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Fisheries Improvement Committee

City of Helsinki Fishery Investigations

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In 1968 the City of Helsinki Engineer's Office water conservation laboratory began fishery investigations connected to the observation of the physical, chemical and biological state of the sea area begun some years previously. The aim of the fishery investigations is to determine the effect of sewage on the fish and fishing in the sea and, on the basis of the results obtained, to draw up a fish water management plan for an area covering about 30 000 hectares.

In Finland the Water Law prohibits any activities that may be an abvious disadvantage to fish or fishing. Special permits to discharge sewage into the sea are issued by the Water Tribunal on consideration. In 1971 the City of Helsinki was granted a provisional permit from the West Finland Water Tribunal to pipe into the Gulf of Finland sewage from 500 000 inhabitants that has been mechanically and biologically treated at ten sewage treatment plants. One condition of the permit is that the fishery investigation in progress be completed by the end of 1972 and that the investigation be used as a basis for drawing up a management plan to preserve the fish stocks and to assess the damage caused by and any disadvantages of piping sewage into the sea. Furthermore the City of Helsinki is annually obliged to plant young fish to a value of at least 30 000 mk.

Sewage has brought about considerable changes in the quality and quantity of fish in the sea area off Helsinki. The changes have mainly been negative. Other causes of the changes have been certain cultural factors such as the damming up of rivers, increased water traffic and a rise in leisure-time fishing. Landrise may also make its contribution in the long term.

Of the close to 90 fish species found in Finland 73 have been observed in the sea area off Helsinki, so the number of species found in the area is high by Finnish standards. Economically the most important

species at the moment are pike-perch (*Lucioperca lucioperca*), perch (*Perca fluviatilis*), bream (*Abramis brama*), Baltic herring (*Clupea harengus*), sprat (*Clupea sprattus*), Brown trout (*Salmo trutta*) and salmon (*Salmo salar*), though admittedly sea trout and salmon are only found far from the city shores. Species occurring in great number but of no economic significance inslude roach (*Rutilus rutilus*), white bream (*Blicca bjoerkna*), ruff (*Acerina cernua*), bleak (*Alburnus alburnus*), blenny (*Zoarces viviparus*), sculpin (*Cottus*) and sticklebacks (*Gasterosteus*).

Fish species susceptible to pollution have declined and/or moved to purer areas. In particular these fish are brown trout (*S. trutta*), whitefish (*Coregonus lavaretus*), burbot (*Lota lota*) and ide (*Leuciscus idus*). The Baltic herring (*Cl. harengus*) and sprat (*Cl. sprattus*) grounds have moved away from the coast out to sea. In some areas pike (*Eso lucius*) has disappeared entirely. Unfortunately the harmful effect of sewage is felt specifically by edible fish, while the less valuable species (particularly roach, white bream and ruff in the Helsinki area) thrive on eutrophication. Of the major edible fish, pike-perch (*L. lucioperca*) has withstood the effects of pollution best, and at first even thriven on it. Pike-perch can make effective use of the abudance of nutritional fish and grows quickly. Another fish that withstands eutrophication well is smelt (*Osmerus eperlanus*).

The fish species in the more eutrophied inner bays (Laajalahti and Vanhankaupunginselkä) have a very high biomass but there are few species. The eutrophied Laajalahti bay, for example, at present has about 15 fish species, while at Central Helsinki level there are already upward of 30. Under extreme conditions only a few species can survive. Thus eutrophication of the waters reduces the number of species.

The predominance of cyprinides in Helsinki waters is quite obvious. Here roach is a general species found in large numbers, from the polluted bays right out to the outer skerries. Other dominant species in the polluted areas are bream, smelt and white bream. In the inner bays

of the Helsinki sea area eutrophication has already passed the stage up to which the growth rate for fish accelerates as a result of the increase in the nutrition available. The present rapid rate of eutrophication has created a situation characterised by following, partly connected, features: relative scarceness of predatory fish, an abundance of roach and ruff, competition within and between fish species and a scarcity of bottom fauna. The situation is reflected in, for example, the slow growth of *Cyprinides* and perch.

Not only the quality and structure of the fish species are negatively affected by sewage, at a certain degree of eutrophication taste defects begin to appear in fish. In Helsinki taste defects appear in fish over a water area of 3 000 - 4 000 hectares. The taste of oil, algae and mud in fish is caused by sewage and oil entering the water. Taste defects have both an immediate and an indirect effect on fishery.

In the past few years the methyl mercury contents measured in perch in the Helsinki sea area have been in the range of 0.4 mg/kg and the corresponding pesticide contents 0.03 mg/kg of the fresh weight of the fish.

Less than one hundred households in the area of Helsinki and its neighbouring municipalities have fishing as their main profession or as part-time job. The types of fishing practised are coastal fishing, trawler fishing and salmon line fishing. As a result of pollution of the waters and the change in the occupational structure professional coastal fishing is rapidly on the decrease, while these factors have no significant effect on trawler and salmon line fishing. The majority of professional coastal fishermen are over 60 years old, and due to the hard work involved and unprofitability of the profession there are no new men ready to take over. If the present trend continues the traditional coastal fishing as a profession will die out in the Helsinki region in the next ten years. On the other hand trawler and salmon line fishing will grow in importance, also in fishing off Helsinki.

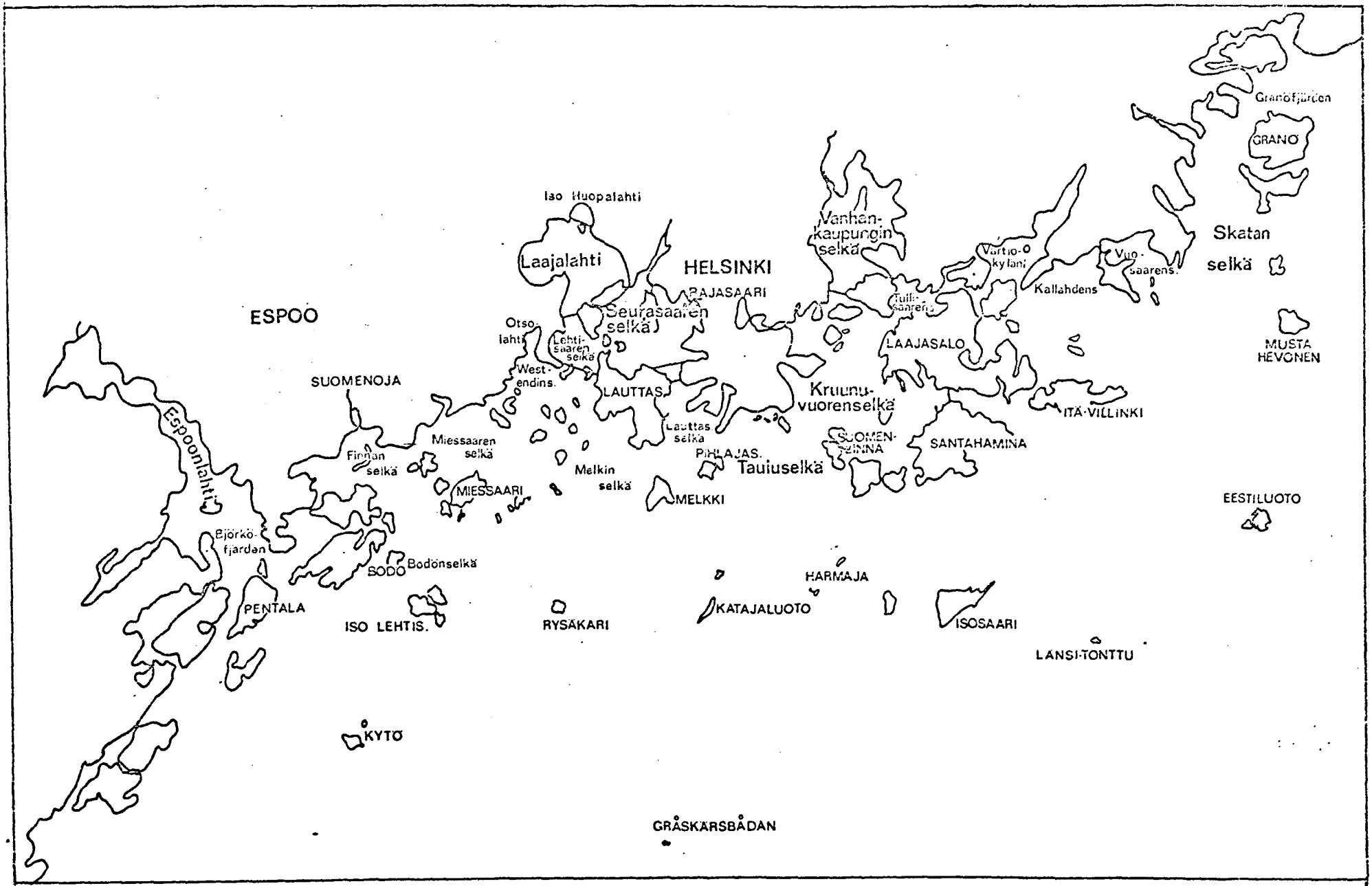
In 1970 a total of 1 700 tons was caught by professional fishermen in the research area, Baltic herring and sprat accounting for over 95 %. Coastal fishing gave over 500 tons, trawler fishing close on 1 200 tons and salmon line fishing 16 tons. The main species caught in coastal fishing were Baltic herring, bream, pike, pike-perch, perch and burbot.

Despite pollution of the water leisure-time fishing is constantly on the increase in the Helsinki region. In 1970 about 35 000 people were engaged in leisure-time fishing in the research area, with a total catch of over 400 000 kg. The bulk of the catch was perch, but a considerable amount of roach, bream and cod was also caught. Most of the fish were gaught the summer during months. As a result of the polluted waters and the rise in the standard of living, fishing expeditions have got longer and, where possible, people have travelled outside the area affected by Helsinki sewage.

A total of 13 000 boats were used in leisure fishing and 70 000 gears. The most popular modes of fishing were angling,fishing with rod and reel and net fishing. The cost of leisure fishing considerably than exceeded the value of the catch, so it can be regarded chiefly as a form of recreation. The fishermen are dissatisfied with the present situation. They consider the worst factor the pollution of the water and its consequences, and most of all they would welcome the planting of such valuable fish as brown trout and pike.

The City of Helsinki has decided to solve its sewage problem by improving effectiveness of sewage treatment by chemical treatment methods and building a collector sewer to pipe sewage out to the edge of the open sea, about 7 km from the mainland, off Katajaluoto. Judging from the research these arrangements would quarantee that the condition of the bays near the town centre would probably improve relatively quickly. From the point of view of fishing an improvement in the condition of the inner Helsinki bays is to be hoped for most. At the moment these areas have dropped 60-100 % in value as regards fish and fishing.

Disturbances that have arisen in the species structure of fish in the eutrophic bays and open waters off Helsinki could at least be partly corrected by regulating fishing, planting fish and to carry out various other management measures for fish waters.



TUTKIMUSALUEEN PAIKANNIMISTÖ

GEOGRAPHICAL NAMES