

DIET OF PIKE, *ESOX LUCIUS* L., FROM LAKE PEIPSI (ESTONIA) IN 1995

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1. Introduction

Pike is the most common fish in the lakes of Estonia. This fish species is unpretentious and resistant to several unfavourable living conditions, particularly to poor oxygen conditions. Pike is also very tolerant to low pH and to high organic matter content (Pihu, 1993). The ecological significance of pike as a top predator in Estonian lakes is great.

Lake Peipsi (Fig. 1) as a large waterbody, poor in higher vegetation, is not a very suitable habitat for pike. Its number in L. Peipsi is relatively small, which is also due to the scarcity of flooded spawning areas in spring (Yefimova, 1966). According to official data pike constituted 1.4 % of fish catches in the Estonian part of L. Peipsi in 1995. The total catch of pike in the last three years has been about 30 t. The legal size of this fish in the lake is 40 cm, and the commercial part of its population consists of about ten generations.

The population of pike in L. Peipsi was studied with respect to the diet composition in 1995. The frequency of occurrence and number of food objects per individual are given. Size-related changes in the diet of pike are discussed.

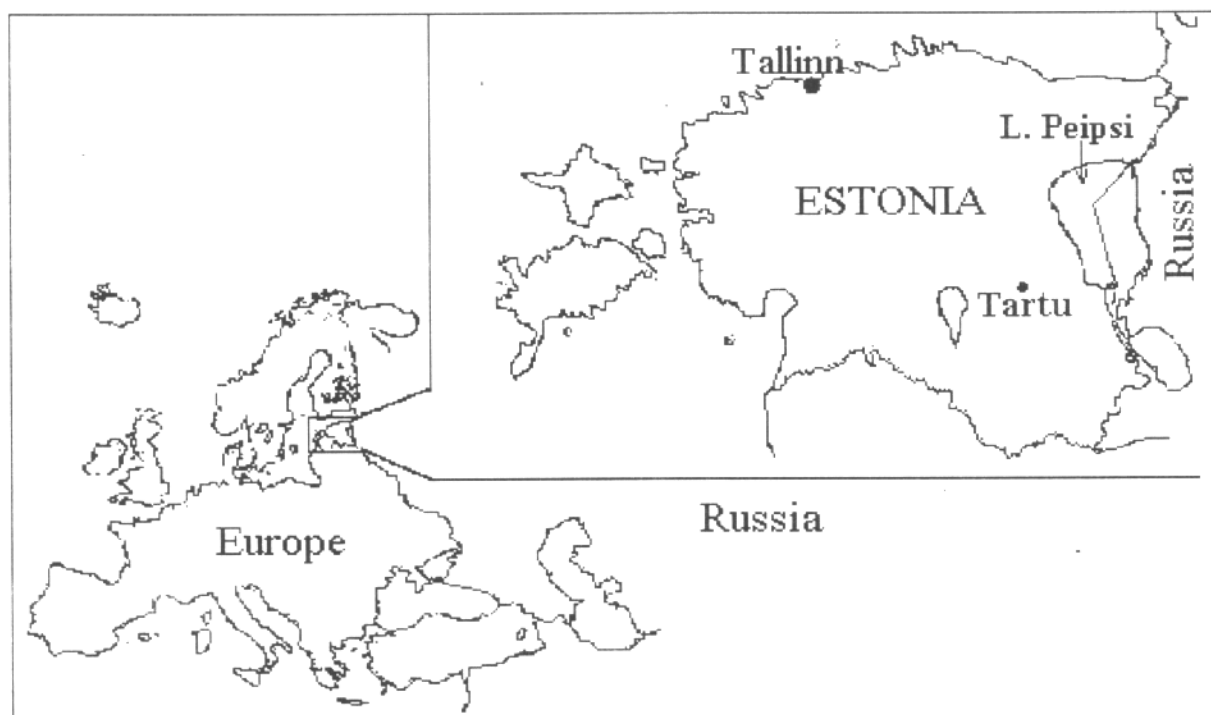


Fig. 1. Location of L. Peipsi.

2. Study area

The total surface area of L. Peipsi (in the broad sense) is 3,558 km², average depth 7.1 m, maximum depth 15.3 m. The lake is located on the border of Estonia and Russia (Fig. 1). This paper considers its northernmost and largest part, L. Peipsi s. s., with a surface area of 2,670 km², average depth 8.3 m and maximum depth 12.9 m (Kupcov & Arukaèvu, 1983). L. Peipsi is a eutrophic waterbody with alkaline water (pH 7.6-8.4) (Timm *et al.*, 1994). Water transparency has not exceeded 1.2 -- 2.7 m in recent years (Timm, 1993). The ice-free period lasts usually from April till November.

L. Peipsi belongs to smelt-bream lakes; due to eutrophication during the last decades it has obtained features of a pikeperch lake. According to official data the total catch of fishes in the Estonian part of L. Peipsi made up 1,624 tons in 1994 and 2,132 tons in 1995.

The share of valuable fishes, mostly the inhabitants of eutrophic waterbodies such as bream *Abramis brama* (L.), pike *Esox lucius* L., pikeperch *Stizostedion lucioperca* (L.), perch *Perca fluviatilis* L. and the inhabitants of oligotrophic waterbodies such as whitefish *Coregonus lavaretus maraenoides* Poljakow and lake smelt *Osmerus eperlanus eperlanus* m. *spirinchus* Pallas was quite large in experimental catches, constituting 89% of the total catch of fishes in 1994. Among them pike made up 2 % (Fig. 2).

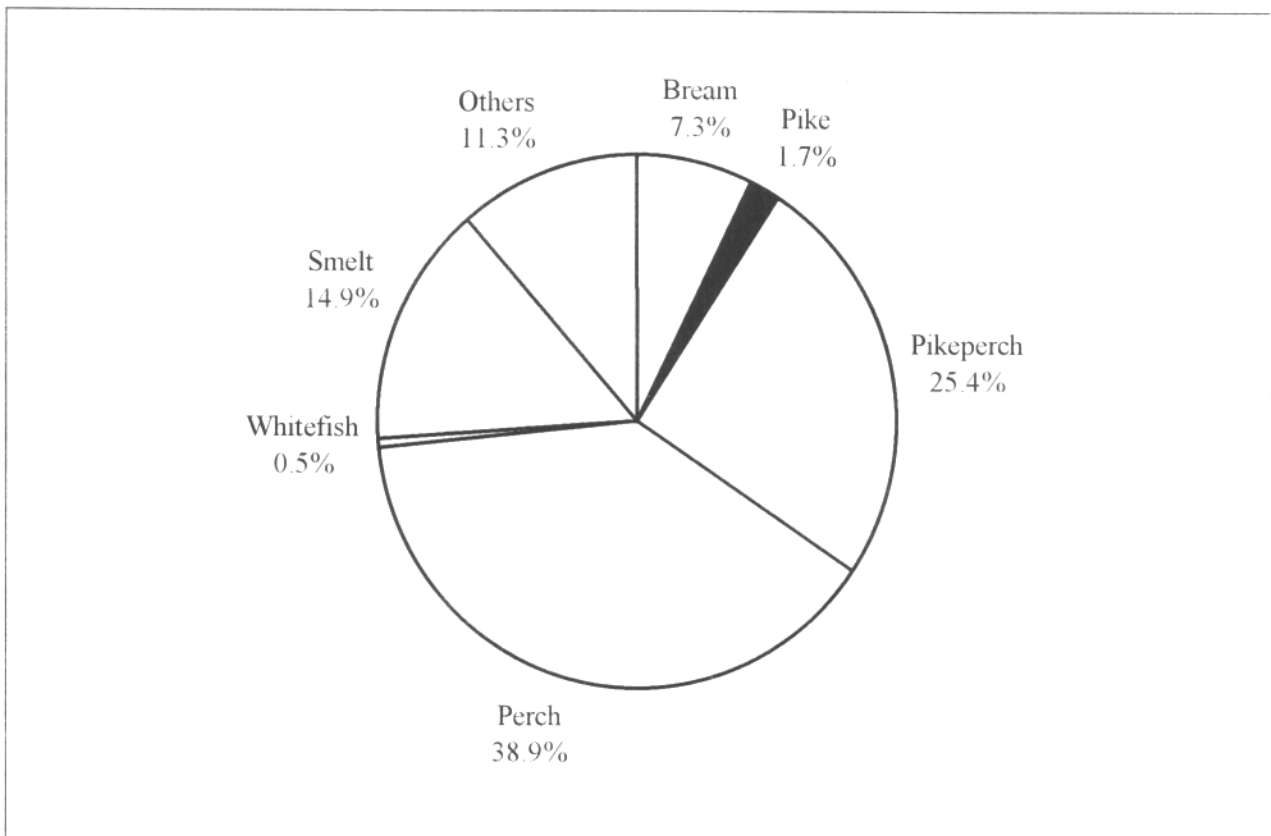


Fig. 2. Weight share of pike and other valuable fishes in experimental catches in L. Peipsi in 1994.

3. Material and methods

The material was collected from the open part of L. Peipsi s. s. from July till October 1995. Fishes were caught with the experimental Danish seine (mesh size 18-22 mm in the cod-end) and the trawl (mesh size 10-14 mm in the cod-end). All caught pikes, a total of 64 fishes with a standard

length (Sl) of 28-105 cm were dissected and the stomach content analyzed. The length of fishes was measured with the accuracy of 1 cm.

Prey fishes or their remains were counted, measured and identified. Some specimens of partly digested prey fishes, not recognizable by external morphology were not identified to the species.

The diet was assessed on the basis of the stomach content and was expressed as prey frequency of occurrence (i. e. the percentage of all fish examined in which that prey species occurred) and as percentage prey number (the number of each prey species expressed as a percentage of all observed prey).

4. Results

4.1. The composition of the diet

Pike turns into a piscivorous predator during the first summer. This fish consumes different food organisms in Lake Peipsi. Its diet included at least 5 prey fish species: perch, ruffe, smelt, roach and pikeperch. Invertebrates were not found in pikes' stomachs. About 40% of the examined stomachs were empty. Smelt, perch and ruffe were the most frequently consumed species (Fig 3)

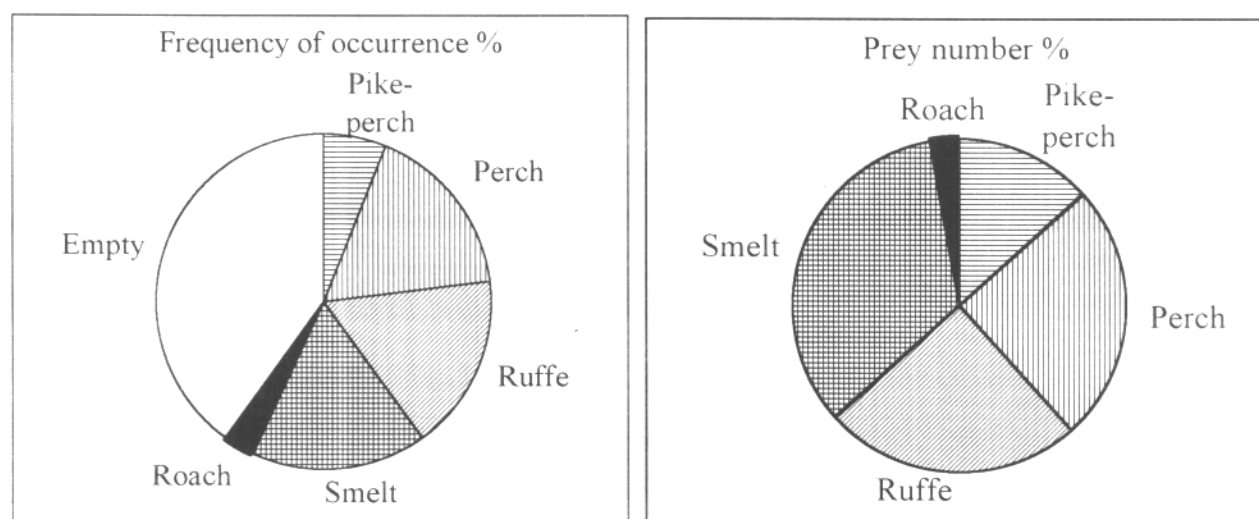


Fig 3. Frequency of occurrence (%) and percentage of prey fish species (in number) in the diet of pike from Lake Peipsi in 1995.

All dissected stomachs contained on the average 1.2 prey fishes, whereas fed fishes had swallowed on the average 2.1 prey items. Smelt dominated in the diet numerically (34%), followed by perch and ruffe (both 25% in number) (Fig 3).

4.2. Size-related changes

Smelt and perch were the commonest fish species in the diet of small pike (28-53 cm) (Figs. 4, 5). They dominated both by frequency of occurrence (25 %) and numerically: the fraction of smelt formed 41 % and that of perch 35 % of all consumed fishes. The part of smelt decreased numerically in the food of larger pikes.

The empty stomach occurred most frequently (65%) in pike Sl = 54-79 cm (Fig. 5). In other length groups the share of empty stomachs made up around 30%. Ruffe was the commonest prey species (54.5% in number and 17% in occurrence) in pike Sl = 54-79 cm.

Pikeperch appeared in the food of the largest (Sl >80 cm) pikes, while it was the most abundant prey species (39 % in number) in this length group.

Predation pressure of pike on the roach population is weak in all length groups.

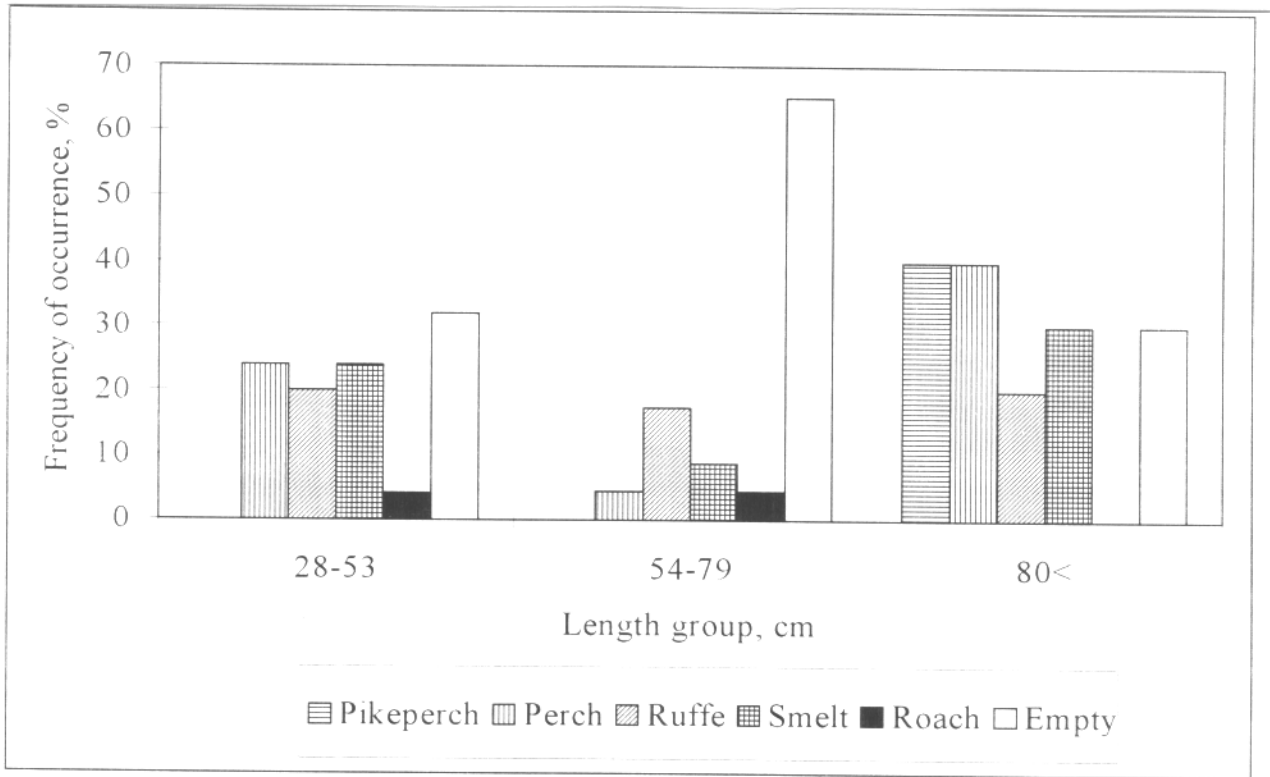


Fig. 4. The frequency of occurrence of prey fish species in the diet of pike from Lake Peipsi in 1995.

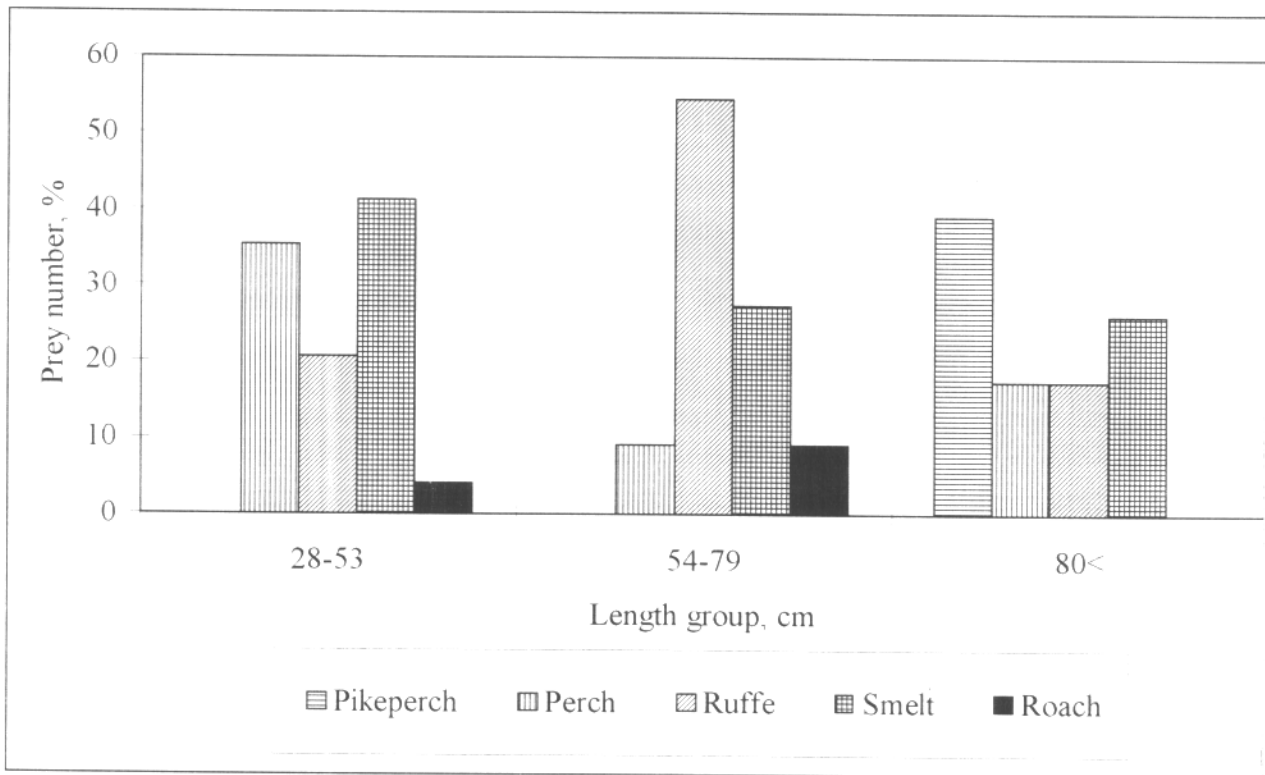


Fig. 5. The percentage of prey fish species in number in the diet of pike from Lake Peipsi in 1995

5. Discussion

Pike are opportunistic in their feeding habits. It has been suggested that they can change their prey selection relatively rapidly in response to changes in the abundance and vulnerability of prey species (Adams, 1991).

A comparison of the diet of pike from L. Peipsi in 1995 with data from 1960-1963 (Pihu, 1966) demonstrates slight shifts in prey choice. The diet of pike included at least 16 prey fish species, among them smelt, perch, ruffe, roach dominated in prey occurrence and number in 1960-1963. Smelt formed a major part in the diet of smaller pike in 1960-1963 as well as in 1995. The role of roach, as well as of bleak, vendace and burbot has decreased during recent decades. At the same time, the share of pikeperch in the food of pike has increased in connection with the growing abundance of the pikeperch population in the lake.

Pikeperch constituted only 0.2-0.3% (about 19 t) of total catch in 1960-1963, but 17-27% (380-470 t) in 1989-1995. During the 1960s pike consumed only single pikeperch fry, whereas in 1995 this prey species dominated in the food of large (Sl >80 cm) pikes. At the same time, the abundance of the pike population has decreased in the lake. The catch of pike made up about 190 t (5-6 % of total annual catch) in 1958-1968, but only 30-93 t (1.5-3.5% of total annual catch) in 1989-1995.

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