ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
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Alaska Department of Fish and Game
State Wildlife Grant

Grant Number: **T-3** **Segment Number: 1**

Project Number: **5.11**

Project Title: Ecology of boreal owls (*Aegolius funereus*) in Interior Alaska

Project Duration: July 1, 2006 – June 30, 2008

Report Period: July 1, 2007 – June 30, 2008

Report Due Date: September 30, 2008

Principal Investigator: Jackson Whitman, Alaska Department of Fish and Game

I. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH

Boreal Owls are considered one of Alaska's Species of Greatest Conservation Needs (CWCS Appendix 7. Nominee Species List, page 20). They also are considered a species of conservation priority by Boreal Partners In Flight based on the potential for negative responses to loss of forest cover, with lost nesting cavities taking centuries to be replaced naturally following forest removal. In developing Alaska's CWCS, species experts noted the lack of knowledge about population status and trends, and that current broad-scale bird surveys do not effectively monitor forest owls. In addition, the statewide Management Plan for Alaska Raptors (USFWS, 2001) noted that numbers and trends of Boreal Owls in Alaska are unknown. This project addresses all or parts of the issues and conservation actions noted in Alaska's CWCS (Raptor Section, Forest Owl Template, Appendix 4, pages 263 – 264).

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

Habitat quality is vitally important in maintaining naturally-occurring ecosystems. Often, demise of upper trophic level predator populations suggests a catastrophic change in the entire ecosystem. Through systematic research on owl populations subjected to differing habitat alterations, future changes to boreal ecosystems may be able to be predicted and mitigated. Preliminary work was conducted on a population of boreal owls in western interior Alaska from 1995-1998. Baseline data were collected on diets, growth rates of nestlings, nesting habitat and site preferences, predation, and nesting densities in upland black spruce and river floodplain white spruce/balsam poplar/paper birch habitats. Because of logistical constraints, efforts to understand boreal owl population dynamics were shifted to areas near Fairbanks during spring 2004.

Currently, many management agencies across North America are undertaking nocturnal monitoring programs for owls. Although these efforts have added greatly to knowledge of distribution, singing rates, and habitat affinities, little research has been conducted specifically on boreal owls. It has been postulated that annual variance in calling owls

reflects breeding population changes, and thus, trends may be inferred. This, however, has never been tested. Through the use of a combination of nocturnal singing (hooting) routes and artificial nesting boxes, we are attempting to understand the relationship between singing rates and subsequent breeding/reproductive activity.

Because of access constraints in other areas (lack of all-weather roads), this research is being conducted within a 100-mile radius around Fairbanks, and includes efforts on the Steese, Elliot, and Parks Highways, as well as Cache Creek, Standard Creek, and Nenana Ridge logging roads. These areas have provided reasonable access, as well as providing a variety of interior Alaska forest habitats to assess population dynamics over a broad scale. Recent wildfires have burned a large portion of the Steese Highway route, and ongoing commercial logging efforts in the Standard Creek area are providing boreal owl data under dramatically changing habitat conditions.

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

OBJECTIVE 1: Establish protocol and conduct spring listening surveys for boreal owls, great horned owls, and great gray owls in Interior Alaska.

The methods section of the attached paper by Whitman and Pendleton, Factors affecting boreal and great horned owl hooting surveys in Alaska that is in review for publication in the Journal of Raptor Research, describes protocol implemented for listening surveys.

OBJECTIVE 2: Establish nest boxes along accessible transects to evaluate feasibility of spring listening surveys for determining owl nesting abundance.

Survey routes (n=10) were situated along primary or secondary roads within 150 km of Fairbanks, Alaska. The attached paper provides survey results.

OBJECTIVE 3: Assess annual productivity of nesting boreal owls throughout an array of habitat types.

The attached paper provides survey results.

OBJECTIVE 4: Data analysis, writing of reports and articles, travel, presentation of papers.

The attached papers provide survey results. See the below publications list, as the two papers that are in review in Appendix 1 and 2.

IV. MANAGEMENT IMPLICATIONS

Prior to this project relatively little was known about the Boreal Owl in North America. This project greatly improves our understanding of factors that affect success in monitoring boreal owl populations through the detection and numeration of owl calls. Some months and times of day have consistently higher detection rates. Air temperature is an important factor, whereas relative humidity, barometric pressure and trend, moon phase, and cloud cover failed to influence calling rates. Nocturnal listening greatly underestimated actual numbers of nesting boreal owls.

Boreal owl breeding ecology was also examined, including nesting time, hatching rate, egg weight, nestling growth rate, nest area fidelity, and nestling mortality factors.

Additionally, we presented data to suggest a surrogate technique to estimate numbers of post-fledgling boreal owls based on prey detritus mass. The dried mass of the prey detritus brick may be a surrogate method for estimating the number of young that were fledged from a particular nest box. In the publication we suggested further testing of this technique for Boreal Owls and other Strigidae species.

V. SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN FOR LAST SEGMENT PERIOD ONLY (July 1, 2007 – June 30, 2008)

JOB/ACTIVITY 1A: Conduct spring listening surveys.

Based on a modified version of the western Canadian protocol, we established 8 nocturnal listening routes. During mid-February through April of each year, routes were systematically completed under a variety of environmental conditions. At least 500 point-counts were completed each spring. Frequency and precise location of each singing owl were carefully recorded on field forms. Based on data collected, we produced a manuscript entitled: Whitman, J.S. and G.W. Pendleton. (*in review*). Factors affecting boreal and great horned owl hooting surveys in Alaska. Journal of Raptor Research. Submitted 18 June 2007. See Appendix 1.

JOB/ACTIVITY 2C: Banding. All attending adult female owls will be captured, weighed, and banded each spring. Fledgling young will also be captured and banded within one week of departing nests. Data on longevity, site attentiveness, and first breeding (maturity) will be gathered through subsequent captures of banded birds.

During 2007, 120 nest boxes were available. See Appendix 2.

JOB/ACTIVITY 3A: Assess annual productivity of boreal owls using nest boxes. Compare and contrast productivity data between years and among various habitat types. Attempt to assess differences in productivity between areas modified by wildfire or by anthropogenic alterations.

During 2007, 120 nest boxes were available. See Appendix 2.

JOB/ACTIVITY 3B: Collect data on prey diversity and abundance. Prey remains will be recorded at each nest visit. Following nesting, prey detritus "bricks" will be collected and analyzed for prey content and numbers. Annual indices of small mammal distribution and abundance indices will be gathered through establishment of snap-trap lines in various habitats. Correlations between prey enumerated from nests and those captured during small mammal trapping will be completed. The relationship between prey indices and annual boreal owl productivity will be investigated.

Field work was completed in 2006. See: Whitman, J.S. 2008. Post-fledging estimation of annual productivity in boreal owls based on prey detritus mass. Journal of Raptor Research 42(1):58-60.

JOB/ACTIVITY 4A: Analyze data and prepare reports.

Data analyses and reports were completed during this reporting period.

JOB/ACTIVITY 4B: Share findings with working groups and agency managers, present at professional meetings and conferences, publish reports including peer-reviewed journals as appropriate.

See 2008 publication and appendices.

VI. PUBLICATIONS

Whitman, J.S. (in preparation) Boreal owl breeding ecology in interior Alaska. Currently being prepared for submission to The Journal of Raptor Research (Appendix 2).

Whitman, J.S. 2008. Post-fledging estimation of annual productivity in boreal owls based on prey detritus mass. Journal of Raptor Research 42(1):58-60.

Whitman, J.S. 2001. Diets of nesting boreal owls, *Aegolius funereus*, in western interior Alaska. Canadian Field-Naturalist 115(3):476-479.

Whitman, J.S. 2007. Boreal owl photo entitled “Parental Duties”. National Wildlife Magazine 45(4):58.

Whitman, J.S. and G.W. Pendleton. (in review) Factors affecting boreal and great horned owl hooting surveys in Alaska. Journal of Raptor Research. Submitted 18 June 2007 (Appendix 1).

Whitman, J.S. (in review) Diet and prey consumption rates of nesting boreal owls, *Aegolius funereus*, in Alaska. Canadian Field-Naturalist. Submitted 17 September 2007.

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