Pelagic Planktivores, 2004

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Introduction

Alewife (*Alosa pseudoharengus*) and rainbow smelt (*Osmerus mordax*) are the most abundant pelagic planktivores in Lake Ontario, and the most important prey for salmon and trout. Alewife are also an important prey for warm water predators, notably, walleye, and for cormorants. The abundance of alewife and smelt has declined over the past decade, likely due to reduced nutrient loading, proliferation of non-native dreissenid mussels, and the buildup of stocked salmon and trout predators. Coincident with this decline, threespine sticklebacks (*Gasterosteus aculeatus*) have become more prominent, and in 1995-1997 there was also a temporary increase in abundance of emerald shiners (*Notropis atherinoides*). These recent observations may signal a change in the pelagic fish community.

The Ontario (OMNR) and New York (NYSDEC) management agencies addressed concerns about declining numbers of prey fish in 1993. At that time the number of salmonines stocked was reduced to a level that would cut the prey demand by approximately half. Since then, however, following public consultation on both sides of the border, stocking levels were moderately increased in 1997. Furthermore, since 1997 increased rates of natural reproduction of Chinook salmon have been observed. Thus the alewife and smelt populations continue to be under intense predatory pressure.

Sound management decisions regarding predator-prey balance require continued monitoring of prey fish populations, and therefore starting in 1991 hydroacoustic surveys to estimate lake-wide abundance of pelagic prey fish have been undertaken jointly by the Ontario Ministry if Natural Resources (OMNR) and the New York State Department of Environmental Conservation (NYSDEC). Information from the hydroacoustic surveys complements information obtained in bottom trawling surveys conducted jointly by NYSDEC and the U.S. Geological Survey (USGS) in the U.S. waters of the lake.

The 2004 survey

The 2004 hydroacoustic survey was conducted during the period of July 20-29, and consisted of six cross-lake transects and an Eastern Basin transect (Fig. 1). This is design provides even geographic coverage, and easy access to ports. It has been followed since the start of the survey series in 1991 with only minor yearly modifications due to logistics. Transects followed a north-south line across the lake. Each night, sampling began approximately one hour after sunset at the 10 m depth contour on one side, and continued across the lake to the 10 m depth contour on the other side. Sampling was usually completed one hour before sunrise. Acoustic data were collected along each transects using a Biosonics DTX 120 kHz split beam echosounder.

The analysis and interpretation of the acoustic data has been delayed this year, due to our recent discovery of possible inconsistencies between the echosounder used since 2003, and the one utilized previously. Results from a side-by-side comparison of the two systems suggest that estimates from the current echosounder tend to be lower than those from the old system. We are undergoing a more comprehensive evaluation of potential inconsistencies before finalizing the 2004 prey population estimates. Similarly, the 2003 estimates (Schaner and LaPan 2004) will likely have to be revised in view of the new information.

Thirteen midwater tows using a 57m^2 trawl net were also conducted during the survey, to obtain samples to assess biological attributes of the prey fish. The following brief observations are based solely on trawling results.

Alewife

The size composition of alewife caught in the trawls (Fig. 2) suggests that older fish dominated the 2004 population. Few fish in the 120mm range, corresponding to 2-year old fish, were caught anywhere, and although some fish under 110mm (1-year olds) were caught, they appeared to be limited to the Kingston Basin.

The mid-summer condition of adult alewife, which was exceptionally low in 2003, appeared to return to the average level observed over the past decade (Fig. 3).

Smelt

The catches of rainbow smelt in the midwater trawls in 2004 were extremely low, similar to 2003. Most of the fish caught were 1-year olds (Fig. 4). The mid-summer condition of the smelt, expressed as the expected weight of a 120mm fish, could not be assessed with any confidence this year due to low sample number.

Threespine stickleback

Threespine sticklebacks are not currently assessed from the acoustic data. They are caught in the midwater trawls, albeit not efficiently, since they are too small for the trawl's mesh size. Nevertheless, over the years the trawls have provided a rough index of the stickleback abundance. In 2004 sticklebacks were caught in most tows, and the average catches were high (Fig. 5). Both the frequency of capture, and the numbers caught suggest that their abundance in 2004 was higher than the average observed since the sticklebacks became prominent in Lake Ontario in the early 1990s.

References

Schaner, T., and S. R. LaPan. 2004. Pelagic planktivores. In: 2003 Annual Report, Bureau of Fisheries, Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes Fishery Commission's Lake Ontario Committee.

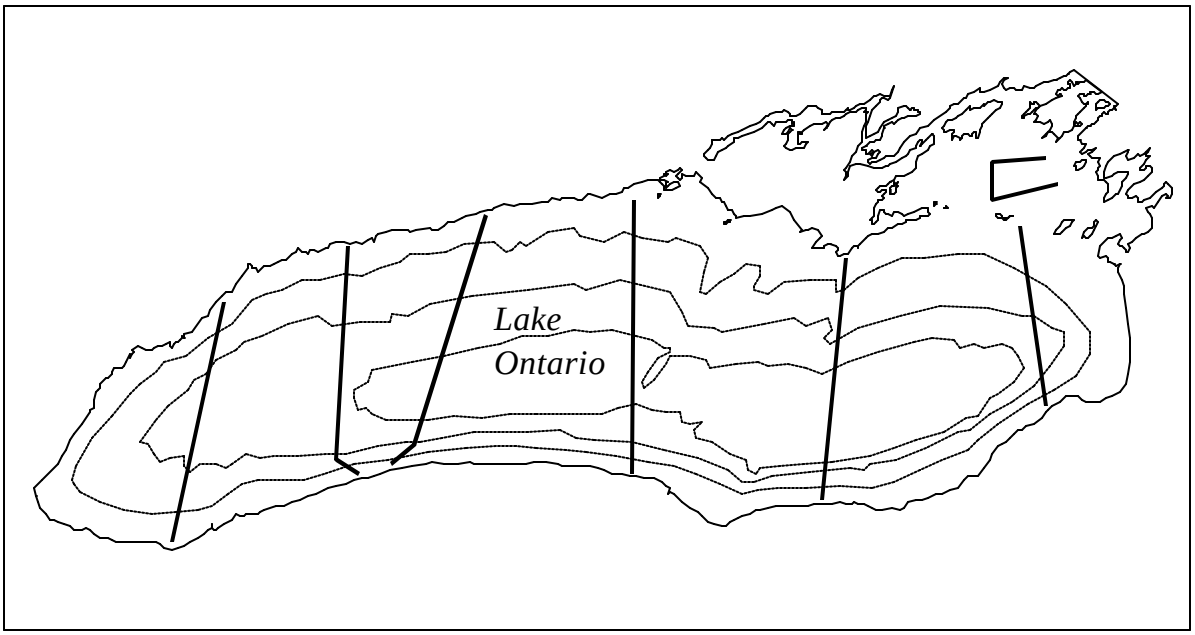

Figure 1. Transects surveyed in the 2004 hydroacoustic survey.

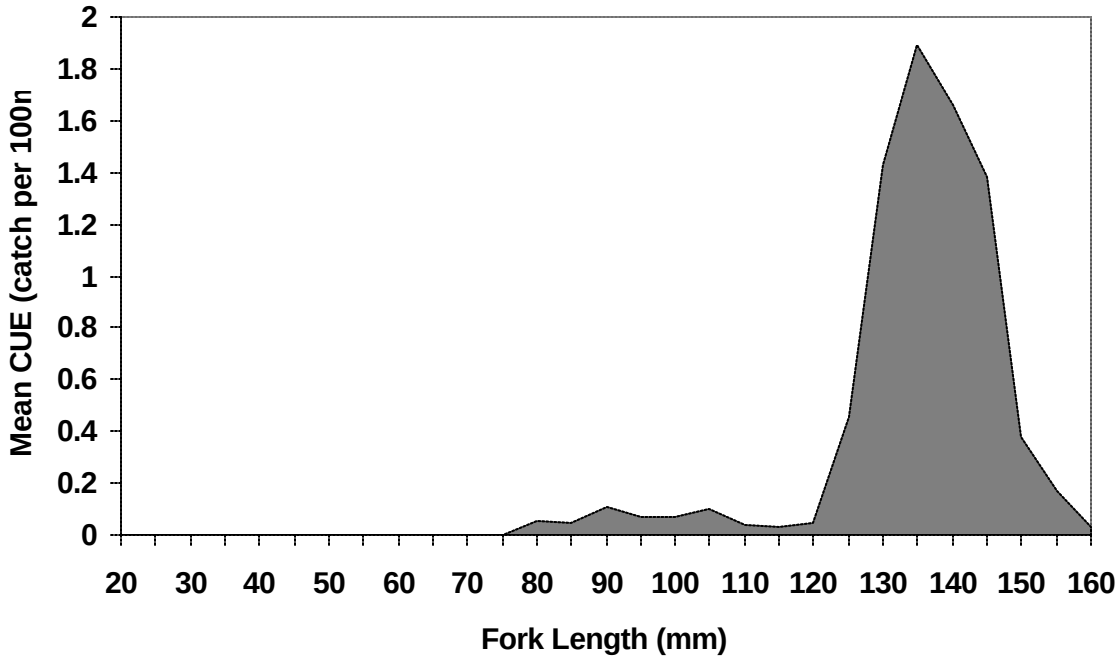

Figure 2. Length (FL) frequency distribution of alewife in the midwater trawl catches conducted during the 2004 hydroacoustic survey.

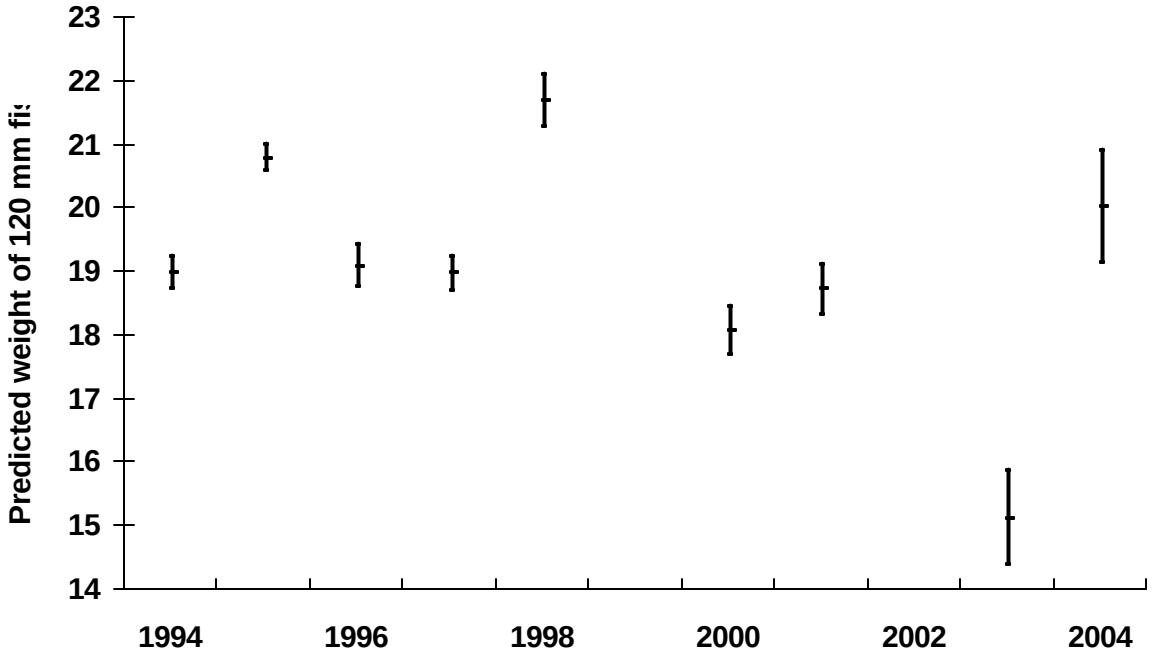

Figure 3. Predicted weights of 120mm (FL) alewife calculated from length-weight regressions of fish larger than 100mm captured with mid-water trawls in summer 2004 surveys. 95% confidence intervals on predicted weights are also indicated.

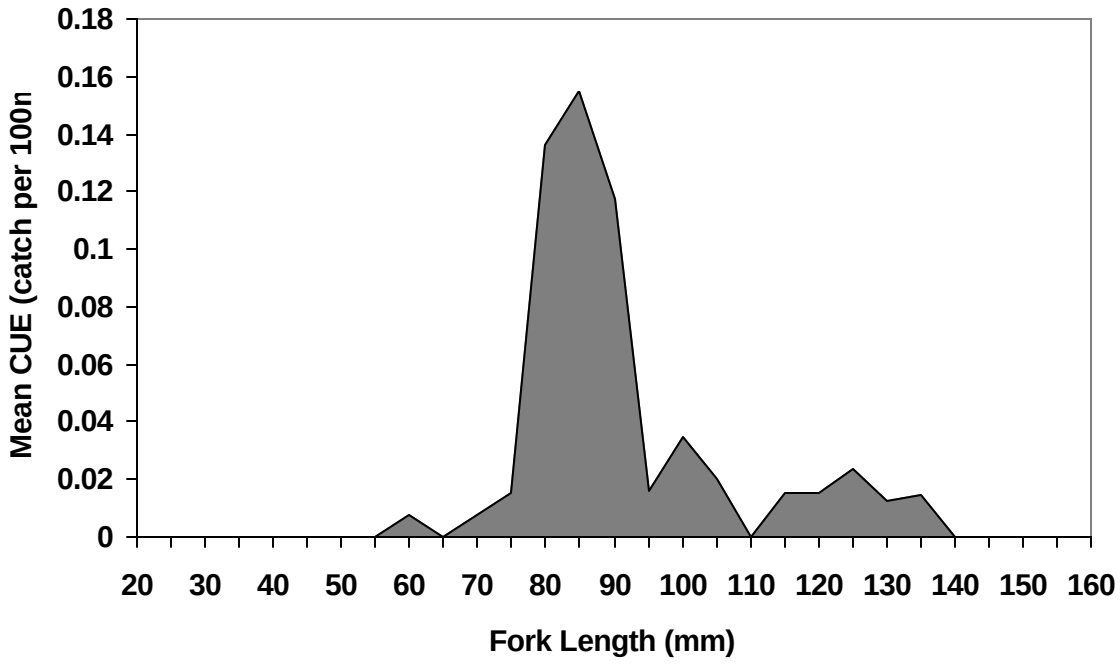

Figure. 4. Length (FL) frequency distribution of rainbow smelt in the midwater trawl catches conducted during the 2004 hydroacoustic survey.

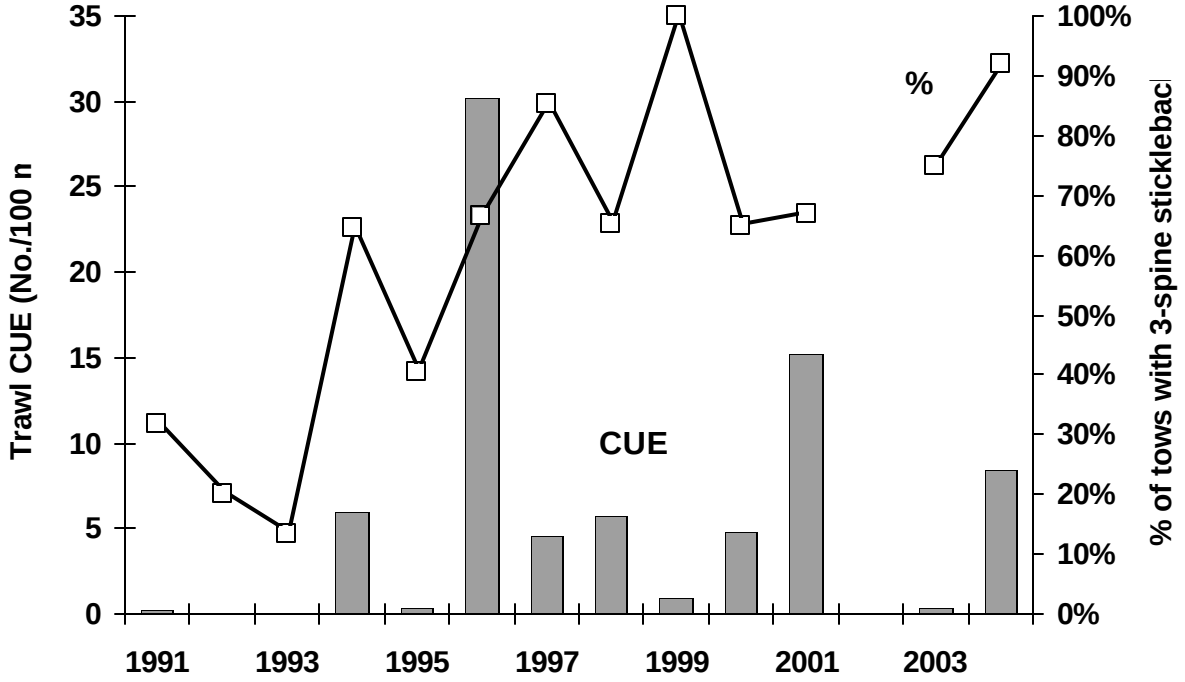

Figure 5. Catches of threespine sticklebacks in midwater trawls conducted during the summer 2004 hydroacoustic surveys. Bars represent yearly catch per unit effort; line shows proportion of tows that contained sticklebacks. No trawls were done in 2002.