Food catch of the Osprey *Pandion haliaetus* during the breeding season

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In 1972—74, the Osprey's food catch was studied at three nests (2—3 young) in central and coastal Finland, with an automatic movie camera. The average daily number of fish brought to the nest was 5.2 ± 1.0 *(S.D.)* and the highest feeding frequency was shown by the nest with young aged 15—35 days. Bream-like fishes (mainly *Abramis brama)* were most abundant in the diet. The amount of fish consumed by an Osprey family with three young during the nestling period was calculated to be 79 kg. The total Finnish Osprey population was estimated to consume 108 000—120 000 kg of fish annually during the time of residence in Finland.

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Introduction

Several German authors have presented conflicting observations on the food consumption of the Osprey during the breeding season (SIEWERT 1941, GRAFE 1960, MOLL 1962, 1967, PRZYGODDA 1965). Their estimates of the fish consumed in the nestling period vary from 92 to 166 kg. MOLL (1962) suggested that this discrepancy might be due to differences in the estimates of prey weight and duration of the nestling period. The studies referred to were based on fragmentary observations made from hides. Long-term monitoring of nest activity and more exact estimates of prey weight would improve the accuracy of catch values. In the present study Osprey food consumption was assessed with the aid of an automatic movie camera placed by the nest.

The importance of accurate estimates of Osprey food consumption is twofold. They are needed to provide basic information on the transfer of environmental pollutants in the food chain, and to evaluate the effects of Osprey predation on both natural waters (NILSSON & NILSSON 1976) and fisheries (HÄKKINEN & JOKINEN 1974).

Material and methods

Two of the nests under observation had three young; they were located in central Finland, at Orivesi (61°40′N, 24°20′E) and Nokia (61° 20′N, 23°20′E). The third nest was on the southwest coast of Finland, at Parainen (60° 15′N, 22°18′E), and had two young. In 1972—74, an automatically operating movie camera (NIZO S-80) was placed by the nests and nest activity was monitored in three different phases of the nestling period. At the beginning of the three filming periods, the young were 5 to 7, 18 to 20, and 36 to 38 days old. The camera was set to operate every second minute, since feeding usually took 5—20 min. Previous observations on feeding did not show any dusk activity, which justified the use of daylight camera techniques. The female returned to

the nest within 15 to 20 min after camera setting.

The daily numbers of prey fish, and when possible their species and size, were recorded from the film material (977 hours, 27 days). However, this report will only summarize the data needed for food consumption calculations. On average, Finnish Ospreys fledge at the age of 55 days (v. HAARTMAN et al. 1963—72). The nestling period was divided into three phases for analysis; 1—14, 15—35, and 36—55 days of age. The division was based on the growth rate of the young and the phases were determined by eye from the growth curve (Fig. 1). It has been demonstrated, e.g. with *Larus argentatus*, that the maximum food consumption of the young coincides with the phase of rapid growth (SPAANS 1971, p. 158). In each phase the average daily number of prey fish was taken as that recorded for the corresponding filming period.

According to MOLL (1962), the male bird obtains the food for the whole family during the nestling period, while the female feeds the young. As the front third of the body was missing in many of the fish brought to the nest, this part was presumably consumed by the male. It is assumed in this paper that the male derives its nourishment from the same prey specimens as the rest of the family (see also SIEWERT 1941, MOLL 1962). Thus, the food consumption was considered on a family basis.

Results and discussion

The average daily number of prey fish brought to the nest was 5.2 ± 1.0 (*S.D.*, $n = 27$ days), but the feeding frequency changed over the nestling period (Table 1). The young less than two weeks of age consumed significantly fewer fish than those 15—35 days old ($t = 2.75$, d.f. 18, $P<0.01$). At the end of the nestling period, the feeding frequency was somewhat, but not significantly, lower than when the young were half-grown. The number of young in the nests may have influenced the results. The nest which provided data for the early phase of the nestling period had two young, but the others had three. Yet, the nest was located on the coast, where more small roach-like fish were included in the diet than in central Finland (HÄKKINEN 1977). The value of 4.4 fish per day may even be too high for central Finland.

TABLE 1. Feeding frequency ($\bar{x} \pm S.D.$) at various stages of the nestling period as indicated by film material.

	Age of the young (days)		
	1—14	15—35	36—55
Prey fish/day	4.4 ± 0.5	5.6 ± 0.9	5.1 ± 1.2
Days	5	15	7

The total catch is estimated at 79 kg of fish (Table 2). However, the amount ingested was somewhat less, because food was left over. The results are most applicable for inland nests having three young.

A nest with three young was observed by SIEWERT (1941) in East Germany (GDR). When the young were one week old, the average number of fish brought to the nest each day by the male was 3; half-grown young received 4—5 and fledglings 3 fish a day. The average weight of the prey fish was 400 g and it remained constant. The increased food requirement was fulfilled by increasing the number of fishing flights. The nestling period was 65 days, during which time the fish consumption was assessed at 92 kg. GRAFE (1960) did not note any change in feeding frequency during the nestling period in a nest in the GDR. The nest was close to the sea and he estimated by eye that the prey weight varied between 500 and 1000 g. The three young fledged at the age of 40 days and the total food consumption of the family was estimated at 166 kg of fish. Thus, the considerable local variation in the Osprey's feeding ecology and breeding behaviour makes generalization of questionable value.

In 1975, SAUROLA (1976) estimated the Finnish Osprey population at 900—

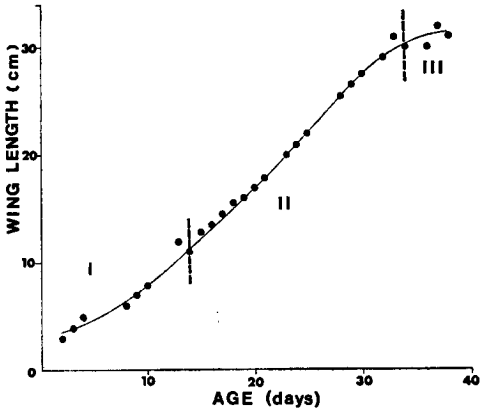

FIG. 1. Growth curve for Osprey young and its division into three phases (I—III). The data were derived from a nest with three young in central Finland.

1000 nesting pairs. The population produced 1.23 young per active nest. SIEWERT (1941) considered that the daily fish consumption of an adult Osprey was 400 g and MOLL (1962) suggested 300 g; the value used here is 350 g. After 1 August, a fledgling may be assumed to use the same amount of food as an adult bird. Together with migration data these figures permit an estimate of the total food consumption of the Finnish Osprey population. The majority of the Finnish Ospreys have already arrived at their nesting sites by 25 April and most of them have departed by the beginning of September (v. HAARTMAN et al. 1963—72). Within the breeding season (129 days), an average Osprey family, producing 1.23 young, needs 120 kg of fish. While in Finland, the total Finnish Osprey population would thus consume 108 000—120 000 kg of fish. This represents 0.6 % of the total Finnish freshwater fish catch in 1973. However, like the other piscivorous birds, Ospreys prey upon smaller fish than those taken by man. In dense fish populations this may be considered beneficial to man, since the remaining fish grow better and the conversion of fish food to food for man becomes more efficient, proportionally less energy being used for maintenance (NILSSON & NILSSON 1976).

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Selostus: Kalasääksen ravinnonkulutus pesäpoikasaikana

Kolmen sääksiperheen ravinnonkulutusta pesä-

TABLE 2. Total food consumption of an Osprey family during the nestling period and its distribution among various prey fish, in central Finland. The composition of the diet and the average weights of the prey fish are taken from HÄKKINEN (1977).

Prey fish	% in the diet	No. of fish	Weight (kg) Average	Total
Abramis spp.	63.7	178.9	0.30	53.7
Rutilus spp.	8.1	22.7	0.15	3.4
Carassius carassius	17.6	49.4	0.30	14.8
Esox lucius	6.4	17.9	0.25	4.5
Other species	4.2	11.8	0.25	2.9
Total	100.0	281		79.3

poikasaikana tutkittiin pesälle asennetun automaattisesti toimivan kaitafilmikameran avulla kesinä 1972—74. Kaksi pesistä sijaitsi sisämaassa, Oriveden ja Nokian kunnissa, kolmas Paraisilla; pesissä oli 3, 3 ja 2 poikasta. Pesäpoikasaika jaettiin poikasten siiven kasvunopeuden perusteella kolmeen vaiheeseen (kuva 1), joille laskettiin pesälle päivittäin tuotujen saaliskalojen keskilukumäärä (taul. 1). Poikasten ollessa 15—35 vrk:n ikäisiä perheen ravinnonkulutus oli suurinta. Kulutusta laskettaessa oli perustana kirjoittajan kalasääksen ravinnon koostumuksesta ja saaliskalojen koosta keräämä aineisto. Viisihenkinen sääksiperhe kulutti n. 79 kg kalaravintoa pesäpoikasaikana (taul. 2). Suomen pesivän kalasääksikannan pesintäaikaiseksi ravinnonkulutukseksi arvioitiin 108 000—120 000 kg, joka vastaa 0.6 % maamme sisävesialueen kalansaaliista v. 1973. Sääkset käyttävät kuitenkin keskimäärin pienempiä kaloja kuin ihminen. Tästä syystä ne voivat tiheää kalastoa harventaessaan jopa lisätä ihmisen kulutettavaksi sopivien kalojen määrää.

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