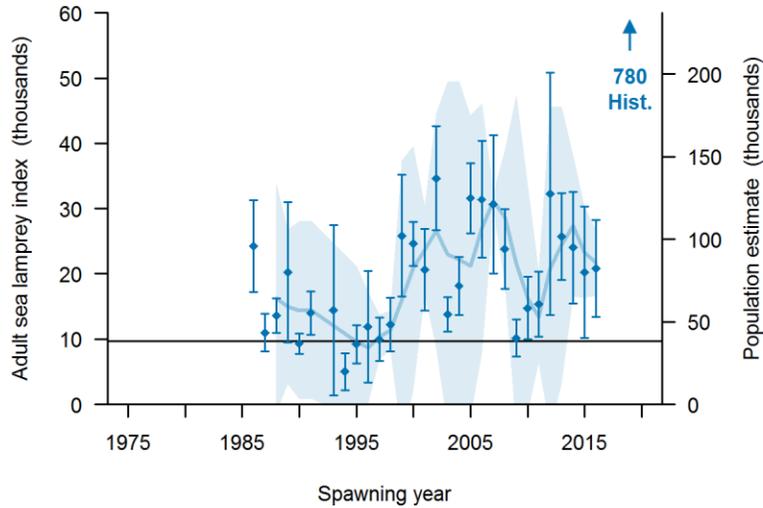
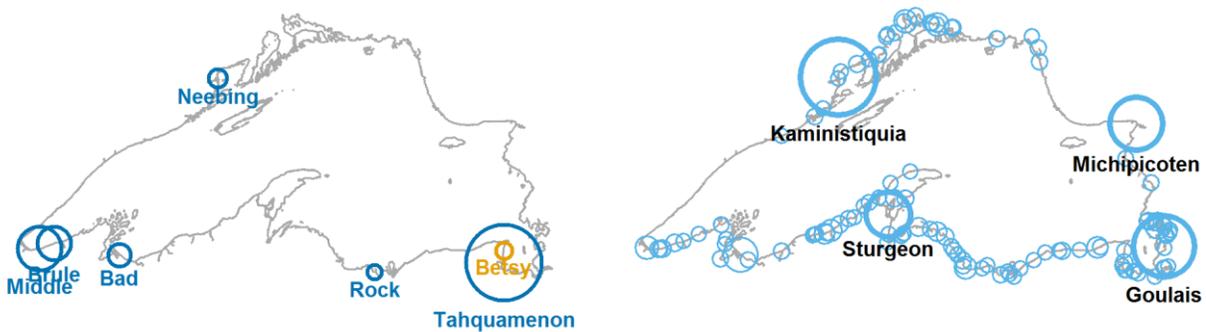


# STATUS OF SEA LAMPREY CONTROL IN LAKE SUPERIOR

## Adult Sea Lamprey:



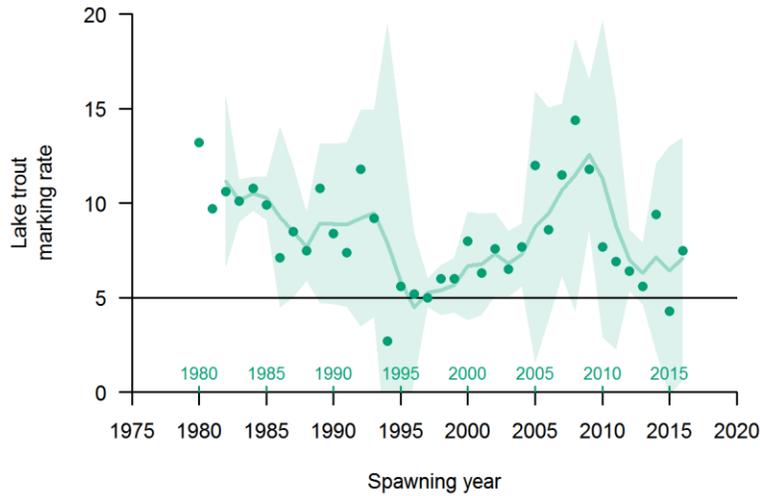
**Figure 1.** Index estimates with 95% confidence intervals (vertical bars) of adult sea lampreys, including historic pre-control abundance (as a population estimate) and the five-year moving average (line) with 95% CIs (shaded area). The population estimate scale (right vertical axis) is based on the index-to-PE conversion factor of 3.95. The adult index in 2016 was 21,000 with 95% confidence interval (13,000-28,000). The point estimate was above the target of 9,700. The index target was estimated as the mean of indices during a period with acceptable marking rates (1994-1998).



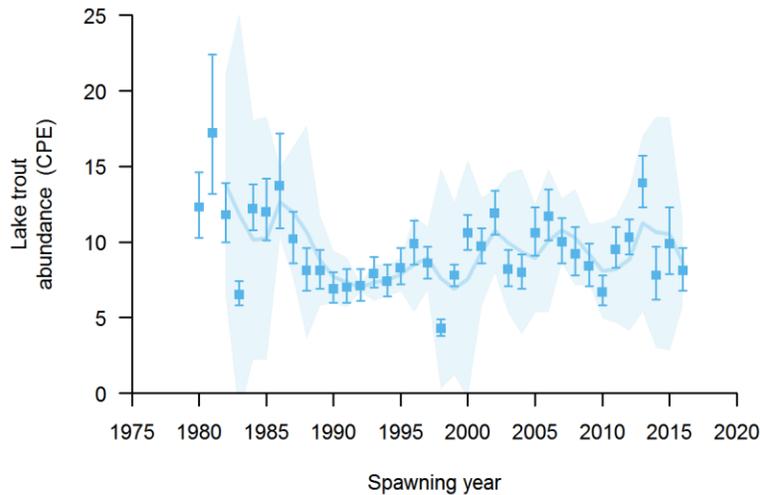
**Figure 2.** LEFT: Estimated index of adult sea lampreys during the spring spawning migration, 2016. Circle size corresponds to estimated number of adults from mark-recapture studies (blue) and model predictions (orange). All index streams are identified. RIGHT: Maximum estimated number of larval sea lampreys in each stream surveyed during 1995-2012. Tributaries composing over half of the lake-wide larval population estimate are identified (Kaministiquia 6,600,000; Goulais 5,000,000; Michipicoten 4,100,000; Sturgeon 3,300,000).

- The 3-year average adult index estimate is above the target, but the adult index has been decreasing over the past 5 years.
- Sources of concern, including the Bad River and lentic areas of the Kam, Nipigon, Gravel, and Batchawana rivers are being addressed.
- The Black Sturgeon River is also a concern due to uncertainty about the future of a *de-facto* sea lamprey barrier presently in place on the river.

**Lake Trout Marking and Relative Abundance:**



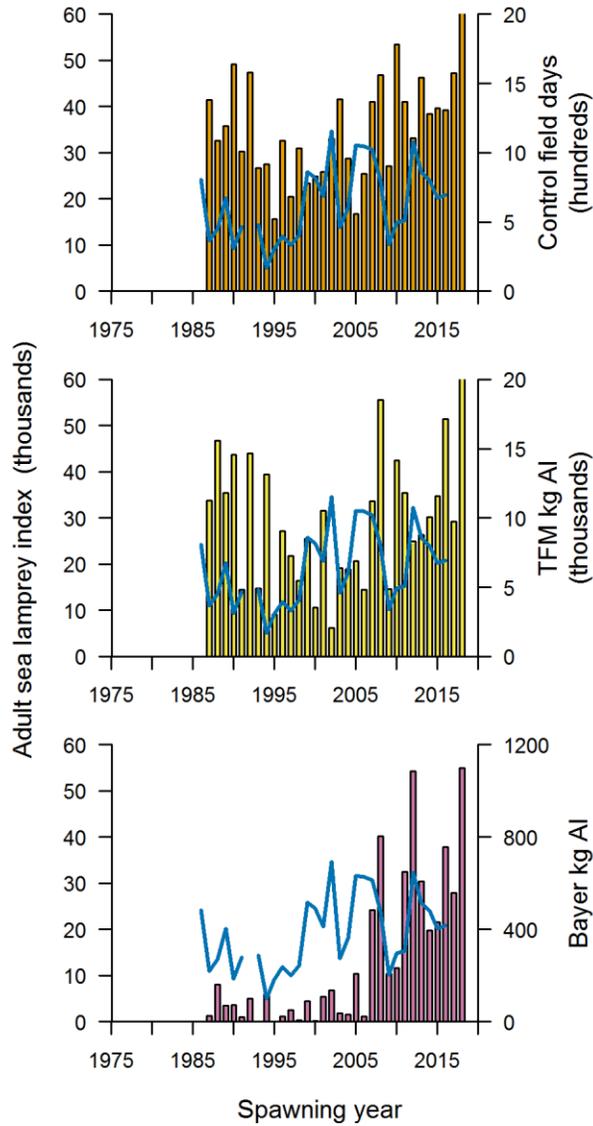
**Figure 3.** Number of A1-A3 marks per 100 lake trout > 532 mm from standardized assessments plotted against the sea lamprey spawning year, including the three-year moving average (line) with 95% CIs (shaded area). The marking rate of 7.5 in spawning year 2016 was above the target of 5 A1-A3 marks per 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 (May assessments using 4.5 inch gillnets) plotted against sea lamprey spawning year, including the three-year moving average (line) with 95% CIs (shaded area). CPE = fish/km/net night of lean lake trout > 532 mm (21") total length.

- The 3-year average marking rate is above target and marking rates have been holding steady over the past 5 years.
- Marking is currently highest in some of the Michigan portions of the lake, but marking has declined in Minnesota waters during recent years.
- Catch-at-Age modeling in some Michigan waters shows that sea lamprey mortality exceeds the mortality caused by the fishery (fishing mortality is low, however, in Michigan waters).
- Lake trout relative abundance has been holding steady over the past 5 years.
- The Commission, in collaboration with management agencies, is building lake trout marking and abundance databases to advance 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-eight tributaries were treated during 2014, 28 during 2015, and 50 during 2016 (2016 to 2018 spawning years).
- Eight lentic areas were treated during 2014, six during 2015, and 12 during 2016 (2016 to 2018 spawning years).
- Many of the lentic areas of concern have been treated during recent years.
- In general, the increase in control effort that began in 2000 (2002 spawning year) and then again in 2006 (2008 spawning year) correlates with the marking rate on lake trout meeting the target.