FEDERAL AID ANNUAL RESEARCH PERFORMANCE REPORT

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

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PROJECT NUMBER: 5.20

PROJECT TITLE: Habitat evaluation techniques for moose management in Interior Alaska

PROJECT DURATION: 1 July 2008–30 June 2012

REPORT PERIOD: 1 July 2009–30 June 2010

REPORT DUE TO HQ: 1 September 2010

PRINCIPAL INVESTIGATORS: Thomas F. Paragi and Kalin A. Kellie

WORK LOCATION: Interior Alaska

COOPERATORS: Jennifer Schmidt (University of Alaska Fairbanks), Matthew Sturm (U.S. Army, Cold Regions Research and Engineering Laboratory)

I. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH

Intensive management of moose (*Alces alces*) populations to produce a high yield for consumptive use was defined and mandated in a 1994 Alaska Statute (AS 16.05.255(e)). The statute required establishment of population objectives by game management unit or subunit and sustainable yield calculated from those objectives. Our project evaluates the utility of selected habitat parameters for objectively defining the appropriate size and location of intensive management areas for moose in the Interior and how environmental factors may influence the response of moose populations to intensive management. The goal is to define habitat parameters that are feasible to inventory and monitor in large remote areas of Interior Alaska.

Estimating habitat capability to support moose requires information on cover type to infer quality of forage (e.g., winter browse) and information on snow characteristics to understand its potential to impede movements, hinder access to forage, and in extreme instances reduce overwinter survival of young moose. Improving the ability to gauge or predict snow depth over spatial scales appropriate to moose range use and population dynamics would improve ability of managers to incorporate winter conditions into management recommendations. Estimating browse removal and its relationship to twinning rate can allow managers to assess the nutritional condition of moose in areas where intensive management is being considered.

Habitat enhancement to increase production of browse for moose requires targeting treatment sites on known winter range. The high density of moose in Unit 20A had reduced population productivity for over a decade (Boertje et al. 2007). With continued high density of moose on subalpine winter range in the Alaska Range foothills and lack of burn conditions or firefighter availability for a prescribed burn closer to Fairbanks (Tanana Flats), experimentation with aerial ignition to conduct a spring burn in subalpine habitats is warranted. Although vegetation response to fire in boreal forest is well documented, potential to increase browse production in subalpine habitat with prescribed fire is unknown.

Although moose abundance and herd composition have been estimated using aerial surveys in defined geographic areas for decades, those attributes have not been linked directly to habitat capability. Creating databases of historical moose abundance and composition and wildlife harvest that can be spatially linked to habitat information and factors of social and economic systems (e.g., distance to communities or methods of access) will improve understanding of spatial relationships and potentially the effectiveness of wildlife management strategies.

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

Prior research on moose indicated that snow depth >40 cm begins to impede movement, depth >70 cm influences habitat selection, and depth >90 cm restricts movements and greatly increases energy consumption (Coady 1974). Initial evaluation of snow depth data assembled by the National Resource Conservation Service from 1975 to 2005 indicated a relatively high frequency of depth >70 cm in the southwestern Interior and southern slopes of the Brooks Range (Paragi et al. 2009: job 1j). Distribution of snow measurement sites in the National Resource Conservation Service data illustrated large areas of the Interior lacking historic or contemporary snow measurements where depth is likely to affect habitat use or potentially winter survival of young moose.

Decisions on intensive management of moose ideally include an assessment of whether nutritional status is limiting the potential for population growth. Boertje et al. (2007) discussed the use of proportional browse removal (Seaton 2002), 10-month-old calf weights, twinning rate, and other indices of nutritional status in moose for gauging population level relative to habitat capability in Alaska. The Seaton (2002) technique is designed to estimate moose forage removal where moose utilize vegetation in Interior Alaska, but its sampling intensity is inadequate to estimate production for modeling carrying capacity at the landscape level. Recent data (Paragi et al. 2008) described how proportional removal of browse production was inversely related to twinning rate in 8 Alaska study areas where intensive management is underway or proposed.

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

Fieldwork was initiated in July 2007 (see Section V). We downloaded the initial release of LANDFIRE classification to evaluate its potential use for characterizing moose habitat by unit. Compilations of existing snow depth data across the Interior identified the lack of sampling sites in areas known to have deep snow winters of relatively high frequency that could potentially influence habitat and population dynamics of moose. We used this information to design an Interior-wide sampling of peak snow depth (early April) to understand scalar properties of snow depth and the required sampling to infer snow depth relative to moose management. Browse surveys and twinning surveys have been conducted to increase knowledge of nutritional indicators. Pretreatment information was collected on potential burn sites in subalpine habitat to infer changes in browse production and removal from prescribed fire.

IV. MANAGEMENT IMPLICATIONS

Initial validation trials indicated that the LANDFIRE classification presently is sufficient to distinguish summer range (vegetated areas) but not winter range (presence of browse species) for moose. Our preliminary analysis of snow depth data collected across the Interior in April 2008 indicated poor spatial correlation of snow depth (high variation) between measurements >1 km apart but comparatively similar variation for measurements made at 1–50 km away from a known snow depth. In units where snow depths were more variable, the prediction was also more variable. We concluded that a fine-scale model of snow depth was not feasible for Interior Alaska because it would require an extremely fine network of snow gauges to be accurate. Based on this work, we decided that the best low-effort, long-term option for incorporating snow into moose management is to monitor a series of gauges within each unit where deep snow is a concern and obtain an index from these of winter severity relative to moose ecology.

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

JOB/ACTIVITY 1A: <u>Define the proportion of each game management unit in Region III that contains vegetated cover for year-round moose habitat, and define the proportion of each unit that contains browse-producing species for winter range</u>

Accomplishments: We downloaded the initial release of the LANDFIRE cover classification and clipped the raster data by unit in a geographic information system. We then calculated the proportion of each unit that was vegetated (potential summer range) and the vegetated types likely to contain browse species (potential winter range) for units with a positive determination for intensive management of moose in Interior Alaska. We also participated in a teleconference of Alaska scientists conducting an independent evaluation to validate classification accuracy of LANDFIRE.

JOB/ACTIVITY 1C: <u>Estimate winter habitat use by moose with respect to snow depth</u>

Accomplishments: In cooperation with M. Keech (principal investigator for project 1.62; "Response of moose and their predators to wolf reduction and short-term bear removal in a portion of Unit 19D East"), we finished preparing a dataset to analyze habitat selection by female moose during periods of low-moderate snow depth and high snow depth, the latter coincident with high calf mortality not related to predation. We continued to review literature on this topic and are planning the analysis with a biometrician.

JOB/ACTIVITY 2A: <u>Estimate browse production (kg/ha) and proportional removal</u>

Accomplishments: We conducted moose browse surveys in Units 20A, 20B, and 20D.

JOB/ACTIVITY 2B: <u>Conduct moose twinning surveys in browse surveys areas</u>

Accomplishments: Galena area staff conducted a twinning survey in Unit 24B.

JOB/ACTIVITY 3A: Collate historic moose survey and harvest/sealing records for moose, bears, and wolves as attributes of an associated spatial extent for electronic storage, analysis, and display

Accomplishments: The cooperator (post-doctoral student J. Schmidt) submitted a digital archive of moose survey data.

JOB/ACTIVITY 4A: Reporting

Accomplishments: We prepared progress reports, budget requests, and work plans. Paragi helped as second author with preparation of manuscript (now in peer review process) describing correspondence between proportional browse removal (Seaton 2002) and twinning rate in Interior Alaska.

JOB/ACTIVITY 5A: Conduct an experimental burn by aerial ignition of fine fuels in spring to evaluate the vegetative response in current annual growth

Accomplishments: We visited the proposed burn sites in May 2010 with a fire specialist to verify fuel conditions. The burn prescription was met periodically during the approved window of dates in the burn plan, but the burn was not conducted because fire specialists or equipment were not available during feasible weather conditions.

VI. PUBLICATIONS

None.

Literature Cited:

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COADY, J. W. 1974. Influence of snow on behavior of moose. Naturaliste Canadien 101:417–436.

PARAGI, T. F., D. A. HAGGSTROM, C. T. SEATON, AND K. A. KELLIE. 2009. Identifying and evaluating techniques for wildlife habitat enhancement in Interior Alaska. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Performance Report. Project 5.10. Juneau, Alaska, USA. http://www.wildlifenews.alaska.gov/pubs/techpubs/research_pdfs/5.10_09_final.pdf Accessed 30 August 2010.

PARAGI, T. F., C. T. SEATON, AND K. A. KELLIE. 2008. Identifying and evaluating techniques for wildlife habitat management in Interior Alaska: Moose range assessment. Alaska Department of Fish and Game. Research Final Technical Report. Project 5.10. Juneau, Alaska, USA. http://www.wildlife.alaska.gov/pubs/techpubs/research_pdfs/hab-mgt08final.pdf Accessed 30 August 2010.

SEATON, C. T. 2002. Winter foraging ecology of moose in the Tanana Flats and Alaska Range foothills. Thesis, University of Alaska Fairbanks.

VII. ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

In May 2010 as part of fieldwork in job 5a, T. Paragi gathered samples from the proposed subalpine burn sites for a UAF graduate student studying the role of fungal mycorrhizae on shrub and tree roots in post-fire re-establishment of woody vegetation near treeline.

K. Kellie has collaborated with J. Schmidt on projects associated with job 3a. They conducted a spatial analysis of moose harvest as a function of moose density, fire history, and distance from community and transportation corridor (e.g., road or river), and a manuscript is being finalized for submission to a peer-reviewed journal. K. Kellie and J. Schmidt also collaborated on an analysis of trends in the field transportation used to hunt moose statewide over time and space among different types of hunts and hunters, and a manuscript is in preparation.

VIII. RECOMMENDATIONS FOR THIS PROJECT

For job 1b we will conduct maintenance of snow gauges already deployed in Units 19A and 19D and will establish 10 additional snow gauges in Unit 21E during summer 2011 in concert with project 1.69 (T. Paragi and K. Kellie as co-investigators; "Movements and sightability of moose in Unit 21E"). We will also consult with a biometrician to critique our analysis and interpretation of the 2008 scalar sampling of snow depth. As part of job 1c we will work with a biometrician and the principal investigator of project 1.62 to analyze moose habitat selection in eastern Unit 19D during 3 winters of low–moderate snow depth in contrast with 1 winter of deep snow (80 cm) when moose calf survival was comparatively low. In FY 2011 we will conduct browse surveys in areas of current management needs (Units 20A, 20B, and 20C; job 2a) and continue twinning surveys in Unit 24B (job 2b). We will begin work on final technical reports and manuscripts (job 4a) and attempt to conduct the subalpine prescribed burn in spring 2011 (job 5a).

Prepared by: Thomas F. Paragi
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