

## NORTHERN SPOTTED OWLS

*Of all the horrid, hideous notes of woe,  
Sadder than owl songs or the midnight blast,  
Is that portentous phrase, "I told you so."*

(George Noel Gordon, Lord Byron, *Don Juan*, Canto XIV [1823])

When Euro-Americans spread across the United States, they systematically killed the large predators. Grizzly bears, cougars, and timber wolves were eliminated in most of their former ranges. Now that the species whose teeth we fear are gone, the ones in greatest peril are those whose homes we crave. No species better illustrates this than the northern spotted owl, a species in jeopardy because it lives in ancient forests.

I asked my colleague, ecologist/ornithologist David Wilcove, to examine the ecology of the spotted owl.

## Of Owls and Ancient Forests

□ David S. Wilcove, *The Wilderness Society, Washington, D.C.*

Two decades ago, the spotted owl was one of the least known, least studied birds in North America. Today it is the subject of intensive study, rancorous debate, and legal battles. This sudden notoriety stems from the owl's specialized habitat requirements in the western portion of its range, where it inhabits old-growth conifer forests. Because old-growth forests on private lands are essentially gone, almost all of the remaining habitat for the spotted owl in the Pacific Northwest is on federal lands. National forests, for example, account for about 68 percent of the remaining habitat; BLM lands in Oregon add another 15 percent, while national parks account for less than 10 percent.

Both the Forest Service and the BLM are in the process of deciding how much old-growth forest to set aside for the owl, and what they decide will in all likelihood determine its fate. The process has been a painful and controversial one. More than any other species, the spotted

owl has become a symbol of the ancient forests, a convenient focal point for the energies and passions of conservationists and loggers alike. It is an almost comical situation—all this attention, all this fury, directed toward a fluffy, twenty-two-ounce bird that likes to spend its days napping and its nights in silent pursuit of rodents scurrying about the forest floor.

There are three subspecies of the spotted owl, distinguished by rather subtle differences in size and coloration. The Mexican spotted owl occurs from southern Colorado and central Utah, south in the higher mountains through Arizona, New Mexico, and extreme western Texas into central Mexico. The California spotted owl is confined to the Sierra Nevada Mountains and the coastal mountains south of San Francisco. The northern spotted owl occurs in southwestern British Columbia, western Washington and Oregon, and northwestern California. Although the Mexican spotted owl is currently under consideration for listing as a "threatened" or "endangered" species under the federal Endangered Species Act, the other two subspecies have caused far greater controversy. The total population of northern and California spotted owls is estimated at about 2,900 pairs, and they are declining. Even more ominously, as tens of thousands of acres of prime spotted owl habitat are cleared each year, populations of these birds are becoming increasingly fragmented and isolated, magnifying the risk of extinction. The spotted owl is listed as an endangered species by the state of Washington, as a threatened species by Oregon, and as a "species of special concern" by California.

Until recently, virtually nothing was known about the ecology of the spotted owl in the Pacific Northwest. A typical account in a field guide might read something like this: "rare, little known, inhabits forests." Studies in the 1970s by Eric Forsman and colleagues (1984) in Oregon, Gordon Gould (1977) in California, and others showed the owl to be more widespread than previously believed, but they also revealed its strong affinity for ancient forests. For example, 95.5 percent of the sites in Oregon where spotted owls were found between 1969 and 1984 were dominated by old-growth forests or mixed stands of old-growth and mature forest. Typical spotted owl habitat in the Westside consists of mid- to low-elevation virgin forests dominated by Douglas-firs. Such forests have mixed age classes, including trees that are very large and very old (200 years and older) and abundant snags and downed logs.

Northern spotted owls are occasionally found in younger, second-growth stands, a fact that invariably attracts the attention of spokes-

people from the timber industry. However, the number of owls that successfully breed and maintain long term occupancy in second-growth is so small as to be simply irrelevant to the long term survival of the species. Moreover, most of these younger stands have, on closer inspection, been found to contain remnant old-growth trees. Thus, the evidence that spotted owls require old-growth is overwhelming.

Exactly why they are so closely tied to old-growth is unclear. Several factors are probably involved. First, spotted owls in the Pacific Northwest nest in large, live trees with cavities, broken tops, dwarf mistletoe, or platforms of branches capable of holding organic matter suitable for use as a nest, the sorts of trees one finds in ancient forests but not in younger stands. Second, the prey of spotted owls—mostly small mammals such as flying squirrels, tree voles, and woodrats—may be more abundant in old-growth than in younger stands. Third, spotted owls, like Roosevelt elk or black-tailed deer, use old-growth stands for thermal cover. And, fourth, ancient forests may provide safety from the spotted owl's predators, such as the great horned owl, which often occur in young stands or along the edges of clearcuts.

Not only do spotted owls need old-growth, they need lots of it. For example, studies in northwestern California showed spotted owls using about 1,900 acres of old-growth per pair. Six pairs in Oregon had an average of 2,264 acres of old-growth per home range. Some of these birds were studied for only three to four months. Had they been studied for longer periods of time, their home ranges probably would have increased in size and included larger amounts of old-growth. Six pairs of owls studied in Washington used about 3,800 acres of old-growth per pair, although not all of this old-growth was in one place. During the winter, the Washington owls moved to different forest tracts. Additional data on other pairs, collected within the last few years, confirm these approximate values. Thus, the evidence to date suggests a north-south gradient in the amount of old-growth used per pair of owls. No one is really sure why such a gradient exists.

Critics who ceaselessly argue that more research is needed before any management decisions are made should spend a year or two tracking these nocturnal birds across the rugged terrain of the Northwest. They should also note that further studies have tended to confirm or enlarge the amount of habitat we understand to be necessary for a pair of owls.

Logging of ancient forests is without question the biggest threat to the survival of the spotted owl. Only a small fraction of the original old-growth remains. Also, the remaining old-growth forests are heavily

fragmented and now occur in a patchwork of old growth and clearcuts of various ages. This fragmentation has isolated populations of owls—such as the birds on the Olympic Peninsula—and reduced the probability that juveniles can disperse successfully into unoccupied patches of old-growth.

Fragmentation of old-growth may also be playing a role in two other threats to the spotted owl: competitive displacement by barred owls and predation by great horned owls. The barred owl, a close relative of the spotted owl, has been expanding its range into the Pacific Northwest over the past two decades. No one is exactly sure what is causing this range expansion, but modern forestry may be at least partly responsible. Regenerating clearcuts often have a higher deciduous component than old-growth stands, and this seems to suit the barred owl. Moreover, barred owls do well in second-growth stands, whereas spotted owls do not. Because barred owls are slightly larger and more aggressive than spotted owls, they seem able to displace spotted owls from suitable habitat. Barred owls also seem to be better dispersers than spotted owls.

Great horned owls prey on young spotted owls. They are also quite tolerant of the edges and openings created by logging operations and may use them to infiltrate spotted owl habitat. Spotted owls, in turn, expose themselves to predation when they fly near or across clearcuts during their evening perambulations, something they are being forced to do with increasing frequency these days. How much of a threat the great horned owl poses for the spotted owl is unknown because no one has studied great horned owl predation under different scenarios of forest fragmentation.

Finally, there is the unpredictable but ever-present threat of natural catastrophes. The eruption of Mount St. Helens in 1980 eliminated about 25,000 acres of forest known to contain spotted owls. The recent Westside fires have also consumed many acres of prime spotted owl habitat. Of course, spotted owls have coexisted with volcanic eruptions, fires, windstorms, and other natural disasters for millennia. But that was when there was far more old-growth than exists today and when spotted owls were far more numerous. Populations of spotted owls today are more vulnerable to natural disasters than before extensive logging of Westside forests began.

Besides the obvious problems of habitat loss and fragmentation, what is the evidence that spotted owls are in trouble? The answer lies in the extensive data that have been gathered on the demography of this species. Most individuals do not breed until they are three years old, a

surprisingly late start for this medium-sized owl. Reproduction by spotted owls also appears to fluctuate dramatically and unpredictably from year to year. In some years most pairs in a given area will breed, while in other years few even attempt to nest. Some researchers have suggested that this variation in breeding success is due to fluctuations in prey abundance, but this is only a hypothesis: No one has studied the prey base in sufficient detail to confirm or refute the idea.

How, then, do we interpret events in the state of Washington, where the majority of spotted owls have not had a successful breeding season since 1983? Is this part of a normal cycle? Or is it evidence of a chronic decline caused by loss of habitat?

Juvenile mortality of spotted owls has been extraordinarily high, both before and during dispersal. From 1982 to 1984, thirty-one young owls were radio-tagged in Oregon; none survived as long as two years. Since studies began in the early 1970s, the overall first-year survival of young spotted owls has averaged just 11 percent. These data, when applied to standard life table analyses or more complicated models, point to a declining population.

Since the early 1970s, the Forest Service and the BLM have been grappling with the issue of spotted owl management, often under legal pressure from conservation organizations. It has been a byzantine process, the full details of which can be found elsewhere. In this essay I highlight only the more recent milestones.

The Forest Service's mandate with respect to the spotted owl is clear: It is required by law to ensure viable populations of all native vertebrate species occurring in the national forests. In the case of the spotted owl, the Forest Service has tried to fulfill its mandate by creating a matrix or network of old-growth habitat areas. The challenge, of course, is to create a matrix of old-growth areas that is essentially self-sustaining. If the habitat areas are too few in number or too far apart, the owls will have difficulty dispersing between them, and the existing populations within these fragments will wink out, one after the other. Similarly, if individual habitat areas are too small to sustain a breeding pair of spotted owls or if the habitat within them is of marginal quality, the birds are unlikely to survive.

In 1984, the Forest Service released its "Regional Guide for the Pacific Northwest," which contained what were to be final guidelines for spotted owl management in Oregon and Washington. The agency planned to set aside 1,000 acres of old-growth for each of 263 pairs of owls. A coalition of conservation organizations quickly appealed the regional

guide, charging that the agency failed to provide an adequate analysis of the likely impacts on the owl and its habitat. The appeal was successful, and the Secretary of Agriculture's office instructed the Forest Service to reexamine its spotted owl guidelines and to prepare a supplemental environmental impact statement (EIS).

In July 1986, a draft EIS was released for public comment, and public comment it got—over 40,000 letters, postcards, and petitions. Most were form letters and postcards generated by the timber industry in opposition to any plans to protect owl habitat. The Forest Service spent an additional two years revising the EIS before issuing a final document in August 1988.

The final EIS calls for the creation of a well-distributed network of habitat areas for spotted owls in Washington and Oregon. The sizes of the habitat areas would vary, depending upon location. In the Klamath Mountains, each habitat area would contain 1,000 acres of suitable habitat. Values for the Oregon Cascades and the Oregon Coast Range are 1,500 and 2,000 acres, respectively. In Washington, habitat areas will contain 2,200 acres in the Cascades and 3,000 acres on the Olympic Peninsula.

For many scientists and conservationists, the final decision was a disappointment. All of the acreage figures fall well below what empirical studies show the owls are using (recall that spotted owls use an average of 2,300 acres of ancient forest per pair in Oregon and 3,800 acres in Washington). Nor does the Forest Service intend to protect very much of the owl's habitat where doing so conflicts with timber production. Only 14 percent of the total number of spotted owl habitats on Forest Service lands designated suitable for timber production will receive protection.

Under this plan, the Forest Service projects only a moderate to low probability of persistence for spotted owl populations after 100 years. A moderate probability provides for "no latitude for catastrophic events affecting the population or for biological findings that the population is more susceptible to demographic or genetic [extinction] factors" than is currently assumed. A low probability means that "[c]atastrophic, demographic, or genetic factors are likely to cause elimination of the species from parts or all of its geographic range during the period assessed" (USDA Forest Service, 1988, p. IV-34). For these reasons, conservationists have challenged the agency's spotted owl plan in court.

The situation is even worse on the BLM lands. The BLM's policy has been to protect the spotted owl only where protection does not interfere

with commercial timber harvesting. Since 1977, the agency has set harvest restrictions on 110 spotted owl sites, effective through 1990. The intent is to protect linkages and habitat for ninety pairs of spotted owls between Forest Service lands in the Oregon Cascades and the Coast Ranges and to preserve the integrity of these sites for the next planning period. BLM habitat areas for breeding pairs of spotted owls contain only 300 acres of old-growth each, an amount far less than what studies show that the owls need.

In early 1986, the BLM was directed by the Secretary of the Interior's office to review the status of the spotted owl on its lands. The bureau then appointed a six-member analysis team. In its report, the team concluded that continued harvesting of old-growth on BLM lands would limit the agency's ability to provide more than 300 acres of old-growth per pair and would further fragment the habitat of the owls. In the spring of 1987, the BLM announced that it would not reconsider its current timber management plans with respect to the spotted owl until at least 1990. That decision has been challenged in a lawsuit brought by a number of environmental organizations.

Given the rarity of the northern spotted owl and the threats to its existence, people often ask if it is a federally listed endangered or threatened species. In 1987, a number of local and national environmental organizations petitioned the U.S. Fish and Wildlife Service to list the northern spotted owl. After studying the situation, the agency announced in December 1987 that "listing the northern spotted owl as an endangered or threatened species is not warranted at this time." In its press release, the agency stated that "sufficient data are not available to determine with certainty the long-term trend of the spotted owl population."

Once again, scientists and environmental organizations were disappointed. By 1987, more was known about the ecology and population dynamics of the spotted owl than for most North American birds. The loss of habitat, low numbers, high rates of juvenile mortality, and poor reproduction, coupled with the invasion of the barred owl, all seemed to make the northern spotted owl a perfect example of an endangered species. Many observers felt that politics rather than biology was behind the agency's decision. Indeed, an investigation by Congress's General Accounting Office (GAO) concluded that the evaluation of the spotted owl petition had been beset by problems. Inadequate time was allotted to the spotted owl study team to conduct its analysis, and management within the Fish and Wildlife Service changed the body of scientific

evidence presented in the study team's status report after it had been reviewed by outside experts. "The revisions," noted the GAO, "had the effect of changing the report from one that emphasized the dangers facing the owl to one that could more easily support denying the listing petition" (1989, p. 1).

A coalition of conservation organizations sued the Fish and Wildlife Service for violating the Endangered Species Act by refusing to list the northern spotted owl. On November 17, 1988, U.S. District Judge Thomas Zilly in Seattle ruled that the Fish and Wildlife Service decision was arbitrary and capricious, contrary to law. He ordered a reanalysis and new decision by May 1, 1989. In late April, the Fish and Wildlife Service released its new analysis and announced that it would propose listing the northern spotted owl as a threatened species. For conservationists, the agency's reversal was a welcome victory. However, conservationists were also quick to point out that the Fish and Wildlife Service's proposal is just that: a proposal. The agency will have as much as a year to study the situation before reaching a final decision, at which point the owl might—or might not—be listed.

As the controversy grows, it is worth remembering what the spotted owl is and isn't. It is just one species in the constellation of plants, animals, fungi, and bacteria that inhabit the ancient forests, and in an ecological sense it may be no more important than any of these other species. But because spotted owls require so much old-growth, protecting them will mean de facto protection for many other species with smaller area requirements. In this respect the spotted owl is quite special. And based on what we know now, it is the most critically endangered denizen of the ancient forest. (Adapted in part from David S. Wilcove, "Public Lands Management and the Fate of the Spotted Owl," *American Birds* 41 [1987]: 361-67.) □

## OTHER BIRDS

*Because of the great diversity of ecosystem types, western Oregon supports more bird families than any other area in North America.* (Larry D. Harris, *The Fragmented Forest* [1984])

If you visit the coast and know precisely what to look for, where and when, you might find a clue to one of the Northwest's most enduring