIR® Systems, Nashua, NH, USA) to evaluate heat transfer in moose; documented hair molt patterns with pictures of moose taken weekly; collected saliva daily during July and August 2015 from 3 non-lactating female moose to determine salivary cortisol concentrations and examine changes relative to environmental temperatures; measured moose heart rate opportunistically using a Polar® equine monitor (Polar Electro Inc., Lake Success, NY, USA). The results will contribute meaningfully to our understanding of thermoregulatory requirements of moose.

IV. PUBLICATIONS

Suzanne Lynn Ishaq, Monica A Sundset, John Crouse, André-Denis G Wright. 2015. High-throughput DNA sequencing of the moose rumen from different geographical location reveals a core ruminal methanogenic archaeal diversity and a differential ciliate protozoal diversity. Microbial Genomics (http://dx.doi.org/10.1099/mgen.0.000034).

Prepared by: John Crouse

Date: September 7, 2016