The food of birds of prey and owls in Fenno-Scandia

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THIS PAPER is a brief summary of the information that is available in the Scandinavian and Finnish ornithological literature on the food of the diurnal birds of prey and the owls. The diet of some species has been relatively well investigated, but that of others is little known and the picture is obscured by many not very objective discussions as to whether raptors are destructive to game.

Food summaries of this kind can be misleading for any of several reasons and these should be borne in mind. The tendency of individuals of some species to specialise on a few kinds of prey means that the food remains at just one or two nests may not be representative of the species as a whole. At the same time the climate, ecology and fauna vary considerably in different parts of Fenno-Scandia and this affects the availability of food. Cultivated areas and forests predominate in the south, while there are large regions of bare mountains in the west and north. In Finland and the northern half of Sweden there are vast tracts of coniferous forest and more than 150,000 lakes. To all this must be added the special conditions found in the archipelagos along the coasts of southern Finland, eastern Sweden and Norway. Finally, it must be remembered that many records of the food of raptors are based on food remains without any allowance for the fact that some prey species leave much more recognisable remains than others.

The food percentages given in this paper (mostly rounded to the nearest whole number and so not necessarily totalling exactly 100) are throughout by number and not by weight.

Golden Eagle (*Aquila chrysaëtos*)

Recent studies by Sulkava (1959b) in Finland and the Norwegian records published by Hagen (1952) give a picture of the diet of the Golden Eagle in Fenno-Scandia, though the question of the amount of carrion taken by this species has not yet been fully cleared up. There is evidence that in Lapland especially the Golden Eagle lives to a considerable extent on dead Reindeer (*Rangifer tarandus*) in winter, and on dead Reindeer calves in spring. Since wild Reindeer have been exterminated in Finland, Sweden and most of Norway, and since the

Wolf (*Canis lupus*) and the Wolverine (*Gulo gulo*) have been almost wiped out, the chances of finding dead animals is practically restricted to the area of Reindeer breeding. This may be the main reason why the Golden Eagle population seems now to maintain itself only in the far north and in the mountains.

Sulkava collected 99 fresh remains at 12 nests in Finland in 1958, all in the coniferous forest. The following are the percentages:

Capercaillie (*Tetrao urogallus*)	33%
Blue Hare (*Lepus timidus*)	23
Grouse (*Lyrurus, Lagopus*)	22
Crane (*Megalornis grus*)	3
Other birds	9
Other mammals	9

The smallest birds were thrushes (*Turdus*) and Cuckoos (*Cuculus canorus*), and the smallest mammals Red Squirrels (*Sciurus vulgaris*) and vole rats (*Arvicola*). The majority of the Capercaillie and Black Grouse (*Lyrurus tetrix*) were adult females. Even grey geese (*Anser*) and Whooper Swans (*Cygnus cygnus*) are on the food list in Finland.

Hagen's Norwegian analysis was based on food remains, pellets and intestinal contents. The percentages on the 137 prey items he lists are:

Blue Hare (*Lepus timidus*)	28%
Grouse (*Lagopus*)	26
Capercaillie (*Tetrao urogallus*), Black Grouse (*Lyrurus tetrix*)	12
Arctic Fox (*Alopex lagopus*)	4
Lamb/Kid (*Ovis/Capra*)	4
Fox (*Vulpes vulpes*)	3
Young Reindeer (*Rangifer tarandus*)	1
Carrion of these four mammals	9
Unidentified carrion	2
Other mammals	4
Other birds	4

The prey included two small rodents (*Arvicola, Lemmus*), a Cat (*Felis catus*) and a Lump-sucker (*Cyclopterus lumpus*).

Buzzard (*Buteo buteo*)

The diet of the subspecies *vulpinus*, a bird typical of coniferous forests, was investigated by Suomus (1952) in a small locality in Finland. In the four summers from 1949 to 1952 the total number of food animals he actually saw brought to the nest was 358, including the following:

Small mammals	54.0%
Frogs	20.6
Birds	13.5
Lizards, blindworms, snakes, etc.	5.5
Hare (*Lepus*), Squirrel (*Sciurus*)	0.5
Not identified	5.8

These percentages are misleading on their own, however, partly because they do not show the changing proportions from year to year which reflected fluctuations in the populations of the food animals, and partly because the remains in the nest were rather different from the prey he saw brought to it. The annual variation in the vole population during the four years could be indicated by the ratios 20:6:3:4, and the corresponding percentages of voles in the diet were 69, 37, 13, and 30. Of the food remains in the nests, 27% were grouse, though these birds formed only 5% of the food which he actually saw brought to the nest. Similarly, 9% of the food remains consisted of Jays (*Garrulus glandarius*), though he never saw a single Jay being carried. All the birds brought to the nests were young.

Rough-legged Buzzard (*Buteo lagopus*)

At least in the breeding area, this species feeds very largely on small rodents. Investigations in Sweden have shown that these animals form over 90% of the diet there, and in Norway about 85%. Hagen (1952) listed 2,114 items of vertebrate prey and these may be summarised:

Small rodents	85%
Other mammals	3
Grouse (*Lagopus*)	5
Small Passerines	2
Black Grouse (*Lyrurus tetrix*), Capercaillie (*Tetrao urogallus*)	1
Other and unidentified birds	3

The vertebrate prey included a few frogs and fish and there were also numbers of insects. The mammals were mainly Stoats (*Mustela erminea*), young hares (*Lepus*) and shrews (*Sorex*). The birds, which totalled about 11%, even included some waders, ducks, birds of prey and owls.

Sparrowhawk (*Accipiter nisus*)

The Sparrowhawk typically catches small Passerines up to the size of thrushes, but it also takes a few other birds as large as Magpie (*Pica pica*), Cuckoo (*Cuculus canorus*) and Woodcock (*Scolopax rusticola*). There are also a very few reports of its preying on young game-birds. Hagen (1952) listed 506 prey items which may be summarised as follows:

Small Passerines	79%
Unidentified small birds	12
Other birds	5
Small mammals	5

The following birds showed the highest numbers: Fieldfare (*Turdus pilaris*) 68 and other thrushes (*Turdus* sp.) 111, pipits (*Anthus*) 40,

Brambling/Chaffinch (*Fringilla montifringilla/coelebs*) 25, Reed Bunting (*Emberiza schoeniclus*) 19, Willow Warbler (*Phylloscopus trochilus*) 18, Redstart (*Phoenicurus phoenicurus*) 18 and Wheatear (*Oenanthe oenanthe*) 18. Only three young Capercaillie (*Tetrao urogallus*) or Black Grouse (*Lyrurus tetrix*) were found, and only one young *Lagopus*.

The damage done by Sparrowhawks to game is of little significance in Norway and most of Finland, but wintering individuals in the southernmost part of Finland, in southern Sweden and in Denmark may prey on game birds, especially Partridges (*Perdix perdix*), to some extent. However, this seems to be done only by a small proportion of females with specialised tastes. Incidentally, the statement by Nordberg (1935) that Sparrowhawks on migration catch more birds with some red on their plumage does not seem to me to be satisfactorily proved.

Goshawk (*Accipiter gentilis*)

Sulkava (1956) made a careful study of the diet of ten pairs of Goshawks in the breeding season in Finland, based partly on direct observations at the nest. The results seem to be representative of the food of this species in the coniferous forests of Fenno-Scandia. Other notable investigations were published by Holstein (1942) in Denmark and Hagen (1952) in Norway. It is evident that in different localities the Goshawk preys on widely different species, the main ones in some areas being "valuable". Capercaillie (*Tetrao urogallus*), Black Grouse (*Lyrurus tetrix*) and even Red Squirrels (*Sciurus vulgaris*) are much taken in the forests, Willow Grouse (*Lagopus lagopus*) and Ptarmigan (*L. mutus*) in moorland and mountains, and hares (*Lepus*) in all parts of Fenno-Scandia.

Sulkava's Finnish figures, based on 253 food items in the breeding season, were:

	1949-54 average	1955
Grouse (Tetraonidae)	74%	36%
Crows (Corvidae)	7	4
Red Squirrel (*Sciurus vulgaris*)	6	46
Ducks (Anatidae)	3	—
Partridge (*Perdix perdix*)	3	—
Other mammals	5	3
Other birds	2	11

The different proportions of grouse and squirrels in the two periods reflect changes in their availability.

Hagen's Norwegian data, based on 101 mammal and 306 bird items over the whole year, were:

Passerines (except crows)	19%
Hill grouse (*Lagopus*)	15
Forest grouse (*Tetrao, Lyrurus*)	12
Pheasant (*Phasianus colchicus*)	9
Crows (*Corvus, Pica, Garrulus*)	5
Waders (Charadriidae, Scolopacidae)	4
Chickens (*Gallus*)	3
Other birds	8
Small mammals	10
Red Squirrel (*Sciurus vulgaris*)	9
Hares (*Lepus*)	6

A considerable proportion of thrushes and grouse were young unable to fly and the former were probably taken from nests. The other birds included Pintail (*Anas acuta*), Kestrel (*Falco tinnunculus*), Tawny Owl (*Strix aluco*) and Tengmalm's Owl (*Aegolius funereus*).

Kite (*Milvus milvus*)

Hörstadius (1928) reported the following food remains in a Swedish nest: Green Woodpecker (*Picus viridis*) one, Cuckoo (*Cuculus canorus*) one, Magpie (*Pica pica*) one, Capercaillie (*Tetrao urogallus*) one, pigeons (*Columba*) two, and fish and small rodents. This species eats considerable amounts of insects, worms, dead fish and varying kinds of refuse. It also even takes prey from other raptorial birds.

Black Kite (*Milvus migrans*)

Lundberg (1955) found the following food remains in a Swedish nest: Mallard (*Anas platyrhynchos*) one, Tufted Duck (*Aythya fuligula*) one, Curlew (*Numenius arquata*) two, thrushes (*Turdus*) several, ?Black-throated Diver (*Gavia arctica*) one pull., and Red Squirrel (*Sciurus vulgaris*) one. V. Törnroos (*in litt.*) identified the remains of a hare (*Lepus*) in a nest in Finland, where this species also eats refuse and dead fish.

White-tailed Eagle (*Haliaëtus albicilla*)*

In Norway the White-tailed Eagle seems to prey chiefly on birds, but in the Baltic area, where there are shallow coasts and archipelagos, it turns to a great extent to fish, especially Pike (*Esox lucius*) and carp (Cyprinidae). No real investigations into the diet have yet been published, but many short notes are to be found in the ornithological literature. In Norway this eagle catches both adult and young sea-birds—Cormorants and Shags (*Phalacrocorax carbo* and *aristotelis*), Little Auks (*Plautus alle*), Razorbills (*Alca torda*), Guillemots (*Uria aalge*), Eiders (*Somateria mollissima*), Long-tailed Ducks (*Clangula*

*The forthcoming paper by J. F. Willgohs (see page 298) will deal with the food of the White-tailed Eagle in greater detail.—EDS.

hyemalis) and others (Hagen 1952)—and in some regions even hares (*Lepus*). In the Baltic archipelagos the bird prey includes Eiders, Velvet Scoters (*Melanitta fusca*), Red-breasted Mergansers (*Mergus serrator*), Goosanders (*M. merganser*) and other ducks, and even young of the larger gulls (*Larus*) in the colonies (Nordberg 1950).

In Finland, in the breeding season, it eats fish (both living and dead) approximately as often as birds (adults and young), but it hardly ever takes living mammals. Contrary to what has been claimed, there is no reliable proof of its preying on sheep (*Ovis*) in Finland, but it will eat dead sheep and seals (Phocidae) if it comes across these on islands or on the ice. During the winter the White-tailed Eagle parasitises the Herring (*Clupea harengus*) fisheries on the ice in south-west Finland. At ice-holes it also preys on concentrations of Long-tailed Ducks, Goldeneye (*Bucephala clangula*) and other diving ducks (*Mergus, Aythya*). In southern Scandinavia various ducks and other waterfowl, fish, carrion and hares are among its food in winter.

Honey Buzzard (*Pernis apivorus*)

As in other countries, the Honey Buzzard feeds mainly on bees, wasps and bumble bees, and on their nests and larvae. Holstein (1944) carried out careful observations at a nest in Denmark, and the food brought to the young over a period of 53 days was made up of the following: nests of wasps (Vespidae) 64 times, frogs (Ranidae) 20, indeterminable invertebrates 53, nests of bumble bees (*Bombus* sp.) 15, small birds two, worms two, lizards one.

Marsh Harrier (*Circus aeruginosus*)

There have been no real investigations of the food of this species in Fenno-Scandia. Small rodents, the young of several kinds of water-birds—for example, Black-headed Gulls (*Larus ridibundus*), Coots (*Fulica atra*) and ducks (*Anas*)—and also frogs (Ranidae), seem to form the main prey (Hortling 1929-31, Hildén and Linkola 1955).

Hen Harrier (*Circus cyaneus*)

The Norwegian prey items listed by Hagen (1952) included 333 (59%) mammals of seven species and 228 (40%) birds of about 30 species:

Small rodents	57%
Shrews (*Sorex*)	1
Young hares (*Lepus*)	1
Small Passerines	21
Young grouse (*Lagopus*)	7
Waders (Charadriidae, Scolopacidae)	4
Other and unidentified birds	8

The birds included a young harrier. Some insects and two lizards were also found.

Osprey (*Pandion haliaëtus*)

This species feeds almost exclusively on fish, especially Pike (*Esox lucius*) and carp (Cyprinidae). Many nests have been investigated in Finland and Sweden, and in all but one of them only remains of fish have been found. The exception was a nest I discovered with three downy young Velvet Scoters (*Melanitta fusca*) which the young Ospreys had refused to eat. Preying upon mating frogs in the early spring while the lakes are still covered with ice has been reported from Finland (Hildén and Linkola 1955).

Hobby (*Falco subbuteo*)

Curry-Lindahl (1945) watched a nest with young near Stockholm, Sweden, for a total of 30½ hours. During this time insects were brought by the adults on 95 occasions and birds on eight occasions; there were also four other visits when the food could not be determined. The most regularly observed feeding areas of this species are wide marshlands where dragonflies (Odonata) are caught.

Peregrine (*Falco peregrinus*)

Investigations into the food of the Peregrine have been made by Hagen (1952) in Norway and, quite recently, by Sulkava (1959a) in Finland. There is considerable variation in the results, partly as a result of regional differences in the open country avifauna, and partly because this species tends to prey on the commonest birds in its hunting area. There are many other scattered records of food remains found in Peregrine eyries and it is clear that, in spite of its tendency to take the commonest species, this falcon preys on very many kinds of birds and is not in any way dependent on any particular one.

Hagen's data from the mountains of Dovre and certain other fjelds were based on 124 bird items of at least 32 species and he also found a single juvenile Blue Hare (*Lepus timidus*). Sulkava's records were from various parts of Finland and included 483 bird items of about the same number of species as Hagen found. The percentages from both investigations are set out below, with the Finnish material divided into two columns, the first (Finland A) based on 159 fresh remains and the second (Finland B) on 324 remains from earlier years. The latter may have been biased in favour of bigger species because of the difficulty of finding and identifying the remains of small birds. It will be noticed that Hooded Crows, Starlings, thrushes and small waders are high on both Norwegian and Finnish lists:

	Norway	Finland A	Finland B
Surface-feeding ducks (*Anas*)	10%	9%	27%
Grouse (*Lagopus*)	10	—	—
Black Grouse (*Lyrurus tetrix*)	2	—	4
Lapwing (*Vanellus vanellus*)	2	13	12
Curlew (*Numenius arquata*)	1	—	8
Small waders (Charadriidae, Scolopacidae)	11	15	9
Gulls, terns (Laridae)	2	20	9
Pigeons (*Columba*)	3	—	14
Cuckoo (*Cuculus canorus*)	5	—	—
Short-eared Owl (*Asio flammeus*), Tengmalm's Owl (*Aegolius funereus*)	5	—	—
Woodpeckers (*Dendrocopos*)	—	4	—
Hooded Crow (*Corvus corone cornix*)	23	9	12
Magpie (*Pica pica*)	5	—	—
Thrushes (*Turdus*), Starling (*Sturnus vulgaris*)	12	30	6
Small Passerines	5	—	—

The Norwegian list also includes 6% other birds, from Swift (*Apus apus*) to Storm Petrel (*Hydrobates pelagicus*). According to Hagen, Peregrines have been seen preying on young Slavonian Grebes (*Podiceps auritus*) and Velvet Scoters (*Melanitta fusca*), and even adult Cranes (*Megalornis grus*) and grey geese (*Anser*) have been reported in their diet.

Sulkava also summarised the available records of other Finnish ornithologists and, on these and his own observations, concluded that small Passerines, waders and gulls and terns together make up over three-quarters of the prey of the Peregrine in Finland. His broad figures were: Passerines up to the size of thrushes 30.8%, waders 28.4% and gulls and terns 18.3%. The last figure may well be on the small side, for in the coastal regions gulls and terns seem to be the main food in the breeding season. In the archipelago of southern Finland I have seen Peregrines make their kills on 32 occasions and every time the victim has been one of these birds. The species involved have been Common Tern (*Sterna hirundo*) (18 times), Arctic Tern (*S. macrura*) (5), Lesser Black-backed Gull (*Larus fuscus*) (5), Common Gull (*L. canus*) (3) and Caspian Tern (*Hydroprogne caspia*) (1).

Gyr Falcon (*Falco rusticolus*)

Hagen (1952) summarised the prey found as remains or in pellets during three breeding seasons in the Dovre mountains. From his analysis it is evident that in Scandinavia the Gyr Falcon preys to a very considerable extent on Ptarmigan (*Lagopus mutus*) and Willow Grouse (*L. lagopus*), and this agrees well with earlier investigations in other parts of the Scandinavian mountains. In Hagen's material no less than 205 of 214 prey items, or about 96%, were of one of these two

species. Other birds occurred only seldom, but a few mammals and some beetles were also recognised in the food remains. The mammals included young Blue Hare (*Lepus timidus*), Lemming (*Lemmus lemmus*) and the vole *Microtus*. The fact that it specialises to such an enormous extent upon Ptarmigan and Willow Grouse enables the Gyr Falcon to stay in the Scandinavian mountains throughout the winter, something which no other raptor can do.

Curiously, in spite of the fact that grouse are its main food, the Gyr Falcon's population is higher in or shortly after the years in which the small rodents reach their peak numbers (see Hagen).

Merlin (*Falco columbarius*)

The Merlin preys on small birds of all kinds up to the size of thrushes (*Turdus*) and even Woodcock (*Scolopax rusticola*) and young grouse (*Lagopus, Lyrurus*) and Capercaillie (*Tetrao urogallus*). According to Hagen (1952) whose analysis for this species in Norway was based on 713 food items, young game-birds form 4.5% of the diet, other birds about 90%, small rodents about 5% and insects the remainder. The birds occurring most frequently in Hagen's material were pipits (*Anthus*) (which formed 27% of all vertebrates), other small birds of open country and also thrushes. Rodents were found only at times when these mammals were particularly abundant.

In Finland a wintering female Merlin preyed on a flock of twelve Partridges (*Perdix perdix*) until all had been killed, but this was quite extraordinary.

Kestrel (*Falco tinnunculus*)

The Kestrel is very much a specialist predator on small mammals. A few small birds are also taken, but these very seldom include any game birds. Hagen (1952) collected data on 254 food items in Norway and these may be summarised as follows:

Small mammals	90%
Lizards, snakes	6
Small Passerines (to size of *Turdus*)	4

Also included were a young Black Grouse (*Lyrurus tetrix*) and a single frog.

Eagle Owl (*Bubo bubo*)

The food of the Eagle Owl has been fairly thoroughly studied. Curry-Lindahl (1950a) reviewed his own and other Swedish investigations, and Hagen (1952) summarised the Norwegian material. In addition, some interesting local studies were carried out in Finland by Olsoni

(1933) and März (1936). The Swedish and Norwegian results may be summarised as follows:

Sweden	%	Norway	%
Brown Rat (*Rattus norvegicus*)	18	Brown Rat (*Rattus norvegicus*)	3
Other small rodents	18	Other small rodents	40
Hares (*Lepus*)	4	Hares (*Lepus*)	7
Red Squirrel (*Sciurus vulgaris*)	7	Red Squirrel (*Sciurus vulgaris*)	3
Hedgehog (*Erinaceus europaeus*)	8	Hedgehog (*Erinaceus europaeus*)	1
		Other mammals	2
[266 mammals = 55% of all food items; even Cat (*Felis catus*) and Stoat/Weasel (*Mustela*)]		[432 mammals = 55% of all food items; even Fox (*Vulpes vulpes*) and Stoat/Weasel (*Mustela*)]	
Hooded Crow (*Corvus corone cornix*)	9	Crows (*Corvus*)	1
Smaller Passerines	1	Smaller Passerines	3
Birds of prey (*Buteo* 4 specimens, *Accipiter gentilis* 3, *Accipiter* sp. 1, *Pandion haliaëtus* 1)	2	Birds of prey (*Falco tinnunculus*, *F. columbarius*, *Buteo lagopus*, *Accipiter nisus*)	1
Owls (*Asio otus* 3, *Aegolius funereus* 1)	1	Owls (*Asio flammeus*, *A. otus*, *Nyctea scandiaca*, *Surnia ulula*)	1
Ducks (*Anas*)	5	Ducks (*Anas*)	3
Waders (Charadriidae, Scolopacidae)	1	Waders (Charadriidae, Scolopacidae)	3
Hill grouse (*Lagopus*)	1	Hill grouse (*Lagopus*)	7
Other game birds (*Tetrao*, *Lyrurus*, *Tetrastes*, *Perdix*)	7	Other game birds (*Tetrao*, *Lyrurus*)	2
Other birds	6	Other birds	2
[159 birds = 33% of all food items; about 30 species]		[184 birds = 24% of all food items; about 30 species]	
Frogs or toads	1	Frogs or toads	20
Fishes	11	Fishes	1

From the above data and the Finnish material, it is clear that there is considerable variation in the food of this species. In general, most Eagle Owls appear to feed largely on rodents, especially on Brown Rats and Vole Rats (*Arvicola terrestris*), and in some areas also on squirrels and hares. According to Curry-Lindahl, Eagle Owls are regularly seen hunting Brown Rats around human settlements which may be several miles from the nearest nest. However, some take many more birds, particularly Hooded Crows. A pair studied by Olsoni in south-west Finland depended largely on Jackdaws (*Corvus monedula*) which were breeding in a church not far away from their nest. In the Finnish archipelago various gulls, waders and other shore birds are frequent among the food remains of Eagle Owls.

Snowy Owl (*Nyctea scandiaca*)

Hagen (1952) reviewed the diet of the Snowy Owl in the Norwegian fjelds on an analysis of food remains, pellets and stomachs of shot birds:

Small rodents	97.5%
Shrews (*Sorex*)	0.3
Stoat/Weasel (*Mustela*)	0.3
Young Blue Hare (*Lepus timidus*)	0.1
Unidentified small mammals	0.1
Grouse (*Lagopus*)	1.2
Other birds	0.4
Fish	0.1

The total number of mammal items found was 1,428, of about nine species. Small mammals thus formed 98.3% of the prey identified. Only one Blue Hare and one fish are included in the above percentages.

The Snowy Owl is one of the best examples of a bird whose numbers fluctuate very markedly in accordance with the density of small rodents, and its dependence upon rodents is clear from food analysis.

Hawk Owl (*Surnia ulula*)

The investigations made by Hagen (1952) show that, at least in the breeding season and for as long afterwards as these mammals are abundant, the Hawk Owl preys on practically nothing but small rodents. These include Lemmings (*Lemmus lemmus*) and various voles (*Microtus, Clethrionomys*). Of other animals, only a young owl (*Surnia ulula*?), four small Passerine birds and one Stoat or Weasel (*Mustela*) were found in the total of 524 items studied.

Pygmy Owl (*Glaucidium passerinum*)

Hagen (1952) analysed 418 food items from Norway. These were made up of 287 mammals (68.6%) and 131 small Passerine birds (31.4%). About 44% of the mammals were shrews (*Sorex*), while the three commonest birds were Goldcrest (*Regulus regulus*), Great Tit (*Parus major*) and Yellowhammer (*Emberiza citrinella*) which appeared 22, 17 and 14 times respectively in the remains examined.

Hildén and Linkola (1955) examined the contents of two food storage holes of the Pygmy Owl in Finland. The first held the remains of 45 shrews (*Sorex*), 13 Bank Voles (*Clethrionomys rufocanus*), two Field Voles (*Microtus agrestis*), two Goldcrests and one Willow Tit (*Parus atricapillus*). The second contained 34 small mammals and three small birds, so that the two combined included 94 small mammals and six small birds. This is a very small owl with a clear preference for very small prey!

Tawny Owl (*Strix aluco*)

Observations from Norway (Hagen 1952), from Sweden (Curry-Lindahl 1950b) and from Finland, the last partly my own, clearly show that small mammals, especially rodents, form 70-80% of the food of the Tawny Owl, and that this proportion remains constant throughout the year. Shrews (*Sorex*) make up 11-14% of the diet, birds generally 3-10% and frogs about 2%. The largest animals in the Norwegian list of 803 mammal and 84 bird items were Brown Rat (*Rattus norvegicus*), Vole Rat (*Arvicola terrestris*) and Red Squirrel (*Sciurus vulgaris*); and Magpie (*Pica pica*), Jay (*Garrulus glandarius*), Tengmalm's Owl (*Aegolius funereus*), Woodcock (*Scolopax rusticola*), Cuckoo (*Cuculus canorus*) and Feral Pigeon (*Columba livia*). Feral Pigeons were recorded more than any other bird, indicating that Tawny Owls collect a lot of their food in towns and villages.

In years when the numbers of small rodents are low, young Common Terns (*Sterna hirundo*) and Black-headed Gulls (*Larus ridibundus*) partly replace mammals in this owl's diet in the coastal regions and at some inland gulleries in southern Finland, also in Sweden (Curry-Lindahl *in litt.*). In such years I have even found shells of snails (*Lymnaea* sp.) and Cockles (*Cardium edule*) in the pellets of owls breeding in the archipelago. In general, however, when populations of small rodents are low, Tawny Owls shift first to shrews, as has been shown by Curry-Lindahl.

Great Grey Owl (*Strix nebulosa*)

Collett (1921) stated briefly that in the winter months only small mammals are found in the food remains of the Great Grey Owl in Norway. He specifically mentioned wood mice (*Apodemus*), field voles (*Microtus*) and bank voles (*Clethrionomys*), also some shrews (*Sorex*). There have been no modern investigations into the food of this species, but observations made by Lundberg (1955) at a nest with young agree well with Collett's conclusion.

Ural Owl (*Strix uralensis*)

The food of the Ural Owl has been studied only in Norway. Of 87 food items summarised by Hagen (1952), 76 were small mammals, mostly Bank Voles (*Clethrionomys rufocanus*). The remainder were two Black Grouse (*Lyrurus tetrix*), two Hazel Hens (*Tetrastes bonasia*), two thrushes (*Turdus*), one Weasel (*Mustela nivalis*), one indeterminable rodent and two indeterminable birds.

Long-eared Owl (*Asio otus*)

According to Hagen (1952), the Long-eared Owl takes up to 95% small rodents (the species varying in different areas) and a few small

birds, of which thrushes (*Turdus*) and Tengmalm's Owl (*Aegolius funereus*) were the largest recorded. Hagen's material consisted of 733 prey items, all from the breeding season as this species is only a summer visitor in Norway.

Short-eared Owl (*Asio flammeus*)

The Short-eared Owl is also only a summer visitor in Fenno-Scandia, and Hagen (1952) showed that in the breeding season in the Norwegian fjelds it too feeds almost entirely on small rodents. These formed about 95% of the 508 food items he analysed. In addition, there were 2% Passerines, but no game birds at all.

Tengmalm's Owl (*Aegolius funereus*)

The food remains listed by Hagen (1952) included 149 small rodents and 15 shrews (*Sorex*), and clearly showed that Tengmalm's Owl feeds almost exclusively on small mammals, though some small birds and even insects are occasionally taken. If there is a shortage of small mammals, however, this owl turns to catching small Passerines as a regular part of its diet (Hortling 1929-31).

A nest I studied in southern Finland contained only remains of small rodents.

SUMMARY

(1) A summary is given of the published information on the food of seventeen diurnal birds of prey and ten owls in Scandinavia and Finland. The species concerned, which are dealt with under individual headings, are Golden Eagle (*Aquila chrysaëtos*), Buzzard (*Buteo buteo*), Rough-legged Buzzard (*B. lagopus*), Sparrowhawk (*Accipiter nisus*), Goshawk (*A. gentilis*), Kite (*Milvus milvus*), Black Kite (*M. migrans*), White-tailed Eagle (*Haliaëtus albicilla*), Honey Buzzard (*Pernis apivorus*), Marsh Harrier (*Circus aeruginosus*), Hen Harrier (*C. cyaneus*), Osprey (*Pandion haliaëtus*), Hobby (*Falco subbuteo*), Peregrine (*F. peregrinus*), Gyr Falcon (*F. rusticolus*), Merlin (*F. columbarius*), Kestrel (*F. tinnunculus*), Eagle Owl (*Bubo bubo*), Snowy Owl (*Nyctea scandiaca*), Hawk Owl (*Surnia ulula*), Pygmy Owl (*Glaucidium passerinum*), Tawny Owl (*Strix aluco*), Great Grey Owl (*S. nebulosa*), Ural Owl (*S. uralensis*), Long-eared Owl (*Asio otus*), Short-eared Owl (*A. flammeus*) and Tengmalm's Owl (*Aegolius funereus*). Some of these birds have been much better investigated than others. The food percentages given (mostly rounded) are by number and not by weight.

(2) Summaries of this kind can be misleading unless the effects of individual specialisation and of differences in habitat and the availability of food are borne in mind. In addition, some prey species leave much more recognisable remains than others.

REFERENCES

COLLETT, R. (1921): *Norges Fugle.* Kristiania (Oslo). Vol. II. 610 pp.

CURRY-LINDAHL, K. (1945): "Några iakttagelser vid ett bo av lärkfalk, *Falco subbuteo* L.". (English summary). *Fauna och Flora,* 40: 193-206.

CURRY-LINDAHL, K. (1950a): "Berguvens, *Bubo bubo* (L.), förekomst i Sverige jämte något om dess biologi". (English summary). *Vår Fågelvärld,* 9: 113-165.
——— (1950b): "Ugglor". In *Svenska Djur* (Fåglarna). Stockholm. pp. 339-362.
HAGEN, Y. (1952): *Rovfuglene og Viltpleien.* Oslo. 603 pp.
HILDÉN, O., and LINKOLA, P. (1955): *Suuri Lintukirja.* Helsinki. 750 pp.
HOLSTEIN, V. (1942): *Duehogen (Biologiske Studier over Danske Rovfugle I).* (English summary). Copenhagen. 155 pp.
——— (1944): *Hvepsevaagen (Biologiske Studier over Danske Rovfugle II).* (English summary). Copenhagen. 199 pp.
HÖRSTADIUS, S. (1928): "Gladan". In *Naturens Liv.* Stockholm. Vol. II. pp. 842-849.
HORTLING, I. (1929-31): *Ornitologisk Handbok.* Helsinki. 800 pp.
LUNDBERG, S. (1955): "Brun glada (*Milvus migrans*) och lappuggla (*Strix nebulosa*) häckande i Norrbotten". (English summary). *Vår Fågelvärld,* 14: 224-230.
MARZ, R. (1936): "Der Uhu auf Åland". *Orn. Fenn.,* 13: 23-34.
NORDBERG, S. (1935): "Zur Ernährungsbiologie des Sperbers, *Accipiter n. nisus* (L.), während der Zugzeit". *Orn. Fenn.,* 12: 65-71.
——— (1950): "Researches on the bird fauna of the marine zone in the Åland archipelago". *Acta Zool. Fenn.,* 63. 62 pp.
OLSONI, B. (1933): "Något om berguvens, *Bubo bubo* (L.), föda". *Orn. Fenn.,* 10: 33-35.
SULKAVA, S. (1956): "Kanahaukan pesimisaikaisesta ravinnosta". *Suomen Riista,* 10: 49-62.
——— (1959a): "Muuttohaukan ravinnosta". *Suomen Riista,* 13: 33-39.
——— (1959b): "Kotkan ravinnosta poronhoitoalueen eteläpuolella". *Suomen Riista,* 13: 69-72.
SUOMUS, H. (1952): "Näringsundersökningar över ormvråken". *Papers on Game Research,* 8: 121-127.