RAPTOR NESTING AND HABITAT SURVEY IN THE

ROSS LAKE DRAINAGE, WASHINGTON - 1987

HELICOPTER NESTING AND HABITAT SURVEY OF PEREGRINE FALCON, BALD EAGLE, GOLDEN EAGLE, AND OSPREY; AND GROUND-SURVEY OF SPOTTED, BARRED, AND GREAT GRAY OWLS IN THE ROSS LAKE DRAINAGE, WASHINGTON STATE.

Investigators:

Jonathan Björklund
David Drummond

National Park Service

Funded by:

Skagit Environmental Endowment Commission

Grant no. 87-09

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ABSTRACT

On 2 and 12 June 1987 helicopter nesting surveys were made to locate the federally Endangered Peregrine Falcon (Falco peregrinus), federally Threatened Bald Eagle (Haliaeetus leucocephalus), Golden Eagle (Aquila chrysaetos), and Osprey (Pandion haliaetus).

No Peregrine Falcons or eyries were detected. However the survey provided an excellent opportunity to view potential nesting habitat at close range. No Bald Eagles or nests were detected during the survey. About 10 stick nests, characteristic of Golden Eagle occurred on these cliffs. No Golden Eagles were observed on any nest, but at least one was active this year. Six known Osprey nests each had at least 1 adult present. Subsequent monitoring at 5 of these nests revealed only 3 juveniles fledged. This represents a ratio of 0.6 young per occupied nest, and 1.5 young per successful nest.

Censusing for Spotted Owls (Strix occidentalis), Great Gray Owls (S. nebulosa), and Barred Owls (S. varia) occured from 15 April to 20 June, 1987 (10 weeks).

We did not detect any Spotted or Great Gray Owls. However, 11 Barred Owls, 6 Northern Pygmy-Owls (Glaucidum gnoma), and 1 Great Horned Owl (Bubo virginianus) were located. The lack of Spotted Owls was attributed perhaps to the fact that old growth tends to occur in relatively narrow bands on valley bottoms in the study area. The majority of Barred Owls occurred in western hemlock/western red cedar with closed-canopy, 25 - 50 cm dbh (diameter at breast height).

INTRODUCTION

Many North American raptor populations have undergone dramatic man-caused declines from historic levels. Several hawk, falcon, and owl species indigenous to the northern Cascade Range have become extremely rare. Some have received federal and state listing as Endangered or Threatened species. Long-term breeding, wintering, and migration surveys coordinated by the U.S. Fish and Wildlife Service between 1970 and 1985 suggest that populations of most raptor species have stabilized, and some have now begun to increase. However, local densities are often well below historic levels, and geographic range is reduced for certain species, indicating full recovery is not guaranteed. Numerous researchers and resource managers are in the process of implementing management programs that hopefully will maintain and increase raptor populations to viable levels.

Because of their high level on food chains, raptors tend to be excellent indicator species. An indicator species is representative of other species that occupy the same habitat (Brown 1985). It is particularly sensitive to man-caused environmental impacts, and is expected to be among the first species to respond noticeably to significant impacts of this type. When an indicator species' population declines, other species that it represents are expected to have similar declines in the future if management actions are not taken.

Raptors are difficult to study (Newton 1979, Sherrod 1983). They tend to be highly mobile, have the capacity for rapid flight, have large home ranges, and are often migratory. Nesting raptors frequently cross boundaries between National Parks, National Forests, and state and private lands. It is difficult to assess whether raptors, prey species, and habitat are adequately protected on these lands. Locating nests and determining productivity from the ground are difficult.

The Skagit Environmental Endowment Commission awarded a grant (No. 87-09) of $ 7,000 (U.S.) to the National Park Service in 1987 for a raptor survey. This consisted of two phases, one was a helicopter survey of nesting Peregrine Falcons, Golden Eagles, Ospreys, and Bald Eagles carried out during 2 days in early June. The second phase included a ground-based census of Spotted, Great Gray, and Barred Owls, carried out over 10 weeks.

This study supplements a Skagit Environmental Endowment Commission raptor survey coordinated by Dave Dunbar (B.C. Ministry of Environment, Surrey) in the Skagit River drainage of British Columbia. Efforts were also coordinated with Ernie Garcia (District Biologist, Twisp) of Okanogan National Forest.

Helicopter Nesting-Survey

Helicopters recently have been used in raptor surveys, proving to be highly valuable tools (Boyce and White 1979, Monk 1980, Craig and Craig 1984). They enable observers to get close enough to nests to detect the presence of adults, young, and eggs. Potential nesting sites on remote cliffs and other habitats can be evaluated from close proximity. If used with sensitivity, a helicopter should not cause any significant disturbance to raptors that it encounters. Despite high rental fees, helicopters reduce overall costs because they do not require the extensive number of work-hours associated with locating and monitoring nests and habitat from the ground, particularly for initial detection.

Peregrine Falcon - The primary objective of the helicopter survey was to locate federally Endangered Peregrine Falcons, and evaluate potential nesting habitat. These falcons primarily nest on overhung ledges on precipitious cliffs. They lay eggs directly onto sand, rock or soil, without building a nest.

Since 1975, 10 Peregrine Falcon nesting territories are known to have been occupied by pairs in Washington State (Fred Dobler, Washington State Department of Wildlife, pers. comm.). One of these occurred in the Cascade Range, but at a considerable distance south of North Cascades National Park Service Complex (NOCA). Several other sites have been occupied by at least 1 adult. Seven active peregrine nesting sites were known in 1986. Five of these sites were successful, producing a total of 12 young.

The Pacific Coast Recovery plan for the Endangered Peregrine Falcon states that downlisting criteria will include 5 breeding pairs in the northern Cascade Range. Monitoring potential habitat is therefore necessary to detect nesting pairs in previously unoccupied areas.

In 1984 NOCA evaluated 13 areas of potential nesting habitat, based on foraging areas; and cliff features such as height, slope, aspect, and ledges. The highest rated sites were monitored from the ground in 1985. Eight of these sites were monitored from helicopter in 1986. No Peregrine Falcons or eyries were found. However, their presence is suspected.

Since 1968, 28 Peregrine Falcon sightings have been reported in or near NOCA. The biological staff could confirm only a few of these.

Golden Eagle - The Golden Eagle is an uncommon raptor in the northern Cascade Range, occurring most frequently in subalpine habitats. A Washington State survey in 1985 revealed 20 territories in all of Western Washington, with only 11 occupied (Fred Dobler, Washington State Department of Wildlife, pers. comm.). Despite the approximately 60 sightings in NOCA since 1968, no confirmed breeding has been detected. While looking for Peregrine Falcons on cliffs, it is possible to observe stick nests constructed by the Golden Eagle.

Osprey - Osprey populations declined significantly, primarily from DDT use, declines in fish populations, and destruction of nesting habitat. Populations recently have increased in most areas and they are not nationally endangered. A Washington State survey in 1984 found a minimum of 167 pairs nesting in Washington (Fred Dobler, Washington State Department of Wildlife, pers. comm.). Populations in the northern Cascade Range apparently have followed a similar trend. The osprey is a good indicator species for aquatic ecosystems. They usually nest quite close to lakes and rivers. It is possible to study Ospreys and their nests at lower elevations during helicopter surveys.

Bald Eagle - Washington has the largest number of nesting Bald Eagles of any of the western states. A total of 227 nesting pairs was seen in 1985. Although the Federally Threatened Bald Eagle is a moderately common winter resident of low valleys on the western

flanks of the northern Cascade Range, it is quite rare during breeding season. No known Bald Eagle nests exist in NOCA, though one lies within 2 km of the western boundary. Simailarly to Osprey, Bald Eagles nest close to rivers and lakes at low elevations.

Owl Ground-Survey

The objectives of this study were to obtain important data on density and distribution of Spotted, Great Gray, and Barred Owls in largely unsurveyed portions of the Ross Lake Basin (NOCA Complex and Okanogan NF). Additionally, details on habitat, nest location, and behavior were to be determined whenever possible.

The Spotted Owl is threatened from habitat loss throughout much of its range, due to logging of old-growth forests (Forsman et al. 1984, U. S. Fish and Wildlife Service 1982, Gutierrez and Carey 1985). The study area has relatively undisturbed habitat. Consequently, baseline data obtained during this study provide an excellent means for assessing how severely owl density, distribution, and behavior in disturbed habitats have diverged from natural conditions.

The Barred Owl previously did not occur in Washington State. It has undergone a recent range expansion and presently occupies much of the Pacific northwest (Eric Forsman, U. S. Forest Service, pers. comm.).

METHODS

Study Area

The Study Area comprises the portion of the Ross Lake. drainage that occurs in Washington State. This includes North Cascades National Park and Ross Lake National Recreation Area (part of the NOCA Complex), plus land administered by the Okanogan National Forest (Fig.1).

Helicopter Nesting-Survey

On 2 and 12 June 1987 raptor surveys were conducted from a helicopter in the Ross Lake basin. A few other nearby sites were visited briefly enroute to and from the helispot in Marblemount, Washington. The helicopter was a Hughes 500D operated with considerable skill by Anthony Reese of Hiline Helicopter, Darrington, Washington. Doors were removed to enhance visibility.

Peregrine Falcon - During the helicopter flight potential nesting cliffs were approached from above to minimize the risk of an aggressive falcon flying into the rotor. A sufficient number of horizontal passes were made at various levels on each cliff to

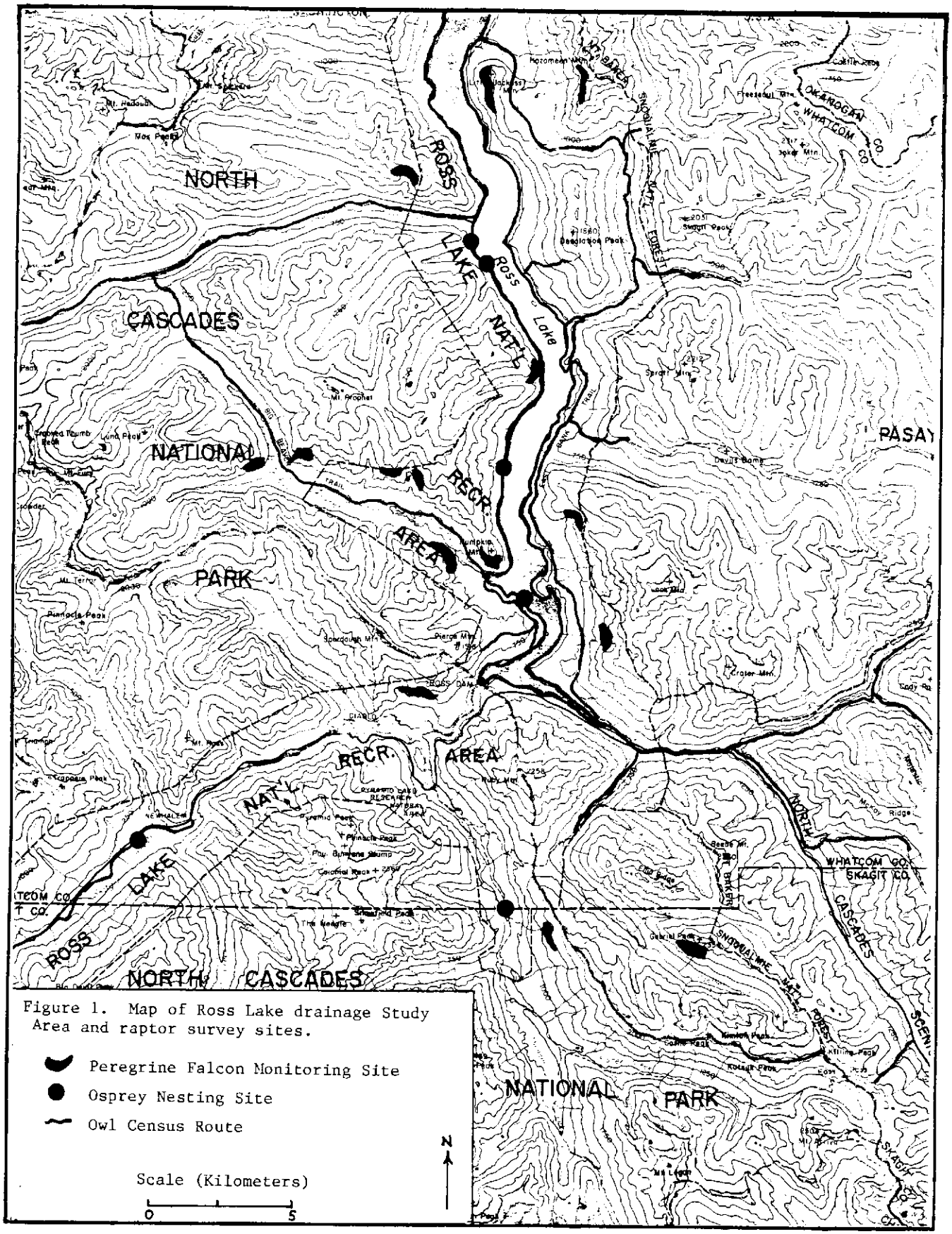

Figure 1. Map of Ross Lake drainage Study Area and raptor survey sites.

Table 1. Hiking and boating survey-routes and codes for Ross Lake drainage (USA), including approximate lengths of trail sections below 1220 m (4000 feet) elevation.

Trails	Route code	Distance Mi.	Km
NPS			
Desolation Peak	N01	5.0	8.0
East Bank	N02	31.0	49.8
Big Beaver (Ross Dam to Little Beaver Cr.)	N03	20.0	32.2
Little Beaver (to Twin Rocks Camp)	N04	15.0	24.1
Pierce Mountain	N05	3.0	4.8
Easy Pass	N06	1.0	1.6
Panther Cr.	N07	7.0	11.3
Ruby Cr. (to Okanogan NF boundary)	N08	1.0	1.6
Little Jack	N09	6.0	9.7
Freezeout Cr. (to Okanogan NF boundary)	N10	1.7	2.7
Three Fools Cr. (to Okanogan NF boundary)	N11	1.0	1.6
Subtotal		91.7	147.5
Okanogan NF			
Freezeout Cr.	F01	5.3	8.5
Three Fools Cr.	F02	4.0	6.4
Dry Cr.	F03	1.0	1.6
Ruby Cr. (NPS boundary to Granite Cr.)	F04	2.4	3.8
McMillan Park	F05	1.9	3.0
East Cr.	F06	2.0	3.2
Canyon Cr. (to Cascade Cr.)	F07	12.0	19.3
Mill Cr.	F08	3.3	5.3
Chancellor (from Canyon Cr.)	F09	1.0	1.6
Cady Pass (from Mill Cr.)	F10	1.0	1.6
Subtotal		33.9	54.5
Total		125.6	202.0

Boating	Route code
Ross Lake	RL1

completely cover the faces. Flight paths tended to be 70 m apart. We flew past 6 of the monitoring sites, identified in 1984, which had excellent potential habitat. These included Big Beaver Creek, Little Jackass Mountain, May Creek, Skymo Creek, Sourdough Mountain, and Thunder Creek. We visited an additional 18 new sites.

Golden Eagle - During the helicopter flight we recorded the number, location, condition, and presence of fresh vegetation on all large stick-nests found on cliff ledges.

Osprey - During the helicopter flight we approached osprey nests from about 150 m above and to the side. Disturbance was minimized by remaining very briefly above the nest, usually less than 30 seconds. Also, at least 1 observer kept any flying birds in sight so evasive maneuvers could be made with the helicopter if necessary. At each nest we recorded the number of adults, young, and eggs, if possible.

Owl Ground-Survey

Owl censusing occurred in the Ross Lake basin from 15 April to 20 June, 1987 (10 weeks). About 80% of the time was spent playing a Spotted Owl tape, and the remainder a Great Gray Owl tape. Two weeks included censusing Ross Lake shoreline by boat, and 8 weeks hiking on trails in the drainage.

Surveying along trails was limited to elevations below 1220 m (4,000 feet). This included approximately 147.5 km (91.7 mi.) in the NOCA Complex and 54.5 km (33.9 mi.) in the Okanogan NF, totalling 202 km (125.6 mi). Table 1 lists these trails and gives approximate distances for each section. Hiking and calling required about 1 hour for each 2.4 km (1.5 mi.) section of trail.

Censusing followed methods developed by the Washington State Department of Wildlife during their statewide survey in 1982 and 1983, except that habitat data were only obtained for stations at which owls were detected. Appendix A describes methods for establishing transects, distances between stations, sequence and duration of calling, and data entry on census sheets.

The work schedule included 10 days on followed by 4 days off, and ran 1700 - 0130 PDT.

RESULTS

Helicopter Nesting-Survey

All phases of the raptor survey field-work were completed as planned. Twenty-four cliffs were surveyed from helicopter (Table 2). Seven of these had been surveyed by helicopter in 1986.

Table 2. Cliffs evaluated during helicopter nesting survey of raptors on 2 and 12 June 1987, including physiographical suitability, and status of raptors. Sites surveyed in previous years by helicopter have an asterisk (*). Sites surveyed enroute to study area have a plus sign (+).

Cliffs surveyed on 2 June

BIG BEAVER CR. (LOWER) *
Four large sections with high vertical cliffs west of confluence. Numerous suitable ledges. One old stick-nest, no evidence of recent activity.

BIG BEAVER CR. - 39-mile Cr.
Large area on northeast side of valley with small to moderate size cliffs, varying suitability. Three stick-nests, no evidence of recent activity.

CANYON CR.
Small outcrops near confluence with Granite Cr., not very vertical. No evidence of recent activity.

EAST CR.
Small outcrop near confluence with Granite Cr., not very vertical. No evidence of recent activity.

GORGE LAKE (NEAR DAM) +
Large vertical cliff with prominent ledges and northern exposure. Stick-nest on prominent overhung ledge, apparently active in 1986.

HIDDEN-HAND PASS
Fairly extensive and vertical rock outcrops with suitable ledges. One Red-tailed Hawk soaring about 150 m away from upper cliff face at 1205 PDT.

HOZOMEEN MT.
Extensive vertical cliff with 3 - 5 suitable ledges. Heavily scoured in some sections. No evidence of recent activity.

LIGHTNING CR.
Surveyed drainage to Willow Lk. No suitable cliffs.

LITTLE BEAVER CR. (NORTH)
Near Beaver Pass. A few outcrops on east side of valley, best cliffs probably too high. Some vertical sections with 2 - 4 ledges. No evidence of recent activity.

LITTLE BEAVER CR. (SOUTH)
Near Beaver Pass. Moderate size, marginal habitat. Too wet, ledges heavily vegetated. No evidence of recent activity.

Table 2. Continued.

LITTLE JACKASS *
Extensive area, though few vertical sections or suitable ledges. No evidence of recent activity.

MAY CR. *
Extensive upper area, quite vertical. Portions appear too wet, and a high degree of scouring has left few suitable ledges. Second lower outcrop to the west, with fewer vertical sections. One large stick-nest, green vegetation indicating recent repair but no raptors seen.

MCMILLAN CR. (EAST)
Just east of Big Beaver Cr., prominent and vertical, a few suitable ledges. No evidence of recent activity.

MCMILLEN CR. (WEST) West of Big Beaver Cr., extensive and vertical, a few suitable ledges. No evidence of recent activity.

PANTHER CR.
Extensive high vertical cliffs on east side of Gabriel Pk., 6 - 8 suitable ledges. No evidence of recent activity.

PUMPKIN MT. *
Outcrop on south side, very limited vertical sections, 1 - 2 good ledges. No evidence of recent activity.

SKYMO CR. *
Excellent, moderate size, with 5 - 7 good ledges. No evidence of recent activity.

SOURDOUGH (LOWER) * +
Small fairly vertical cliff. Stick-nest of Red-tailed Hawk reported by Fackler (pers. comm.) in 1976, none found.

SOURDOUGH (UPPER) * +
Extensive area of prominent rock outcrops. Stick-nest known on west side. No evidence of recent activity.

THUNDER ARM +
Several prominent rock outcrops, most too low-angle. A few fairly vertical sections. No evidence of recent activity.

THUNDER CR. (UPPER) +
A few isolated fairly vertical rocky outcrops opposite McAllister Cr., with 1 - 2 suitable ledges. Western exposure, with much vegetation on ledges. No evidence of recent activity.

Table 2. Continued.

Cliffs surveyed on 12 June

LITTLE BEAVER CR.
Moderate size cliffs between Perry Cr. and Ross Lk., 6 - 8 excellent ledges. Limited riparian development nearby. No evidence of recent activity.

SILVER CR.
Extensive in 2 upper basins, 4 - 6 good ledges. Hanging valley with marsh, probably good prey base. No evidence of recent activity.

SOURDOUGH (LOWER) * +
No evidence of recent activity at stick-nest, or other sections.

SOURDOUGH (UPPER) * +
Extensive with 3 - 4 excellent ledges. No evidence of recent activity.

STETATTLE CR. * +
A few suitable outcrops on lower slopes of Davis Pk., 2 - 3 good ledges. No evidence of recent activity.

Table 3. Ospreys and nests surveyed by helicopter on 2 and 12 June 1987.

ARCTIC CR.

2 June - One adult in incubating posture in upper nest, did not flush. Could not determine whether eggs or young were present.

12 June - Upper nest in good condition. No adults, eggs, or young present.

BABCOCK CR. (previously called GOODELL CR.)

2 June - One adult flying, second in incubating posture, then flushed. No young or eggs.

12 June - One adult in incubating posture. Did not flush, could not determine whether eggs or young were present.

COUGAR ISLAND

2 June - One adult flying, second in incubating posture, then flushed. One egg.

12 June - One adult in incubating posture. Flushed, no eggs or young.

NONAME CR.

2 June - Both adults flying near nest. No young or eggs.

12 June - One adult flushed. No eggs or young present.

THUNDER CR.

2 June - One adult flying, second in incubating posture, then flushed. No young or eggs. New nest, 200 m northwest of previous nest.

12 June - Two adults present, one in incubating posture. Both flushed. No young or eggs present.

THURSDAY CR. (new in 1987)

2 June - Nest empty, no adults detected, but new vegetation on top. Birds seen on nest during previous few days.

12 June - Two adults present, one in incubating posture. Did not flush. Could not determine whether eggs or young were present.

OTHER SITES

Several areas of potential habitat were surveyed but no additional Osprey nests were detected. Areas include:

Table 3. Continued.

2 June - a few sections on west shore of Ross Lk., much of the east shore of Ross Lk., lower Thunder Cr., lower Skagit R., and Hozomeen Lk.
12 June - north shore of Diablo Lk. and Ruby Arm of Ross Lake.

Table 4. Estimates of Osprey productivity in several conterminous states in recent years. Sources include Brett 1985) = A, Brett (1986) = B, Smith (1985) = C Smith (1986) = C, Spettigue 1985 = E.

State	Mean number young		Source
	Per occupied nest	Per successful nest	
Connecticut	1.6	2.1	B
Iowa	1.6		C
Massachusetts	1.7	2.2	B
Montana	1.5	2.2	E
New Hampshire	0.9	1.6	B
New York	1.3	2.1	B
Rhode Island	1.4	1.7	A
Wisconsin	0.8		D
Approximate mean	1.3	1.8	
This study	0.6	1.5	

No Peregrine Falcons or eyries were detected. However the survey provided an excellent opportunity to view potential nesting habitat at close range.

About 10 stick nests, characteristic of buteos (Golden Eagle and Red-tailed Hawk), occurred on these cliffs. No birds were observed on any nest, but at least one was active this year, as indicated by the presence of fresh nest material.

Six known Osprey nests were surveyed twice from helicopter, on 2 and 12 June, respectively. Each had at least 1 adult present (Table 3). Subsequent monitoring at 5 of these nests revealed only 3 juveniles fledged. This represents a ratio of 0.6 young per occupied nest, and 1.5 young per successful nest. Compared with approximate recent means of 1.3 and 1.8 respectively, for 8 conterminous states (Table 4.) these ratios are fairly low.

Attempts to locate new Osprey nests at other sites were unsuccessful.

No Bald Eagles or nests were detected during the survey.

Owl Ground-Survey

Ten weeks of ground and boat surveys failed to locate any Spotted or Great Gray Owls. However, 11 Barred, 6 Northern Pygmy, and 1 Great Horned Owl were detected.

We evaluated habitat where each Barred Owl was observed. The dominant vegetation type in which owls occurred was western hemlock/western red cedar (68 %). Other types included western hemlock/Douglas-fir (17 %), western hemlock/Douglas-fir/Pacific silver fir (8 %), and lodgepole pine (8 %).

At each site where we observed Barred Owls, vegetation stand condition was evaluated. The majority of owls occurred in closed-canopy small conifers 25 - 50 cm dbh (diameter at breast height) (36 %). Other types included open sapling or pole stage (< 60 % crown-cover) (24 %), large conifer (> 50 cm dbh) (18 %), grass-forb or shrub stage (17 %), closed sapling or pole stage (> 60 % crown-cover) (4 %), and old-growth (1 %).

DISCUSSION

Helicopter Nesting-Survey

This study determined that much excellent potential nesting habitat exists for Peregrine Falcons in the Ross Lake drainage of the northern Cascade Range of Washington State. Although no Peregrines were seen during the survey, we predict one or more pairs will be located in the relatively near future, if helicopter

surveys continue. Since the ban on DDT in 1973, numbers of nesting Peregrines have gradually increased in Washington (Fred Dobler, Washington State Department of Wildlife, pers. comm.) and most other conterminous states within their range (Boyce and White 1979, Monk 1980). Locating nesting Peregrine Falcons is difficult because of the extensive potential habitat available here. Additionally they tend to be highly mobile, have the capacity for rapid flight, have large home ranges, and are migratory.

As mentioned, productivity of Ross Lake drainage Ospreys was 0.6 young per occupied nest, and 1.5 young per successful nest. Compared with approximate recent means of 1.3 and 1.8 respectively, for 8 conterminous states (Table 4.) these ratios are fairly low.

One possible explanation for low Osprey productivity is that prey population denstities may be lower than in other areas. The primary food source for Ospreys studied is salmonids occurring in Ross Lake. In Ross Lake salmonids depend on natural spawning that takes place in several tributaries. In contrast numerous lakes receive supplemental stocking of hatchery-raised fish to augment populations. Additionally, some productivity estimates shown in Table 4. were taken from Ospreys using marine ecosystems. These generally have a greater diversity and abundance of fish prey.

Owl Ground-Survey

As mentioned, 10 weeks of ground and boat surveys failed to locate any Spotted or Great Gray Owls. However, 11 Barred, 6 Northern Pygmy, and 1 Great Horned Owl were detected.

We were quite surprised not to locate any Spotted Owls. Since 1968 1 confirmed and 3 unconfirmed Spotted Owl sightings have occurred in the study area. An additonal 15 unconfirmed sightings have been documented in other areas of the NOCA Complex. Personnel from the adjacent Mount Baker-Snoqualmie National Forest to the west have detected about 31 confirmed Spotted Owl nesting territories since 1982 in the Mount Baker District.

While hiking many trails in the Ross Lake drainage, particulary Big Beaver and Little Beaver, habitat appeared to be excellent for Spotted Owls. After failing to find any during this study, we evaluated aerial photographs of the study area and determined that old-growth conifer stands were not as extensive as we originally thought. Old-growth stands tended to occur in fairly narrow bands on these valley bottoms. Also, large avalanche paths and rock outcrops often interspersed with the conifers.

The observations of 11 Barred Owls suggests the study area provides suitable habitat for this species. Barred Owls apparently have less specialzed habitat requirements than Spotted Owls, and use less old-growth conifers. However, this is not well-documented in the literature.

We had expected to possibly locate a few Great Gray Owls. Four unconfirmed sightings have occurred in NOCA since 1968. Little is known of this enigmatic species in the area. We cannot make any inferences on habitat-use of Great Gray Owls from this study.

The Northern Pygmy-Owl and Great-horned Owl are uncommon in the area, but we assume populations are relatively stable and not threatened. Their presence was expected.

Recommendations

Continued monitoring of Peregrine Falcon nesting habitat is essential. As mentioned, the Pacific Coast Recovery Plan for the Endangered Peregrine Falcon states that, among other criteria, it will consider delisting from Endangered to Threatened when 5 breeding pairs occupy the northern Cascade Range. The plan emphasizes that continuous studies will be required to determine when this goal is acheived.

In view of the comparatively low productivity rates of Ross Lake Osprey, we advise continued monitoring of the 6 nests to determine numbers of eggs layed and young fledged by these pairs. Also, the search for new nests should proceed.

Considering that no Spotted Owls were located, we consider further censusing to be very important. This includes an increase in funding and effort from 1987 levels.

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ACKNOWLEDGEMENTS

The Skagit Environmental Endowment Commission provided generous finacial suppport for this study (grant no. 87-09). National Park Service, Skagit District personnel provided logistical support. C. Robert Wasem, Jon Jarvis, and Robert Kuntz II reviewed earlier drafts of the manuscript.

APPENDIX A

Owl censusing methods

1) Running the census
2) Data sheet
3) Census route codes
4) Habitat evaluation codes

Running the Census

1. You will need:

   a. Compass
   b. Cassette caller and tape of owl calls
   c. Clip board and pencils (please use #2 pencils)
   d. Data forms, code sheets and instructions
   e. Watch or vehicle clock

2. Avoid censusing in the rain, or in winds averaging over 7 mph. Begin at your first listening station no earlier than one hour after sunset.

3. At each stop, record on the data sheet, in column(s):

   6 - month
   7-8 - day (use 01, 02, 03, etc. if only 1 digit)
   10 - rain code (see code sheet)
   12 - wind code "
   14 - cloud cover "

   The station numbers are already on the data sheets. If there are no changes in conditions throughout the route, you don't need to add additional entries in that column on the field form; but do fill in codes for each stop # on the green sheet as in the example. If conditions are variable, record changes at the appropriate stop #.

4. At each station, play the following series of calls:

   a. Three 3-hoot calls/ wait 20 secs/ three 3-hoot calls
   b. Wait 1 minute
   c. Three 3-hoot calls/ wait 20 secs/ three 3-hoot calls
   d. Wait 1 minute
   e. Three 3-hoot calls/ wait 20 secs/ three 3-hoot calls

   If no owls are heard, play the 9-13 bark call; wait 1 minute.

   Record in column 19 how many spotted owls are heard. If no owls, put in a 0.
   If an owl is heard, record the time.
   If another species of owl is heard, record the appropriate code (see code sheet) in column 50. If 2 other species of owls are heard at one stop, record one in column 50 and the other in column 51 (=NOTHER OWL).

   If a spotted owl is heard, write the verification code in column 26.
   Also, draw a line on your map from the center point of the listening station in the direction from which the owl was first heard. Write the date along the line.
   If a spotted owl is heard, skip the next station, so you travel a full mile before calling again.
   If no owl is heard, move to the next station and repeat the process.

   Make any notations in the comments space.

SPC) O(ENS ATA M

ROUTE #_____ RUN #____ DATE_____

OBSERVERS_____

DESCRIPTIVE NAME_____

ROUTE #	RUN #	MONTH	DAY	RAIN	WIND	CLOUD CVR	STOP #	SPOT OWL	TIME	VERIFIC	FOREST TYPE DOM	FOREST TYPE CODOM	STAND CONDITION 1	2	3	4	5	6	ELEVATION	SLOPE	ASPECT	OTHR OWLS	NOTHR OWL	COMMENTS
1 2 3	4 5 6		7 8	9 10	11 12	13 14	15 16 17	18 19	20 21 22 23 24	25	26 27	28 29 30 31	32	33	34	35	36	37 38	39 40 41 42 43	44 45	46 47	48 49	50	51	

GAM 569

CENSUS ROUTE CODES

RAIN CODE

0 = No precipitation
1 = Light mist
2 = Sprinkle
3 = Light shower
4 = Shower or harder

WIND CODE

1 = 0-3 mph (smoke rises straight up)
2 = 4-7 mph (feel breeze on face)
3 = 8-12 mph (tree leaves, branches moving)
4 = 12-15 mph (tree tops bend or wave)
5 = Over 15 mph (trees moving, very noisey)

CLOUD COVER CODE

0 = Clear
1 = < 20% cloud cover
2 = < 50% cloud cover
3 = > 50% cloud cover
4 = Overcast
5 = Fog

VERIFICATION CODE

0 = No owls heard
1 = Owls heard first time
2 = Owls heard and seen first time
3 = Owls heard second time (> 72 hrs later)
4 = Owls heard and seen second time
5 = Definite pair located
6 = Nest located

OTHER OWLS CODE

1 = Barred Owl
2 = Screech Owl
3 = Great Horned Owl
4 = Sawhet Owl
5 = Long-eared Owl

HABITAT EVALUATION CODES

FOREST TYPE CODES

01 = Douglas fir/western hemlock
02 = Western hemlock/western red cedar
03 = Douglas fir/silver fir/western hemlock
04 = Sitka spruce/western hemlock
05 = Silver fir/mountain hemlock or subalpine fir/ mountain hemlock
06 = White fir/Douglas fir
07 = White fir
08 = White fir/red fir/Douglas fir
09 = Mixed conifer (usually mix of Douglas fir, true firs, ponderosa pine & cedar)
10 = Lodgepole pine
11 = Ponderosa pine
12 = Grass-forb association (incl. clearcuts)
13 = Shrub or chapparral
14 = Deciduous (explain in comment space)
16 = Silver fir/western hemlock/western red cedar
17 = Alaskan yellow cedar
18 = Red alder/bigleaf maple/sitka spruce
19 = Red alder
20 = Subalpine fir/western white pine
21 = Douglas fir/western red cedar
22 = Douglas fir/western red cedar/red alder
23 = No vegetation (e.g., lake; talus slope)
24 = Mixed conifer/deciduous
25 = White pine
26 = Residential
27 = Lodgepole pine/ponderosa pine/grand fir
28 = Douglas fir/larch/subalpine fir
29 = Douglas fir/spruce/larch, lodgepole
30 = Engelmann spruce/subalpine fir
31 = Engelmann spruce
32 = Larch
33 = Douglas fir/red alder
34 = Douglas fir/grand fir/bigleaf maple
35 = Noble fir/Engelmann spruce/lodgepole pine
36 = User defined (explain in comment space)

STAND CONDITION CODES

1 = Grass-forb or shrub stage
2 = Open sapling-pole stage (<60% crown cover)
3 = Closed sapling or pole stand (>60% crown cover)
4 = Closed small sawtimber (10-20" dbh)
5 = Large sawtimber (>21" dbh)
6 = Old growth (generally, over 250 yrs old)

PERCENT CODES

0 = 0%
1 = 1-10%
2 = 11-20%
3 = 21-30%
4 = 31-40%
5 = 41-50%
6 = 51-60%
7 = 61-70%
8 = 71-80%
9 = 81-90%

ELEVATION

Obtain from topo map; convert to Meters

SLOPE

Use actual % slope (0-99%)

ASPECT CODES

0 = No aspect (level)
1 = N
2 = NE
3 = E
4 = SE
5 = S
6 = SW
7 = W
8 = NW

APPENDIX B

Expenditures

Description item	Unit price (U.S. $'s)	Quantity	Total of (U.S. $'s)
Helicopter flight time	390 per hour	7.7 hours	3,003
Owl biologist salary, benefits	9.80 per hour	10 weeks	3,920
Miscellaneous equipment: (lithium headlamp batteries, headlamp bulbs, cassette batteries)			77
Total			7,000