

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

GRANT NUMBER: AKW-30 Habitat Enhancement

PROJECT NUMBER: P1.0

PROJECT TITLE: Evaluation of the effects of fire on moose and forage quantity and quality in the southcentral Alaska area of Alphabet Hills

PERIOD OF PERFORMANCE: 05 February 2018 – 30 June 2022

PERFORMANCE YEAR: 01 October 2020 – 30 September 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: Jeff Stetz – ADF&G Wildlife Biologist IV
William Collins – ADF&G (retired)
Don Spalinger – ADF&G (retired)
Katie Anderson – ADF&G Wildlife Biologist I
Amanda Droghini – Alaska Center for Conservation Science
Timm Nawrocki – Alaska Center for Conservation Science

Authorities: 2 CFR 200.328
2 CFR 200.301
50 CFR 80.90

I. PROGRESS ON PROJECT OBJECTIVES DURING PERFORMANCE YEAR

OBJECTIVE 1: Quantify moose browse quality, quantity, and proportional browse removal within the 2003/2004 Alphabet Hills burn area (Burn Area A; BAA), the planned Alphabet Hills burn area (Burn Area B; BAB), and the unburned area (UA).

ACCOMPLISHMENTS: Browse quality, quantity, and proportional removal within BAA, BAB (not yet burned), and the UA were sampled a total of six times during early-, mid-, and late- summer, and again in late-winter in 2018 and 2019. Sample and data analyses are ongoing. Additional sampling was completed in summer 2021.

OBJECTIVE 2: Document body condition, productivity, twinning rates, and survival of collared moose that are using BAA and the UA.

ACCOMPLISHMENTS: 60 GPS collars were deployed on bull and cow moose in the vicinity of BAA and the UA between Fall 2018 and Spring 2019. Survival analyses of GPS-collared moose are ongoing.

OBJECTIVE 3: Monitor spatial habitat selection of moose in BAA and the UA, the immediate response of moose to prescribed fire in BAB, and the moose colonization rate of BAB if it is ignited.

ACCOMPLISHMENTS: Hourly GPS fixes from 60 collared moose have been compiled and will be analyzed to evaluate habitat use relative to burned area A. The burn to produce burned area B has not been completed.

OBJECTIVE 4: Compare moose densities and composition between BAA and the UA.

ACCOMPLISHMENTS: Fall moose composition surveys were flown in BAA and moose pellet counts were conducted in BAA and the UA to estimate relative moose densities in initial years of the study.

OBJECTIVE 5: Model the effects of fire on browse quality; moose nutrition, fitness, and movements; and moose abundance.

ACCOMPLISHMENTS: The data needed for these analyses has been collected, but some browse quality samples are still being analyzed. As such, no modeling has been accomplished to date, but is expected to be completed in the next project year.

OBJECTIVE 6: Evaluate the usefulness of prescribed fire as a tool for habitat enhancement in GMU 13.

ACCOMPLISHMENTS: The burn project has been delayed and thus no analysis of data or evaluation of the usefulness of prescribed fire as a tool for habitat management has been accomplished to date.

II. SUMMARY OF WORK COMPLETED ON PROJECT TO DATE.

Related to Objective 1: we sampled the Alphabet Hills burn (BAA) on six occasions: five times across the summers of 2018 and 2019 and once in the winter of 2018-2019. Samples for nutritional analyses were collected among 20 random sites in the burn perimeter, and 20 random sites in the adjacent unburned forest. We collected over 500 plant samples, and measured canopy coverage of moose browses from randomly selected plots in burned ($n = 16$) and unburned habitats ($n = 10$) to help characterize relative availabilities of foods in both habitats. We found that the total canopy cover and available bite frequencies of moose browses were higher in forested sampling sites than in the burned sites. There was a significant difference between browse canopy cover in the forest compared to the burn (forest % cover = 10%, SE = 0.019, $n = 10$, burn % cover = 9%, SE = 0.01, $n = 16$; $t = 19.18$, $p = 0.033$). Average frequency of available bites in the forest was 13.22/100 points (SE = 1.48) and 9.48/100 points (SE = 0.88) in the burn, which was not significantly different. Diamond leaf willow, one of the important browses for moose, was sparse in the burn, with cover representing less than 10%, while in the forest, average cover of diamond leaf willow was approximately 20%. The greater cover of an abundant food source such as diamond leaf willow could explain the significantly higher bite frequency found in the forest.

The burned area had a higher diversity of species (burn $H = 1.709$, forest $H = 1.509$), with four species (fireweed, quaking aspen, little tree willow, and various mushrooms (*Boletus* spp.)) that were found only in the burned areas. Overall, forage digestible energy concentration (DE) of browses was significantly higher in the forest than in the burn, but digestible protein (DP) concentration was not significantly different. DE of diamond leaf willow was significantly higher in forested sites than in burned sites. Although DE was higher in the forest than in the burn, burned areas had a greater diversity of species than forest areas, many with higher DE than the same species in the forest. As a consequence of the apparent higher quality of foods in the forest, but the higher diversity of foods available in the burn, moose are expected to benefit nutritionally from the juxtaposition of burned and unburned habitats. Further work on the nutritional quality of winter foods and modeling the overall impact of yearlong nutritional changes in abundance, diversity, and quality of foods on moose nutritional fitness remains to be completed.

In 2021, we completed additional vegetation sampling at $n = 66$ sites for available bites and quality of browse species available to moose within the Alphabet Hills. We collected bite mass samples at $n = 21$ sites and forage quality samples at $n = 5$ sites. This information is currently being analyzed to produce maps of available browse in the Alphabet Hills.

Year 4 of this 5-year project has just ended and we have completed the data collection phase but are still analyzing samples and conducting statistical analyses for the most recently collected data.

III. SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.

Staffing changes in the performance period resulted in the following changes to the project:

- Change in PI from Jeff Stetz – ADF&G Wildlife Biologist IV to Kristin Denryter – ADF&G Wildlife Physiologist II.
- Cooperator Katie Anderson, a UAA Graduate Student, was hired as an ADF&G Wildlife Biologist I.
- Amanda Droghini – Alaska Center for Conservation Science and Timm Nawrocki – Alaska Center for Conservation Science were brought on as Cooperators

IV. PUBLICATIONS

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

V. RECOMMENDATIONS FOR THIS PROJECT

No changes to the project statement are required at this time.

Prepared by: Kristin Denryter, Wildlife Physiologist II

IPR AKW-30

Date: 01 November 2021