

## Brief reports • Tiedonantoja

### Fluctuations of vole-eating birds of prey in northern Finland

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*Received 13 October 1991, accepted 25 February 1992*

#### Introduction

In northern Fennoscandia voles fluctuate in abundance, having peaks about every 3–5 years. As a result, vole-eating avian predators also fluctuate in numbers, but their response varies, depending on the diversity of their diet (Lundberg 1979, Mikkola 1983, Ylimaunu et al. 1985, Korpimäki 1986). The Eagle Owl *Bubo bubo* and the Ural Owl *S. uralensis* have a diverse diet and they are resident. In years of low vole numbers, these species shift to alternative prey, such as birds. The Hawk Owl *Surnia ulula*, the Short-eared Owl *Asio flammeus* and the Great Grey Owl *Strix nebulosa* specialize on small mammals and are nomadic. The Tengmalm's Owl *Aegolius funereus* has a partially nomadic strategy in Fennoscandia: nomadism of females and residence of males (Korpimäki et al. 1987). Among diurnal birds of prey, the breeding population of the Rough-legged Buzzard *Buteo lagopus* also fluctuates in size according to the vole cycles.

In general, nomadic species have more northern distributions than resident ones. In northernmost Fennoscandia most owl species are nomadic. This is probably because the length of vole cycles increases towards the north; in

southern Finland the cycle length is 3 years, in northern Finland 4–5 years (Hanski et al. 1991). Therefore, a resident owl in the north may be able to nest only once or twice during its lifetime, while a nomadic strategy, searching for areas of abundant vole populations, would have the advantage of increasing lifetime reproduction. In general, the nomadic strategy should be favoured when cyclic but not random fluctuations occur in food abundance (Andersson 1980).

In this paper I report on the occurrence of the vole-eating Hawk Owl, Short-eared Owl, and Rough-legged Buzzard in northern Finland from one vole peak to another in the 1980s.

#### Study area, material and methods

I observed the occurrence of birds of prey in the Tankajoki-Mäkärärova area (68°10'N, 26°55'E, Fig. 1) in 1983–89. The size of the area was about 20 km<sup>2</sup>, two thirds consisting of thinned and young pine-dominated forests and one-third of open peatlands, flark fens. I checked the number of nesting birds of prey yearly in this area. I also recorded the observations of Hawk Owls and Short-eared Owls in an area of about

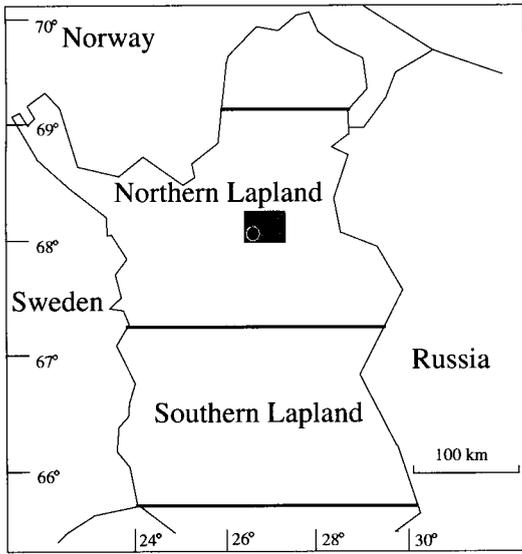


Fig. 1. Southern and northern parts of Finnish Lapland as separated in the study. The shaded square shows the larger study area (Vuotso) and the filled circle the Tankajoki-Mäkärärova area.

1000 km<sup>2</sup> near Vuotso each year in the period 1982–89 (Fig. 1, see, e.g., Virkkala 1991a). The Owl records were standardized by dividing the number of observations by the number of field days during 25 May – 30 June. The number of field days varied from 17 (1982, 1985) to 29 (1989). Only observations of separate birds or pairs were included.

I further compared the number of nestlings of the Hawk Owl and Rough-legged Buzzard ringed in Lapland in the different vole peaks of the 1980s. The northernmost part of Lapland was excluded from these comparisons (see Fig. 1), as an intensive study of birds of prey including large-scale ringing of nestlings was carried out there in the late 1980s.

In the 1980s peak years of voles occurred in different parts of Lapland in 1982–84 and 1987–89 (H. Henttonen, pers. comm.). In comparing the peaks between southern and northern Lapland I combined the ringing data for 1982–84 and 1987–89.

In order to study ringing efficiency, I compared the numbers of persons ringing the Hawk

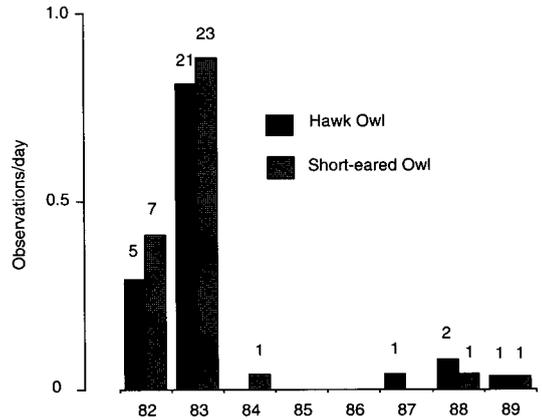


Fig. 2. Number of observations of Hawk Owls and Short-eared Owls near Vuotso in 1982–89 in the period 25 May – 30 June; the records were standardized by dividing the actual number of observations (above the histograms) by the number of field days.

Owl and the Rough-legged Buzzard, which were as follows:

	1982–84		1987–89	
	Owl	Buzzard	Owl	Buzzard
S Lapland	12	–	18	–
N Lapland	16	22	12	17

The number of ringers did not change greatly during the 1980s.

### Results

The Hawk Owl and the Short-eared Owl nested in the area of Tankajoki-Mäkärärova in the vole peak of 1982–1983, but were absent in the subsequent peak of 1987–88 (Table 1). The Hawk Owl and the Short-eared Owl were also abundant locally in the larger Vuotso area in 1982–83, but rare in 1987–88 (Fig. 2). I did not observe the third nomadic owl species of the north-boreal forests, the Great Grey Owl, in my study area.

The Rough-legged Buzzard occurred in the Tankajoki-Mäkärärova area during both vole peaks (Table 1) and some Buzzards were also present in the years of low vole populations. In the vole peaks of 1982–83 and 1987–88 similar numbers (213, 234) of nestlings of the Rough-

Table 1. The occurrence of birds of prey in the Tankajoki-Mäkärärova area (about 20 km<sup>2</sup>). The numbers of Rough-legged Buzzards and Hawk Owls represent pairs with nests, and those of Short-eared Owls pairs with singing males.

	83	84	85	86	87	88	89
Rough-legged Buzzard	5	1	—	1	5	5	2
Hawk Owl	6	—	—	—	—	—	—
Short-eared Owl	6	—	—	—	—	—	—

Table 2. Number of nestlings of the Rough-legged Buzzard ringed in northern Lapland in 1982–89.

	82	83	84	85	86	87	88	89
No. of nestlings	103	110	3	2	1	154	80	5

Table 3. Number of nestlings of the Hawk Owl ringed in the vole peaks of 1982–84 and 1987–89 in southern and northern Lapland.

	1982–84	1987–89
Southern Lapland	69	217
Northern Lapland	62	21

legged Buzzard were ringed in northern Lapland (Table 2). This suggests that on a larger, regional scale also there were no great differences in the numbers of Rough-legged Buzzards between the two consecutive vole peaks.

The numbers of nestlings of the Hawk Owl ringed in southern and northern Lapland in the vole peaks of the 1980s are presented in Table 3. In the peak of the early 1980s, Hawk Owls were ringed in equal numbers in different parts of Lapland, but in the late 1980s Hawk Owls seemed to be concentrated in southern Lapland, since during the 1987–89 vole peak 90% of the nestlings were ringed there.

**Discussion**

There were clear differences in the fluctuation patterns of the three species of vole-eating birds

of prey. All were numerous only in years of vole peaks. The Rough-legged Buzzard was equally abundant in the consecutive peaks. In the years of low vole populations, Rough-legged Buzzards may be present in the north, but do not necessarily nest. Rough-legged Buzzards are not as obligate vole specialists as Hawk Owls and Short-eared Owls (Korpimäki & Norrdahl 1989) as they can eat birds as well (Pasanen & Sulkava 1971).

The Hawk Owl and the Short-eared Owl do not occur in large numbers in every vole peak in a given area, although they presumably search the taiga belt for regions abundant in voles. The total numbers in Fennoscandia may, however, be about the same in the different peak years, while the owls can settle in different areas in different peak years. For instance, in 1989 the Hawk Owl was fairly common in central Finland (see Haapala et al. 1990). Thus, the occurrence of these nomadic owl predators in vole peak years seems to be highly sporadic.

The numbers of Hawk Owls and Short-eared Owls are probably affected by factors operating on a very large biogeographic scale in the taiga belt: in Fennoscandia and northern Russia. Their absence from a particular area in which their preferred food is abundant may be due to ecological events occurring far away from the area

studied. For instance, the seed-eating Two-barred Crossbill *Loxia leucoptera* was abundant in northern Finland in 1987 as a consequence of a good spruce seed crop, whereas the species was absent or very rare in the other years of the 1980s (Virkkala 1989, 1991b). Normally the Two-barred Crossbill breeds in larch forests in northern Russia and Siberia. Like the variation of the Two-barred Crossbill, the spatial and temporal variation in the density of the nomadic owls should be considered on a large continental, biogeographic scale (see Virkkala 1991b).

*Acknowledgements.* Valuable comments on an earlier draft of the manuscript were made by Ilkka Hanski, Heikki Henttonen, Erkki Korpimäki, Arne Lundberg and Hannu Pietiäinen. The ringing data were provided by Pertti Saurola.

## Selostus: Myyriä syövien petolintujen populaatioiden vuosittainen vaihtelu Lapissa

Piekanan, hiiripöllön ja suopöllön populaatioiden vaihtelua 1980-luvulla tutkittiin Sodankylän Vuotson ympäristössä sekä koko Lapissa rengastusten perusteella. Lapissa oli 1980-luvulla kaksi myyrähuippua. Hiiri- ja suopöllö olivat runsaita Vuotson ympäristössä myyrähuippuna vuosina 1982–83, mutta hyvin vähälukuisia 1987–88 myyrähuipun aikana. Rengastusaineiston perusteella hiiripöllöjä pesi 1980-luvun lopulla runsaasti Etelä-Lapissa. Sen sijaan piekanoita pesi molempina 1980-luvun myyrähuippuna sekä Vuotson ympäristössä että rengastusten perusteella koko Pohjois-Lapissa.

Nomadisten hiiri- ja suopöllön esiintyminen on hyvin sporadista: ne voivat olla hyvin runsaita tietyllä alueella myyrähuipun aikaan, mutta niitä

ei välttämättä tavata samalla alueella seuraavana myyrähuippuna.

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