ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 25526
Juneau, AK 99802-5526

STATE WILDLIFE GRANT (SWG)

STATE: Alaska **GRANT AND SEGMENT NR.:** T-1-8
PROJECT NR.: 6.0

WORK LOCATION: Juneau and Ketchikan

PROJECT DURATION: 1 July 2002 – 30 June 2003

PROJECT REPORTING PERIOD: 1 July 2002 – 30 June 2003

PROJECT TITLE: Interagency goshawk study on the Tongass National Forest: technical assistance, analysis, and dissemination of results.

Project Objectives:

1. Continue analysis of data collected from 1991 – 1999 and prepare manuscripts on these topics:
    a. Goshawk morphology as related to the status of the Queen Charlotte goshawk (*Accipiter gentilis laingi*);

    b. Description of nest site habitat; and

    c. Estimation of goshawk survival rates based on radiotagged birds.

2. Acquire a more complete sample of habitat data at goshawk nest sites, including (a) collecting samples from more goshawk nest sites; and (b) acquiring and analyzing fixed plot habitat data from the USFS.

Summary of Project Accomplishments:

1. We completed analyses listed in objectives and are in the process of finalizing manuscripts. Some delay in manuscript completion (i.e., publication) will result from processes associated with publication in peer-review journals.

    a. A manuscript on morphology of goshawks from Southeast Alaska and Vancouver Island was presented at the International Symposium on the Ecology and Management of the Northern Goshawk held during the 2003 Annual Meeting of the Raptor Research Foundation in Anchorage, Alaska (Appendix 1). This manuscript is scheduled for publication in the proceedings from that symposium. Funding is being acquired for those proceedings and manuscripts will be assembled by the December 2003 with a tentative publish date of Winter 2004.

    b. A manuscript on northern goshawk nest site habitat data was presented at the North American Ornithological Conference in New Orleans, LA. These data

were then combined with data from a U.S. Forest Service dataset to look at goshawk nesting area preferences. This combined manuscript was presented at the International Symposium on the Ecology and Management of the Northern Goshawk held during the 2003 Annual Meeting of the Raptor Research Foundation in Anchorage (Appendix 2). This manuscript is scheduled for publication in the proceedings from that symposium. Funding is being acquired for those proceedings and manuscripts will be assembled by the December 2003 with a tentative publish date of Winter 2004.

c. A manuscript on northern goshawk survival rates based on radiotagged birds was prepared for the North American Ornithological Conference in New Orleans, LA (Appendix 3). This manuscript is being readied for submission to a peer-reviewed journal.

2. We acquired a more complete sample of habitat data from goshawk nest sites in Southeast Alaska.

   a. We acquired vegetation data at 5 nesting areas during the 2002 field season, including 3 additional nest stands and 5 nest trees. This brings the total to 24 nesting areas within which 33 nest sites and 42 nest trees are described.

   b. We acquired and analyzed habitat data from the U.S. Forest Service's Permanent Plot Grid Database. We used this dataset to generate a sample of random points (n = 479) located throughout the Tongass National Forest to compare with northern goshawk nesting area data to better describe goshawk nesting habitat and understand goshawk selection of certain forest attributes (Appendix 2).

Project Costs: Federal share $24,700 + state share $8,200 = total cost $32,900

Prepared By: Kim Titus, Principal Investigator

Date: 27 August 2003

Appendix 1. Abstract of manuscript on northern goshawk morphology.

SIZE AND COLOR VARIATION OF NORTHERN GOSHAWKS FROM SOUTHEAST ALASKA AND VANCOUVER ISLAND

CRAIG J. FLATTEN, Alaska Department of Fish and Game, Division of Wildlife Conservation, 2030 Sea Level Drive, #211, Ketchikan, AK 99901, USA. ERICA L. MCCLAREN, Ministry of Water, Land, and Air Protection, 2080 Labieux Road, Nanaimo, BC, Canada V9T 6J9.

Two subspecies of Northern Goshawk, hereafter goshawk, are currently recognized in North America on the basis of body size and plumage color: *Accipiter gentilis laingi* and *A. g. atricapillus*. The validity of these subspecies is questionable because descriptions were based on small sample sizes and included museum specimens and wintering individuals. Therefore, we compared size and plumage characteristics from live, breeding adult and juvenile goshawks from relatively large datasets in southeast Alaska (AK) and Vancouver Island (VI). Between 1992-2000 and 1994-2001, adult and juvenile goshawks were trapped at or near 42 and 43 nesting areas in AK and VI, respectively. We collected standard morphological data from trapped individuals. We compared size within age and sex groupings between AK and VI and assessed phenotypes of goshawks within AK, VI, and other western North American study areas. Culmen length, wing chord, hind claw length and mass reflected size (PC1) while tail length, hind claw length and tarsus width reflected shape (PC2) in adult male and female goshawks. VI adults were significantly smaller than AK adults for several PC1 size variables. Individuals from coastal islands in AK were not significantly different in size from individuals from mainland AK. VI males had significantly smaller mean wing chords than males in AK, central British Columbia, Yukon, Olympic Peninsula, Washington, northeast Oregon, and northern Arizona. Our results generally support earlier descriptions of *A. g. laingi* as smaller and darker than cogenerics from other regions of western North America, and confirm the existence of clinal size variation among goshawks of the Pacific Northwest Coast. Inconsistent with earlier studies, we observed a broader range of phenotypes among adults and juveniles for *A. g. laingi*, and found that overall only one-third of individuals from our study areas clearly had dark phenotype Taverner (1940) described as distinct for this race.

Appendix 2. Abstract of manuscript on northern goshawk nesting areas habitat preferences.

NESTING AREA PREFERENCES OF NORTHERN GOSHAWKS (*ACCIPITER GENTILIS LAINGI*) IN SOUTHEAST ALASKA

STEPHEN B. LEWIS and KIMBERLY TITUS, Alaska Department of Fish and Game, Division of Wildlife Conservation, P.O. Box 240020, Douglas, AK 99824, USA. CRAIG J. FLATTEN, Alaska Department of Fish and Game, Division of Wildlife Conservation, 2030 Sea Level Drive, Suite 205, Ketchikan, AK 99901, USA.

We studied northern goshawk nesting area preferences in the temperate rainforests of southeast Alaska. First, we systematically described and quantified goshawk nesting area characteristics at three spatial scales: nest tree, nest site, and nest stand. Next, we assessed nesting area preference by comparing goshawk nest stands with a sample of available forested points. We measured nest and nest tree characteristics at 37 nest trees in 22 nesting areas and measured habitat characteristics at 30 nest sites and nest stands from 21 nesting areas. Goshawks selected the location of their nests at different spatial scales based on forest structure. At the stand scale, goshawks nested in large volume, western hemlock (*Tsuga heterophylla*) dominated forests with relatively dense canopy and shrub layer. Within those stands, nest sites occurred in forest patches containing larger trees on average and an overall higher volume forest, predominately western hemlock. Nest trees were either Sitka spruce (*Picea sitchensis*) or western hemlock, were larger than those around them in the nest site (mean DBH ± SE; 68.7 ± 3.7 cm vs. 47.4 ± 3.4 cm), and were either dominant or codominant in the forest canopy. Goshawk nest stands contained larger trees (35.5 ± 0.4 cm vs. 30.2 ±0.1cm), greater basal area, and fewer trees/ha than available sites. Forest managers in southeast Alaska can ensure that goshawks have nesting habitat into the future by preserving high volume timber stands with large trees and relatively dense canopy.

Appendix 3. Abstract of manuscript on northern goshawk survival.

NORTHERN GOSHAWK SURVIVAL RATES ~~ TONGASS NATIONAL FOREST, ALASKA

KIM TITUS, CRAIG FLATTEN, GREY PENDLETON, RICH LOWELL, AND STEVE LEWIS, Alaska Department of Fish and Game, Division of Wildlife Conservation, Douglas and Ketchikan

Few studies have estimated northern goshawk survival rates (*Accipiter gentilis*). We used radiotelemetry to estimate goshawk survival rates by following adults from 1992 – 2000. Using data from 31 male and 32 female goshawks, we estimated survival by month using program MARK. Mean annual survival of males was 0.59 (SE = 0.10) but was not constant across months, with most male mortalities occurring in late winter. Mean annual survival of females was not constant across months or groups. Resident females had lower survival than movers. Survival estimates for males are among the lowest reported for the species. Possible explanations include transmitter impacts and types of transmitters (tailmounts and 1 – year backpacks on males versus mostly 2 – year backpacks on females). For females, the model that separated movers, residents and first year tagged birds suggests differences among groups. Females that exhibit breeding dispersal among years had much higher survival than females that remained in the same home across years, however part of this analysis is confounded by differing prey on some islands.

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
Juneau, AK 99811-5526

Alaska Department of Fish and Game
State Wildlife Grant

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

Project Number: **5.10**

Project Title: The population status and trend of peregrine falcons, gyrfalcons and other raptors in western and northwestern Alaska (Region V)

Project Duration: July 1, 2006 – June 30, 2010

Report Period: 1 July 2006 – 30 June 2007

Report Due Date: September 30, 2007

Partner: Alaska Department of Fish and Game

Project Objectives

OBJECTIVE 1: Conduct, or cooperate with other investigators to complete population and production surveys (monitoring) of cliff-nesting raptors in selected areas on a scheduled rotational basis.

OBJECTIVE 2: Assess contaminant levels by analyzing opportunistic collections of addled eggs and other tissues located or found during production surveys. Note: laboratory analysis is coordinated by US Fish and Wildlife Service and often takes extended time and analysis will be completed when lab results are received.

OBJECTIVE 3: Collect 20 or more molted feathers from separate nesting areas of gyrfalcons (and other species as needed) to contribute to the State-wide effort to investigate genetic variation in gyrfalcons populations on a circumpolar basis.

OBJECTIVE 4: Evaluate the long-term potential for monitoring raptors in the area by comparing current population statistics with historical records.

Summary of Project Accomplishments

OBJECTIVE 1: Survey Area Schedule:

Lower Yukon River – last surveyed in 2004; scheduled for survey in June 2009
Southern Seward Peninsula – surveyed in June 2007; scheduled for June 2008
Norton Sound Coastline – scheduled for survey in 2010
DeLong Mountains – not surveyed; not scheduled due to difficult logistics
Northwest Alaska – scheduled for survey in July 2007
Sagavanirktok River – last surveyed in 2002; not scheduled due to low staffing

Summary of Southern Seward Peninsula: Aerial surveys of the Southern Seward Peninsula study area were conduced in June 2007 using a R-44 helicopter for a total of 19.8 hours of flight. The area surveyed was the same as 2006 and included areas extending approximately 75 km east, 65 km west, and 140 km north of Nome

(approximately 16,000 km^2). Previously mapped nest sites (N=543) and new sites within the survey area (N=57) were checked for occupancy by slow-speed fly-by survey techniques using GPS navigation to move from site to site. No landings or ground inspections were made during the survey. Total nest site occupancy (raptors attending nest sites or nests with eggs/young) was documented as follows: Common Raven – 35; Golden Eagle – 19; Goshawk – 0; Gyrfalcon – 41; Peregrine Falcon – 6; Rough-legged Hawk – 41; additionally, Canada Goose occupied 2 nest cliffs. Total raptor abundance (including ravens) was 142 nest sites, yielding an approximate occurrence of 1 pair per 113 km^2. Classification of 458 vacant sites was not completed during the reporting period. Nesting success was variable among species: Golden Eagles were distributed similarly to previous years with 2 nestlings in many nests; Gyrfalcons experienced a wide range in hatching (about 40 days) and smaller than average brood sizes; Rough-legged Hawks were often attending cliffs without successful nests; Peregrine Falcons were distributed similarly to previous years.

OBJECTIVE 2: Since nest sites were not visited during annual aerial surveys, tissue samples for contaminants were not collected during the reporting period.

OBJECTIVE 3: Since nest sites were not visited during annual aerial surveys, feather samples for genetic analysis were not collected during the reporting period.

OBJECTIVE 4: Progress was made towards compiling historical and current records from two survey areas (Seward Peninsula and Northwest Alaska) into a comprehensive database to allow comparative analysis of raptor occupancy. Evaluation of trends of raptor occupancy will be possible once regional comprehensive data are summarized.

Prepared by: Peter Bente

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
Juneau, AK 99811-5526

Alaska Department of Fish and Game
State Wildlife Grant

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

Project Number: **5.10**

Project Title: The population status and trend of peregrine falcons, gyrfalcons and other raptors in western and northwestern Alaska (Region V)

Project Duration: July 1, 2006 – June 30, 2010

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

Report Due Date: September 30, 2008

Principal Investigator: Peter Bente, Alaska Department of Fish and Game

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Project Objectives:

OBJECTIVE 1: Conduct, or cooperate with other investigators to complete population and production surveys (monitoring) of cliff-nesting raptors in selected areas on a scheduled rotational basis.

OBJECTIVE 2: Assess contaminant levels by analyzing opportunistic collections of addled eggs and other tissues located or found during production surveys. Note: laboratory analysis is coordinated by US Fish and Wildlife Service and often takes extended time and analysis will be completed when lab results are received.

OBJECTIVE 3: Collect 20 or more molted feathers from separate nesting areas of gyrfalcons (and other species as needed) to contribute to the State-wide effort to investigate genetic variation in gyrfalcons populations on a circumpolar basis.

OBJECTIVE 4: Evaluate the long-term potential for monitoring raptors in the area by comparing current population statistics with historical records.

Summary of Project Accomplishments:

OBJECTIVE 1: Survey Area Schedule:
Lower Yukon River – last surveyed in 2004; scheduled for survey in June 2009
Southern Seward Peninsula – surveyed in June 2007; scheduled for June 2008
Norton Sound Coastline – scheduled for survey in 2010
DeLong Mountains – not surveyed; not scheduled due to difficult logistics
Northwest Alaska – scheduled for survey in July 2007
Sagavanirktok River – last surveyed in 2002; not scheduled due to low staffing

Lower Yukon River: not surveyed during reporting period.
Southern Seward Peninsula: Comprehensive aerial surveys of the Southern Seward Peninsula study area were conduced in June 2008 using an R-44 helicopter for a total of 19.7 hours of flight. The area surveyed was the same as 2007 and included areas extending approximately 75 km east, 65 km west, and 140 km north of Nome

(approximately 16,000 km^2). Previously mapped nest sites (N=613) and new sites within the survey area (N=22) were checked for occupancy by slow-speed fly-by survey techniques using GPS navigation to move from site to site. No landings or ground inspections were made during the survey. A summary of total nest site occupancy (raptors attending nest sites or nests with eggs/young) and classification of potential habitat was not completed during the reporting period. Overall, total raptor abundance (including ravens) was very similar to previous years for Common Raven, Golden Eagle and Gyrfalcon. A few species (Goshawk, Peregrine Falcon, Rough-legged Hawk) showed notable increases in abundance compared to 2007 surveys. Opportunistic observations of ground-nesting raptors (Northern Harrier and Short-eared Owl) and jaegers showed increased numbers during the 2008 nesting season, indicating a year with abundant microtine and small mammal prey.

Replicate surveys of historic Gyrfalcon nest sites were completed by two observers in each of three reference areas for a total of nine surveys to evaluate/estimate sightability rates for different observers. The replicate study areas were located within the Comprehensive survey area described above and surveys were completed on 24 – 27 June during 19.5 hours of flight using a R-44 helicopter. Analysis of data is on-going and will be used to estimate Gyrfalcon population size with statistical confidence.

Norton Sound Coastline: not surveyed during reporting period.

De Long Mountains: not surveyed during reporting period.

Northwest Alaska: Aerial surveys in the Northwest Alaska study area were conducted in July 2007 using PA-18 fixed-wing aircraft for a total of 26.0 hours of flight time. Survey area coverage included Eagle Creek (465 km^2), Kokolik River (1768 km^2), Kukpowruk River (1768 km^2), Pitmegea River (1117 km^2), and Utukok River (2420 km^2). Compared to the previous surveys, approximately 86% of the entire study area was surveyed, only the Ipewik River (1210 km^2) was not completed in 2007. Total survey coverage in 2007 was approximately 7540 km^2. Previously mapped nest sites (N=806) within the survey area were checked for raptor occupancy by slow-speed fly-by survey techniques using GPS navigation to move from site to site. Primarily, surveys follow the major rivers of the area although off-river sites are checked when suitable habitat is visible from river survey routes. No landings or ground inspections were made during the survey. Total nest site occupancy (raptors attending nest sites or nests with eggs/young) was documented as follows: Common Raven – 13; Golden Eagle – 47; Gyrfalcon – 24; Merlin – 2; Peregrine Falcon – 14; Rough-legged Hawk – 54. Total raptor abundance (including ravens) was 154 nest sites, yielding an approximate occurrence of 1 pair per 49 km^2. Classification of 548 sites of potential raptor habitat was documented as follows: cliff without color – 55; cliff with color – 95; cliff with rock ledge – 12; cliff with sticknest – 171; cliff with fallen sticknest or scar – 4; cliff with white-wash – 75; river cutbank with soil – 134; river cutbank with gravel – 2. Nesting success was variable among species: Common Ravens were underestimated because most nests had fledged by July; Golden Eagles were widely distributed with greater success in eastern locations; Gyrfalcons were low in number with small broods; Merlins were present at two cliffs with unknown success; Peregrine Falcons were found at an increased number of sites; Rough-legged Hawks were

moderately abundant with average broods (n=3-5);. Surveys are scheduled for July 2009 following caribou census work in the region.

Sagavanirktok River: not surveyed during reporting period.

OBJECTIVE 2: Since nest sites were not visited during annual aerial surveys, tissue samples for contaminants were not collected during the reporting period.

OBJECTIVE 3: Since nest sites were not visited during annual aerial surveys, feather samples for genetic analysis were not collected during the reporting period.

OBJECTIVE 4: Progress was made towards compiling historical and current records from two survey areas (Seward Peninsula and Northwest Alaska) into a comprehensive database to allow comparative analysis of raptor occupancy. Evaluation of trends of raptor occupancy will be possible once regional comprehensive data are summarized.

Prepared By: Peter Bente, Survey and Inventory Coordinator, Region V

Date: September 4, 2008

FEDERAL AID
INTERIM 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
State Wildlife Grant

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

Project Number: 5.10

Project Title: The population status and trend of peregrine falcons, gyrfalcons and other raptors in western and northwestern Alaska (Region V)

Project Duration: July 1, 2006 – June 30, 2011

Report Period: July 1, 2008 –June 30, 2009

Report Due Date: September 30, 2009

Partner: Alaska Department of Fish and Game

Project Objectives:

OBJECTIVE 1: Conduct, or cooperate with other investigators to complete population and production surveys (monitoring) of cliff-nesting raptors in selected areas on a scheduled rotational basis.

OBJECTIVE 2: Assess contaminant levels by analyzing opportunistic collections of addled eggs and other tissues located or found during production surveys. Note: laboratory analysis is coordinated by US Fish and Wildlife Service and often takes extended time and analysis will be completed when lab results are received.

OBJECTIVE 3: Collect 20 or more molted feathers from separate nesting areas of gyrfalcons (and other species as needed) to contribute to the State-wide effort to investigate genetic variation in gyrfalcons populations on a circumpolar basis.

OBJECTIVE 4: Evaluate the long-term potential for monitoring raptors in the area by comparing current population statistics with historical records.

Summary of Project Accomplishments:

OBJECTIVE 1: Conduct, or cooperate with other investigators to complete population and production surveys (monitoring) of cliff-nesting raptors in selected areas on a scheduled rotational basis.

Survey Area Schedule:

Lower Yukon River – last surveyed in 2004; not scheduled due to low staffing
Southern Seward Peninsula – surveyed in June 2009
Norton Sound Coastline – scheduled for survey in 2010
DeLong Mountains – not surveyed or scheduled due to difficult logistics
Northwest Alaska – scheduled for survey in July 2009
Sagavanirktok River – last surveyed in 2002; not scheduled due to low staffing

Southern Seward Peninsula (survey summary): Comprehensive aerial surveys of the Southern Seward Peninsula study area were conducted in June 2009 using a R-44 helicopter for a total of 19.2 hours of flight. The area surveyed included areas extending approximately 75 km east, 65 km west, and 140 km north of Nome (approximately 16,000 km^2). Previously mapped nest sites (N=607) and new sites within the survey area (N=22) were checked for occupancy by slow-speed fly-by survey techniques using GPS navigation to move from site to site. Except for selected gyrfalcon nesting sites (Objective 3), no landings or ground inspections were made during the survey.

Total nest site occupancy (raptors attending nest sites or nests with eggs/young) was documented as follows: common raven – 47; golden eagle – 32; goshawk – 1; great-horned owl – 1; gyrfalcon – 36; peregrine falcon – 5; rough-legged hawk – 111. Total raptor abundance (including ravens) was 233 nest sites, yielding an approximate occurrence of 1 pair per 68 km^2. Classification of 374 sites of potential raptor habitat was documented as follows: cliff without color – 56; cliff with color – 64; cliff with rock ledge – 17; cliff with sticknest – 137; cliff with fallen sticknest or scar – 44; cliff with white-wash – 9; river cutbank with soil – 1; man-made structures - 6. Overall, total raptor abundance (including ravens) was very similar to previous years for common raven, golden eagle and gyrfalcon. Rough-legged hawks were abundant with large broods (n=5-7) in response to high numbers of small mammals. Two species (goshawk, great-horned owl) were present at only 1 site each, and merlins were not detected on the survey.

Replicate surveys of 147 historic gyrfalcon nest sites were completed by three observers on separate R-44 helicopter flights to evaluate/estimate sightability rates for different observers. The replicate study sites were located within the Comprehensive survey area described above and surveys were completed in June 2009 during 15.5 hours of flight using a R-44 helicopter. Analysis of data is on-going and will be used to estimate gyrfalcon population size with statistical confidence.

Northwest Alaska (survey preparation): Preparation for aerial surveys was completed during the reporting period. Over 800 previous locations were moved into GPS format with flight routes scheduled for July 2009 along the following rivers in the study area: Eagle Creek (465 km^2), Ipewik River (1210 km^2), Kokolik River (1768 km^2), Kukpowruk River (1768 km^2), Pitmegea River (1117 km^2), and Utukok River (2420 km^2).

OBJECTIVE 2: Assess contaminant levels by analyzing opportunistic collections of addled eggs and other tissues located or found during production surveys.

No tissue samples were collected for contaminant analysis during the reporting period.

OBJECTIVE 3: Collect 20 or more molted feathers from separate nesting areas of gyrfalcons (and other species as needed) to contribute to the State-wide effort to investigate genetic variation in gyrfalcons populations on a circumpolar basis.

Feathers were collected from 5 Gyrfalcon nest sites for genetic analysis. Also, feather samples from 2 Gyrfalcons taken as falconry birds from the survey area (in previous years) were added to the feather collections.

OBJECTIVE 4: Evaluate the long-term potential for monitoring raptors in the area by comparing current population statistics with historical records.

Progress was made towards compiling historical and current records from two survey areas (Seward Peninsula and Northwest Alaska) into a comprehensive database to allow comparative analysis of raptor occupancy. All records collected from Northwest Alaska in 1989, 1999, 2002, and 2007 were compared to Google Earth locations of landforms and compiled into annual survey summaries. Similar work was completed for Seward Peninsula surveys in 2007 and 2008. Evaluation of trends of raptor occupancy will be possible once regional comprehensive data are summarized.

Significant Deviations: None.

Prepared By: Peter Bente

FEDERAL AID
INTERIM 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
State Wildlife Grant

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

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: 1 July 2006 – 30 June 2007

Report Due Date: September 30, 2007

Partner: Alaska Department of Fish and Game

Project Objectives

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

JOB/ACTIVITY A: Conduct spring listening surveys. Based on the western Canadian protocol, we established 8 nocturnal listening routes. During mid-February through April of each year, routes are systematically completed under a variety of environmental conditions. At least 500 point-counts are completed each spring. Frequency and precise location of each singing owl are carefully recorded on field forms.

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

JOB/ACTIVITY A: Establish nest boxes along transects. Over 100 nest boxes appropriate for boreal owl use have been established along boreal owl nocturnal singing routes. Maintenance of boxes is ongoing. We will attempt to correlate singing route data with subsequent breeding activity (proportion of use of nest boxes).

JOB/ACTIVITY B.: Collect nest box data on reproductive success/productivity. All nest boxes will be visited at least twice each spring (late April-early May) to assess proportion of use. Active nest boxes will be visited weekly throughout the brood-rearing season in an effort to record timing of egg-laying and subsequent hatching dates. Number of eggs produced, hatching success, and fledging success will be evaluated at each successful box.

JOB/ACTIVITY C: 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.

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

JOB/ACTIVITY A: 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.

JOB/ACTIVITY B: 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.

JOB/ACTIVITY C: Collect data on habitat types and correlate prey abundance and productivity of owls to habitats. Each nest box will be evaluated by conducting a $1/100^{th}$-acre timber stand exam. Productivity will be evaluated based on site characteristics (slope, aspect, elevation, forest type, forest age, understory characters, habitat alterations such as logging, wildfire history, etc.).

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

JOB/ACTIVITY A: Analyze data and prepare reports.

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

Summary of Project Accomplishments

OBJECTIVE 1:

JOB/ACTIVITY A: During February-April 2007, 8 owl survey routes were completed by biologists and volunteers. A total of 210 point counts were amassed, with 39 great horned owls (*Bubo virginianus*), 55 boreal owls (*Aegolius funereus*), 2 great gray owls (*Strix nebulosa*), and 2 northern hawk owls (*Surnia ulula*)detected. Unseasonably cold nights and uncharacteristic winds severely curtailed or hampered survey efforts.

OBJECTIVE 2:

JOB/ACTIVITY A: One hundred nineteen nest boxes were available for use during spring 2007. Of those, 38 were occupied by boreal owls (32% occupancy rate). Correlation analyses of singing rates and box occupancy rates are in progress.

JOB/ACTIVITY B: Over 350 nest box visits occurred during spring 2007. Thirty-eight occupied nest boxes produced 200 eggs (mean of 5.26 eggs/clutch). Hatching rates were high, with a mean of 4.9 hatchlings/clutch, with number of owlets surviving to fledging at 3.7 (or 4.2 fledglings per successful brood). These statistics are

significantly higher than that observed during 2006. Timing of egg-laying was significantly earlier than 2006 as well, with a mean laying date of 13 April (versus 26 April in 2006).

JOB/ACTIVITY C: Banding at nests was successful during 2007. A total of 80 fledglings and 30 adult female boreal owls were banded, and an additional 8 adult females were recaptured from previous bandings.

OBJECTIVE 3:

JOB/ACTIVITY A: Annual productivity was assessed at all occupied nest boxes. Data analyses are ongoing in an attempt to assess differences in box occupancy and success rates between different box routes and habitat types.

JOB/ACTIVITY B: During nest box visits in 2007, 795 prey items of 16 species were recorded. As with prior years' data, arvicoline rodents formed the vast bulk of the diet, with passerines being secondary. Eight prey detritus "bricks" from occupied nest boxes used during 2006 were analyzed as well. A manuscript entitled "Post-fledging determination of annual productivity in boreal owls based on prey detritus mass" was accepted for publication in the Journal of Raptor Research. During August and September 2006, 1,233 trapnights on 8 standardized small mammal traplines resulted in the capture of 77 individuals of 6 species. Overall, catch per unit effort declined significantly, indicating that prey availability for boreal owls was low (40% and 6% in 2005 and 2006, respectively). Data are still being analyzed in an attempt to correlate diet of boreal owls as seen in the nest versus what is caught in standard small mammal traplines.

JOB/ACTIVITY C: Efforts are ongoing to describe habitat affinities of all species of small mammals captured on standardized traplines. One-meter radius vegetation plots at small mammal trapsites are generally completed in all available habitat types, and those data are being analyzed to detect avoidance or preference by each species of small mammal captured.

OBJECTIVE 4:

JOB/ACTIVITY A & B: Data analyses are underway on a variety of aspects of boreal owl ecology. A manuscript entitled "Post-fledging Determination of Annual Productivity in Boreal Owls based on Prey Detritus Mass" was submitted and accepted for publication in the Journal of Raptor Research. A manuscript entitled "Factors Affecting Boreal and Great Horned Owl Hooting Surveys in Alaska" is currently undergoing revisions for publication in the Journal of Raptor Research. A third manuscript, "Diet and Prey Consumption Rates of Nesting Boreal Owls, *Aegolius funereus*, in Alaska," was submitted for review to Canadian Field-Naturalist. A photo of a boreal owl with multiple prey items in a nest box was published in National Wildlife Magazine. Additional scientific publications are in progress.

Prepared By: Jackson S. Whitman

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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

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.

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.

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.

Prepared By: Jackson S. Whitman

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
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Alaska Department of Fish and Game
State Wildlife Grant

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

Project Number: **5.12**

Project Title: Monitoring raptor nesting fluctuations on Minto Flats State Game Refuge, Alaska

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

Report Period: 1 July 2006 – 30 June 2007

Report Due Date: September 30, 2007

Partner: Alaska Department of Fish and Game

Project Objectives

OBJECTIVE 1: Establish and refine protocol to survey raptor and raven stick nests in interior Alaska's boreal forest lowlands.

JOB/ACTIVITY A: Using a combination of fixed-wing and rotor-winged aircraft, establish nest search protocol on Minto Flats State Game Refuge.

JOB/ACTIVITY B: In conjunction with biometrics staff, ensure that established protocol is statistically valid.

OBJECTIVE 2: Based on protocol above, provide baseline population of raptor and raven stick nests on Minto Flats State Game Refuge.

JOB/ACTIVITY A: Using helicopters, monitor nest sites for occupancy by various raptor species.

JOB/ACTIVITY B: Calculate minimum nesting density for active nesting pairs of at least 3 raptor species using the refuge.

OBJECTIVE 3: For at least 3 raptor species nesting on Minto Flats State Game Refuge, describe nesting habitat affinities based on overstory vegetation classifications.

JOB/ACTIVITY A: While assessing raptor and raven nest site use on the Refuge, gather various metrics on forest stand composition and describe nesting habitat for species with more than 5 nesting pairs.

OBJECTIVE 4: For at least an additional 2 years, continue spring monitoring of known nest sites to provide information on annual fluctuations in nesting raptors.

JOB/ACTIVITY A: Following establishment of baseline information on nesting densities of Refuge raptors, use helicopters to assess breeding efforts of at least 3 raptor species during spring 2007 and 2008.

JOB/ACTIVITY B: During each of the next 2 years, gather information on nest mortality/longevity.

Summary of Project Accomplishments

OBJECTIVE 1:

JOB/ACTIVITY A: In 2005, conducted a low-intensity survey with fixed-wing aircraft to gather preliminary data on nesting raptors and to develop appropriate survey techniques for future surveys. In 2006, conducted a more comprehensive survey of randomly selected units to use in analyses of nest density estimates.

JOB/ACTIVITY B: Consulted with Department biometric staff to ensure survey techniques were valid to estimate nesting densities of common raptor species. Developed a survey method to allow for Geospatial models and classical approaches to estimate nest abundance and densities.

OBJECTIVE 2:

JOB/ACTIVITY A: In June 2007, all nests located during the 2005 and 2006 surveys were visited with rotor-wing aircraft (Robinson R44) to determine species occupancy and productivity. A total of 12.7 hours of survey time was used.

JOB/ACTIVITY B: In fall 2006, calculated Geospatial estimates for 18 parameters that included combinations of nest quality, occupancy status, and species presence. A sightability correction factor was calculated for application to the estimate of total nests.

OBJECTIVE 3:

JOB/ACTIVITY A: In 2005 and 2006, collected vegetation data and landscape conditions to describe habitat affinities of nesting raptors and common ravens. Classified vegetation to include species composition and percent cover. Landscape conditions included distance to and water body type.

OBJECTIVE 4:

JOB/ACTIVITY A: In June 2007, visited 241 nests using rotor aircraft (Robinson 44) and determined species occupancy and productivity. Total survey time was completed in 12.7 hours over two days.

JOB/ACTIVITY B: In June 2007, all nests located during the 2005 and 2006 surveys were visited with rotor-wing aircraft (Robinson R44) to determine sources and rates of nest structure mortality. Total survey time was completed in 12.7 hours over two days and as part of Job/Activity 4(a).

Prepared By: Jackson Whitman and Jason Caikoski

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
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Alaska Department of Fish and Game
State Wildlife Grant

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

Project Number: **5.12**

Project Title: Monitoring raptor nesting fluctuations on Minto Flats State Game Refuge, Alaska

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

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

Report Due Date: September 30, 2008

Principal Investigators: Jackson Whitman, Jason Caikoski, Alaska Department of Fish and Game

I. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH

This project focuses on raptor species that use large stick nest platforms visible with aerial survey methods. Preliminary work indicates that 8 species are likely to occur on the Refuge: Bald Eagle, Osprey, Great Gray Owl, Northern Goshawk, Red-tailed Hawk, Rough-legged Hawk, Peregrine Falcon, and Common Raven. Five of these species are ranked S3 by the Alaska Natural Heritage Program (rare or uncommon in state). All of these, except the Raven, are considered to be one of Alaska's Species of Greatest Conservation Needs (CWCS Appendix 7. Nominee Species List, pages 15 and 20), with specific templates developed to address their conservation concerns in Alaska's CWCS. This project addresses all or parts of conservation actions noted in the Northern Goshawk Template, Appendix 4, page 245 issues 4 and 6; the Contaminant-affected Raptor Species Template, page 250 issue 1; the Diurnal Migrant Raptors Template, page 255 issue 3; and the Forest Owls Template, page 263 issue 1 and page 264 issues 3 and 4. In addition to the importance of this data to species management efforts, it will ensure that existing conservation areas, including state special areas, are managed to maintain the wildlife values and use opportunities for which they were designated.

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

Raptor populations occur at the apex of natural food webs. As such, monitoring their populations may be used as an indicator of diminished capacity of an area to support natural ecological systems. Management of Minto Flats State Game Refuge (Minto) is a state responsibility, and recent interest in natural resource extraction has the potential to degrade existing habitat. Alaska State Statutes establishing the Refuge and the Refuge Management Plan mandate that the Department of Fish and Game manage the refuge to protect and enhance fish and wildlife habitat and conserve fish and wildlife populations and diversity. However, only preliminary information exists on the extent of use of the area by raptors. This investigation is designed to establish baseline data on nesting

raptors, and further, to document specific nesting locations and habitats. Future management of the area (locations of temporary facilities, road corridors, etc.) can be improved if baseline data exist.

Minto Flats State Game Refuge encompasses about 500,000 acres (2,023 km^2) of unique riverine and lacustrine riparian habitats 35 miles (56 km) west of Fairbanks. Because of its proximity to Fairbanks and its world-class waterfowl productivity, it has been subjected to extensive research efforts by the University of Alaska-Fairbanks staff and students, the U.S. Fish and Wildlife Service, and the Alaska Department of Fish and Game Statewide Waterfowl Program. However, basic inventories of other nongame vertebrates have not been undertaken. Because of recent interest in extractable natural resources in and adjacent to the Refuge (including natural gas exploration leasing, white spruce timber harvesting) and aerial military training (supersonic and low altitude), habitat alteration in this pristine area will occur. Baseline information on the extent of use by nesting raptors would be beneficial in future planning and mitigation processes on the refuge.

While extensive use of aircraft for monitoring raptor nesting has occurred in more open habitats in Alaska and elsewhere, little work has been conducted in boreal forest habitats. Through the use of geospatial population estimators (GSPE), we have developed methodologies that adequately provide estimates of the extent of use of the area by raptors and common ravens, as well as providing statistical bounds on those estimates.

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

OBJECTIVE 1: Establish and refine protocol to survey raptor and raven stick nests in interior Alaska's boreal forest lowlands.

We used the distribution of nests located in a 2005 survey to model the predictive ability of varying sample unit sizes for a plot based sampling approach using the geospatial population estimation (GSPE) technique in 2006. The GSPE technique is a finite population version of block kriging that involves measuring spatial correlation among samples, modeling that relationship as a function of distance, and using the model to predict population size.

Based on the modeling exercise, we defined a sample unit for GSPE surveys by 2 minutes of latitude and 5 minute of longitude. We then surveyed 100 of 188 sample units in the study area with fixed wing aircraft to estimate population size for various observable parameters. Overall search intensity averaged 6.12 min/mi^2. When adjusted for available habitat, actual search intensity increased to 6.73 min/mi^2.

OBJECTIVE 2: Based on protocol above, provide baseline population of raptor and raven stick nests on Minto Flats State Game Refuge.

We used GSPE techniques to estimate the observable population size of 18 parameters that were derived from species occupancy and nest structure classifications (Table 1). We calculated a sightability correction factor for total nests based on known nests located in a 2005 survey that were not observed during the 2006 survey. The mean SCF for the 2006

survey was 1.44 (SE= 0.138). Correcting for sightability, we estimated a total of 417 (SE= 49.2) raptor and common raven nests in Minto Flats in 2006.

Table 1. Estimates of nest abundance in Minto Flats in 2006.

Parameter	Estimate	SE
Total Nests	287	19.6
Total Nests with SCF	417	49.2
Total Occupied	102	10.2
Total Absent	181	15.9
Total Good	217	18.1
Total Marginal	13	3.7
Total Poor	53	8.3
BAEA Occupied	24	4.3
BAEA Absent	8	3.1
NOGO Occupied	23	4.6
RTHA Occupied	17	3.6
RTHA Absent	3	1.0
CORA Occupied	21	4.0
CORA Absent	8	3.1
GGOW Occupied	8	2.5
GHOW Occupied	9	3.4
Unk Absent-Good	102	12.6
Unk Absent-Marginal	13	3.7
Unk Absent-Poor	53	8.3

BAEA = Bald Eagle, NOGO = Northern Goshawk, RTHA = Red-tailed Hawk, CORA = Common Raven, GGOW = Great Grey Owl, GHOW = Great Horned. Good = a functionally new nest, recently used and maintained, Marginal = a nest that was not recently used or maintained but potentially functional, Poor = a nonfunctional nest that was partially destroyed, Occupied = nest occupied by a raptor or raven, Absent = a nest not used during that year, SCF = sightability correction factor.

OBJECTIVE 3: For at least 3 raptor species nesting on Minto Flats State Game Refuge, describe nesting habitat affinities based on overstory vegetation classifications.

We broadly classified vegetation types within 100m of nests sites for 275 nests using rotor-wing aircraft (Robinson 44) in 2005-2007. Due to impending retirement of the senior author and no replacement being hired, analyses to describe habitat affinities based on vegetation classification have not been conducted.

OBJECTIVE 4: For at least an additional 2 years, continue spring monitoring of known nest sites to provide information on annual fluctuations in nesting raptors.

In June 2007, we relocated 241 nest sites using rotor aircraft (Robinson 44) to determine species occupancy, productivity, and nest structure mortality. Total survey time was completed in 12.7 hours over two days. After 1 July 2007, no additional field work was conducted on this project. Because of impending retirement of the senior author and no replacement being hired, efforts during FY08 went into data analyses and publications preparation.

IV. MANAGEMENT IMPLICATIONS

Because of recent interest in extractable natural resources in and adjacent to the Refuge (including natural gas exploration leasing, white spruce timber harvesting) and aerial military training (supersonic and low altitude), habitat alteration in this pristine area will occur.

We provided survey protocol and baseline estimates in areas of Minto Flats prior to development. Managers will have the ability to monitor the future status of raptors and common ravens, the effects of development, and provide guidance for appropriate mitigation of roads, facilities, and habitat alteration.

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

JOB/ACTIVITY 4B: <u>During each of the next 2 years, gather information on nest mortality/longevity.</u>

After 1 July 2007, no additional field work was conducted on this project. Because of impending retirement of the senior author and no replacement being hired, efforts during FY08 went into data analyses and publications preparation.

VI. PUBLICATIONS

We prepared and submitted a short manuscript to the Journal of Raptor Research entitled “Peregrine Falcon Nesting in Tree Platform in Alaska”. This manuscript (as of 5 May 2008) was accepted for publication in Journal of Raptor Research.

Prepared By: Jackson Whitman and Jason Caikoski

FEDERAL AID
INTERIM 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
State Wildlife Grant

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

Project Number: **5.13**

Project Title: Distribution, abundance, and ecology of forest owls in Southeast Alaska

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

Report Period: 1 July 2006 – 30 June 2007

Report Due Date: September 30, 2007

Partner: Alaska Department of Fish and Game

Project Objectives

OBJECTIVE 1: Establish a Southeast Alaska Owl Network – train volunteers to participate in region-wide owl monitoring efforts.

JOB/ACTIVITY A: Recruit and train volunteers in cooperation with the Juneau Raptor Center.

JOB/ACTIVITY B: Send volunteers to the field to begin collecting data.

OBJECTIVE 2: Design a survey protocol for nocturnal owls in Southeast Alaska.

JOB/ACTIVITY A: Use distance sampling, repeated surveys, and radio-telemetry to estimate probability of detection of at least one species of owl in SEAK and evaluate survey methods for estimating abundance of forest owls.

JOB/ACTIVITY B: Determine the influence of temporal, weather, and lunar factors on vocalizations of forest owls in Southeast Alaska.

OBJECTIVE 3: Describe distribution and abundance of forest owls in Southeast Alaska.

JOB/ACTIVITY A: Design and conduct broad-scale surveys for forest owls during the peak period of detectability and using the optimal survey method.

JOB/ACTIVITY B: Locate marked owls using radiotelemetry to describe habitat associations, nesting and roosting habitat (if possible), and diet through pellet analysis (if possible).

JOB/ACTIVITY C: Investigate and opportunistically survey unroaded areas.

OBJECTIVE 4: Develop recommendations for a broad-scale monitoring protocol for this species group.

JOB/ACTIVITY A: Analyze data.

JOB/ACTIVITY B: Write reports and journal articles.

Summary of Project Accomplishments

OBJECTIVE 1:

JOB/ACTIVITY A: We continued to solicit volunteers for the Southeast Alaska Owl Network, in conjunction with the Juneau Raptor Center.

JOB/ACTIVITY B: We continued to have volunteers document owl sightings and conduct silent and broadcast surveys.

OBJECTIVE 2:

JOB/ACTIVITY A: The field portion of this job was completed during 2006; final analysis and reporting will be completed during the final year (2008) of this project.

JOB/ACTIVITY B: The field portion of this job was completed during 2006; final analysis and reporting will be completed during the final year of this project.

OBJECTIVE 3:

JOB/ACTIVITY A: Based on results of objectives 1 and 2, we designed and implemented a survey protocol for forest owls in Southeast Alaska. We utilized the Southeast Alaska Owl Network to conduct surveys in 14 communities throughout Southeast Alaska during the peak period of detectability. Because of the record snowfall in Southeast Alaska during the winter of 2006/2007, many survey points and routes that would normally have been available during this time period were unavailable. To date, many volunteers have not turned in data from their surveys so these numbers are incomplete. Thirty-eight volunteers conducted silent surveys and 10 volunteers participated using an extended survey protocol that combined silent and broadcast survey methods. Volunteers spent 107.36 hours surveying for forest owls and detected 25 owls during broadcast surveys and 9 owls during silent surveys. Volunteers submitted anecdotal sighting reports of 155 owls. Once we receive all volunteer data, final analysis and reporting will be completed.

JOB/ACTIVITY B: Based on radio-telemetry relocations of western screech-owls gathered during 2005 and 2006, we generated estimates of use area size and documented roosting and nesting habitat. These data were reported at the IV North American Ornithological Conference, in Veracruz Mexico. We attempted to collect additional data on habitat use in conjunction with a student volunteer in Sitka by radio-tagging 2 western screech-owls in the Sitka area. The first was an immature that was captured on 16 November on the campus of Sheldon Jackson College. This bird was located the day after capture and then dispersed from the area (i.e., the radio was not heard again). A second western screech-owl was captured on 20 April in the vicinity of Starrigavan River. This owl was relocated several times over the following week before being found dead due to starvation. These 2 captures did not generate enough data to supply us with additional home range or habitat use data; final analysis of owl relocation data will be completed during the final year of this project.

JOB/ACTIVITY C: While planning our survey effort this year, we evaluated several options for surveying unroaded areas for owls. However, because our goal was to design a monitoring protocol that could continue based solely on the volunteer network; we did not try to use methods this year that, in all likelihood, would be unavailable to volunteers (i.e., snowmachines) in later years. We did not attempt to survey unroaded coastal areas from skiff due to the numerous problems associated with that method, such as boating at night and difficulty hearing owls over water noise. We feel that, at this time, surveying away from roads is too difficult and would not provide sufficient additional information.

Prepared By: Stephen B. Lewis

FEDERAL AID
INTERIM 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
State Wildlife Grant

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

Project Number: **13**

Project Title: Distribution, abundance and ecology of forest owls in Southeast Alaska

Project Duration: July 1, 2004 – December 31, 2008

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

Report Due Date: September 30, 2008

Partner: U. S. Fish & Wildlife Service

Project Objectives:

Objective 1: Establish a Southeast Alaska Owl Network – train volunteers to participate in region-wide owl monitoring efforts.

Job/Activity 1a: Recruit and train volunteers in cooperation with the Juneau Raptor Center.

Job/Activity 1b: Send volunteers to the field to begin collecting data.

Objective 2: Design a survey protocol for nocturnal owls in Southeast Alaska

Job/Activity 2a: Use distance sampling, repeated surveys, and radio-telemetry to estimate probability of detection of at least one species of owl in SEAK and evaluate survey methods for estimating abundance of forest owls

Job/Activity 2b: Determine the influence of temporal, weather, and lunar factors on vocalizations of forest owls in Southeast Alaska

Objective 3: Describe distribution and abundance of forest owls in Southeast Alaska

Job/Activity 3a: Design and conduct broad-scale surveys for forest owls during the peak period of detectability and using the optimal survey method

Job/Activity 3b: Locate marked owls using radiotelemetry to describe habitat associations, nesting and roosting habitat (if possible), and diet through pellet analysis (if possible).

Job/Activity 3c: Investigate and opportunistically survey unroaded areas.

Objective 4: Develop recommendations for a broad-scale monitoring protocol for this species group.

Job/Activity 4a: Analyze data.

Job/Activity 4b: Write reports and journal articles.

Summary of Accomplishments:

Objective 1:

Job/Activity 1a: We continued to solicit volunteers for the Southeast Alaska Owl Network, in conjunction with the Juneau Raptor Center.

Job/Activity 1b: We continued to have volunteers document owl sightings and conduct silent and broadcast surveys during the spring of 2008 through the Southeast Alaska Owl Network. We attempted to have surveys conducted in areas that, due to heavy snow during the winter/spring of 2007, volunteers were unable to access.

Objective 2:

Job/Activity 2a: The field portion of this job was completed during 2006; final analysis and reporting will be completed during the final year of this project, by 31 December 2008.

Job/Activity 2b: The field portion of this job was completed during 2006; final analysis and reporting will be completed during the final year of this project.

Objective 3:

Job/Activity 3a: Based on results of objectives 1 and 2, we designed and implemented a survey protocol for forest owls in Southeast Alaska. We utilized the Southeast Alaska Owl Network to conduct surveys in 7 communities throughout Southeast Alaska during the peak period of detectability. Because of the record snowfall in Southeast Alaska during the winter of 2006/2007, many survey points and routes that would normally have been available during this time period were unavailable. Therefore, we attempted to have volunteers survey these points or routes that were inaccessible last year. To date, many volunteers have not turned in data from their surveys so these numbers are incomplete. Once we receive all volunteer data, final analysis and reporting will be completed. Some of these data were presented as a poster at the 13th Alaska Bird Conference entitled "Attack of the Barred Owl in Southeast Alaska".

Job/Activity 3b: Based on radio-telemetry relocations of western screech-owls gathered during 2005 and 2006, we generated estimates of use area size and documented roosting and nesting habitat. These data were reported in a talk entitled "Home Range and Habitat Use of Western Screech-owls in Southeast Alaska" at the 13th Alaska Bird Conference. Final analysis of owl relocation data will be completed during the final year of this project.

Job/Activity 3c: While planning our survey effort this year, we evaluated several options for surveying unroaded areas for owls. However, because our goal was to design a monitoring protocol that could continue based solely on the volunteer network, we did not try to use methods this year that, in all likelihood, would be unavailable to volunteers (i.e., snowmachines) in later years. We did not attempt to survey unroaded coastal areas from skiff due to the numerous problems associated with that method, such as boating at night and difficulty hearing owls over water noise. We feel that, at this time, surveying away from roads is too difficult and would not provide sufficient additional information.

Objective 4:

Job/Activity 4a: Because of heavy snows in 2007, we had volunteers conduct additional surveys in spring 2008. We incorporated those data into previously collected data for

analysis. In addition, we received additional data from surveys conducted in the early 1990s and have been working to incorporate that into our analysis. Analysis of owl relocation data was completed during the FY08 and will be finalized in FY09.

Job/Activity 4b: Because final analysis was not completed during FY08, we did not work towards any publications. However, we have delineated several manuscripts with target journals for submission in FY09.

Significant Deviations: None

Project Leader: Stephen B. Lewis

Additional Information: An article on one aspect of this work, documentation of barred owl expansion in to southeast Alaska, was reported in the Alaska Science Forum on 9 April 2008 (http://www.gi.alaska.edu/ScienceForum/ASF19/1902.html).

ALASKA DEPARTMENT OF FISH AND GAME
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PO Box 115526
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Alaska Department of Fish and Game
State Wildlife Grant

GRANT AND SEGMENT NR: **T-3-1**

PROJECT NUMBER: **5.13**

PROJECT TITLE: Distribution, abundance and ecology of forest owls in Southeast Alaska

PARTNER: U. S. Fish & Wildlife Service, Alaska Department of Fish and Game

COOPERATORS: U.S. Fish & Wildlife Service, Juneau Raptor Center

PRINCIPAL INVESTIGATORS: Stephen B. Lewis (ADF&G) and Michelle L. Kissling (USFWS)

PROJECT DURATION: July 1, 2006 – March 31, 2009

REPORT PERIOD: July 1, 2008 – March 31, 2009

I. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH

Little is known about the distribution and abundance of nocturnal owls continent-wide, and most owl populations are not adequately monitored. In the United States, owl research and monitoring has focused on a few species of conservation concern (e.g., Northern Spotted Owl). Recently, biologists in Canada and Montana developed guidelines for monitoring nocturnal owl species in North America by standardizing survey efforts across the region. These guidelines were implemented in Canada in 2000, and the volunteer-based program has been extremely successful. Boreal Partners in Flight ranked forest owls as the highest priority raptor species group for conservation effort. This study evaluated survey methods typically used to estimate owl abundance to ensure that surveys are producing biologically meaningful results. It developed a survey protocol appropriate for Southeast Alaska to meet regional objectives and to contribute to ongoing continent-wide efforts for monitoring nocturnal owls. Distribution and abundance of forest owls in Southeast Alaska subsequently can be documented.

This project generates data on distribution, abundance and habitat for 10 species of owls, all listed in Alaska's CWCS as Species of Greatest Conservation Need (Appendix 7, page 20). The lack of information about population status, trends and habitat use is one of the biggest impediments for management of these species in southeast Alaska (Appendix 4, sections C and E, page 263). This project begins to fill that information gap. It seeks to build a sound monitoring program, as well as address several other related conservation actions noted in the Forest Owl Template (Appendix 7, section G, page 264).

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

Boreal Partners In Flight ranked forest owls as the highest priority raptor species group (Schempf 2001). Information about the distribution and abundance of owls in Southeast

Alaska (SEAK) is lacking, and a comprehensive study has never been initiated. During the 1970's on Prince of Wales Island, broadcast surveys were conducted for breeding owls in May/June. Nest boxes were distributed locally (e.g., Juneau, Petersburg, POW, and Heceta Island), but efforts to check for owl use are inconsistent, and few (<5) boxes have been used by owls for roosting or nesting. Recently, owl surveys have been conducted on the Thorne Bay Ranger District, and have resulted in a surprisingly high number of owl observations (C. Mlodik pers. comm.). These results suggest that while nest boxes are not used often, owls are present at low densities in the forest and likely could be monitored using standard methods (e.g., broadcast surveys).

Prior to field efforts to document distribution and abundance of nocturnal owls in SEAK, an efficient survey protocol needs to be developed. The objective of the guidelines outlined by Takats et al. (2001) was to provide a sound basis for developing regional owl monitoring protocols to provide comparable data across North America. Information regarding optimal timing for surveys, and route selection and accessibility varies among regions. In geographic areas not yet studied, such as SEAK, this information is critical to designing a successful monitoring program. In this study, we propose to gather information to allow for participation in the continent-wide, owl monitoring program, and to develop guidelines for monitoring trends in forest owl populations as a result of forest management activities in SEAK.

Singing owl surveys may not be appropriate for monitoring some owl species (Benson 2001), and there is concern whether broad-scale auditory surveys produce an accurate estimate of owl abundance because these surveys assume that all birds are equally detectable. For example, singing of Boreal Owls has been positively correlated to pairing status, and may be inversely related to breeding success (Lundberg 1978). Point counts are the most common method for estimating abundance of birds, but typical analysis methods fail to account for differences in detection probabilities. A common misconception is that point count data is a complete census; in reality, the number of birds counted at a point is a proportion of the true population at that point (Lancia et al. 1996). Probability of detection can be considered a correction factor, which is used to compensate for individuals that are present but are not detected (Iverson and Fuller 1991). It can be estimated by using distance sampling methods (Reynolds et al. 1980), repeating counts on a survey route (Hewitt 1967, Seber 1982), and using radio telemetry methods. Failure to account for differences in detection probabilities results in biased population estimates that can be substantially below true densities. We propose to evaluate survey methods for estimating abundance of nocturnal owls in SEAK.

Recently, biologists in Canada and Montana developed guidelines for monitoring nocturnal owl species in North America by standardizing survey efforts across the region. These guidelines were implemented in Canada in 2000, and the volunteer-based program has been extremely successful.

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

OBJECTIVE 1: Establish a Southeast Alaska Owl Network – train volunteers to participate in region-wide owl monitoring efforts.

We created the Southeast Alaska Owl Network (SEAKON) in conjunction with the Juneau Raptor Center (JRC) to assist us in documenting owl occurrence throughout the year and across the entire region. Working with JRC, we recruited members of the public with an interest in owls and wildlife. We made public presentations in 6 communities (Juneau, Petersburg, Sitka, Ketchikan, Wrangell, and Craig) around Southeast Alaska to generate interest in owl conservation, explain the need to gain information on owls, and identify potential volunteers. We enlisted 46 volunteers and agency personnel from 14 Southeast Alaskan communities to conduct owl surveys over 4 years (2005-2008). We used these survey data to estimate site occupancy and trend of 3 common owl species (northern saw-whet owl, western screech-owl, and barred owl). An additional 134 individuals submitted owl sightings to SEAKON; these sightings assisted in documenting seasonal variation of all owl species in Southeast Alaska.

The SEAKON proved to be an extremely valuable resource for completion of the region-wide survey. Most of our volunteers were exemplary, but, as with most volunteer-based programs, there were inherent challenges to overcome. Coordinating SEAKON was time-consuming at some times of the year and, at those times, required more time than a partially-volunteer coordinator could afford. Some volunteers were unavailable during part or all of the survey period (e.g., other commitments, travel) or had permanently moved without informing the SEAKON Coordinator, leaving us scrambling to find a new volunteer before surveys were scheduled to begin. A few volunteers were unwilling to participate in broadcast surveys because of potential disturbance to the owls; we worked directly with these volunteers on a survey protocol that would still collect valuable data without compromising their principles. On occasion, we received incomplete datasheets from volunteers, which prevented us from using some of the data in our final analyses. Similarly, many volunteers failed to document survey hours in the timesheet format required by the State Wildlife Grant Program and therefore, we estimate that roughly 30 % of non-federal match was lost because of documentation issues. We received feedback that this step was an excessive burden on volunteers and only reduced enthusiasm to participate in SEAKON. In fact, some volunteers ceased participating in surveys because of the extra steps required of them. Overall, the benefits of the SEAKON exceeded the drawbacks, particularly in terms of generating interest in owls, educating the public and school groups on the conservation of owls in Southeast Alaska, surveying relatively remote areas that otherwise we would not have been able to reach, and providing data for a region-wide survey.

OBJECTIVE 2: Design a survey protocol for nocturnal owls in Southeast Alaska.

We dedicated our entire first year of study to evaluating survey methods and design, considering the allocation of survey effort, and identifying sources of variation in detection probabilities. We were particularly concerned with imperfect detection of owls at survey stations; information is lost when a site is surveyed but no owl is detected because it is not clear if the site is not occupied by an owl or if it is occupied but the owl was not detected. Because we expected owls to occur in relatively low densities in Southeast Alaska, we wanted to design a survey protocol that maximized detection probabilities. Therefore, we tried to estimate and incorporate detection probabilities into the survey protocol to ensure unbiased results and to get the most out of our survey effort.

At the conclusion of the first field season, we developed a survey protocol that was appropriate for the landscape and weather conditions of Southeast Alaska (see Final Report). The final protocol used in this study is compatible with owl surveys that have been conducted across Canada and a few select areas in the United States since 2000 (Takats et al. 2001).

OBJECTIVE 3: Describe distribution and abundance of forest owls in Southeast Alaska.

During the early stages of this study, a derivative of mark-recapture methodology was being refined to estimate occupancy probabilities while accounting for imperfect detectability. The proportion of sites occupied can be a surrogate for abundance of owls in the region (MacKenzie et al. 2006) and, because it has a measure of the variability in the data, can be repeated to learn if site occupancy is changing over time. After careful evaluation, we concluded that this approach has several advantages for monitoring populations of nocturnal owls in Southeast Alaska. First, occupancy modeling incorporates heterogeneity in detection probabilities. Second, this technique provides a measure of confidence on the occupancy estimates. Third, occupancy modeling relies on presence-absence data and therefore, it is realistic to achieve adequate sample sizes to estimate occupancy of rare species. We believe this approach offers an efficient and economical method for monitoring nocturnal owls in Southeast Alaska and elsewhere.

We estimated occupancy of the 3 most common owl species (northern saw-whet owl, western screech-owl, and barred owl) in Southeast Alaska using methods developed by MacKenzie et al. (2006). In addition, we identified habitat features associated with occupancy and factors influencing detectability of these species (Final Report, Chapter 2). During the course of the study, we learned of an owl survey designed and conducted by L. Suring (USFS) in the late 80s and early 1990s in Southeast Alaska. Suring agreed to share his data with us to evaluate trends in owl numbers over the 2 time periods (1986-1992 and 2005-2008). Although survey techniques differed slightly, we were able to model site occupancy and trend across the time periods by making several realistic assumptions. Most notably, we were unable to estimate detection probabilities directly for the historical data; instead we applied detection probabilities from our study to the historical data and assumed that we encountered similar conditions (e.g., weather) during our surveys. After close examination of our protocol with that used during the historical surveys, we believe this was a reasonable assumption. Our collaborative effort with Suring resulted in valuable information on the status of 3 owl species in Southeast Alaska by utilizing previously-gathered data that would otherwise have not been reported.

OBJECTIVE 4: Develop recommendations for a broad-scale monitoring protocol for this species group.

We designed and conducted a region-wide survey for nocturnal owls in Southeast Alaska. We recommend that this survey be repeated annually to estimate colonization and extinction rates because these values would be most useful for management purposes. If annual surveys are cost-prohibitive, we recommend repeating surveys at 2- or 3-year intervals to monitor trends in occupancy of the more common owls of Southeast Alaska's forests. This survey could involve collaboration between ADF&G's Nongame Program, the USDA Forest Service, and the U.S. Fish and Wildlife Service, as well as volunteers from SEAKON.

1. We provide a protocol for conducting surveys for nocturnal owls (see Final Report, Appendix I), specifically Western Screech-Owls and Barred Owls. If other owls are of interest, the protocol could easily be modified to accommodate them. If broadcast segments for additional species are included, we recommend broadcasting calls in the order of increasing owl size and using the same time intervals we used for this study.
2. To maximize efficiency in occupancy surveys, we recommend increasing detection probabilities of target species. In our protocol, we provide advice on conditions to avoid and variables to measure during surveys to account for detectability issues in the occupancy-modeling process. All data sheets should be completed properly, including all weather and noise variables and coordinates from a GPS unit.
3. We recommend a minimum of 200 stations across the region to monitor occupancy of target owl species. These sites should be visited 3 times during the survey season. There is a trade-off between number of sites that can be visited and the number of visits at each site. The survey we executed was designed based on using volunteers from various communities across the region to conduct the bulk of the surveys. Thus, most surveys were located close to cities or towns. Future surveys, utilizing agency personnel, could incorporate additional sites further away from population centers (i.e., sites requiring greater logistics to reach). If an understanding of owl occupancy was desired at a smaller scale (e.g., a FS District) than the entire region, additional sites could be added at that level of spatial resolution to resolve finer scale differences in site occupancy.
4. Despite some of the hurdles we encountered with the SEAKON, we believe that a volunteer-based program for monitoring owls in Southeast Alaska could be successful with a few minor improvements. We recommend the following if a volunteer-based owl monitoring program is implemented in Southeast Alaska:
    a. Create a web-based data submission platform that allows volunteers to enter and submit survey data. We collaborated with Bird Studies Canada (contact: Denis Lepage) on several proposals to fund a data entry system and database for monitoring nocturnal owl populations across North America. Bird Studies Canada led the effort and we wrote letters of support committing to use the system should it be funded. Unfortunately, only a portion of the proposal was funded, supporting the design of the website and database, which is now part of the Avian Knowledge Network. For a small annual fee, Bird Studies Canada will customize the system to meet regional needs. We recommend working with Bird Studies Canada to incorporate any owl survey efforts and data into this system, which will allow for broad-scale analysis of owl populations and status.
    b. Serve information on training, protocols, datasheets, and frequently asked questions on a website for volunteers and other surveyors.
    c. Hire 2-4 technicians to rotate around Southeast Alaska during surveys to fill in gaps when volunteers are unavailable and to ensure that the protocol is properly followed. We suggest that each new volunteer be required to survey first with a seasoned volunteer or hired technician before leading surveys on their own.

   d. Hire a coordinator to communicate with volunteers, update information on the website regularly, present survey results, and manage the volunteer database.

5. Populations of some nocturnal owls are monitored successfully at migration stations. The Rocky Point Bird Observatory in coastal British Columbia has been banding migrating owls since 2002. We recommend investigating the feasibility of collaborating with Rocky Point Bird Observatory on the long-term monitoring of nocturnal owl populations at migration stations.
6. We suggest continued monitoring of owl populations in Southeast Alaska in order to determine any effects of Barred Owls on other owl species. Similarly, information on the status of owl populations, especially if combined with diet studies, would complement small mammal investigations and potentially serve as a surrogate to documenting the status of some small mammal species in Southeast Alaska.
7. We recommend investigating the use of automated recording systems (e.g., "frogloggers") to collect information on the distribution and occupancy of owls in unroaded areas. This approach could be used to validate roadside surveys or to address specific hypotheses related to owl occupancy.

IV. MANAGEMENT IMPLICATIONS

See Objective 4 above for management implications and recommendations on owl monitoring in Southeast Alaska. Here we provide implications and recommendations regarding the ecology and conservation of forest owls in Southeast Alaska.

The Owl Expert Panel convened for ADF&G's CWCS recommended several conservation objectives and actions, including learning more about owl habitat associations and diet. We recommend the following studies and considerations to address conservation concerns for forest owls in Southeast Alaska.

1. The relatively recent range expansion of Barred Owls (Livezey 2009) and the resulting effects on resident raptors (e.g., Northern Spotted Owls; Kelly et al. 2003, Olson et al. 2005) has garnered much attention in the literature lately. We recommend further evaluation of several aspects of Barred Owl ecology in Southeast Alaska and points further north.
   a. We recommend a detailed study of Barred Owl food habits involving video documentation of deliveries to nests. Understanding the diet of Barred Owls would be an important component of its ecology to learn because 1) Barred Owls may compete with smaller owls (e.g., screech-owls) for prey; 2) Barred Owls might be active predators of smaller owl species; and 3) Barred Owls are large enough that, in a prey-depauperate region such as Southeast Alaska, they may be food competitors with other resident raptors (e.g., northern goshawk).
   b. We recommend that in conjunction with the diet study above, it would be useful to learn about habitat use of Barred Owls. This would give insight into the potential habitats important for this expanding bird and, perhaps most importantly, those habitats that are avoided. A better understanding of habitat use (including nesting habitat) would provide information on the potential for Barred Owls to compete with other comparably-sized and smaller raptors.

2. Vehicle collisions with owls appear to be a noteworthy source of mortality, especially for Western Screech-Owls (Final Report, Appendix IV). Relatively open, grassy roadsides probably offer owls good hunting opportunities. Of the known sources of mortality of owls in Southeast Alaska, starvation and trauma are the primary causes of owl deaths. Starvation is the natural outcome of reduced food resources, but trauma events (e.g., vehicle collisions) could be reduced. We recommend conducting a risk assessment in a few select communities of Southeast Alaska, including an attempt to quantify owl deaths along relatively busy roads. Based on our cursory evaluation, we think that a fairly large number of both resident and migratory owls are killed in vehicle collisions each year, especially in the fall when young birds are learning to hunt.

3. In Southeast Alaska, Western Screech-Owl home ranges were focused on riparian forests associated with larger, fish-bearing streams in all cases. While we did not capture and radiotag any owls in higher elevations away from larger stream valleys, we rarely detected screech-owls in such areas during nocturnal surveys (Chapters 1 & 2). Riparian zones are rich ecological areas, providing critical habitats for many wildlife species and the food they depend on (e.g., bears and Pacific salmon; Naiman et al. 2000, Schindler et al. 2003). Based primarily on anadromous fish needs, riparian standards and guidelines for the Tongass National Forest prohibit commercial timber harvest within 30 m of streams that contain fish (i.e., Stream Class 1 or 2; USDA Forest Service 1997). We found that while only 13 % of locations were within the 30-m buffer, 68 % of locations were in 150 m of streams. This distance relates to the buffer placed on parts of streams that are deemed “important bear foraging areas” (USDA Forest Service 1997) and should be applied to all fish-bearing streams to benefit bears as well as the other species that use these riparian forests.

4. Harvest operations, especially clearcutting, can lower the number of trees with suitable nest and roost cavities for owls. Managers could mitigate this impact by leaving clumps of large and small standing trees within harvest units to ensure persistence and future recruitment of cavity-bearing trees (DeGayner et al. 2005). This may be consistent with timber harvest economic objectives since many of the large old-growth trees that may recruit into suitable nest-cavity trees have little timber value due to their poor form and high degree of wood defect (DeGayner et al. 2005). Because of Western Screech-Owl use of riparian forests and need for trees relatively large and old enough to support natural cavities, continued protection of the valley-bottom forest of Southeast Alaska would benefit Western Screech-Owls in this area.

5. Although Short-Eared Owl (*Asio flammeus*) is not a forest owl, we recommend a study of the migration and stopover ecology of this species. This species is not surveyed by traditional nocturnal owl surveys as we recommended (Final Report, Appendix I) and thus, additional techniques will need to be used to learn about their ecology in this region. It has been documented in the past that waves of Short-Eared Owls appear during fall migration in large wetland and tidal grassflat areas (e.g., Gustavus Forelands, Mendenhall Forelands). Capturing and marking Short-Eared Owls with satellite tags could help to elucidate their habitat use and stopover ecology in Southeast Alaska.

V. SUMMARY OF WORK COMPLETED ON JOBS FOR LAST SEGMENT PERIOD ONLY (July 1, 2008 – March 31, 2009)

JOB/ACTIVITY 1A: Recruit and train volunteers in cooperation with the Juneau Raptor Center.

We no longer solicited volunteers for the Southeast Alaska Owl Network and our contract with the Juneau Raptor Center ended.

JOB/ACTIVITY 1B: Send volunteers to the field to begin collecting data.

Following data collection in Spring 2008, we stopped having volunteers do owl surveys as we were working on completing the project. Some volunteers continued to collect sightings but otherwise, we stopped working on this objective.

JOB/ACTIVITY 2A: Use distance sampling, repeated surveys, and radio-telemetry to estimate probability of detection of at least one species of owl in SEAK and evaluate survey methods for estimating abundance of forest owls.

The field portion of this job was completed during 2006; final analysis and reporting will be completed during the final year of this project, by 30 June 2009.

JOB/ACTIVITY 2B: Determine the influence of temporal, weather, and lunar factors on vocalizations of forest owls in Southeast Alaska.

The field portion of this job was completed during 2006; final analysis and reporting will be completed during the final year of this project, by 30 June 2009.

JOB/ACTIVITY 3A: Design and conduct broad-scale surveys for forest owls during the peak period of detectability and using the optimal survey method.

The field portion of this job was completed during the last reporting period; final analysis and reporting will be completed during the final year of this project, by 30 June 2009.

JOB/ACTIVITY 3B: Locate marked owls using radiotelemetry to describe habitat associations, nesting and roosting habitat (if possible), and diet through pellet analysis (if possible).

Based on radio-telemetry relocations of western screech-owls gathered during 2005 and 2006, we generated estimates of use area size and documented roosting and nesting habitat. Final analysis and reporting will be completed during the final year of this project, by 30 June 2009.

JOB/ACTIVITY 3C: Investigate and opportunistically survey unroaded areas.

We evaluated several options for surveying unroaded areas but concluded that surveying away from roads is too difficult and would not provide sufficient additional information beyond our region-wide survey.

JOB/ACTIVITY 4A: Analyze data.

We compiled all data and completed final analyses during this reporting period.

JOB/ACTIVITY 4B: Write reports and journal articles.

We drafted and completed the final report for this project during this reporting period. We submitted the final report to the ADF&G Nongame program in May 2009. We

designed the report to have several chapters, each of which was submitted for publication to a peer-reviewed journal. In addition, the report had several appendices containing additional information gathered during the study, including our recommended survey protocol, monthly occurrence of owls based on volunteer sightings, and information on owl mortalities learned from carcass collection and necropsy.

VI. PUBLICATIONS

We did not publish any manuscripts during this reporting period to date but will submit 5 articles for publication upon completion of the final report (see Final Report). Article citations are listed below with the journal that each manuscript will be submitted to:

1. Kissling, M.L., S. B. Lewis, and G. W. Pendleton. *In prep*. Factors affecting owl detectability in Southeast Alaska. Condor.
2. Kissling, M.L., S. B. Lewis, and G. W. Pendleton. *In prep*. Decadal changes in occupancy of forest owls in Southeast Alaska, 1986-2008. Journal of Wildlife Management.
3. Lewis, S. B. and M. L. Kissling. *In prep*. Home range, habitat use, and movements of Western Screech-Owls (*Megascops kennicottii*) in central Southeast Alaska. Journal of Raptor Research.
4. Lewis, S. B. and M. L. Kissling. *Submitted*. Western Screech-Owl (*Megascops kennicottii*) capture in Southeast Alaska: technique evolution and capture rates. North American Bird Bander.
5. Kissling, M.L., S. B. Lewis, and D. A. Cushing. *In prep*. Diet of the Western Screech-Owl (*Megascops kennicottii*) in Southeast Alaska. Journal of Raptor Research.

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: **5.14**

Project Title: Monitoring population fluctuations in boreal owls in Interior Alaska

Project Duration: 1 July 2008 – 30 June 2011

Report Period: 1 July, 2008 – 30 June 2009

Report Due Date: September 30, 2009

Partner: Alaska Department of Fish and Game

Project Objectives:

OBJECTIVE 1: Provide long-term population trend information on boreal owls.

JOB/ACTIVITY 1A: Maintain at least 100 nest boxes along at least 5 routes accessible from the all-weather road system around Fairbanks.

JOB/ACTIVITY 1B: Provide annual indices to breeding boreal owl abundance by monitoring use of the nest boxes.

JOB/ACTIVITY 1C: Monitor annual productivity of boreal owls (number of branchlings/fledglings).

JOB/ACTIVITY 1D: Through direct examination of prey in nest boxes, maintain data base of annual boreal owl diets.

JOB/ACTIVITY 1E: Through the use of standard USFWS legbands, assess nest site fidelity of adult female boreal owls and gather information on movements and nesting area fidelity of fledgling owls.

Summary of Project Accomplishments:

OBJECTIVE 1:

JOB/ACTIVITY 1A: Maintain at least 100 nest boxes along at least 5 routes accessible from the all-weather road system around Fairbanks.

112 boxes were maintained and remained available for Boreal Owl use in FY09.

JOB/ACTIVITY 1B: Provide annual indices to breeding boreal owl abundance by monitoring use of the nest boxes.

T. Booms monitored Boreal Owl use of 129 historical nest box sites and found 112 boxes in good condition and available for owl use. Of 112 boxes available, 18 boxes were occupied by Boreal Owls giving an occupancy rate of 16%. This is the lowest occupancy rate of the previous three comparable years (2005-2007; 28-36% occupancy). However, unlike previous years, boxes were not cleaned during

the preceding fall because the biologist position responsible for the study was vacant. Boreal Owls are probably less likely to nest in boxes that contain nest remains from previous years and this may have contributed to the low occupancy observed in 2009.

JOB/ACTIVITY 1C: Monitor annual productivity of boreal owls (number of branchlings/fledglings).

T. Booms conducted clutch counts at the 18 occupied boxes but was unable to complete nestling/fledgling counts because of scheduling conflicts. The 18 boxes produced a minimum of 80 eggs, giving a mean clutch size of 4.4 eggs/nest.

JOB/ACTIVITY 1D: Through direct examination of prey in nest boxes, maintain data base of annual boreal owl diets.

T. Booms visually assessed prey remains present during box checks. The predominant remains were those of voles from the *Microtus* and *Clethrionomys* genera in similar proportions to that previously reported.

JOB/ACTIVITY 1E: Through the use of standard USFWS legbands, assess nest site fidelity of adult female boreal owls and gather information on movements and nesting area fidelity of fledgling owls.

T. Booms captured 12 after hatch year (AHY) female Boreal Owls from 12 nest boxes and banded 7 nestlings from 2 boxes. Of the 12 birds captured, three were previously captured and banded as part of this study. Two of these birds were at least 4 years old and nesting in the same nest box used when first caught in 2006. One owl was at least 3 years old and was nesting in a box within 1 km of the box it nested in when first caught in 2007. Hence, these data continue to support our general finding of high nest site fidelity among breeding Boreal Owls and only short-distance movements.

Prepared By: Travis Booms

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Alaska Department of Fish and Game
State Wildlife Grant

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

Project Number: **5.15**

Project Title: Determination of nesting locations and relative productivity of short-eared owls in East-central Alaska

Project Duration: 1 July 2008 – 30 June 2011

Report Period: 1 July, 2008 – 30 June 2009

Report Due Date: September 30, 2009

Partner: Alaska Department of Fish and Game

Project Objectives:

OBJECTIVE 1: Test the use of helicopter (Robinson R44) flushing techniques to determine efficacy of finding nests in the Fortymile drainages, Alaska.

JOB/ACTIVITY 1A: Establish standardized protocols for helicopter airspeed and altitude (above-ground-level) that will lead to locating nests/nesting locations of short-eared owls.

JOB/ACTIVITY 1B: Provide baseline information on relative values of various habitat types for short-eared owl nesting.

JOB/ACTIVITY 1C: At each identified short-eared owl nest location, document productivity (number of eggs/young) and timing of various phases of the reproductive cycle in eastern Interior Alaska.

JOB/ACTIVITY 1D: Collect information on short-eared owl diets based on prey remains found in/near nests.

Summary of Project Accomplishments:

OBJECTIVE 1:

JOB/ACTIVITY 1A: Establish standardized protocols for helicopter airspeed and altitude (above-ground-level) that will lead to locating nests/nesting locations of short-eared owls.

T. Booms and a field technician searched for nesting Short-eared Owls from an R44 helicopter for 13 hours over three days in June and covered 416 linear kilometers of potential nesting habitat. We observed a total of 45 owls. We flushed 28 owls from the ground in front of the helicopter and found 2 Short-eared Owl nests. Airspeed varied from 18-55 km/hr and altitude varied from 10-40 meters above ground. The most effective, efficient airspeed for flushing Short-

eared Owl was 37 km/hr at an altitude of 15-20 meters above ground. We recommend these values be followed for future survey protocols.

JOB/ACTIVITY 1B: Provide baseline information on relative values of various habitat types for short-eared owl nesting.

While surveying the 416 km, almost all Short-eared Owls observed were in grassland, tundra, or low shrubland habitat types. Both nests occurred in areas with mixed dwarf birch, willow, sedges, and grasses. Few birds were found in areas that had not been burned. Detailed habitat data was collected at each nest site and these data will be compiled for descriptive purposes.

JOB/ACTIVITY 1C: At each identified short-eared owl nest location, document productivity (number of eggs/young) and timing of various phases of the reproductive cycle in eastern Interior Alaska.

T. Booms counted the eggs in each nest (1 and 3 eggs) and returned the following day to determine if eggs were still being laid. Both nests contained an additional egg on the subsequent day, indicating the owls were still in the egg-laying phase.

JOB/ACTIVITY 1D: Collect information on short-eared owl diets based on prey remains found in/near nests.

T. Booms searched both nest locations extensively for prey remains or pellets, but found no evidence of either. No information on diet could therefore be collected.

Prepared By: Travis Booms