

The Barred Owl, *Strix varia* in Alberta: Distribution and Status

LISA TAKATS PRIESTLEY

Beaverhill Bird Observatory, Box 1418, Edmonton, Alberta T6B 2X3; e-mail: lisa@beaverhillbirds.com

Priestley, Lisa Takats. 2004 The Barred Owl, *Strix varia*, in Alberta: Distribution and Status. Canadian Field-Naturalist 118(2): 215-224.

Barred Owl distribution and status in Alberta were investigated using over 300 individual records (1912 through 1999) that were collected from literature, museum/zoo specimens, nest cards, bird surveys, volunteer raptor banders, and naturalists. Barred Owls were distributed throughout much of the boreal forest, aspen parkland, foothill, and mountain ecoregions of Alberta. Fifty-four breeding records (46 nests) were found. Barred Owls were associated with older forests and had a clumped distribution, predominantly along water where larger Balsam Poplar trees provide nesting sites. According to Alberta's "Status of Alberta Wildlife 2000" criteria, the Barred Owl should be assessed as Sensitive. There is no evidence that Barred Owls have expanded their range in Alberta in the last 100 years; rather, they have maintained their distribution.

Key Words: Barred Owl, *Strix varia*, distribution, status, Alberta, volunteer surveys, nests.

The Barred Owl, *Strix varia*, is widely distributed throughout North America, ranging from the east coast to the western Canadian provinces (American Ornithologists' Union 1998; Johnsgard 1988; Mazur and James 2000). It is found from the southern tip of Florida to southeastern Alaska. In Canada, the Barred Owl is a permanent resident in woodlands of British Columbia, through central and western Alberta, central Saskatchewan, south-central and southeastern Manitoba, central and southern Ontario, southern Quebec, New Brunswick, Prince Edward Island, and the Maritime provinces (Godfrey 1986). There is little published historical information available on the Barred Owl in western Canada, except for British Columbia (Boxall and Stepney 1982). However, recent studies have found this owl to be more common in western Canada than originally believed (Campbell et al. 1990; Mazur and James 2000; Mazur et al. 1997; Takats 1998).

The Barred Owl is still considered rare in northern regions of Alberta (McGillivray 1996). It was found in the boreal forest region north of Edmonton, in the foothills/montane forests of western Alberta, and in Jasper National Park. The detailed status and distribution of the Barred Owl, however, is poorly documented in the province (Boxall and Stepney 1982; Kirk and Hyslop 1998). There has been considerable debate over the theory that the Barred Owl has only recently extended its range into the western states, Canada, and Alaska, although their relative rarity in the west has been assumed from the paucity of historical records (Shea 1973; Taylor and Forsman 1976; Leder and Walters 1980; Boxall and Stepney 1982; Sharp 1989; Houston and McGowan 1999). It has also been suggested that their numbers are increasing in the boreal forest due to their increasing tolerance of predominantly coniferous forests (Boxall 1986).

In many parts of its range, the Barred Owl is dependent on large areas of remote forest with mature and

old growth trees for nesting, roosting, and foraging (Paris 1947; Elody 1983; Devereux and Mosher 1984; McGarigal and Fraser 1984; Elody and Sloan 1985; Allen 1987; Bosakowski et al. 1987; Johnson 1987; Dunbar et al. 1991; James 1993; James et al. 1995; Mazur et al. 1997; Mazur et al. 1998). In the United States it has been reported to nest in interior portions of expansive, mature woodland (Allen 1987). The typical Barred Owl nest is in a cavity in a large living or dead tree or in the top of a broken snag. There are records of Barred Owls using more conspicuous platform nests (i.e., stick nests) built by squirrels or other large birds (Mazur et al. 1997), as well as ground nests (Robertson 1959; Postupalsky et al. 1997), but these are potentially less productive than cavity nests (Postupalsky et al. 1997) and are generally quite rare.

Alberta Environmental Protection (1996) placed the Barred Owl on the Yellow B list in the Status of Alberta Wildlife report. The Yellow B list includes species that are: (1) naturally rare but not in decline, (2) naturally rare and have clumped breeding distributions, or (3) associated with habitats or habitat elements that are, or may be, in decline. The status of Canada's remaining old growth forests is of growing concern because of the high rate of harvest (Ellis 1993). In the year 2000, the Barred Owl was placed on the Sensitive species list (Alberta Sustainable Resource Development 2000).

The first step in managing wildlife populations is having knowledge of distribution and abundance (Mosher and Fuller 1996). The first objective of this paper was to compile all historic Barred Owl records (published and unpublished) for Alberta, in order to determine the past and present distribution in the province. The second, based on recent studies, was to evaluate this species' status and general habitat use (as it relates to status) in Alberta. The third was to establish whether evidence exists to support the suggestion of range expansion into the west.

TABLE 1: Barred Owls banded in Alberta: date, location, age, sex, and name of bander (1966-1999).

Date	Location	Age-Sex*	Number	Bander
May 1966	Edmonton	L-U	3	E. Jones
April 1987	Water Valley	SY-U	1	D. Collister
November 1988	53.4°, 113.5°	U-U	1	F & W
April 1988	Deerland	AHY-F	1	R. Cromie
June 1989	Deerland	L-U	3	R. Cromie
May 1990	Deerland	L-U	1	R. Cromie
May 1991	Niton	L-U	3	H. Pletz/B. Gehlert
May 1991	Deerland	L-U	3	R. Cromie
May 1992	Deerland	L-U	3	R. Cromie
May 1994	Millarville	AHY-F	1	D. Collister
June 1994	Tawatina	L-U	1	R. Cromie
June 1994	Uncas	L-U	1	R. Cromie
June 1994	Calling Lake	AHY-F	1	D. Stepnisky/G. Court
June 1995	Solomon Creek	AHY-F	1	L. Takats
August 1996	Gregg Lake	AHY-U	1	L. Takats
May 1995	Water Valley	AHY-F	1	D. Collister
May 1995	Water Valley	AHY-M	1	D. Collister
May 1995	Uncas	AHY-F	1	R. Cromie
May 1995	Uncas	L-U	2	R. Cromie
May 1995	Tawatina	L-U	3	R. Cromie
November 1995	Redwater	AHY-M	1	T. Roper
November 1995	51.1°, 114.2°	U-U	1	G. Halmazna
April 1995	Calling Lake	AHY-M	1	G. Court
June 1995	Calling Lake	AHY-F	1	R. Sissons/G. Court
June 1996	Tawatina	AHY-F	1	R. Cromie
June 1996	Tawatina	L-U	3	R. Cromie
May 1996	Calling Lake	AHY-M	1	B. Olsen/R. Sissons
May 1996	Calling Lake	AHY-M	1	B. Olsen/R. Sissons
May 1996	Calling Lake	AHY-F	1	B. Olsen/R. Sissons
June 1996	Calling Lake	AHY-M	1	B. Olsen/R. Sissons
July 1996	Calling Lake	AHY-M	1	B. Olsen/R. Sissons
August 1996	Calling Lake	AHY-M	1	B. Olsen/R. Sissons
May 1997	Tawatina	L-U	2	R. Cromie
May 1998	Calling River	L-U	1	R. Cromie
May 1998	Calling Lake	L-U	2	R. Cromie
June 1998	Uncas	L-U	3	R. Cromie
June 1999	Uncas	L-U	3	R. Cromie
June 1999	Vinca	L-U	4	H. Pletz

* Age – L=nestling/fledgling, AHY=after hatch year, SY=second year, Sex – U=unknown, M=male, F=female

Methods

Information on Barred Owls in Alberta was collected from a variety of sources, which included: published literature, museum collections (National Museum of Canada, National Museum of Natural Sciences (now Canadian Museum of Nature), American Museum of Natural History, Cornell University Museum of Vertebrates, Royal Ontario Museum, University of Calgary Museum of Zoology, University of Alberta Museum of Zoology, Provincial Museum of Alberta, Alberta Breeding Bird Atlas (Federation of Alberta Naturalists), Avian Raptor Nest Cards (Alberta Sustainable Resource Development/Beaverhill Bird Observatory 1999*), banding records (Canadian Wildlife Service Bird Banding Office), and personal communications with Provincial and National Parks personnel. Records

from the following volunteer programs were also collected: Alberta Bird Records 1983-1988 (Alberta Ornithological Records Committee), Breeding Bird Surveys, Christmas Bird Counts and May Species Counts, volunteer owl survey programs (Edmonton Owl Prowl, Alberta Owl Prowl, Alberta Nocturnal Owl Survey), dead raptors turned in to Alberta Sustainable Resource Development, and unpublished data including field notes.

All georeferenced Barred Owl sightings and nest locations were entered into the Biodiversity Species Observation Database (BSOD) (Alberta Sustainable Resource Development/Alberta Conservation Association 1998*). Maps comparing distributions from 1912 to 1975 and 1976 to 1999 were created in ArcView (ESRI GIS Mapping and Software).



FIGURE 1. Photo of a Barred Owl pausing before entering a typical nesting cavity (photo by Gordon Court).

Results

Of 320 reports of Barred Owls, 297 of these were entered into the BSOD database (23 records lacked information on date, location, and/or observer). The first record of a Barred Owl in Alberta was from a specimen collected in 1912, from the Calgary area, though this has been considered a mislabeled specimen (Houston and McGowan 1999). The first live Barred Owl recorded in Alberta was one heard calling along the Athabasca River near Fort McMurray in 1934 (Preble 1941).

Dead Owls

Museum specimens, private collections, and dead owls turned in to Fish and Wildlife constituted 53 Barred Owl locations distributed throughout the province. The most southeasterly report was a dead owl turned in to Fish and Wildlife in February 1984 from Coronation (Boxall 1986). Morphological information collected on 26 owls shows that the majority were adults (24 of 26), 12 females, 10 males, 4 unknown sex. Boxall and Stepney (1982) reported an unusually high number of dead Barred Owls turned in to Fish and Wildlife during a short period of time (15 individuals from 1982 to 1985).

Banding, Literature and Personal Communications

Barred Owls have been banded on 38 occasions in Alberta from 1966 to 1999 (CWS Banding Office) by thirteen banders (Table 1). There were 15 clutches of owls banded at nest sites, as well as nine adult females, eight adult males, and three adults of unknown

sex. Only one Barred Owl was banded before 1987 (2.6 percent).

There were 42 reports of Barred Owls collected from publications (Preble 1941; Jones 1956; Jones 1966; Salt and Wilk 1958; Salt and Salt 1976; Francis and Lumbis 1959; Jones 1987; Sadler and Myers 1976; Boxall and Stepney 1982; Rintout and Myers 1983; Pintel et al. 1991; Takats 1995) and 63 records collected from personal communications. Only 35 of these records were pre-1975 (33 percent). Jones (1987) summarized observations of Barred Owls as being "fairly evenly distributed in Alberta, particularly in Alberta's northern forests and heavily forested foothill regions of Alberta".

Holroyd and VanTighem (1983) report the Barred Owl as a rare, year-round resident in Banff and Jasper National Parks. They state:

"It occurs regularly near Jasper townsite especially along the lower Miette River, where it has nested, and near Cottonwood Slough (Roy Richards, pers. comm.) and Pyramid Lake (R. Salt, pers. comm.). It has been recorded twice near North Saskatchewan River Crossing (M. Dyer, pers. comm.), twice near Vermilion Lakes Banff, once at Lake Annette (K. VanTighem, pers. comm.) and once near Maligne Canyon (J. Salt, pers. comm.)."

Volunteer Surveys

Breeding Bird Atlas volunteers reported 65 Barred Owl locations during a five-year survey from 1987 through 1991 (data were collected between February and July of each year). Atlas data showed that Barred Owls were concentrated in the Boreal Forest region,

TABLE 2. Barred Owl locations recorded on volunteer owl survey programs (EOP – Edmonton Owl Prowl, AOP – Alberta Owl Prowl, ANOS – Alberta Nocturnal Owl Survey).

Date	Location	Observation	Observer
24 February 1988	Big Lake	1 individual	EOP – Beck and Beck (1988)
5 March 1988	Cooking Lake	1 individual	EOP – Beck and Beck (1988)
6 March 1988	Wabamun Creek	1 individual	EOP – Beck and Beck (1988)
24 February 1989	Big Lake	1 individual	AOP – E. Bamford
05 March 1989	Cooking Lake	1 individual	AOP – R. and M. Berg
06 March 1989	Wabamun Lake	1 individual	AOP – S. Jungkind, Belmonte, Gomez, Diener
21 May 1989	Water Valley	1 individual	AOP – D. Hutchinson, D. Collister
10 April 1998	Lac La Biche	pair duetting	ANOS – J. Gammon and P. Okrainec
15 May 1998	Shaw Lake	1 individual	ANOS – J. Gammon
18 April 1998	Hillcrest Road	2 individuals	ANOS – M. Heckbert and J. Doll
26 April 1998	Sibbald	1 individual	ANOS – D. Woodsworth, Kanagawa, Mitchell
27 March 1999	Nojack South	1 individual	ANOS – R. Gutsell, R. Wiacek, B. McCulloch

and primarily coniferous foothills and montane forests west of Calgary and in Jasper National Park (Semenchuk 1992). Few records indicated breeding evidence and only one possible breeding record was discovered, north of Lesser Slave Lake at La Crete along the Peace River. During Alberta Christmas Bird Counts from 1965 to 1998, volunteers in 44 count circles recorded 53 Barred Owls. Only 17 (32 percent) of these owls were recorded before 1990. Only four and two owls were recorded during Breeding Bird Surveys and May Species Counts, respectively.

There have been three volunteer surveys conducted specifically for owls (Table 2): Edmonton Owl Prowl (1988), Alberta Owl Prowl (1989), and the volunteer Alberta Nocturnal Owl Survey (1998 and ongoing). Seven Barred Owls were found during the first two owl surveys (Beck and Beck 1988, personal communication). Volunteer Alberta Nocturnal Owl surveyors found 13 individual Barred Owls (11 records) on eleven 10 km transects along roads (16 routes were surveyed throughout the province). The Alberta Bird Record contributed 35 more locations of Barred Owls in 1988 (Alberta Ornithological Records Committee).

Two intensive studies have been conducted on the Barred Owl in Alberta (Takats 1998; Olsen 1999). Takats (1998) conducted a study on distribution and abundance of the Barred Owl in the Foothills Model Forest (located in the foothills and mountains around Hinton and Jasper). Forty-two different territorial Barred Owls (10 females, 17 males, and 15 unknown sex) were recorded in 1995 and 1996. Of these, seven were paired and the other 28 were single but may have had mates that did not respond to broadcasts (Takats 1998). Surveys were continued in 1997 and 1998 and four additional Barred Owls were located. The density of Barred Owls was determined to be 0.05 and 0.04 owls/km², in 1995 and 1996, respectively.

The habitat used by Barred Owls at 45 calling locations in the Foothills Model Forest was predominant-

ly older mixedwood forest containing Trembling Aspen (*Populus tremuloides*), White Spruce (*Picea glauca*) and Balsam Poplar (*Populus balsamifera*). Roosting and foraging occurred in a variety of stand types, but were also predominantly older mixedwood *Populus* sp. and spruce (Takats 1998).

A study to evaluate the effects of forest fragmentation on bird communities was initiated in north-central Alberta (Schmiegelow and Hannon 1993). Preliminary work located six Barred Owl territories, and evidence of three breeding pairs was discovered in the Calling Lake area (G. Court, personal communication). Two additional territories and four additional breeding sites were found in a study from 1996 through 1998 (Olsen 1999). During the breeding season, the density of Barred Owls was 0.04 pairs/km². Owls were found to use old growth mixed forest stands (Olsen 1996).

Breeding Records

There were 54 breeding records (only three found before 1975). The first evidence of breeding was recorded in 1949 (Grant 1966), but the first nest was not discovered until 1966, in Edmonton (Jones 1966) (Table 3). Boxall and Stepney (1982) reported eight breeding records, and Semenchuk (1992) reported six confirmed breeding records during the Provincial Breeding Bird Atlas Project (1987-1991). The northern-most breeding record was a nest found at 58° 19' latitude and 116° 17' longitude near La Crete (Takats 1995). Some local residents have reported Barred Owls to be present for over 20 years.

Breeding records for Barred Owls were not common (n = 54) and only 46 nests have been found (1966 through 1999): 38 (82.6 percent) were in natural cavities (or bowls on top of dead trees that had broken off), two (4.3 percent) were in stick nests, one (2.2 percent) was in a man-made stick nest, and five (10.9 percent) were in nest boxes. In most cases owls nested in older mixedwood stands and used large diameter *Populus* sp. trees (> 40 cm) (primarily Balsam Poplar) for

TABLE 3: Confirmed breeding records of Barred Owls for Alberta.

Date	Location	Nest Type	Observer/Reference
1949	Lesser Slave Lake	Unknown	Grant (1966)
1966	Edmonton	Cavity Nest	Jones (1966)
1968*	Edmonton	Cavity Nest	E. Jones (personal communication)
1976*	Blue Lake	Cavity Nest	Boxall and Stepney (1982)
1977*	Jasper	Cavity Nest	Boxall and Stepney (1982)
1977*	Blue Lake	Cavity Nest	Boxall and Stepney (1982)
1978	Chilver Lake	Unknown	Wiseley (personal communication)
1979*	Miette River	Cavity Nest	Richards (personal communication)
1980*	Miette River	Cavity Nest	Richards (personal communication)
1984**	Spruce Grove	Cavity Nest	R. Copeland (personal communication)
1988	Deerland	Cavity Nest	R. Cromie (Nest Card)
1989	Deerland	Cavity Nest	R. Cromie (Nest Card)
1990	Deerland	Cavity Nest	R. Cromie (Nest Card)
1991	Deerland	Cavity Nest	R. Cromie (personal communication)
1991	Niton	Cavity Nest	H. Pletz/B. Gehlert
1992	Deerland	Cavity Nest	R. Cromie (Nest Card)
1993	La Crete	Cavity Nest	Takats (1995)
1994	La Crete	Cavity Nest	Takats (1995)
1994	Millarville	Unknown	D. Collister (personal communication)
1994	Uncas	Man-Made Platform	R. Cromie (Nest Card)
1994	Tawatinaw	Cavity Nest	R. Cromie (Nest Card)
1994	Elk Island	Stick Nest	H. Pletz (personal communication)
1994	Calling Lake	Unknown	G. Court (personal communication)
1994	Miette River	Cavity Nest	Takats (1998)
1995	Lynx Creek	Cavity Nest	Takats (1998)
1995	Miette River	Cavity Nest	Takats (1998)
1995	La Crete	Cavity Nest	A. Miller (personal communication)
1995	Tawatinaw	Cavity Nest	R. Cromie (Nest Card)
1995	Cross Lake	Cavity Nest	R. Cromie (Nest Card)
1995	Uncas	Nest Box	R. Cromie (Nest Card)
1995	Calling Lake	Cavity Nest	G. Court (personal communication)
1995	Calling Lake 2	Cavity Nest	G. Court (personal communication)
1996	Bragg Creek	Cavity Nest	H. Pletz (personal communication)
1996	Solomon Creek	Cavity Nest	Takats (1998)
1996	Blackcat Ranch	Cavity Nest	Takats (1998)
1996	Miette River	Cavity Nest	Takats (1998)
1996	Tawatinaw	Nest Box	R. Cromie (Nest Card)
1996	Calling Lake	Unknown	Olsen (1999)
1997	Cross Lake	Cavity Nest	A. Karvonen (personal communication)
1997	Miette River	Cavity Nest	L. Takats (personal communication)
1997	Tawatinaw	Cavity Nest	R. Cromie (Nest Card)
1997	Lac La Biche	Stick Nest	Olsen (1999)
1997	Calling Lake	Cavity Nest	Olsen (1999)
1998	Uncas	Cavity Nest	R. Cromie (personal communication)
1998	Solomon Creek	Cavity Nest	L. Takats (personal communication)
1998	Calling River	Cavity Nest	T. Roper (Nest Card)
1998	Calling Lake	Cavity Nest	Olsen/Cromie (Nest Card)
1999	Uncas	Nest Box	R. Cromie (Nest Card)
1999	Tawatinaw	Nest Box	R. Cromie (Nest Card)
1999***	Vinca	Cavity Nest	H. Pletz (Nest Card)
1999	Cross Lake	Nest Box	R. Cromie (Nest Card)

* Boxall and Stepney (1982) ** Nest cut down, two eggs cracked, one survived, owl held at Valley Zoo, Edmonton

*** One young Barred Owl was fostered in to this nest.

nesting (Takats 1998; Avian Raptor Nest Cards; Olsen 1999). Nest boxes built specifically for Barred Owls were readily taken over in areas where natural cavities were not abundant (G. Court, personal communication; R. Cromie, personal communication).

Distribution

Most occurrences of Barred Owls were in the boreal forest, foothill, and mountain ecoregions from 1912 through 1974 (Figure 2) and from 1975 to the present (Figure 3). Few owls were recorded in the parkland,

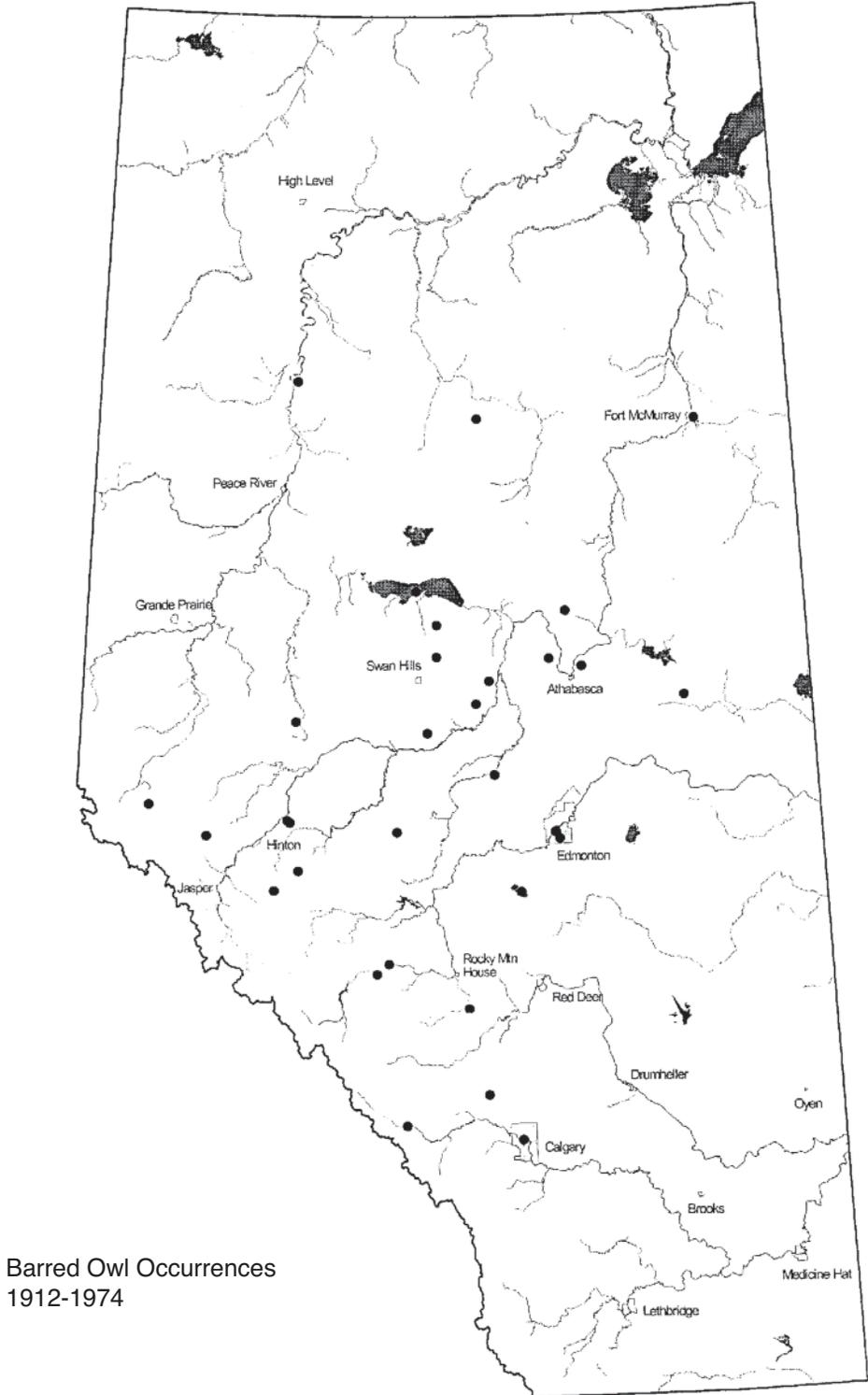


FIGURE 2. Barred Owl distribution from 1912 through 1974 (map courtesy of Alberta Conservation Association/Alberta Sustainable Resource Development).

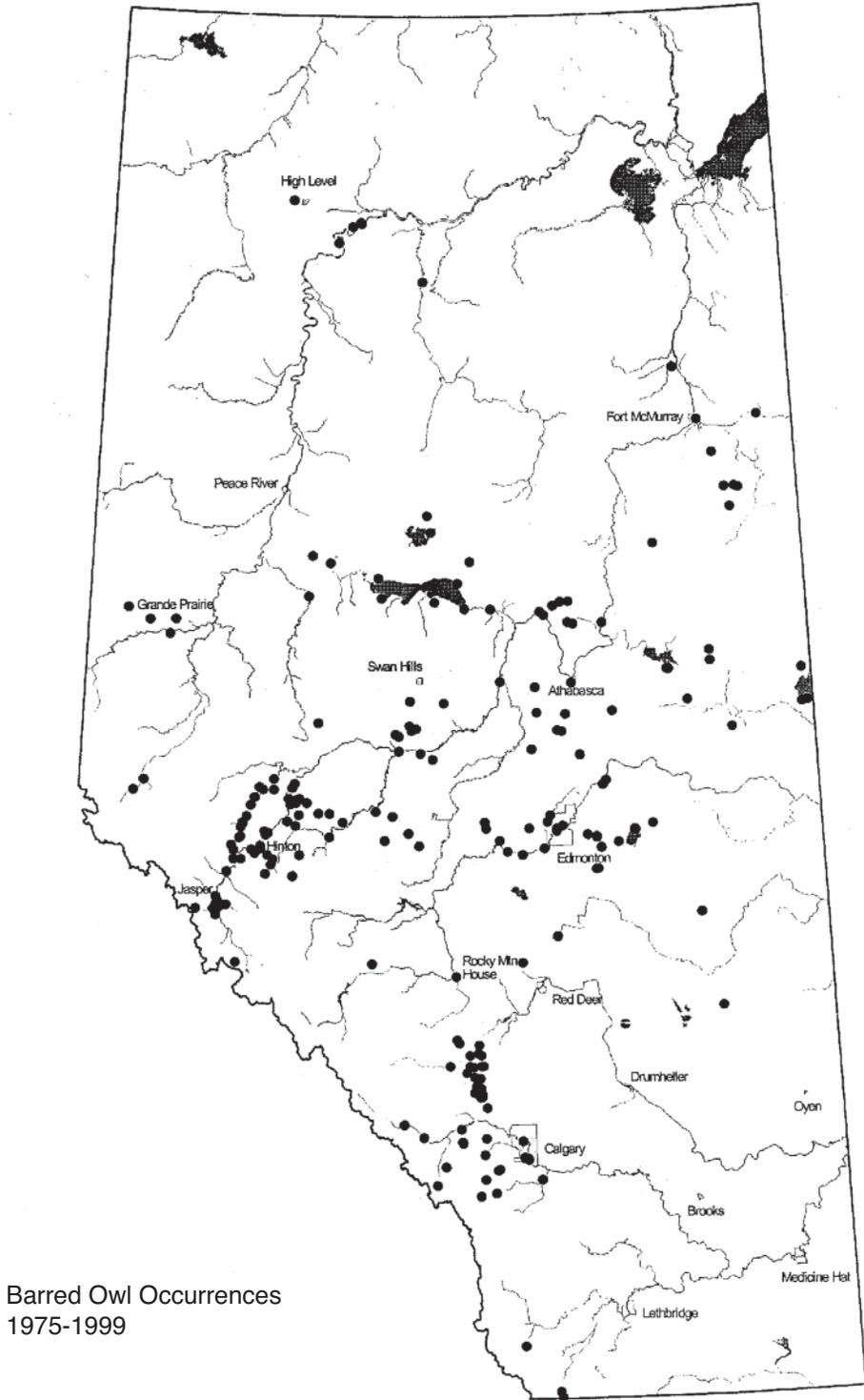


FIGURE 3. Barred Owl distribution from 1975 through 1999 (map courtesy of Alberta Conservation Association/ Alberta Sustainable Resource Development).

and only one individual was recorded in the northern limit of the grassland ecoregion. Detection of Barred Owls appears to have increased after 1975, but there have been only two records outside the range of the early distribution map.

Discussion

The Barred Owl is distributed over much of Alberta's forested area. Evidence suggests that Barred Owl distribution in the province has changed little over the last 100 years. As more detailed studies are conducted, as there is an increase in the number of interested naturalists exploring isolated woodlands, and as there is increased access to remote areas, more reports of Barred Owls will accumulate, Oeming (1957) and Jones (1966) concur. Mazur et al. (2000) suggested that Barred Owls are shy of humans, which may account for their secretive nature.

In British Columbia the first records of Barred Owls were from Liard Crossing in 1943 and Nechako Lowlands in 1946 (Campbell et al. 1990). Scotter et al. (1985) reported a Barred Owl record from 1977 in the South Nahanni River, Northwest Territories, which shows that Barred Owls have existed northwest of Alberta for over 20 years. As well, the idea that the Barred Owl is adapting to the coniferous boreal forest does not hold true. Barred Owls have shown a clumped distribution in areas that contain large deciduous trees (predominantly riparian areas). They use Balsam Poplars for nesting and rely on a more open subcanopy for flight, although the roost cover provided by White Spruce trees is important, particularly in the winter (Takats 1998). Some of the first records of Barred Owls occurred along riparian areas.

The Sensitive designation assigned by Alberta Sustainable Resource Development (2000) is well founded. Based on recent studies and personal communications with raptor banders and naturalists, the Barred Owl should not be considered rare in Alberta; however, this species does have a clumped breeding distribution. As well, these owls rely on cavities in old, large diameter *Populus* sp. trees for nesting, and select old and/or mature mixedwood forests (a habitat that is in decline) to fulfill their life requisites (Takats 1998; Olsen et al. 1996*; Olsen 1999; Mazur and James 2000).

As older forests are usually targeted first for harvest, the amount of old growth forest remaining decreases and stands become increasingly fragmented. Loss of nesting, roosting, and foraging habitat occurs when a forest is clearcut; moreover, Great Horned Owls, *Bubo virginianus*, are known to favour fragmented landscapes. There is direct conflict between these two owl species, with the Barred Owl losing out to the larger Great Horned Owl (Bent 1961; Bosakowski 1994; Laidig and Dobkin 1995; Takats 1998 and field notes; Olsen 1999; G. Court, personal communication). Barred Owl numbers and range are limited by the amount of adequate nesting habitat available where they can reproduce successfully and fledge

their young without interference from competitors and predators.

Acknowledgments

Funding for parts of this work was provided by Foothills Model Forest, Alberta Sport, Recreation, Parks and Wildlife Foundation, Alberta Sustainable Resource Development (Fish and Wildlife), Environment Canada (Canadian Wildlife Service), Beaverhill Bird Observatory, and Weldwood of Canada, Hinton. The Bird Banding Office (Canadian Wildlife Service) provided Barred Owl banding information for Alberta. The Federation of Alberta Naturalists provided locations from the Breeding Bird Atlas. The Alberta Conservation Association/Alberta Sustainable Resource Development provided use of the Biodiversity Species Observation Database (BSOD) to create maps of the distributions.

I thank Tony Erskine, Jim Duncan, and Bob Nero for reviewing the submitted manuscript. Gordon Court, Jim Beck, and Geoff Holroyd initially reviewed the manuscript, provided owl location information, and continue to encourage me with my work in raptor ecology. Lance Engley (Alberta Conservation Association) provided the maps. Chuck Priestley, Dawn Birn, Kris Kendell, and Jeff Adamyk also provided some editorial comments. Jim Duncan and Kurt Mazur provided the idea to write the paper in the first place. I acknowledge Jim and Barb Beck (the 'Owl Nuts') for providing the Edmonton and Alberta Owl Prowl data as well as many other locations. Edgar Jones, Doug Collister, Ray Cromie, Wayne Smith, Hardy Pletz, Bob Gehlert, Ben Olsen, Trevor Roper, and Rick Lauzon (AXYS) provided many owl locations. Thanks also to Wayne Roberts (University of Alberta Museum of Zoology), Michel Gosselin (National Museum of Canada [now Canadian Museum of Nature]), Mark Steinhilber (Provincial Museum of Alberta), and Rusty Copeland (Valley Zoo, Edmonton) for providing information on museum and zoo specimens. Thanks to Howard Troughton for providing the Christmas Bird Count information in a ready-to-use file. Special thanks to Stephen Glendinning and Jeff Adamyk, who spent many hours conducting broadcast surveys for owls in the foothills. Finally, thank you to all the volunteer raptor banders, owl surveyors, and raptor enthusiasts who have contributed most of the information we know about Barred Owls in Alberta.

Documents Cited [marked * in text]

- Alberta Environmental Protection/Alberta Conservation Association.** 1998. Biodiversity species observation database. 7th floor O. S. Longman Building, 6909-116 Street, Edmonton, Alberta.
- Alberta Sustainable Resource Development/Beaverhill Bird Observatory.** 1999. Avian raptor nest record cards. Edmonton, Alberta.
- Olsen, B., L. Takats, B. Beck, and J. Beck.** 1996. Barred Owl (*Strix varia*) breeding habitat: draft habitat suitability index model. In *Habitat Suitability Index Models for 35 Wildlife*

Species in the Boreal Foothills of West-Central Alberta. Interim Report, Foothills Model Forest, Hinton. 11 pages.

Literature Cited

- Alberta Environmental Protection.** 1996. The status of Alberta wildlife. Natural Resources Service, Wildlife Management Division, Edmonton, Alberta. 44 pages.
- Alberta Sustainable Resource Development.** 2000. The general status of Alberta wild species 2000. Alberta Sustainable Resource Development, Edmonton, Alberta. 46 pages.
- Allen, A. W.** 1987. Habitat suitability index models: Barred Owl. U.S. Fish and Wildlife Service Biological Report 82. 17 pages.
- American Ornithologists' Union.** 1998. Check-list of North American birds, 7th edition. American Ornithologists' Union, Washington, D.C. 877 pages.
- Beck, B., and J. Beck.** 1988. The greater Edmonton owl prowl. *Edmonton Naturalist* 18: 97-100.
- Bent, A. C.** 1961. Life histories of North American birds of prey. Part II. Reprinted from Smithsonian Institution United States National Museum Bulletin 170, 1938. Dover Publications, Inc. New York, New York.
- Bosakowski, T.** 1994. Landsat reveals negative effect of forest fragmentation on Barred Owl distribution. *Records of New Jersey Birds* 20: 66-70.
- Bosakowski, T., R. Speiser, and J. Benzinger.** 1987. Distribution, density, and habitat relationships of the Barred Owl in Northern New Jersey. Pages 135-143 in *Biology and Conservation of Northern Forest Owls*. Edited by R. W. Nero, R. J. Clark, R. J. Knapton, and R. H. Hamre. USDA Forest Service Technical Report RM-142.
- Boxall, P. C.** 1986. Additional observations of the Barred Owl in Alberta. *Blue Jay* 44: 41-43.
- Boxall, P. C., and P. H. R. Stepney.** 1982. The distribution and status of the Barred Owl in Alberta. *Canadian Field-Naturalist* 96: 46-50.
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall.** *Editors.* 1990. The birds of British Columbia, Volume 2. University of British Columbia Press, Vancouver, British Columbia.
- Devereux, J. G., and J. A. Mosher.** 1984. Breeding ecology of Barred Owls in the central Appalachians. *Raptor Research* 18: 49-58.
- Dunbar, D. L., B. P. Booth, E. D. Forsman, A. E. Hetherington, and D. J. Wilson.** 1991. Status of the Spotted Owl, *Strix occidentalis*, and Barred Owl, *Strix varia*, in southwestern British Columbia. *Canadian Field-Naturalist* 105: 464-468.
- Ellis, L.** 1993. Canadian old growth forests, a status report from Newfoundland to British Columbia. Canadian Parks and Wilderness Society. 42 pages.
- Elody, B. J.** 1983. Techniques for capturing, marking, monitoring and habitat analysis for the Barred Owl in the Upper Peninsula of Michigan. M.Sc. thesis, Michigan Technological University. 104 pages.
- Elody, B. J., and N. F. Sloan.** 1985. Movements and habitat use of Barred Owls in the Huron Mountains of Marquette County, Michigan, as determined by radio-telemetry. *Jack-Pine Warbler* 63: 3-8.
- Francis, J., and K. Lumbis.** 1979. Habitat relationships and management of terrestrial birds in northeastern Alberta. Alberta Oil Sands Environmental Research Program Report Number 78. Canadian Wildlife Service, Edmonton, Alberta. 365 pages.
- Godfrey, W. E.** 1986. The birds of Canada, revised edition. National Museum of Natural Sciences, National Museums of Canada, Museum of Natural Sciences.
- Grant, J.** 1966. The Barred Owl in British Columbia. *The Murrelet* 47: 39-45.
- Holroyd, G. L., and K. J. Van Tighem.** 1983. Ecological (biophysical) land classification of Banff and Jasper National Parks, vol. III: the wildlife inventory. Environment Canada, Canadian Wildlife Service, Edmonton, Alberta. 444 pages.
- Houston, C. S., and K. J. McGowan.** 1999. The westward spread of the Barred Owl. *Blue Jay* 57: 190-195.
- James, P. C.** 1993. Old growth and owls: what have we learned? Pages 70-79 in *Birds in the Boreal Forest*, Proceedings of a Workshop held March 10-12 in Prince Albert, Saskatchewan. Edited by D. H. Kuhnke.
- James, P. C., K. M. Mazur, and S. D. Frith.** 1995. The Barred Owl as an indicator of old forest and its role in long-term forestry planning. Annual Report for Saskatchewan Environment and Resource Management. 27 pages.
- Johnsgard, P. A.** 1988. North American owls: biology and natural history. Smithsonian Institution, Washington, D.C. 295 pages.
- Johnson, D. H.** 1987. Barred Owls and nest boxes: results of a five-year study in Minnesota. Pages 129-134 in *Biology and Conservation of Northern Forest Owls*. Edited by R. W. Nero, R. J. Clark, R. J. Knapton, and R. H. Hamre. USDA Forest Service Technical Report RM-142.
- Jones, E. T.** 1956. New and unusual bird records for Alberta. *Canadian Field-Naturalist* 70: 143-144.
- Jones, E. T.** 1966. Barred Owl nest record for Alberta. *Blue Jay* 24: 140.
- Jones, E. T.** 1987. Early observations of the Barred Owl in Alberta. *Blue Jay* 45: 31-32.
- Kirk, D. A., and C. Hyslop.** 1998. Population status and recent trends in Canadian raptors: a review. *Biological Conservation* 83: 91-118.
- Laidig, K. J., and D. S. Dobkin.** 1995. Spatial overlap and habitat associations of Barred Owls and Great Horned Owls in southern New Jersey. *Raptor Research* 29: 151-157.
- Leder, J. E., and M. L. Walters.** 1980. Nesting observations for the Barred Owl in western Washington. *Murrelet* 61: 110-112.
- Mazur, K. M., P. C. James, and S. D. Frith.** 1997. Barred Owl (*Strix varia*) nest site characteristics in the boreal forest of Saskatchewan, Canada. Pages 267-271 in *Biology and Conservation of Owls of the Northern Hemisphere*. Edited by J. R. Duncan, D. H. Thomson, and T. H. Nicholls. USDA Forest Service General Technical Report NC-190.
- Mazur, K. M., P. C. James, and S. D. Frith.** 1998. Barred Owl home range and habitat selection in the boreal forest of central Saskatchewan. *The Auk* 115: 746-754.
- Mazur, K. M., and P. C. James.** 2000. Barred Owl (*Strix varia*). In *The Birds of North America*, Number 508. Edited by A. Poole and F. Gill. The Birds of North America, Inc., Philadelphia, PA.
- McGarigal, K., and J. D. Fraser.** 1984. The effect of forest stand age on owl distribution in southwestern Virginia. *Journal of Wildlife Management* 48: 1393-1398.
- McGillivray, W. B.** 1996. A survey of summer birds in north-central Alberta. *Alberta Naturalist* 26: 75-77.
- Mosher, J. A., and M. R. Fuller.** 1996. Surveying woodland hawks with broadcasts of Great Horned Owl vocalizations. *Wildlife Society Bulletin* 24: 531-536.

- Oeming, A. F.** 1957. Notes on the Barred Owl and Snowy Owl in Alberta. *Blue Jay* 15: 153-156
- Olsen, B.** 1996. Effects of forest fragmentation on the distribution and ecology of woodland owls in north-central Alberta. *Alberta Wildlifer* 7: 4-8.
- Olsen, B.** 1999. Breeding habitat ecology of the Barred Owl (*Strix varia*) at three spatial scales in the boreal mixed-wood forest of Alberta. M.Sc. thesis, Department of Biological Sciences, University of Alberta, Edmonton, Alberta.
- Paris, O. H.** 1947. "Squeaking" to attract Barred Owl. *Chat* 11: 73.
- Pinel, H. W., W. W. Smith, and C. R. Wershler.** 1991. Alberta birds, 1971-1980, Volume 1. Non-Passerines. Provincial Museum of Alberta Natural History Occasional Paper Number 13. Edmonton, Alberta.
- Postupalsky, S., J. M. Paap, and L. Scheller.** 1997. Nest sites and reproductive success of Barred Owls (*Strix varia*) in Michigan. Pages 325-337 in *Biology and Conservation of Owls in the Northern Hemisphere: Second International Symposium*. Edited by J. R. Duncan, D. H. Johnson, and T. H. Nicholls. USDA Forest Service General Technical Report NC-190.
- Preble, E. A.** 1941. Barred Owl on Athabasca River, Alberta. *Auk* 58: 407-408.
- Rintoul, J., and S. Myers.** 1983. Avifauna of Crow Lake candidate ecological reserve. Alberta Energy and Natural Resources, Edmonton, Alberta. Natural Areas Technical Report Number 10.
- Robertson, W. B.** 1959. Barred Owl nesting on the ground. *Auk* 76: 227-230.
- Sadler, T. S., and M. T. Myers.** Alberta birds 1961-1970. Provincial Museum of Alberta Natural History Section Occasional Paper Number 1. Edmonton, Alberta.
- Salt, W. R., and J. R. Salt.** 1976. The birds of Alberta, 3rd edition. Hurtig Publishers, Edmonton.
- Salt, W. R., and A. L. Wilk.** 1958. The birds of Alberta. Queen's Printer, Edmonton.
- Schmiegelow, F. K. A., and S. J. Hannon.** 1993. Adaptive management, adaptive science and the effects of forest fragmentation on boreal birds in northern Alberta. Pages 584-598 in *Transactions of the 58th North American Wildlife and Natural Resources Conference*.
- Scotter, G. W., L. N. Carbyn, W. P. Neily, and J. D. Henry.** 1985. Birds of Nahanni National Park, Northwest Territories. Saskatchewan Natural History Society, Regina, Saskatchewan.
- Semenchuk, G. P. Editor.** 1992. The atlas of breeding birds of Alberta. Federation of Alberta Naturalists, Edmonton, Alberta. 371 pages.
- Sharp, D. U.** 1989. Range extension of the Barred Owl in western Washington and the first breeding record on the Olympic Peninsula. *Raptor Research* 23: 179-180.
- Shea, D. S.** 1973. Barred Owl records in western Montana. *The Condor* 76: 222.
- Takats, D. L.** 1995. Rare bird sightings in the boreal forest of northern Alberta. *Alberta Naturalist* 25: 79-81.
- Takats, D. L.** 1998. Barred Owl habitat use and distribution in the Foothills Model Forest. M.Sc. thesis, Department of Renewable Resources, University of Alberta, Edmonton, Alberta. 139 pages.
- Taylor, A. L., and E. D. Forsman.** 1976. Recent range extensions of the Barred Owl in western North America, including the first records for Oregon. *Condor* 78: 560-561.

Received 30 July 2002

Accepted 22 June 2004