

STATUS OF SEA LAMPREY CONTROL IN LAKE MICHIGAN

Adult Sea Lamprey:

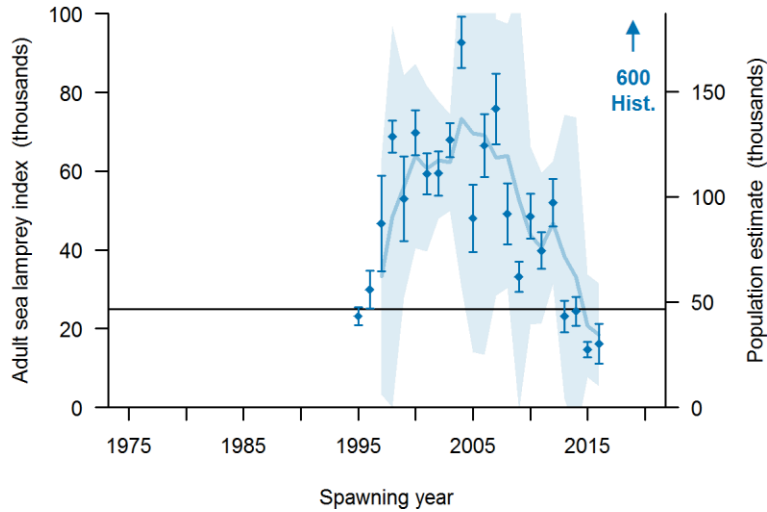


Figure 1. Index estimates with 95% confidence intervals (vertical bars) of adult sea lampreys, including historic pre-control abundance (as a population estimate) and the five-year moving average (line) with 95% CIs (shaded area). The population estimate scale (right vertical axis) is based on the index-to-PE conversion factor of 1.87. The adult index in 2016 was 16,000 with 95% confidence interval (11,000-21,000). The point estimate met the target of 25,000. The index target was estimated as 5/8.9 times the mean of indices (1995-1999).

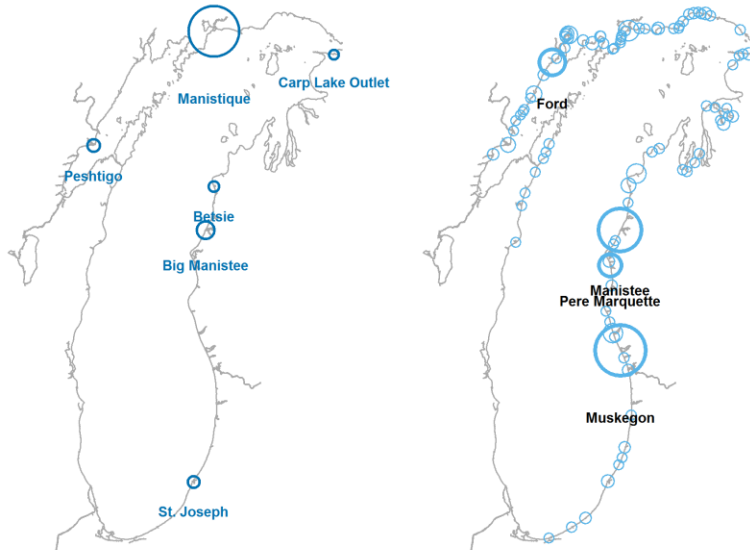


Figure 2. LEFT: Estimated index of adult sea lampreys during the spring spawning migration, 2016. Circle size corresponds to estimated number of adults from mark-recapture studies (blue) and model predictions (orange). All index streams are identified. RIGHT: Maximum estimated number of larval sea lampreys in each stream surveyed during 1995-2012. Tributaries composing over half of the lake-wide larval population estimate are identified (Muskegon 4,500,000; Manistee 3,600,000; Ford 1,800,000; Pere Marquette 1,400,000).

- The 3-year average adult index estimate is meeting the target and the adult index has been holding steady over the past 5 years.
- 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:

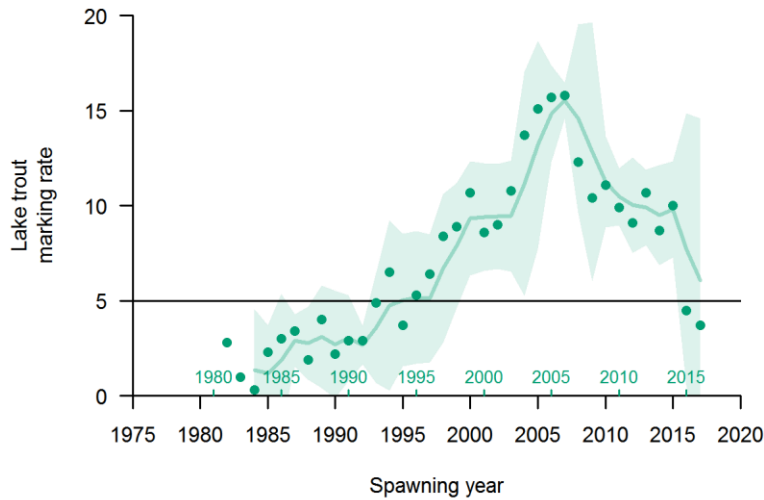


Figure 3. Number of A1-A3 marks per 100 lake trout > 532 mm from standardized assessments during August-November plotted against the sea lamprey spawning year, including the three-year moving average (line) with 95% CIs (shaded area). The marking rate of 3.7 in spawning year 2016 met the target of 5 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) with 95% CIs (shaded area). 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 above target, but the marking rate has been decreasing over the past 5 years.
- Lake trout relative abundance has been holding steady over the past 5 years.
- Sea lamprey-induced mortality in the northern portion of the lake has set lake trout restoration efforts back by at least a decade.
- Sea lamprey-induced mortality is affecting the quota for the commercial fishery in that components of the lake trout management regimen are currently suspended in the consent decree agreement between the tribes, the state of Michigan, and the federal government.
- The Commission, in collaboration with management agencies, is building lake trout marking and abundance databases to advance the assessment and guidance of the program.

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

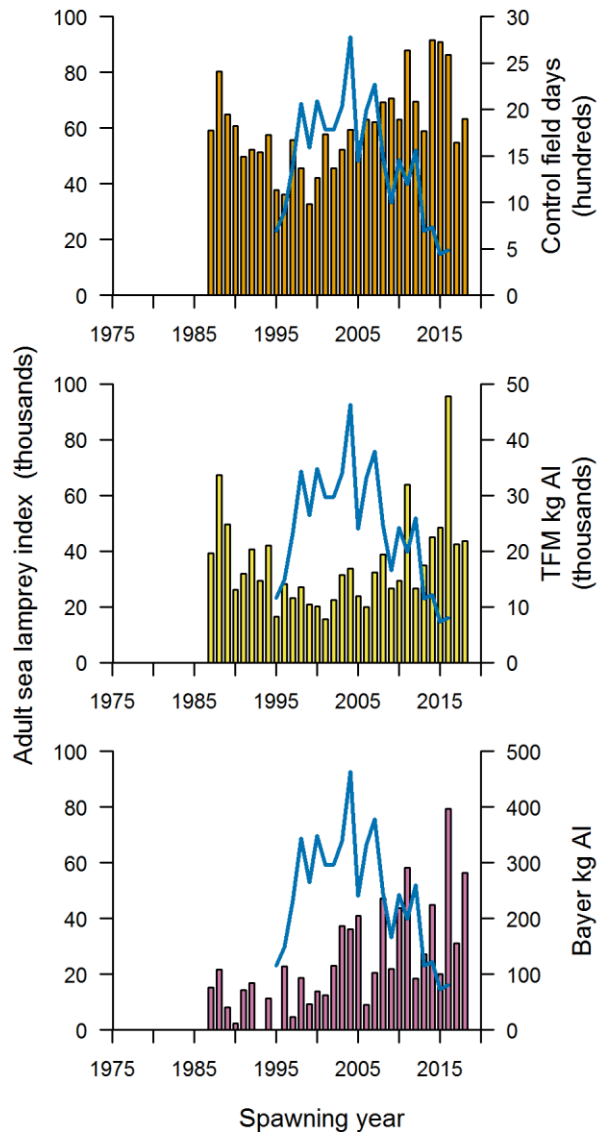


Figure 5. Index of adult sea lampreys (blue lines) and number of control field days (orange bars), TFM used (kg active ingredient; yellow bars), and Bayluscide used (kg active ingredient; purple bars). Field days, TFM, and Bayluscide are offset by 2 years (e.g., field days, TFM, and Bayluscide applied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

- twenty-two streams were treated during 2014, 20 during 2015, and 14 during 2016 (2016 to 2018 spawning years).
- Five lentic areas were treated during 2014, three during 2015, and two during 2016 (2016 to 2018 spawning years).
- Many of the areas of concern have been treated during recent years, including six treatments of the Manistique River since 2003 and increased treatment in the St. Marys River (Lake Huron), and sea lamprey abundance is likely responding.