Competitive Interactions and Resource Partitioning between Northern Spotted Owls and Barred Owls in Western Oregon

Northern spotted owl (left) and barred owl (right). © Patrick Kolar

Background

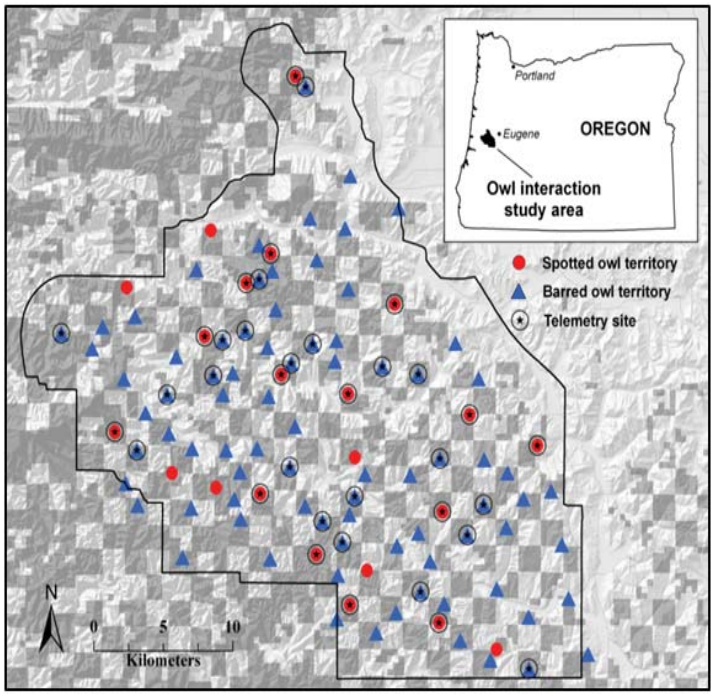
The northern spotted owl (*Strix occidentalis caurina*), a resident of forests in western Washington and Oregon and northwestern California, was listed as threatened under the U.S. Endangered Species Act in 1990. Loss and fragmentation of old-forest habitat were cited as the primary threats when the listing decision occurred. In an effort to stabilize declining populations, millions of acres of public forest land in the Pacific Northwest were reserved as habitat for the owl and associated wildlife species. Spotted owl populations still declined despite widespread conservation efforts focused on the owl and its habitat.

Recently, a relatively new threat to spotted owls has emerged in the form of a competitor—the barred owl (*Strix varia*). The barred owl has expanded its range from eastern into western North America, and now overlaps the entire range of the northern spotted owl.

From 2007 through 2009, the U.S. Geological Survey and its research partners investigated spatial relationships, habitat selection, diet, survival, and reproduction of overlapping populations of spotted owls and barred owls. The 975-km^2 study area included a mixed ownership of lands administered by the U.S. Bureau of Land Management, Oregon Department of Forestry, timber companies, and private landowners. A small amount of lands administered by the U.S. Forest Service was in the study area but not part of the formal study. The objective of the study was to determine the potential for and possible consequences of competition for space, habitat, and food between the two owl species. Twenty-nine spotted owls and 28 barred owls were radio-marked. The birds were monitored over 24 months, with individual owls moinitored for an average of 593 days. To get infomation about diet, the scientists also collected and dissected pellets that owls regurgitate after eating. The pellets contained bones, insect parts, fur, and other undigested animal parts.

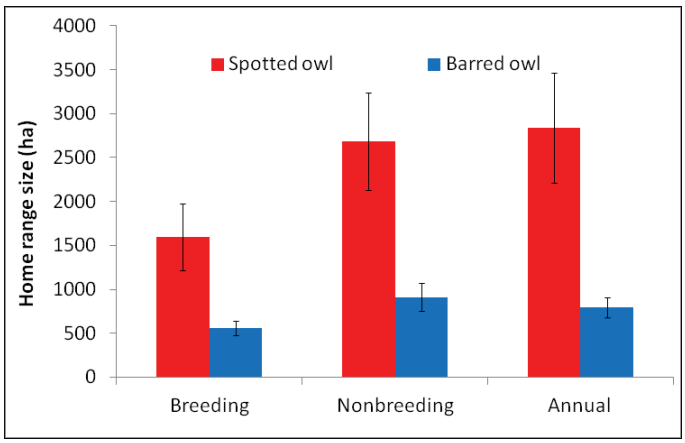
Number of Territories

The number of territories occupied by pairs of barred owls in the study area (82) greatly outnumbered those occupied by pairs of spotted owls (15). Estimates of average size of home ranges and core-use areas of spotted owls (1,843 ha and 305 ha, respectively) were two to four times larger than those of barred owls (581 ha and 188 ha, respectively). A core-use area is where an owl concentrated its activities during the breeding season, primarily for roosting and nesting. The home range is the area regularly traversed by an owl



Distribution of territories occupied by northern spotted owls and barred owls on the study area in western Oregon. Also shown are sites where radio-marked owls occurred (telemetry sites). Dark-gray areas indicate federal or state ownership, and light-gray areas indicate private or county lands.

during its daily activities. Individual spotted and barred owls in adjacent territories often had overlapping home ranges, but space sharing between the two species was largely restricted to foraging areas in the home range, with minimal spatial sharing of core-use areas.



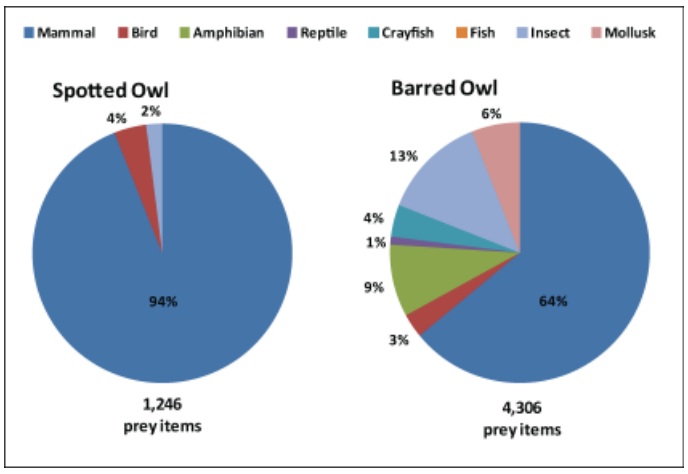
Home-range sizes of northern spotted owls and barred owls.

Habitat Selection

Spotted owls and barred owls most often used conifer forests that were more than 120 years old and large hardwood trees near streams. Barred owls also used a variety of other forest types, whereas spotted owls spent a large amount of time foraging and roosting in large conifer trees along steep slopes in ravines. There was strong evidence that spotted owls attempted to avoid areas of concentrated use by barred owls in adjacent territories.

Diets and Foraging

Diets of both species were dominated by nocturnal mammals, but diets of barred owls included many other terrestrial, aquatic, and diurnal species that were rare or absent in diets of spotted owls. Northern flying squirrels (*Glaucomys sabrinus*), woodrats (*Neotoma fuscipes*, *N. cinerea*), snowshoe hares, (*Lepus americanus*), and brush rabbits (*Sylvilagus bachmani*) were particularly important prey for both owl species, accounting for 81% and 49% of total dietary biomass for spotted owls and barred owls, respectively.



Diets of spotted owls and barred owls.

Survival and Reproduction

Relationships were documented between the presence of barred owls and spotted owl survival and reproduction. The annual survival probability of spotted owls was 81% compared to 92% for barred owls, and barred owls produced over six to nine times as many young as spotted owls during the period of study. Survival rates of both species increased with increasing amounts of old forest in the home range, which suggested that availability of old forest was a limiting factor in the competitive relationship between the two species. In addition, the farther a spotted owl nest was from a barred owl territory, the greater the survival of spotted owl young to flight stage. Also, any spotted owl that attempted to nest within 1.5 km of a barred owl nest was unsuccessful in producing young.

Management Implications

The results support the conclusion that, when barred owl density is high, competition for territories can constrain the availability of critical resources required for successful recruitment and reproduction of spotted owls. The findings have broad implications for the conservation of spotted owls. They suggest that variability in survival and reproduction may arise not only because of differences among territories in the quality of forest habitat, but also because of the presence of an invasive competitor. Furthermore, the results emphasize the importance of old conifer forests and moist streamside habitats for both species. Additional loss of old forests might further restrict both species to a common set of limiting resources, thereby increasing competitive pressure.

Report Citation

Wiens, J.D., 2012, Competitive Interactions and Resource Partitioning between Northern Spotted Owls and Barred Owls in Western Oregon: Corvallis, OR, Ph.D. Dissertation, Oregon State University, p. 141.

Contacts

Carol Schuler, Director
USGS Forest and Rangeland Ecosystem Science Center
carol_schuler@usgs.gov
541-750-1030

J. David Wiens, Wildlife Biologist
USGS Forest and Rangeland Ecosystem Science Center
jwiens@usgs.gov
541-750-0961