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

General

Båtsjön is a 111 hectare lake at Åtvidaberg municipality. The lake suffers from unnaturally high nutrient content. Reduction fishing of cyprinids is one of the methods, and a relatively inexpensive one, for reducing internal loading of nutrients and summertime algae problems as well as increasing water clarity. The method suits best to the lakes where external loading does not explain wholly the bad condition of the lake and the highest nutrient contents and murkiest water are observed during warm summer months when fish activity is most intense. The Finnish seining method for cyprinid fishing has been developed during the last 30 years, starting from early 1990s. In small lakes (about <100 ha) it can be used throughout a year but especially in large lakes the technique is most effective during autumn when cyprinid fishes tend to shoal to dark refuges, i.e. deep areas of a lake, at daytime.

The seining and catches

The seining took place on 26th – 30th October including five days of fishing and nine seine hauls. Conditions were good for both echo sounding and seining. Water temperature decreased slightly from 8,9 to 8,4 °C during the period. Secchi depth was measured as 1,4 m. The seine used was a 314 m long and 6 m deep cyprinid bottom seine.

The fish were found from the areas that were at least 3 m deep and there close to the bottom. The smallest species and individuals occupied only the deepest 3,5-3,7 m areas while big bream were also found on somewhat shallower areas. This pattern was consistent through the fishing days.

The total biomanipulation catch was 13100 kg and consisted mainly of bream (braxen 59 %), roach (mört 20 %) and bleak (benlöja 9 %). Other species (gers, små abborrar, björkna, sutare) made about 12 % of the catch. (Table 1, Figure 1). The average catches per seine haul and per fishing day were 1456 and 2620 kg. Length of the nine seine hauls varied between 120 – 510 m and they covered about 2-10 ha areas accordingly (Figure 2).

About 1180 kg predatory fishes were released back to the lake in good condition. They consisted of pikeperch (gös, 1356 individuals, 909 kg), pike (gädda, 186 ind., 252 kg) and predatory perch (abborre >15 cm, 93 ind., 17 kg) (Table 1). The prey-predator ratio (kg/kg) in the total catch was about 11.

Some notices and conclusions

The fishing cost for the catch was 5,8 Skr/kg (just our fishing, without other possible costs). With this figure seining was cost effective at Lake Båtsjön and the lake is suitable for the method. In our seining and fykenet fishing contracts cost per kg has varied typically in a range of 1-20 Skr/kg. We consider costs under 10 Skr/kg cost-effective and 10-20 Skr/kg reasonable. Prices over 20 Skr/kg are costly and with these figures one should consider changing the methods.

The biomanipulation catch was 118 kg/ha. This is under the preliminary target of 157 kg/ha [1)] and fishing should be continued during the next year. We suppose the target catch is achieved in about 3 extra seining days and one might ask why the three extra days were not done at once. However, usually a break in the fishing re-promotes the shoaling of cyprinids and the rest of the target catch is gained with less days and costs. Usually, the first year's catch is about 50-75 % of the target and the rest is achieved in the next year or two.

The biomass of cyprinid fishes contains 0,8 % phosphorus and 2,5 % nitrogen[1)]. Therefore, the fishing removed directly 105 kg phosphorus and 328 kg nitrogen from the lake´s ecosystem.

The lake has a rather good population of predatory fishes but the dominance of pikeperch (gös) over pike and especially predatory perch is typical for nutrient rich lakes. If the fishing increases water clarity, perch normally reacts quickly and increases its population markedly.

Lake Båtsjön is shallow and the present catch might already be enough to increase the autumnal Secchi depth over 2 meters. When this happens, the lake does not offer dark refuge for fishes anymore. In that situation all small cyprinids that are under the biggest risk to be eaten by pike or fish-eating birds may move to rivers or inside littoral vegetation during the autumn. Accordingly, all what is left for seining at open lake area is the biggest roach and bream. They may be enough to achieve the target catch but if not, the fishing method must be changed. Firstly, the seining could be started earlier during warm water (> 12 °C) when all the fishes are usually still in the lake. Or secondly, the river areas where fishes migrate should be sought and found a method to catch them from there.

1) Target catch (kg) = 16.9 x TP ug/l 0.52 ; 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

Thanks!

Thanks for the good organization of the project. And thanks for all the help and good company for the local people during the fishing.

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Table 1. *The hauls and catches in the reduction fishing of cyprinids by seining in Lake Båtsjön in autumn 2020. An excel file with a more complete fishing diary has been sent separately for the client.*

DRAG				FÅNGST kg								ROVFISKAR						
							abborre				Biomanipulering	gös		gädda		abborre >15 cm		Rovfiskar
nummer	dag	lengd m	yta ha	braxen	mört	gers	<15 cm	benlöja	björkna	sutare	fångst kg	st.	kg [2]	st.	kg [3]	st.	kg [4]	tillsammans kg
1	26.10.2020	250	5	1020	280	27	170	170	30	3	1700	57	46	26	26	8	1	73
2	26.10.2020	180	3.6	1430	135	25	25	135	45	5	1800	132	106	36	36	2	0	142
3	27.10.2020	250	5	370	130	64	160	105	20	1	850	58	46	10	10	18	3	59
4	27.10.2020	230	4.6	1640	150	24	60	120	6	0	2000	112	90	21	42	5	1	132
5	28.10.2020	220	3.3	920	460	13	90	110	6	1	1600	245	98	9	27	7	1	126
6	29.10.2020	310	6.2	220	780	14	390	45	0	1	1450	85	170	21	32	20	6	208
7	29.10.2020	250	5	110	436	55	55	440	2	2	1100	108	86	24	24	15	2	113
8	30.10.2020	510	10.2	100	150	200	10	40	0	0	500	450	180	7	7	8	1	188
9	30.10.2020	120	1.8	1950	40	18	5	5	2	80	2100	109	87	32	48	10	2	137
			44.7	7760	2561	440	965	1170	111	93	13100	1356	909	186	252	93	17	1177

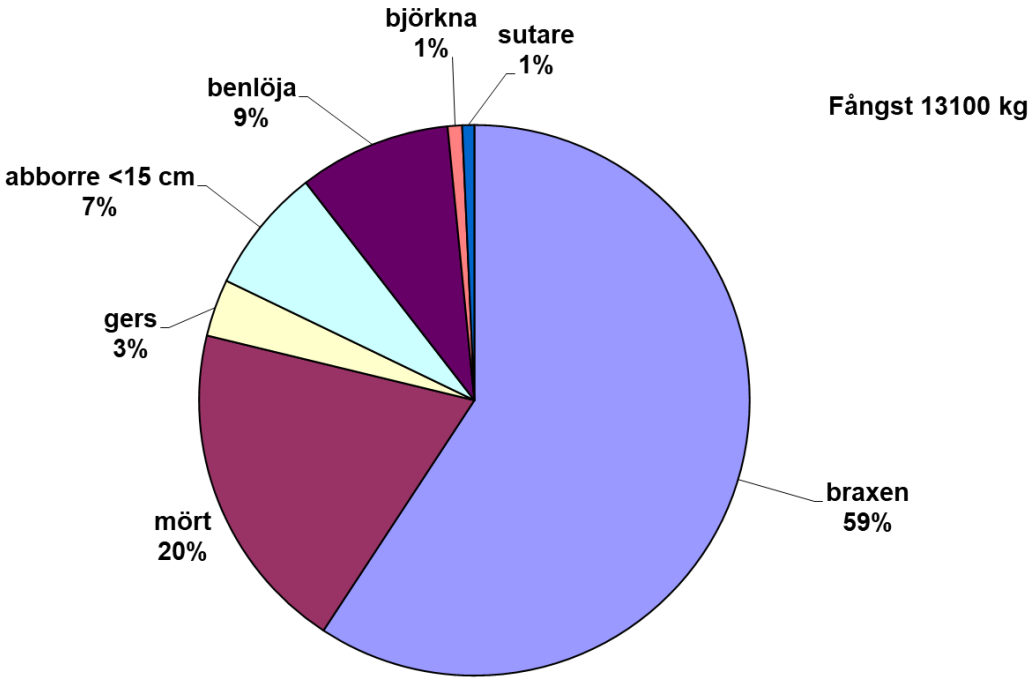

Figure 1. *The composition of catch in the reduction fishing of cyprinids by seining in Lake Båtsjön in autumn 2018*

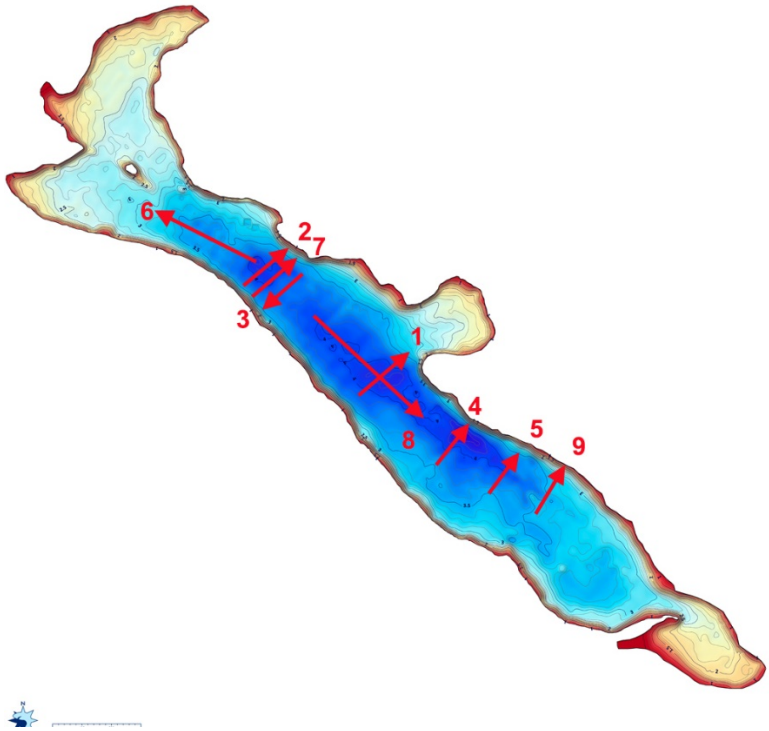

Figure 2. *The locations of 9 hauls made in the reduction fishing of cyprinids by seining in Lake Båtsjön in autumn 2020. The layout depth map is by Husshållningssällskapet, Ola Helmerson.*