



## ***Owl versus Owl:***

### **The Conundrum of Managing Barred and Spotted Owls in the Pacific Northwest**

A full-day symposium, immediately before the 2015 Annual Conference of The Western Section of The Wildlife Society

# **ABSTRACTS**

Monday January 26, 2015

Alexander 1, Hyatt Vineyard Creek Hotel & Spa - Santa Rosa, CA

**Symposium: Owl versus Owl: The Conundrum of Managing Barred and Spotted Owls in the Pacific Northwest**

Chair: Lowell Diller, retired Green Diamond Resource Company, Korbek, CA

8:30–8:45 a.m. Opening remarks and setting the stage. Lowell Diller

Ecology and competitive interactions of spotted and barred owls

8:45–9:20 a.m.

**Competitive Interactions and Resource Partitioning between Northern Spotted Owls and Barred owls in the Pacific Northwest.**

J. David Wiens, *U.S. Geological Survey Forest and Rangeland Ecosystem Science Center, Corvallis, OR, 97331; jwiens@usgs.gov*

Competition with recently established barred owls (*Strix varia*) is an increasingly relevant factor to consider in conservation strategies for the northern spotted owl (*S. occidentalis caurina*). We used radiotelemetry data from 29 spotted owls and 28 barred owls to investigate spatial relationships, habitat use, and dietary overlap between these previously allopatric predators. Individual spotted and barred owls in adjacent territories often had overlapping home ranges, but interspecific space sharing was largely restricted to broader foraging areas with minimal spatial overlap among core-use areas. The two predators displayed broadly similar patterns of habitat use; both species spent a disproportionate amount of time foraging in patches of old conifer forest or in lowland riparian areas along streams. Diets of both species were dominated by nocturnal mammals, but barred owls captured many aquatic and diurnal prey species that were rare or absent from diets of spotted owls. In addition to overlap in resource use, we also identified strong associations between the presence of barred owls and the behavior of spotted owls, as shown by changes in space-use, habitat use, and reproductive output of spotted owls exposed to varied levels of spatial overlap with territorial barred owls. We conclude that increasing populations of barred owls can affect the viability of spotted owls both directly (via territorial exclusion) and indirectly (via joint exploitation of primary prey). Future research will build upon our results to determine if experimental removal of barred owls can positively influence the vital rates of spotted owls.

9:20–9:40 a.m. *Potential for interference competition between barred and spotted owls.* Peter Carlson, Cooperative Fish & Wildlife Research Unit, Colorado State University, Fort Collins, CO.

Who Hits and Hoots at Whom?

## Investigating Interference Competition between Barred and Northern Spotted Owls

Nicholas J. Van Lanen, Alan B. Franklin, Kathryn P. Huyvaert, & Peter C. Carlson

The barred owl, a species historically restricted to eastern North America, has recently expanded its range to completely overlap that of the northern spotted owl which is listed as threatened under the Endangered Species Act. Recent evidence suggests that barred owls may compete with northern spotted owls and may be one cause for recent declines in some northern spotted owl populations. Barred owls have been observed exhibiting more aggressive behavior than spotted owls, especially aggressively vocalizing in response to owl surveys. Occasional attacks of spotted owls by barred owls have also been observed on several study areas. We examined whether barred owls have the potential to competitively exclude northern spotted owls from their territories through interference competition. We used a playback experiment to quantify aggressive vocal and physical behavior of barred and northern spotted owls during territorial defense. Experimental trials consisted of displaying northern spotted or barred owl taxidermy mounts and broadcasting recorded vocalizations of the corresponding species in both barred and northern spotted owl territories. The frequency of interspecific interactions was lower compared to intraspecific interactions between northern spotted owls alone. However, barred owls responded with higher levels of vocal and physical aggression than did northern spotted owls when agonistic interspecific interactions occurred. Our results suggest that barred owls are likely to assume the dominant role during interspecific interactions with northern spotted owls. Thus, interference competition is a plausible mechanism by which barred owls could contribute to observed population declines of northern spotted owls in areas where the species co-occur.

9:40–10:00 a.m. *Genome of the northern spotted owl and its use in studying the genetic relationships of barred and spotted owls.* Zachary Hanna, Museum of Vertebrate Zoology, University of California, Berkeley, CA.

The Barred Owl has invaded the western U.S. in the last 50-100 years. Over the course of this period it has become broadly sympatric with the Spotted Owl, now extending from British Columbia to southern California. This represents one of the few documented cases of natural, dynamic, and ongoing invasion with secondary contact that can be studied across space in real time. Although it is well documented that Barred Owls ecologically displace Spotted Owls, debate remains as to whether the situation is being exacerbated via hybridization between these two species. To explore this question we have assembled a draft Northern Spotted Owl genome from an individual collected prior to contact with Barred Owls. Prompted by the observation that

some Barred Owl populations have high frequencies of morphotypes that appear intermediate between Barred and Spotted Owls, we expect to detect owls representing admixed individuals. We are utilizing low-coverage, whole-genome sequence data to assess hybridization in individuals sampled throughout the range of overlap between the two species.

10:20–10:40 a.m.

*Parasites and diseases of barred and spotted owls.* Krista Lewicki, USGS Forest & Rangeland Ecosystem Science Center, Corvallis, OR.

Although the barred owl (*Strix varia*) was historically limited to eastern North America, its range has expanded westward over the past century and currently overlaps that of the federally threatened northern spotted owl (*S. occidentalis caurina*). Such recent, rapid expansions have generated concern among wildlife managers and conservationists, particularly as invasive hosts may introduce parasites to which native hosts are naïve, drastically impacting native host populations through disease effects and changes in parasite assemblages. We summarized findings of two recent studies aimed at understanding blood parasite transmission dynamics between barred and northern spotted owls. The initial study detected a *Plasmodium* parasite for the first time in a northern spotted owl. A subsequent follow-up study did not find any evidence that such *Plasmodium* parasites have exerted strong, widespread impacts on northern spotted owls, but there was some support for *Haemoproteus* spillback between native northern spotted and invasive barred owls. Collectively, these studies raise several questions about the parasites of barred/spotted owls and their competitive impacts on both host species.

10:40-11:00 a.m. *Barred owl exposure to anticoagulant rodenticides: likely sources of poisons potential for impacts to spotted owls.*

J. Mark Higley, Mourad W. Gabriel, Lowell Diller, Greta Wengert, Jack Dumbacher and Robert Poppenga

Barred owls (*Strix varia*) have been identified as a serious threat to northern spotted owls (*Strix occidentalis caurina*) and experimental barred owl removal projects designed to determine the feasibility and potential conservation benefit to spotted owls have begun. The method of removal has been lethal removal and thus, has provided a large sample of specimens available for a variety of research opportunities. Fishers (*Pekania pennant*) throughout their range in California have been exposed to anticoagulant rodenticides (AR) at a very high rate. Therefore, we have been concerned that spotted owls might also be exposed and potentially impacted by AR. We have tested liver samples taken from 155 barred owls collected in Humboldt and Del Norte Counties within the northern California coastal and Klamath Provinces. Barred owls have been

collected from sites and within habitats used by northern spotted owls on both private timber company land (Green Diamond Resource Company) and the Hoopa Valley Indian Reservation. Fifty percent of barred owls tested have been exposed to one or more second generation AR's. Exposure rate was significantly higher ( $p < 0.008$ ) among the sample collected at Hoopa ( $n=71$ , 44 (62.0%) exposed) than those collected at Green Diamond ( $n=84$ , 34 (40.5%) exposed). Sources of exposure to these human created chemicals include proper and improper use near human habitation and illegal use at trespass marijuana cultivation sites.

### Status of spotted and barred owl populations

11:20–11:40 a.m.

*Status of spotted and barred*

*owls on working forests in CA.* Robert Douglas, Mendocino

Redwood Company, Fort Bragg, CA.

Abstract: For the past several decades, industrial forestland owners in California have devoted considerable resources towards surveying, monitoring, and conserving the northern spotted owl (*Strix occidentalis caurina*; spotted owl) on landscapes undergoing frequent timber harvesting. This work has substantially improved our knowledge of spotted owl distribution, population dynamics, and ecology. Because these lands continue to be intensively surveyed annually for spotted owls, they are also valuable in monitoring the invasion patterns of the barred owl (*Strix varia*)—a species increasing at spotted owl sites in California and identified as a primary factor in spotted owl declines throughout the Pacific Northwest. In an effort to evaluate trends on working forests, a questionnaire was submitted to multiple landowners asking them to characterize spotted and barred owl populations using their professional judgment, and if available, empirical data for the past 15 years. A total of 12 responses were received from 10 landowners, comprising 1.9 million acres of private land across seven counties in coastal and interior provinces, and covering 996 spotted owl territories. Eleven of 12 respondents detected barred owls on their lands since initiating spotted owl surveys in 1989. During the past 15 years, barred owls were detected within one mile of 350 of the 996 spotted owl territories, and have established an estimated 197 territories across these lands. Seventy-three spotted owl territories were thought to be displaced by barred owls and there were three observations of barred owls physically attacking spotted owls. Seventy-five percent of the respondents detected barred owls “mostly at night” and characterized the barred owl population as “increasing.” The qualitative assessment was supported by a quantitative summary from 10 of 12 landowners showing an exponential increase in spotted owl territories with barred owl detections after 2008. Similarly, 75% of respondents characterized their spotted owl populations as “stable,” while the remaining 25% characterized them as “decreasing.” Two respondents attributed the decrease in their spotted owl populations to barred owls, while another

attributed the decrease to having a small population of spotted owls on the eastern edge of its range. The empirical data show a slight decline in pairs, an increase in singles, and a dynamically stable pattern of total adult/subadult birds from 2000-2014. There was an increase in the number of designated spotted owl sites from 2009-2014, possibly due to barred owls displacing spotted owls. Interestingly, changes in the spotted owl population (i.e. pair-to-single ratio, number of designated sites) coincide with both an increase in barred owl detections after 2008 and a period of unprecedented decline in spotted owl reproduction on coastal ownerships. Although barred owl populations are increasing across northern California, the summarized patterns shown here are correlative and may neither reflect patterns observed on individual ownerships nor indicate the causal mechanisms responsible. Moreover, these patterns should be considered hypotheses requiring further testing using demographic or occupancy modeling. Such approaches could account for measures of detectability, survey effort, and other sources of environmental variation.

11:40–12:00 a.m.

## Current status of Spotted and Barred owls in Marin County California

David Press, and Taylor Ellis, National Park Service, Point Reyes National Seashore, 1 Bear Valley Road, Point Reyes Station, California 94956

William W. Merkle, National Park Service, Golden Gate National Recreation Area, Bldg. 201, Fort Mason, San Francisco, California 94123

Scott Jennings, Renée L. Cormier, and Thomas Gardali, Point Blue Conservation Science, 3820 Cypress Dr., Suite 11, Petaluma, California 94954

**ABSTRACT:** Marin County, California, is the southern limit of the range of the Northern Spotted Owl (*Strix occidentalis caurina*), listed as threatened under the Endangered Species Act. The Marin County population of the Northern Spotted Owl has some of the highest densities reported, unique habitat associations, and is apparently genetically isolated from other Spotted Owl populations. Unlike elsewhere in the Northern Spotted Owl's range, habitat loss to timber harvest is not an issue in Marin County. The Barred Owl (*Strix varia*) is a threat to the Northern Spotted Owl across its range primarily due to competition. Barred Owls were first detected in Marin County in 2002. We determined the distribution and abundance of Barred Owls by summarizing information from published literature, by consulting local birders, and through detections during Spotted Owl surveys, continuous since 1996. We estimated the county's current population of the Barred Owl at four to seven individuals, including one territorial pair and a single territorial male. We documented seven nesting attempts by the Barred Owl pair, with 14 young fledged. Two pairs of Northern Spotted Owls have been displaced from territories. Since 2012 we have annually surveyed seven Barred Owl call routes, amounting to 73 call points, with no new Barred Owls detected. Observations to date suggest that while the Marin County population of Northern Spotted Owls is currently stable, a potentially-growing Barred

Owl population will likely have similar effects as have been observed elsewhere. Hence, the need to proactively plan for Barred Owl management should be considered.

### Ongoing and proposed barred owl removal experiments

1:30–1:50 p.m.     *Status of spotted and barred owls on Forest Service lands in CA* and update on USFWS barred owl removal experiments. Betsy Glenn, U.S. Fish and Wildlife Service, Portland, OR.

In the past two decades, the threatened northern spotted owl (*Strix occidentalis caurina*) has experienced sharp population declines across its range, almost to the point of extirpation in the north. To recover spotted owls, the U.S. Fish and Wildlife Service (Service) needs to address the emergent threat from competition with newly-established barred owls (*Strix varia*), including assessing whether removal of barred owls could improve population trends of spotted owls. Previous research has documented interference competition between the two species, and declines in spotted owl survival, reproduction, and site occupancy have been associated with increased barred owl presence. After evaluating available science and assessing threats to spotted owls, the Service concluded that a carefully controlled field experiment is needed to directly evaluate the effects of barred owl removal on spotted owl populations to inform development of future management strategies. The Service addressed potential public concern over removal of barred owls by conducting extensive education and outreach to a variety of stakeholders and inviting public comment on a draft Environmental Impact Statement (EIS) developed for this project. We believe these outreach efforts were invaluable for reducing controversy. The field experiment identified in the EIS uses a spatially replicated before-after, control-treatment design on four long-term spotted owl demographic study areas in the Pacific Northwest to determine effects of barred owl removals on vital rates of spotted owls. A combination of strong science and focused outreach activities were essential for the Service to be able to conduct this controversial project, which was initiated in Fall of 2013 in northern California. Here, in addition to providing an update on current status of this study, we review the process and analyses behind the Service's decision to conduct the experiment, describe outreach efforts, and discuss broader implications of the experiment for conservation of threatened species. In addition, we will also provide an update on the status of spotted and barred owl monitoring on Forest Service lands in California to complete the morning session on population status of spotted and barred owls.

1:50–2:20 p.m.

### **Green Diamond Pilot Removal Experiment: Cost, Effectiveness and NSO Demographic Response.**

Keith A. Hamm\*, Green Diamond Resource Company, 900 Riverside Road, Korbel, CA 95550;

[khamm@greendiamond.com](mailto:khamm@greendiamond.com); Lowell V. Diller, Desiree A. Early; David W. Lamphear, Trent L. McDonald, Charles B. Yackulic, Peter C. Carlson and Katie M. Dugger

A long-term demography study of Northern Spotted Owls was initiated in 1990 on Green Diamond Resource Company timberlands in coastal northern California. The owl population was stable until 2001 when it began a downward trend despite estimations of continuously improving habitat quality and quantity. The decline in Spotted Owls coincided with an apparent increase in Barred Owls. Given this new threat, we initiated the first removal experiment with paired treatment (removal) and control areas to determine the feasibility of doing lethal removal and to test the impact of Barred Owls on site occupancy, survival and fecundity of Spotted Owls. We collected 73 of 81 territorial Barred Owls detected within treatment areas from 2009 to 2012 during 122 field visits. It took an average of 2 hrs 23 min to collect each owl from the time of arrival at a site to the time a collected bird was processed for field data. However, most female Barred Owls were collected within ½ hour of arrival at a site. Annual maintenance of the treatment areas was necessary, because following removal, Barred Owls tended to recolonize a proportion of the preferred owl sites. From 2009-12, 20 Barred Owls removed were considered residents (existed at site  $\geq 1$  breeding season prior to removal) and from 2009-2014, 86 removed Barred Owls were considered colonizers.

Using the techniques of the most recent Northern Spotted Owl meta-analysis, we analyzed occupancy rates, fecundity, survival and rate of population change ( $\lambda$ ) of Spotted Owls in treatment versus control areas. Spotted Owl occupancy rates increased in treatment areas after removal of Barred Owls, while Spotted Owl occupancy rates continued to decline in control areas. Barred Owls primarily affected Spotted Owl occupancy by increasing extinction rates of Spotted Owls in co-occupied areas. All Spotted Owls showed a decline in fecundity in recent years, but despite a more precipitous decline in the control areas (no Barred Owls removed) there was no treatment effect on fecundity. Following removal, there was a significant increase in mean adult survival (0.868 versus 0.809,  $p=0.003$ ) and  $\lambda$  (1.029 versus 0.870,  $p=0.0004$ ) in treatment compared to control areas. This initial study indicated that Barred Owl removal was technically feasible and cost effective, and that there was a strong positive treatment effect in adult survival and  $\lambda$ .

2:20–2:40 p.m.     *Hoopa Study Area Experimental Barred Owl Removal: Effort and Preliminary Results.* Mark Higley, Hoopa Tribal Forestry, Hoopa, CA.

Hoopa Study Area Experimental Barred Owl Removal: Effort and Preliminary Results  
J. Mark Higley

Barred owls (*Strix varia*) have been identified as a serious threat to northern spotted owls (*Strix occidentalis caurina*) and experimental barred owl removal projects designed to determine the feasibility and potential conservation benefit to spotted owls have begun on the 364 km<sup>2</sup> Hoopa Valley Indian Reservation under the direction of the U.S. Fish and Wildlife Service (USFWS). We lethally removed barred owls with the a

shotgun throughout the Reservation beginning on October 16, 2013 and ending March 26, 2014 for the first removal season effort. We used 337 calling locations and approximately 200 hours of effort while completing 193 visits to 58 estimated territories. Seventy one barred owls were removed out of 91 (78%) we estimated were detected during the removal effort. We removed 39 of 42 (93%) females and 32 of 49 (65%) males estimated to be detected. The estimate of males detected may be inflated as females were often removed first at sites and the males may have then been detected in more than one estimated territory as they were searching for new mates. We averaged 169 minutes per bird collected across all visits. During visits with detections (88 visits) the average time per bird collected dropped to 102 minutes. On visits with detections during the initial fall effort we averaged 1.2 birds collected per visit. During early winter that number declined to 0.5 birds and then increased to 0.8 birds collected per visit with detections in late winter. During the breeding season surveys that followed barred owls were detected in 22 of 60 (36.7%) spotted owl territories during the 2014 survey season.

2:40–3:00 p.m.     *Overview of the Canadian program – spotted owl captive breeding and barred owl control?* Dennis Rock, National Council of Air & Stream Improvement, Amboy WA.

Options for the future: Long-term barred owl management

3:00–3:15 p.m.     *Ethical considerations of doing barred owl removal.* Robin Bown, U.S. Fish and Wildlife Service, Portland, OR.

**Ethical considerations of doing barred owl removal**

Presented by Robin Bown, USFWS, Portland, OR

Scientific information continues to point to barred owls as a primary threat to northern spotted owls through interference competition. Evidence from the Green Diamond study and British Columbia's barred owl removal programs indicate that removal may be a viable tool to manage barred owls, and further testing is underway with the U.S. Fish and Wildlife Service's Barred Owl Removal Experiment. However, the largest barrier to long term barred owl management may not be technical at all, but rather public concerns over the ethics of killing one species to save another. In developing the Barred Owl Removal Experiment, we engaged a broad-based

stakeholder group. Following education on the issues, biological interactions, and spotted owl population dynamics, we used this group to ensure we captured the ethical concerns over the experiment, and potential future management strategies. While this was time consuming, the increased understanding lead to general support of the experiment. Using the information on the basis of the ethical concerns, we crafted ongoing public information presentations and materials. We intend to use a similar process in developing a barred owl management strategy in the near future.

3:15–3:30 p.m. *Legal hurdles to do barred owl management in CA.* Chris Carr,  
Morrison Foerster, San Francisco, CA.

3:30–3:50 p.m. Refreshment Break

3:50–5:00 p.m. Panel discussion

Moderator Rocky Gutierrez, Department of Fisheries, Wildlife, and Conservation  
Biology, University of Minnesota, St. Paul, MN.

Each panelist will provide a brief discussion/proposal relative to the issue of long term  
barred owl management followed by a panel/audience discussion.

Researcher – Jack Dumbacher, California Academy of Sciences, San  
Francisco, CA

NGO – Audubon Society, TBA

Agency – Robin Bown, U.S. Fish and Wildlife Service, Portland, OR.

– Brad Valentine, retired California Fish and Wildlife, Fort Bragg,

CA

## **LONG-TERM BARRED OWL MANAGEMENT – DISCUSSION AND A PROPOSAL**

**Brad Valentine**; California Department Fish and Wildlife (Retired); 707 564-5040;  
bvalentine@sonic.net

Substantial correlational evidence and mounting scientific studies are demonstrating the negative impacts that invasive barred owls have on native northern spotted owls. The competition may be intense enough to necessitate barred owl control efforts; however, such efforts need to comply with California statutes and regulations. A primary obstacle is Fish & Game Code § 3503.5, a statute that makes it unlawful to take, possess, or destroy individuals, nests, or eggs of any raptor “... except as otherwise provided by this code or any regulation adopted pursuant thereto.” One provision of the Fish and Game Code (§3513) states “[i]t is

unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act (the Barred owl is so designated) except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Treaty Act.” A plain-English and literal reading of these codes together suggest that the holder of a federal take permit issued by the Secretary of Interior has satisfied the exception clause of F&GC §3503.5. Other code sections that might apply include the Natural Communities Conservation Planning Act (F&GC § 2835) and permitting for scientific collecting (14 CCR § 650, Fish & Game Code 1002). Because the former mandates monitoring and adaptive management, and the latter requires the purpose to be for bona fide scientific purposes, a control program authorized under these sections will require rigorous study designs that can lead to insightful, long-term scientific research. One possible template would be to implement a program analogous to “A Conservation Strategy for the Northern Spotted Owl” (Thomas et al 1990), except barred owl management substituted for logging restriction in cores. Core areas sized to be inhabited by 20 spotted owl pairs would be spaced 12 miles apart and subjected to treatments intended to test various competition and management hypotheses (e.g., threshold numbers, source area control only, complete control, no action). The matrix around the cores might also be subject to varied levels of control to elucidate dispersal impacts and mitigation measures. While possibly producing strong science over decades, to be successful such a program would require among other things willing and enthusiastic agencies and cooperators; an open and active public relations effort; a specified governance structure (e.g., long-term research and adaptive planning structure, research oversight, and program management); committed financial support to both implement the control measures and to evaluate outcomes; and ensure landowner equity.

Private – Lowell Diller, retired Green Diamond Resource Company,  
Korbel, CA

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