

Decreasing Sea Lamprey Populations in the Great Lakes

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Introduction

The sea lamprey are ancient fish that have been on earth for at least 340 million years (6). However, they are not native to the Great Lakes as they were introduced in the 1830s when shipping canals were built from Lake Ontario to Lake Erie, allowing them to cross Niagra falls and invade the Great Lakes (6). Sea Lampreys are an invasive species that devastate the Great Lakes ecosystems by latching on to a fish and causing them to either die of blood loss or infection at the wound site. In the lifetime of a lamprey, they are estimated to consume around 40 pounds of fish (7). Due to their high reproductive rates and lack of natural predators in the Great Lakes, their populations have skyrocketed, and native fish populations have decreased.



Figure 1. A Sea Lamprey's suction cup like mouth full of sharp teeth
source: nas.er.usgs.gov

Process Description

1. Sea Lamprey Larvae hatch from eggs
2. Larvae then travel to tributaries where they burrow in sand and will stay to develop into adult Lamprey
3. The Lampricide TFM is then applied to the tributary with a measured concentration
4. TFM acts physiologically disrupting Larvae energy metabolism
5. Unlike other fish Lamprey have low levels of enzymes to fight TFM
6. Eventually the Lamprey die before reaching adulthood
7. Depending on a tributaries characteristics (temperature, pH, stream discharge) the TFM is reapplied every 3 to 5 years (6).

Potential Impact on Ecological Services

Lampricides:

- Do not always work
- Could create lampricide resistance if used alone
- Documented harm towards other aquatic life populations such as mudpuppies or sturgeon (1 & 4)
- Potential harm towards humans due to TFM being an estrogen agonist (6)

Lamprey Traps:

- Do not always work
- Could break and pollute waterways
- Could potentially catch wrong fish

Lamprey Sterilization:

- Could take too long to provide real dent in population

Although lampricides are effective, the risks are too high to rely on them entirely. Using traps to catch or scare lamprey away from different parts of the water using pheromones will also help. Lamprey sterilization is also a good idea because the females will still try to reproduce with the males. In 2017 in the Cheboygan River, sterile males were released, and in the various tributaries, sea lamprey larvae were either not seen or had decreased populations (8).



Figure 3. Sea lamprey traps in river.
Source: T. Lawrence via GLFC

Sensitive Unit

The most important part of managing sea lamprey populations is rapidly decreasing the number of sea lampreys. Female sea lampreys can lay up to 10,000 eggs (8). Once these babies hatch, they lie dormant under the sand to live as bottom feeders for a few years (6). They begin to wreak havoc on the native fish populations as they mature.



Figure 2. Baby sea lampreys. Source: R. McDaniel, Great Lakes Fisheries Commission

Adult sea lampreys have caused such severe damage to native fish species, such as declining lake trout populations and driving three species of fish to extinction (6). Although population control measures have decreased sea lamprey numbers, there are still large amounts of them found in the Great Lakes (6):

- ~69,000 in Lake Huron
- ~80,000 in Lake Superior
- ~27,000 in Lake Michigan
- ~24,000 in Lake Ontario
- ~10,000 in Lake Erie

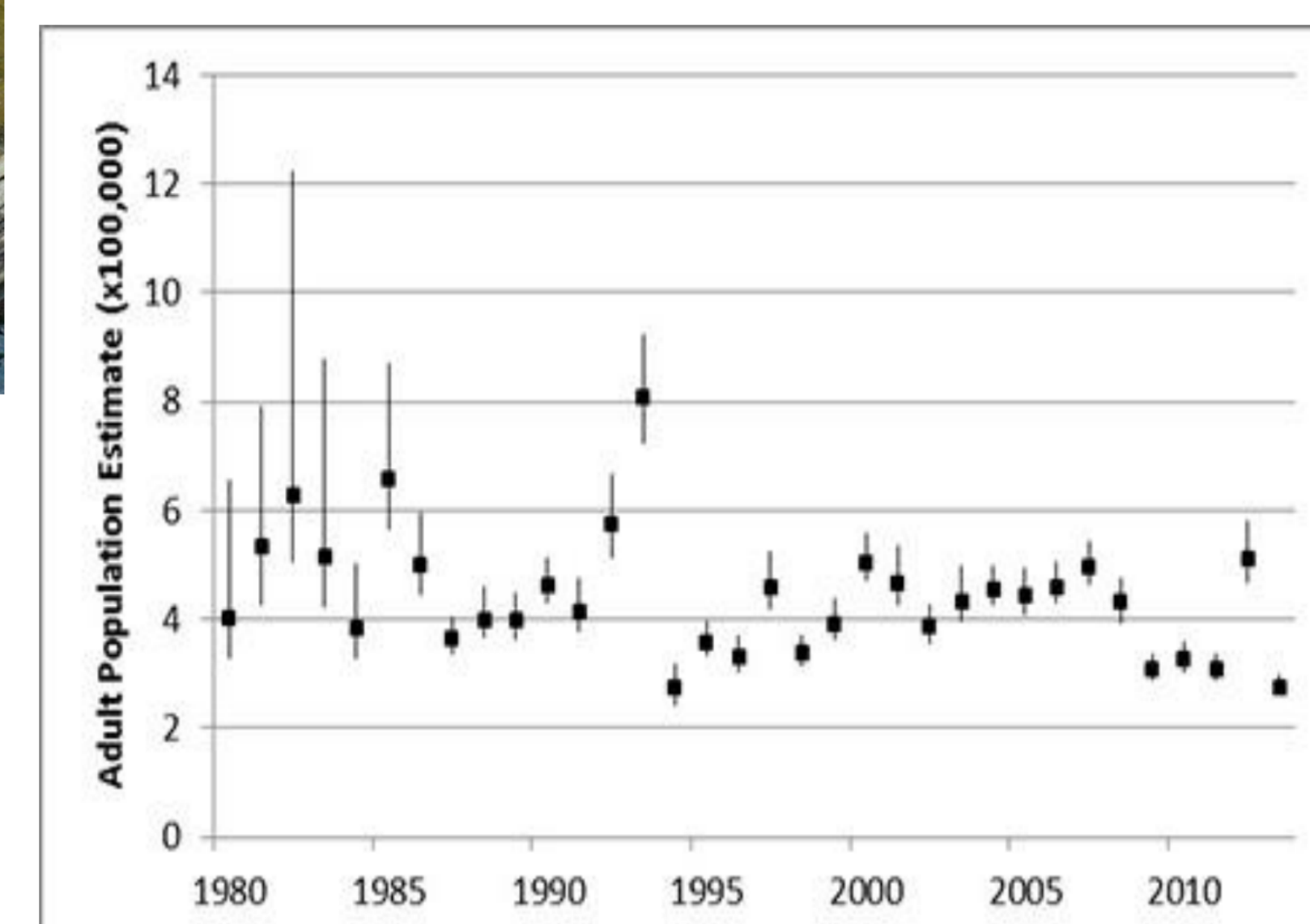


Figure 4. Sea lamprey populations in Great Lakes. Source: GLFC.org

Research

Hypothesis: If lampricides such as TFM alongside other population control methods are used, lamprey populations will decrease and native fish populations will increase.

Objectives:

1. Measure sea lamprey populations
2. Measure native fish populations

Tasks:

1. Apply lampricides and traps while performing lamprey sterilizations
2. Measure the sea lamprey larvae populations
3. Measure the native fish populations

Data Analysis: A detailed analysis of each river and tributary must be conducted to conclude how much TFM should be used. Factors like the flow rate of the river and the size of the river are considered. For traps, they must strategically be placed in a river. Factors such as sediment in the river, flow rate, and depth are considered.

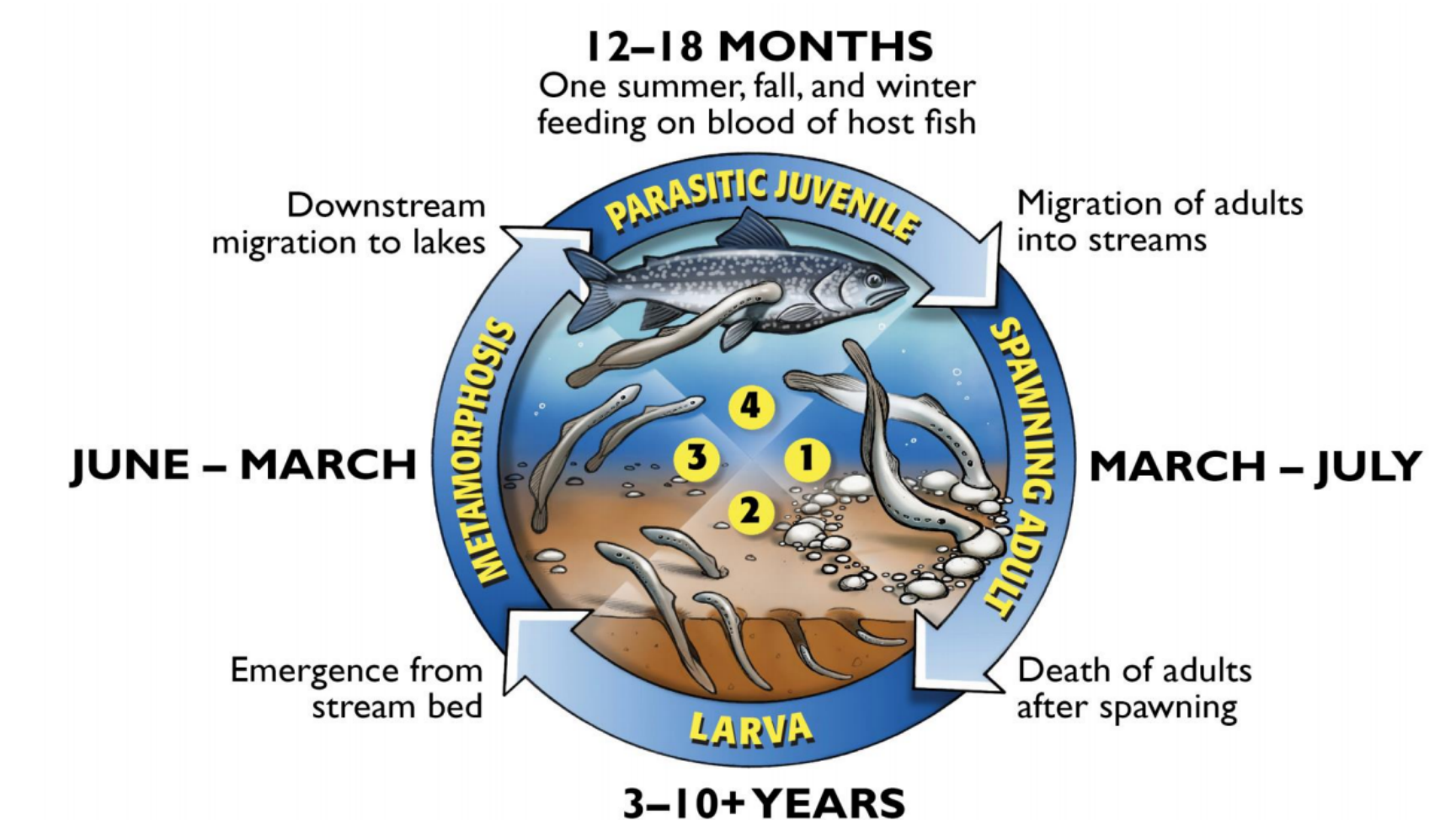


Figure 5. Sea lamprey lifecycle. Source: GLFC.org

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