



**Distribution, Abundance, and Habitat Use of Territorial Male Boreal Owls  
(*Aegolius funereus*) in Northeast Minnesota**

William H. Lane, David E. Andersen, and Thomas H. Nicholls<sup>1</sup>

We conducted nocturnal auditory surveys from 1987-1992 to determine the distribution, abundance, and habitat use of Boreal Owls (*Aegolius funereus*) in northeast Minnesota. We concentrated our efforts in areas where documented nesting attempts by the owls had occurred, along roadways maintained for winter-time access by motor vehicles, and by traversing all habitat types found within the study area.

Survey efforts were generally initiated by 15 March each year and consisted of 3 min listening stations at 0.8 km intervals. Surveys were not conducted during moderate to heavy precipitation or in winds exceeding 23 km/ph. At each stop observers listened for the staccato song, the primary vocalization of the male Boreal Owl. When an owl was detected, a directional azimuth was recorded and the distance to the owl estimated qualitatively. Additional directional azimuths from subsequent listening stations were recorded to facilitate a more accurate placement of the owl's location.

Two owl abundance indices were derived from survey efforts, one based on all owl detections/total km surveyed (representing the encounter rate), and one based on the cumulative number of individual owls located along the length of each survey route (an index of density). Owl detections were placed into one of two categories: Unique (new) detections were assigned to owls the first time they were detected within a given landscape, whereas owls heard within 1.8 km of an initial detection point during subsequent surveys were considered the same owl (repeat) unless there was evidence of more than one owl within a given location (i.e., simultaneous vocalizations).

To determine the habitat used by Boreal Owls during courtship activities, owl locations (derived from on-the-ground foot searches) were assigned forest stand characteristics according to USDI Geological Survey 1:24,000 topographic maps, aerial photographs, and USDA Forest Service compartment folder analysis. To determine the habitat available to owls along the survey routes, we first established an effective range of detection for vocalizing owls (i.e., 92 percent of vocalizing owls were heard from within 2.0 km of a survey point) and subsequently constructed a scaled 4 km<sup>2</sup> grid as the sampling basis for habitat evaluation. Habitat used and habitat available were categorized according to habitat type, stand size density, and acreage. The proportion of each habitat type and density was then tabulated for "used" versus "random" locations. Chi-square and Bonferroni Confidence Interval tests were conducted to determine if a difference existed between observed habitat use and expected use according to habitat availability.

**RESULTS**

From 1987 to 1992, singing male owls were detected on 234 occasions during 4,998.2 km of surveys, representing an overall encounter rate of 0.047 detections/km surveyed. The lowest annual encounter rate was recorded in 1991 (0.030 owls/km surveyed), and the highest in 1989 (0.089 owls/km surveyed). When the abundance of individual owls/route length were calculated, the lowest indices occurred in 1987 (0.059 owls/linear km), and the highest occurred in 1989 (0.219 owls/linear km). Combined, the encounter rate and abundance index suggest a 3 year periodicity in owl numbers, with peaks recorded in 1989 and 1992, and lows in 1987 and 1990. Previously detected owls accounted for 63 (26.9 percent) of 234 detections, and were most prevalent during 1989 when 33 (37.5 percent) of eight Boreal Owls heard were categorized as previously detected. During 1988 and 1989, 90 (69.7 percent) of 129 Boreal Owls were located prior to 15 April. An analysis of singing activity suggested that encounter rates increased towards 15 April and gradually decreased thereafter.

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<sup>1</sup> 195 Main St., Freeport, ME 04032, (207)865-4516, MN Cooperative Fish and Wildlife Research Unit, 200 Hodson Hall, St. Paul, MN 55108, and North Central Forest Experiment Station, 1992 Folwell Ave., St. Paul, MN 55108, respectively.



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Owls were widely distributed throughout the study area, although differences in abundance were noted along portions of the survey routes. Specifically, sawtimber-sized stands (dominated by cavity-substrate trembling aspen (*Populus tremuloides*)) were used significantly more, and regenerative stands significantly less (both at  $P = 0.05$ ) than expected by the owls for courtship activities, based on availability within the landscape.

Our results indicate that Boreal Owls occur as a regular breeding species at low densities, and that they select older aspen-dominated habitats for their nesting activities in northeast Minnesota. Although Boreal Owls are prone to annual population fluctuations, possibly due to prey availability and winter conditions, the current 40 year rotation emphasis on timber harvests in aspen dominated, upland-mixed type forests could negatively impact population size and distribution of Boreal Owls across the landscape of northeast Minnesota.