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Surveying Spotted Owls on the East Slope of North Cascades National Park Service Complex, 2007-2008

Report for the 2007 and 2008 Field Seasons

Natural Resource Technical Report NPS/NCCN/NRTR—2009/184

ON THE COVER
Spotted owl
Photograph: courtesy of Micah Scholer, The Institute for Bird Populations

Surveying Spotted Owls on the East Slope of North Cascades National Park Service Complex, 2007-2008
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March 2009

U.S. Department of the Interior
National Park Service
Natural Resource Program Center
Fort Collins, Colorado

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This report was accomplished under Cooperative Agreement H9471061071 and Task Agreement Numbers J9471061159 and J9471071281.

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Please cite this publication as:

Siegel, R. B., K. E. Jablonski, M. N. Scholer, R. C. Kuntz II, and R. L. Wilkerson. 2009. Surveying for Spotted Owls on the east slope of North Cascades National Park Service Complex, 2007-2008. Natural Resource Technical Report NPS/NCCN/NRTR—2009/184. National Park Service, Fort Collins, Colorado.

NPS D-306, March 2009

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Executive Summary

Northern Spotted Owl populations have declined over the last century (Gutiérrez et al. 1995), and the subspecies has been listed as "threatened" by the federal government since 1990. The status of the northern Spotted Owl has not been well documented in the North Cascades of Washington and southwestern British Columbia. In 1993, National Park Service (NPS) resource management staff initiated the first comprehensive inventory of Spotted Owls in suitable habitat within North Cascades National Park Service Complex (NOCA). This 4-year survey documented 11 active Spotted Owl territories in NOCA during the 1993-1996 period, including six active territories located within the Lake Chelan/Stehekin River watershed in 1993.

Since completion of NOCA's four-year baseline owl inventory in 1996, only sporadic compliance-related owl surveys have occurred. Acquisition of updated information on the status of the park's Spotted Owl population is needed to aid NPS managers implementing updates to the Lake Chelan National Recreation Area (LACH) General Management Plan and NOCA's Fire Management Plan, as well as provide input to a recently initiated Stehekin River Corridor Implementation Plan being developed. In response to these needs, NPS, with help from The Institute for Bird Populations, initiated a two-year study to acquire updated information on the status of the Spotted Owl within the Stehekin River watershed and along Lake Chelan within LACH. Specific objectives of the study are threefold:

1. Revise NOCA's Spotted Owl suitable habitat model and develop a revised GIS map layer showing suitable Spotted Owl habitat throughout the park.
2. Resurvey owl transects surveyed in 1993 to locate active Spotted Owl territories, estimate relative abundance, and determine productivity at all activity sites found.
3. Develop individual Spotted Owl activity site management plans for both currently active and historic sites with recommendations for protection measures.

Objective 1 has already been completed (Wilkerson and Siegel 2007). This report summarizes work completed for Objective 2. During the 2007 and 2008 breeding seasons, we surveyed transects throughout the Stehekin River watershed and along Lake Chelan, using survey procedures that were virtually identical to those used during the 1990s survey, including mimicking Spotted Owl vocalizations (hereafter, 'hooting') at regularly spaced call points along both on-trail and off-trail transects, and repeated follow-up visits to sites with historic records of detections. Over the two field seasons we completed a total of 161 visits (113 visits in 2007 and 48 visits in 2008) to 41 survey transects, and 76 follow-up visits (22 follow-up visits in 2007 and 54 follow-up visits in 2008) to sites with historical detections or new detections gathered during the transect surveys.

We found four confirmed Spotted Owl pairs. We also recorded a single detection at one additional site. Of the confirmed pairs, one pair nested and fledged young in both years. A second pair was present but apparently non-breeding in 2007, and then nested and fledged two juveniles in 2008. And, a pair was not detected in 2007, but was found nesting just outside the park boundary in 2008; two juveniles fledged from that nest. Finally, another pair was present

but non-breeding in 2007, and then absent in 2008. A pair of Barred Owls nested in 2008 very close to the site of a 2007 Spotted Owl nest.

We conclude that the east slope of North Cascades National Park appears to have lost two of its historical Spotted Owl activity sites since the previous extensive Spotted Owl survey in 1993-1996. Both sites were known to be occupied in all four years of the 1990s survey, but repeated, intensive search efforts during the 2007-2008 survey turned up no Spotted Owls, and indeed, found area to be occupied by Barred Owls. Similarly, an activity site, although not known to have been occupied in the early 1990s, was occupied by non-breeding Spotted Owls in 2007, but in 2008 Barred Owls moved into the area and the Spotted Owls could not be found. These results are consistent with other research across the Pacific Northwest indicating that Barred Owls are displacing Spotted Owls across much of their range.

We also note that of the four confirmed Spotted Owl pairs we observed during this study, three of them hold territories that have been substantially affected by recent wildfire. All three pairs occupying burned habitat successfully fledged young in 2008.

Finally, although our survey was designed specifically to detect Spotted Owls, we also documented incidental detections of other owl species. Throughout the season, we observed and documented individuals of five additional owl species: Great Horned Owl (18 detections, representing a minimum of 7 activity sites), Barred Owl (65 detections, representing an estimated 10 activity sites), Western Screech-Owl (detections at 3 sites, including one confirmed breeding pair), Northern Pygmy-Owl (2 detections), and Northern Saw-whet Owl (22 detections, representing perhaps 15 individuals).

Acknowledgments

We are grateful to our field technicians for their hard work and dedication to the project. Our 2007 field crew was comprised of Carlie Brue, Chad Holy, Kevin Jablonski (crew leader), and Micah Scholer. Our 2008 field crew was comprised of Daniel Nally, Nito Paniagua, and Micah Scholer (crew leader). We thank Roger Christophersen for assisting with crew training, providing advice about the survey, and sharing his knowledge of the park's owls. We thank the entire Stehekin community for making our crew feel welcome; Vicki Gempko for supporting the project in numerous ways; Murray Boatright, Cascade Hahn, Brad Richardson and Aaron Robinson for information about trails and assistance crossing Agnes Creek; and Wally Winkel for hospitality in Stehekin. We also thank Scott Gremel at Olympic National Park for advice on survey methods. We thank Scott Gremel, Patti Happe, and Jake Verschuyl for their review and thoughtful suggestions on improving this report. Ron Holmes helped format this report to NPS technical report standards. Finally, we thank Carol Beidleman and the Park Flight Migratory Bird Program for coordinating Nito Paniagua's visit from Costa Rica. This is Contribution No. 346 of The Institute for Bird Populations.

Introduction

The northern Spotted Owl (*Strix occidentalis caurina*) is a medium-sized, dark brown, owl with dark eyes, barred tail, and white spotting on its head, back, and breast. It occupies mature/old-growth conifer forest that has a multi-layered, multi-species canopy with moderate to high canopy closure (USDI 2007). One of three subspecies, the northern Spotted Owl occurs from southwestern British Columbia through the Cascade Range and coastal mountains of Washington and Oregon to northern California, including the coastal ranges to just north of San Francisco (Gutiérrez et al. 1995). The Spotted Owl is relatively long-lived, has a long reproductive life span, and exhibits high adult survivorship compared to other owl species (Gutiérrez et al. 1995).

Northern Spotted Owl populations have declined over the last century (Gutiérrez et al. 1995). In June 1990, the U.S. Fish and Wildlife Service (USFWS) listed this subspecies as "threatened" (USDI 1990). Major reasons for population declines cited habitat loss or alteration of mature and old-growth forests due to logging, urbanization, and changes in fire regimes (Thomas et al. 1990). The invasion of Barred Owls (*Strix varia*) into Spotted Owl habitat over the past 40 years also has contributed to declines in Spotted Owl abundance through competition for nesting habitat and prey (Hamer 1988, Dunbar et al. 1991, Gutiérrez et al. 1995, USFWS 2007). Recent demographic data suggest that populations over the 14 long-term demographic study areas in Washington, Oregon, and California decreased by about 3.7 percent annually from 1985 to 2003 (Anthony et al. 2004).

The status of the northern Spotted Owl has not been well documented in the North Cascades of Washington and southwestern British Columbia. Past efforts to assess the status of Spotted Owls within North Cascades National Park Service Complex (NOCA) began in the early 1980's when random calling surveys were initiated by the Washington Department of Fish and Wildlife (WDFW). Only a few of the random survey transects actually entered NOCA boundaries and no Spotted Owls were detected in NOCA from these surveys (A. Potter, pers. comm. 1996). Other surveys conducted by NOCA biologists were done in conjunction with environmental assessments of NPS operations (NOCA files). No Spotted Owls were detected from these surveys either. Throughout most of the 1990s, biologists from the National Council of the Paper Industry for Air and Stream Improvement, Incorporated (NCASI), completed reconnaissance-level surveys in the Stehekin Valley while conducting Spotted Owl investigations on U.S. Forest Service (USFS) lands adjacent to NOCA (Fleming 2005, unpubl. data). The NCASI surveys stopped in the late 1990s due to lack of funding. In 1993, National Park Service (NPS) resource management staff initiated a comprehensive inventory of Spotted Owls in suitable habitat within NOCA. This 4-year survey was the first systematic survey of Spotted Owl habitat completed in the park (Kuntz and Christophersen 1996). NPS staff conducted an extensive survey of suitable habitat east of the Cascade crest in 1993 and intensive surveys of known eastside activity sites in 1993 through 1996. This NPS inventory documented 11 active Spotted Owl territories, including 6 active territories located within the Lake Chelan/Stehekin River watershed.

Since completion of NOCA's 4-year baseline owl inventory in 1996, only sporadic compliance-related owl surveys have occurred. Acquisition of updated information on the status of the park's Spotted Owl population is needed to aid NPS managers implementing updates to the Lake Chelan National Recreation Area (LACH) General Management Plan and NOCA's Fire Management Plan, as well as provide input to a recently initiated Stehekin River Corridor Implementation Plan being developed. In response to these needs, NPS, with help from The Institute for Bird Populations, initiated a 2-year study to acquire updated information on the status of the Spotted Owl within the Stehekin River watershed and along Lake Chelan within LACH. Specific objectives of the study are threefold:

1. Resurvey owl transects surveyed in 1993 to locate active Spotted Owl territories, estimate relative abundance, and determine productivity at all activity sites found.
2. Develop individual Spotted Owl activity site management plans for both currently active and historic sites with recommendations for protection measures.
3. Revise NOCA's Spotted Owl suitable habitat model and develop a revised GIS map layer showing suitable Spotted Owl habitat throughout the park.

This report summarizes Objective 1. Development of individual Spotted Owl activity site management plans is underway and will be completed in early 2009. Wilkerson and Siegel (2007) documents revisions to NOCA's Spotted Owl suitable habitat model (objective 3).

Study Area

The North Cascades National Park Service Complex (NOCA) includes North Cascades National Park, Lake Chelan National Recreation Area, and Ross Lake National Recreation Area. NOCA is located in the North Cascades physiographic province in northwestern Washington. While NOCA spans areas both east and west of the Cascade Crest, this study was confined to the semi-arid continental east slope of the Cascades Range (Franklin and Dyrness 1973; see Figure 1).

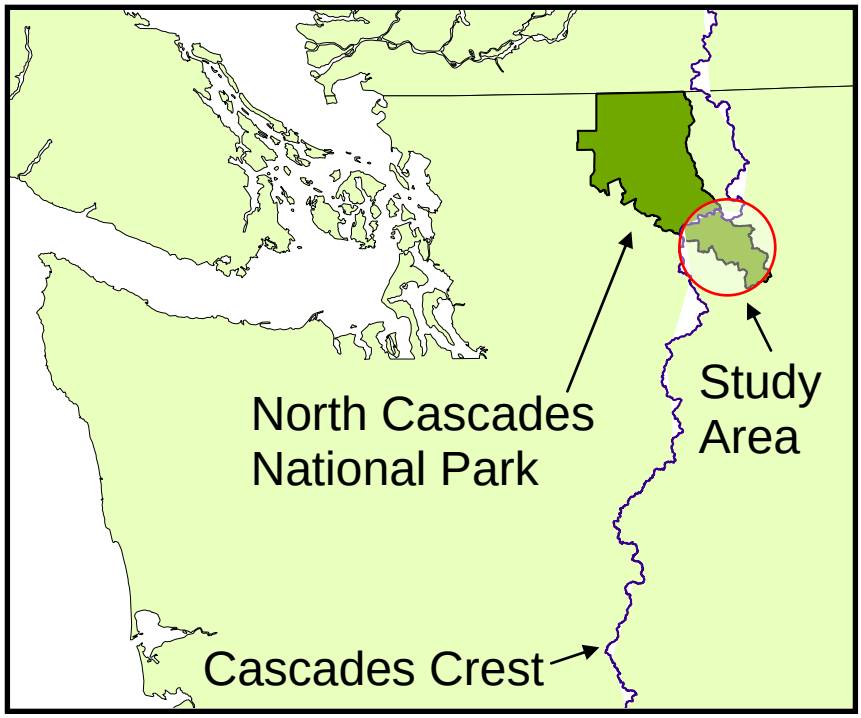

Figure 1. Location of North Cascades National Park Service Complex (NOCA). Study area is restricted to the portion of NOCA that is east of the crest of the Cascades Range.

East of the Cascade crest a rainshadow effect exists creating cool winters and warm dry summers. Below 1,220 m, forested habitat is dominated by the Douglas-fir cover type with Western Redcedar, Lodgepole Pine (*Pinus contorta*), Western White Pine (*Pinus monticola*), and Ponderosa Pine (*Pinus ponderosa*) commonly found as minor components (Agee and Kertis 1986).

Methods

Survey design

We initially hoped to resurvey all of the transects surveyed by Kuntz and Christophersen (1996) in the early 1990s. These transects generally consisted of 8 to 12 point count stations placed at 400-m intervals in areas of suitable habitat, at all elevations. Point-count stations were placed along trails and at off-trail locations. Whenever possible, stations were placed along ridges and away from streams to maximize coverage by enhancing sound transmission.

Funding limitations forced us to scale back the project somewhat. We decided to resurvey only those transects east of the Cascades crest in the low-elevation stratum (<1,220 m) surveyed by Kuntz and Christophersen (1996) as their surveys detected no Spotted Owls in the high-elevation stratum (>1,220 m), despite surveying 4,785 ha of potential habitat. Thus, the upper elevation limit for our survey is 1,220 m, which corresponds well with more recent habitat definitions for the Northwest Forest Plan (Davis and Lint 2005). Davis and Lint's model suggested that 99.5% of the habitat-capable area for Spotted Owls east of the Cascades crest in North Cascades National Park lies below 1,190 m (Wilkerson and Siegel 2007). We classified transect elevations by the average elevation of all the call stations along each transect, so a few of the higher-elevation transects that we surveyed actually include one or more points higher than 1,220 m.

We then eliminated a few additional transects that presented unique logistic difficulties but did not yield any Spotted Owl detections during the early 1990s. The end result was a set of 41 transects (Figures 2 and 3) that cover most of the appropriate Spotted Owl habitat on the park's eastern slope (Figure 4).

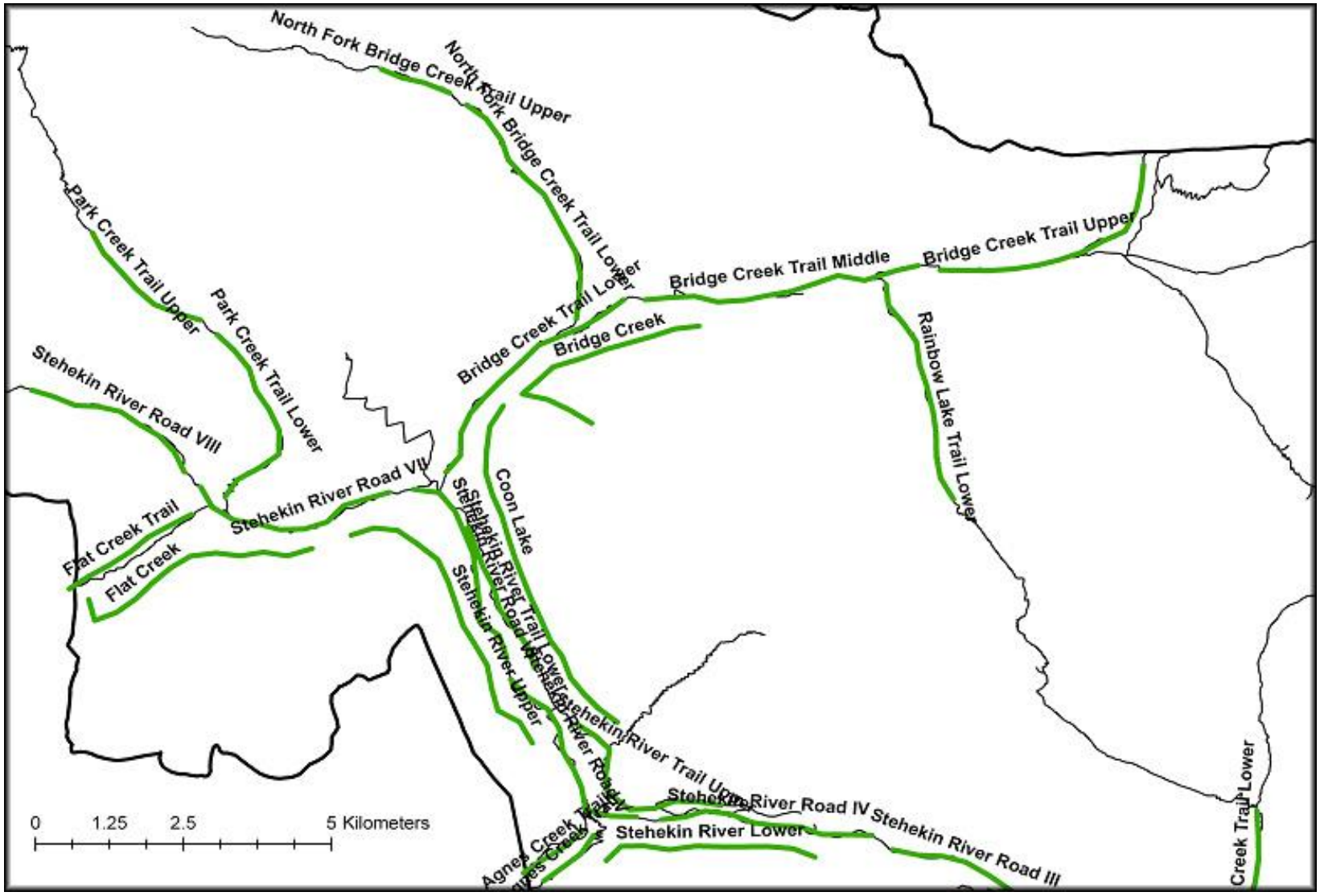

Figure 2. Green lines indicate Spotted Owl survey transects in the northern half of the study area in North Cascades National Park. Thick black lines indicate park boundaries; thin black lines indicate roads and trails.

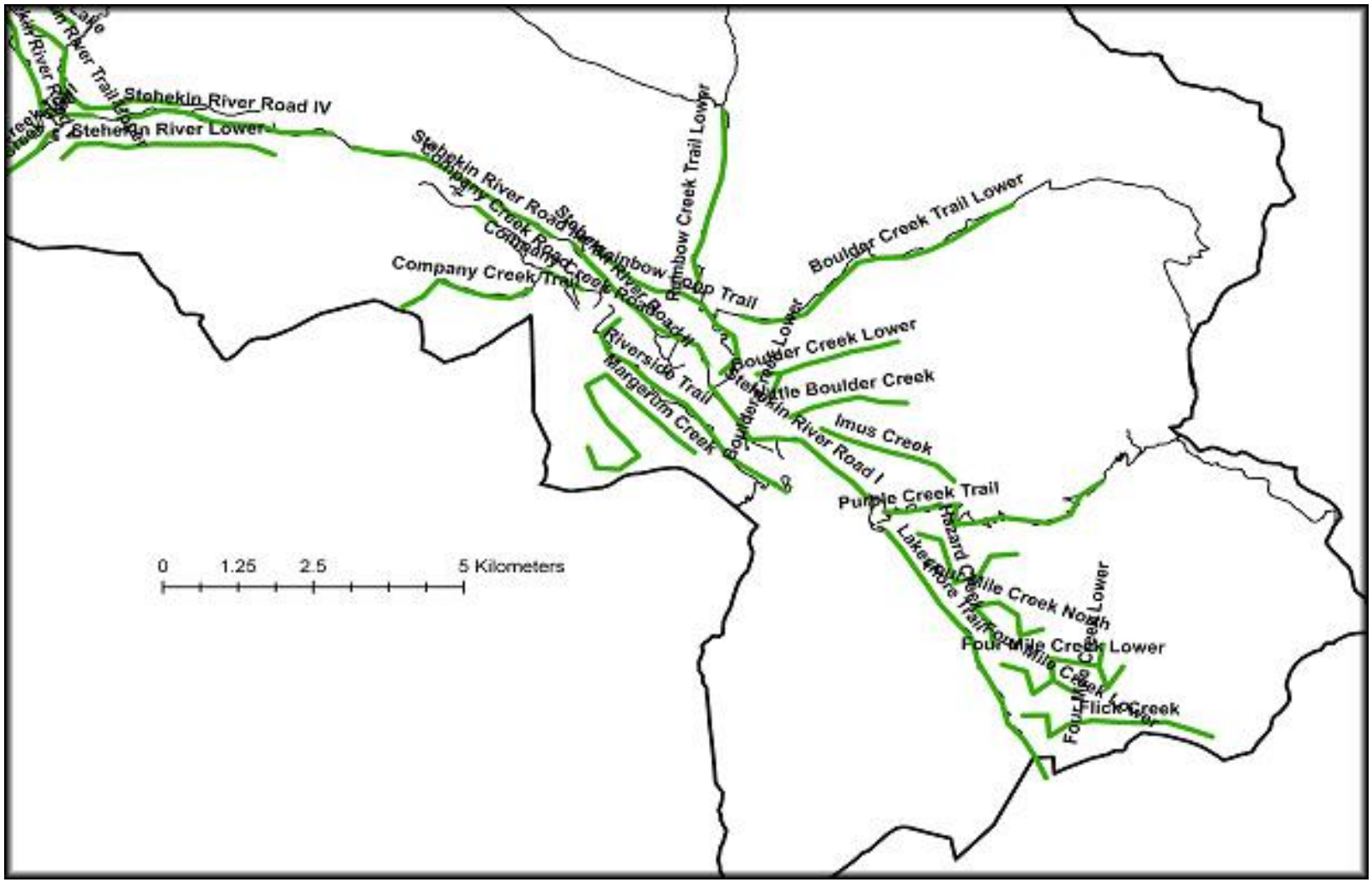

Figure 3. Green lines indicate Spotted Owl survey transects in the southern half of the study area in North Cascades National Park. Thick black lines indicate park boundaries; thin black lines indicate roads and trails.

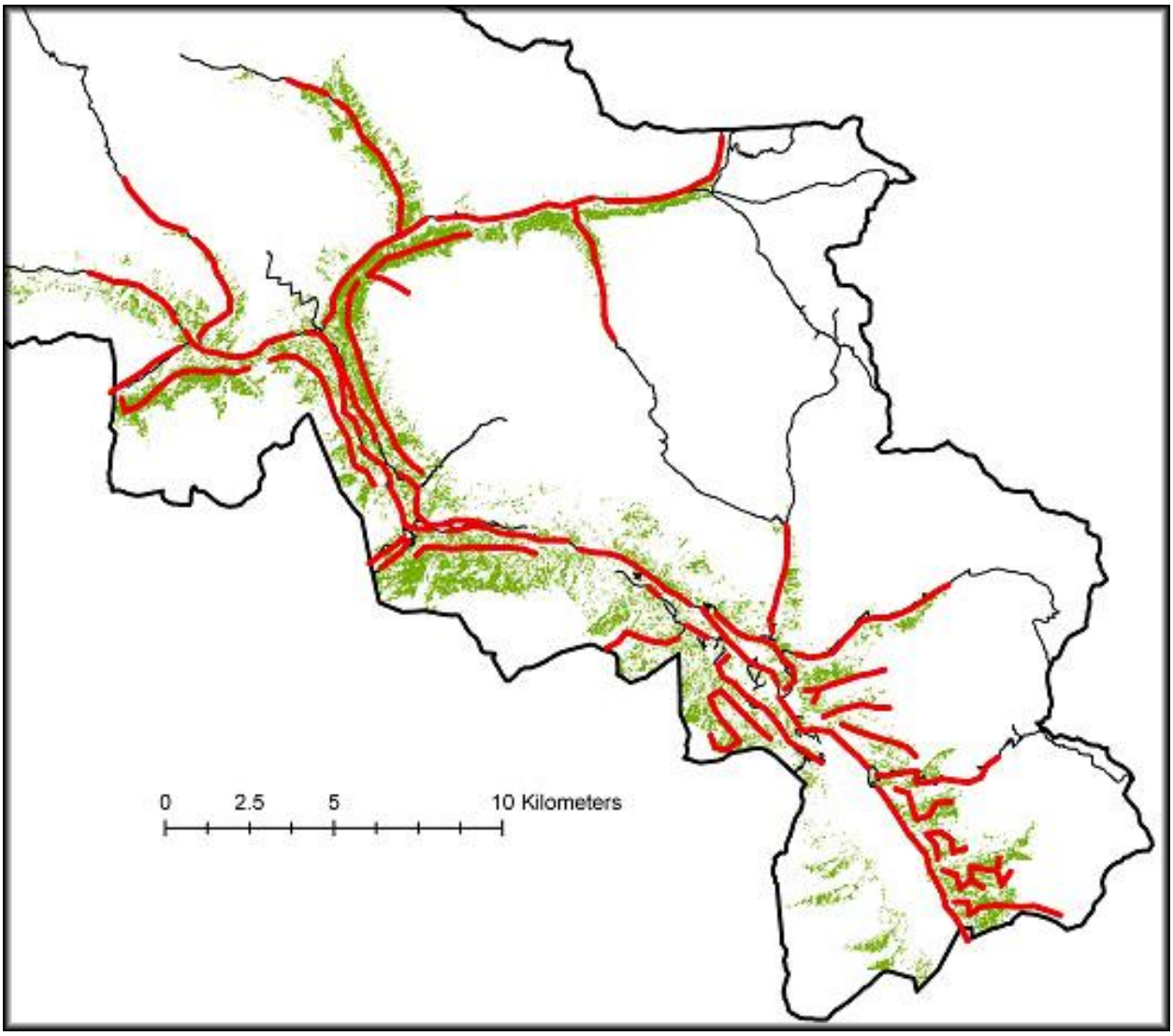

Figure 4. All transects (indicated in red) surveyed for Spotted Owls, and areas classified as suitable Spotted Owl habitat (indicated with green shading) by the habitat suitability model developed for the Northwest Forest Plan (Davis and Lint 2005).

During the 2007 breeding season we sought to survey each of the 41 selected transects three times. Having completed the spatially extensive survey in 2007, in 2008 we focused our efforts more narrowly on surveying historical activity centers and detection sites, rather than on completing surveys at all 41 transects. We sought to complete up to six visits to every Spotted Owl activity center or detection location in the study area that has been documented since 1993. We also selected 12 of the 41 transects for re-survey in 2008. Transects were chosen either because they crossed through habitat that appears particularly promising even though it did not yield any Spotted Owl detections in 2007, or because they cross through areas where substantial land management issues currently exist.

Crew training and certification

At the beginning of each field season, we provided the crew with an intensive week-long training session that focused on owl identification, orienteering, first aid and backcountry safety, and data collection procedures.

Data collection

Most agencies conducting Spotted Owl surveys in the Pacific Northwest use 6 survey visits to determine annual pair occupancy and reproductive status within a defined geographical location (USDI 1992). This standard was mainly developed for use in determining Spotted Owl presence/absence in areas where management actions that could affect Spotted Owls (such as logging or road construction) are planned. Since our objective was to find as many activity sites as possible, we chose to deviate from the standard protocol for most transects in order to maximize coverage of potential habitat in the park. We realize this may have caused us to miss detections of some occupied activity sites. However, results from surveys conducted at Olympic National Park showed there was a high probability of detecting at least one member of a resident pair during the first three visits and most owl pairs were detected on the first visit (Seaman et al. 1992). More recent work by Olsen et al. (2005) indicated that 3 survey visits provided an 88% confidence level in finding pairs of Spotted Owls and a 95% level of confidence in finding single territorial birds at occupied sites.

Spotted Owl surveys are usually conducted at night, when owls are more active and are thought to be more responsive to standard survey techniques (USFWS 1992). Because much of our study area is in inaccessible, rugged backcountry, the location of transects influenced the time of day they were conducted. Off-trail transects were surveyed during daylight hours (sometimes near dawn or dusk, but more commonly in full sunlight) to provide a safe working environment for field crews. Trail and road transects were sampled at night, beginning no earlier than 30 minutes after official sunset.

Data collection procedures were virtually identical to those used by Kuntz and Christophersen (1996). Technicians conducted a series of ten-minute surveys placed every 400 m along each transect. Two-minute point surveys were conducted at the mid-point (200 m) between ten-minute stations. We used standard methods for locating Spotted Owls (Forsman 1983). Using a series of vocal imitations of Spotted Owl calls, usually the three-note or four-note location calls, and series calls, technicians hooted at the surveys stations. For both the 10- and 2-minute surveys, technicians hooted by voice once every thirty seconds, except that the frequency was reduced to once every minute during the last three minutes of the 10-minute surveys.

When a Spotted Owl was detected, observers attempted to locate the owl to determine its sex, age, and if the owl was banded, band colors and band positions. Using standard mousing techniques (Forsman 1983), Spotted Owls were then monitored throughout the season to determine pair status and locate nests and juveniles. We also documented detections of any other owl species detected during transect surveys or at any other time during the field season.

In 2007 we surveyed each transect three times between March 26 and July 2, with a few exceptions as noted below (see Results). In 2008 we selected 12 transects for resurvey, either because they pass through particular promising habitat but have not previously yielded Spotted Owl detections, or because they pass through areas with pressing management issues for the park. We focused the remainder of our efforts on conducting at least six follow up visits to all 8 sites in the study area where Spotted Owls have been detected at any time since 1993.

Results

In 2007, we completed 113 visits to 41 transects (amounting to over 2,100 2-min or 10-min surveys) plus 22 additional follow-up visits to sites where Spotted Owls were detected. In 2008 we completed 48 visits to 12 transects (amounting to well over 800 2-min or 10-min surveys), plus 54 follow-up visits to sites with historical detections.

Spotted Owl detections and activity areas

We found four confirmed Spotted Owl pairs. We also recorded a single detection at one additional site. Of the confirmed pairs, one pair nested and fledged young in both years. A second pair was present but apparently non-breeding in 2007, and then nested and fledged two juveniles in 2008. Another pair was not detected in 2007, but was found nesting just outside the park boundary in 2008; two juveniles fledged from the nest. Finally, at a fourth site a pair was present but non-breeding in 2007, and then absent in 2008. A pair of Barred Owls successfully nested in 2008 very close to one historical Spotted Owl nest site.

Table 1. Spotted Owl status at activity sites surveyed where owls were detected during the 2007 and 2008 Spotted Owl survey in North Cascades National Park Service Complex.

Activity Site Name	2007 Status	2008 Status

Information in this table has been removed because it refers to site locations that are protected information about a LISTED species.

Information in this figure has been removed because it refers to site locations that are protected information about a LISTED species.

Figure 5. Locations of Spotted Owl activity sites found during the 2007-2008 Spotted Owl survey on the east side of North Cascades National Park Service Complex.

The remaining sites with historical detections yielded no Spotted Owl detections during the 2007-2008 survey, despite intensive searching. It should be noted that of these three, only two ever had confirmed pair occupancy; the third site record stems from a single historical detection of a lone owl.

Detections of other owl species

Although our survey was designed specifically to detect Spotted Owls, we documented incidental detections of any owl species encountered at Spotted Owl survey stations, or anywhere else in the park. Throughout the two field seasons, we observed and documented individuals of five additional owl species: Great Horned Owl (*Bubo virginianus*), Barred Owl, Western Screech-Owl (*Otus kennicottii*), Northern Pygmy-Owl (*Glaucidium gnoma*), and Northern Saw-whet Owl (*Aegolius acadicus*).

Great Horned Owl

We documented 18 Great Horned Owl detections, representing a minimum of 7 activity sites (Table 2, Fig. 7). Confirmed pairs were detected along Company Creek Road (near the airstrip), the Flick Creek transect, the Purple Creek Trail, the Stehekin River Road II transect (near the orchard), and the Stehekin River Road VI transect. In 2007 one fledged juvenile was seen near station 4.0 of the Flick Creek transect, and two fledged juveniles were seen near station 60.0 of the Stehekin River Road VI transect. In 2008 two fledged juveniles were detected along the Stehekin River Trail transect. We also detected single Great Horned Owls (which may have been mated, but we only ever detected one owl at a time) at two other locations: the South Fork camp along Bridge Creek and along the Stehekin River Road IV transect (near Moon Creek).

Table 2. Great Horned Owl activity sites detected during the 2007-2008 Spotted Owl survey in North Cascades National Park.

Activity Site Code[a]	Location Description	Year(s) Detected	Breeding Status	Breeding Status Notes
A	So. Fork Campground on Bridge Creek	2007	Unk.	
B	Stehekin River Road VI	2007	Pair	Two juveniles detected.
C	Stehekin River Road IV	2008	Unk.	
D	Company Creek Road	2007	Pair	Male and female detected.
		2008	Pair	Male and female detected.
E	Stehekin River Road II, Riverside Trail[b]	2007	Unk.	
		2008	Pair	Two juveniles detected.
F	Purple Creek Trail	2007	Pair	Male and female detected.
G	Flick Creek	2007	Pair	One fledged juvenile seen.

[a]Letters correspond to those in Figure 7.

[b]These detections could possibly represent two adjacent territories.

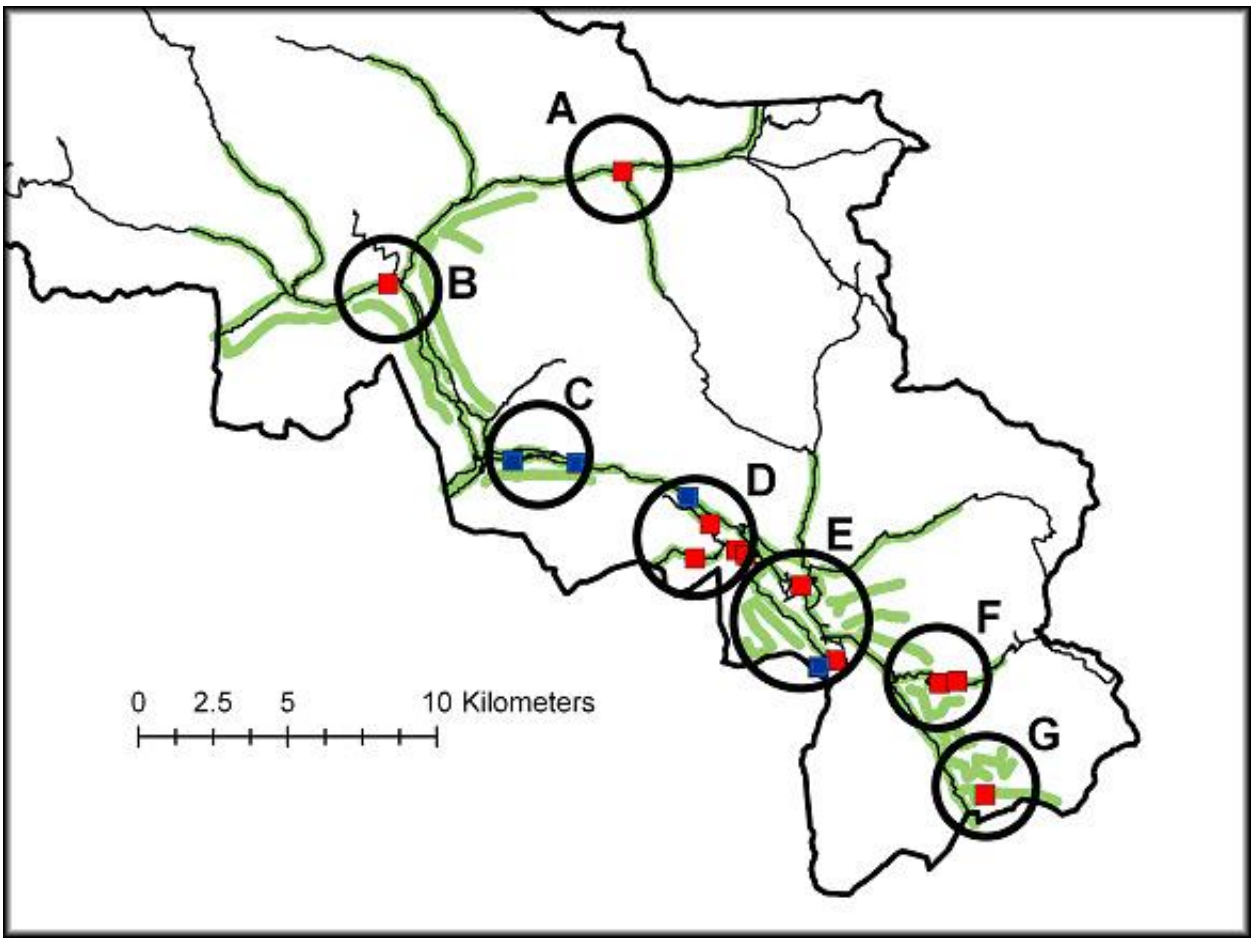

Figure 7. Locations of incidental Great Horned Owl detections during the 2007 and 2008 Spotted Owl survey on the east side of North Cascades National Park. Red squares indicate detections in 2007; blue squares indicate detections in 2008. Lettered black circles group the detections according to our 'best guess' of the number of territories represented by the detections. Presumed territories are discussed by letter in the Results section of this report. Green lines indicate Spotted Owl survey transects; black lines indicate trails and roads.

Barred Owl

We documented 65 Barred Owl detections, representing at least 10 activity sites (Table 3, Fig. 8). Those sites are: Boulder Creek Trail, Company Creek Road, Flat Creek, McGregor Meadow, North Fork Bridge Creek, Park Creek, Riverside Trail, Stehekin Landing (near the community garden), Stehekin River Road VIII, and Old Wagon Road (Buzzard Creek area). We were able to confirm that birds at Company Creek Road, Flat Creek, McGregor Meadows, North Fork Bridge Creek, and Stehekin Landing were paired. In 2007 we observed at least one fledged juvenile at North Fork Bridge Creek and three juveniles at Stehekin Landing. In 2008 we observed two juveniles at McGregor Meadows and two juveniles at Stehekin Landing. The breeding pair of Barred Owls at McGregor Meadows was not detected in 2007, when a non-breeding pair of Spotted Owls occupied the area. In 2008 when Barred Owls newly occupied the area, we could not locate Spotted Owls there, despite intensive search efforts.

Table 3. Barred Owl activity sites detected during the 2007-2008 Spotted Owl survey in North Cascades National Park.

Activity Site Code[a]	Location Description	Year(s) Detected	Breeding Status	Breeding Status Notes
A	North Fork Bridge Creek Trail, Lower	2007	Pair	At least one juvenile detected.
		2008	Unk.	
B	Park Creek Trail, Upper	2007	Unk.	
C	Stehekin River Road VIII	2007	Pair	Male and female detected.
		2008	Pair	Male and female detected.
D	Flat Creek[b]	2007	Unk.	
		2008	Pair	Male and female detected.
E	Stehekin River Trail Lower	2007	Unk.	
		2008	Pair	Male and female detected.
F	McGregor Meadows	2008	Pair	Male, female, and two juveniles detected.
G	Company Creek Road	2007	Pair	Male and female detected.
		2008	Pair	Male and female detected.
H	Riverside Trail	2007	Unk.	
I	Boulder Creek Trail, Lower	2007	Unk.	
J	Stehekin Landing	2007	Pair	Three juveniles detected.
		2008	Pair	Two juveniles detected.

[a] Letters correspond to those in Figure 8.

[b] The numerous detections in this area, on both sides of Flat Creek, might represent two adjacent territories.

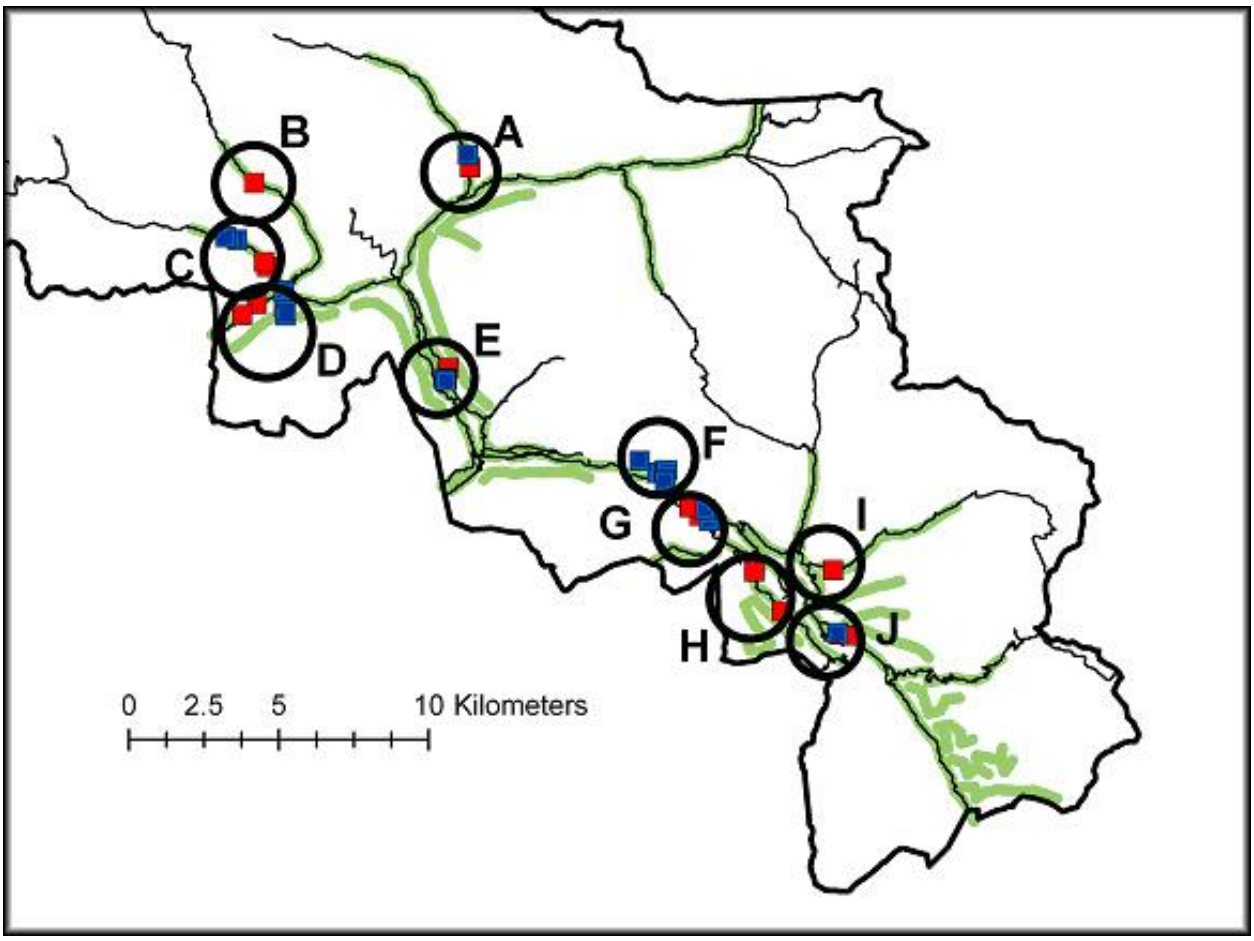

Figure 8. Locations of incidental Barred Owl detections during the 2007 and 2008 Spotted Owl survey on the east side of North Cascades National Park. Red squares indicate detections in 2007; blue squares indicate detections in 2008. Lettered black circles group the detections according to our 'best guess' of the number of territories represented by the detections. Presumed territories are discussed by letter in the Results section of this report. Green lines indicate Spotted Owl survey transects; black lines indicate trails and roads.

Western Screech-Owl

We detected Western Screech-Owls at three sites in 2007 (Table 4, Fig. 9): along the Lakeshore Trail, along Company Creek Road, and near the Golden West Visitor Center (distinct from the Lakeshore Trail detection). There was a mated pair nesting near the Golden West Visitor Center, and they fledged at least one juvenile. No Western Screech-Owls were detected in 2008.

Table 4. Western Screech-Owl activity sites detected during the 2007-2008 Spotted Owl survey in North Cascades National Park.

Activity Site Code[a]	Location Description	Year(s) Detected	Breeding Status	Breeding Status Notes
A	Company Creek Road	2007	Unk.	
B	Golden West Visitor Center	2007	Pair	At least one juvenile detected.
C	Lakeshore Trail	2007	Unk.	

[a]Letters correspond to those in Figure 9.

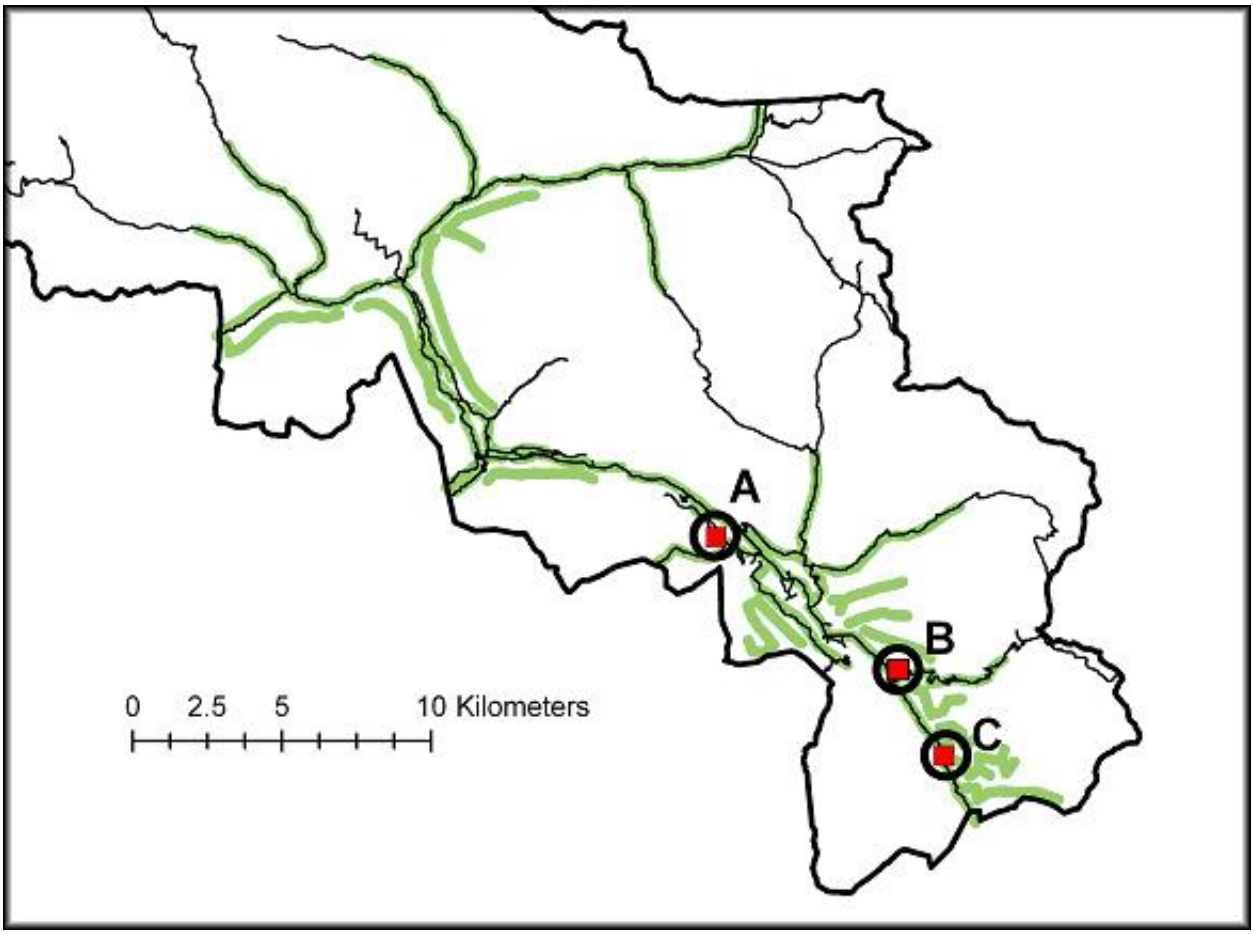

Figure 9. Locations of incidental Western Screech-Owl detections during the 2007-2008 Spotted Owl survey on the east side of North Cascades National Park. Red squares indicate detection locations in 2007; no Western Screech-Owls were detected in 2008. Lettered black circles group the detections according to our 'best guess' of the number of territories represented by the detections. Presumed territories are discussed by letter in the Results section of this report. Green lines indicate Spotted Owl survey transects; black lines indicate trails and roads.

Northern Pygmy-Owl

In 2007 we detected what we believed were two distinct males calling near the Purple Creek Trail (Table 5, Fig. 10); however, it is possible that the two detections were actually the same owl. We detected no Northern Pygmy-Owls in 2008.

Table 5. Northern Pygmy-Owl activity sites detected during the 2007-2008 Spotted Owl survey in North Cascades National Park.

Activity Site Code[a]	Location Description	Year(s) Detected	Breeding Status	Breeding Status Notes
A	Purple Creek Trail[b]	2007	Unk.	
B	Purple Creek Trail[2]	2007	Unk.	

[a]Letters correspond to those in Figure 10.

[b]The two detections along Purple Creek Trail could possibly have been of the same owl.

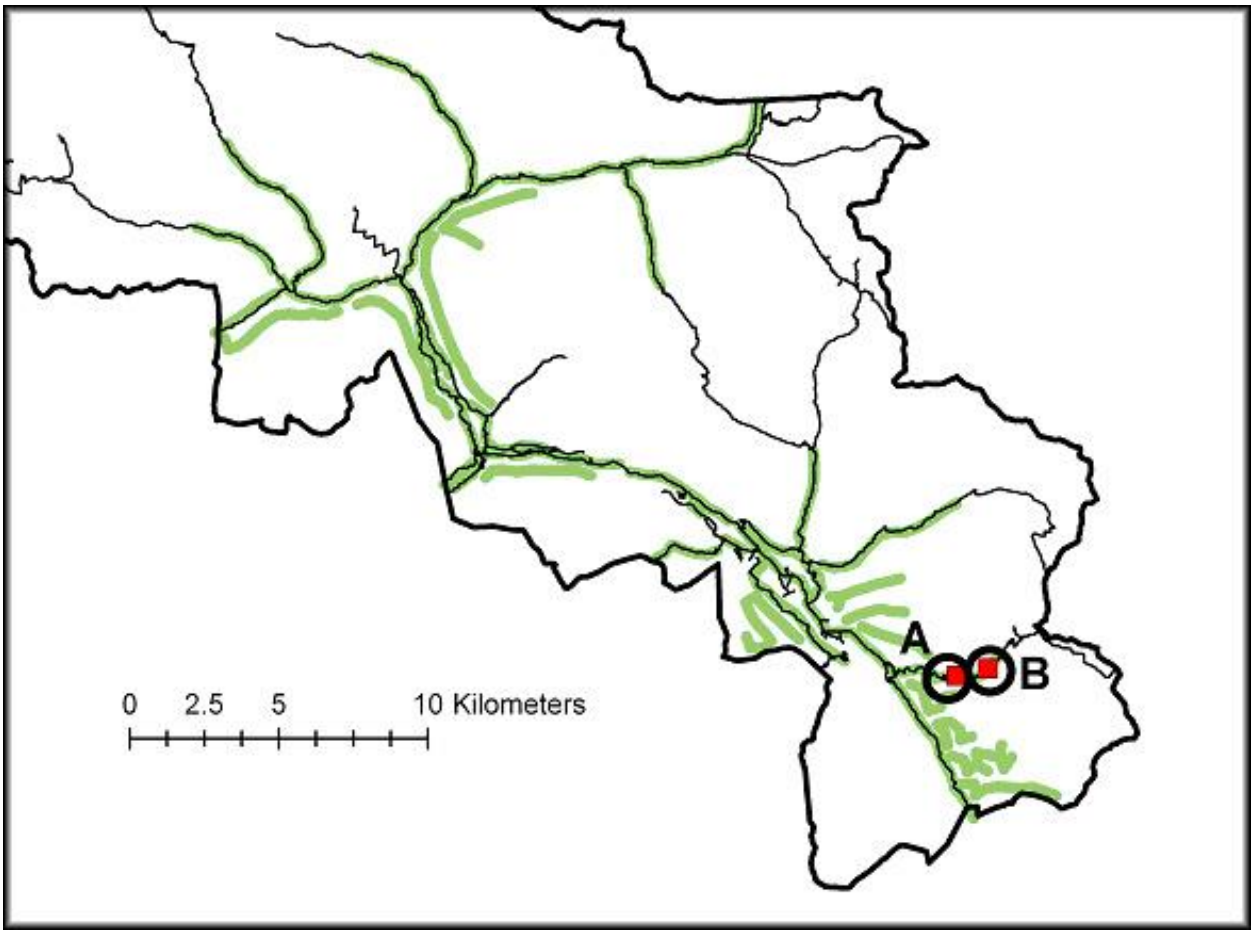

Figure 10. Locations of incidental Northern Pygmy-Owl detections during the 2007-2008 Spotted Owl survey on the east side of North Cascades National Park. Red squares indicate detection locations in 2007; no Western Screech-Owls were detected in 2008. Lettered black

circles group the detections according to our 'best guess' of the number of territories represented by the detections. Presumed territories are discussed by letter in the Results section of this report. Green lines indicate Spotted Owl survey transects; black lines indicate trails and roads.

Northern Saw-whet Owl

We documented 22 detections of Northern Saw-whet Owls, representing perhaps 15 activity sites (Table 6, Fig. 11). On one exceptional night along the North Fork of Bridge Creek in 2007, observers detected 5 individual Northern Saw-whet Owls calling at various points along the trail. Other activity areas were on the Boulder Creek Trail, on Company Creek Road, on the Company Creek Trail, at Flat Creek, on the Riverside Trail (2 individuals) and on Stehekin River Road Transects II, III and VII. The majority of the detections were in March and April, with only a few detections recorded in May and none in June or July. There were no documentations of breeding pairs or fledged juveniles.

Table 6. Northern Saw-whet Owl activity sites detected during the 2007-2008 Spotted Owl survey in North Cascades National Park.

Activity Site Code[a]	Location Description	Year(s) Detected	Breeding Status	Breeding Status Notes
A	North Fork Bridge Creek Trail, Lower	2007	Unk.	
		2008	Unk.	
B	North Fork Bridge Creek Trail, Lower	2007	Unk.	
		2008	Unk.	
C	North Fork Bridge Creek Trail, Lower	2007	Unk.	
		2008	Unk.	
D	North Fork Bridge Creek Trail, Lower	2007	Unk.	
E	North Fork Bridge Creek Trail, Lower	2007	Unk.	
F	Stehekin River Road VII	2007	Unk.	
G	Flat Creek	2007	Unk.	
H	Stehekin River Road IV	2007	Unk.	
		2008	Unk.	
I	Stehekin River Road III	2007	Unk.	
J	Company Creek Road	2007	Unk.	
K	Company Creek Trail	2007	Unk.	
L	Stehekin River Road II	2007	Unk.	
M	Riverside Trail	2007	Unk.	
N	Boulder Creek Trail	2007	Unk.	
O	Riverside Trail	2007	Unk.	
		2008	Unk.	

[a]Letters correspond to those in Figure 11.

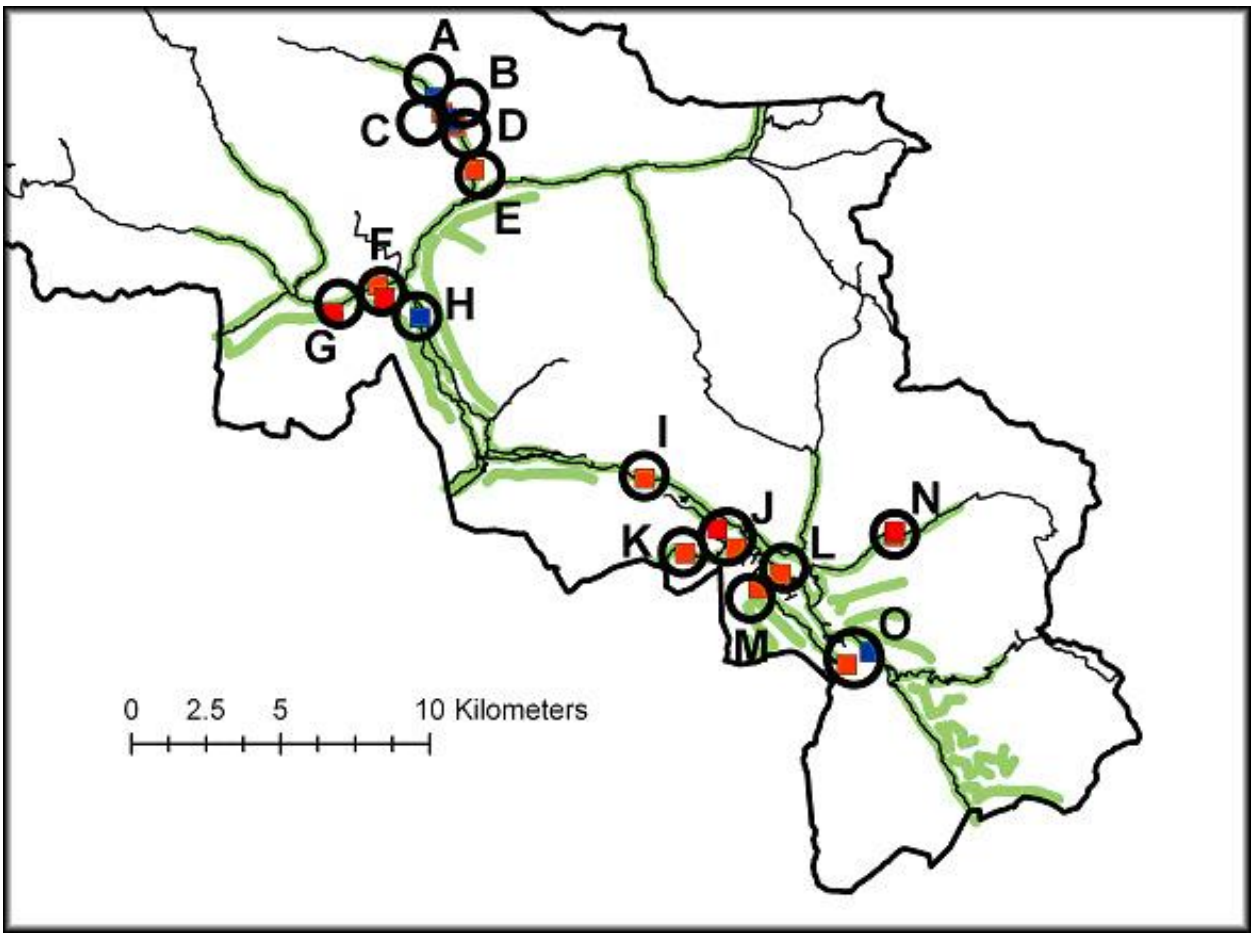

Figure 11. Locations of incidental Northern Saw-whet Owl detections during the 2007 and 2008 Spotted Owl survey on the east side of North Cascades National Park. Red squares indicate detections in 2007; blue squares indicate detections in 2008. Lettered black circles group the detections according to our 'best guess' of the number of territories represented by the detections. Presumed territories are discussed by letter in the Results section of this report. Green lines indicate Spotted Owl survey transects; black lines indicate trails and roads.

Discussion

Population Status and Interactions with Barred Owls

Since the previous extensive Spotted Owl survey in 1993-1996, the east slope of North Cascades National Park appears to have lost two of its historical Spotted Owl activity sites. Both sites were known to be occupied in all four years of the 1990s survey, but repeated, intensive search efforts during the 2007-2008 survey turned up no Spotted Owls, and indeed, found one of the areas to be occupied by Barred Owls. Similarly, the other activity site, although not known to have been occupied in the early 1990s, was occupied by Spotted owls in 1998, 1999, 2000, 2004, 2005, 2006, and by a non-breeding pair in 2007. In 2008, Barred Owls moved into the area and Spotted Owls could not be found.

Table 7. Survey history of all activity sites on the eastern slope of North Cascades National Park with confirmed pair status in at least one year during the 1993-1996 survey, the 2007-2008 survey, or both. An entry of 'X' indicates at least one Spotted Owl was detected at the activity site, regardless of whether pair status was confirmed. Surveys were not consistently conducted from 1997-2006.

Year	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
1993	X	X	X	X		X
1994	X	X		X		
1995	X	X				
1996	X	X		X		
--	--	--	--	--	--	--
2007				X	X	X
2008			X	X		X

Throughout the Pacific Northwest and British Columbia, Barred Owls are known to be displacing Spotted Owls (Dunbar et al. 1991, Hamer et al. 1994, Kelly et al. 2003, Peterson and Robbins 2003). Our methodology is tailored to locate Spotted Owl activity sites, rather than Barred Owl activity sites, so our results should not be construed as a thorough Barred Owl census. Nevertheless, in 2007 we located what we believe were ten discreet Barred Owl activity sites, whereas Kuntz II and Christophersen (1996) found only six such sites in the same study area during the 1993 extensive Spotted Owl survey (Kuntz and Christophersen 1996). While not conclusive, the evidence therefore suggests that the study area's Barred Owl population has increased since the early 1990s, and may still be increasing.

Effects of Wildfire

Spotted Owls generally nest and forage in forest stands with high canopy cover, so it is often assumed that wildfire will negatively impact the species (e.g., Verner et al. 1992, Weatherspoon et al. 1992, MacCracken et al. 1996). Nevertheless, recent information suggests Spotted Owls may be more tolerant of partially burned landscapes than previously thought, at least in the short-term (Bond et al. 2002, Bond et al. in revision). Of the four confirmed Spotted Owl pairs we observed during this study, three of them hold territories that have been substantially affected by recent wildfire. None of the currently unoccupied historical sites we surveyed have been affected by wildfire in the last decade.

All three Spotted Owl pairs occupying burned habitat successfully fledged young in 2008, indicating that low- or moderate-severity fire does not necessary preclude successful Spotted Owl reproduction in the following years.

Conclusions

During the breeding seasons of 2007 and 2008, we resurveyed owl transects originally surveyed in 1993-1996 to locate active Spotted Owl territories and determine productivity at all activity sites found. Two of five historical Spotted Owl territories appear to have been vacated since the extensive survey of the mid 1990s. One of these vacated territories was found to be occupied by Barred Owls. An additional territory, not known to have been occupied in the mid 1990s, was occupied by a non-breeding pair of Spotted Owls in 2007. In 2008, Barred Owls moved into this area and we were unable to find the Spotted Owls. Three pairs of Spotted Owls, all occupying burned habitat, fledged young in 2008. From these findings, we conclude the following:

- Our survey methods proved adequate to detect the presence of Spotted Owls.
- Spotted Owls continue to persist on the east slope of the North Cascades within park boundaries.
- Evidence suggests that the Barred Owl population in the study area has increased since the mid-1990s and may still be increasing.
- Low- to moderate-severity fires do not necessarily preclude successful Spotted Owl reproduction in following years.

Results of this study are being incorporated into a Spotted Owl activity sites management plan for the east slope of NOCA. This management plan will provide specific recommendations for managing each known Spotted Owl activity site and provide general guidance we hope will further enhance Spotted Owl habitat management on the east side of NOCA.
We recommend annual monitoring of all known activity sites. Furthermore, we believe the 2007-2008 east slope Spotted Owl inventory should be repeated in approximately 10 to 15 years to further document the status of this species within the park complex.

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Appendix. Spotted Owl survey data forms

Spotted Owl Survey at North Cascades National Park—Transect Visit Form (Side 1)

Transect:_____ Observer(s): __ __ __, __ __ __ Visit No.:____
Date:___/___/___

Sta. # (xx.x)	Start Time	Dur. (min)	Cmmt. Code	Precip.	Wind	Cloud Cover	Temp. (ºC)	Noise	FUF #

Cmmt. Codes for Sta.'s Not Fully Surveyed
NW=Weather/Noise
NE=Error
NB=Nearby Barred Owl
NG=Nearby Goshawk
NH=Nearby G. Horned Owl
NP=Nearby SPOW pair
NS=New SPOW detected
NO=Other reasons

Precip. Codes:
N=None
L=Light Drizzle
S=Light Snow
Heavier *precip. precludes surveys.*

Wind Codes (Beaufort scale):
0=Calm; smoke rises vertically (<2km/h)
1=Light air; smoke drifts (2-5km/h)
2=Light breeze; wind felt on face, leaves rustle (6-12km/h)
3=Gentle breeze; leaves and twigs in constant motion (13-9km/h)
Stronger wind precludes surveys.

Noise Codes:
L=Low
M=Medium
H=High

Appendix. Spotted Owl survey data forms (continued)

Spotted Owl Survey at North Cascades National Park—Transect Visit Form (Side 2)

Transect:_____ Observer(s): __ __ __, __ __ __ Visit No.:____
Date:___/___/___

Detections of Other Owl Species Along the Transect (use FUF for SPOW detections)

Sta. #	Time	Species[1]	Sex	Age	Dist. (m)	Bearing	Notes

[1]Western Screech-Owl=WESO, Great Horned Owl=GHOW, Northern Pygmy-Owl=NOPO, Barred Owl=BADO, Northern Saw-whet Owl=NSWO).

Transect Logistics:

_____

_____

_____

_____

_____

_____

_____

_____

Natural History Notes:

_____

_____

_____

_____

_____

_____

Appendix. Spotted Owl survey data forms (continued)

Spotted Owl Survey at North Cascades National Park

Incidental Owl Detection Form (use FUF for SPOW detections)

Obs.1	Obs.2	Date (mmddyy)	Time	Species	Sex	Age	UTM E (NAD 83)	UTM N (NAD83)	Error
		/ /07							
Notes:									

Obs.1	Obs.2	Date (mmddyy)	Time	Species	Sex	Age	UTM E (NAD 83)	UTM N (NAD83)	Error
		/ /07							
Notes:									

Obs.1	Obs.2	Date (mmddyy)	Time	Species	Sex	Age	UTM E (NAD 83)	UTM N (NAD83)	Error
		/ /07							
Notes:									

Obs.1	Obs.2	Date (mmddyy)	Time	Species	Sex	Age	UTM E (NAD 83)	UTM N (NAD83)	Error
		/ /07							
Notes:									

Obs.1	Obs.2	Date (mmddyy)	Time	Species	Sex	Age	UTM E (NAD 83)	UTM N (NAD83)	Error
		/ /07							
Notes:									

Appendix. Spotted Owl survey data forms (continued)

Spotted Owl Survey at North Cascades National Park
Station Relocation Form

Transect:_____ Observer(s): __ __ __, __ __ __ Visit No.:____
Date:___/___/___

	Use NAD83														
Sta. #	**UTM E**							**UTM N**						**Error (m)**	**Reason for relocation**

Notes:
_____
_____
_____
_____
_____
_____
_____

Appendix. Spotted Owl survey data forms (continued)

Spotted Owl Survey at North Cascades National Park—Follow-up Form (Side 1)

FUF#:_____Site Name:_____ Date: ___/___/___ FUF Type: TS ID RF

Observers:__ __ __, __ __ __, __ __ __ Transect:_____ Sta. #_____

Start Time: _____ Finish Time:_____ Response:_____ Species:_____

If the detection is NOT at a transect station:

UTM E: __ __ __ __ __ __ UTM N: __ __ __ __ __ __ __ Error (m):_____ Elev.:_____ m ft

Precip.:_____ Wind:_____ CC (%):_____ Temp (ºC):_____ Noise:_____

Nesting indicators (check all that apply):

1___ Female roosting >30 min.

2___ Prey accepted but not taken to nest or yg.

3___ Female observed on nest

4___ Prey (offered or natural) taken to nest

5___ Yg. detected with adult

6___ Brood patch on female

7___ No brood patch on female

Fate of Mice:

_____

_____

_____

_____

_____

_____

_____

SPOW Detection				Band Info.				Mice	
Sex	Age	Meth. (S,I,U)	Det. Time	Band No.	No. Leg	Band Color	Color Leg	Offered	Taken

Sex (F,M,U,J)	Calls Given (circle all that apply)							
	L	C	AC	S	B	N	J	WC
	L	C	AC	S	B	N	J	WC
	L	C	AC	S	B	N	J	WC
	L	C	AC	S	B	N	J	WC

Nest found?_____

Nest UTM E: __ __ __ __ __ __

Nest UTM N: __ __ __ __ __ __ __

Nest UTM Error:_____m

Nest Elev. _____ m ft

Appendix. Spotted Owl survey data forms (continued)

Spotted Owl Survey at North Cascades National Park—Follow-up Form (Side 2)

Nest Description:

_____

_____

_____

_____

_____

Nest Stand Description:

_____

_____

_____

_____

_____

Directions for Relocating Site:

_____

_____

_____

_____

_____

_____

Detailed Notes and Chronology of Events:

_____

_____

_____

_____

_____

_____

_____

Attach additional sheets if necessary

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS D-306, March 2008

National Park Service
U.S. Department of the Interior

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