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BARRED OWL RANGE EXPANSION INTO THE CENTRAL IDAHO WILDERNESS

ANTHONY L. WRIGHT
Hornocker Wildlife Institute, HC-83 Running Creek Ranch, Cascade, ID 83611 U.S.A.

GREGORY D. HAYWARD
Department of Zoology and Physiology, University of Wyoming, Laramie, WY 82071 U.S.A.

ABSTRACT.—During the past century the geographic range of the Barred Owl (*Strix varia*) has expanded in western North America beginning in Alberta and British Columbia and moving southward in the United States. The pattern of range expansion remains poorly documented and several untested explanatory hypotheses have been proposed. We surveyed for owls in central Idaho from 1980–95 and recorded the occurrence of Barred Owls (1980–93 surveys did not employ playback calls of Barred Owls). Despite numerous surveys for owls across a broad range of habitats, we did not encounter Barred Owls until 1985. Thereafter, we heard them regularly at several sites in central Idaho. We encountered Barred Owls most frequently in upland mature and old-growth mixed conifer forests. We suggest that expanding Barred Owl populations reached central Idaho very recently, possibly in the early to mid-1980s. Although earlier reports of expanding Barred Owl populations in western North America focused mainly on managed forest lands with extensive timber harvest, forest conditions within designated wilderness also apparently support expanding Barred Owl populations. Range expansion by this species in western North America is especially surprising in light of the limited range of a close congener, the Spotted Owl (*Strix occidentalis*), in the region.

KEY WORDS: *Barred Owl*; Strix varia; *range expansion*; *habitat use*; *movement*; *wilderness*.

La expansión del rango de *Strix varia* hacía el centro de Idaho

RESUMEN.—Durante el siglo pasado el rango geográfico del buho *Strix varia* ha aumentado en el oeste de Norte América, comenzando desde Alberta y British Columbia, Canadá, y continuando hacia el sur de los Estados Unidos. Extensiones de bordes geográficos, documentados, son escazas de datos esenciales y más recientes, varias hipótesis explanatorias han sido propuestas sin ninguna prueba. Hicimos conteos de buhos en Idaho central durante los años 1980–95, la presencia de *S. varia* fue anotada utilizanda grabaciones de cantos repetitivos (entre 1980–93 no fue utilazada la repetición de cantos grabados). A pesar de que se realizaron conteos numerosos a través de un rango amplio de habitats, *S. varia* no fue registrado hasta el año 1985. Desde ese entonces, fueron registrados con frequencia en varios sitios. *S. varia* fue encontrado con más frequencia en bosques maduros de coníferas mixtos. Sugerimos que hace pocos años llegaron las poblaciones de *S. varia* a Idaho central, posiblemente a principio o a mediados de la década 1980. Aúnque los reportes preliminarios sobre la expansión de poblaciones de *S. varia* en el oeste de Norte América se enfocaron en bosques administrados con aprovechamiento extensivo de madera, los bosques de áreas pristinas también sostienen poblaciones en expansión. La expansión del rango de esta especie es aún más sorprendente en comparación al rango limitado de su congener *Strix occidentalis* en la región.

[Traducción de David L. Anderson]

The Barred Owl (*Strix varia*) has been reported regularly in the northern Rocky Mountains of the U.S. since the late 1960s (Shea 1974, Taylor and Forsman 1976), expanding its range into the area from the adjacent mountains of British Columbia and Alberta (Grant 1966, Jones 1987). From 1912–49, the Barred Owl was reported only five times in Alberta (Boxall and Stepney 1982). Early sightings were in mixed coniferous-deciduous boreal forests, but after 1950 the number of reports increased substantially and included breeding records from coniferous forests of the northern Rocky Mountains. The first Barred Owl was reported from British Columbia in 1943, but by 1966 the species was considered a "common resident of a large part of the interior of the province" (Grant 1966). Prior to 1965, there were no records for Barred Owls from Washington, Oregon, or Idaho although there were several records from extreme northern Montana (e.g., Wright 1976). The expansion of Barred Owls in western North America, south of Canada, was documented by Taylor and Forsman (1976), Forsman (1988), Sharp (1989), and Stephens and Sturts (1991). Ellis et al. (1987) described the concomitant range expansion in Montana as far south as the Bitterroot Valley. However, Stephens and Sturts (1991) reported it only as a transient (nonbreeding records) in central Idaho. We document the occurrence of Barred Owls at several dispersed sites in central Idaho since 1985 with strong evidence of breeding.

Two nonexclusive hypotheses have been proposed to explain the range expansion of the Barred Owl into southwestern Canada and northwestern U.S. Grant (1966) concluded that an ecological barrier, perhaps the Rockies, but more likely something farther east, was recently bridged. Boxall and Stepney (1982) attributed range expansion and increasing numbers in part to an "increased tolerance of coniferous forest." In addition to these hypotheses, Dunbar et al. (1991) indicated that Barred Owls have successfully colonized a wide range of habitats including old-growth and mature forests used by Spotted Owls (*Strix occidentalis*). They went on to say that it was not clear if Spotted Owls were absent from particular areas logged in the early 1900s, "because of the removal of older forests or the presence of Barred Owls, or a combination of both factors." We consider the two hypotheses and the observations of Dunbar et al. (1991) as they relate to our observations of Barred Owls in extensive wilderness areas.

STUDY AREA AND METHODS

Our study area consisted of four geographically dispersed sites in the 1.5 million ha of contiguous, federally designated wilderness that comprise the Selway-Bitterroot (SBW) and Frank Church—River of No Return (RNR) wilderness of central Idaho. Our study sites, which sampled the full range of elevations across this region, were Chamberlain Basin, Cold Meadows, and the Big Creek drainage in the RNR, and the Selway River and its tributaries from Moose Creek to Whitecap Creek in the SBW.

Elevations at these sites range from 750–3000 m and topography varies from rolling plateau at Chamberlain Basin to high peaks and deep, rocky canyons in the Big Creek and Selway River drainages. The vegetation of central Idaho reflects elevation, topography, and moisture (which increases from south to north) gradients and is strongly influenced by fire history. Most of the landscape is a mosaic of conifer forests dominated by ponderosa pine (*Pinus ponderosa*), grand fir (*Abies grandis*), Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*). Open areas include brush lands, steep slopes of grasses and forbs, and wet meadows. Some riparian areas support diverse, deciduous vegetation. Finklin (1988) and Hayward et al. (1993) describe the vegetation and climate of the region in more detail.

From 1980 to the present, we conducted a variety of field studies in the wilderness of central Idaho (e.g., Hayward and Garton 1988, Quigley et al. 1989, Hayward et al. 1993, Wright and Kelsey 1997) some of which were directed at owls and some of which provided opportunities to observe owls incidental to other objectives. During 1980–81, we surveyed for owls from mid-January through May in the Big Creek drainage and at Chamberlain Basin. We alternated between sites on a rotating 10–14-d period (Hayward and Garton 1988). Survey routes were selected to allow sampling of major forest habitats and topographic positions at each study site. During surveys, we broadcast recorded songs of several owl species including Great Horned Owl (*Bubo virginianus*) but not Barred Owl. Calls of one to three owl species were broadcast at stations 0.3–0.6 km apart on transects traveled by walking or skiing. Approximately 80 night-time surveys were conducted during which seven species of owls were observed (see Hayward and Garton 1988).

During January through April 1984–87, we surveyed for owls at Chamberlain Basin and Cold Meadows (Hayward et al. 1993). These surveys were associated with studies of the Boreal Owl (*Aegolius funereus*). Beginning when the first stars became visible, we played tape recordings of the staccato song of the Boreal Owl at 0.5–1-km intervals along trails and ridge lines. We remained at each calling station 10–12 min playing three series of staccato song with 2 min of silence after each series. In addition to time spent listening for owls at each calling station, we paused for 1 min at least once between stations. Approximately 160 nocturnal surveys were conducted and nine species of owls were observed during these studies.

During 1986 and January–March 1987, we recorded Barred Owl contacts made in the Big Creek drainage dur-

Table 1. Barred Owl observations made in the Frank Church—River of No Return (RNRW) and Selway—Bitterroot Wildernesses (SBW) during surveys conducted 1980–95.

DATE	LOCATION	AREA	LAT./LONG.	ELEV. (m)	FOREST TYPE	DESCRIPTION
4 Feb. 1985	Chamberlain Cr.	RNRW	45°21′40″N 115°10′30″W	1830	Mixed conifer	Pair, sang
28 March 1985	Chamberlain Cr.	RNRW	45°21′40″N 115°10′30″W	1850	Mixed conifer	Pair, sang
19 April 1986	Chamberlain Cr.	RNRW	45°21′40″N 115°10′30″W	1850	Mixed conifer	Sang
8 June 1986	Rush Cr.	RNRW	45°04′21″N 115°58′33″W	1850	Mixed conifer	Adult seen
22 March 1987	No Name Cr.	RNRW	45°20′50″N 115°13′30″W	2160	Mixed conifer	Sang
1 April 1987	Chamberlain Cr.	RNRW	45°21′40″N 115°10′30″W	1850	Mixed conifer	Sang
7 August 1989	Goat Cr.	SBW	45°58′00″N 114°53′13″W	1600	Mixed conifer	Fledgling seen
6 June 1994	Crow Cr.	SBW	45°59′11″N 114°46′06″W	1650	Mixed conifer	Responded to song
18 June 1994	Elk Cr.	SBW	45°59′11″N 114°51′38″W	1100	Mixed conifer	Responded to song
4 July 1994	Eagle Cr.	SBW	45°52′34″N 114°52′47″W	1300	Mixed conifer	Responded to song
25 October 1994	Ditch Cr.	SBW	45°59′02″N 114°59′08″W	2050	Spruce/Fir	Responded to Boreal Owl song
30 September 1995	Gardiner Fork	SBW	45°58′54″N	1500	Mixed conifer	Sang

ing unrelated field work. During November 1988–May 1994, we recorded Barred Owls observed incidentally in SBW. Most time was spent in early successional, low elevation (<1525 m) forests except during July and August when higher areas were visited. During June and July 1994, we gave vocal imitations of Barred Owl songs both morning and evening at six locations in the SBW in Douglas-fir/grand fir/ponderosa pine forest (mixed conifer). During June and July 1995, we repeated this procedure at seven more locations in the SBW in high elevation forests of lodgepole pine, spruce-fir, or whitebark pine (*Pinus albicaulis*).

RESULTS

Despite numerous surveys across a broad range of habitats, we did not encounter Barred Owls in the RNR in 1980, 1981, or 1984. We first heard a pair of Barred Owls on 4 February 1985 at a site in Chamberlain Basin which had been visited in earlier years (45°22′N, 115°07′W). We encountered Barred Owls at this same site again in 1986 and 1987 and at two other sites in Chamberlain Basin (Table 1). In 1986, we saw a Barred Owl southwest of Rush Creek Lookout about 36 km southeast of the earliest location in Chamberlain Basin. During surveys in the SBW targeting Barred Owls, they responded to our vocalizations at 3 of 6 mixed-conifer sites in 1994 and 0 of 7 high elevation forest sites in 1995. The high elevation surveys may have sampled sites of lower habitat quality.

We encountered Barred Owls most frequently (9 of 10 sites) in upland, mature to old growth, mixed-conifer forests (Table 1). Stands were most often dominated by an overstory of Douglas-fir and/or grand fir although, on one site, ponderosa pine dominated the overstory. On many sites, dense patches of pole-size (diameter at breast height <25 cm) Douglas-fir occurred in the understory. Several sites had patches (up to 1 ha) of dead, mature Douglas-fir that may have been killed by root rot.

DISCUSSION

The pattern of Barred Owl detections during surveys from 1980–95 suggests that the southward expansion of this species into central Idaho may have occurred sometime in the early to mid-1980s. This conclusion must be accepted with caution, as Barred Owls may have occurred in our study areas

but were not detected during the first 3 yr of field surveys. Breeding populations of Barred Owls were not reported in central Idaho prior to our observations. For instance, Burleigh (1972) did not list Barred Owls for the state although he noted records for more elusive species such as Boreal and Hawk (*Surnia ulula*) Owls. Although the other eight resident owl species were located during surveys and fieldwork of 1980, 1981, and 1984, we did not encounter Barred Owls until 1985. After 1985, we encountered Barred Owls each year that we conducted fieldwork in the RNR. When we searched for them in mixed conifer forest in the SBW in 1994, we found them to be widespread. Our observations of singing, multi-year persistence on sites, and a locally produced fledgling provided convincing evidence of Barred Owl breeding in central Idaho.

What factors are responsible for the recent expansion of Barred Owls in the Rocky Mountains? Changes in climate and/or forest cover may have permitted the westward expansion of Barred Owl populations through the mixed deciduous-coniferous forests of northern Alberta into the Canadian Rockies as documented by Boxall and Stepney (1982). This process parallels that proposed for the expansion of the Blue Jay (*Cyanocitta cristata*) and other birds across the great plains along the expanding forests of the Platte and other river systems (Knopf 1994).

Once Barred Owls reached the Rockies, various mechanisms may have influenced the rate and pattern of spread through the region. By the mid-1950s, less than 10 yr after the first reports in the region (Grant 1966), the species had become widespread in interior British Columbia. This seems a very short time frame to accommodate the genetic adaptation to coniferous forest suggested by Boxall and Stepney (1982). Because the initial colonization and much of the subsequent expansion of the Barred Owl has occurred outside the range of the Spotted Owl (Campbell and Campbell 1984, Forsman et al. 1984), any hypothesis regarding habitat mediated changes in competition between the two species is not relevant east of the Cascades. The rate and extent of range expansion by Barred Owls is particularly striking in light of the absence of Spotted Owls from much of this region. Why didn't this close congener, already endemic to the region and adapted to a variety of forest types across its range (e.g., Gutiérrez and Carey 1985, Gutiérrez et al. 1995, Verner et al. 1992), exploit forests of the northern Rockies first? One possible, untested hypothesis is that recent anthropogenic change created a niche for an owl of this type which the Barred Owl was better preadapted to exploit. If such anthropogenic changes in habitat have enhanced the southward movement of Barred Owls, our observations suggest that such changes occurred both inside and outside of wilderness.

Beginning about 1935, efficient fire suppression led to major changes in forest structure both in central Idaho (Habeck 1976, Steele et al. 1986, Barrett 1988) and elsewhere in the region (summary in Morgan 1994). The extent and homogeneity of mixed-conifer forests increased as ponderosa pine stands were invaded by fir. As a consequence of fire suppression, closed canopy forests developed, dense patches of young conifers became common beneath mature trees, and tree mortality due to disease and insects increased. Based on this pattern of vegetation change and our observations of Barred Owl occurrence in central Idaho, we pose our untested hypotheses regarding the spread of Barred Owls in the region. We have no direct evidence that human-induced changes in forest structure facilitated the spread of the Barred Owl, but the changes are typical of sites where we observed owls. Compared to pre-1935 forests, perhaps these stands offer increased protection from Great Horned Owls and large *Accipiters*, more suitable dead tree nest sites, or higher prey densities. Present knowledge of Barred Owl habitat associations in the region is too limited to allow an evaluation of this scenario. Referring to Barred Owl, Holt and Hillis (1987) note only the importance of mature and old growth trees, particularly western larch (*Larix occidentalis*), in western Montana. However, Dunbar et al. (1991) state that Barred Owls were most common in broad riparian corridors in southwestern British Columbia; these riparian forests may have similar, closed canopy structure to Barred Owl sites we observed in central Idaho.

More refined data on the movement of Barred Owls into new habitat both within and outside the range of the Spotted Owl will be necessary to understand the ecological factors most important in determining the range expansion of the former in western North America. Understanding characteristics of Barred Owl dispersal behavior will further aid interpretation. Our observations provide insight into the timing of this expansion, habitats being occupied, and use of landscapes by Barred

Owls in relatively unmanaged forest within designated wilderness.

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