PILOT TESTS OF A LIGHT TRAP FOR DOWNSTREAM MIGRANT JUVENILE SEA LAMPREY

Alex Haro[2], Scott Miehls[3], Nicholas S. Johnson[3]

[2]U.S. Geological Survey, Leetown Science Center, S.O. Conte Anadromous Fish Research Laboratory, 1 Migratory Way, Turners Falls, MA USA 01376.

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

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ABSTRACT:

The potential for light to be used as a guidance cue for trapping downstream migrant juvenile Sea Lamprey (*Petromyzon marinus*), also known as transformers, into traps as a means of control of this invasive species in the Great Lakes has been demonstrated in recent studies. The effect of water velocity (0.25, 0.50, 0.75 and 1.0 m/sec test velocities) on light guidance behavior was evaluated in a controlled laboratory flume. Behaviors and rates of downstream movement were monitored using passive integrated transponder (PIT) telemetry. At 0.25 m/sec water velocity Sea Lamprey were 2.8 times more likely to be detected at antennas along a wall with a linear light array compared to other antennas across the width of the flume. However, an inconsistency in guidance between different illuminated walls of the flume at 0.25 m/sec velocity was observed. The guidance response appeared to be consistent along the length of the linear light array. At a water velocity of 75 cm/sec, there was a significant interaction between light treatment and distance travelled downstream and Sea Lamprey were 3.3 times more likely to be detected along the lighted wall rather than at other antennas across the flume only at the downstream-most detection point. The rate of downstream movement through the length of the flume decreased under artificial lighting compared to dark controls at both the 25 and 75 cm/sec velocity conditions. A prototype light-guidance trap was constructed and deployed in a box culvert on Furlong Creek, Michigan during fall 2021. Low water levels during fall 2021 resulted in a suppressed fall juvenile lamprey migration and thus low catches in both the lighted trap and a downstream net array, while unusually high water levels during spring 2022 rendered trapping impossible. Testing will need to continue to further develop the prototype light-guidance trap. The

results of all the studies demonstrate that light can be used to guide transformers over a range of water velocities, but further refinements in light array design and further understanding of other behavioral responses to light are required to develop effective light guidance trapping technologies for transformers.