

ABSTRACT NOT FOR CITATION WITHOUT AUTHOR PERMISSION.

The title, authors, and abstract for this completion report are provided below. For a copy of the full completion report, please contact the author via e-mail at mhowe@usgs.gov.

Questions? Contact the GLFC via email at research@glfc.org or via telephone at 734-662-3209 ext. 119.

Reconnaissance: Tracking outmigration of sea lamprey as they seek their first host

Project ID – 2022-ADA-541013

Michael R. Lowe¹, Heather A. Dawson²

¹ U.S. Geological Survey, Great Lakes Science Center, Hammond Bay Biological Station, 11188 Ray Road, Millersburg, MI 49759

² University of Michigan, Flint, 264 Murchie Science Bldg. 303 E. Kearsley St., Flint, MI 48502 USA

June 2026

ABSTRACT:

This pilot project was originally designed to track newly transformed sea lampreys from Harlow Creek through the stream-lake transition and into Lake Superior using a combination of fixed nearshore receivers, a boat-towed receiver, and receivers carried by a Wave Glider autonomous surface vehicle. Lake-based range testing was intended to quantify detection of submerged and buried Eel/Lamprey Acoustic Tags (ELAT tags), define receiver and survey-path spacing, and support interpretation of missing detections. Initial field testing did not support the assumptions required for that design. Only four tag detections were recorded during the initial Lake Superior range trials, rather than the thousands expected, preventing estimation of a defensible detection range and raising concern about acoustic interference, with a vessel depth sounder identified retrospectively as a plausible source. The Wave Glider mission was also terminated early because late-autumn solar charging could not maintain sufficient power for sustained operation. Consequently, the original lake-based, multi-platform design was abandoned rather than treated as a partially completed study. Although Harlow Creek remained the geographic study site, the project was reconfigured as a distinct in-stream study using seven fixed JSATS receivers spaced approximately 37 m apart and paired environmental sensors. Twenty-five transformers were implanted with ELAT tags, 19 healthy tagged fish were released, and 14 were subsequently detected, producing 224,009 detections. The revised analyses reconstructed movement through the creek and evaluated biologically meaningful downstream progression in relation to short-term changes in water temperature and current. Progression was episodic and unevenly distributed among fish, and within-fish. Within-receiver comparisons indicated that progression events occurred during periods when water temperature was farther above its recent baseline. Because movement and environmental conditions both changed through time, this association should not be interpreted as independent proof that warming triggered movement. The revised study demonstrated the feasibility of high-resolution tracking in a relatively low-noise stream environment, but it did not evaluate lake entry timing, nearshore residence, offshore dispersal, comparative performance of the original receiver platforms, or first-host encounter. Appendices A and B document the initial field efforts and results that prompted the redesign.