

STATUS OF SEA LAMPREY CONTROL IN LAKE MICHIGAN

Adult Sea Lamprey:

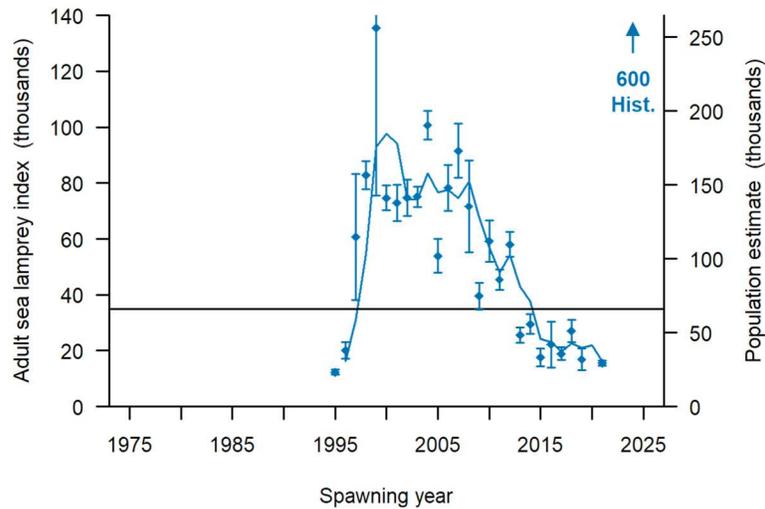


Figure 1. Index estimates with 95% confidence intervals (vertical bars) of adult sea lampreys, including historic pre-control abundance (as a population estimate) and the three-year moving average (line). The population estimate scale (right vertical axis) is based on the index-to-PE conversion factor of 1.89. The adult index in 2021 was 16,000 with 95% confidence interval (15,000-16,000). The three-year (2019-2021) average of 16,000 met the target of 35,000. The index target was estimated as 5/8.9 times the mean of indices (1995-1999).

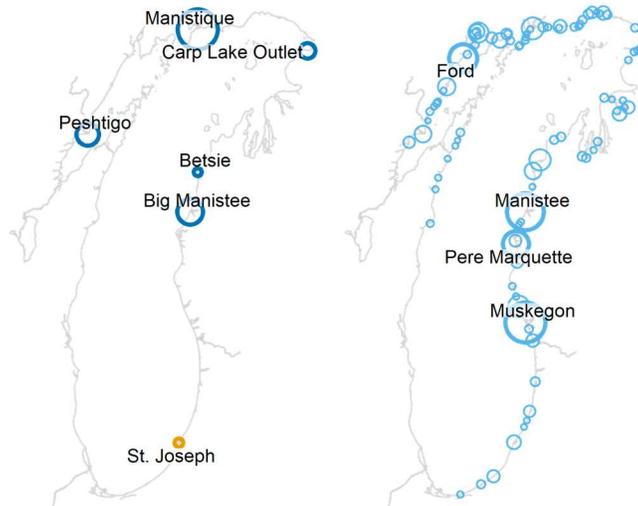


Figure 2. LEFT: Estimated index of adult sea lampreys during the spring spawning migration, 2021. Circle size corresponds to estimated number of adults from mark-recapture studies (blue) and model predictions (orange). All index streams are labelled. RIGHT: Maximum estimated number of larval sea lampreys in each stream surveyed during 1995-2012. Tributaries composing over half of the estimated maximum lake-wide larval population are identified (Muskegon 4,500,000; Manistee 3,600,000; Ford 1,800,000; Pere Marquette 1,400,000).

- The 3-year average (2019 – 2021) adult index estimate is meeting the target and the adult index has been holding steady over the past five years.
- Mark-recapture estimates were generated for five of the six index streams and the sixth estimate was modeled.
- Sources to watch include productive tributaries in the northern portion of the lake, particularly the Manistique River and the St. Marys River (Lake Huron). Delays in construction of a sea lamprey barrier on the Manistique River is a strong concern.

Lake Trout Marking and Relative Abundance:

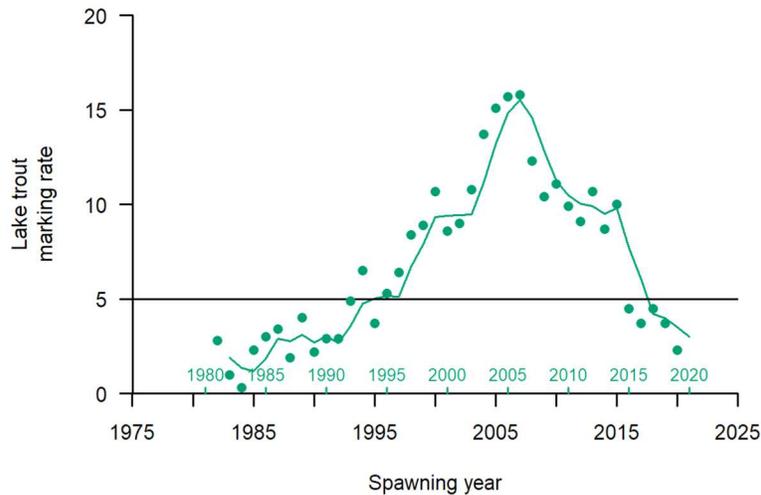


Figure 3. Number of A1-A3 marks per 100 lake trout > 532 mm from standardized assessments during August-November plotted against the sea lamprey spawning year, including the three-year moving average (line). The three-year (2019-2021) average marking rate of 3 met the target of 5 A1-A3 marks per 100 lake trout > 532 mm (horizontal line). A second x-axis shows the year the lake trout were surveyed.

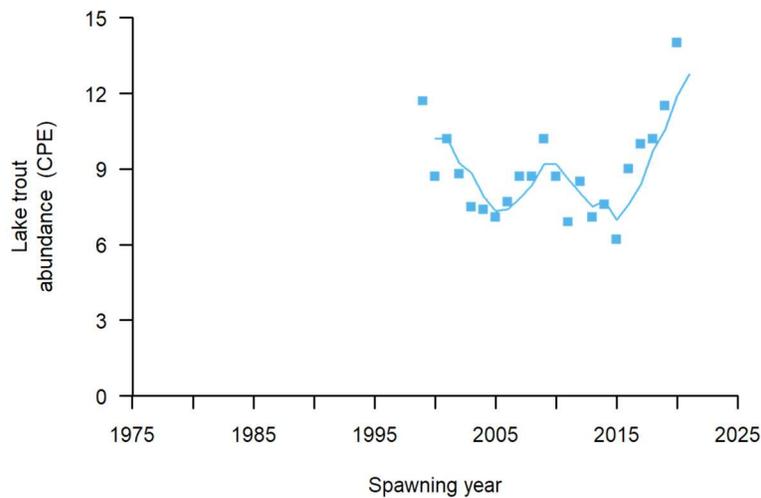


Figure 4. Lake trout relative abundance plotted against sea lamprey spawning year, including the three-year moving average (line). CPE = fish/1000'/net night of lean lake trout > 532 mm (21") total length caught in the Lake Wide Assessment Plan nets (the plan began in the late 1990s).

- The 3-year average marking rate is meeting target and the marking rate has been steady over the past five years.
- Lake trout relative abundance has been increasing over the past five years.

Lampricide Control - Adults vs. Field Days, TFM, and Bayluscide:

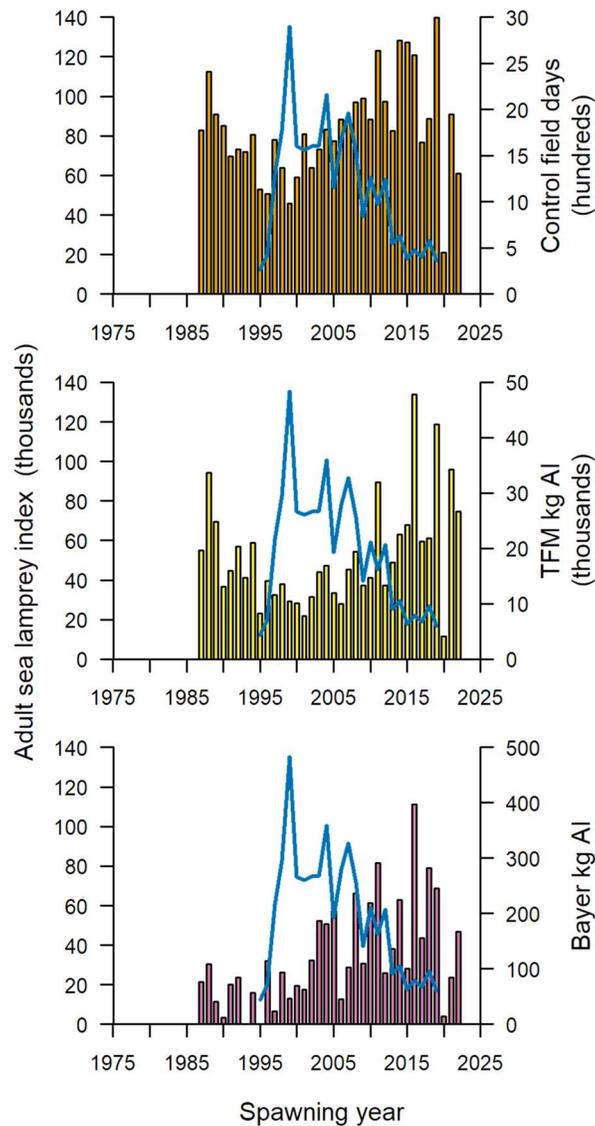


Figure 5. Index of adult sea lampreys (blue lines) and number of control field days (orange bars), TFM used (kg active ingredient; yellow bars), and Bayluscide used (kg active ingredient; purple bars). Field days, TFM, and Bayluscide are offset by 2 years (e.g., field days, TFM, and Bayluscide applied during 1985 is plotted on the 1987 spawning year, when the treatment effect would first be observed in adult sea lamprey populations).

- 2021 lampricide treatment information will be available soon. Ten tributaries were treated with TFM and two lentic areas were treated with granular Bayluscide during 2020 (2022 sea lamprey spawning year).
- Forty two tributaries were treated during 2017, nine during 2018, and 22 during 2019 (2019 to 2021 sea lamprey spawning years).
- Three lentic areas were treated during 2017, one during 2018, and two during 2019 (2019 to 2021 sea lamprey spawning years).
- Targeted treatment efforts focusing on Lake Michigan occurred during 2017 (2019 sea lamprey spawning years).
- Many of the areas of concern have been treated during recent years, including biennial treatments of the Manistique River since 2003 and increased treatment in the St. Marys River (Lake Huron), and sea lamprey abundance is likely responding.