GREAT LAKES FISHERIES HERITAGE Trail

EDUCATION ALIGNMENTS

Invasive Sea Lamprey, a Slippery Great Lakes Fishery Issue

Story Summary

Invasive Sea Lamprey, a Slippery Great Lakes Fishery Issue story traces the dramatic transformation of the Great Lakes fishery—from the accidental invasion of sea lamprey through man-made canals, to the collapse of native fish populations, to the groundbreaking discovery of TFM by Vern Applegate and his team, and finally to the development of a coordinated, binational system of integrated pest management that continues to guide fisheries stewardship today.

(Invasion → collapse → Applegate & TFM discovery → integrated control → binational management)

Overarching Relevance to Education Standards

- Demonstrates cause-and-effect in ecosystems (science) and
- Shows how policy, collaboration, and scientific innovation shape resource management (social studies)

Education Alignments - Michigan Science (MSS) / Social Studies (MSSS)

Elementary (Grades 3–5)

Science (MSS)

- **3-LS4-3:** Construct an argument with evidence that in a particular habitat some organisms thrive, some survive less well, and some cannot survive.
- **5-ESS3-1:** Obtain and combine information about ways communities use science ideas to protect Earth's resources and environment.

Social Studies (MSSS — history-forward)

- **Grade 3 – History (H3, Michigan History):** Michigan's past; change over time; local historical inquiry (fits lamprey crisis as a Michigan turning point).
- **Grade 3 – Geography G5 (Environment & Society):** Human–environment interactions (how people respond when ecosystems change).
- **Story linkage:** Lamprey arrival via canals, fishery decline, and community response through research/control are directly treated in the fishery overview and in the Applegate narrative.

Middle School (Grades 6–8)

Science (MSS)

- **MS-LS2-4:** Construct an argument that changes to physical or biological components of an ecosystem affect populations.
- **MS-ESS3-3:** Apply scientific principles to design a method for monitoring and minimizing human impacts on the environment.

Social Studies (MSSS — history-forward)

- **Grade 8 – USHG (Modern U.S. / public policy eras):** Analyze how institutions and policy respond to major national challenges (pairs well with post-war binational fishery governance).

- **P3/P4 (Public Discourse & Civic Participation):** Identify an issue, weigh perspectives, propose action (fits "how should lamprey control be managed?").
- **Story linkage:** GLFC coordination, TFM field use, and integrated pest management tools provide the historical-policy spine and the ecosystem case study.

High School (Grades 9–12)

Science (MSS)

- **HS-LS2-7:** Design, evaluate, and refine a solution for reducing impacts of human activities on biodiversity.
- **HS-ESS3-4:** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

Social Studies (MSSS — history-forward)

- **HS USHG (Post-WWII U.S.):** Evaluate how post-war institutions and policies shaped modern environmental governance and public resources management.
- **HS Civics P3/P4:** Analyze policy tradeoffs and advocate a reasoned position using evidence (fits long-term funding, ethics, and cross-border management).
- **Story linkage:** Positions lamprey control as an enduring "science + governance" solution set with measurable ecological outcomes.



Anchor Facts / Story Linkages

- Sea lamprey entered the Great Lakes through human-built canals (Erie and Welland), demonstrating how infrastructure can unintentionally reshape ecosystems.
- By the mid-20th century, lampreys caused a collapse of native fish populations, particularly lake trout, contributing to the loss of over 100 million pounds of fish annually.
- Each individual sea lamprey could kill up to 40 pounds of fish per year, dramatically altering predator–prey relationships and destabilizing the food web.
- At Hammond Bay Biological Station, Vern Applegate and his team tested thousands of chemical compounds, ultimately identifying TFM lampricide in the 1950s as an effective control method.
- Widespread lampricide treatments began in 1958, leading to a 90–95% reduction in lamprey populations in many watersheds.
- The creation of the Great Lakes Fishery Commission (1955) marked a major shift toward binational, science-based management.
- Modern control programs use integrated pest management, combining:
  - lampricides
  - barriers
  - trapping
  - pheromone and sterile-male techniques
- The lamprey story represents one of the most successful large-scale invasive species control efforts in North America.