



Barred Owl (*Strix varia*) Nest Site Characteristics in the Boreal Forest of Saskatchewan, Canada

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Abstract.—Between 1994 and 1996 we located 15 active Barred Owl (*Strix varia*) nests in the boreal forest of central Saskatchewan, Canada. Eighty-seven percent of Barred Owl nests were located within old mixedwood forest stands. Nest tree species included white spruce (*Picea glauca*), trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), and white birch (*Betula papyrifera*). The majority of nests were within natural cavities (67 percent), and the majority of nest trees were live (67 percent). Nest trees were of large diameter, averaging 47.4 cm. Nest site availability appears to be an important factor for this species reliance on old forest.

Raptor populations are in part limited by the availability of suitable nest sites (Newton 1979). Owls are further affected by nest site availability as they do not construct a nest as a rule (Johnsgard 1988). This is especially true for those species which rely on existing cavities to nest in. Barred Owls (*Strix varia*) primarily nest in tree cavities, but will also use stick nests, and have been noted to nest on the ground (Bent 1938, Johnsgard 1988, Robertson 1959). In the boreal forest of Canada few Barred Owl nest records exist. Our objective was to describe Barred Owl nests within the boreal forest of Saskatchewan.

STUDY AREA AND METHODS

The research was conducted from March 1994 to August 1996 within the southern boreal forest of Saskatchewan, Canada (53°35'-54°15'N, 105°05'-106°45'W). The approximately 400,000 ha study area encompassed the Prince Albert Model Forest including a portion of Prince Albert National Park. The common tree species in the study area included trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), white birch (*Betula papyrifera*), white spruce (*Picea glauca*), black spruce (*Picea*



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Barred Owl (*Strix varia*).

mariana), tamarack (*Larix laricina*), jack pine (*Pinus banksiana*), and balsam fir (*Abies balsamea*). The habitat included pure deciduous, mixed coniferous/deciduous, and pure coniferous forest, muskeg, and shrub lands. Elevation ranged from 490 to 698 m. The topography is gently rolling, interspersed with numerous lakes and creeks. The climate is boreal continental, with an average annual precipitation of 401 mm; 281 mm as rain and 120 mm as snow; July and January temperatures average 17.6°C and -19.7°C, respectively, with annual extreme temperatures of 36.1°C and -48.3°C (Environment Canada Parks 1986).

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Nests were located either by following a radio-marked female Barred Owl to a nest, or by searching the area where a pair of Barred Owls had been detected during call-playback surveys (Frith *et al.* 1997). The forest stand that each nest fell within was classified according to a scheme created using the updated (1993) version of the existing forest inventories for Prince Albert National Park (Padbury *et al.* 1978) and the Saskatchewan Northern Provincial Forest (Lindenau 1985) (table 1). Nest tree species and its status (dead or live) was recorded, as well as the type of nest structure. Nest structures were classified as either cavity or platform, where cavity included a tree cavity formed by the top of a tree or limb breaking off, and a platform included stick nests. Nest tree height and nest structure height were measured with a clinometer (Suunto, Espoo, Finland). Nest tree diameter at breast height (d.b.h.) and distance to the nearest all-weather road were measured.

RESULTS

Fifteen active Barred Owl nests were located between 1994 and 1996 (table 2a). Nest sites were located almost exclusively in old mixed-wood forest, with one nest in old coniferous forest and one in mature deciduous forest (table 2a). Nest tree species was variable, with five nests in white spruce, five in trembling aspen, four in balsam poplar, and one in a white birch. The majority of the nest trees were live (10 of 15; 67 percent). Sixty-seven percent

(10) of nests were tree cavities, with the remainder on platforms (table 2a). Six of the cavity nests were formed where the top of the tree broke off leaving a cavity in the snag. The other four were formed where a limb broke off, likely from rot. In all cavity nests the owl was entirely concealed from view from the ground. Two of the platform nests were old stick nests (Accipitridae and Corvidae). These stick nests were used by the same owl in consecutive years. Red squirrel (*Tamiasciurus hudsonicus*) nests constituted two platform nests, where the owl sat on top of the structure, and one owl nested on top of a witch's broom (dense branching caused by *Arceuthobium* spp.) in a white spruce tree. Nest tree height averaged 18.8 m and nest height averaged 13.3 m (table 2b). Nest trees were large, averaging 47.4 cm d.b.h. The proximity to an all-weather road was quite variable ranging from 25 m to 2,000 m (average 430 m; table 2b).

Reuse of nests over years varied among owls. Summit and Beaver Glen Owls used the same nest for 2 consecutive years, while Prospect and Spruce River Owls used different nests within the same territory in consecutive years. The Whelan Bay female shifted her territory after 1994, and subsequently used a different nest in 1995, and also used a different nest in 1996 while remaining on the same territory. All other owls were only monitored for 1 year. Of the 15 nests found, three (20 percent) had fallen down within the 3-year study period.

Table 1.—*Habitat classification by habitat cover type and age in the boreal forest of Saskatchewan, Canada.*

Habitat type	Cover vegetation description
Deciduous ¹	Trembling aspen +/- balsam poplar +/- white birch (<20 percent conifer)
Mixedwood ¹	Combination of deciduous and coniferous species: trembling aspen, balsam poplar, white birch, white spruce, black spruce, jack pine, balsam fir (≥ 20 percent conifer, ≥ 20 percent deciduous)
Coniferous ¹	White spruce +/- black spruce +/- jack pine +/- tamarack +/- balsam fir (<20 percent deciduous)
Treed muskeg	Black spruce +/- tamarack, excessive moisture and retarded tree growth

¹ Could occur in three age classes: Young (<50 years). Mature (50-79 years), and Old (80+ years).



Table 2a.—*Characteristics of 15 Barred Owl (Strix varia) nests in the boreal forest of Saskatchewan, Canada.*

Owl	Nest stand	Nest tree species	Nest tree status	Nest type
Prospect 95	Old mixedwood	White spruce	Live	Platform (witch's broom)
Prospect 96	Old mixedwood	White spruce	Live	Platform (squirrel nest)
Summit	Old mixedwood	White spruce	Dead	Cavity (broken top)
Spruce River 94	Old mixedwood	White spruce	Live	Cavity (broken top)
Candle Lake	Old mixedwood	White spruce	Live	Platform (squirrel nest)
Spruce River 95	Mature deciduous	White birch	Live	Cavity (broken top)
Beaver Glen	Old mixedwood	Balsam poplar	Dead	Cavity (broken top)
Heart Lakes 94	Old mixedwood	Balsam poplar	Live	Cavity (broken limb)
Heart Lakes 96	Old mixedwood	Balsam poplar	Live	Cavity (broken limb)
Point View	Old mixedwood	Balsam poplar	Live	Cavity (broken limb)
Whelan Bay 94	Old mixedwood	Trembling aspen	Dead	Cavity (broken top)
Whelan Bay 95	Old mixedwood	Trembling aspen	Live	Platform (stick nest)
Whelan Bay 96	Old coniferous	Trembling aspen	Live	Platform (stick nest)
Whiteswan	Old mixedwood	Trembling aspen	Dead	Cavity (broken limb)
Birch Bay	Old mixedwood	Trembling aspen	Dead	Cavity (broken top)

Table 2b.—*Further characteristics of 15 Barred Owl (Strix varia) nests in the boreal forest of Saskatchewan, Canada.*

Owl	Nest tree height (m)	Nest height (m)	Nest tree d.b.h. (cm)	Distance to road (m)
Prospect 95	29.5	22.3	42.5	25
Prospect 96	27.4	15.9	35.6	200
Summit	14.7	12.2	74.5	1,000
Spruce River 94	16.7	14.3	59.0	50
Candle Lake	21.5	15.5	34.7	150
Spruce River 95	13.8	6.9	51.5	50
Beaver Glen	7.8	7.0	41.6	900
Heart Lakes 94	24.5	11.0	69.2	150
Heart Lakes 96	19.8	15.5	58.5	500
Point View	21.8	10.8	54.0	100
Whelan Bay 94	9.3	9.0	37.8	800
Whelan Bay 95	23.5	18.0	31.9	300
Whelan Bay 96	22.3	17.3	36.4	75
Whiteswan	19.3	14.0	48.1	2,000
Birch Bay	11.3	11.3	35.0	150
Mean (SD)	18.8 (6.2)	13.3 (4.1)	47.4 (12.8)	430.0 (525.7)

DISCUSSION

Barred Owl nests were predominantly found in old mixedwood forests. This is consistent with what has previously been recorded for this species (Bent 1938, Devereux and Mosher 1982, Johnsgard 1988). Nest sites along with prey availability are thought to be two primary features involved in raptor habitat selection (Newton 1979). The large body size (female $\bar{x}$ = 801 g) (Johnsgard 1988) of the Barred Owl demands a large tree cavity for nesting, hence a large tree. In the boreal forest of Alberta, old mixedwood forest was the only forest type found to contain both trees and snags of this size (Lee *et al.* 1995). This is likely true for our study area as well. Nest site requirements are considered the predominant factor involved in the Barred Owls' association with old forest (Devereux and Mosher 1982, Elderkin 1987, Johnsgard 1988). Elderkin (1987) found Barred Owls readily inhabiting young forest that contained nest boxes, and only located natural nests in mature forests. Mazur (1997) found Barred Owls in the boreal forest selecting old mixedwood forest for both roosting and hunting as well. The relationship between nest site availability and old forest has been established for other cavity nesting North American owls such as the Boreal Owl (*Aegolius funereus*) and the Spotted Owl (*Strix occidentalis*) (Forsman *et al.* 1984, Lane and Andersen 1995).

Although found nesting in stick nests, Barred Owls are considered to be mainly secondary tree cavity nesters (Bent 1938, Devereux and Mosher 1982, Johnsgard 1988). Two-thirds of the nests found in this study were in tree cavities, with one-third on platform type nests, suggesting some flexibility in their nesting requirements. The use of a platform nest may be a behavior imprinted on owls raised in stick nests, as suggested by Devereux and Mosher (1984). Suitable tree cavities may also be in short supply, limiting some owls to platform nests. Of the Barred Owls that used platform nests, one used a cavity (snag) 1 year and then used a stick nest the following 2 years, while another owl used a witch's broom 1 year and a squirrel nest the following year. In contrast, other owls used tree cavities exclusively.

Two Barred Owls reused nest sites over 2 years while three owls switched nests in consecutive years. Nest switching may have been a result of nest failure or predation the previous year.

However, reproductive success of the nests was not monitored in this study. Devereux and Mosher (1984), reported of four nests found in 1 year, none was reused the following year. Conversely, Elderkin (1987) reported high nest site tenacity. It often appears that more than one nest is available within a Barred Owl's territory. This would provide an alternate choice for nesting if the previous nest site had fallen down or had proved susceptible to predation. Sonerud (1989) found that Tengmalm's Owl suffered lower predation by pine martens (*Martes martes*) by switching nest sites. Nest switching may be adaptive for Barred Owls in the boreal forest which are susceptible to nest predation by American pine marten (*Martes americana*) and fisher (*M. pennanti*). Barred Owl nest sites are ephemeral by their nature. Many of the trees supporting cavity nests have some degree of rot, and stick nests eventually come apart. By having more than one nest site within a territory, Barred Owls ensure that nesting attempts can be made despite the disappearance of one nest site.

The distance Barred Owl nest sites were from roads was quite variable, with many nests quite close (25 m) to roads. As surveys for Barred Owls were conducted along roads, the distance nests were from roads may not be a true representation of the Barred Owl population in the study area. Within the boreal forest, the Barred Owl's relatively narrow use of habitat for nesting makes it susceptible to alteration or loss of this habitat.

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