



---

Increase in Distribution Records of Owl Species in Manitoba Based on a Volunteer Nocturnal Survey Using Boreal Owl (*Aegolius funereus*) and Great Gray Owl (*Strix nebulosa*) Playback

James R. Duncan and Patricia A. Duncan<sup>1</sup>

**Abstract.**—From 1991 through 1995, extensive owl surveys were conducted in late March and early April in Manitoba. Prior to these surveys, distribution records of owls covered only 16-71 per cent of their expected range in Manitoba. The degree to which the survey increased the documented range varied from no increase (6 of 12 species) up to an 88 per cent increase for the Northern Saw-whet Owl (*Aegolius acadicus*). The Boreal Owl (*Aegolius funereus*) and Great Gray Owl (*Strix nebulosa*) had the second and third largest increases respectively, a result possibly enhanced by using male territorial call playback for these species. New Northern Hawk Owl (*Surnia ulula*), Barred Owl (*Strix varia*) and Great Horned Owl (*Bubo virginianus*) occurrences were also obtained. This project was initiated under the auspices of the Manitoba Department of Natural Resources.

---

Nocturnal surveys (spontaneous calling or using playback recordings to elicit calls) have been used to determine the distribution and local status of several owl species (Smith 1987, Takats et al. 1997). Such surveys are also used to determine habitat associations (Kearns et al. 1997), population densities and fluctuations (Francis and Bradstreet 1997), and to aid in owl nest location (Frith et al. 1997). Although generally secretive, owls are extremely vocal during the early breeding season and can be located with relatively little effort using call playback. This technique is based on the territorial behavior of owls; song playback or vocal imitations within a territory will often produce a vocal or visual response by an owl attempting to defend its territory against the "intruder." Because most owls initiate reproduction in early spring, are nocturnal, and occur at low densities, standard breeding bird surveys fail to record long-term population changes for most owl species. Owl prey populations can fluctuate over a period of many years, possibly affecting owl response rates as well. Therefore, to obtain reliable data, surveys need to be conducted over longer periods (Saurola 1997).

In April 1991, under the auspices of the

Manitoba Department of Natural Resources, we organized a long-term and extensive owl survey of Manitoba. Our objectives were to:

1. Determine relative owl species distribution and abundance;
2. Determine owl species habitat associations;
3. Describe multi-annual fluctuations in the number of owls detected; and
4. Provide an organized opportunity for volunteers to contribute to our understanding of owl ecology.

This paper assesses the extent to which the survey provided new distribution records. While the primary objective was to survey for all endemic owl species, we initially placed an emphasis on the Boreal Owl (*Aegolius funereus*) and the Great Gray Owl (*Strix nebulosa*) in boreal forest regions. Consequently, only playback of those species were used. Since 1995, the survey has been expanded to include aspen parkland and grassland regions, and here, playback of Northern Saw-whet Owl (*Aegolius acadicus*) and Eastern Screech-owl (*Otus asio*) male territorial calls was used.

## METHODS

### Survey Technique

In 1991, skilled naturalists were recruited as volunteers. In subsequent years, new volunteers contacted us after they heard or read

---

<sup>1</sup> Box 253, Balmoral, MB R0C 0H0 CANADA  
email <jduncan@nr.gov.mb.ca>

about the survey. Volunteers were either assigned predetermined routes or were assisted in designing their routes. Route locations were not predetermined randomly or according to any systematic plan. Rather, new routes were generally promoted in areas not currently or previously surveyed. Volunteers were given a map delineating their route, instructions, and data sheets. A cassette tape was provided with recorded calls of 12 owl species (and frog calls) known to occur in Manitoba on one side, and a 20-second call of two target owl species on the other side. Because the survey involved playback, volunteers had to provide a portable tape recorder. The type and loudness of the cassette player was not standardized.

Surveys, conducted in late March or early April, started 30 minutes after sunset, and finished at least 30 minutes before sunrise. Survey stations were spaced at 0.8 km intervals. Any deviations in station spacings were recorded in the "Remarks" column on the data sheet for that station number, and an overall spacing of 0.8 km between stations was maintained. At each station, there was an initial listening period of 1 minute. All owls detected during this period were recorded. After the initial listening period, a pre-recorded 20-second male Boreal Owl call was played, and owls that were detected in the following 1-minute listening period were recorded. Next, a pre-recorded 20-second male Great Gray Owl call was broadcast, and owls that were detected in the following 1-minute listening period were recorded. The playback call was broadcast even if these species (or any others) had been detected in an earlier listening period. Surveyors recorded if the identification of a sound or owl call was uncertain; these records were not included in our analysis.

#### Owl Distribution Analysis

Manitoba is a large province, spanning 11 degrees north Latitude (49° to 60° N) and 13 degrees west Longitude (approximately between the meridians of 89° and 102°), with a land area of 65,000,000 ha (Teller 1984). For convenience, the province was divided into 104 rectangles corresponding to one degree Latitude-Longitude grid blocks (hereafter simply "degree blocks"). Survey routes were digitized on a Geographic Information System to determine in which degree block individual owls were detected during the survey. The expected distribution of each owl species was estimated

from range maps in Godfrey (1986). Documented owl occurrences in Manitoba were obtained from the Prairie Nest Record Scheme administered by the Manitoba Museum (190 Rupert St., Winnipeg, MB R3B 0N2) and from the Manitoba Avian Records database c/o the Manitoba Naturalists Society (401 - 63 Albert St., Winnipeg, MB R3B 1G4). The estimated range and documented occurrences were mapped and tallied by degree block separately.

#### RESULTS AND DISCUSSION

A total of 204 volunteers participated from 1991 to 1995 (Duncan and Duncan 1995). The number of routes, and hence the number of km surveyed increased annually, yet the total number of owls detected per km fluctuated considerably (table 1). Prey availability likely influenced the annual number of owls detected per km, at least for such species as the Great Horned Owl (*Bubo virginianus*) (Frank Doyle, unpubl. data in Holroyd and Takats 1997).

Some species (e.g., Great Horned Owl and Short-eared Owl, *Asio flammeus*) are thought to be widely distributed over most of Manitoba; others have a restricted range (table 2). Prior to our survey, the documented distribution of owl species (as estimated by degree block) ranged from 16 to 71 per cent of their expected range. The degree to which the survey increased a species' documented range varied from no increase (6 of 12 species) up to an 88 percent increase (table 2). However, five of the six species for which there was no increase may be less detectable by the survey methodology. The Boreal Owl and the Great Gray Owl were the focus of this survey effort. While the survey methodology was not designed to solicit responses from other owl species, all owl responses were recorded, regardless of species. Therefore, there are limitations in assessing non-target owl species' distributions with the methodology used.

A strategy to better assess the distributions of non-target owl species might include a combination of habitat analysis and additional focused survey efforts. Such efforts might include longer time periods spent at survey stations, as this has been found to be important for other owl species (Francis and Bradstreet 1997). Likewise, the breeding season for some owls is slightly later than those targeted in this study, and a survey strategy spanning a different timeframe (e.g., including May) may prove beneficial.



Table 1.—Summary data from a volunteer-based nocturnal owl survey in Manitoba.

Year	Total km surveyed	Total number of owls detected	Number owls/km
1991	618	222	0.36
1992	727	152	0.21
1993	807	244	0.30
1994	951	288	0.30
1995	1,532	309	0.20

Table 2.—Number of one-degree Latitude-Longitude grid blocks (db's) in which an owl species was expected to occur in Manitoba and percent increase in documented range due to nocturnal owl surveys (1991-1995).

Owl species <sup>1</sup>	Number of db expected <sup>2</sup>	Number of db documented <sup>3</sup>	Percent of expected db documented	Number of db's including survey data	Percent increase in number of db's documented
NSWO	35	8	23	15	88
BOOW	96	15	16	21	40
GGOW	95	21	22	25	19
NHOW	91	20	22	22	10
BARR	38	13	34	14	8
GHOW	101	31	31	33	6
ESCO	14	10	71	10	0
LEOW	66	19	29	19	0
SEOW	104	22	21	22	0
SNOW	7	18	NA <sup>4</sup>	18	0
BUOW	14	9	64	9	0
BARN	0	3	NA <sup>5</sup>	3	0

<sup>1</sup> NSWO = Northern Saw-whet Owl (*Aegolius acadicus*), BOOW = Boreal Owl (*Aegolius funereus*), GGOW = Great Gray Owl (*Strix nebulosa*), NHOW = Northern Hawk Owl (*Surnia ulula*), BARR = Barred Owl (*Strix varia*), GHOW = Great Horned Owl (*Bubo virginianus*), ESCO = Eastern Screech-owl (*Otus asio*), LEOW = Long-eared Owl (*Asio otus*), SEOW = Short-eared Owl (*Asio flammeus*), SNOW = Snowy Owl (*Nyctea scandiaca*), BUOW = Burrowing Owl (*Speotyto cunicularia*), and BARN = Barn Owl (*Tyto alba*).

<sup>2</sup> Based on Godfrey (1986).

<sup>3</sup> Data from the Prairie Nest Record Scheme, Manitoba Museum and Manitoba Avian Records, Manitoba Naturalists Society, Winnipeg, MB.

<sup>4</sup> The Snowy Owl breeds in extreme northern Manitoba, whereas the majority of documented occurrences are during winter in southern Manitoba.

<sup>5</sup> Manitoba is outside the normal breeding range of the Barn Owl.

Owl Species with no Increase in Documented Distribution

Although Manitoba is north of the usual breeding range of the Barred Owl (*Tyto alba*) (Godfrey 1986) there is one documented breeding record (the nest with eggs was unsuccessful) and other records are considered to be casual occurrences (Nero 1995). The Snowy Owl (*Nyctea scandiaca*) nests sporadically in extreme northern Manitoba (Godfrey 1986), an area that has yet to be included in this survey. Nonetheless, some late migrant Snowy Owls were observed in southern Manitoba during the survey period by survey volunteers.

The Burrowing Owl (*Speotyto cunicularia*), Long-eared Owl (*Asio otus*) and Short-eared Owl are migratory in Manitoba, although a few individuals of the latter two species occasionally overwinter in southern parts of the province (Godfrey 1986). The timing of the survey (late March to mid-April) may be less optimal for detecting these species, especially in years with thick snow cover and late snow melt. In addition, the Burrowing Owl was increasingly rare over the survey period in Manitoba (DeSmet 1997).

The Eastern Screech-owl occurs in southern Manitoba and is mainly restricted to riparian areas near adequate prey populations (Walley and Clyde 1996, table 2). A detailed examination of the survey data reveals new documented occurrences for this species (Duncan and Duncan, unpubl. data); these were masked by the coarse scale of the degree blocks used to estimate species' distributions in this analysis.

Owl Species with an Increase in Documented Distribution

The Boreal Owl and Great Gray Owl had relatively large increases in their documented range as a result of the survey (table 2). We speculate that this is due, in part, to the targeted use of playback of male territorial calls for these species during the surveys. Francis and Bradstreet (1997) documented an improved response rate for the Boreal Owl, and possibly for the Great Gray Owl, with playback in surveys in Ontario. Interestingly, the largest increase was for the Northern Saw-whet Owl, a species thought to be an aggressive competitor of the congeneric Boreal Owl (Lane 1988). This result may relate to the idea that some owls often respond more readily to the playback

calls of other owl species than to their own (Beck and Beck in Holroyd and Takats 1997). New occurrences of the Northern Hawk Owl (*Surnia ulula*), Barred Owl (*Strix varia*) and Great Horned Owl were also documented during the survey (table 2).

CONCLUSIONS

Volunteer-based nocturnal surveys can effectively document new occurrences of owl species. With a strategic plan to survey areas with little or no information on target species, information can be obtained to better determine a species' distribution, and hence conservation status, in a province or state. More importantly, from a conservation perspective, volunteer-based nocturnal owl surveys give participants an opportunity to explore a different world where senses other than sight play an important role. In addition to increasing data on owl distribution, a host of volunteers have gained a greater appreciation for owls and their habitats.

"The dancing apparitions ahead of us turned out to be nothing more than the car's lights, reflecting off puddles into the mist rising out of the weed-choked ditch. Laughing nervously, we attributed our sudden case of 'the chills' to the cold and damp night air. Still, I was eternally grateful for my partner's presence as we left the vehicle and stepped into the darkness ...." Anonymous Owl Surveyor, 1991.

ACKNOWLEDGMENTS

A survey of this magnitude would have been impossible without the interest and dedication of the 204 volunteers involved during the reported period. They are listed individually and duly acknowledged in annual reports, which are mailed out to them once the survey results are tallied. This survey has been supported financially or in-kind by the Manitoba Department of Natural Resources, the James L. Baillie Memorial Fund, the Saskatchewan Natural History Society Membership Initiatives Fund, the University of Manitoba Alumni Fund, and the Manitoba Conservation Data Center. Ken DeSmet identified new routes and volunteers in southwestern Manitoba in 1995 and circulated survey packages to them. Ken Donkersloot, Kurt Mazur, and Shanna Frith helped with copying survey tapes. Kelly Hamilton, Jeffrey Turner, and



François Blouin kindly digitized owl survey routes on a Geographic Information System. We are grateful to Herb Copland for his help in obtaining access to the Prairie Nest Record Scheme administered by the Manitoba Museum. Brian Knudsen assisted by preparing a list of owl records from the Manitoba Avian Records database c/o the Manitoba Naturalists' Society. Robert Nero, David Johnson, and Kurt Mazur constructively reviewed early drafts of the manuscript.

#### LITERATURE CITED

- DeSmet, K. 1997. Return rates and movements of Burrowing Owls in southwestern Manitoba. In: Duncan, J.R.; Johnson, D.H.; Nicholls, T.H., eds. *Biology and conservation of owls of the northern hemisphere: 2d International symposium; 1997 February 5-9; Winnipeg, MB. Gen. Tech. Rep. NC-190.* St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 122-130.
- Duncan, J.R.; Duncan, P.A. 1995. Manitoba's nocturnal owl survey: 1995 progress report. Balmoral, MB: Unpublished Report. 6 p.
- Duncan, J.R.; Kearns, A.E. 1997. Habitat Associated with Barred Owl (*Strix varia*) Locations in Southeastern Manitoba: A Review of Habitat Model. In: Duncan, J.R.; Johnson, D.H.; Nicholls, T.H., eds. *Biology and conservation of owls of the northern hemisphere: 2d International symposium; 1997 February 5-9; Winnipeg, MB. Gen. Tech. Rep. NC-190.* St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 138-147.
- Francis, C.M.; Bradstreet, M.S.W. 1997. Monitoring boreal forest owls in Ontario using tape playback surveys with volunteers. In: Duncan, J.R.; Johnson, D.H.; Nicholls, T.H., eds. *Biology and conservation of owls of the northern hemisphere: 2d International symposium; 1997 February 5-9; Winnipeg, MB. Gen. Tech. Rep. NC-190.* St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 175-184.
- Frith, S.D.; Mazur, K.M.; James, P.C. 1997. A method of locating Barred Owl nests. In: Duncan, J.R.; Johnson, D.H.; Nicholls, T.H., eds. *Biology and conservation of owls of the northern hemisphere: 2d International symposium; 1997 February 5-9; Winnipeg, MB. Gen. Tech. Rep. NC-190.* St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 545-547.
- Godfrey, W.E. 1986. *The birds of Canada.* (rev. ed.) Ottawa, ON: National Museums of Natural Sciences. 595 p.
- Holroyd, G.L.; Takats, D.L. 1997. Report on the nocturnal monitoring workshop. In: Duncan, J.R.; Johnson, D.H.; Nicholls, T.H., eds. *Biology and conservation of owls of the northern hemisphere: 2d International symposium; 1997 February 5-9; Winnipeg, MB. Gen. Tech. Rep. NC-190.* St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 610-612.
- Lane, B. 1988. 1988 Boreal Owl survey in Cook County. *Loon*. 60: 99-104.
- Nero, R.W. 1995. Barn Owl nesting in Manitoba. *Blue Jay*. 53: 159-166.
- Saurola, P.L. 1997. Finish owl populations 1982-96: results from the nation-wide monitoring program. In: Duncan, J.R.; Johnson, D.H.; Nicholls, T.H., eds. *Biology and conservation of owls of the northern hemisphere: 2d International symposium; 1997 February 5-9; Winnipeg, MB. Gen. Tech. Rep. NC-190.* St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 363-380.
- Smith, D.G. 1987. Owl census techniques. In: Nero, R.W.; Clark, R.J.; Knapton, R.J.; Hamre, R.H., eds. *Biology and conservation of northern forest owls: symposium proceedings; 1997 February 3-7; Winnipeg, MB. Gen. Tech. Rep. RM-142.* Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 304-309.

- Takats, D.L.; Holroyd, G.L. 1997. Broadcast surveys in the Foothills Model Forest. In: Duncan, J.R.; Johnson, D.H.; Nicholls, T.H., eds. *Biology and conservation of owls of the northern hemisphere: 2d International symposium; 1997 February 5-9*; Winnipeg, MB. Gen. Tech. Rep. NC-190. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 421-431.
- Teller, J.T. 1984. *Natural heritage of Manitoba: legacy of the ice age*. Winnipeg, MB: Manitoba Museum of Man and Nature, and Manitoba Nature Magazine. 208 p.
- Walley, W.J.; Clyde, C.F. 1996. Occurrence and breeding of the Eastern Screech-owl north of the Riding Mountains, Manitoba. *Blue Jay*. 54: 89-100.