

Management problems with the differential allocation of fishing rights to sport and commercial fishermen in the Frisian lakes, The Netherlands

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Abstract

The Frisian lakes in the north of The Netherlands, with surface areas up to 2000 ha each, cover a total area of 16 000 ha. They are all shallow eutrophic lakes, interconnected, and having a retention time of 3-6 months. The fish stocks in the lakes are dominated by pikeperch (*Stizostedion lucioperca*), bream (*Abramis brama*), perch (*Perca fluviatilis*), roach (*Rutilus rutilus*), ruffe (*Gymnocephalus cernua*), smelt (*Osmerus eperlanus*) and eel (*Anguilla anguilla*). Since 1977 the fishing rights for eel have been allocated to commercial fishermen while those for all other species are allocated to sport fishermen. The discontinuation of the gill-net fishery for pikeperch and perch has caused a shift in the population structure of pikeperch and bream to older individuals. Although the fish stocks should be managed as a unit, the administrative organization and the rules applied were not strict enough to ensure this.

1. Introduction

The growing number of anglers in The Netherlands in the 1950s and 1960s provoked changes in the Fishery Act, and led to the political decision in 1972, that sport fishermen should be accorded priority in the acquisition of fishing rights, but that at the same time the interests of commercial fishermen should be considered. It was decided to re-allocate the fishing rights over inland waters. Commercial fishermen can now acquire the fishing rights for eel (*Anguilla anguilla*), and the organizations of sport fishermen can acquire the fishing rights for all other freshwater fish species. The major fish species in the latter category (coarse fish) are bream (*Abramis brama*), white bream (*Blicca bjoerkna*), pikeperch (*Stizostedion lucioperca*), roach (*Rutilus rutilus*), perch (*Perca fluviatilis*), pike (*Esox lucius*), rudd (*Scardinius erythrophthalmus*) and carp (*Cyprinus carpio*).

In The Netherlands the allocation of fishing rights to fishermen is a normal procedure and covers some 120 000 ha of inland waters. The major exception is Lake IJssel (180 000 ha). The most important rights acquired by individuals or organization are:

- To fish, within the restrictions of the National Fishery Act (closed seasons, minimum sizes etc.).

- To stock, within the prescription of the National Fishery Act.

Co-ordination of management has been stimulated by way of governmental extension to fishery managers. In some state-owned waters the organization that rents the fishing right is obliged to set up a management committee with representatives of both sport and commercial fishermen who become responsible for a management plan that must be approved by the State. The implementation of the re-allocation of fishing rights has been stimulated by the Ministry of Agriculture and Fisheries by means of a financial compensation to those commercial fishermen who have voluntarily discontinued their fishery for coarse fish. In Friesland, a province in the north of The Netherlands, with 16 000 ha of inland waters, the Frisian Organization of Commercial Fishermen and the Frisian Association of Angling Clubs agreed on the re-allocation of fishing rights in 1975. This agreement was reached in 1977. The Ministry contributed 2 300 000 Dfl and the Frisian Association of Angling Clubs 700 000 Dfl. The main points of the agreement are:

- The installation of a management advisory committee which is to co-ordinate the management of eel and coarse fish, and which would draft a management plan.
- The contracting parties agree to take no management measures which may harm the interest of the other party.
- The parties are obliged to manage the fish stock according to the views of the management advisory committee.
- In case of serious disputes an independent committee with representatives of the State as the owner of the fishing rights, the Province of Friesland and the Association of Dutch Municipalities must be instituted. The judgements of this committee are to be absolute.

In 1977 the Ministry of Agriculture and Fisheries started annual trawl surveys to gain insight into the dynamics of the fish stocks in the lakes, and to provide the management advisory committee with information on the stocks. Until 1977, coarse fish were exploited by commercial fishermen with gill-nets (101 mm stretched mesh) and seines (Goldspink & Banks 1975), and there was an intensive fishery for the two valuable species, perch and pikeperch, which today, are also sought by anglers. It was anticipated that the sudden end to commercial exploitation would lead to an increase in the density of pikeperch and perch stocks, but how the stocks would develop in the long-term could not be foreseen, nor the degree of stability that would be reached.

This contribution discusses critically, the fisheries management of the Frisian Lakes since 1977. A stricter organization of the management process than that hitherto employed, with an adequate supply of fisheries-dependent research data, is suggested.

2. Management objectives and measures

Until 1988 the management advisory committee did not succeed in drafting a management plan with management objectives. From the beginning the discussions were frustrated by the strongly conflicting views of the commercial and sport fishermen regarding the future management of the fisheries. The commercial fishermen stated that the (now) increasing stock of bream had detrimental effects on the fyke net catches of eel, both directly and indirectly. Directly, because of too large a by-catch of low-valued bream in the fyke nets set to catch eel. Indirectly, because of the competition for benthic food organisms between bream and eel. Therefore the commercial fishermen advocated a

periodic removal of a large part of the bream stock by seining in winter. The sport fishermen strongly opposed this because they feared a gradual re-introduction of the commercial fishery for pikeperch and perch. The Association of Angling Clubs stated that their catches were satisfactory and that, if the development of the bream stock had an adverse effect on the catches of eel, this had to be proven by scientific research. Specific research into this question was carried out in 1982-1984 (see section 3).

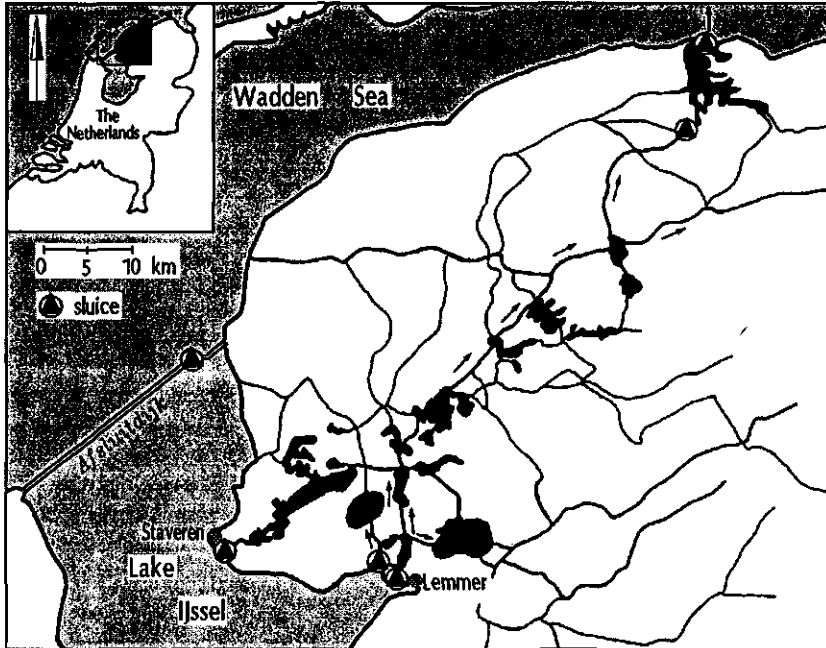


Figure 1. The location of the Frisian lake district. The arrows indicate the major water flow from the freshwater Lake IJssel through the lakes region into the Wadden Sea.

There are no catch statistics available, neither from commercial fishermen, nor from sport fishermen. One reason why there are no landing statistics concerning the catches of the c. 40 full-time and 40 part-time commercial fishermen, is the dispersed nature of the fishery in Friesland. There are some 20 lakes (Figure 1) of which the largest is about 2000 ha (Tjeukemeer) and there are only 3 fishermen per lake at maximum. There is no central place for wholesale trading. Recording of catch-effort data would thus only be done on the initiative of the fishermen themselves. On the basis of an economical study of the Frisian fishery, in the years 1966-1970, the annual yield of eel was estimated at 8.6 kg/ha and that of pikeperch at 7.2 kg/ha (van Densen 1983). These figures were in the same order of magnitude for Tjeukemeer, the only lake for which detailed catch

statistics were analysed over the period 1964-1970. Catch rates were 6.6 kg eel/ha and 3.7-10.4 kg pikeperch/ha (Goldspink & Banks 1975).

Sport fishing is popular among the inhabitants of the province of Friesland. The number of licenses issued per unit number of inhabitants is roughly twice as high in Friesland as the national average (van Densen 1983). Some 50 000 licences were issued in the province in 1986, of which 24 000 were issued to people in angling clubs. About 40% of the people angling in Friesland come from elsewhere (de Groot & van Haasteren 1979). In The Netherlands, anglers fish some 25 times a year. The conservative estimate of angling pressure in Friesland is 1 300 000/rod days/yr (80 rod days/ha/yr).

In addition to national regulations, the management measures taken by the commercial fishermen in Friesland are:

- Stocking of glass eel and young eel.
- Limitation of fishing effort to prevent the over-exploitation of the eel stocks.

Their effort is limited by the maximum number of 50-60 fyke nets/fisherman allowed. These have to be littoral fyke nets of 150-300 meshes, set at fixed sites. Summer, open water, fyke nets, longlines and eel boxes, as used in Lake IJssel (van Densen *et al.* 1990) are forbidden.

The Association of Angling Clubs in Friesland has changed the minimum allowable size of pike to 50 cm (national 45 cm) and has set catch limits of 10 pikeperch/day and 1 pike/day. The catch limit has been set to prevent, among other things, the sale of valuable pikeperch to fish traders.

3. Research

Catch-effort data are lacking. Since the discontinuation of the gill-net fishery, in 1977, a monitoring programme for fish other than eel has been performed by the Fisheries Department. Every autumn about five 10 minute trawl hauls per lake are taken in 7 selected lakes. The total weight and the LF-distributions per species are recorded. By comparing these catches with the more frequent and detailed sampling carried out in the Frisian lakes (especially Tjeukemeer) by the Dutch Limnological Institute, the value of the annual monitoring programme can be established (van Densen & Klein Breteler 1985). The mean length of 0-group fish can be recorded unbiased. However, the estimate of their relative abundance (numbers/10 minute trawl haul) is influenced by the changing patterns of distribution of the younger age groups at the end of the summer, especially those of young bream and roach. For this reason the monitoring programme must not be executed later than in September.

On the basis of the research by the Limnological Institute (Ministry of Education) into the dynamics of fish populations and food organisms, future monitoring programmes can be considerably improved by investing marginal extra time. The condition of the fish is easily recorded and proves to be a sensitive indicator for the well-being of the populations of pikeperch and bream (Lammens 1982, van Densen & Vijverberg 1982). The impact of planktivorous fish on the large *Daphnia hyalina* was so great that the mean size of *D. hyalina* could be used as an indicator of the biomass of 0-group fish, and of the availability of the zooplankton for the facultatively planktivorous older bream (Lammens 1982, Vijverberg & van Densen 1984, van Densen 1985). The zooplankton, and certainly the abundance and mean size of the key organism *D. hyalina*, is easily monitored. A lumped

zooplankton sample (0.125 mm gauze) for the whole of the lake gives a reliable average picture of zooplankton density and composition (de Nie, Bromley & Vijverberg 1978, de Nie & Vijverberg 1985). Wind induced water circulation in the shallow lake prevents the clumping of the zooplankton. The analysis of the lumped sample will take about 4 hours per lake, including data processing.

The major food organisms for fish in the Frisian lakes are zooplankton and chironomids. Sampling of chironomids is most time-consuming. Because of their heterogeneous spatial distribution at least 15-20 samples have to be taken over several transects in each lake (Beattie 1982). The samples have to be separated from the bottom sediments (peat, sand, clay) by laborious sieving. The incorporation of this type of observations into a monitoring programme must be done selectively.

Specific research was done by the Fisheries Department and The Netherlands Institute for Fishery Investigations to study the effect of a cropping programme for bream in part (3000 ha) of the lake district during 3 consecutive winters (1981/1982 - 1983/1984). Parameters recorded were the condition of the bream, the fat content of the eels and the abundance of the zoobenthos. Because all lakes are interconnected 10 000 bream and 570 pikeperch were tagged to study their migrations in the area concerned. The cropping by winter seining was done by the commercial fishermen. Only 50% of the target for cropping (100 kg/ha/year) was realized. The evaluation of this large-scale research programme has not yet been completed, but it can already be concluded that this type of research would have been better started on a much smaller scale.

The Limnological Institute was able to follow the development of the fish stocks in Tjeukemeer after the re-allocation of the fishing rights in 1977. There was a shift in the bream and pikeperch populations to the larger size classes which were formerly caught by the intensive gill-net fishery of the commercial fishermen (Lammens 1986, Lammens 1987, Goldspink & Banks 1975). An indirect effect of the re-allocation was the decrease of the roach and the perch populations, which almost disappeared from the open water area as a result of the increased predation pressure by large pikeperch. The latter can prey upon almost all length classes of these species. Within the zooplankton, only the large *Daphnia hyalina* showed a significant increase after 1977 and made the growth of the bream population possible. Only in years with very successful recruitment of smelt (*Osmerus eperlanus*) and perch, did *Daphnia hyalina* stocks collapse and cause deterioration in the condition of bream (van Densen & Vijverberg 1982, Lammens, de Nie, Vijverberg & van Densen 1985).

4. Conclusions

The re-allocation of fishing rights in the Frisian lakes in 1977 brought about a situation in the management of the fish stocks which was difficult to handle. The administrative organization was not strict enough, nor were the rules obligatory. Therefore the management of the eel stocks and the stocks of other freshwater fish as a total unit could not be ensured. The latter aspect is necessary because of the strong interaction between both categories of fish (Lammens *et al.* 1985).

Other constraints on the management of the fish stocks result from the physical character of the lake district. There are many small lakes, which form a typical Dutch polder (reservoir) system, together with the surrounding pasture land. All lakes are

interconnected, water has a short retention time (3-6 months) and the system as a whole is open to the immigration of large numbers of larval and juvenile fish from the nearby Lake IJssel (van Densen & Vijverberg 1982).

The dispersed character of the lakes hampers the introduction of an official system for recording commercial eel catches. This is even more difficult for the catches of sport fishermen. They fish chiefly for recreational purposes and put the major part of their catch (bream, roach) back into the lake. There is a specific group of anglers, both from Friesland and from elsewhere, who fish more selectively for pikeperch for consumption. Poachers are expected to take a considerable part of the pikeperch stock.

The openness of the lake district for immigrating larvae and juveniles causes fast and unpredictable shifts in the ratio of predator to prey species. These strong variations have been superimposed on the main trend since 1977, i.e. the ageing of the populations of pikeperch and bream. It is difficult for the fisheries managers to distinguish both dynamic aspects.

The monitoring programme can be up-graded by investing just a little extra time. However, the set-up of a catch and effort registration system for both commercial and sport fishermen seems even more urgent. Such a system has not been imposed by the government and, preferably, it should be developed on a voluntary basis. The efforts of fisheries administrators and extension officers must be directed to the development of such a system, before intensive specific research is done. The combination of catch statistics and an efficient and up-graded monitoring programme is a pre-requisite for the future management of the fisheries, including the essential evaluation of management objectives which has still to be formulated.

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