

## FISHES AND FISHERIES MANAGEMENT IN LAKE PEIPSI

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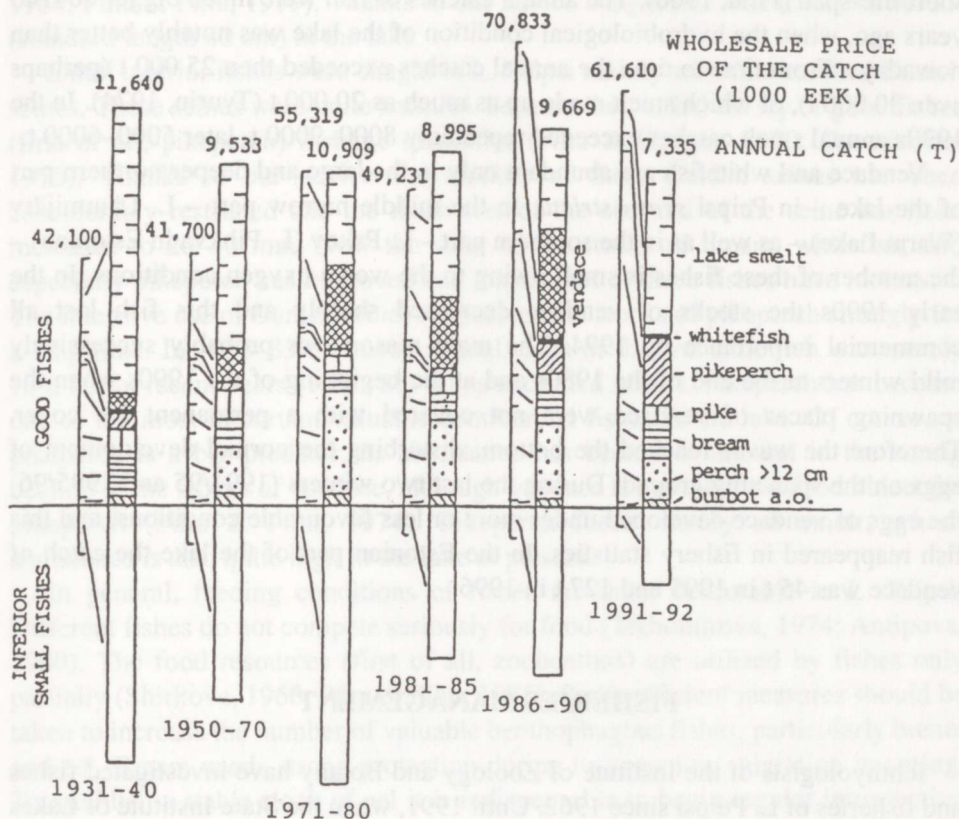
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**Abstract.** The main commercial fishes in Lake Peipsi are smelt, bream, pike, perch, ruffe, roach, till the 1990s also vendace and, recently, pikeperch. The second rate commercial fishes are burbot, whitefish, white bream, ide, eel, and bleak. The total catch of fish has usually been 9000–12 000 t (25–34 kg ha<sup>-1</sup>) a year. As a result of an intensive use of trawls and fine-meshed Danish seines, the stock of pikeperch was strongly suppressed for a long time. After trawls were prohibited and the number of Danish seines considerably restricted, the stock and catches of pikeperch began to grow rapidly. Pikeperch has become one of the main commercial fishes. In recent years the abundance of vendace has sharply decreased. Probably this is mainly caused by the high mortality of its eggs on the spawning grounds during successive mild winters at the end of the 1980s and at the beginning of the 1990s. It would be reasonable to begin a regular introduction of elvers into the lake.

**Key words:** lake smelt, vendace, pikeperch, perch, roach, burbot, feeding, spawning, fisheries management.

### LAKE AND FISHES

Lake Peipsi is a large (3558 km<sup>2</sup>) and relatively shallow (up to 15.3 m deep) productive water body lying on the territories of Estonia and Russia. According to the data presently available there are 33 permanent fish species and 1 lamprey species in L. Peipsi or in the lower reaches of its inlets. The main commercial fishes are lake (dwarf) smelt (*Osmerus eperlanus e. m. spirinchus*), bream, pike, perch, ruffe, roach, till the 1990s also vendace (by now its abundance has sharply decreased), and in recent years pikeperch (Figure). Of secondary importance are burbot, whitefish (*Coregonus lavaretus maraenoides*), white bream, ide, eel, and bleak. The catch rarely contains gudgeon, crucian carp, tench, and rudd. The rest of fishes are of no commercial significance.



Catch of fish and its price in Lake Peipsi. Columns on the right indicate the average annual catch of fish in tonnes during a certain period; vertical lines on the left show the wholesale price of the catch in thousand Estonian kroons (EEK 8 = DEM 1) at current prices.

Earlier, L. Peipsi was regarded as a smelt-bream lake, since the second half of the 1980s it has acquired some qualities of a pikeperch lake. For example, the water transparency in the lake has diminished notably (about twofold as compared with the 1950s-70s), making the water turbid, which is one of the main features of a good pikeperch lake. With respect to its productivity and catches (usually 9000-12 000 t or 25-34 kg ha<sup>-1</sup> yr<sup>-1</sup>) this lake surpasses all the other large lakes of North Europe. About 40-45% of the catch is landed by Estonian, the rest by Russian fishermen. The total annual catch of fish in L. Peipsi is, however, very variable (during the last 60 years from 6300 to 15 100 t). This is caused mostly by the fluctuation in the abundance of smelt. Its numbers and catches depend, first and foremost, on hydrometeorological conditions and are highly variable owing to its

short life-span (Pihu, 1966). The annual catches of fish were much bigger 70–140 years ago, when the hydrobiological condition of the lake was notably better than nowadays. From time to time the annual catches exceeded then 25 000 t (perhaps even 30 000 t), of which smelt made up as much as 20 000 t (Tyurin, 1974). In the 1930s annual smelt catches exceeded repeatedly 8000–9000 t, later 5000–6000 t.

Vendace and whitefish are abundant only in the large and deeper northern part of the lake – in Peipsi *sensu strictu*. In the middle narrow part – L. Lämmijärv (Warm Lake) – as well as in the southern part – L. Pskov (L. Pihkva in Estonian) – the number of these fishes is small owing to the worse oxygen conditions. In the early 1990s the stocks of vendace decreased sharply and this fish lost all commercial importance by 1994. The main reason was probably successively mild winters at the end of the 1980s and at the beginning of the 1990s when the spawning places of vendace were not covered with a permanent ice cover. Therefore the waves reached the bottom, disturbing the normal development of eggs on the spawning ground. During the last two winters (1994/95 and 1995/96) the eggs of vendace developed under more or less favourable conditions, and this fish reappeared in fishery statistics. In the Estonian part of the lake the catch of vendace was 45 t in 1995 and 127 t in 1996.

## FISHERIES MANAGEMENT

Ichthyologists of the Institute of Zoology and Botany have investigated fishes and fisheries of L. Peipsi since 1962. Until 1991, when the State Institute of Lakes and Rivers Fisheries (GosNIORKh, Leningrad) studied the state of the stocks of the main commercial fishes of the lake (smelt, whitefish, vendace, pike, pikeperch, bream), established the quotas of their catch, etc., we attracted attention to the biological role of the main predatory fishes (pike, perch, pikeperch, burbot) and small inferior fishes (mainly ruffe and roach) in the ichthyocoenosis of the lake. In 1985–88 the production of bream and perch was studied in the open part of L. Peipsi (Kangur, 1990, 1991). In 1992 our ichthyologists began to estimate the state of main commercial fishes in the Estonian part of the lake: A number of recommendations made and management advice given by our ichthyologists have been accepted by the authorities and implemented.

In the former Soviet Union perch and roach were regarded as dangerous food competitors and roe eaters of more valuable fishes in the lakes of the northwestern part of the country (including L. Peipsi) (Tyurin, 1957, 1974). In addition, in L. Peipsi burbot was considered as an undesirable predatory fish (Efimova, 1963). On the ground of these *a priori* suppositions serious attempts were made to decrease their stocks at any price by means of intensive catch. However, no marked results were achieved. We ascertained that perch and roach are not harmful fishes in L. Peipsi (Pihu & Pihu, 1971, 1975) and burbot is even a rather useful predator, because its main food consists of ruffe and small perch (Pihu,

1964; Pihu & Pihu, 1979). Thanks to our advice a legal size was fixed for burbot (standard length 40 cm) in the lake.

Small inferior fishes were caught in L. Peipsi mainly with fine-meshed Danish seines. These seines were quite harmful, because they killed the fry of good fishes (first of all, pikeperch) in large quantities (Pihu & Kangur, 1970; Dorozhkina, 1975). Thanks to our advice the number of these Danish seines has been considerably restricted and the mesh-size of the cod-end of the seine has been increased to 20–40 mm. Now the state of the stocks of bream, whitefish, and especially pikeperch has improved and the catches of these fishes have increased. The intensive use of Danish seines suppressed the stocks of pikeperch strongly for a long time. In 1958–83 the mean annual catch of this valuable fish was merely 18 t, but in recent years (1991–96) it has exceeded 1000 t. Pikeperch has become one of the most important valuable commercial fishes in the lake. Of course, as pikeperch is a big predator, its abundance has been instrumental in the strong decline of the stocks of vendace, although vendace is not the main food object for pikeperch (Pihu & Pihu, 1974). Pikeperch feeds mainly on smelt, whose abundance is also quite high in the lake at present.

In general, feeding conditions of fishes are quite favourable in L. Peipsi. Different fishes do not compete seriously for food (Tikhomirova, 1974; Antipova, 1980). The food resources (first of all, zoobenthos) are utilized by fishes only partially (Shirkova, 1966; Pihu & Pihu, 1975). Some efficient measures should be taken to increase the number of valuable benthophagous fishes, particularly bream and eel. Bream needs strong protection during its spawning migration in spring. To establish a stable stock of eel it is indispensable to begin regular introduction of elvers (glass eels) into the lake (at least 10 million individuals a year).

The stocks and catches of pike, burbot, and whitefish are quite scanty in L. Peipsi. Good spawning places for pike are insufficient in the lake, especially at a low water level (Efimova, 1966). Probably the same reason restricts the stocks of whitefish (Shirkova, 1974). Whitefish and burbot as cold water fishes are to a certain extent suppressed also by too warm water in the lake in summer.

The bulk of the catch of fish in L. Peipsi usually consists of smelt and small inferior fishes (young perch, roach, ruffe, and others). These abundant and easy to access fishes make the main food for pikeperch, pike, perch, and burbot, which are therefore useful ameliorators in the lake (Pihu & Pihu, 1974).

In the last years Estonian and Russian fishery statistics has become unreliable. The former large fishery kolkhozes split into separate cooperatives and catches are not completely registered now.

## PROSPECTS OF FISHERIES

Lake Peipsi has already passed its “golden” age. The hydrobiological indices of this lake are deteriorating, its food resources are growing poorer. In the near

future the stocks and total catches of fish will probably stay on the present level (8000–10 000 t yr<sup>-1</sup>). Rational management of fisheries (further restriction of fine-meshed active fishing gear, efficient protection of the stocks of valuable fishes, sufficient introduction of elvers) may improve the quality of the catch of fish taken here. Continuous close collaboration of Estonian and Russian ichthyologists as well as fish protection boards and fishing organizations is inevitably needed.

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## PEIPSI JÄRVE KALAD JA KALANDUS

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Peipsi järve tähtsamad töõnduskalad on tint, latikas, haug, ahven, kiisk, särg, 1990. aastateni ka rääbis ja viimasel ajal koha. Teisejärgulised töõnduskalad on luts, siig, nurg, säinas, angerjas ja viidikas. Kalade aastane kogusaak on tavaliselt olnud 9000–12 000 t (25–34 kg ha<sup>-1</sup>). Traalide ja peenesilmaliste mutnikute intensiivse kasutamise tõttu olid kohavarud pikka aega väikesed. Pärast traalpüügi keelamist ja mutnikute arvu tunduvalt vähendamist hakkasid kohavarud ja -saigid kiiresti kasvama. Nüüd on koha muutunud üheks tähtsamaks töõnduskalaks. Viimaseil aastail on rääbise arvukus kõvasti kahanenud. Seda on arvatavasti põhjustanud eelkõige rääbisemarja suur suremus koelmutel järjestikuste pehmete talvede ajal 1980. aastate lõpul ja 1990. aastate algul. Järve tuleks hakata regulaarselt tooma klaasangerjaid.