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Proof of Concept test of accelerometer tags on lake trout to detect sea lamprey attachment

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by:

Connor Reeve<sup>2</sup>, Jean V. Adams<sup>3</sup>, Scott M. Miehls<sup>4\*</sup>, Michael R. Lowe<sup>4</sup>, Steven J. Cooke<sup>2,5</sup>, Mary Moser<sup>6</sup>, Jacob W. Brownscombe<sup>2,7</sup>

<sup>2</sup> Department of Biology, Carleton University, 1125 Colonel By Dr., Ottawa, ON, K1S 5B6, Canada

<sup>3</sup> U.S. Geological Survey Great Lakes Science Center, 1451 Green Rd, Ann Arbor, MI, 48105, United States

<sup>4</sup> U.S. Geological Survey Hammond Bay Biological Station, 11188 Ray Dr, Millersburg, MI, 49759, United States

<sup>5</sup> Institute of Environmental and Interdisciplinary Science, Carleton University, 1125 Colonel By Dr., Ottawa, ON, K1S 5B6, Canada

<sup>6</sup> National Oceanic and Atmospheric Administration Northwest Fisheries Science Center, 2725 Montlake Blvd. East, Seattle, WA, 98112, United States.

<sup>7</sup> Great Lakes Laboratory for Fisheries and Aquatic Sciences, Fisheries and Oceans Canada, 867 Lakeshore Rd., Burlington, ON, L7S 1A1, Canada

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## **ABSTRACT:**

Sea lamprey (*Petromyzon marinus*) remain problematic to lake trout (*Salvelinus namaycush*) restoration in the Greats Lakes. Fisheries assessments would benefit from knowledge of spatial-temporal patterns of parasitism; however, these are challenging to estimate from marking rates in collected lake trout alone. Implantable tags can be used to examine behaviors in wild fish and may be useful in detecting sea lamprey attachments. Therefore, we implanted lake trout with biologgers that record heart rate and/or acceleration then observed their responses to sea lamprey attack in lab. Using a method based on optimal model fit with the fewest variables, we determined that the top predictors of attachment were related to body position and heart rate. These predictors were used to produced two models (one using heart rate and acceleration, another using acceleration only) using random forests. Both models yielded high predictive accuracy with low false positive rates after a secondary method of aggregating predictions was applied. The application of these models could yield the first field-based estimates of sea-lamprey attack rates and attack lethality in lake trout.