

Raptors – Introduction

This species group includes resident and migratory raptors that breed in Alaska and have experienced (or are likely to experience impacts causing) population declines, loss of habitat, impacts from contaminants, changes in breeding range, or threats while migrating or wintering outside Alaska. Since raptors are high trophic-level predatory birds, they serve as indicator species of ecological changes and other human-induced influences or impacts and may serve as “barometers” of significant impacts in the ecosystem. Some raptors are secretive and not well known or understood, and these species have been included to further understand and conserve little-known species.

This account is an assemblage of templates that addresses the conservation of raptors using species with historical baseline studies that demonstrate sensitivity to environmental or ecological changes. Monitoring of selected raptor populations in Alaska largely began in the mid 1970s, with particular emphasis on cliff-nesting raptors in tundra regions, peregrine falcons in Interior and Arctic Alaska, Bald Eagles in south coastal areas, and forest owls in Southcentral Alaska. Species templates were developed to include species with conservation concerns representing a cross-section of biomes (tundra, boreal forest, and temperate rain forest), contaminant-affected species, migrant species, forest owl species, restricted habitat species, little-known species, and high-profile species of public interest.

Six templates covering single species or groups of species are presented. Additional introductory information is provided at the beginning of each template:

Northern Goshawk (*Accipiter gentilis atricapillus*) and Queen Charlotte Goshawk (*A. g. laingi*), representing boreal forest and temperate rain forest habitats (respectively) where forest management (logging, fire) may affect species through changes in habitat and/or prey.

Contaminant-affected species (Peregrine Falcon, *Falco peregrinus*; Bald Eagle, *Haliaeetus leucocephalus*; Osprey, *Pandion halieatus*; and Merlin, *Falco columbarius*) associated with aquatic habitats and the presence of environmental contaminants.

Migrant raptors (Golden Eagle, *Aquila chrysaetos*; Rough-legged Hawk, *Buteo lagopus*; Red-tailed or Harlan’s Hawk, *Buteo jamaicensis*; Sharp-shinned Hawk, *Accipiter striatus*; Northern Harrier, *Circus cyaneus*; and Short-eared Owl, *Asio flammeus*) that may have some conservation concerns away from Alaska while migrating and/or on their wintering grounds.

Forest owl species in coastal temperate rain forest (Western Screech-Owl, *Megascops kennicottii*; Northern Pygmy-Owl, *Glaucidium gnoma*; Barred Owl, *Strix varia*; Northern Saw-whet Owl, *Aegolius acadicus*; Great Horned Owl, *Bubo virginianus*, also found in boreal forest) and boreal forest (Great Gray Owl, *Strix nebulosa*; Boreal Owl, *Aegolius funereus*; Northern Hawk Owl, *Surnia ulula*; Great Horned Owl) that are little understood.

Snowy Owl (*Bubo scandiacus*), a species closely linked with the abundance of brown lemmings (*Lemmus sibiricus*) and highly responsive to varying abundance of

prey, nest in localized areas on the North Slope in close proximity to expanding oil/gas infrastructure and may be impacted by broad climate changes or localized resource development.

Gyrfalcons (*Falco rusticolus*) and Black Merlins (*Falco columbarius suckleyi*), species with high public or scientific profile and restricted or specific habitat requirements, are representative of tundra and temperate rain forest habitats (respectively) where broad-scale changes in habitat or impacts from resource development would have significant impact on species abundance or distribution.

Northern Goshawk

A. Species description description

Common name: Northern goshawk

Scientific name: *Accipiter gentilis*

Two subspecies exist in Alaska, the widely distributed Northern Goshawk (*A. g. atricapillus*), which occurs throughout most of the state, and the Queen Charlotte Goshawk (*A. g. laingi*), which occupies the coastal temperate rain forests of Southeast Alaska (Squires and Reynolds 1997). These subspecies probably intergrade in northern Southeast Alaska (ADF&G unpublished data, Iverson et al. 1996). For the purposes of this document, we regard goshawks in Southeast Alaska as *A. g. laingi*, and those in other portions of the state as *A. g. atricapillus*.

B. Distribution and abundance

Range:

Global range comments: Holarctic.

State range comments:

A. g. laingi: Coastal temperate rain forest from Dixon Entrance to northern Southeast Alaska, boundary unknown.

A. g. atricapillus: Boreal forests throughout state, northern extent not clear but sightings up to and beyond the northern extent of trees.

Abundance:

Global abundance comments: Approximately 490,000 (Rich et al. 2004).

State abundance comments:

A. g. laingi: Unknown.

A. g. atricapillus: No reliable population estimates exist (USFWS 2001); Interior breeding density ranged from 1 pair/41 km² to 1 pair/372 km² (McGowan 1975), and appeared tied to snowshoe hare numbers (Doyle and Smith 1994).

Trends:

Global trends: Unknown but thought to be stable, increasing in some areas, decreasing in others.

State trends: Unknown but potentially declining in some parts due to habitat alteration. Populations fluctuate with prey cycles.

C. Problems, issues, or concerns for species

- Queen Charlotte Goshawks are landscape species, i.e., use space at a landscape level of scale and thus are difficult and costly to study.
- Standard techniques used to locate breeding goshawks and monitor population have limited utility in Southeast Alaska.
- After a 10-year study, still do not have realistic estimate of goshawk population in Southeast Alaska.
- Importance of prey species is not well understood.
- Goshawk ecology and habitat relationships in boreal forests are known only from specific locales and broad-based information is needed.
- Effects of forest management are not well studied.
- Use of second-growth forest by goshawks in forest management areas is not well understood.
- Raptors in general and Northern Goshawks specifically, are susceptible to West Nile Virus (Saito et al. 2003, Marge Gibson, personal communication).

D. Location and condition of key or important habitat areas

A. g. laingi: Coastal, temperate old growth – Goshawks nest and forage in forest stands with high timber volume and dense overstory canopy above a relatively open understory (Reynolds et al. 1982; Beier and Drennan 1997; Squires and Reynolds 1997; Widén 1989; Daw and DeStefano 2001); condition of this habitat is good.

A. g. atricapillus: Boreal forest, general (McGowan 1975); condition of this habitat is very good to pristine.

E. Concerns associated with key habitats

A. g. laingi: Forest management in portions of Southeast Alaska (for nesting and foraging):

- No knowledge of prelogging population status.
- Previous study in relation to forest management practices has produced incomplete assessment of impacts on species.
- Nest-based management systems are not effective because goshawk nests are very difficult to locate.

A. g. atricapillus: Changes in boreal forest habitat

- Possibly due to logging, death of forest from spruce bark beetle infestation, catastrophic fire caused by suppression, or some combination of the above.

F. Goal: Ensure Northern Goshawk populations remain sustainable throughout their range within natural population-level variation and historical distribution across Alaska.

G. Conservation objectives and actions

State conservation and management needs:

Objective 1: Conserve sustainable goshawk populations in Southeast Alaska.

Target: A naturally distributed population in Southeast Alaska.

Measure: Index of abundance based on survey of known nesting areas.

Issue: Considerable effort has gone into surveying for breeding goshawks and monitoring known nests, yet these resulting data are insufficient for a reliable assessment regarding the status of goshawks in Southeast Alaska.

Conservation actions:

- a) Maintain habitat capable of sustaining goshawks distributed through the region.
- b) Maintain current old-growth reserve system stipulated in Tongass National Forest - Forest Plan (TLMP).
- c) Employ resource selection modeling based on existing nesting and foraging habitat data to build predictive model to determine what landscape is most favorable to goshawks.
- d) Work collaboratively to review existing goshawk conservation measures in TLMP.

Objective 2: Manage habitats to ensure long-term sustainable goshawk populations in Southeast Alaska.

Target: Integrated forest management that provides for sustainable goshawk populations in Southeast Alaska.

Measure: Conservation strategies associated with forest management.

Issue: Review current standards and guidelines in forest plan.

Conservation actions:

- a) Evaluate existing goshawk conservation measures in TLMP.
- b) Based on interagency goshawk study, recommend refined standards and guidelines for conserving and sustaining goshawk habitats in a multiple use setting on national forest managed lands.
- c) Work with state and private land managers to conserve and sustain goshawk habitat in a multiple use setting.
- d) Coordinate with agencies in British Columbia to compile information on Queen Charlotte Goshawk and standardize techniques.
- e) Coordinate with Northern Goshawk researchers in other states on management and conservation guidelines and strategies for this species.
- f) Publish results of ADF&G/USFS cooperative goshawk study.

Objective 3: Learn more about Northern Goshawk ecology in Southeast Alaska.

Target: More complete understanding of goshawk ecology in Southeast Alaska.

Measure: Data concerning goshawk ecology, habitat relationships, and prey ecology.

Issue 1: We have little knowledge about the ecology of important prey species of goshawks in Southeast Alaska, including Blue Grouse (*Dendragapus obscurus*) and Spruce Grouse (*Falcapennis canadensis*), red squirrel (*Tamiasciurus hudsonicus*), Stellar's Jay (*Cyanocitta stelleri*), thrushes (Varied Thrush [*Ixoreus naevius*], American Robin [*Turdus migratorius*], *Catharus* spp.), Northwestern Crow (*Corvus caurinus*), and ptarmigan spp. (*Lagopus* spp.) (Lewis 2001).

Conservation actions:

- a) Learn best methods to survey prey species to determine density in a variety of landscapes.
- b) Learn how key prey species are associated with forest management.

Issue 2: A lack of knowledge concerning how forest management affects goshawks.

Conservation actions:

- a) Investigate species response to land management practices, especially logging; determine if there are thresholds in the amount of the landscape logged below which goshawk populations decline.
- b) Quantify relationship between amount of mature forest and nesting density and survival.

Issue 3: A lack of knowledge concerning how goshawks use second-growth forest.

Conservation actions:

- a) Determine how goshawks use second growth.
- b) Determine if second growth can be managed to improve it for goshawks, or make it available to them sooner for foraging.
- c) Partner with USFS to study second-growth management to improve habitat for goshawks, their prey, and other wildlife.

Issue 4: Standard inventory methods do not provide consistent method to monitor goshawk population.

Conservation action: Develop a standardized, cost-efficient protocol for inventory, data collection, and monitoring.

Issue 5: Efficacy of nest-based conservation strategy.

Conservation action: Investigate landscape level conservation strategy for goshawks in Southeast Alaska (and possibly in conjunction with British Columbia) similar to that being used in Southwest region of USFS (Reynolds et al. 1992).

Issue 6: Little knowledge of goshawk ecology and habitat relationships on boreal forests of state.

Conservation action: Develop population status and trend information over broad areas of boreal forest (document populations, locations, habitat used, diet, and other aspects of ecology).

Issue 7: Little knowledge concerning potential impact of West Nile Virus on goshawks and their susceptibility to this virus in Alaska.

Conservation action: Collaborate with existing ADF&G and U.S. Centers for Disease Control and Prevention efforts on surveying dead birds for virus to detect if (or when) virus appears in Alaska.

H. Plan and time frames for monitoring species and their habitats

ADF&G recently completed field portion of long-term study of ecology and habitat relationships of goshawk in Southeast Alaska. Data should be thoroughly analyzed in cooperation with other agencies, and future field work should rely on the results from previous work among all key agencies.

I. Recommended time frame for reviewing species status and trends

In 5 years, review state of knowledge (final results from interagency study will have been peer-reviewed and published); annual cooperator meetings should be convened to outline the goals and objectives among all key agencies.

J. Bibliography

- Andersen, D.E., S. DeStefano, M.I. Goldstein, K. Titus, C. Crocker-Bedford, J.J. Keane, R.G. Anthony, and R.N. Rosenfield. 2003. The status of northern goshawks in the western United States. Wildlife Society Technical Review 04-1. The Wildlife Society, Bethesda, MD.
- Beier, P. and J.E. Drennan. 1997. Forest structure and prey abundance in foraging areas of northern goshawks. Ecological Applications 7:564–71.
- Daw, S.K. and S. DeStefano. 2001. Forest characteristics of northern goshawk nest stands and post-fledging areas in Oregon. Journal of Wildlife Management 65:59–5.
- Doyle, F.I. and J.M.N. Smith. 1994. Population responses of northern goshawks to the 10-year cycle in numbers of snowshoe hares. Studies in Avian Biology 16:122–29.
- Iverson, G.C., G.D. Hayward, K. Titus, E. DeGayner, R.E. Lowell, D.C. Crocker-Bedford, P.F. Schempf, and J. Lindell. 1996. Conservation assessment for the northern goshawk in southeast Alaska. USFS, General Technical Report, PNW-387.
- Lewis, S.B. 2001. Breeding season diet of northern goshawks in Southeast Alaska with a comparison of techniques used to examine raptor diet [M.S. thesis]. Boise State University, Boise, ID.

Bibliography (continued)

- McGowan, J.D. 1975. Distribution, density, and productivity of goshawks in interior Alaska. Federal Aid in Wildlife Restoration Project Report, Job 10.6R, ADF&G, Juneau, AK.
- Reynolds, R.T., E.C. Meslow, and H.M. Wight. 1982. Nesting habitat of coexisting *Accipiter* in Oregon. *Journal of Wildlife Management* 46:124–138.
- Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, Jr., G. Goodwin, R. Smith and E.L. Fisher. 1992. Management recommendations for the northern goshawk in the southwestern United States. USFS, General Technical Report RM-217.
- Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, S.W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Iñigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, and T.C. Will. 2004. Partners in Flight North American landbird conservation plan. Cornell Lab of Ornithology, Ithaca, NY.
- Saito, E.K., L. Sileo, D.E. Green, C.U. Meteyer, D. Docherty, G. McLaughlin, and K. Converse. 2003. Raptor mortality due to West Nile virus, 2002. *American Journal of Tropical Medicine and Hygiene* 69:231–232.
- Squires, J.R. and R.T. Reynolds. 1997. Northern Goshawk (*Accipiter gentilis*). In: A. Poole and F. Gill, editors. *The Birds of North America*, No. 298. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- USFWS. 2001. Management plan for Alaska raptors: a plan covering all species of diurnal and nocturnal raptors that occur in Alaska. Juneau Raptor Management Program, Juneau, AK.
- Widén, P. 1989. The hunting habitats of goshawks *Accipiter gentilis* in boreal forests of central Sweden. *Ibis* 131:205–213.

Contaminant-affected Raptor Species

A. Species group description

Raptor species affected by environmental contamination due to their trophic position, aquatic associations, or documented contaminant levels

Common names: Bald Eagle, Osprey, Peregrine Falcon, and Merlin

Scientific names: *Haliaeetus leucocephalus*, *Pandion halieatus*, *Falco peregrinus*, and *Falco columbarius*

B. Distribution and abundance

Range:

Global breeding range comments:

Bald Eagle: North America; associated with aquatic habitats (coastal, rivers, lakes, reservoirs)

Osprey: Cosmopolitan; associated with aquatic habitats (especially shallow water for foraging)

Peregrine Falcon: Cosmopolitan; diverse habitats

Merlin: Holarctic; circumboreal; occasional occurrence in Central and South America

State range comments: All statewide

Abundance:

Global abundance comments:

Bald Eagle: estimated at 100,000 in 1999, increasing (Buehler 2000)

Osprey: estimated at 24,000 to 31,000 in early 1980s; increased 50–100% in many areas since then (BNA 2002)

Peregrine Falcon: no estimate of abundance (BNA 2002); *anatum* = 1365 in United States (USFWS 2003)

Merlin: no estimate of abundance in BNA (1993); 1972 population estimate of 8000 in Canada and United States (Johnsgard 1990)

State abundance comments:

Bald Eagle: 45,000 (Alaska Raptor Management Plan, based on Stalmaster 1987); likely more now

Osprey: Low hundreds of breeding pairs (Alaska Raptor Management Plan)

Peregrine Falcon: American subspecies (*P.f. anatum*) - 750–900 pairs (USFWS unpubl. data, 2001); Arctic subspecies (*P.f. tundrius*) - 225–250 pairs (USFWS unpubl. data, 1994); Peale's subspecies (*P.f. pealei*) - 600 pairs (Ambrose et al. 1988)

Merlin: Unknown; possibly in the low thousands

Trends:

Global trends: Since the Pesticide Era (post-1970), all have increasing to stable trend

Bald Eagle: increasing from estimate of 70,000 in 1980 (Buehler 2000)

Osprey: increasing (BNA 2002)

<p>Peregrine Falcon: North America – increasing 5–10% annually in late 1990s (BNA Merlin: decreasing numbers of migrants in 1980s and early 1990s; recent increases (BNA 1993)</p> <p><u>State trends:</u></p> <p>Bald Eagle – increasing; stable in Southeast Alaska since the early 1980s; limited evidence for increasing numbers in Prince William Sound (no data for last decade) and the Alaska Peninsula.</p> <p>Osprey – stable</p> <p>Peregrine Falcon – increasing</p> <p>Merlin – stable or increasing</p>
<p>C. Problems, issues, or concerns for species group</p> <p>All species vulnerable to effects of environmental contaminants due to their top trophic position, aquatic associations, or documented contaminant concentrations with associated effects. Recent studies indicate contaminants are still a problem for raptors in the Aleutians. Being apical predators, owls tend to be susceptible to contaminant loading. Consumption of prey with small amounts of environmental contaminants can result in bioaccumulation, leading to death or diminishing the potential for successful reproduction. An obvious example is DDT and its derivatives that caused eggshell- thinning and reduced reproductive performance in peregrines.</p>
<p>D. Location and condition of key or important habitat areas</p> <p>Peregrines: Aleutians, Interior rivers, North Slope rivers, Southeast Alaska coast – very good/pristine</p> <p>Bald Eagles: Aleutians, lake shore habitats, riverine areas, coastal areas – very good/pristine</p> <p>Osprey: Interior lakes and rivers – very good/pristine</p> <p>Merlin: Forest and tundra statewide – very good/pristine</p> <p>These species occur in a variety of habitats, which are in a variety of conditions. However, the primary issue is contaminant exposure, through point sources or atmospheric transport, in breeding, migrating, and wintering areas. This issue is not given to traditional evaluation of habitat quality, nor limited to within the state of Alaska. Within the state of Alaska, however, aquatic habitats are key to minimizing contaminant exposure.</p>
<p>E. Concerns associated with key habitats</p> <p>Because aquatic habitats concentrate contaminants from large terrestrial areas, they are key habitats to conserve from point source contamination, including leachate from landfills, mercury contamination from old mining sites, and persistent organic pollutants such as PCBs and DDT from military, municipal, and industrial sites.</p>

F. Goal: Conserve Peregrine Falcon, Bald Eagle, Osprey, and Merlin populations so that they remain sustainable throughout their natural range and within natural population-level variation and there is no need for endangered species type of management.

G. Conservation objectives and actions

State conservation and management needs:

Objective: Ensure that reproduction, mortality, and other population parameters are not significantly affected by contaminant concentrations in birds or their habitats.

Target: Contaminant concentrations (mercury and persistent organic pollutants, including chlorinated and brominated compounds) below those associated with reproductive impairment (e.g. mercury < 0.5 ppm wet weight in eggs, Peakall et al. 1990).

Measure: Periodic measurements of contaminants and reproductive or demographic parameters in breeding populations; compare contaminant concentrations to reproductive parameters and toxicity thresholds, and evaluate for trends through time.

Issue 1: Increases in levels of contaminants in these birds could affect their reproductive success and ability to sustain current population levels.

Conservation actions:

Coordinate with other state and federal agencies to:

- a) Collect samples to assess presence and degree of contamination (addled egg, feather) using standardized protocols (e.g. USFWS 2003).
- b) Determine if contaminants are found in Alaska or are being obtained during migration or during the winter.
- c) Leverage funding for collection and analyses.
- d) Interpret and analyze chemical and population parameter data as part of an interdisciplinary contaminant monitoring program.
- e) Monitor reproduction, mortality, or other population parameters in selected species affected by contaminants.

Issue 2: Point sources of contamination, including leachate from landfills, mercury contamination from old mining sites, and persistent organic pollutants such as PCBs and DDT from military, municipal, and industrial sites may concentrate in aquatic habitats and lead to increases in contaminant levels in these bird species.

Conservation actions:

- a) Monitor for presence of contaminants in raptors.
- b) Ensure contaminant levels in raptor habitats or food do not exceed safe levels.

Global conservation and management needs:

Objective: Similar to state conservation and management needs, above.

Issue: Atmospheric transport of contaminants from other countries to northern regions. Ultimately, raptor exposure to environmental contaminants is a global threat requiring international cooperation and regulation.

Conservation action: Participate in national and international efforts to reduce impact of environmental contaminants to raptors (e.g., AMAP).

H. Plan and time frames for monitoring species and their habitats

Integrate the American Peregrine Falcon post-delisting monitoring plan (USFWS 2003) with a comprehensive contaminant monitoring program that coordinates sample collections from ongoing studies and recommends contaminant sample collection every 3–5 years. Use the SWG Program to coordinate and supplement existing monitoring program. Although sample-size dependent, this is an appropriate interval (e.g., Ambrose et al. 2000) for raptors affected by contaminants.

I. Recommended time frame for reviewing species status and trends

Review and evaluate collected data at least every 5 years; revise strategy as appropriate based on contaminant concentrations in individual species.

J. Bibliography

- Alaska Raptor Management Program. 2001. Management Plan for Alaska Raptors. USFWS, Juneau, AK.
- Ambrose, R.E., R.J. Ritchie, C.M. White, P.F. Schempf, T. Swem, and R. Dittrick. 1988. Changes in status of Peregrine Falcon populations in Alaska. In: T.J. Cade, J.H. Enderson, C.G. Thelander, and C.M. White, editors. Peregrine Falcon Populations: Their Management and Recovery. The Peregrine Fund, Inc., Boise, ID. p. 73–82.
- Ambrose, R.E., A. Matz, T. Swem, and P. Bente. 2000. Environmental contaminants in American and Arctic Peregrine Falcon eggs in Alaska, 1979–95. Technical Report NAES-TR-00-02, USFWS, Northern Alaska Ecological Services, Fairbanks, AK. 67 p.
- Arctic Monitoring and Assessment Program: www.amap.no/
- Buehler, D.A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 506. The Birds of North America, Inc., Philadelphia, PA.
- Cade, T.J., J.H. Enderson, C.G. Thelander, and C.M. White, editors. 1988. Peregrine Falcon populations; their management and recovery. The Peregrine Fund, Inc., Boise, ID.

Bibliography (continued)

- Hickey, J.J., editor. 1969. Peregrine Falcon populations: their biology and decline. Univ. of Wisconsin Press, Madison.
- Peakall, D.B., D.G. Noble, J.E. Elliott, J.D. Somers, and G. Erickson. 1990. Environmental contaminants in Canadian Peregrine Falcons, *Falco peregrinus*: A toxicological assessment. Canadian Field-Naturalist 104:244–254.
- Poole, A.F., R.O. Bierregaard, and M.S. Martell. 2002. Osprey (*Pandion haliaetus*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 683. The Birds of North America, Inc., Philadelphia, PA.
- Sodhi, N.S., L.W. Oliphant, P.C. James, and I.G. Warkentin. 1993. Merlin (*Falco columbarius*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 44. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- White, C.M., N.J. Clum, T.J. Cade, and W.G. Hunt. 2002. Peregrine Falcon (*Falco peregrinus*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 660. The Birds of North America, Inc., Philadelphia, PA.
- USFWS. 2003. Monitoring Plan for the American Peregrine Falcon, a Species Recovered Under the Endangered Species Act. USFWS, Divisions of Endangered Species and Migratory Birds and State Programs, Pacific Region, Portland, OR. 53 p.

Diurnal Migrant Raptors – Introduction

Rationale for choosing these species/species group: There is potential for impacts to these species when they are not in Alaska, either on the wintering grounds or during migration. The condition of habitats and threats along migration routes/wintering areas are major concerns for migratory raptors. Differing migration strategies and life histories need to be considered when developing conservation strategies for these species. For example, species migrating into Central and South America may have greater threats than species wintering north of Mexico. Grouping these species provides a broad-based connection based on their migratory behavior, and it reduces the total number of featured species requiring individual treatment.

Diurnal Migrant Raptors

A. Species group description

Common and Scientific names: species group – diurnal migrant raptors

Golden Eagle - *Aquila chrysaetos*

Rough-legged Hawk - *Buteo lagopus*

Red-tailed Hawk - *Buteo jamaicensis* (Harlan's Hawk - *Buteo jamaicensis harlani*)

Sharp-shinned Hawk - *Accipiter striatus*

Northern Harrier - *Circus cyaneus*

Short-eared Owl - *Asio flammeus*

B. Distribution and abundance

Range:

Global range comments:

Golden Eagle - Holarctic – open spaces with cliff-nesting habitat

Rough-legged Hawk - Panboreal – taiga and tundra habitats

Red-tailed Hawk - North and Central America, Caribbean Islands; diverse habitats – woodlands with open areas

Sharp-shinned Hawk - New World: North and South America; deciduous, coniferous and mixed forests (Bildstein and Meyer 2000)

Northern Harrier - Holarctic; New World includes Central America (MacWhirter and Bildstein 1996)

Short-eared Owl - Holarctic; New World includes South America – open, nonforested habitats

State range comments: can be found statewide.

Abundance:

Global abundance comments: variable by species

Golden Eagle – up to 100,000 in North America during 1970s; subsequent declines outside of Alaska (Kochert et al. 2002)

Rough-legged Hawk – no estimate of abundance; CBC estimate of 50,000 wintering birds in North America (Bechard and Swem 2002)

<p>Red-tailed Hawk – <i>B. j. harlani</i> – no estimate of abundance Sharp-shinned Hawk – no estimate of abundance (Bildstein and Meyer 2000) Northern Harrier – no estimate of abundance (MacWhirter and Bildstein1996) Short-eared Owl – no estimate of abundance</p> <p><u>State abundance comments:</u> variable by species. Within specific habitats, certain species are frequent.</p> <p>Golden Eagle – high densities in Denali National Park (Kochert et al. 2002) Rough-legged Hawk – high densities along some rivers in some years associated with small mammal populations Red-tailed Hawk – unknown and variable by region and habitat Sharp-shinned Hawk – unknown Northern Harrier – unknown Short-eared Owl – unknown</p> <p>Trends:</p> <p><u>Global trends:</u> unknown, but not believed to be declining, except perhaps for Short-eared Owl, which may be declining.</p> <p>Golden Eagle – declining in western United States; stable in Denali National Park, Alaska; unknown in remainder of Alaska (Kochert et al. 2002). Rough-legged Hawk – Palmer (1988) reported no evidence of change in North America (Bechard and Swem 2002); natural variations in abundance occur. Red-tailed Hawk – <i>B. jamaicensis</i> – recent increases, up to 30% in some areas; <i>B. j. harlani</i> – no data (Preston and Beane 1993). Sharp-shinned Hawk – declining in North America 1940s–1970s and again in 1990s (Bildstein and Meyer 2000). Northern Harrier – declining in North America during 20th Century due to loss of habitat (MacWhirter and Bildstein1996). Short-eared Owl – declining in North America since listed by National Audubon Society in 1976 (Holt and Leasure 1993); declining in North America and designated high priority by Partners in Flight (2004).</p> <p><u>State trends:</u> currently undetermined. Habitat for Harlan’s Hawk may be increasing in Southcentral Alaska with changes in habitat. Prey-dependent species (Short-eared owl, Northern Harrier, Rough-legged Hawk, Golden Eagle) can vary widely in annual abundance.</p> <p>Golden Eagle – unknown Rough-legged Hawk – unknown Red-tailed Hawk – unknown Sharp-shinned Hawk – unknown Northern Harrier – unknown Short-eared Owl – unknown</p>
<p>C. Problems, issues, or concerns for species group</p> <ul style="list-style-type: none"> • Lack of knowledge about population size and trend (e.g., Sharp-shinned Hawk, Harlan’s Hawk, Northern Harrier, Short-eared Owl, Golden Eagle and Rough-legged Hawk)

<ul style="list-style-type: none"> • Migration corridors may not be well defined; patterns possibly too diffuse; difficulty of finding, and accessing, suitable migration corridors; finding sufficient, qualified personnel to operate sites; migration count data in Alaska is not reliable to monitor population trends • Need for long-term data stewardship • Potential impacts at wintering grounds such as shooting, poisoning, and habitat alteration and habitat loss • As migrants, these species have increased potential for exposure to West Nile Virus
<p>D. Location and condition of key or important habitat areas</p> <ul style="list-style-type: none"> • tundra – very good • temperate forest – variable by location • boreal forest – variable by location • Southcentral forests – spruce bark beetle impacted • temperate rain forest – variable by location • migratory routes – variable by location • wintering grounds – variable by location
<p>E. Concerns associated with key habitats</p> <p>Concerns for key breeding habitats in Alaska:</p> <ul style="list-style-type: none"> • logging – loss or conversion of nesting habitat has an impact on migrant species returning to Alaska to breed (exception: Harlan’s Hawks and other species may actually benefit from conversion of dense or mature stands to more open areas). • spruce bark beetle – created massive habitat change in Southcentral forests, which is likely to have impacts on migratory raptors that use this area. • tundra – impact of resource development (oil, gas and mining). Roads bring people, disturbance, increased competitors/predators associated with humans (e.g., fox, ravens).
<p>F. Goal: Ensure that diurnal raptor populations remain sustainable throughout their range within natural population-level variation and historical distribution across Alaska.</p>
<p>G. Conservation objectives and actions</p> <p>State conservation and management needs:</p> <p>Objective: Maintain diurnal migrants at sustainable population levels.</p> <p>Target: Maintain population indices within observed variability.</p> <p>Measure: Index of population size based on standardized counts of migrants at established monitoring sites (to be considered in combination with breeding ground counts, reproductive estimates, etc.).</p> <p>Issue 1: <u>Migration corridors may not be well defined; patterns possibly too diffuse; difficulty of finding, and accessing, suitable migration corridors.</u></p>

Conservation actions:

- a) Identify and develop migratory monitoring sites by coordinating work and efforts with biologists from Yukon Territory, Canada and Hawk Watch International.
- b) Use protocol for identifying locations established by Hawk Migration Association of North America.

Issue 2: Finding sufficient, qualified personnel to operate monitoring sites is difficult.

Conservation actions:

- a) Coordinate with organizations already involved (e.g., Alaska Bird Observatory, Hawk Watch International).
- b) Publicize the concept of migratory raptor management which utilizes standardized monitoring procedures within professional and/or volunteer birding community, e.g. Hawk Migration Association of North America.

Issue 3: Lack of knowledge about population levels of diurnal migrants.

Conservation action: Develop methods to link abundance and trend of migrants with their actual population size.

Issue 4: Spruce bark beetle infestations have created massive habitat change in Southcentral forests, which is likely to have impacts on migratory raptors that use this area.

Conservation action: Coordinate with researchers involved with consequences of spruce bark beetle infestation to assess potential impacts to migratory raptors.

Issue 5: Potential impacts at wintering grounds (e.g., shooting Rough-legged Hawk and Golden Eagle, road kills, poisoning of Golden Eagle on ranches), habitat alteration and habitat loss.

Conservation action: Use stable isotope methods to locate wintering grounds. Explore potential for feather analysis to determine natal areas through use of stable isotopes.

Issue 6: There is no single entity responsible for the long-term stewardship of data.

Conservation action: Initiate discussions with potential governmental and nongovernmental organizations on who should be the lead coordinating group for data storage and standardized protocol development.

Issue 7: As migrants, these species have increased potential for exposure to West Nile Virus, may be more susceptible to it, and may affect Alaska breeding populations by succumbing to disease outside of Alaska.

Conservation action: Continue existing ADF&G and CDC efforts on surveying dead birds for virus to detect if (or when) virus appears in Alaska.

Global conservation and management needs:

Conservation actions:

- a) Determine if Short-eared Owls are nomadic between continents.
- b) Consult Birds of North America accounts for global impacts.
- c) Access Bird Banding Lab database for information about band recoveries and returns to determine summer/winter relationships using existing data.

H. Plan and time frames for monitoring species and their habitats

Year 1–2: review data and develop monitoring plan

1. Review existing information on migration monitoring in Alaska and western Canada.
2. Determine efficacy of additional monitoring and sample sizes necessary.
3. Use results from 1 and 2 to determine the feasibility of establishing more monitoring sites.
4. If monitoring or migrants is not feasible, evaluate alternatives.
5. If feasible, then establish partnership with HawkWatch International to start developing a migration monitoring strategy.

Year 3 +: Continue monitoring.

Year 5 +: Begin assessing data collected to establish baseline.

I. Recommended time frame for reviewing species status and trends

Review strategy every 5 years.

J. Bibliography

Alaska Raptor Management Program. 2001. Management Plan for Alaska Raptors. USFWS, Juneau, AK.

Bechard, M.J. and T.R. Swem. 2002. Rough-legged Hawk (*Buteo lagopus*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 641. The Birds of North America, Inc., Philadelphia, PA.

Bildstein, K.L. and K. Meyer. 2000. Sharp-shinned Hawk (*Accipiter striatus*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 482. The Birds of North America, Inc., Philadelphia, PA.

Holt, D. W. and S. M. Leasure. 1993. Short-eared Owl (*Asio flammeus*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 62. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Kochert, M.N., K. Steenhof, C.L. McIntyre, and E.H. Craig. 2002. Golden Eagle (*Aquila chrysaetos*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 684. The Birds of North America, Inc., Philadelphia, PA.

Bibliography (continued)

- MacWhirter, R.B. and K.L. Bildstein. 1996. Northern Harrier (*Circus cyaneus*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 210. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Preston, C.R. and R.D. Beane. 1993. Red-tailed Hawk (*Buteo jamaicensis*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 52. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Black Merlin and Gyrfalcon

A. Species group description

This group contains 2 raptors, Gyrfalcon and Black Merlin, that have restricted ranges in Alaska and conservation issues related to habitat change and population status.

Common name: Gyrfalcon **Scientific name:** *Falco rusticolus*

Common name: Black Merlin **Scientific name:** *Falco columbarius suckleyi*

B. Distribution and abundance

Gyrfalcon:

Range:

Global range comments: Holarctic – Arctic regions of Northern Hemisphere.

State range comments: Most common north of Brooks Range, in parts of Alaska Range, and on the Seward and Lisburne Peninsulas but distributed throughout tundra locations (USFWS 2001).

Abundance:

Global abundance comments: Approximately 110,000 (Rich et al. 2004).

State abundance comments: Estimated 375–675 pairs in Alaska (Swem et al. 1994) but varies with season. Some Alaskan birds migrate from state during winter while others remain in general breeding areas.

Trends:

Global trends: Unknown

State trends: Unknown – likely stable overall

Black Merlin:

Range:

Global range comments: Coastal locations from northern Southeast Alaska south to Oregon (Sodhi et al. 1993).

State range comments: Southeast Alaska (USFWS 2001)

Abundance:

Global abundance comments: Unknown

State abundance comments: Unknown

<p>Trends:</p> <p><u>Global trends:</u> Unknown but thought to be stable, increasing in some areas, decreasing in others.</p> <p><u>State trends:</u> Unknown but potentially declining in some parts due to habitat loss.</p>
<p>C. Problems, issues, or concerns for species group</p> <p>Gyr Falcon: Baseline information only available from specific locales, need baseline information from majority of range, i.e., habitat associations, response to fluctuating prey base, migratory and movement patterns.</p> <p>Black Merlin: Lack of information concerning natural history and taxonomic status of subspecies.</p>
<p>D. Location and condition of key or important habitat areas</p> <p>Gyr Falcon: nest on protected ledges on cliffs, along rivers, mountains and coasts – pristine; forage over tundra – pristine.</p> <p>Black Merlin: coastal, temperate rain forest – very good to pristine; localized areas of forest management – degraded.</p>
<p>E. Concerns associated with key habitats</p> <p>Gyr Falcon: Anticipated localized loss of nesting habitat in areas planned for mining in northwestern Alaska. Changes in habitat and prey due to climate change.</p> <p>Black Merlin: Loss of forest habitat in Southeast Alaska.</p>
<p>F. Goal: Ensure that Black Merlin and Gyr Falcon populations remain sustainable throughout their range within natural population-level variation and historical distribution across Alaska.</p>
<p>G. Conservation objectives and actions</p> <p>State conservation and management needs:</p> <p>Gyr Falcon:</p> <p><u>Objective:</u> Maintain Gyr Falcon populations in Alaska at current levels.</p> <p><u>Target:</u> Maintain nesting habitat protections for Gyr Falcons.</p> <p><u>Measure:</u> Monitor Gyr Falcons at known nesting sites.</p> <p><u>Issue:</u> Lack of knowledge of population status and trend.</p> <p>Conservation actions:</p> <ol style="list-style-type: none"> Learn more about Gyr Falcon populations so we have baseline information on which to base decisions concerning conservation status and threats to populations; Develop reliable survey methods for remote, inaccessible species. Monitor nesting success at important sites at risk. Collaborate with falconers for monitoring status and sharing data

Black Merlin:

Objective: Maintain Black Merlin populations in Alaska at current levels.

Target: Increase knowledge and information about population abundance of Black Merlins.

Measure: Population and habitat monitoring.

Issue 1: Lack of knowledge about natural history of this species.

Conservation action:

- a) Obtain baseline information about Black Merlin ecology in Southeast Alaska.
- b) Evaluate relationships between forest management and Black Merlins.
- c) Coordinate with other entities to understand merlin ecology throughout range.
- d) Develop practical survey method.

Issue 2: Lack of knowledge concerning taxonomic status of Black Merlin as a subspecies or simply a color morph.

Conservation action: In conjunction with natural history studies, collect feathers and or tissue with which to begin to evaluate taxonomic status of this species.

H. Plan and time frames for monitoring species and their habitats

Gyrfalcon:

USFWS, NPS, ADF&G, and private entities (e.g., ABR, Inc.) have expertise in the study of tundra raptors; use cooperative partnership of raptor biologists to identify study objectives and survey areas in monitoring plans. Reports should be in the form of a report due at 5 years after plan implementation, with annual summary reports (should not be required to be extensive).

Black Merlin:

Various state and federal agencies have raptor expertise, and they should use a coordinated approach in the study of this species along with other field studies. Reports should be in the form of a report due 5 years after plan implementation, with annual summary reports.

I. Recommended time frame for reviewing species status and trends

Review at 5 years.

J. Bibliography

Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, S.W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Iñigo-Elias, J.A. Kennedy, A. M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, and T.C. Will. 2004. Partners in Flight North American landbird conservation plan. Cornell Lab of Ornithology, Ithaca, NY.

Sodhi, N.S., L.W. Oliphant, P.C. James, and I.G. Warkentin. 1993. Merlin (*Falco columbarius*). In: A. Poole and F. B. Gill, editors. The birds of North America, No. 210. Academy of Natural Sciences, Philadelphia, PA, and American Ornithologists Union, Washington, DC. p. 1–20.

Bibliography (continued)

- Swem, T., C. McIntyre, R.J. Ritchie, P.J. Bente, and D.G. Roseneau. 1994. Distribution, abundance, and notes on the breeding biology of Gyrfalcons *Falco rusticolus* in Alaska. In: B.U Meyburg, and R.D. Chancellor, editors. Raptor conservation today. Pica Press, Helm Information, Robertsbridge, East Sussex, England. p. 437–444.
- USFWS. 2001. Management plan for Alaska raptors: a plan covering all species of diurnal and nocturnal raptors that occur in Alaska. Juneau Raptor Management Program, Juneau, AK.

Forest Owls – Introduction

Forest owls occurring in Alaska are identified as featured species in the conservation plan because of several factors. These factors include:

Forest owls are hard to detect, enumerate, and monitor. Therefore, we have very little knowledge about population size, status, and trend.

Forest fragmentation is occurring, and we don't have reliable statistics on the rate change occurring in the forest types where these owls occur.

Some owl species are negatively impacted by forest fragmentation, but we don't know the threshold of fragmentation that causes impacts, nor do we know the magnitude of the impact in relation to the total range of these species in Alaska.

Some owl species are enhanced by forest fragmentation, and we do not know the threshold of fragmentation that causes species to expand into new areas, nor do we know the magnitude of expansion in relation to the total range of these species in Alaska.

Conserving common species is an important conservation strategy; however, the lack of knowledge about forest owl species makes it hard to identify the commonness of these owl species.

Protecting vulnerable species is a core conservation strategy, yet lacking specific knowledge about forest owl species makes it difficult to identify strategies applicable to impacted species because we do not know which forest owl species are vulnerable or impacted.

Forest Owls

A. Species group description

“Forest Owls” is a grouping of 8 little-known species occurring in boreal forest (3 species) or temperate rain forest (4 species) in Alaska. One species (Great Horned Owl) occurs in both forest types.

Common names:

Coastal temperate rain forest owls include:

Western Screech-Owl, Northern Pygmy-Owl, Barred Owl, Northern Saw-whet Owl, and Great Horned Owl (also found in boreal forest)

Boreal forest owls include:

Great Gray Owl, Boreal Owl, Northern Hawk Owl, and Great Horned Owl (also found in coastal temperate rain forest)

Scientific names:

Western Screech-Owl – *Megascops kennicottii*
 Northern Pygmy-Owl – *Glaucidium gnoma*
 Barred Owl – *Strix varia*
 Northern Saw-whet Owl – *Aegolius acadicus*
 Great Gray Owl – *Strix nebulosa*
 Boreal Owl – *Aegolius funereus*
 Northern Hawk Owl – *Surnia ulula*
 Great Horned Owl – *Bubo virginianus*

B. Distribution and abundance

Range:

Global range comments: See Birds of North America.

Western Screech-Owl – Western North America – woodland and forest habitats; riparian deciduous; suburban.

Northern Pygmy-Owl – New World – Southeast Alaska through the western cordillera to Guatemala.

Barred Owl – New World – Southeast Alaska, central British Columbia eastward through southern Canada to New Brunswick and Nova Scotia, southward through most of the United States, into Mexico and Central America to Guatemala and Honduras; primarily in heavily forested areas.

Northern Saw-whet Owl – New World – woodlands and coniferous forests at moderate elevations and latitude.

Great Gray Owl – Circumboreal – boreal forest and montane coniferous forest.

Boreal Owl – Circumboreal – boreal forest and subalpine forest.

Northern Hawk Owl – Circumboreal – boreal forest and mixed deciduous/coniferous forest, burned areas.

Great Horned Owl – New World – North and South America; diverse habitats and elevation.

State range comments:

Western Screech-Owl, Northern Pygmy-Owl, Barred Owl, Northern Saw-whet Owl – generally, breeding limited to Southeast and Southcentral Alaska (coastal temperate rain forest).

Great Gray Owl, Boreal Owl, Northern Hawk Owl – generally, breeding in Southcentral and Interior Alaska (boreal forest).

Great Horned Owl – generalist; throughout Alaska where trees or thick shrubbery are available.

Abundance:

Global abundance comments: See Birds of North America.

Western Screech-Owl – no estimate of abundance (Cannings and Angell 2001); 740,000 worldwide; about 540,000 in North America (Rich et al. 2004).

Northern Pygmy-Owl – 2,000 to 10,000 in Canada (Holt and Petersen. 2000); 100,000, about 84,000 in North America (Rich et al. 2004).

Barred Owl – 10,000–50,000 pairs in Canada (Mazur and James 2000); 560,000 (Rich et al. 2004).

Northern Saw-whet Owl – 100,000–300,000 individuals (Cannings 1993); 2,000,000, with about 1,920,000 in North America (Rich et al. 2004).

<p>Great Gray Owl – no estimate of abundance. Density: 0.66 to 1.72 pairs/km² (Bull et al. 1993); 63,000, with about 31,500 in North America (Rich et al. 2004). Boreal Owl – no estimate of abundance (Hayward and Hayward 1993); 2,000,000, with about 600,000 in North America (Rich et al. 2004). Northern Hawk Owl – 10,000–50,000 individuals based on North America densities (Duncan and Duncan 1998); 130,000, with about 65,000 in North America (Rich et al. 2004). Great Horned Owl – no estimate of abundance (Houston et al. 1998); 5,300,000, with about 2,300,000 in North America (Rich et al. 2004). <u>State abundance comments:</u> unknown</p> <p>Trends: <u>Global trends:</u> see references Western Screech-Owl – declining due to habitat loss and invasion of Barred Owls (Cannings and Angell 2001). Northern Pygmy-Owl – unknown Barred Owl – expanding numbers and range in western North America (Mazur and James 2000). Northern Saw-whet Owl – unknown Great Gray Owl – unknown Boreal Owl – Scandinavia – reduced numbers due to removal of forest (Hayward and Hayward 1993). Northern Hawk Owl – Anecdotal evidence of decline since 1800s; decline in Northern Europe (Duncan and Duncan 1998). Great Horned Owl – cycle with prey availability; increasing in disturbed areas (Houston et al. 1998). <u>State trends:</u> unknown</p>	<p>C. Problems, issues, or concerns for species group</p> <ul style="list-style-type: none"> • Lack of knowledge about population status and trends. Current broad-scale bird survey methodologies (e.g., BBS, CBC) are generally lacking for owls and do not effectively monitor these species • Habitat alteration and fragmentation (e.g., logging, urbanization, mining) are occurring and impacts have not been assessed • Contaminants may affect health and reproduction • Disease (e.g., West Nile Virus) • Since the 1970s, Barred Owls have been expanding into Alaska and they may be impacting other owl species <p>D. Location and condition of key or important habitat areas</p> <p>Western Screech-Owl, Northern Pygmy-Owl, Barred Owl, Northern Saw-whet Owl: coastal, temperate rain forest – locally degraded.</p> <p>Northern Hawk Owl, Boreal Owl, and Great Gray Owl: boreal forest – good.</p> <p>E. Concerns associated with key habitats</p> <ul style="list-style-type: none"> • Lack of knowledge about species abundance and use of habitats • Habitat alteration from logging, urbanization, and mining is occurring in both habitats (boreal forest, rain forest)
--	---

F. Goal: Ensure that forest owl populations remain sustainable throughout their range within natural population-level variation and historical distribution across Alaska.

G. Conservation objectives and actions

Objective: Maintain current population levels for forest owls in respective biomes.

Target: For selected forest owls, identify and obtain density estimates (e.g. singing males/distance sampled).

Measure: Index of abundance based on density estimate methodology used (e.g., number of singing males during the breeding season per distance sampled).

Issue 1: Survey methods. There is a lack of knowledge about population status and trends because current broad-scale bird survey methodologies (e.g., BBS, CBC) do not effectively monitor owls. It is not clear what density of singing males is needed to conserve species, and it is unclear if singing male method is an appropriate method to estimate abundance.

Conservation actions:

- a) Develop and employ methodologies to measure populations accurately.
- b) Coordinate with existing owl monitoring groups to keep updated on changes or improvements in survey methods.
- c) Assess standard owl monitoring techniques (e.g., singing surveys, playback surveys, monitoring of nest boxes).
- d) Based on assessment above, identify, employ and, if necessary, develop methods to determine abundance and trend.
- e) Develop methodologies for nonsinging, noncavity-nesting species.
- f) Investigate relationship between health of non-owl species that build nests that may also be used as nesting sites by owls.

Issue 2: Nest boxes. It is unclear how placement and occupancy of nest boxes relates to population status and dynamics. Artificial nest structures may enhance breeding opportunity for several species and/or create artificially high densities in formerly vacant habitat. Populations using nest boxes may not be reflective of larger metapopulations.

Conservation action: Assess nest box checks as a standard owl monitoring technique.

Issue 3: Lack of knowledge about species use of habitats.

Conservation actions:

- a) Investigate habitat associations
- b) Conduct research to increase understanding of dependence on certain prey items, and what effect variations in prey abundance may have on owl populations
- c) Identify the spatial dispersion and physical features of suitable nesting cavities and surrounding vegetation types to include in conservation guidelines for forest managers.

Issue 4: Habitat modifications. It is unclear what amount of habitat change could negatively affect populations of these species.

Conservation action: Assess potential status related to habitat change.

Issue 5: Contaminants may affect health and reproduction of owls.

Conservation action: Assess potential threats from contaminants.

Issue 6: Disease, such as West Nile Virus, may affect health and reproduction of owls.

Conservation action: Assess potential threats from disease.

H. Plan and time frames for monitoring species and their habitats

Survey methods need development and 3–5 years will be needed to develop methods for assessing forest owl population status and trend for at least 2 species in each biome.

I. Recommended time frame for reviewing species status and trends

Five years from plan implementation.

J. Bibliography

Bull, E.L. and J.R. Duncan. 1993. Great Gray Owl (*Strix nebulosa*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 41. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Cannings, R.J. 1993. Northern Saw-whet Owl (*Aegolius acadicus*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 42. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Cannings, R.J. and T. Angell. 2001. Western Screech-Owl (*Otus kennicottii*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 597. The Birds of North America, Inc., Philadelphia, PA.

Duncan, J.R. and P.A. Duncan. 1998. Northern Hawk Owl (*Surnia ulula*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 356. The Birds of North America, Inc., Philadelphia, PA.

Hayward, G.D. and P.H. Hayward. 1993. Boreal Owl (*Aegolius funereus*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 63. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Hayward, G.D. and J. Verner, tech. editors. 1994. Flammulated, Boreal, and Great Gray Owls in the United States: A technical conservation assessment. Gen. Tech. Rep. RM-253. Fort Collins, CO: USFS, Rocky Mountain Forest and Range Experiment Station. 214. 3 Maps.

Holt, D.W. and J.L. Petersen. 2000. Northern Pygmy-Owl (*Glaucidium gnoma*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 494. The Birds of North America Inc., Philadelphia, PA.

Houston, C.S., D.G. Smith, and C. Rohner. 1998. Great Horned Owl (*Bubo virginianus*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 372. The Birds of North America, Inc., Philadelphia, PA.

Bibliography (continued)

Mazur, K.M. and P.C. James. 2000. Barred Owl. (*Strix nebulosa*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 508. The Birds of North America Inc., Philadelphia, PA.

Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, M.S.W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter. E.E. Inigo-Elias, J.A. Kennedy. A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C. M. Rustay, J.S. Wendt, and T.C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY.

Snowy Owl - Introduction

The rationale for featuring this species includes climate change and increasing human development (village growth and resource extraction) and the associated infrastructure, which may lead to changes in nesting of Snowy Owls. On the North Slope, Snowy Owls nest most reliably and are usually most abundant near the village of Barrow. Near Barrow, numbers and reproductive effort of Snowy Owls are thought to be linked to abundance of brown lemmings, which varies considerably from year to year. Anecdotal observations indicate that the periodicity and amplitude of brown lemming population fluctuations near Barrow may have changed in recent years. If so, this may affect Snowy Owl reproductive performance.

Snowy Owl

A. Species description description

Common name: Snowy Owl

Scientific name: *Bubo scandiacus*

B. Distribution and abundance

Range:

Global range comments: holarctic and nomadic

State breeding range comments: coastal tundra of northern and western Alaska

Abundance:

Global abundance comments: irruptive (increase rapidly and irregularly in number)

State abundance comments: irruptive

Trends:

Global trends: unknown

State trends: unknown

C. Problems, issues, or concerns for species

- Increased human presence in tundra areas (from village growth and expansion of development infrastructure and roads) may increase disturbance of Snowy Owls.
- Given their dependence on brown lemming populations, Snowy Owls may be impacted by changes in brown lemming population ecology, which may in turn be impacted by global climate change. Snowy Owls may be representative of a broad array of Arctic Coastal Plain species that could be impacted by broad-scale environmental change.

<ul style="list-style-type: none"> • Satellite telemetry data from work at Barrow suggests that Snowy Owls are a single Holarctic population. Effective management will need to address issues throughout the Arctic.
<p>D. Location and condition of key or important habitat areas</p> <p>Arctic tundra: very good but locally degraded, particularly immediately adjacent to Barrow where Snowy Owls habitually nest.</p> <p>Yukon-Kuskokwim Delta: very good but locally degraded.</p> <p>Aleutians and Bering Sea, winter habitat: very good.</p> <p>Beyond the borders of Alaska: unknown</p>
<p>E. Concerns associated with key habitats</p> <ul style="list-style-type: none"> • Human disturbance on tundra, including recreational use around villages (both foot and vehicular) • Human take by Siberian trappers (causing significant mortality) needs to be evaluated in relation to species characteristics and distribution (e.g. single holarctic species) • Broad-scale environmental changes (e.g., climate change)
<p>F. Goal: Ensure Snowy Owl populations remain sustainable throughout their range within natural population-level variation and historical distribution across Alaska.</p>
<p>G. Conservation objectives and actions</p> <p>State conservation and management needs:</p> <p>Objective: Maintain sustainable numbers of Snowy Owls, within observed annual variability.</p> <p>Target: Ensure that Snowy Owls continue to nest in key habitats and locales.</p> <p>Measure: On the North Slope and other breeding areas, use aerial waterfowl surveys as index of abundance and distribution.</p> <p>Issue 1: <u>Tremendous natural annual variation in density and distribution may reduce the power of surveys to discern long-term population trends.</u></p> <p>Conservation actions:</p> <ol style="list-style-type: none"> a) Use historic data to establish baseline detections and sample sizes to determine population trends. b) To monitor trends, repeat and expand the USFWS analysis of Snowy Owl abundance and distribution from aerial waterfowl survey data (Arctic Coastal Plain Eider Survey, North Slope Waterfowl Breeding Pair Survey). c) Cooperate with Canadian Wildlife Service to institute or expand surveys of Snowy Owls in Canada, including waterfowl surveys in which Snowy Owl observations are recorded. d) Cooperate with Russian and European biologists working with Snowy Owls on Wrangell Island and elsewhere to estimate abundance and trend globally.

Issue 2: Increased human presence in tundra areas (from village growth and expansion of development infrastructure and roads) may increase disturbance of nesting Snowy Owls, resulting in nest failures.

Conservation action: Determine the effect on Snowy Owls of disturbance from human presence.

Issue 3: Snowy Owls are closely linked with prey species (e.g., brown lemming) and may respond to climate change by being impacted by changes in availability and abundance of their primary prey. This species may be representative of a broad array of Arctic Coastal Plain species that could be impacted by broad-scale environmental change.

Conservation action: Evaluate population dynamics of brown lemmings and other small mammals near Barrow related to environmental change, including extrapolation to Snowy Owls and other Arctic Coastal Plain species.

Global conservation and management needs:

Objective: Ensure that Snowy Owls continue to nest in important nesting areas.

Target: Use aerial surveys as index of abundance and distribution.

Measure: Maintain numbers of Snowy Owls, within observed annual variability.

Issue: Changes in the global climate may affect brown lemmings, the primary prey species of Snowy Owls, and could therefore reduce Snowy Owl numbers.

Conservation action: Assess climatic change by investigating changes in Arctic habitats and winter sea ice conditions in relation to Snowy Owl distribution at the edge of the Arctic Ocean.

H. Plan and time frames for monitoring species and their habitats

Annual aerial waterfowl surveys on North Slope are currently conducted by USFWS. Additional surveys (western Alaska, Canada) should be conducted annually.

I. Recommended time frame for reviewing species status and trends

Strategy should be reviewed after 5 years; additional information should be compiled in the meantime.

J. Bibliography

- Alaska Raptor Management Program. 2001. Management Plan for Alaska Raptors. USFWS, Juneau, AK.
- Parmelee, D. 1992. Snowy Owl. In: A. Poole, P. Stettenheim, and F. Gill, editors. The Birds of North America, No. 10. Philadelphia: The Academy of Natural Sciences; Washington, DC: The American Ornithologists' Union.
- Petersen, J. and D.W. Holt. 1999. Observations on the Snowy Owl (*Nyctea scandiaca*) at Barrow, Alaska: A progress report 1992–1998. Owl Research Institute, Charlo, MT.