

Choice of prey by a pair of Gyrfalcons *Falco rusticolus* during the nesting period in Forest-Lapland¹

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Food-remains and pellets collected at the eyrie of a pair with four young of Gyrfalcons in northeastern Finnish Lapland (Forest-Lapland) were studied. A total of 68 animals corresponding to about 41 kg (fresh weight) of prey was identified. Adult Willow Grouse (*Lagopus lagopus*) comprised two thirds of the diet according to both the number of prey animals and their fresh weight. The remaining third consisted of ten *Numenius phaeopus*, two *Lepus timidus*, two *Anas crecca*, two female *Tetrao urogallus*, two *Tringa glareola*-sized waders, two *Turdus musicus*, one female *Lyrurus tetrrix*, one *Surnia ulula* and one *Turdus pilaris*.

Introduction

CADE (1960) divided Gyrfalcons (*Falco rusticolus*) into two distinct groups, namely coastal and insular breeding populations which basically feed on aquatic birds, and interior populations, most of which are predominantly ptarmigan (*Lagopus* spp.) feeders, even in the summer. According to DEMENTIEV & GORTCHAKOVSKAYA (1945), HAGEN (1952 a, b), HAFTORN (1971), and MIKKOLA & SULKAVA (1972) the Gyrfalcons of Fennoscandia belong to the latter group. Besides the Willow Grouse (*Lagopus lagopus*) and the Rock Ptarmigan (*L. mutus*) other tetraonids, waders, waterfowl, hares, lemmings and other small rodents, among others, may be included in the diet of Gyrfalcons in this area.

The Gyrfalcon is a very rare species in Finland. In the 1960's, it was known to breed only in northernmost Lapland (SUOMINEN 1967). In 1973, however, an eyrie of the species was found in Forest-Lapland (PULLIAINEN et al. 1973) in an area where practically no Rock Ptarmigans or Norwegian Lemmings (*Lemmus lemmus*), for instance,

were available. It appeared justified, therefore, to publish observations made on the choice of prey of this Gyrfalcon pair.

Study area and potential quarries

The present eyrie of the Gyrfalcon was situated in the subalpine zone (420 m above sea level) at a distance of 300 m from the alpine zone (limit 460 m above sea level) in NE Finnish Lapland (67°43'N, 29°45'E) (for further details, see PULLIAINEN et al. 1973). Besides the alpine and subalpine zones of three fells (Sautunturi, Pulkkatunturi and Värriötunturi), there are typical taiga forests, bogs and a large burned area (Tuntsa) in the surroundings of the eyrie.

The Willow Grouse is the most abundant tetraonid species in the surroundings of the eyrie. The density of the local Capercaillie (*Tetrao urogallus*) population is generally much lower than that of the former species. The densities of the Black Grouse (*Lyrurus tetrrix*) and Hazel Grouse (*Tetrastes bonasia*) populations are generally low. Teals (*Anas crecca*) and

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Goldeneyes (*Bucephala clangula*) are found in rivers and ponds in the summer. In 1973, Golden Plovers (*Charadrius apricarius*), Dotterels (*Ch. morinellus*) and Whimbrels (*Numenius phaeopus*) arrived from their spring migration in the middle of May. *Tringa* spp., several owls and passerines belong to the local avifauna, too.

Microtus agrestis, *Clethrionomys glareolus*, *Cl. rufocanus* and *C. rutilus* are the most important species among the local small rodent fauna. In the spring and early summer of 1973, their populations were rather small. The same concerned the local Arctic Hare (*Lepus timidus*) population, whereas the Red Squirrel (*Sciurus vulgaris*) population was on the increase.

Material and methods

It is difficult to get a wholly reliable picture of the composition of the food of the Gyrfalcon. MIKKOLA & SULKAVA (1972) emphasized that both food remains and pellet analyses are necessary. HAFTORN (1971, p. 159) stated that small-sized prey animals are usually underestimated in a food remains analysis while WAYRE & JOLLY (1958) observed that Gyrfalcons often carry remains of prey away from their nests. CADE (1960) found numerous remains of prey at the end of the nestling pe-

riod, when both parents were active in bringing prey to the eyries. Direct observations (with the help of a field-TV system, for instance, see PULLIAINEN 1971) at an eyrie in connection with food remains and pellet analyses were thus helpful. In the present case this kind of direct observation was, however, impossible. Food remains and pellets were collected at the eyrie on June 19, July 2 and 14. Special attention was paid to wings, feet and sterna, when analysing remains.

Results and discussion

Table 1 shows the results of the food-remains analyses. The remains of a total of 68 prey animals were identified. The total fresh weight of these animals is likely to have been about 41 kg. CADE (1960) estimated that a pair of adult Gyrfalcons and their young (number unknown) require about 200 adult ptarmigan during a period of about 120 days (from May to August), i.e. on average 1.7 ptarmigan (about 900 g) a day. BENGTON (1971) reported that the total fresh weight of prey consumed by a pair which raised four young was about 88 kg (about 1250 g/day). He found the remains of 50, 66, 67, 80, 90, 96 and 107 prey animals/eyrie/year in Iceland while HAGEN (1952 a) found evidence of 12, 86

TABLE 1. Food remains collected at a Gyrfalcon eyrie in northeastern Finnish (forest) Lapland.

Species	Weight (g)/ one ind.	Number	Per cent by weight	Per cent by number
<i>Lepus timidus</i>	2000	2	9.8	2.9
<i>Anas crecca</i>	300	2	1.5	2.9
<i>Lagopus lagopus</i>	600	45	66.3	66.2
<i>Lyrurus tetrix</i> (♀)	1000	1	2.4	1.5
<i>Tetrao urogallus</i> (♀)	2000	2	9.8	2.9
<i>Numenius phaeopus</i>	350	10	8.6	14.7
<i>Tringa glareola</i> -sized waders	60	2	0.3	2.9
<i>Surnia ulula</i>	320	1	0.8	1.5
<i>Turdus pilaris</i>	100	1	0.2	1.5
<i>Turdus musicus</i>	60	2	0.3	2.9
Total		68	100.0	100.0

and 116 prey animals/eyrie/year in Norway. In all these cases small rodents played practically no part in the spring and summer food of Gyrfalcons. Compared with these Icelandic and Norwegian results it seems to be evident that at least during the first half of the nesting period the present Gyrfalcon pair had also fed outside its eyrie and/or carried food remains away from it. During the last 13 days of the fledgling period, however, the food remains found at the eyrie (24 animals) represented about 1300 g of prey/day.

Two Arctic Hares were the only mammals found among the food remains. Arctic Hares also occur in the diet of Gyrfalcons in northernmost Lapland (MIKKOLA & SULKAVA 1972). The Gyrfalcons of that area also feed on small rodents (MIKKOLA & SULKAVA 1972), whereas there was no evidence that these animals were consumed by the present Gyrfalcon pair. In the latter case, however, very few small rodents were available.

Birds clearly dominated among the food remains and probably also the food of the present Gyrfalcon pair. The two pellets studied also contained remains (feathers) of birds, especially those of the Willow Grouse. Two thirds of the prey brought by this pair to its eyrie were Willow Grouse. Both HAGEN (1952 a) and CADE (1960) emphasized that the young Gyrfalcons are raised on an adult population of *Lagopus* spp. surviving from the winter, since the young are fledged at about the time *Lagopus* chicks first begin to hatch. This was evident in the present case, too. At least 45 adult Willow Grouse were caught by the present pair and brought to the nest. WAYRE & JOLLY (1958) and CADE (1960) suggested that the primary adaptation inherent in this timing may relate to the slow development of hunting and self-maintenance among fledg-

ling juveniles. They point out that it must be a decided advantage to young Gyrfalcons to learn their hunting tactics at a time when there are numbers of juvenile ptarmigan that have just begun to fly. They suggest that the Gyrfalcon's set on Ptarmigan may well develop at this time because of the relative ease with which young Ptarmigan are caught. This seems to be one apparent advantage, but there seem to be other relevant aspects, too.

As emphasized by CADE (1960:231), the fact that the young Gyrfalcons are raised on an adult population of *Lagopus* surviving from the winter is in sharp contrast to the behaviour of most other raptors, which raise their young during the period when their chief prey species have augmented their populations by a summer increment of immature animals. It may be thought that Gyrfalcons, which begin nesting in April (HAARTMAN et al. 1963—72), are aware of the abundance of a local *Lagopus* population, i.e. potential food reserves, and will refrain from nesting in areas where food reserves appear to be scarce. On the other hand, those raptors which raise their young on immature animals base their nesting on a more uncertain future. In fact, in the latter group it is not rare that the young die of starvation because the parents cannot acquire enough food for them.

Besides the Willow Grouse, the present Gyrfalcon pair carried other gallinaceous birds (female Black Grouse and female Capercaillie) to its eyrie like Gyrfalcons in northernmost Lapland (MIKKOLA & SULKAVA 1972). The Arctic Hare and the female Capercaillie, which are often of about the same weight (approx. 1800 g) as the female Gyrfalcon (HAGEN 1952 b), seem to represent the maximum size of animal on which the Gyrfalcon preys (cf. also the data presented by HAGEN 1952 a, b, CADE 1960, BENGTON 1971, HAF-

TORN 1971, MIKKOLA & SULKAVA 1972).

Teals, Whimbrels, *Tringa glareola*-sized waders and Hawk Owls (*Surnia ulula*), which were identified among the food remains, are generally known to occur in the diet of Gyrfalcons (see e.g. HAGEN 1952 a, b, CADE 1960, BENGTON 1971, HAFTORN 1971, MIKKOLA & SULKAVA 1972). It is noteworthy that Golden Plovers did not occur in the list of food items, although they were abundant in the vicinity of the eyrie.

The number of small-sized animals (like small waders, *Turdus pilaris* and *T. musicus*) found in the food remains was perhaps lower than the number of these animals which were brought by the Gyrfalcon pair to the eyrie. Owing to the fact that these migratory birds were available in the study area only 4–6 weeks at the end of the nesting period the difference between these two values was hardly great.

Only very few feathers were found at the eyrie, which means that the prey birds were mainly plucked outside the nest, as already reported by DEMENTIEV (1951:119).

In general, it may be said that, in their food biology (in the conditions which prevailed in the study area in 1973) the present pair of Gyrfalcons were typical representatives of an interior population according to CADE's (1960) classification.

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Selostus: Tunturihaukkaparin pesimäaikaisesta ravinnonvalinnasta Metsä-Lapin alueella

Keväällä ja alkukesällä 1973 tunturihaukkapari pesi Metsä-Lapissa Koilliskairan itäosassa. Pe-

sässä oli neljä poikasta. Pesältä kerättiin ravinnonjätteet ja oksennuspalot. Niistä määritettiin 68 saaliseläintä, jotka vastasivat noin 41 kilon saalista. Aikuiset riekot käsittivät kaksi kolmasosaa tunturihaukkaparin pesälle tuomasta saaliista sekä saaliseläinysilöiden lukumäärän että niiden tuorepainon perusteella laskettuna. Loppukolmanneksessa oli 10 pikkukuovia, kaksi jänistä, kaksi tavia, kaksi naarasmetsoa, kaksi noin liron-kokoista kahlaajaa, kaksi punakylkirastasta, yksi naarasteeri, yksi hiiripöllö ja yksi räkättirastas.

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