

The Great Grey Owl *Strix nebulosa* — a bird of the northern taiga

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The article summarizes the new information on the occurrence and biology of the Great Grey Owl, providing a background to a selection of photographs taken in recent years in Finland. Since the middle of the 1960s, dozens of nests of the species have been found during peak breeding years. The present range is considerably more southern than before and during the 1930s. The Great Grey Owl is a nomadic bird and settles to breed in areas with peak vole populations, but some adults may stay in the same area during the intervening years as well, if the rodent crash is not complete.

Local concentrations are typical of the Great Grey Owl, and in extreme cases two nests have been found only 100—300 m apart. It occupies a wide variety of wooded habitats, but the nest is always situated near the forest edge. About 78 % of the pairs settle in old raptor nests or their artificial substitutes, 20 % nest on top of tree stumps and 2 % on the ground. The peak period of egg-laying is late April, the clutch consists of 3—6 eggs (average 4.3) and the incubation lasts c. 30 days. The young leave the nest at the age of 21—27 days, when still unfledged. The parents, particularly the female, are very aggressive at the nest.

The species preys almost exclusively on small mammals, mainly voles. The hunting technique is described. The irregular winter movements are mainly caused by food shortage. The birds usually remain within the breeding range, but at long intervals they perform large-scale invasions occurring in numbers on the south coast of Finland. The largest irruption ever recorded took place in winter 1980/81.

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Introduction

Few species belonging to the permanent breeding bird fauna of Fennoscandia have remained virtually unknown to the ornithologists for as long as the Great Grey Owl. Even the new comprehensive handbook of Finnish birds (v. Haartman et al. 1967) contained very scanty data on the nesting, behaviour, food and movements of the species; only 7 nest records were known from the period 1945—65. But since the middle of the 1960s, dozens of nests have been

found during peak breeding years in both Finland and Sweden, and much new information has been published on the biology of the species (Höglund & Lansgren 1968, Mikkola & Sulkaiva 1969, 1970, Wahlstedt 1969, 1974, 1976, Mikkola 1973, 1976, 1981, Lahti & Mikkola 1974, Helo 1975, Pulliainen & Loisa 1977, Stefansson 1979, Helo et al. 1980, Leinonen 1980, Huhta 1981).

The fantastic appearance of the Great Grey Owl has naturally also inspired bird-photographers. This issue of *Ornis Fennica* presents a

selection of the best black-and-white photographs of the species taken in recent years in Finland. They are selected partly on photographic and artistic grounds, partly on account of their biological information. The aim of the present article is to provide a background to the photographs by summarizing the new information on the occurrence and biology of the Great Grey Owl. It is based mainly on the papers listed above, but partly also on unpublished data collected by the authors. The numbers in the text refer to the plates.

Distribution, site tenacity and density

In the last century and up to the 1930s, the occurrence of the Great Grey Owl in Finland was mainly confined to Lapland (v. Haartman et al. 1967, Mikkola & Sulkava 1969, Mikkola 1973). After that the species seemed to be almost extinct in Finland for more than two decades. Since its reappearance in the middle of the 1960s, its range has been considerably more southern, the best breeding areas lying approximately between the 63rd and 67th parallels. A similar southward shift of the breeding range has taken place in Sweden, too (Wahlstedt 1974).

Among the owls of Northern Europe, there are both strictly sedentary and highly nomadic species. A good example of the former category is the Ural Owl *Strix uralensis*: the adult birds stay all their life within the same restricted area but may fail to nest when rodent prey is scarce. On the other hand, the Snowy Owl *Nyctea scandiaca* is extremely nomadic: like crossbills it leads a vagrant life, settling to breed only in areas with a plentiful food supply.

To which category does the Great Grey Owl belong? Traditionally, it has been considered a typically nomadic species, which suddenly appears in an area when small rodents are very abundant and disappears again after the crash of the rodent population. This opinion is supported by the old mass occurrences observed in Lapland during certain years, with very few intervening records, and by the occasional local concentrations in more southern areas in recent times. The latest good breeding years of the species in Finland have been 1966—67, 1970, 1973—74, 1977—78 and 1981, following the 3-to-4-year vole cycle. The opportunistic strategy of the Great Grey Owl is understandable, as the fluctuations of vole populations are very accentuated in the northern regions, and the owls could not usually survive the trough years of the vole cycle if they stayed within the same area. The search for areas rich in food may at times grow into large-scale movements. Thus, during the winter of 1964/65 large numbers of Great Grey Owls invaded Finland from the east and evidently moved back eastwards after the two good breeding seasons 1966—67 (Mikkola & Sulkava 1969).

On the other hand, some pairs of Great Grey Owls have been recorded on their territories during the intervening years as well, when they may perform some display or even attempt to nest (Mikkola 1973, Stefansson 1979). This may happen in years when the crash of voles is not complete. And when voles have been abundant over two successive summers, ringed birds have been found breeding within the same territories (Wahlstedt 1976). In contrast, no recoveries have been reported proving long-distance move-

ments to new breeding areas. Thus it seems likely that the Great Grey Owl does not belong to the extremely nomadic owl species and does not travel as long distances as the Snowy Owl, the Hawk Owl *Surnia ulula*, Tengmalm's Owl *Aegolius funereus* and Short-eared Owl *Asio flammeus* (see also p. 165).

During peak years Great Grey Owls may nest in considerable numbers in suitable areas. In Sweden, for instance, 32 nests were found in the eastern parts of Norrbotten in 1974 (Wahlstedt 1976), and in Finland 23 nests were reported from Kainuu in 1977 (Helo et al. 1980) and 19 from Kemi-Tornio in 1978 (Rauhala 1980). According to the number of nests found in Kainuu, this species was the second commonest owl in the area in 1977, clearly outnumbered only by Tengmalm's Owl. But since all the above areas extend over thousands of square kilometres, the average density of the Great Grey Owl remains low even in peak years. Nevertheless, the total population in Finland in these years can certainly be estimated at several hundreds of pairs.

Locally, however, dense concentrations may occur. In 1973, for example, 7 pairs were found in Norrbotten within an area about 3 km in diameter (Wahlstedt 1974). The shortest distances recorded between two simultaneously occupied nests were only 100 m (Höglund & Lansgren 1968), 200 m (Mikkola 1976) and 300 m (Mikkola 1973, P. Rauhala in litt.). Such local concentrations cannot be explained simply by the irregular distribution of suitable nest sites. Wahlstedt (1974) suggests that the concentrations are socially induced: the Great Grey Owls gather together during movements outside the breeding season and may settle to nest in groups

in spring. It is more probable, however, that the reason is an exceptional abundance of voles in certain places, which makes them easy to catch. This, rather than intraspecific sociability, may cause the dense concentrations of owls in winter and early spring, and since the species is not strictly territorial, the birds may remain to breed in the same area.

Fairly often, the species may breed close to (150–400 m) the nest of some other big birds of prey, like the Ural Owl, Goshawk *Accipiter gentilis*, Common Buzzard *Buteo buteo* or Osprey *Pandion haliaetus* (Mikkola 1973). The neighbouring species have not been noted to interfere seriously with each other.

Habitat and breeding biology

The Great Grey Owl occupies a wide variety of habitats, the decisive factors being the availability of a suitable nest site and good hunting grounds in the vicinity. It favours old mature forests, both coniferous and mixed stands, rarely even pure deciduous woods, and the nest is almost always situated near an open space, e.g. a field, clear-cut area or moor. Although nests have often been found in severely cleared forests, occasionally even in solitary trees left in the middle of clear-cut areas, the large-scale destruction of virgin forests by modern forestry must be considered a serious threat to the existence of the species (cf. Ahlén 1977, Stefansson 1979). On the other hand, clear-cut areas and abandoned fields are favoured hunting grounds of Great Grey Owls, so the rapid increase of such land in Finland may at least partly counterbalance the continuous contraction of mature forests. Moreover, construction of

TABLE 1. Distribution of nests of the Great Grey Owl by different sites in three areas of northern Finland.

| | Salla-Kemijärvi (Pulliainen & Loisa 1977, S. Saari) | Kemi-Tornio (P. Rauhala) | Kainuu (P. Helo) | Total N % |
|--|---|-----------------------------|---------------------|--------------|
| Raptor nest | 10 ¹ | 26 ² | 48 ³ | 84 72 |
| Artificial nest of branches ⁴ | — | 7 | — | 7 6 |
| Stump | 4 | 3 | 14 | 21 18 |
| Open box ⁵ | — | — | 2 | 2 2 |
| On ground | — | 1 | 2 | 3 3 |
| Total | 14 | 37 | 66 | 117 101 |

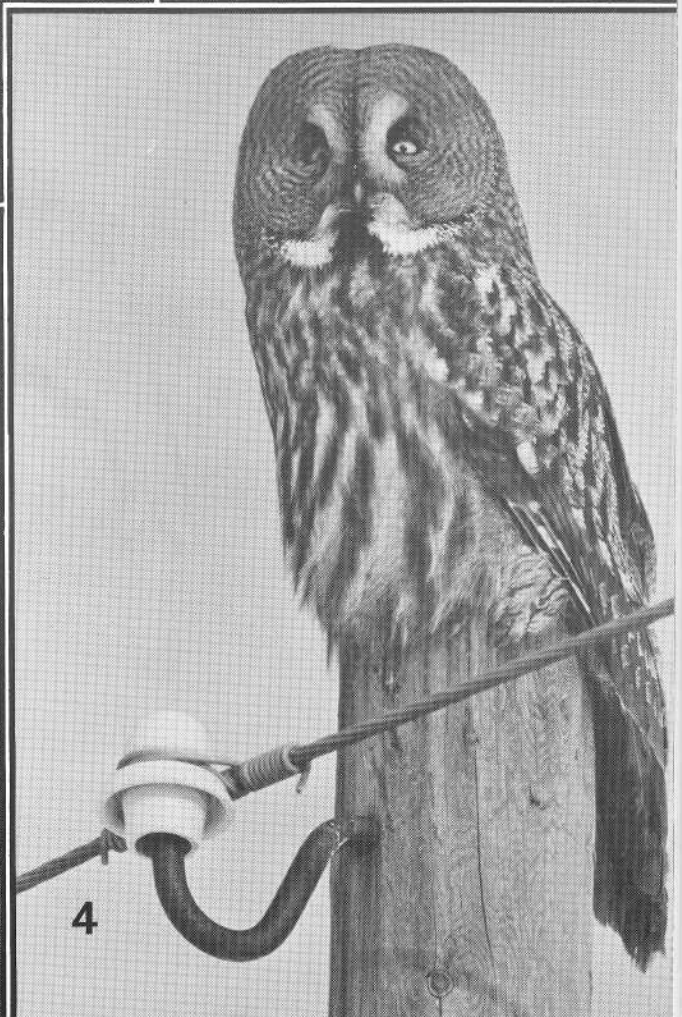
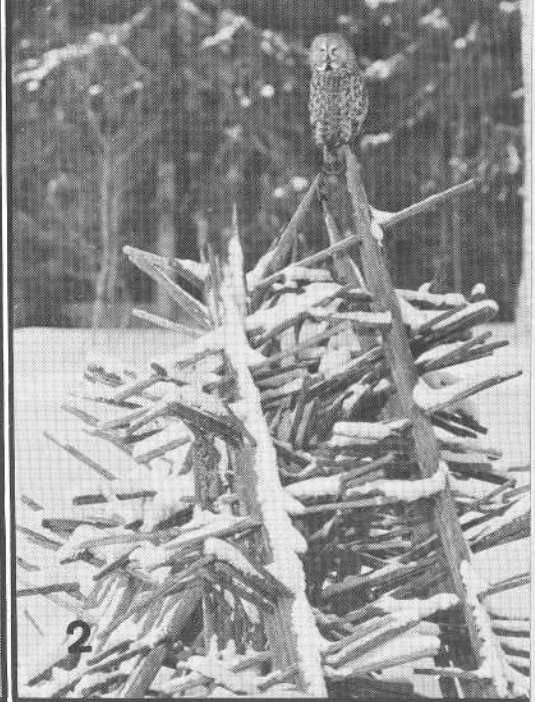
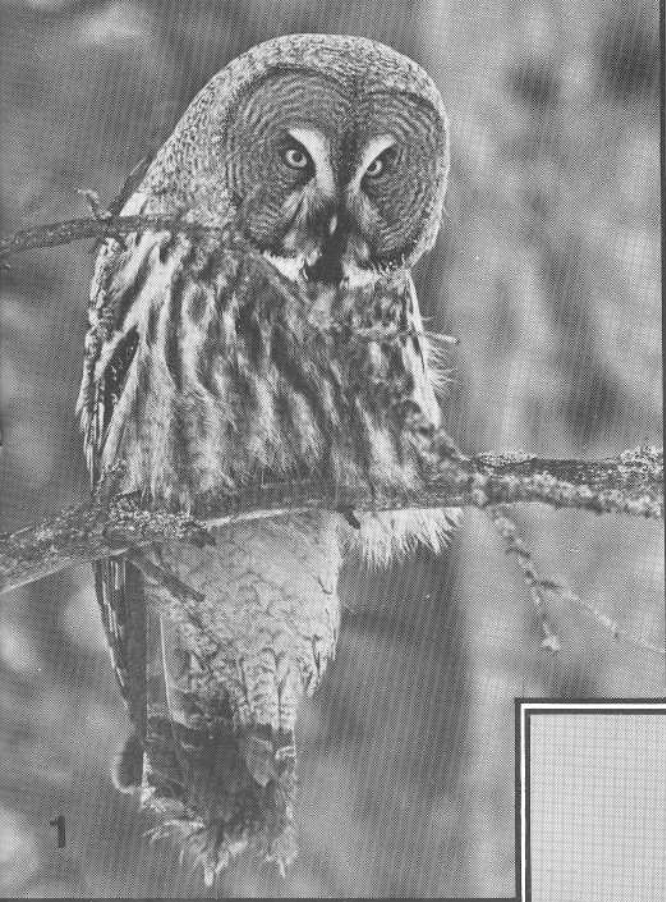
¹Including one nest of *Pica pica*²Including one nest of *Corvus corax*³Including one nest of *Corvus corone*⁴Constructed only in Kemi-Tornio⁵Tested only in Kainuu

artificial nests can do much to improve breeding opportunities in forests subjected to modern silviculture.

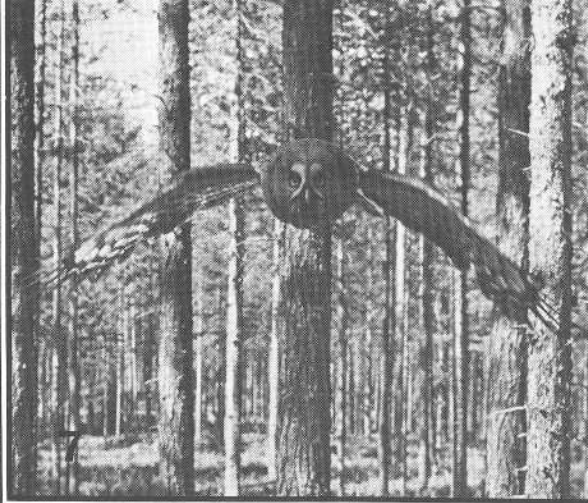
Most pairs of the Great Grey Owl occupy old raptor nests, generally those of the Goshawk and Common Buzzard (8). In both Finland and Sweden, several nestings have also been recorded in artificial nests made of branches and twigs in trees. In the surroundings of Kemi, for instance, 20 artificial nests were constructed in 1977 and five of them were occupied by Great Grey Owls the following year; one of them, built for the Osprey, was on top of a 16 m high pine (Rauhala 1980). Less frequently, the species nests on top of tree stumps (5–6). The stumps are usually thick and fairly low, between 1 and 4 m in height, but one nest in Sweden was situated on top of a birch stump that was 8–9 m high and only c. 25 cm thick (Wahlstedt 1974). An artificial substitute for this nest site type can be provided by nailing an open box, filled with sawdust, onto a tree whose crown has been cut off at a height of c. 2 m. In Kainuu, two pairs have nested in such boxes (P. Helo). The first nest on the ground was reported from Finland in 1966 (Mikkola 1969), and

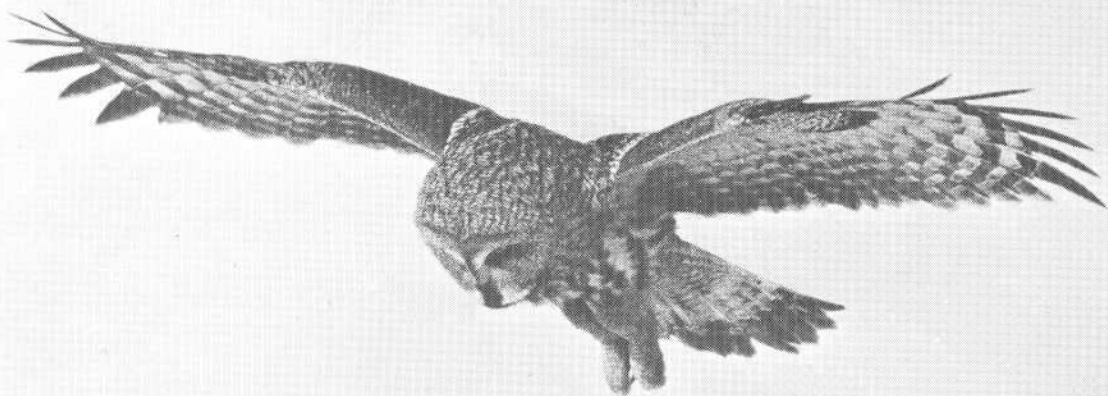
since then a few others have been found (9). They have had an exposed situation on even ground and consisted of a shallow scrape dug by the owl. This nesting habit probably occurs when food is plentiful but no suitable raptor nest or stump is available in the area. Table 1 shows the proportions of different nest sites in three areas in northern Finland.

The low and relatively weak display call of the male can be heard as early as January–February and more regularly in March–April. The earliest clutches known from Finland have been initiated in early April, and most pairs start egg-laying in the latter half of the month. Annual differences seem to be considerable, probably due to variation in the food supply. In Kainuu, for instance, the onset of egg-laying ranged in 1977 from 24 April to 10 May (average 1 May; $N=16$) and in 1978 from 6 to 28 April (average 18 April; $N=9$). In 1981, an exceptionally hard snow crust made hunting difficult for owls and most pairs started egg-laying as late as mid-May, after the snow had melted, some even later, in June–July (P. Helo). In one of the nests in Kainuu, the first four eggs

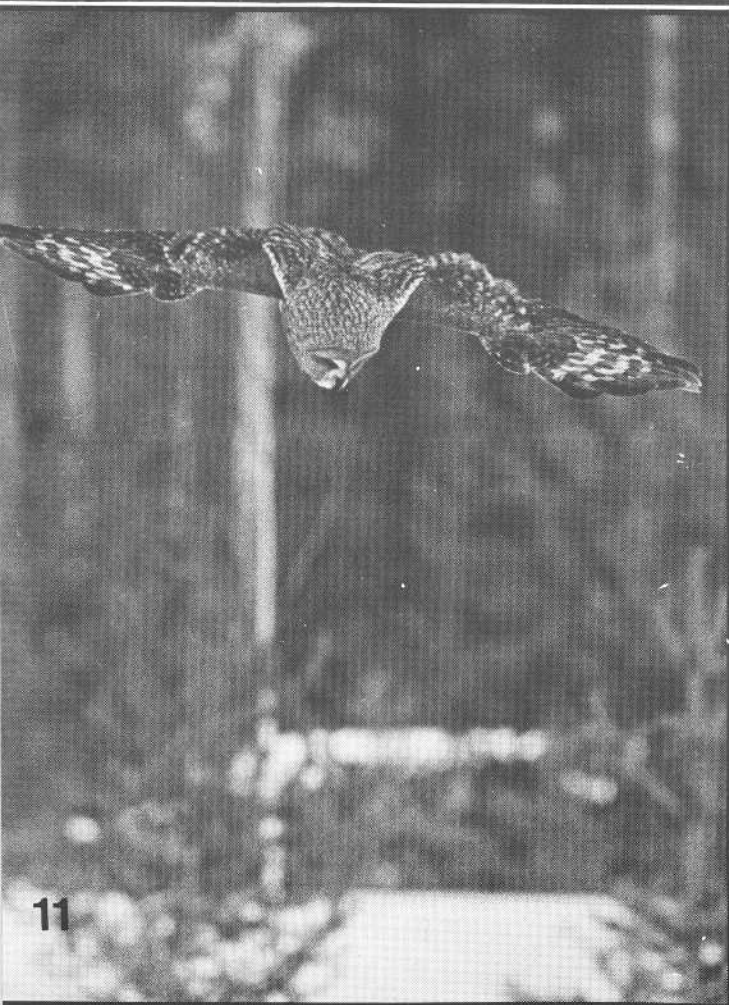








10



11



12



13

Plates 1—9 are photographed by Pekka Helo, 10—13 by Eero Kemilä.

Legends to the photographs

Plates 1—4. The hunting Great Grey Owl usually sits on the watch for prey on elevated, open perches.

Plate 5. Some Great Grey Owls nest on top of thick and low tree stumps. Suomussalmi 1977.

Plate 6. The same nest site as in plate 5, with the female sitting on the eggs.

Plate 7. When protecting its nest, the large bird is really dangerous.

Plate 8. Most pairs of the Great Grey Owl occupy raptor nests, generally those of the Goshawk and Common Buzzard. Vuolijoki 1974.

Plate 9. A few nests situated on the ground have been found in Finland. This bird had dug a shallow scrape in open pine barren. Ristijärvi 1977.

Plates 10—13. The hunting Great Grey Owl glides low over the ground on somewhat raised wings (10), soars above the located spot (11), plunges vertically on to the prey (12) and seizes it through the snow (13). Kajaani 1976.

Tämän kuvallitteen painatuksen on maksanut Kustannusosakeyhtiö Otava. Otava on vuosien varrella julkaissut monia lintukirjoja (esim. Suuri lintukirja, Retkeilijän lintuopas, Lintuharrastuskirja, Pohjolan linnut värikuvoin), ja parhaillaan ollaan kustantamossa tekemässä maamme lintukuvaajien parhaisiin otoksiin perustuvaa suurta kuvateosta Pohjoismaiden linnustosta.

were laid on four successive days, the fifth after an interval of 3 days. In this clutch the exact incubation period is known for one egg: 29.5—30 days (Helo et al. 1980).

The completed clutch usually consists of 3—5, not infrequently 6 and occasionally 2 or 7 eggs (Table 2). The annual differences in clutch size are much smaller than in the other nomadic owls (*Nyctea scandiaca*,

Surnia ulula, *Asio flammeus*, *Aegolius funereus*). The female incubates almost continuously, leaving the nest unattended for only short periods 1—5 times during the night. The male brings her prey, usually 3—4 times per day (Pulliainen & Loisa 1977).

During the first two weeks after hatching, the female still spends 99% of the time on the nest brooding and protecting the young (Pulliainen &

TABLE 2. Clutch size of the Great Grey Owl in Fennoscandia and different parts of Finland in this century.

| Area and period | No. of eggs | | | | | | | | Reference |
|----------------------|-------------|---|----|----|----|----|---|-------------|-------------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | \bar{x} N | |
| Fennoscandia 1905—64 | 1 | 2 | 16 | 14 | 18 | 13 | 2 | 4.38 66 | Höglund & Lansgren 1968 |
| Finland 1955—70 | — | 1 | 8 | 13 | 6 | 2 | — | 4.00 30 | Mikkola 1973 |
| Kemi-Tornio 1977—81 | — | — | 4 | 9 | 3 | 5 | — | 4.43 21 | P. Rauhala |
| Kainuu 1974—81 | — | 3 | 3 | 6 | 14 | 2 | — | 4.32 28 | P. Helo |
| Total | 1 | 6 | 31 | 42 | 41 | 22 | 2 | 4.31 145 | |

Loisa 1977). As is usual in owls, the young leave the nest long before they are fledged, at the age of 21—27 days (Helo et al. 1980). In peak rodent years the nesting success seems to be fairly good. Only a few of the nestings followed in different areas in Finland and Sweden have failed, and the mean number of young leaving the nest has varied annually between 2.7 and 3.9. The few nestings recorded between the rodent peaks have been much less successful. In Kainuu, for instance, four of the five nests found in 1980 were deserted and the fifth produced one fledgling (P. Helo).

The Great Grey Owl is notoriously aggressive at the nest. While sitting on the eggs, the female usually only utters threatening cries and growl and is very reluctant to leave the nest. But during the period when she is tending the young, especially its latter half, she furiously attacks people trying to climb up to the nest or approach the young sitting dispersed in the nearby trees (7). The large size of the bird makes these attacks really dangerous; at least one Finnish ornithologist has had his sight badly damaged and several others have been hurt. Sometimes both parents attack. All prudent ringers and bird-photographers protect themselves with various kinds of helmets and thick clothes when visiting the nest of the Great Grey Owl.

Food and hunting technique

All studies made on the food of the Great Grey Owl show consistently that it preys almost exclusively on small mammals, mainly voles, both in and outside the breeding season (Höglund & Lansgren 1968, Mikkola &

Sulkava 1970, Mikkola 1973, 1976, 1981, Pulliainen & Loisa 1977). Unlike the Ural Owl, it seems incapable of switching to larger prey when rodents are short. This can be fatal to the bird, as is shown by the numerous specimens found starving or dead in winters of poor food supply. During the last mass invasion in 1980/81, two individuals were observed eating fat put out for tits in Jyväskylä, central Finland (S. Ojala in litt.).

The hunting technique of the Great Grey Owl has been studied in most detail during winters when lack of food has forced the owls to leave the forests and come to settled areas, where abandoned fields, clearings and even courtyards are favourite haunts (e.g. Stefansson 1979, Leinonen 1980). A hunting Great Grey Owl sits on the watch for prey on an elevated, open perch, e.g. tree-top, telegraph post or the roof of a barn (1—4). It locates the voles without seeing them, by turning its head and listening to them squeaking and scratching in the snow. If the prey is near, the owl swoops down, gliding straight toward the sound, and seizes the prey through the snow. If the distance is longer, the bird makes 2—4 high wing-beats and then glides to the located spot on somewhat raised wings (10), soars above it to a height of c. 5 m (11), stops or hovers for a moment and then plunges vertically on to the prey, head first with wings half-closed and legs outstretched (12). The large bird may completely disappear in the snow (13), and often eats the prey on the spot, while still partly invisible. In Porvoo, on the south coast, a case was witnessed in which the owl plunged through a snow crust hard enough to bear a 80-kg man (T. Korkolainen, pers. comm.)! Dozens of deep holes in the snow can be seen in

an area frequented by a Great Grey Owl.

Often the owl cannot locate the vole hiding in the snow, possibly because the prey has stopped making a noise, in which case the reconnoitring glide above the suspected spot does not result in a plunge and the bird returns to its perch. Such hunting attempts usually last about 15 seconds. A third variant is a more continuous hunting flight, in which the bird patrols low over the ground in a manner resembling that used by Harriers *Circus sp.* and the Short-eared Owl. In winter, Great Grey Owls hunt in full daylight.

Movements and invasions

The irregular winter movements of Great Grey Owls have been known for long. As in most irruptive birds, they seem to be caused by the combined effect of overpopulation and food shortage. In peak rodent years the owls raise many young, and when the rodent population crashes most birds are faced with starvation unless they leave the area. Usually Great Grey Owls move only short distances, remaining within the breeding area. In this respect they differ from other nomadic owls. Thus, in winters 1974/75 and 1975/76, following the good breeding years, remarkable numbers of owls were seen in the eastern part of Norrbotten, not far from their previous nesting areas (Stefansson 1979).

At long intervals, however, the Great Grey Owl performs large-scale invasions, travelling far beyond the limits of its breeding range. In recent decades such irruptions have occurred in Finland in the winters of 1928—29, 1935/36, 1939/40, 1942/43, 1963/64,

1968/69 and 1980/81 (Mikkola 1981). The last irruption was the largest ever recorded and reached the south coast of Finland (see also Sammalisto 1981). Hundreds of birds were reported from different parts of Finland, most of them close to human habitations. In the district of Porvoo, for instance, about 50 km east of Helsinki, data on no less than c. 40 Great Grey Owls at 26 localities were collected, partly by the ornithologists themselves, partly by means of inquiries in newspapers and radio programmes (L. Härö, pers. comm.). Northeast of Kajaani, northern Finland, c. 70—80 birds were reported from an area of about 300 km² (P. Helo). Mass irruptions of this kind are likely to occur when there is a food shortage extending over large areas, mainly east of Finland.

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Selostus: Lapinpöllö, pohjoisen taigan lintu

Kirjoitus on tarkoitettu taustaksi kuvasarjalle lapinpöllön elämästä. Se esittelee tiiviissä muodossa lajin esiintymisestä ja elintavoista viime aikoina Suomessa ja Ruotsissa kertyneen tiedon. Numerot viittaavat valokuviin.

Nykyinen asuinalue on selvästi eteläisempi kuin levinneisyys viime vuosisadalla ja 1900-luvun alkupuolella. Lapinpöllö kuuluu opportunistisiin, pesimäalueitaan jyrksijäkantojen runsauden mukaan vaihtaviin lajeihin. Runsaista pesimävuosia sattuu Suomessa 3—4 vuoden välein. Jos myyräkannat eivät romahda täysin, osa vanhoista linnuista voi kuitenkin pysytellä samalla alueella välivuosiakin, ja kahtena peräkkäisenä hyvänä myyrävuonna on rengastettujen lintujen todettu pesivän samassa reviirissäkin. Lapinpöllön esiintymiselle ovat tyypillisiä paikalliset tihentymät, ääri-esimerkkeinä 7 paria 3 km:n läpimittaisella alueella ja kaksi samanaikaisesti asuttua pesää vain 100 m toisistaan.

Lapinpöllö pesii monenlaisessa metsämaas-

tossa, lähes aina kuitenkin lähellä aukion reunaa. Pääosa pareista asettuu vanhoihin petolintujen, etenkin kana- ja hiirihaukan pesiin (8), niiden korvikkeena myös rakennettuihin keinopesiin, harvemmin pesä on pötkelön päässä (5—6) ja poikkeuksellisesti maassa (9). Taulukko 1 esittää pesäpaikat kolmella alueella. Muninta alkaa tav. huhtikuun jälkipuoliskolla, munia on yleensä 3—6 (taul. 2), hautomisaika n. 30 vrk ja pesäpoikasaika 21—27 vrk. Emojen hyökkäykset pesällä ovat rajuja ja vaarallisia (7).

Lapinpöllön ravinto koostuu sekä kesäisin että talvisin lähes yksinomaan pikkunisäkkäistä, etenkin myyristä. Saalistustekniikkaa on tutkittu eniten talvisin. Lintu istuu avoimilla tähytyspaikoilla ja yrittää kuulonsa avulla paikallistaa lumen alla liikkuvia myyriä (1—4). Pyyntilennossa lintu liittää siivet vähän koholla (10), tekee kaarrokseen paikallistamansa kohdan yläpuolella (11), syöksyy pää edellä, siivet puolisuopassa ja kynnet ojossa alas (12) ja iskee saaliiseen hangen läpi (13).

Epäsäännölliset talvivaellukset aiheutunevat hyvät poikastuotoon ja myyräkantojen romahduksen yhteisvaikutuksesta. Yleensä pöllöt pysyvät pesimäalueensa sisäpuolella, mutta pitkin välein tapahtuu pitempiä joukkovaelluksia, jolloin lintuja nähdään yleisesti etelärannikolla asti. Tähän mennessä suurin todettu vaellus tapahtui talvikaudella 1980/81 (mm. Kajaanin lähistöllä 70—80 ja Porvoon seudulla n. 40 havaittua yks.). Joukkovaellukset lienevät lähtöisin pääosaksi itärajamme takaa ravintokadon ulottuessa laajoille alueille.

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