**Ring the alarm: behavioural manipulation of sea lamprey populations with damage-released alarm cues and predator cues**

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Sea lamprey (*Petromyzon marinus*) invaded the upper Great Lakes in the early 20th century and caused extensive economic damage to a variety of native fish populations. We investigated whether sea lamprey 1) show avoidance of injured conspecific, injured heterospecific, and predator cues, 2) respond to these cues during the day at different water temperatures, 3) show an avoidance response with repeated exposure to alarm cues, and 4) whether this response is found in juvenile sea lamprey. Mobile sea lamprey showed a significant avoidance response at night to migratory sea lamprey extract, white sucker (*Catostomus commersonii*) extract, 2-phenylethylamine (PEA), human saliva (predator cues) and a migratory sea lamprey extract and human saliva combination (injured conspecific and predator cue). Sea lamprey nighttime avoidance response was consistently induced after being exposed to the majority of the above stimuli 4x and 8x, respectively, the previous day. During the day, mobile sea lamprey showed an avoidance response only to PEA and human saliva once water temperatures had risen to mean (± SD) = 13.7 (± 1.4) °C. Resting and hiding sea lampreys did not show an avoidance response to any of the stimuli. Sea lamprey larvae increased the rate of escape attempts and direction changes after exposure to larval lamprey extract, suggesting that larval sea lamprey respond to potential chemosensory risk assessment cues. Our findings support the continued investigation of natural damage-released alarm cue and predator-based repellents for the behavioural manipulation of sea lamprey populations in the Laurentian Great Lakes.