The Boreal Owl: Ecology, Behaviour and Conservation of a Forest-dwelling Predator

By Erkki Korpimaki and Harri Hakkarainen. 2012. Cambridge University Press, 100 Brock Hill Road, West Nyack, NY, USA, 10994-2133. xiv + 359 pages, 96.95 CAD, Cloth.

The pre-eminence of Scandinavians and Finns in studying northern forest owls became evident in 1987 at the Symposium on the Biology and Conservation of Northern Forest Owls in Winnipeg. The strength of the present fact-filled book by Korpimaki and Hakkarainen 25 years later has set a new and even higher standard. The extensive bibliography includes 67 major publications by Korpimaki and 20 by Hakkarainen.

I was amazed at the numbers of Boreal Owls and nests monitored each year in the main study area near Kauhava in western Finland. At the latitude of 63° North, these owls depend on Field Voles *Microtus agrestis,* for food, an extreme example of "boom and bust" food availability. This vole follows a three-year cycle in numbers over large areas, at times a 1000-fold difference between highs and lows, whereas in southern Europe their fluctuations are only 10-fold. Other Boreal Owl prey items are Bank Voles, shrews and birds. Since 1982, 1224 female, 994 male, and 4158 fledgling Boreal Owls have been trapped and banded at 1135 occupied nests.

Nearly one-third (32%) of Boreal Owl nests were in natural cavities made by the Black Woodpecker; the remaining 68% were in 450 to 500 nest boxes monitored annually. Natural nests and man-made boxes were visited over 41,000 times, requiring 10,000 hours of field work. Over 20% of nest boxes 1 to 4 years old were occupied, compared to less than 10% for older boxes in place for 11 to 18 years. No less than 27,759 prey items were analyzed, including 12,554 from nests, 1560 in prey detritus layers in nests, and 819 in 117 roosting holes and nest-boxes in winter. The prey items were positively correlated with the number of owl fledglings.

In the 1950s and 1960s, the Boreal Owl was the most common bird of prey in the coniferous forests of Finland and Sweden. Sadly, with continuing destruction of old-growth forests and in spite of provision of thousands of nest boxes, its population has since decreased steadily by 2.1 to 2.3% per year. About 15% of the nest boxes placed in spruce forests but only 8% in pine forests were occupied by Boreal Owls. Radio-tracking of 24 Boreal Owls confirmed their preference for spruce-dominated forests and their avoidance of large open areas in spite of voles being more numerous there. Boreal Owl home range size varied from 73 to 499 ha and the nocturnal hunting range size was 94 to 226 ha.

At Kauhava, males were site-tenacious after their first breeding attempt, whereas adult females and juveniles were nomadic, traveling long distances when voles were scarce. There was a striking cyclical 21-fold difference in the number of fledglings that survived to the end of the season in the study area, varying from 3 (twice) in low vole years to 81 and 87 in high vole years. Vole populations meanwhile varied 45-fold. In poor vole years, light and long-tailed males were more economical fliers and efficient hunters than heavy males.

Most pairs are monogamous, but most pair bonds last for only one breeding season. Female owls, strictly fed by the males, stay in or near the nest-box and put on weight for 2 or 3 weeks prior to egg-laying. At Kauhava 24% of males were unmated bachelors that nevertheless possessed a home range and a nest-box, even in good vole years; 66% of males were monogamous and 10% polygynous in good vole years. One extremely productive male paired with at least nine females that laid 51 eggs, of which 46 hatched, 26 fledged but only 3 lived to breed. However, two other males raised 10 and 20 fledglings during their lifetime.

The start of egg-laying was earliest (mean laying date 13 March) in the decline phase of the vole cycle, and the latest (mean date of 2 May) in a low vole year. The yearly mean clutch size varied from 3.6 to 6.7, the latter in a good vole year. An average of 13.3% of eggs failed to hatch. The mean number of hatchlings varied from 2.5 to 5.8, with a mean of 4.95, but only 2.95 fledged, this final decrease largely due to starvation in low vole years.

Lifetime reproductive success (LRS) is the most important determinant of an individual's fitness, but can be studied only in males that remain in the study area. Females, on the other hand, show long breeding dispersal distances, often beyond study areas. Of 141 males whose lifetime production of young was recorded, mean lifespan was 3.5 years, with a maximum of 11 years in Finland and 13 years, twice, in Germany. At Kauhava, 25% of males first bred at 1 year, 51% at 2 years and 24% at or beyond 3 years. Most males bred only once, hence 50% of the fledglings produced were

fathered by 31 of the 141 males. In low vole years, only about one-tenth of males managed to breed and only 25% survived the winter, versus 75% in good vole winters. LRS was highest in old-growth forest, where there is better refuge against larger owl predators and greater availability of voles.

When a male had two females (polygyny), the first female raised 83% of her eggs to the fledgling stage, whereas the second female, on average 2827 m distant, laid eggs later, had less provisioning from the male, and raised only 49% of her eggs to fledglings. Polygynous males added to their reproductive success; when mated to three females they contributed to 9 fledglings, with two females, 6 fledglings, and when monogamous that year, 4 fledglings.

The authors test a number of hypotheses to good effect, adding to the scientific value and the reader's interest. For example, dispersal of Boreal Owls could be consistent with resource competition, predation risk, reproductive success, or food depletion, with evidence predominantly favouring the latter.

Finnish ringing data showed 83 males and 211 females were recaptured elsewhere after being ringed as nestlings. The median and maximum distances moved by males was 14 km and 409 km; for females, 62 km and 1099 km. The few published papers about breeding Boreal Owls in Alaska and the Rocky Mountains from Idaho and Montana south to Colorado are summarized.

I have only minor criticisms. I would have preferred totals at the bottom of appropriate columns and a map with lines to show the precise movement of each long-distance female dispersal. Precise definitions of "cyclicity index" and of H, used in the Kruskal-Wallis test, would have helped me.

This sumptuous book, written by the world's foremost Boreal Owl experts and chock full of interesting information barely skimmed in this review, is literally "worth its weight in gold." It should stimulate a few Canadians to undertake detailed breeding studies wherever populations are accessible, perhaps in Quebec. It is highly recommended for every University library and for every keen owl student throughout the world.

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