

Wildlife Restoration
FINAL 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: AKW-23 FY18

PROJECT NUMBER: 34.0

PROJECT TITLE: Forest management and wildlife-habitat relationships in Interior Alaska

PERIOD OF PERFORMANCE: July 1, 2014 – June 30, 2018 (extended in FY2017 and FY2018)

REPORT DUE DATE: September 1, 2018

PRINCIPAL INVESTIGATOR: Thomas F. Paragi, Wildlife Biologist IV; Julie C. Hagelin, Wildlife Biologist III; and Scott M. Brainerd, Wildlife Biologist IV.

COOPERATORS: James Durst (ADF&G Habitat Division, retired) and Martha Freeman (Alaska Department of Natural Resources, Division of Forestry, retired)

I. SUMMARY OF WORK COMPLETED ON PROJECT

OBJECTIVE (1) Conduct a literature review that summarizes existing information about boreal wildlife and habitat that is applicable to forest management in Interior Alaska.

- a. How game and non-game species can positive or negatively impact tree regeneration and vegetative succession (e.g., seed predation and fungi dispersal via small mammals, herbivory by hares and moose).
- b. Methods for maintaining diverse communities of passerine songbirds and small mammals that potentially mitigate irruptions of defoliating insects while providing an important prey base for other trophic levels (furbearers and raptors).
- c. How forest practices may affect key game species in the Interior (black bears, furbearing mammals, gallinaceous birds, moose) or impact non-game Species of Greatest Conservation Need (SGCN; Alaska State Wildlife Action Plan, Appendix 7).
- d. Potential to design tree harvest and post-logging site treatments that mimic natural disturbance patterns and processes (e.g., wildland fire in uplands) that are perceived to influence the current patterns of wildlife diversity and abundance across the landscape. This will include a review of prescribed fire as a silvicultural treatment, typically for site preparation after harvest.

ACCOMPLISHMENTS: We reviewed scientific and agency information to better inform stakeholders on wildlife habitat issues and drafted an ADF&G wildlife technical bulletin now in revision following colleague review. The bulletin includes guidelines to inform coordination

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between the Alaska Department of Fish and Game (ADF&G) Divisions of Habitat and Wildlife Conservation and the Alaska Department of Natural Resources, Division of Forestry (DOF) in planning and monitoring the relationship of forestry practices and wildlife responses in boreal forest of Alaska. We expect improved coordination to help foresters and wildlife biologists, primarily in state management agencies of interior Alaska, to achieve the following goals:

- Maintain key ecological processes and services of forests that are beneficial to Alaska residents and promote resilience of forests to disturbance or other stressors, such as climate change;
- Clarify options and recommend approaches for achieving specific outcomes (i.e. forest products and wildlife ecosystem services) at stand and landscape scales as desired by the public and expressed in policy or planning documents;
- Facilitate forest regeneration following timber harvest;
- Inform the public and decision makers about tradeoffs in how forest practices (road expansion, timber harvest, and regeneration activities) can positively or negatively influence different wildlife species in managed boreal forest; and
- Monitor forest and wildlife responses to timber harvest to identify pragmatic, effective, and efficient management practices that can be implemented through adaptive management.

These voluntary best practices are described in a format of principles and guidelines for planning, implementing, and evaluating timber sales. The guidelines are constructive means for ADF&G and DOF to integrate timber harvest and conservation of wildlife habitat and species in managed forests. We consider best practices to be testable hypotheses that should be validated for the intended wildlife responses.

Citations were entered in an EndNote library that linked to PDF formats of published or scanned information. The EndNote library serves as a topic reference source that will be archived with project data and can be openly shared, but copyright protections prohibit electronic sharing of several peer-reviewed journal articles. The electronic file will be archived on the agency server WinfoNet under project 34.0.

OBJECTIVE (2) Use information from Objective 1 and patterns found in existing spatial data on forest vegetation and disturbance from fire and logging to design a framework for monitoring and adaptively managing forests and wildlife in areas where trees are commercially harvested in the Tanana Valley. We anticipate that monitoring design will require a series of steps and propose to begin the initial steps:

OBJECTIVE (2a): Identify habitat gradients within the existing landscape that include recently harvested stands. Examples include percentage of landscape harvested, stand type, volume of coarse woody debris, etc.

ACCOMPLISHMENTS: We contracted with a landscape ecologist through project 11.0 (State Wildlife Grant T-32-1, PI: Hagelin) to calculate common landscape indices (e.g., patch size, patch shape, nearest neighbor distance, edge density) using the DOF forest inventory for the Tanana Valley that includes stand cover type and tree diameter class (Hanson 2013). The inventory polygons were resampled to raster format for metric calculations using FRAGSTATS (McGarigal and Marks 1995). We had intended the

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exercise as a proof of concept to illustrate spatial patterns in habitat (e.g., interior vs. edge) and potential gradients over which to monitor species diversity or reproductive fitness. However, the detail required for explanations of example locations and wildlife species would have substantially lengthened the bulletin and potentially been distracting from main findings of the literature review. The spatial layers of calculated metrics will be archived with the project data for future scoping of monitoring design as questions on species, habitats, or locations may be formulated through a stakeholder process.

OBJECTIVE (2b): Design a pilot study aimed at describing patterns in wildlife conditions (e.g., songbird diversity) or effects (e.g., herbivory on trees) at extremes of habitat gradients to discern the range of existing conditions or effects correlated to habitat patterns in managed forests.

ACCOMPLISHMENTS: Through project 11.0 we planned a pilot study of songbird species diversity as a function of proximity distance to proportional degrees of harvested forest in the Standard Creek portion of the Tanana Valley State Forest. The area has some of the highest road and timber harvest density in the state forest because of its proximity to Fairbanks. We contracted a biometrician to estimate the sampling power (number of independent listening sites) necessary to detect differences in songbird species diversity based on variation in detection rate in similar habitats from other studies. The initial analysis suggested it would require ≥ 2 years of sampling, which was beyond the funding duration of project 11.0. This pilot study was not based on a species-specific need identified by the 2015 State Wildlife Action Plan or by stakeholders on the Citizens Advisory Committee for the Tanana Valley State Forest, so we felt the workload to seek additional funding and commit staff time was beyond the scope of our primary intent of a literature review. The pertinent details will be archived with the project data for potential use in future research planning as agency or stakeholder questions arise.

Additional Federal Aid-funded work not described above that was accomplished on this project

Hagelin's contributions for non-game species were supported under State Wildlife Grants T-21, project 25.0 and T-32-1, project 11.0. Paragi and Hagelin were invited to participate in a science and technical committee convened by the Alaska Board of Forestry to review reforestation standards for the boreal region. Participation in the committee involved five meetings in Fairbanks (two in 2014; three in 2015) and one teleconference. In 2014 we gave an oral presentation "Wildlife-vegetation interactions in regeneration of Alaska boreal forest" to the committee and separately gave it to the Board of Forestry in 2015. The standards were adopted by the Board in 2016 and were approved by the Legislature, and the habitat recommendations were incorporated into training materials for DOF staff and operators that implement timber sales. We gave a poster "Incorporating forest-wildlife interactions into reforestation guidelines for boreal Alaska" at the April 2017 meeting of the Alaska Chapter of The Wildlife Society in Fairbanks. We gave an oral summary of this project to the Alaska Board of Forestry in August 2018. Outreach publications that benefitted from our involvement in this project are listed above.

Recommendations for this project

Outreach to stakeholders on wildlife outcomes from past management actions will allow informed decisions on future actions. For example, mechanized logging and aggressive fire suppression in parts of Canada and Eurasia during the 20th Century generally led to reduced natural disturbance and decreased prevalence of late seral habitat features (e.g., dead wood) and to increasing fragmentation of natural vegetation patterns in forested landscapes. These trends had detrimental effects on some wildlife species, particularly where practices were extensive, affected relatively rare habitats, or affected species with limited distributions or specialized habitat requirements. Knowing this background can help society proactively avoid detrimental trends in habitat and wildlife during live timber harvest under sustained yield or post-disturbance salvage of dead wood in the Tanana Valley.

Now that project 34.0 is completed, within the scope of ongoing project 25.0 (forest habitat management; PI: Paragi) we will put key points from the technical bulletin into a concise brochure for public stakeholder outreach. We will also discuss the best practices with DOF staff and the Citizens Advisory Committee for the Tanana Valley State Forest to get feedback on how to best bring wildlife information to forest planning deliberations, operations, and monitoring. This may result in a future proposal for a Federal Aid project when priorities for research and monitoring are defined.

II. SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.

The project was extended 2 years because of invited PI involvement in a reforestation practices review that was complementary to Objective 1 (see section IV, Additional Federal Aid-funded work). Preliminary results from Objectives 2a and 2b were archived because further work to complete intended outcomes would have required additional time extensions (see section I).

III. PUBLICATIONS

Matsuoka, S.M., J.C. Hagelin, M.A. Smith, T.F. Paragi, A.L. Sesser, and M.A. Ingle. Pathways for avian science, conservation, and management in boreal Alaska. *Avian Conservation and Ecology* [*invited article in review*]

Paragi, T. P., J. C. Hagelin, and S. M. Brainerd. **2015**. Habitat guidelines for boreal forest management. *The Alaskan Wildlifer* (Alaska Chapter of The Wildlife Society), fall issue, p. 9-10. <[link](#)> (accessed 6 Mar. 2018)

Paragi, T. P., J. C. Hagelin, and S. M. Brainerd. 2016. Wildlife-reforestation interactions and adaptive management. Pages 122-186 *in* M. Freeman and J. Durst, editors. *Forest Resources and Practices, Region II-III Reforestation Review, Annotated Bibliography*. Department of Natural Resources, Forestry Science and Technical Committee. Document version August 30, 2016. <[Link](#)> (accessed 6 Mar. 2018)

Paragi, T. P., J. C. Hagelin, and S. M. Brainerd. Managing boreal forest for timber and wildlife in the Tanana Valley, Alaska. Wildlife Technical Bulletin ADF&G/DWC/WTB-2018-##
[revised draft in review with cooperator]

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

Problem or need that prompted this research

Interest in wood energy increased substantially during 2008-09 in response to a dramatic rise in fuel oil prices (AK Dept of Commerce 2016), coincident with \$1.1 billion in federal incentives for bioenergy projects in the Food, Conservation, and Energy Act of 2008 (Stubbs 2010). As a result, demand for wood increased substantially in interior Alaska and the Copper River basin (Alaska Energy Authority 2015; Alaska Division of Forestry 2007:21), including multiple private sector proposals for wood energy cogeneration facilities (heat and electricity) in the Tanana Valley of eastern Interior Alaska (Alaska Department of Commerce 2016). Cogeneration facilities require substantial feed stock and large, multi-year timber sale contracts. The Alaska Division of Forestry (DOF) responded to demand by revising its timber inventory to estimate the amount of biomass (i.e. equivalent wood volume or acres of timber type) that could be sustainably harvested in the Tanana Valley (Hanson 2013).

The sequence of events above illustrates an important problem: Demand for forest biomass has the potential to rapidly increase in the Tanana Valley when the price renewable energy becomes cost competitive with fuel oil or government policies change in ways that influence harvest levels for a range of wood uses. Supplying a greater demand for wood energy requires increased harvest areas and road building on public lands that are also important to local users of wildlife. The number of people participating in wildlife-related activities (consumptive and non-consumptive) continues to increase nationally in Alaska (U.S. Fish and Wildlife Service 2013). Wildlife resources are an important part of culture and the economy in Alaska (ECONorthwest 2014). These two demands (wood and wildlife) highlight the potential for competing interests in forest management. Proactive guidance for landscape-scale scoping of new timber sales and road access is needed during creation of the Five-Year Schedule of Timber Sales by DOF.

Review of prior research and studies in progress on the problem or need

The Alaska Forest Resources and Practices Act (FRPA: Alaska Statute 41.17) requires that consultations occur between ADF&G and DOF during the planning and operational design of timber sales, roads, and reforestation activities to ensure conservation of fish habitat and water quality. Existing guidance for wildlife habitat is vague: “allowance shall be made for important fish and wildlife habitat” (AS 41.17.060(c)(7)). Past examples of ADF&G guidance to DOF focused at the stand-scale. And included: (1) methods to enhance early-seral woody habitat for game like moose, hares, and grouse, (2) retention of late-seral features such as snags, cavity trees, and dead wood for nesting, resting, and foraging habitat for birds and smaller mammals, and (3) mimicking natural disturbance by creating irregular cut borders along stand edges (Collins 1996, Haggstrom and Kelleyhouse 1996, Paragi and Haggstrom 2007, Paragi 2009, 2010).

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- Alaska Division of Forestry. 2007. Annual report. Alaska Department of Natural Resources. 70 p.
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