RESULTS OF A PILOT STUDY MONITORING NORTHERN SAW-WHET OWL MIGRATION IN CENTRAL ALBERTA, CANADA

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ABSTRACT: We initiated monitoring of Northern Saw-whet Owl (*Aegolius acadicus*) migration by mist-netting at Beaverhill Lake Natural Area, Alberta, Canada, with a part-time effort in 1997, 2000, and 2001. On the basis of positive results in those years we expanded the study to nightly netting following a standardized protocol in fall 2002 and 2003. Those years yielded 145 and 151 owls captured, respectively. First-year owls represented 68.7% of captures, and females represented 73.8% of captures (two-year mean). Migration began on 18 August, peaked on 3 October, and ended 11 November. Ninety-five percent of the owls were captured between 9 September and 4 November. There were three recaptures within a year and no recaptures in subsequent years.

Migration counts have been used to monitor bird populations for many years. These counts have been observational, such as hawk watches (Fuller and Titus 1990, Hussell and Ralph 1998; http://www.bsc-eoc.org/download/Hussell-Ralph%20migmon.pdf), or based on capture, such as banding programs using various trapping techniques (Dunn and Hussell 1995). For many species passive mist-netting has become a standard way of gauging the relative abundance of birds moving through an area (Hagan et al. 1992, Dunn and Hussell 1995). More recently, mist nets and an audio lure have been used in combination to study the movements of various nocturnal owls (Erdman and Brinker 1997, Evans 1997, Whalen and Watts 1999).

The Northern Saw-whet Owl (*Aegolius acadicus*) is monitored extensively in the eastern United States and southeastern Canada during migration (Catling 1971, Holroyd and Woods 1975, Weir et al. 1980, Slack and Slack 1987, Cannings 1993, Brinker et al. 1997). Little monitoring, however, has been reported from the West or from regions north of 44° N—2000 km south of the northern limit of the species' range. Some pilot monitoring has been conducted on Vancouver Island, British Columbia (P. Levesque pers. comm.), in southern Alberta (D. Collister pers. comm.), and in north-central Oregon (Frye and Gerhardt 2003). To date, however, no data from standardized monitoring of Saw-whet Owl migration have been published from northwestern North America.

Even though Saw-whet Owls are known to occur in Alberta during the winter (Beck and Beck 1988, 1997), birds banded as nestlings in central Alberta have been recovered in Idaho, Wisconsin, North Dakota, Manitoba, and British Columbia (R. Cromie, H. Pletz pers. comm.). This suggests that Saw-whet Owls may migrate regularly through central Alberta in numbers large enough to warrant a long-term program.

Our objectives were to determine whether Saw-whet Owls migrate in fall past Beaverhill Lake, Alberta, and if so, of what age and sex classes the birds consist and on what schedule they move. Here we report results from three pilot years and two years of full-time standardized monitoring.

METHODS

Our study site was at the southeast corner of Beaverhill Lake (53° 32.7′ N, 113° 29.4′ W, elevation 672 m). This shallow lake is approximately 18 km long and 10 km wide, covers 13,900 ha, and is located in the aspen parkland ecoregion. Most of the north and west sides of the lake are surrounded by cropland and rangeland. The forest surrounding the east and south edges of the lake is dominated by Quaking Aspen (*Populus tremuloides*) and Balsam Poplar (*P. balsamifera*). Understory shrubs are predominantly willow (*Salix spp.*).

In 1997, 2000, and 2001, we set up two mist nets (12 m long, 2.6 m high, 38 mm mesh) for several nights, for variable numbers of hours. The main objective of this preliminary effort was to determine whether any Saw-whet Owls were moving through the Beaverhill Lake area. During the fall of 2002 and 2003 we used a full-time standardized protocol that incorporated recommendations by Dunn (1999). In this phase of the study we set up four mist nets (12 m long, 2.6 m high, 60 mm mesh) about 150 m from the banding laboratory. Two nets were set adjacent to each other to form an L-shaped array, and two nets were set 20 m and 40 m from the array. We opened the nets one hour after sunset and broadcast the Saw-whet's solicitation call (Cannings 1993) from a CD player next to the L-shaped net array. To assess the owl's migration schedule we started netting earlier (15 August) and finished later (15 November) than we expected the birds to be moving. Nets were opened for four hours each night from 15 August to 10 October and for six hours from 11 October to 15 November. Nets were not set when the temperature fell below –20°C, the wind was stronger than 3 on the Beaufort scale (19 km/hr), or during precipitation. We checked the nets every 30 min, and any captured owls were brought back to the lab for processing. Data recorded included age based on Pyle (1997), sex based on Brinker (www.projectowlnet.org/df.htm), weight, wing chord, tail length, and molt of primaries, secondaries, and rectrices.

Because the number of net-hours varied some evenings, we standardized daily totals into daily capture rates per net-hour by dividing the total number of birds caught by the number of net-hours.

We calculated the mean capture date and the 66% and 90% distributions of captures around the mean so that our results could be compared to those of Holroyd and Woods (1975). In addition, we calculated the distribution of 95% of captures centered on the mean to determine appropriate starting and ending dates for future monitoring at our site.

To calculate the mean capture date, we added daily capture totals to make a seasonal capture total. We then divided the seasonal capture total by 2. We added daily capture totals in chronological order until the sum was larger than half the seasonal total. The mean capture date was the date on which the midpoint capture total was reached.

We calculated the 66%, 90%, and 95% capture distributions, centered on the mean capture date, by multiplying the seasonal capture total by 0.17 and 0.83, 0.05 and 0.95, and 0.025 and 0.975, respectively. We then determined the dates marking the distributions by adding the daily capture totals chronologically until the two critical capture rates were reached for each interval.

RESULTS

Occurrence

Table 1 shows our effort and results for the 5 years of the study. In 2002, two owls were recaptured within the same season: a first-year female was banded on 17 September and recaptured on 30 September (13 days between captures), and another first-year female was banded on 15 October and recaptured on 26 October (11 days between captures). In 2003 one owl was recaptured within the same season: a first-year female banded on 19 October was recaptured on 21 October (2 days between captures). These encounters suggest that in addition to migrating through the study area, some individuals stop over.

Age and Sex Classes

First-year birds constituted the most common age class captured. During 2002 and 2003, these immatures accounted for 74.8% and 62.6% of the total captures, respectively. In 2002 we captured 3 males (2.1%), 108 females (75.5%), and 32 owls of unknown sex (22.4%). In 2003, we captured 11 males (7.5%), 106 females (72.1%), and 30 owls of unknown sex (20.4%).

Timing

During both 2002 and 2003 the mean capture date was in early October (Figure 1). The interval within which 95% of the owls were caught extended from mid-September to early November (Figure 1).

The distribution of captures around the mean capture date was skewed toward the early end of the season in both 2002 (1.4) and 2003 (1.6) (Figure 2). The distribution of capture rates was slightly (1.3) leptokurtic in 2002 and strongly so (4.3) in 2003 (Figure 2). The high value of kurtosis in 2003 might be explained by larger variation in weather during that year: more variation in weather is likely be related to more variation in daily capture rates.

Table 1 Numbers of Northern Saw-whet Owls Captured at the Beaverhill Lake Natural Area, Alberta, Autumn 1997–2003

Year	Nights	Net-Hours	Owls Captured	Owls/Net-Hr
1997	6	79.75	1	0.012
2000	13	182.75	12	0.066
2001	12	149.50	9	0.060
2002	74	1097.00	145	0.132
2003	64	903.00	151	0.167
Total	169	2412.00	322	—

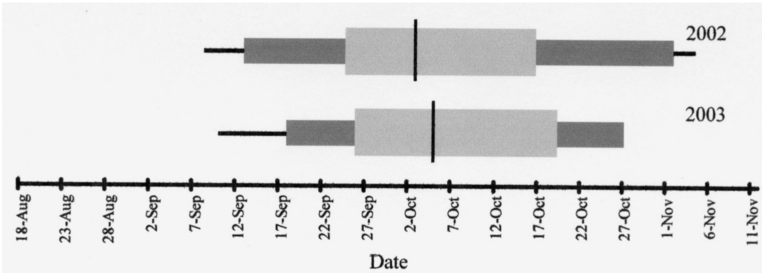

Figure 1. Temporal distribution of fall captures of Northern Saw-whet Owls at the Beaverhill Lake Natural Area, Alberta. The vertical line represents the mean, the light gray block 66% of the captures, the dark gray block 90% of the captures, and the horizontal black line 95% of the captures.

DISCUSSION

Our study demonstrates that Saw-whet Owls migrate through the Beaverhill Lake Natural Area in autumn. We found the widest interval encompassing 95% of captures in 2002: 9 September–4 November. We suggest that future monitoring at Beaverhill Lake focus on this period.

Our findings are consistent with those of Holroyd and Woods (1975), who reported that in fall peak rates of Saw-whet Owl capture are later at southern banding stations than at northern stations. Of the sites of monitoring reported by Holroyd and Woods (1975), Wisconsin is latitudinally closest to (44° 15.4′ N, 1011 km south) and Maryland is latitudinally farthest from (39° 4.3′ N, 1589 km south) our research site. The peak capture dates reported

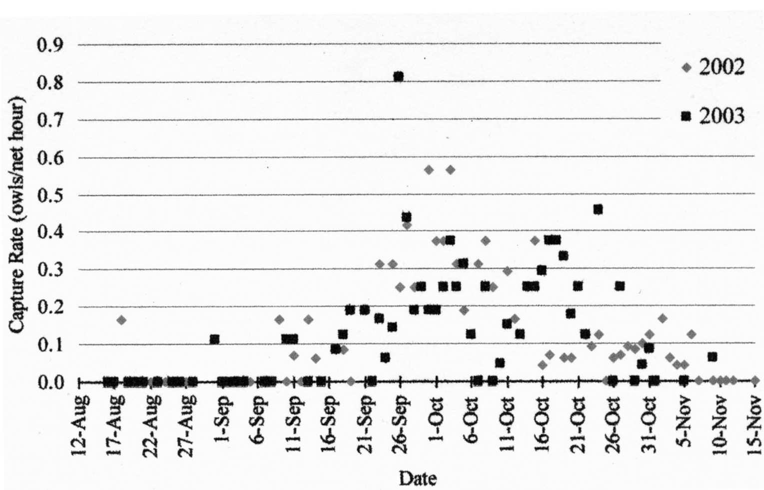

Figure 2. Daily capture rates of Northern Saw-whet Owls at the Beaverhill Lake Natural Area, Alberta, autumn 2002 and 2003.

for these two places were mid October and late October, respectively. The peak capture date at Beaverhill Lake of early October was earlier than any of the peak dates reported by Holroyd and Woods (1975).

Most of the Saw-whet Owls we caught were in their first year. This result was expected because of the species' high reproductive output (Cannings 1993). More work is needed on determining the age of Saw-whet Owls by molt pattern because some of the owls we caught had molted in patterns not described by Pyle (1997).

The great majority of the owls captured at Beaverhill Lake were female (at least 74%; 94% of those identified to sex, 2-year mean). This finding is consistent with the results of other projects monitoring Saw-whet Owl migration. Females represented the majority of total captures at Cape May, New Jersey (79%, 5-year mean), Assateague Island, Maryland (86%, 6-year mean), Casselman River, Maryland (92%, 5-year mean), and Cape Charles, Virginia (82%, 3-year mean) (Brinker et al. 1997). Duffy and Matheny (1997) reported that 71% (15-year mean) of the Saw-whet Owls caught at Cape May were female.

The high proportion of females caught at our station might be caused, in part, by the audio lure. Duffy and Matheny (1997) reported that using an audio lure increased the proportion of females caught over that yielded by passive mist netting. Duffy and Matheny (1997) found that the audio lure accounted for 23% of the discrepancy between the number of females and males caught. The discrepancy between the proportion of females and males caught at our site, however, was 73.4% in 2002 and 64.6% in 2003. The reason for this large discrepancy is unknown.

Only three of the owls we banded were recaptured within the same year, and none were recaptured in a subsequent year or recovered away from our site. Given the limited number of years of monitoring and the lack of other banding stations nearby focusing on the Saw-whet Owl, this result was expected. We anticipate our recapture and recovery rates to increase with more years of monitoring, as has been found elsewhere (Weir et al. 1980, Whalen and Watts 2002).

The study will have to be continued for multiple years before we can investigate any trend in abundance. The benefit of such analyses increases exponentially when similar data from other areas, throughout the range of the target species, are compared and pooled**.** Trends can suggest the target species' response to environmental manipulation (Rivera-Milan et al. 2003), information useful to ecosystem management (Dunn et al. 1997, Bennun 2000).

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