Range Expansion of Barred Owls into Redwood National and State Parks:

Management Implications and Consequences for Threatened Northern Spotted Owls

By Howard Sakai

The northern spotted owl *(Strix occidentalis caurina)* (fig. 1) is a federally listed threatened species that inhabits old-growth and mature second-growth forests. During surveys of known spotted owl territories in Redwood National and State Parks (California) investigators encountered barred owls *(Strix varia)* (fig. 2). Barred owls are known to displace and hybridize with spotted owls, which could have a negative impact on the genetic makeup of northern spotted owls as hybrids develop (Hamer et al. 1994). This article provides a brief synopsis of survey results within the parks and briefly discusses some management implications relative to these findings.

Figure 1 (background photo). The northern spotted owl is a federally listed threatened species that inhabits the old-growth and mature second-growth forests of Redwood National and State Parks.

Figure 2. The generalist nature of barred owls in selecting habitats allows the species to populate a variety of forests and riparian areas.

Range expansion of barred owls

Historically, barred owls ranged from south-central Mexico north through the southern and eastern United States. Westerly range expansion occurred over the past several decades whereby barred owls became common in southwestern British Columbia, and western Washington and Oregon. Biologists from Olympic National Park (Gremel 2003, 2001) and Crater Lake National Park (M. Brock, chief of Resource Management Division, Crater Lake National Park, phone contact, October 2001) have documented barred owl encroachment into spotted owl territories.

The expansion of barred owls is probably a function of their generalist nature in using a variety of habitats in both disturbed and undisturbed conditions (Hamer 1988). Barred owls are known to successfully colonize a variety of forest and riparian habitats, including old-growth and mature forests that spotted owls also inhabit. The extensive amount of disturbed forests impacted by human activities such as logging throughout the Pacific Northwest probably facilitated their expansion.

Barred owls are slightly larger and known to be more aggressive than spotted owls, so the probability of competition with spotted owls and the likelihood that barred owls will displace spotted owls from their established territories are relatively high. Their aggressiveness may even lead to the predation of spotted owls. For example, in 1997 researchers noted an incident of a possible predation of a spotted owl by a barred owl within Redwood National and State Parks (Leskiw and Gutierrez 1998).

Spotted owls surveyed

In fall 1993 we embarked upon a three-year federally funded project to survey and monitor northern spotted owl territories throughout the 106,000 acres (42,898 ha) of the parks. We divided the linear-shaped park complex into three zones (southern, central, and northern) to facilitate survey coverage of all suitable spotted owl habitats, which totaled 97,000 acres (39,000 ha). We initiated surveys in the southern portion of the park complex and expanded northward in 1994 and 1995.

Investigators located 36 northern spotted owl territories during the three-year survey and monitored each for occupancy, nesting status, and reproductive success. Each year since 1996 we continued monitoring all spotted owl territories during the spotted owl breeding season. In 2002 we switched our survey efforts to monitor 20 known functioning activity centers (defined as being occupied by one or more spotted owls within the previous three years) and inventoried a subset of the remaining 16 "inactive" centers. We inventoried inactive sites within a 1-mile (1.6-km) radius centered on the last-known (historical) spotted owl activity center location. The objective of resurveying inactive sites is to determine the current status of the original spotted owl occupants. Between 1993 and 1995 we banded many of the spotted owl adults and fledglings with colored leg bands. We discontinued this practice because of budget constraints and low frequency of re-sight information from banded birds.

Observations

During the 11 years of spotted owl surveys, we detected barred owls, including five spotted owl–barred owl hybrids (three in 1995 and two in 1996). The barred owls responded audibly to spotted owl vocal lure surveys throughout most of the park complex (fig. 3, page 26). Detection of barred owls ranged from 2 to 42 observations between 1993 and 2003 (fig. 4, page 26). The 42 barred-owl detections in 1995 may reflect expanded survey efforts in the northernmost portion of the park complex where barred owls may occur in highest densities (fig. 3). Alternatively, this result could be attributed to repetitive counts of barred owl individuals or pairs. To date, we have detected barred owls at an estimated 32 independent sites that include 17 spotted owl territories within Redwood National and State Parks (Schmidt 2004). Barred owl sites are locations where at least one barred owl has been detected at least once and are 1 mile (1.6 km) or more away from another such site. This distance is comparable to the average radius of the home range of barred owls in Washington (Hamer 1988, Kelly 2001).

At Redwood National and State Parks what was perceived to be displacement of a known spotted owl territorial pair by barred owls may not be as clear as originally noted. In 1993 we found the South Fork Little Lostman Creek spotted owl pair. Barred owls immigrated into the spotted owl territory in 1996, and both species coexisted there until 1999 when the spotted owl pair vacated their historical nest site. Since 1999 this historical spotted owl activity center has been either vacant or occupied by barred owls. In 2002 two spotted owls of opposite sex were detected about a mile (1.6 km) from the known historical spotted owl site, which was occupied by a pair of barred owls (Schmidt 2003). A single male spotted owl was detected there in 2003 but no barred owls.

Resurveying 8 of 18 known inactive spotted owl territories in 2003 resulted in one spotted owl pair detection within 1 mile (1.6 km) of their historical nest site (Schmidt 2004).

Is range expansion of barred owls natural dispersal?

Within the scientific community, different views persist regarding the possible causes of barred owl range expansion in the Pacific Northwest, from increased forest frag-

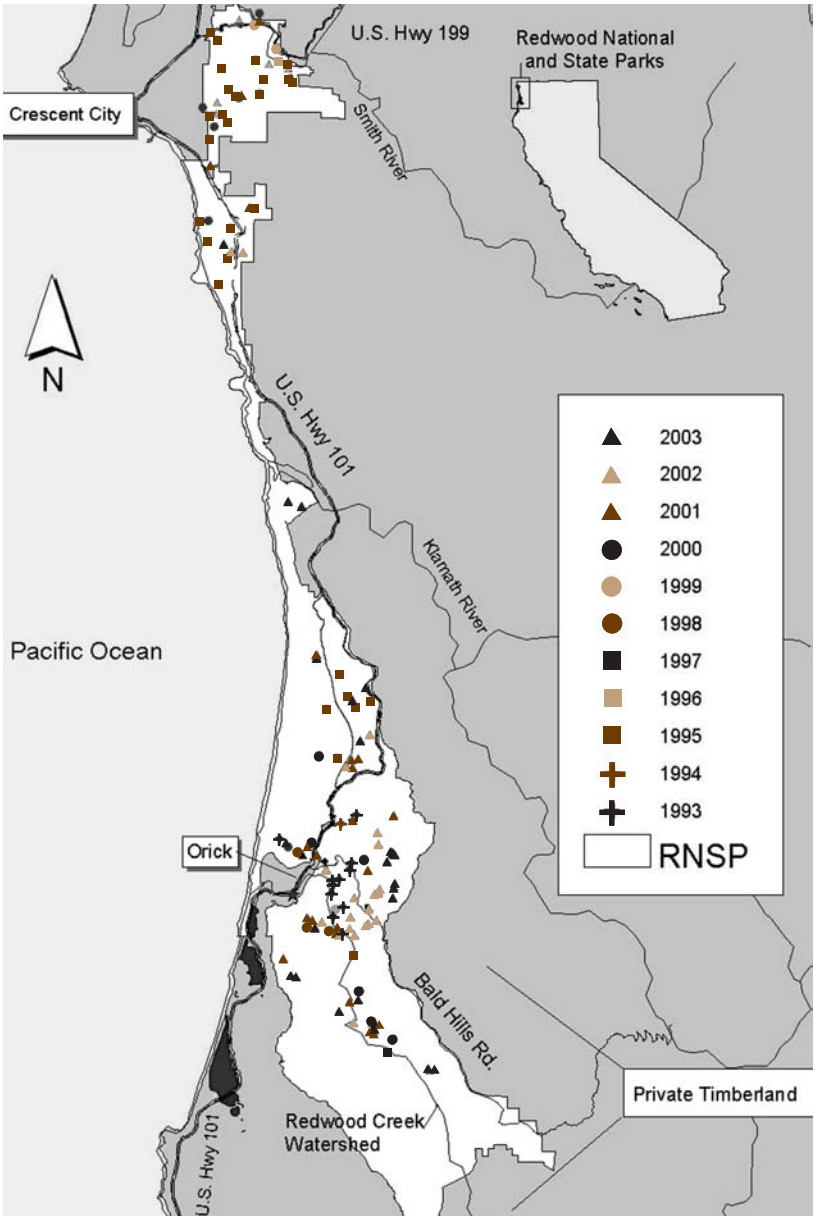

Figure 3. Investigators encountered barred owls at the locations depicted on the map during the surveys of known spotted owl territories (1993–2003). Barred owls are now distributed throughout most of the park complex except in the southeastern portion of the Redwood Creek watershed.

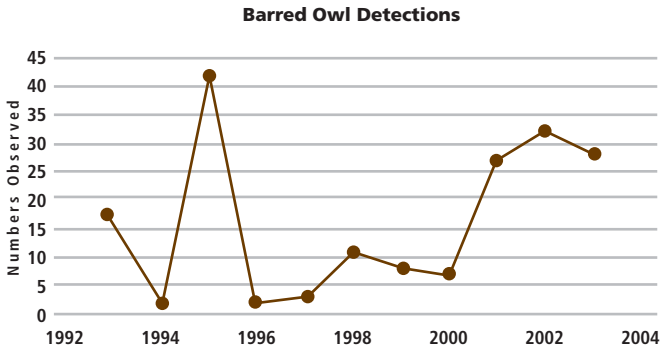

Figure 4. Detection of barred owls during the 11-year monitoring program ranged from 2 to 42 observations.

mentation (i.e., disturbed forests) (Johnson 1992; Hamer 1988; R. J. Gutierrez, Professor, University of Minnesota, phone call, November 2001) to other anthropogenic influences (e.g., establishment of riparian forests or planting trees) (Knopf 1994). Some scientists view barred owl range expansion as a natural event based on the species, expansion into a variety of habitats, not just old-growth and mature, undisturbed forests (Hamer 1988; Dunbar et al. 1991; Johnson 1994; Kelly et al. 2003). These different views highlight the complexity of and the need for additional research on the species' life history (including distribution), ecology, and habitat requirements.

Consequences of barred owl expansion

The lack of baseline information about barred owls has managers at Redwood National and State Parks in a quandary as to the appropriate action to take regarding potential adverse impacts that barred owls may have on spotted owls. Park managers have discussed their concerns with U.S. Fish and Wildlife Service (USFWS) regulatory staff in Arcata and researchers (Eric Forsman, research wildlife biologist, USDA Forest Service Pacific Northwest Research Station, October 2001; R. J. Gutierrez, Professor, University of Minnesota; and A. Franklin, Research Associate, Colorado Cooperative Fish and Wildlife Research Unit, phone contacts, November 2001) regarding barred owl range expansion, displacement of spotted owls, and whether anything can or should be done to manage for this invasive species. Although *NPS Management Policies 2001* and guidelines for natural resources of threatened and endangered species (NPS-77) provide the possible foundation for action, park managers must decide whether to endorse and pursue such an endeavor. Without credible, science-based information on barred owls, managers at Redwood National and State Parks and other agencies with spotted owls do not have the knowledge to fully address this issue or make effective decisions relating to the conservation and recovery of spotted owls.

Researchers and USFWS staffs are aware of this issue but make no recommendation except that more research on barred owls is needed. Whether barred owls are indeed impacting spotted owls (e.g., reducing reproductive success and suitable habitat) or whether anything can be done to reverse the situation is unknown and needs addressing. In the meantime, the ongoing USFWS five-year review petition for spotted owls may give some direction or useful information for managers. The pur-

pose of the five-year review, as required for all listed species under the Endangered Species Act, is to determine if a change in listing status is warranted. The evaluation will use all existing and current information to make an assessment of how the spotted owls have fared since they were listed for protection in the early 1990s.

Implications and recommendations

The question managers may want to ask is whether prevention of barred owl expansion into spotted owl territory or intervention into already established barred owl territory is warranted in order to maintain viable populations of northern spotted owls. A significant factor in the decision of whether to intervene and control the further expansion of barred owls into Redwood National and State Parks may be that barred owls are already quite common throughout most of the park complex. Of interest to park management is whether the progression of barred owls into the southern portion of the park will continue eastward through old-growth forested parklands within the Redwood Creek drainage and eventually into adjacent managed private timberlands (fig. 3) where currently only two barred owls have been reported (Schmidt 2003).

Restoration goals of the National Park Service usually focus on restoring ecosystem processes rather than managing a specific (single) species. However, the federally listed northern spotted owl is an important component of Redwood National and State Parks' old-growth redwood forest ecosystem and, therefore, is a consideration in management decisions. Another factor is the feasibility and practicality of any planned action, which may be controlling or eradicating an invasive species or sterilizing a target species, in this case barred owls. In addition, the participation, cooperation, and support of other agencies and landowners throughout the range of the northern spotted owl are factors in the success of any management endeavor, as barred owl range expansion is a regional issue in the Pacific Northwest.

If park managers decide to pursue an invasive control or eradication program, objectives of the program should include public education as a means of addressing the potentially controversial nature of the decision. Public education presentations and materials should anticipate potentially negative public attitudes with clear objectives and scientific evidence.

Managers may also want to consider whether (1) the chosen action is cost-effective because costs could be in the hundreds of thousands of dollars or more, (2) participating agencies and landowners are willing to commit to a long-term program, and (3) sufficient biological knowledge is available on the target species (i.e., barred owls).

The sterilization of barred owls currently is not a viable technique and is still experimental for birds, especially raptors (K. Fagerstone, research program manager, USDA Animal and Plant Health Inspection Service, phone call, November 2003). A major concern with this type of program is choosing an effective mode of delivering the sterilizing agent to the target species (e.g., injecting it into a food source or into a captive target species) without affecting any non-target species (e.g., the spotted owl). Unfortunately, unlike spotted owls, barred owls are not caught easily as they do not respond well to proven spotted owl techniques used to lure them into mist nets and entice them to retrieve handheld mice as bait and be captured by hand (A. Franklin, research associate, Colorado Cooperative Fish and Wildlife Research Unit, phone call, November 2001; E. Forsman, research wildlife biologist, USDA Forest Service Pacific Northwest Research Station, phone call, October 2001). Therefore, barred owls may not be good candidates for injection unless capture of the species becomes more reliable.

My overall assessment of the current knowledge of barred owls and the practicality and potential cost of implementing and maintaining an invasive species program is that such programs presently are unrealistic and infeasible. However, in the near future, sterilization of barred owls may prove to be viable. Until that time, I recommend that park managers:

- Continue to seek assistance from subject-area experts and the U.S. Fish and Wildlife Service to address this issue.
- Obtain funds to conduct a regional inventory and research on barred owls within the parks and on other public lands.
- Enlist interagency and public cooperation to address the potential threat of barred owls to spotted owls across their range, including support to develop public education programs and materials with clear scientific evidence on this issue.
- Continue discussion with the U.S. Fish and Wildlife Service on the potential impact of luring barred owls into spotted owl territories using their recommended spotted owl survey protocol. Discussions could lead to changes in the protocol that may lessen encounters with barred owls within spotted owl territories.

Conclusions

Distribution of barred owls, occurrence of hybridization with spotted owls, and potential displacement of spotted owls from known territories within Redwood National and State Parks indicate a potential threat that could change diversity of species, including the northern spotted owl—a federally listed threatened species—within the parks' old-growth forest ecosystem. Although observations of barred owls were made incidental to monitoring

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for spotted owls at known territories, these observations identify the need to conduct research on barred owls and gather data on the species, life history (including distribution), ecology, and habitat requirements. This potential threat also gives credence to continued monitoring of spotted owls and expanding the survey of spotted owl habitat to include areas not occupied currently by spotted owls. In addition to gathering valuable information about barred owls, the survey would help validate the current status of spotted owls in those areas.

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