

**SPOTTED OWL MONITORING IN
OLYMPIC NATIONAL PARK:
2008 ANNUAL REPORT**



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EXECUTIVE SUMMARY

This report summarizes progress on the northern spotted owl (*Strix occidentalis caurina*) monitoring program in Olympic National Park (ONP) in 2008. Monitored spotted owl territories in ONP, together with those visited by U.S. Forest Service Pacific Northwest Research Station (PNW) crews in the surrounding Olympic National Forest, make up the Olympic Peninsula Demographic Study Area. This is one of eight demographic study areas called for under the Effectiveness Monitoring Plan for the Northwest Forest Plan. The goal of these studies is to estimate spotted owl population trends from demographic data.

ONP personnel monitored and managed data on a sample of 52 spotted owl territories (hereafter “sites”) in 2008 to determine their occupancy and reproductive status. Eighteen sites were occupied by spotted owl pairs, and one by a single spotted owl, roughly 1/3 the level of occupancy in the early 1990’s. We documented nesting attempts at 16 sites, and 15 of these were successful, fledging a total of 21 juveniles. We relocated 29 previously banded spotted owls, and banded 5 new territorial spotted owls.

The most recent analysis of trends in northern spotted owl populations, completed in January of 2004, indicated that declines continue, particularly in the northern parts of the subspecies’ range. The overall rate of decline was 4.1% a year, slightly less than the estimate for the Olympic Peninsula. Female fecundity appeared stable, but the more important estimate of adult survival was declining in several areas, including the Olympic Peninsula. All four study areas in Washington State had evidence of both declining adult survival and declining populations. Data collected 1990-2008 will be analyzed at the next meta-analysis workshop in January of 2009.

Barred owls (*Strix varia*) were first documented on the Olympic Peninsula in 1985, and competition with this species is now one of the primary threats to the conservation of spotted owls. In the course of spotted owl monitoring this year, we detected barred owls at 28 spotted owl sites and this species has now been detected at 87% of monitored spotted owl sites in ONP. Despite the presence of barred owls in the vicinity of most sites, 79% of occupied spotted owl sites remain more than 800 m from all previous barred owl locations. Occupancy of spotted owl sites has declined significantly following the first detection of barred owls in the area. Spotted owl territories which have remained occupied following detections of barred owls have both moved farther and increased in elevation relative to sites where barred owls have been absent. Extensive areas of ONP that formerly supported spotted owls now appear to support only barred owls, and most remaining spotted owls are found on steep, well-drained sites above 2000’ elevation.

INTRODUCTION

Olympic National Park (ONP) is located on the Olympic Peninsula in northwest Washington State. The park consists of 922,653 acres, of which 755,820 acres are forested. There is a marked precipitation gradient from rainforest valleys in the southwest to rainshadow areas in the northeast, and it is convenient to refer to two very different strata (hereafter east- and west-side). Drier, east-side forests tend to be younger and are dominated by Douglas-fir (*Pseudotsuga menziesii*). West-side forests have a lower frequency of fire and contain more shade-tolerant species such as western red-cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), and Pacific silver fir (*Abies amabilis*), with varying amounts of Douglas-fir.

The Olympic Peninsula Demographic Study area consists of 54 northern spotted owl (NSO) territories monitored by ONP crews and 45 territories monitored by U.S. Forest Service Pacific Northwest Research Station (PNW) crews in the surrounding Olympic National Forest. This is one of eight areas where basic demographic rates are monitored to assess the effectiveness of the Northwest Forest Plan in preventing a further decline in spotted owl populations.

Washington Department of Natural Resources (DNR) biologists formerly monitored several spotted owl sites in ONP's coastal strip and Queets River corridor, as well as historically occupied sites in the Olympic Experimental Forest. As of 2001, only one spotted owl was known to remain in the coastal strip and there have been none found in the Queets corridor since the early '90's. The DNR has since suspended formal spotted owl monitoring due to budget restrictions and the low level of spotted owl activity on state-owned lands (S. Horton, pers. comm.).

This report summarizes results of fieldwork, cooperative efforts and administration of the owl monitoring project in Olympic National Park during the 2008 NSO breeding season. It is intended as a summary of results for administrators and cooperators, but does not present detailed methodologies or data analysis. Methods are described in Franklin et al. (1996). Results from Olympic National Forest will be available at:
<http://www.fs.fed.us/pnw/olympia/wet/team-research/owl-res/index.shtml>

OBJECTIVES

ONP provides a unique opportunity to understand the ecology of the northern spotted owl in a large area of suitable habitat with almost no history of timber harvest. The specific objectives of the ONP study are to:

1) Document age-specific survival and fecundity to contribute to a range-wide assessment of spotted owl population trends, as required by the effectiveness monitoring component of the Northwest Forest Plan.

2) Monitor the effects of increasing barred owl populations on spotted owls

2008 RESULTS

General Monitoring and Site Status

The project employed seven full-time biological technicians, one Student Conservation Association intern, and one project leader. ONP field crews made 207 visits (mean visits/site = 4.0, range 3-7) to 54 monitored spotted owl sites (Figure 1). Due to the last minute loss of our second intern, and increased collateral duties for the project lead, the total number of site visits was lower than the average 263 visits/year. Two of the sites were formerly monitored by PNW crews, and they will continue to manage those data. We report these site visits here, but the sample size for most analysis is 52 sites except where noted. The full field crew (4-5 one or two-person teams) made visits to owl sites between March 31 and July 16. Two crews remained in the field through the end of July.

Winter snow pack was over 130% of average by the beginning of the field season, and snow persisted late into the year at the elevation of many spotted owl activity centers. There was some form of precipitation on 18% of site visits, in the form of heavy rain (2%), light rain (8%) and snow (8%).

The 52 spotted owl sites monitored in 2008 represented a sample of roughly 23% of the 229 spotted owl territories estimated to occur in ONP as of 1995 (Seaman et al., 1996). Funding limitations and the difficult logistics involved in monitoring sites as far as 24 miles from a trailhead determined the number of sites that were feasible to monitor. We have continued to monitor sites regardless of their occupancy status in order to avoid skewing our sample towards higher quality territories. We have also tried to keep sites well distributed throughout the park, although the west side is not as well represented, mainly due to the lower density of owls there. We monitored 39 sites on the park's east side and 13 on the west side in 2008. The mean length of record was 16.4 years (range 13-17), not including years prior to 1992, when monitoring to current protocols began at most sites.

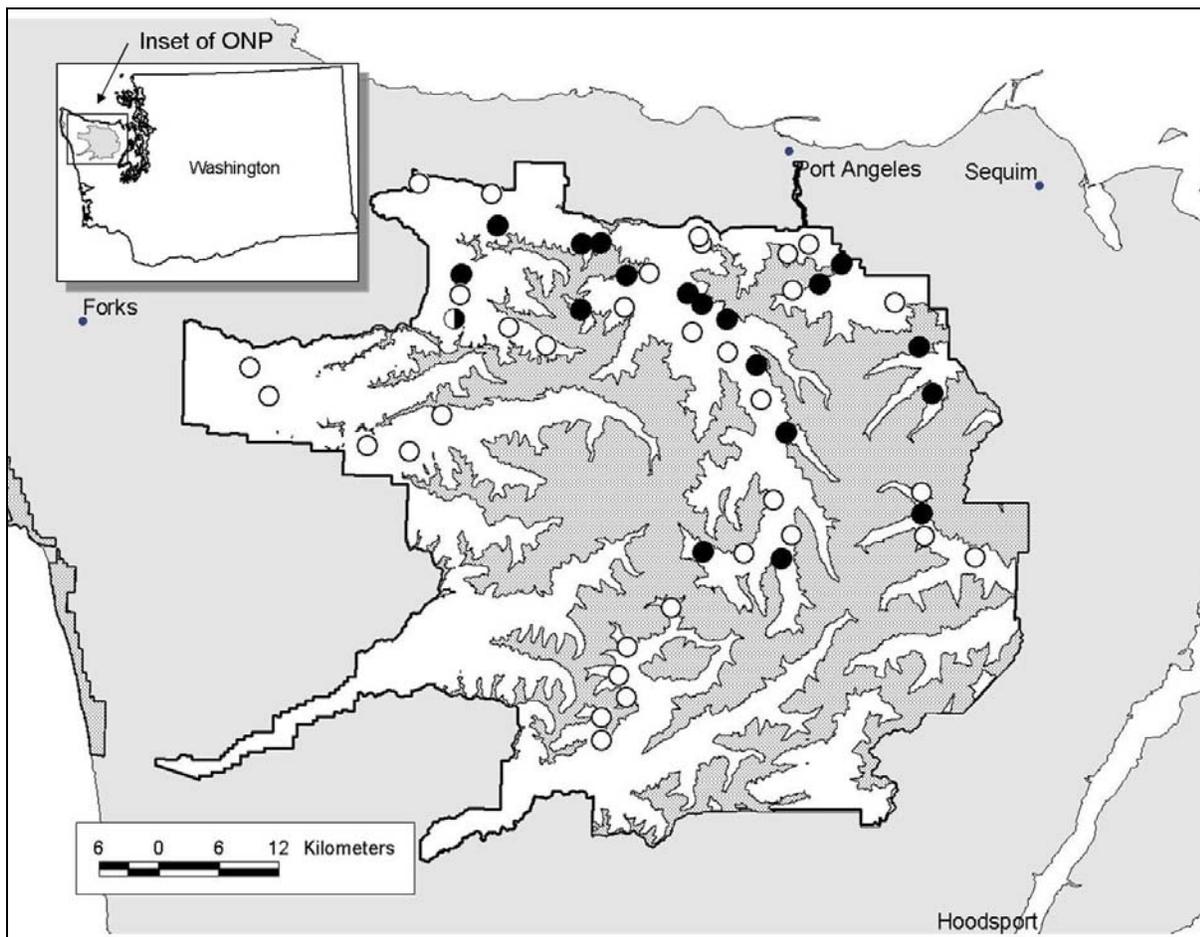


Figure 1. Location and occupancy status of 52 monitored spotted owl territories in Olympic National Park, 2008. Black dots are spotted owl pairs, half-filled circles are single owls and white circles are monitored sites with no response. Shaded area within the park boundary is high elevation non-habitat.

At least one spotted owl was detected at 19 (37%) of the monitored sites, and pairs were documented at 18 of these (Figure 2). We detected at least one spotted owl on 29% of site visits. For the second year in a row, we did not locate any spotted owl pairs at monitored sites on the west side of the park. We located a total of 37 territorial spotted owls at monitored sites, of which 19 were males and 18 were females. These rates of occupancy are around 1/3 of that in the early 1990's, but represent the same number of occupied sites as in 2007. Among the 33 territorial owls identified to age class, three were sub-adults one or two years old, and the remainder were adults three years of age or older. Six spotted owls were of known age (range 2-14 yrs) as a result of initially being banded as juveniles or sub-adults. NSO initially captured as adults can only be assigned a minimum age; the oldest of these are a male and female both at least 20 years old this year.

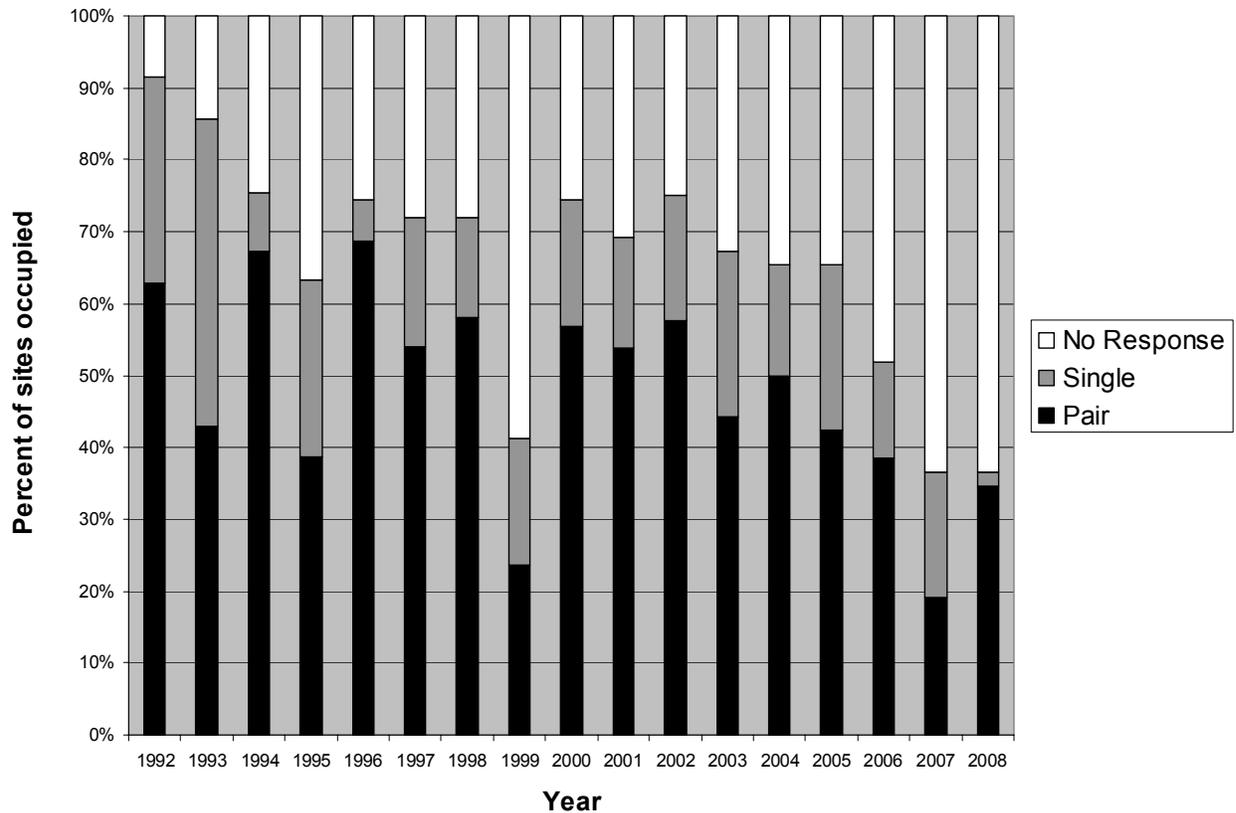


Figure 2. Percent of monitored spotted owl sites occupied by 0, 1, or 2 adult owls, Olympic National Park, 1992-2008.

When calculated for a fixed sample limited to NSO sites monitored from 1994-2008 (N = 50), the mean elevation of occupied sites has increased 650' over 15 years, to 2777'. Historically, spotted owls on the drier east side of ONP have been found at higher elevations than on the west side. This year, none of the monitored sites on the west side were occupied, so we could not analyze differences in elevation by side. Only two of 19 occupied sites were located below 2000' this year, while six were above 3000'.

Nest and Reproductive Monitoring

We determined the reproductive status of 17 of 18 female spotted owls at monitored sites. Of these, 16 attempted to nest and 15 were successful, fledging a total of 21 juveniles. Spotted owl productivity (fecundity) is calculated as the number of female young produced per

territorial female, assuming a 50:50 sex ratio of offspring. In 2008 the mean fecundity for adult females was 0.67 ($N = 15$, $SD=0.309$) and for sub-adult females was 0.50 ($N = 2$, $SD=0.707$). Spotted owl fecundity in the Olympics has been highly variable, with years of high productivity often followed by years with little or no nesting (Figure 3). The mean annual fecundity rate for adult female spotted owls in Olympic NP ($N = 17$ years) was 0.34 (SE 0.079); the estimate for adult females over the range of the northern spotted owl was 0.37 (SE 0.029) (Anthony, et al., 2004).

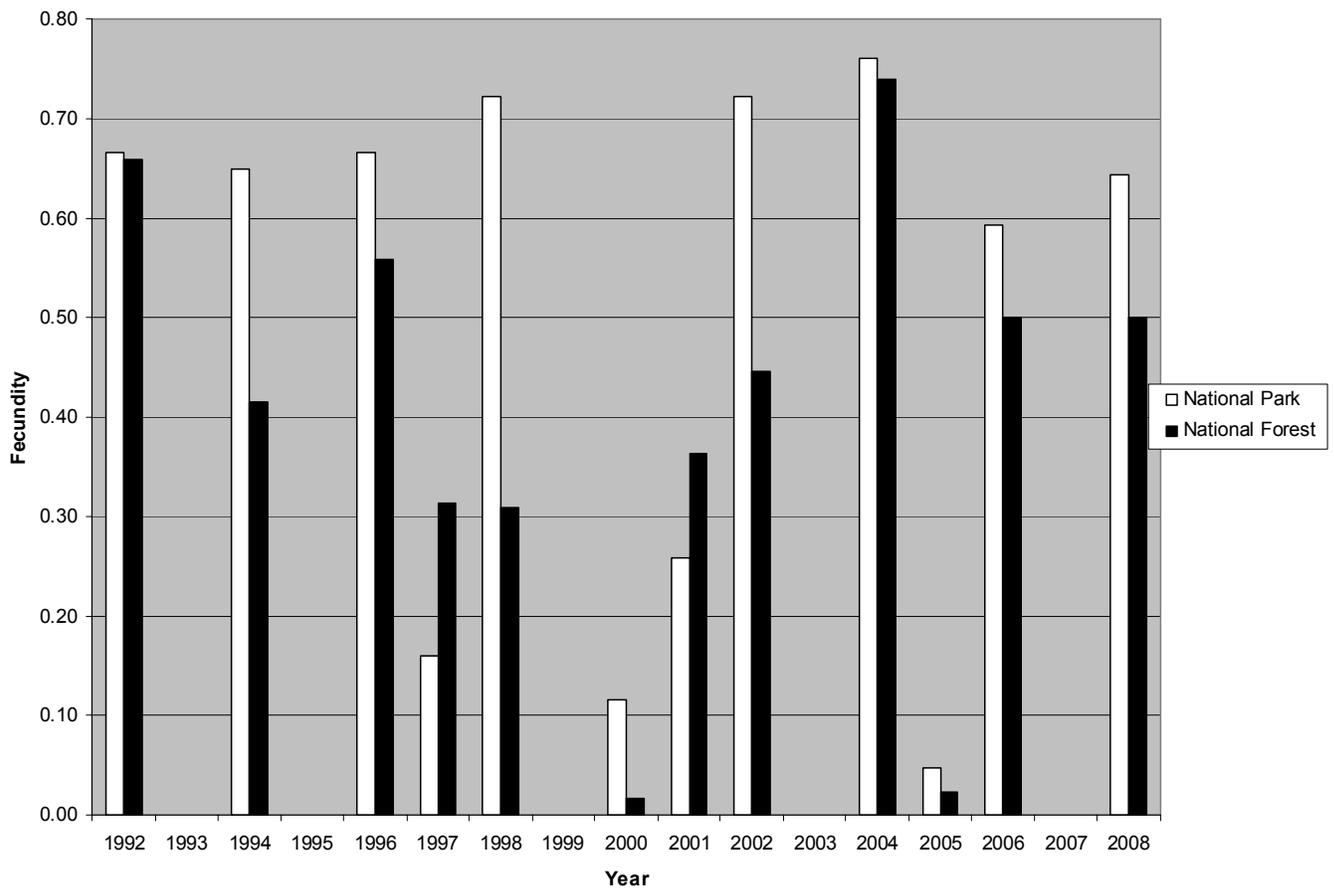


Figure 3. Olympic Peninsula spotted owl fecundity (mean # of female offspring/adult territorial female), 1992-2008. Includes both National Park (white bars) and National Forest (black bars).

The high year-to-year variation in female fecundity has mostly been driven by the fraction of the population attempting to nest, and the productivity of those nests, rather than the rate of

nest success, which averages over 90% (Appendix 1). Of 200 nesting attempts since 1992, only 18 failed and 5 had unknown outcomes.

Banding and Capture

Banding owls is necessary to identify individuals and estimate survival rates. All captured owls are fitted with a unique U.S. Fish and Wildlife Service number band. Adult and sub-adult owls are marked with a color band unique to a 16 km radius from the capture site, which enables field crews to identify these individuals without recapturing them. Juveniles receive a standard color band, which is changed if these birds are re-captured as adults on a new territory. We use standard capture techniques for spotted owls (Franklin et al., 1996), and emphasize owl safety during training.

In 2008, ONP crews captured 21 spotted owls. We banded two adults, two second year sub-adults, 10 juveniles and one adult or sub-adult female with heavily worn tail feathers that could not be aged. We recaptured six spotted owls to: identify a banded adult owl at a new site (3), replace a juvenile band with a standard color band on a territorial owl (2) and to confirm the identity of a banded bird that that surveyors could not see a band on until the owl was captured (1). Of the 37 territorial spotted owls detected, 3 were unknown audio detections, 11 were newly banded or recaptured, and 23 were identified by re-sighting of color bands. Overall, we identified 92% of the territorial spotted owls occupying monitored sites by capture or re-sighting of color bands.

Since 1988, ONP crews have performed 508 captures of 371 different spotted owls. This season, we documented the first mortality that was potentially the result of capture. On June 26 we banded two juveniles at the Remann's site. The second juvenile was in hand from 12:16-12:40. This was the smaller of the two owls captured with a net weight of 575 g, vs. 675 g for the first juvenile. Upon release, the owl flew normally and was observed perched for 10 minutes, with no signs of stress or abnormal behavior. While passing back through the area at 14:00 the juvenile spotted owl was found dead at the base of a large tree. The necropsy of the owl was inconclusive; there was no sign of direct trauma related to the capture and the owl appeared healthy except for excess fluid in its lungs.

We captured and banded under ONP master station banding permit 22633 and U.S. Fish and Wildlife Service 10(a)(1)(a) "take" permit TE842449-3.

Juvenile Dispersal

Eighteen of the 152 spotted owls banded as juveniles by ONP crews prior to 2008 have been recaptured as adults or sub-adults on the Olympic Peninsula. Five dispersed to Olympic National Forest, the rest were found within ONP. The median dispersal distance for this sample was 17.0 km, and the mean 19.4 km (SD 10.0, range 5.3-41.8 km). The mean

dispersal distance of females was 42% greater than that of males, but this difference was not statistically significant. The greater dispersal distance for females is consistent with results reported by Forsman et al. (2002) for a large sample of juveniles in Washington and Oregon. The mean age at recapture was 2.9 years, implying that most spotted owls spend several years as non-territorial "floaters" or on territories outside of our study sites before being detected. To date, we have documented no dispersal of spotted owls between the Olympic Peninsula and Cascade provinces.

Barred Owls and Hybrids

Barred owls have recently expanded their range into the Pacific Northwest. The first documented occurrence on the Olympic Peninsula was on the west side of ONP in 1985 (Sharpe, 1989), and the number of sightings continues to increase. Barred owls are dominant in competitive interactions with spotted owls and evidence from many areas suggests that barred owls displace spotted owls from otherwise suitable habitat (Dark et al., 1998; Hamer, 1988; Kelly, 2001, Gremel, 2005).

Barred owls are generally more wary of humans and appear to be less responsive to our survey efforts than spotted owls. Most biases associated with our incidental data on barred owl occupancy, reproductive status and rate of increase likely lead to underestimates of these parameters. For example, although we attempt to revisit every past activity center at a spotted owl site, more of those visits cover where the spotted owls are currently or most recently located. Since current locations are often a result of spotted owls moving to areas of lower barred owl activity, less of our monitoring is devoted to the areas where barred owls are most abundant. Also, as barred owl densities have increased, it has become more difficult to discern the number of adjacent territories. Barred owls are not banded and we conservatively lump clusters of sightings within several kilometers of each other as one territory ("site") until we get simultaneous evidence of multiple pairs. Many barred owl sites with single occupancy were not visited frequently enough to determine pair status, or at the proper time to document reproduction. Consequently, our estimates of barred owl pair and reproductive status should be considered minimum estimates of these values, and are useful only as indices for comparison among years.

We recorded barred owls on 60 separate occasions representing an estimated 39 barred owl territories in 2008. Twelve detections and four of the territories were detected only as a result of calling for barred owls. These will be tracked separately from incidental detections on spotted owl surveys, so as not to bias comparisons of barred owl detections with previous years when we did not use barred owl calls. To standardize for variable survey effort between years, the annual count of occupied barred owl sites is divided by the number of days spotted owl survey teams were in the field (Fig. 4). The level of effort was highest (396-560 team-days/year) in the early 1990's when we were conducting both inventory and monitoring projects, and has remained relatively constant (207-318 team-days/year) since the conclusion

of the inventory project in 1995. The annual rate of increase in this index, calculated from the log of the slope from 1992-2008, was 14.2 % a year.

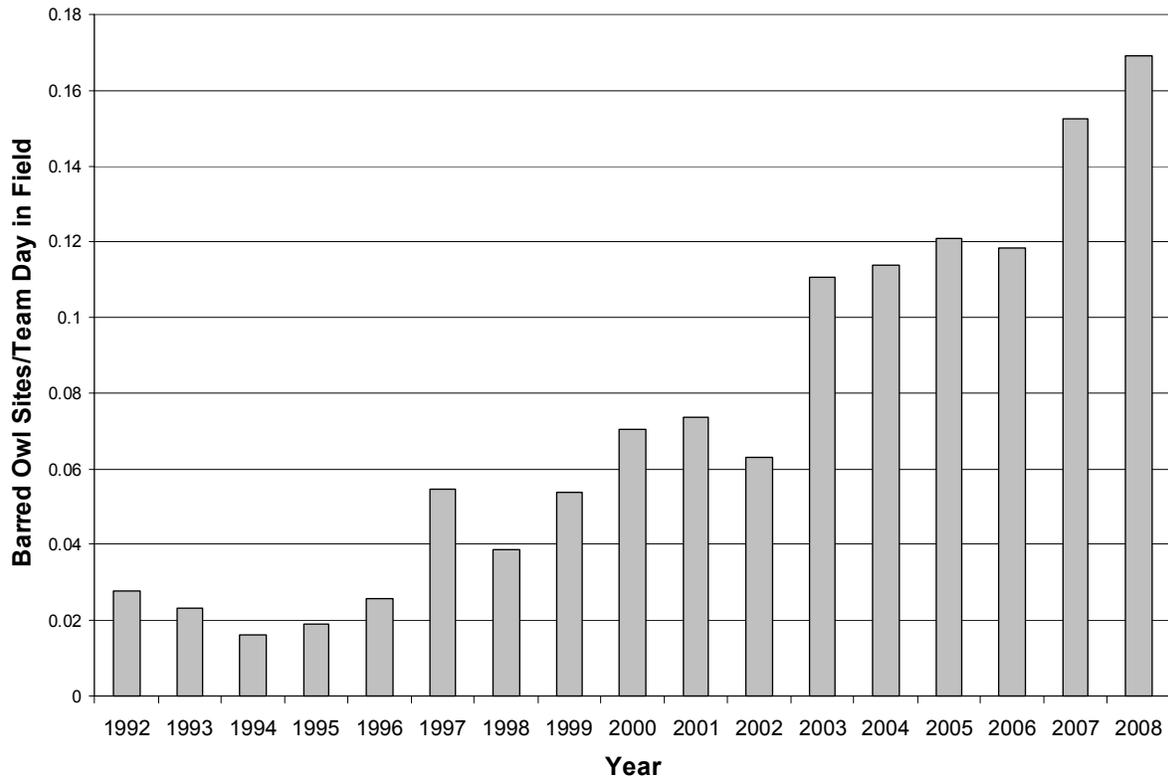


Figure 4. *Number of occupied barred owl sites standardized by survey effort, Olympic National Park, 1992-2008. Excludes sites detected as a result of using barred owl calls.*

Barred owl pairs were detected at 17 sites, and single barred owls at 22. Only one of these was a previously unknown territory, bringing the total number of known barred owl sites in ONP to 87. We documented nesting by barred owls at 11 sites, fledging a minimum of 19 juveniles. An index of barred owl reproduction (the number of juveniles detected/occupied barred owl site) correlated significantly with annual rates of spotted owl fecundity from 1992-2006 (Spearman’s rho = 0.726, $p < 0.01$).

Hybridization between barred and spotted owls has been documented, but appears to be infrequent after the initial period of colonization (Hamer et al. 1994; Herter and Hicks, 2000; Kelly and Forsman, 2004). We know of two hybrids in the park, a male and a female, both

paired with barred owls inhabiting former spotted owl activity centers. The male hybrid in the Soleduck Valley was located twice this year.

Morse Creek Barred Owl Study

We conducted a second season of work on a 7000 acre study area in the Morse Creek drainage, where we plan to monitor density and space use by both barred and spotted owls. The area was selected for its combination of both year-round road and trail access and the history of monitoring at all known spotted owl sites ($N = 5$). Due to limited staff, we did not conduct a second season of landscape level surveys in the area. We continued to monitor the five known spotted owl sites, conducting 21 visits and locating spotted owl pairs at two sites. One of these pairs was first discovered when they responded to recorded barred owl calls during a night-time barred owl capture attempt. The females at these sites were both banded this year, and the males were both originally captured at other sites in the valley. The male spotted owl which had occupied another site from 1992-2006 was found dead this spring, around 1500 m from the historic activity center. This site was first occupied by a pair of barred owls in 2007 and no spotted owls had been detected since then. From the condition of the carcass, this owl probably died sometime in 2007.

We successfully installed backpack radios on one member of each known barred owl pair ($N = 4$ females and 1 male) in late March, using a barred owl decoy, taped calls and mist net. One female hooked a harness strap over her bill soon afterwards, and we recaptured her to remove the backpack. The remaining four barred owls were tracked 1-2 times weekly throughout the season, with a range of 26-33 locations by late September. All three females nested, fledging 0, 1 and 2 juveniles.

One objective of the study is to better understand the effectiveness of our spotted owl monitoring protocols at detecting barred owls when they are present. All five spotted owl sites fell within one or more home range of the barred owls tracked this year. Despite this, barred owls were detected at only three spotted owl sites and on three of 21 monitoring visits conducted in the study area.

Effects of Barred Owls on Spotted Owls

In 2008, we detected barred owls within 800 m of 28 monitored spotted owl sites in the course of demographic monitoring, and at two additional sites while calling for barred owls. We did not detect barred owls at any new spotted owl sites. Using a cumulative measure, barred owls have now been detected at 45 (87%) of monitored spotted owl sites. (Fig. 5). At ONP, rates of pair occupancy have declined at spotted owl sites following the first barred owl detection there. At sites where spotted owls have remained after barred owls were detected,

they have both moved farther from their original location and shifted to higher elevations, relative to spotted owl sites without barred owls (Gremel, 2005).

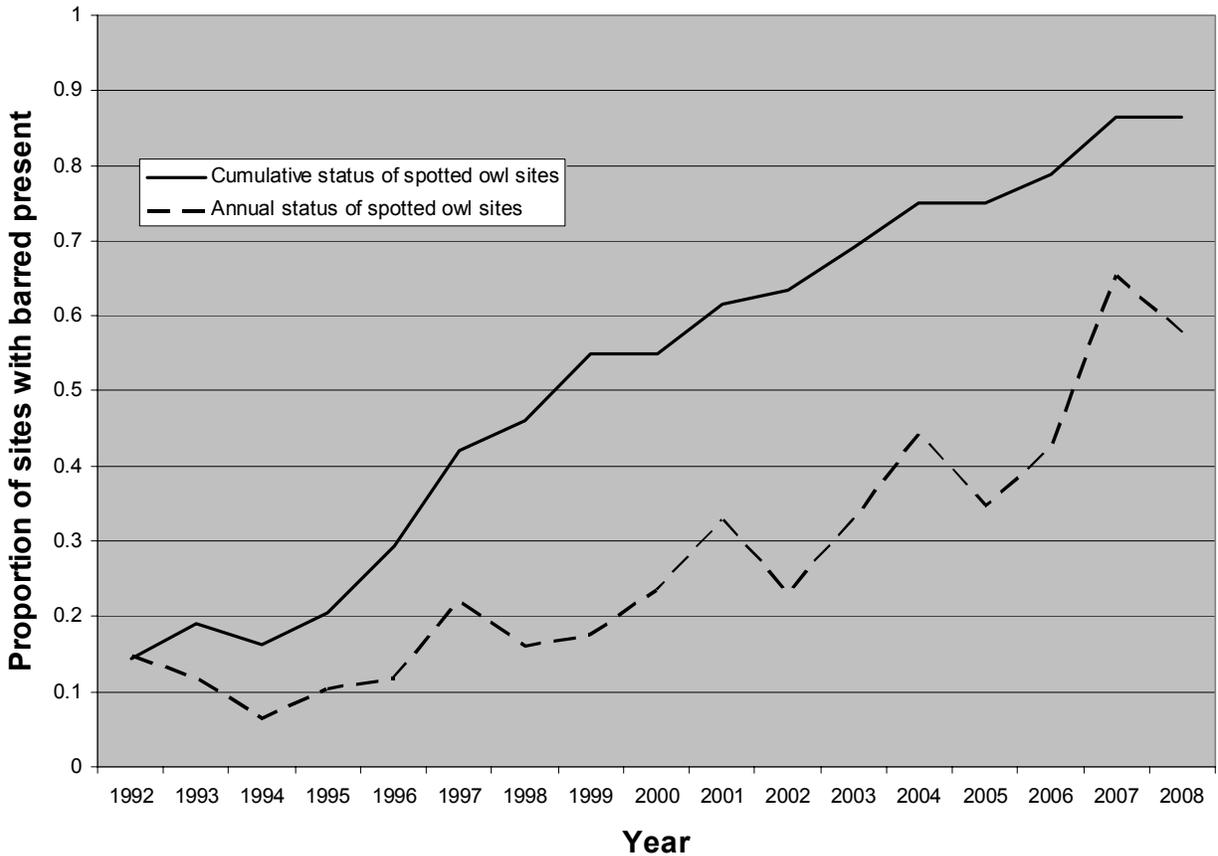


Figure 5. Presence of barred owls at monitored spotted owl sites (N=52), Olympic NP, 1992-2008. Spotted owl sites are defined as the area within 800m of any annual activity center through 2008. The solid line is the proportion of sites that have ever had a barred owl detected in this area, the broken line is the annual proportion of sites with barred owls.

In 2008, we found barred owls and spotted owls within 800 m of each other at only two of 19 occupied spotted owl sites. A pair of spotted owls were located at night 475m from a barred owl detected earlier this year. This pair successfully nested, fledging one juvenile. At a second site, a barred owl was found within 100m of an active near the time of fledging, and this nest apparently failed. Two other pairs were found within 800m of barred owls detected in previous years, and the remaining 15 active spotted owl site centers were more than 800 m from any prior barred owl detection.

Data from ONP suggest that spotted owls are excluded from areas occupied by barred owls, rather than remaining and going undetected for many years. Despite the increased movement documented at sites with barred owls, the mean per visit response rate at sites with any spotted owl responses this year was 0.68, compared to the rate of 0.52 found during a spotted owl inventory here 1992-1995. There was also no indication of declining spotted owl detection rates in the last mark-recapture analysis of data from ONP (Anthony, et al., 2006). In the years 2004-2008, 36% of the initial detections on a visit were visual, indicating that we would be likely to detect owls at some point, even if they became much less vocal. Finally, our experience has shown that occupied spotted owl roosts are readily identified by signs including pellets, whitewash, or feathers, all of which are also absent in areas where we no longer detect spotted owls.

Other Species

In addition to barred and spotted owls, we also record incidental responses by northern goshawks (*Accipiter gentilis*) and great-horned owls (*Bubo virginianus*). The number of occupied goshawk sites encountered during owl monitoring has ranged from 0-6 per year. This year we encountered goshawks at 3 sites; a nest with eggshell fragments was located at one of these. We detected great-horned owls at one site and found nearly a full set of plucked flight feathers of this species at another. Great-horned owls are rare in the dense, mid-elevation conifer forests of ONP where most of our monitoring takes place, and both sites found this year were located at the transition between montane forest and subalpine meadows above 4000' elevation.

COOPERATIVE EFFORTS

2004 Demographic Workshop

We participated in the northern spotted owl demographic workshop, held Jan. 4-11, 2004 in Corvallis, OR. Data from the Olympic demographic study area (ONP and Olympic National Forest combined) were analyzed along with those from 13 other spotted owl demographic studies to estimate age-specific rates of fecundity, survival and population trends for territorial females across the range of the northern spotted owl.

Fecundity rates were stable, both on the Olympic demographic study area and when measured across the range of the northern spotted owl. Annual apparent survival estimates ranged from 0.75 to 0.89 for territorial non-juvenile spotted owls. Olympic was one of five study areas

with evidence of a decline in survival rates over time; three of the five studies with declining survival were also located in Washington State.

The annual rate of population change was analyzed differently than in prior analyses, but trend estimates were similar. Range-wide, the decline in numbers of territorial northern spotted owls was estimated to be 4.1% a year. Point estimates for 13 of 14 study areas fell below 1 (stable population), and there was evidence for a statistically significant population decline at 8 of these, including Olympic. The estimate of decline in the Olympic demographic study was 4.4% a year. The 95% confidence interval for this estimate barely included 1, indicating a strong probability, although slightly less than 95%, that the population was actually declining. Overall, it appeared that spotted owl populations in Washington were faring worse than those in Oregon and California. Population trends were more favorable on federal lands (declining 2.5% a year) than on all other study areas (declining 6.6% a year).

Northern Spotted Owl Presence/Absence Monitoring

The need for a more extensive survey method, designed to track both population trends and changes in distribution, was identified as a priority in a recent review. Beginning in 2006, we have implemented these surveys as part of the park's long-term landbird monitoring program. Crews from the Institute for Bird Populations surveyed randomly located 1.8 km-long transects, using protocols developed for a spotted owl inventory conducted at ONP in the early 1990's. Surveyors called for spotted owls after conducting point counts for songbirds at stations along these transects. Transects consisted of five or more stations located 400 m apart and each station was called for 10 minutes. All stations in forested habitat are called, regardless of elevation. These surveys should provide an inexpensive test of the feasibility of implementing a larger scale presence/absence survey.

In 2008, these surveys were completed in Olympic, North Cascades and Mt. Rainier National Parks, but results from the surveys were not yet available.

Interagency Activities

- Provided NSO location data to BLM for work on habitat covariate to be used in next meta-analysis
- Served as NPS representative on the Northern Spotted Owl Recovery Plan Implementation Team and Barred Owl Working Group (Gremel).
- Collaborated with Dr. Sam Wasser at the University of Washington, collecting spotted owl fecal samples for the fifth year of a study of corticosteroid stress hormone levels.

- Provided records of all field visits and annual site summary information to the Washington Department of Fish and Wildlife for their state-wide spotted owl database.
- Agreement technical representative for collaboration with Oregon State University on a study of interactions between barred and spotted owls (Happe). This study is currently underway near Eugene, OR and is partially funded by the NPS through the Northwest Forest Plan's Regional Ecosystem Office.
- Supplied barred owl pellets collected in ONP to Scott Graham, Boise State University, for inclusion in a MS thesis on this species' diet within the range of the northern spotted owl.
- Collaborated with Amber Giroux and Dr. Tim Parker of Whitman College on an analysis of potential changes in spotted owl diet at ONP related to competition and displacement by barred owls.
- Provided spotted owl occupancy data and barred owl covariate data to Dr. Katie Dugger, Oregon State University, for an analysis of the effects of barred owls on spotted owl site occupancy and probability of detection.

BUDGET

All funding was provided by the NPS through the Regional Ecosystem Office of the Northwest Forest Plan. Funding for spotted owl monitoring was provided at the level of \$131,250 in FY 2008. An additional \$5000 was provided to support NPS participation in the northern spotted owl recovery team, and \$50,000 for the interagency barred and spotted owl interaction study was administered through ONP.

RECENT PUBLICATIONS

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.B. Burnham, G.C. White, C.J. Schwarz, J. Nichols, J. Hines, G.S. Olson, S.H. Ackers, S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.B. Gerhardt, S.A. Gremel, R.J. Gutierrez, P. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, and S.G. Sovern. 2006. Status and trends in demography of northern spotted owls, 1985-2003. Wildlife Monographs 163.

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ACKNOWLEDGEMENTS

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APPENDIX 1

Nesting status and success rate of female spotted owls of all age classes, at monitored sites in Olympic National Park, 1992-2008.

	Non-nesting	Nesting	Unknown nest status	Total females	% known nest status	% females nesting	Nest success ¹
1992	1	15	7	23	0.70	0.94	0.93
1993	16		5	21	0.76	0	*
1994	3	24	7	34	0.79	0.89	0.92
1995	15		6	21	0.71	0	*
1996	5	28	3	36	0.92	0.85	0.86
1997	15	8	6	29	0.79	0.35	0.75
1998	1	24	5	30	0.83	0.96	0.88
1999	9		5	14	0.64	0	*
2000	17	10	5	32	0.84	0.37	0.5
2001	16	8	4	28	0.86	0.33	1
2002	3	27		30	1.00	0.90	0.89
2003	23		3	26	0.88	0	*
2004	2	22	4	28	0.86	0.92	0.95
2005	19	1	3	23	0.87	0.05	1
2006	1	17	2	20	0.90	0.94	0.94
2007	13		1	14	0.93	0	*
2008	1	16	1	18	0.94	0.94	0.94
Total	160	200	67	409	0.84	0.58	0.91

¹ Proportion of nest attempts that result in at least one fledgling, calculated on nests with known outcomes

* No nesting attempts