

## Reduction of cyprinid fish populations at Lake Nimmern by seine fishing, autumn 2020

### General

The biomanipulative autumn seining at Lake Nimmern aims to improve the lake's water quality by reducing cyprinid fish populations which cause internal nutrient loading. Earlier fishing in autumns 2017, 2018 and 2019 produced a catch of 79600 kg and 202 kg/ha which is already over the level of calculatory minimum target catch 180 kg/ha <sup>1)</sup>. This year's fishing aimed to:

1. survey the efficiency of earlier fishing and its impact on lake's present fish populations
2. still increase the reduction catch

### The seining and catches 2020

The seining took place on 31th October and 1<sup>st</sup> November including 2 days of fishing and 3 seine hauls (Fig. 1). The conditions during the fishing were good and all hauls were technically successful. Winds were decent, Secchi depth 2,6 m and water temperature 8,6 °C.

The biomanipulation catch in the two days was 4000 kg and consisted of big individuals of roach (mört 73 %), bream (braxen 23 %) and tench (sutare 5 %). Some usually caught species (benlöja, små abborre, gers) were absent (Tab. 1, Fig. 2). The average catches per seine haul and per fishing day were 2000 and 1333 kg.

About 4600 kg predatory fishes were released back to the lake in good condition. They consisted of pikeperch (gös, 38 individuals, 98 kg), pike (gädda, 81 ind., 180 kg) and predatory perch (abborre >15 cm 9684 ind., 4338 kg). (Tab. 1). The prey-predator ratio in the catch was 0,9.

### Some notices and conclusions

The "seine-fishable" fish population (i.e. the fishes that can be detected by echo sounding and also seined at open water) have now changed markedly two times during this four years seining history; 2017 and 2018 the main catch was all sizes of bream and roach, 2019 small perch (one summer old) and ruffe, and now 2020 only big specimens of roach, bream and tench and especially predatory perch weighing 200 – 1300 g. Actually, big perch was the main catch in such a way that we have never experienced anything like that in our 30 years seining history in hundreds of lakes. Almost 10 000 individuals and 4300 kg big perch was released from the three seine hauls! That is already 11 kg/ha!

The water was now very clear and Secchi disk was visible from 2,6 m in the deep area of the lake, which is a vast improvement from our first measurement 0,45 m in autumn 2017. Thus, the lake is suitable for this restoration method and the reduction fishing of bottom dwelling big cyprinids is done with sufficient effort so far (Fig. 3).

Increasing water clarity (and increasing water plant biomass) changes the behavior of fishes especially during the cold season when the need for daily food can be satisfied with relatively short (night time) activity. According to test fishing with Nordic gillnets (C J Natur 2020) and spring time fykenet fishing (Nimmerns fiskevårdsförening) there are still reasonable populations of small perch and ruffe, perhaps also roach, in the lake but now they hardly have a dark refuge (needs now 2 x 2,6 m = 5,2 m depth!) in the open water near littoral feeding areas. Thus, they now seem to prefer littoral vegetation zones as daytime hiding places. All predatory perch were in good condition (actually they were fat!) and thus there still is or has been adequately small fishes for feeding even though these were not present in catches or found by echo sounding. The observed biomass of visually feeding predatory perch makes a serious daytime risk for all

small fishes in the lake. We suppose that during the next couple years the reproduction of all species in the lake will be diminished by foraging perch. This includes the perch itself too; they will reproduce good age classes but they will also eat them away during the following summer.

During the two days we echo sounded all the open water areas in the fishable area once or twice, and also a marked proportion of the non-fishable northern part of the lake. Both side scanner and traditional echo sounding techniques were used. The bottoms of the lake were mostly empty and those few places where fish gatherings/shoals were found were also seined. After the third haul we did again a thorough echo sounding but did not find anything else but even more marks of big perch. At this point more seining was considered useless.

In the previous 2017-2019 fishing reports we anticipated that cyprinid spring migration from the deeper and colder Lake Åsunden might cease some of the benefits of reduction fishing. So far, no significant migration has occurred, which is good news.

It is interesting to make comparative statistics about the changes in the seine catches 2017-2020, and we have added a such excel file (comparative20172020.xls) to this report. However, the conditions for the fishing have been so different in 2019 - 2020 when compared to 2017-2018 that the results are only informational and they do not show how the numbers or biomasses of different species or size classes have changed. As an overall result we would rather use the trend in Fig. 3, which shows that biomass of bottom stirring bream and roach is diminished markedly.

### What next - suggestions for coming years

Here we would like to suggest the same procedure as in the report 2019. In short:

1. Surveying the essential water chemistry (Total phosphorous and Secchi depth) during a year cycle in a cheap way (read more from 2019 report)
2. Reduction fishing every 2-5 years, schedule can be adjusted later according to water sample results, visual observations and catches.

This opinion was asked to add to this report:

The results from the spring time fykenet fishing with two fykenets, done by Nimmerns Fiskevårdsförening, can be used as a one measure for evaluating the need for reduction fishing. The catch from this fishing shows rather well the dominant species and age classes. The fykenet catches as such are quite low and not very effective for biomanipulation purposes.

### Thanks!

Thanks again for all the help during the fishing and for the excellent organization and handling of the catch at the shore for Nimmerns Fiskevårdsområdesförening.

November 5<sup>th</sup>, 2020

Arto Hautala

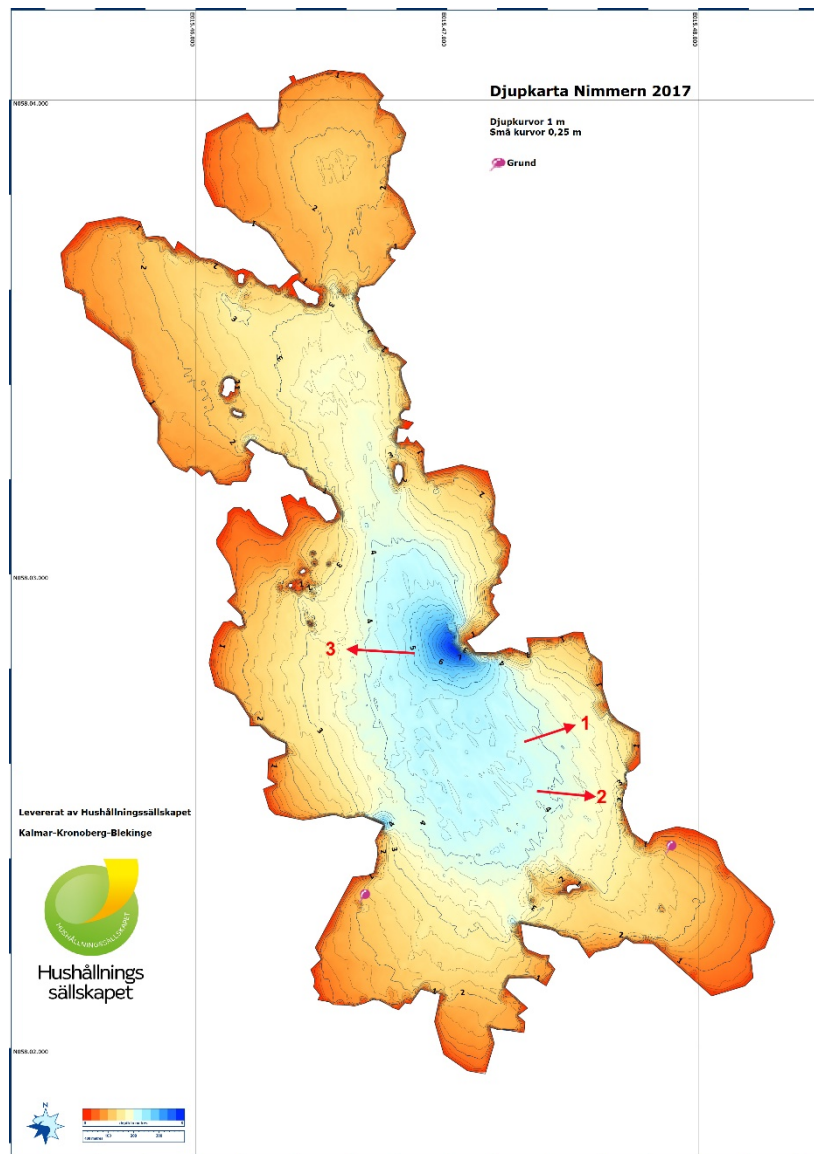
Aulis Kiiskilä

Fish biologist

Fisheries engineer

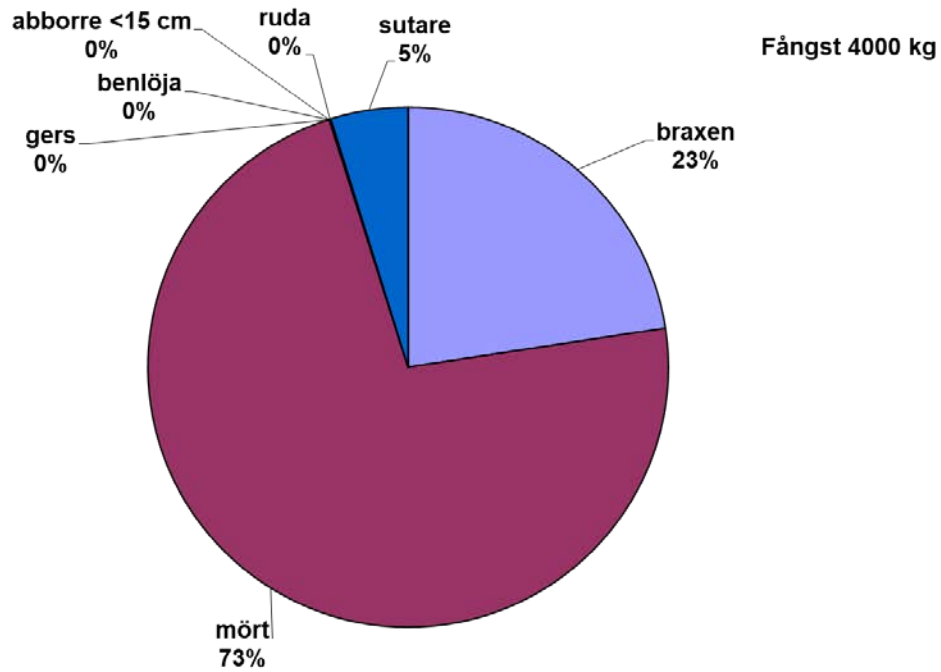
WWW.VÅRDFISKE.FI

1) Target catch (kg) =  $16.9 \times (\text{TP ug/l})^{0.52}$ . (TP=total phosphorus during vegetation period 15<sup>th</sup> June – 15<sup>th</sup> September). Jeppesen, E. & Sammalkorpi, I. 2002. Lakes. In: Davy, A.J. & Perrow, M.R.(ed.). Handbook of ecological restoration. Vol. II. Restoration in practice. Cambridge University Press: 297-324

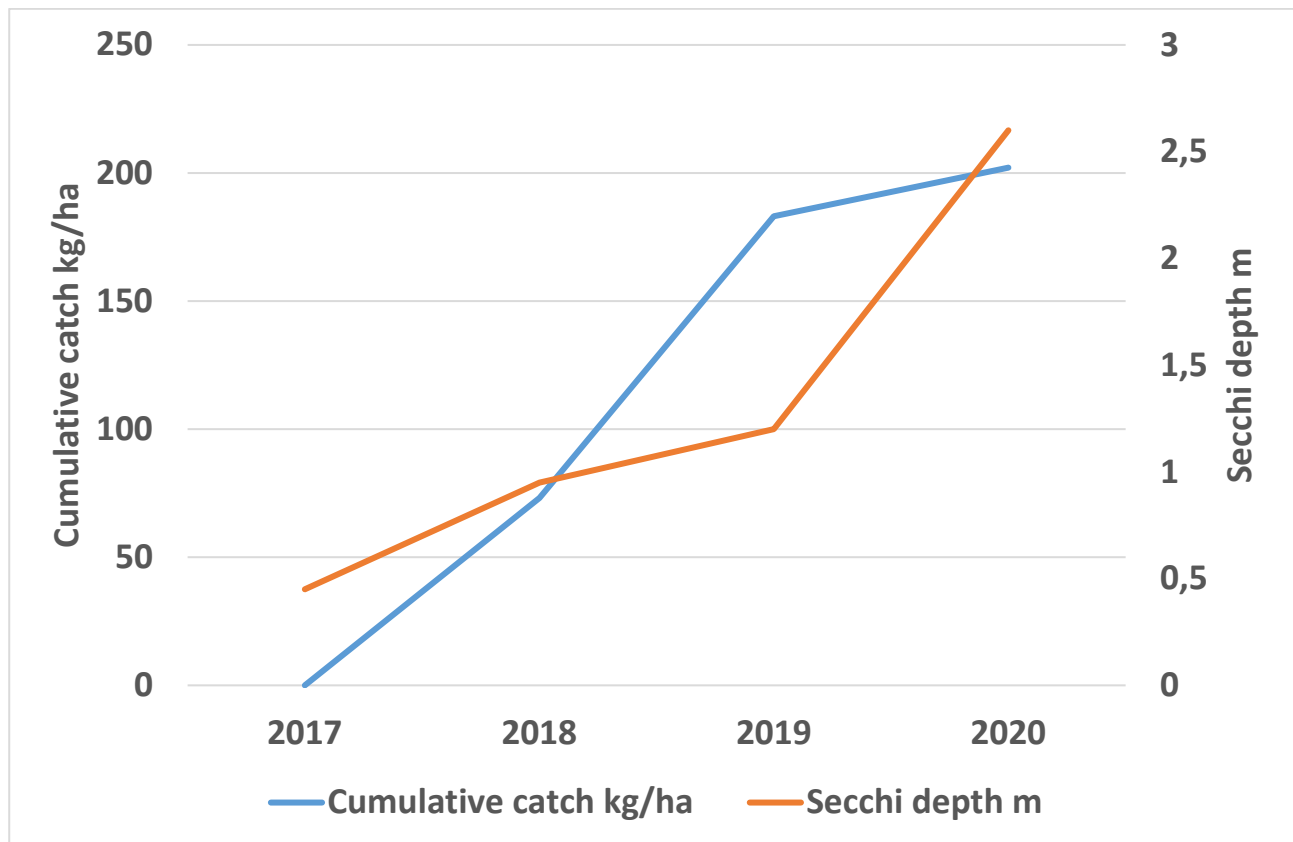


**Figure 1.** The locations of 3 seine hauls made in the survey/reduction fishing of cyprinids by seining in Lake Nimmern in autumn 2020





**Figure 2.** The composition of catch in the reduction fishing of cyprinids by seining in Lake Nimmern in autumn 2019



**Figure 3.** Development of cumulative biomanipulation catch and Secchi depth in Lake Nimmern in 2017-2020. Secchi depth was measured in the lake's deep area during the seining in late October.



*A typical catch in autumn 2020 seine fishing: a lot of predatory 200-1300 g perch and some big cyprinids. Left photo by [vardfiske.fi](http://vardfiske.fi), right photo by CJNatur*