

GRADUATE EXIT SEMINAR



Chelsey Nieman

Visual Ecology of Lake Erie Fishes: An Investigation of the Impacts of Elevated Turbidity on Vision

Advisor: Dr. Suzanne M. Gray

Aquatic environments globally are experiencing increases in intense modification from human activities, which can result in severe consequences for freshwater fish. One key stressor is that of turbidity, which is associated with increased urbanization and run-off as well as increased anthropogenic nutrient inputs. While elevated turbidity is likely to result in negative physical consequences for fish, it is also likely to result in disruptions to sensory mechanisms of species in these ecosystems. Changes to the visual environment from increased turbidity are expected to result in disrupted visual ecology and are hypothesized to lead to community-level shifts in freshwater ecosystems; however, the proximate mechanisms underlying such shifts and the implications for populations and ecosystems remain to be investigated. My main objective was to determine the effects of elevated turbidity on visual ecology of native Lake Erie fishes. Turbidity influences visual abilities differently within and across trophic levels (e.g. planktivores vs. piscivores) and across different types of turbidity (e.g. algal vs. sedimentary). Due to its relatively shallow bathymetry and high levels of urbanization and anthropogenic inputs, Lake Erie has been experiencing high levels of both sedimentary and algal turbidity in recent years. I tested if elevated sedimentary and algal turbidity alter the visual ecology of two Lake Erie fishes, a forage fish, Emerald Shiner (*Notropis atherinoides*), and a top predator, Walleye (*Sander vitreus*). The specific objectives of this research were (1) to determine the differential effects of elevated turbidity on visual sensitivity through assessment of the optomotor response, (2) to determine the effects of elevated turbidity on visual acuity using reaction distance tests as a behavioral proxy, (3) to determine the effects of elevated turbidity on prey consumption by emerald shiner, (4) to test for long-term (i.e. decadal) changes in visual morphology of emerald shiner associated with prevailing environmental conditions, and finally, (5) to determine how elevated turbidity, particularly algal turbidity, influences lure color successes in the recreational walleye fishery using a citizen science approach.