

Graduate students explore emerald shiner ecology in the Upper Niagara River

by Jacob Cochran (GLES); and Christopher Osborne, John Lang, and Steven Fleck (Biology)

This winter, the **Emerald Shiner** crew has been busy processing samples that were collected over the 2014 field season. During summer sampling, adult emerald shiners (*Notropis atherinoides*) were collected with electroshocking equipment and juvenile/larval fishes were seined in the upper Niagara River. Processing these collected specimens has been at the forefront of our work this offseason. Here we report what each of us has been working on individually to further advance our collective understanding of the emerald shiner in the upper Niagara River.

To better understand the feeding ecology of adult emerald shiners, Steve Fleck and John Lang are performing a diet analysis. This procedure involves dissecting preserved guts, quantifying the various prey items, and drying the gut contents to determine dry weights. So far, they have encountered several notable prey items, including the invasive cladoceran zooplankton *Bythotrephes*.

John Lang is in the beginning stages of his research on emerald shiner morphometrics. For preliminary data, he will assess differences in body shape of adult emerald shiners between different size classes and also between fresh and preserved samples. He plans to present these results as a poster at the 2015 International Association for Great Lakes Research (IAGLR) Conference in May.



GLES student Jacob Cochran identifies a larval fish collected from the Niagara River last summer using a microscope with a camera system to capture photos and make measurements.

Chris Osborne has begun work to determine lipid allocation to the female shiner ovaries, to measure reproductive effort across age classes over the spawning season, which lasts from May through August, and in different habitats. He is able to do this by first removing the ovaries from each fish then separately extracting all lipids from both the ovary and the rest of the fish's tissue. He also ages each fish by counting annuli on tiny auditory bones called otoliths, located just anterior to the base of the skull. This work will be presented at the IAGLR conference.

Jake Cochran, with the help of Joshua Fisher (a biologist at our Field Station), has been conducting taxonomic analysis of juvenile/larval fish samples collected at various sites throughout the river. Samples were first sorted by family and will be taken to the species level. Currently, cyprinid (carp/minnow family) samples are being identified to species. Along with identifying the specimens of each sample, weights and lengths are recorded to analyze length-frequency distributions. The data collected from these samples will allow for size distribution and species diversity analyses of young-of-the-year fishes throughout the river over the sampling season. This work will also be presented at the IAGLR conference. •



Microphotograph of the partially digested zooplankton *Daphnia* sp., only the head and swimming antennae are present; found in the stomach of an emerald shiner from the Niagara River.



Microphotograph of the zooplankton *Bosmina longirostris* found in the stomach of an emerald shiner from the Niagara River.



Emerald shiner larva collected in the Niagara River. These larvae form schools near piers in marinas.