



THE GREAT LAKES FISHERY COMMISSION'S
contribution to
THE GREAT LAKES RESTORATION INITIATIVE



PHEROMONES

Tricking Sea Lamprey with their Own Scents: *A new weapon in the sea lamprey control arsenal*

More than a decade ago, scientists hypothesized that pheromones – natural odors that animals use to communicate – could disrupt sea lamprey spawning. These pheromones can both attract and repel sea lamprey. Seizing upon this possibility for a new control technique, the commission's pheromone project has applied GLRI funds to aggressively move this research from the lab to the field.

The GLRI has advanced the development and implementation of sea lamprey pheromones by at least a decade, and the investments are paying off! Research results suggest that pheromones can influence sea lamprey behavior, enhance trapping by serving as “bait,” and lure sea lampreys into unsuitable spawning habitat or areas where lampricide treatments and trapping are more effective. In addition, the GLRI has helped scientists discover an exciting new alarm pheromone, which appears to warn sea lampreys of impending harm. This pheromone, which has been found in the decaying bodies of dead sea lampreys, may well serve as a repellent.

This project has helped develop tactics in which pheromones can be used to control sea lampreys, and built capacity and expertise to elevate viable pheromone control tactics to operational status within the sea lamprey control program.

Through the commission's pheromone project:

- **A male sea lamprey mating pheromone** has been used in management-scale field trials to develop pheromone-baited trapping techniques for incorporation into the sea lamprey control program. The results of these trials are promising and show that using the mating pheromone as trap bait can increase trapping efficiencies by up to 53%, and that baited traps can capture up to 113% more sea lampreys than un-baited traps.
- **A sea lamprey migratory pheromone** has been shown to function as a cue to sea lampreys in the lake searching for a spawning stream. The pheromone induces searching behaviors that allow sea lampreys to find the mouth of a stream and migrate in that stream to suitable spawning habitat. Results indicate that the migratory pheromone can enhance control by manipulating sea lamprey behavior and enhance trapping.
- **Additional components of the mating and migratory pheromones** have been identified and determined to possess pheromone-like potency and are ready for behavioral testing. These additional pheromone components will increase the efficacy of sea lamprey control tactics.
- The commission and its partners have refined their understanding of the **sea lamprey alarm pheromone**, which could prevent migration up streams which are hard to treat. The alarm pheromone, coupled with the migratory pheromone, could provide a “push-pull” effect for more effective control.



Pheromone Research: A Successful Regional Collaboration

The GLRI has inspired additional extensive pheromone research, work, and partnerships:

- Research is being conducted by five graduate students, three post-docs, and numerous undergraduate technicians from Michigan State University;
- The U.S. Fish and Wildlife Service has dedicated funds to the project;
- The U.S. Geological Survey provides scientific expertise and supports seasonal technicians, one permanent technician, and a research ecologist; and,
- Facility upgrades have enhanced research, helped secure future pheromone research, and supported the local economies by supplying jobs to local contractors.



A sea lamprey stops in front a capsule releasing the mating pheromone. Photo:T. Meckley, MSU

Successful Pheromone Research: Contributing to a Healthy Fishery

Sea lamprey pheromone research is an example of a successful, innovative, and collaborative effort leading to on-the-ground results: better sea lamprey control for better fishing. By increasing sea lamprey control through pheromones, this investment will directly result in decreased damage to Great Lakes fish communities and will help keep the Great Lakes fishery and economy healthy.

