

**Alaska Department of Fish and Game
Wildlife Restoration Grant**

GRANT NUMBER: AKW-29 Research & Management

PROJECT NUMBER: 13.0

PROJECT TITLE: Analysis and interpretation of ungulate dietary composition and forage nutritional quality in Alaska

PERIOD OF PERFORMANCE: 01 April 2018 – 31 December 2022

PERFORMANCE YEAR: March 24, 2020–September 30, 2021

REPORT DUE DATE: Submit to Coordinator 24 November 2021; due to FAC 1 December 2021

PRINCIPAL INVESTIGATOR: Kristin Denryter – ADF&G Wildlife Physiologist II

COOPERATORS: Don Spalinger – ADF&G (retired)
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Katie Anderson – ADF&G

Authorities: 2 CFR 200.328
2 CFR 200.301
50 CFR 80.90

I. PROGRESS ON PROJECT OBJECTIVES DURING PERFORMANCE YEAR

OBJECTIVE 1: Complete dietary composition analyses for previously collected samples from the Togiak, Goodnews, Nushagak, and Coalville River moose populations.

ACCOMPLISHMENTS: We have continued testing DNA barcoding as a means for determining diet composition, and we are comparing that technique with micro histological, fecal alkane-alcohol, and bite-count methods for moose and caribou sample sets. During the current performance period, we continued to refine DNA-metabarcoding techniques with an emphasis on bioinformatics (analyzing the complex output from DNA analyses). This has proved more difficult than anticipated in part due to limited processing capabilities at the laboratory (located at the University of Alaska), in part related to labor restrictions associated with the Covid-19 pandemic. Additionally, willows in fecal samples have proven difficult to distinguish owing to genetic polyploidy and we are still evaluating potential workarounds that would better facilitate distinguishing among willow species.

OBJECTIVE 2: Determine forage nutritional quality for the diets determined in Objective 1.

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ACCOMPLISHMENTS: We continued to operate the nutrition laboratory created through AKW-R-1-2018 Project 1.0. Since the inception of the project, we completed analyses for the following projects: Nelchina caribou, Nelchina moose, Colville River moose, Southern Alaska Peninsula caribou, Region III's western Alaska moose habitat project, and Northern Alaska Peninsula caribou. We have completed analyses of all samples collected for the Alphabet Hills project (AKW-30 P1.0) through August 2021.

OBJECTIVE 3: Determine winter diets for Nelchina caribou wintering in the Tanana Hills from previously collected samples.

ACCOMPLISHMENTS: Laboratory analyses of these samples have been completed, with data processing ongoing.

II. SUMMARY OF WORK COMPLETED ON PROJECT TO DATE.

Completion of laboratory analyses necessarily precedes evaluation of ungulate diets and nutritional quality of browse samples. Upon completion of the comparison of laboratory techniques (e.g., metabarcoding vs. micro-histological), we will be able to determine needs for reanalysis of samples and finalize the determination of diet composition and quality across the various datasets we have developed.

III. SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.

No SDRs or amendments were submitted during this performance year.

IV. PUBLICATIONS

We are still in the data collection and analysis phase of the project and do not yet have any publications associated with this project.

V. RECOMMENDATIONS FOR THIS PROJECT

The project has proven more difficult to complete than initially envisioned due to complicated genetics of plants (e.g., polyploidy) and a lack of genetic markers for distinguishing polyploid species of willow (*Salix* spp.) using DNA metabarcoding techniques. Although there is a benefit to developing these techniques, the resources needed to do so go beyond those provided in this project description. To complete the current objectives, it will be necessary to increase our resources, including dedicated and specialized lab personnel, additional equipment, and additional sample analyses. We will work with the Federal Aid Coordinator to identify our options.

Prepared by: Kristin Denryter, ADF&G Wildlife Physiologist II

Date: 01 November 2021