

Great Lakes Center Newsletter Spring 2019



One of the new habitat plantings at the Field Station.

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Habitat enhancements at the Field Station

by Brian Haas

The staff at the Field Station have been eagerly awaiting spring on the waterfront following a fall filled with native plantings, the construction of an osprey nesting platform, and the installation of purple martin housing. Funding for this work was provided by the Niagara River Greenway Commission in 2018. Mark Clapsadl (PI), Brian Haas (co-PI), and Kit Hastings (co-PI) are managing this project, which aims to enhance habitat at the Field Station for native wildlife.

The developed shorelines and urban sprawls that border the Niagara River have created many challenges for native wildlife in the region. In particular, the lack of numbers and diversity of native vegetation has reduced food availability and nesting sites for many species that reside and migrate through the Niagara River Corridor. The location of the Field Station along a heavily developed section of shoreline on the Niagara River offered the opportunity for significant improvements through habitat enhancement.

Three sections on the Field Station grounds were chosen to be transformed from lawn into quality habitat for migrating and resident wildlife. [Plantings](#) of native trees, shrubs, and grasses were selected based on their high wildlife value for providing cover, nesting sites, fruit, and pollen. Attractiveness to insects was also considered due to the additional food source that this can provide to some species. In addition, Buffalo State arborists helped design the layout and select species that would tolerate the harsh conditions experienced on the waterfront. With the onset of spring, these plants will take root and begin growing into a great addition to the Field Station grounds.

Looking out of the windows of the Dick Smith Teaching Pavilion, one will notice more than new plantings. A 50-foot utility pole crowned with a [nesting platform](#) now stands tall at the water's edge. This structure offers a safe site this spring for a pair of osprey to nest and rear their young before migrating south prior to the onset of winter. The osprey (*Pandion haliaetus*) is a native bird of prey that primarily feeds on fish and is listed as a species of special concern in New York State. The lack of large dead trees for nesting sites has created a need for manmade structures that offer nesting

opportunities. Consultation with Region 9 of the NYSDEC confirmed that the Field Station was a suitable location for such a structure. Similar structures in Western New York have had mixed success and sometimes stay empty for years before being used successfully. While hopes are high for a nesting pair this year, patience over optimism may be the key to success.

New sights are not the only change at the field station this spring, but new sounds will be heard emanating from the Teaching Pavilion during the early morning hours. A speaker playing the dawn song, which imitates a male purple martin will be played to help attract this species to the site. The purple martin (*Progne subis*) is the largest North American swallow and has become almost entirely dependent upon humans for nesting sites across large portions of their range. With help from the [Friends of Iroquois National Wildlife Refuge, Inc.](#), a suitable site and [housing structure](#) were chosen for the Field Station. A 16-foot aluminum pole that holds 12 individual nesting gourds rises out of the grassy clearing next to the Teaching Pavilion. If all goes well, this site will help produce many purple martins that will then make the long journey back to South America for the winter.

These habitat enhancements are not only beneficial for the wildlife, but they also offer unique opportunities for ecological education within the city limits. In addition, the public can easily view these features from the Bird Island Pier, which runs parallel to the Field Station and is separated by the Black Rock Canal. If you are looking for something to do this spring, take a walk on the Bird Island Pier and check out the new additions to the Great Lakes Center Field Station. •



The osprey pole is situated near the waterfront, with another habitat planting at its base.



The purple martin houses are situated on the lawn between the teaching pavilion and a habitat planting.

Specimens sent for genetic barcoding

by Susan Daniel

In February, Susan Daniel sent three genetic barcoding plates to the Centre for Biodiversity Genomics at the University of Guelph in Ontario, Canada as part of an effort to create a DNA Barcode Reference Library for Great Lakes aquatic invertebrates. Each plate contained 95 individuals that will have their genetic material decoded and posted on the [Barcode of Life Database \(BOLD\) System](#), where it will be made publicly available. This whole process can take several months from collection of typical specimens that represent the species, identification confirmation, photographs (over 600 in total), and harvesting tissue for genetic plating. In this latest batch of samples, the three plates comprise three different taxonomic groups: Unionidae (native freshwater mussels), Gastropoda (freshwater snails), and Sphaeriidae (fingernail clams). Twenty-four species of Unionidae were sent, including very rare taxa like a juvenile Salamander Mussel (*Simpsonaias ambigua*) collected from a Wisconsin Hatchery program. The salamander mussel is the only known species that uses a non-fish species for its glochidial host, the Common Mudpuppy (*Necturus maculosus*). Within the second plate, GLC researchers sent 24 species of snails, including the rare species Flat-whorled Pondsnaail (*Stagnicola exilis*) that was collected by Knut Mehler and Sasha Karatayev in a wetland in a forest next to Lake Michigan. The third plate included 16 species of fingernail clams that were identified to species level by Jakob Boehler at the [National Center for Water Quality Research](#) located at Heidelberg University, Tiffin, Ohio.

This project was funded by the U.S. EPA [Great Lakes National Program Office](#) (GLNPO) through July 2019, unless a no-cost extension is granted, and the GLC plans to continue collections in the summer and fall of 2019. We have already collected over 100 samples in the Great Lakes and their watershed and identified over 80 species needed for barcoding. We expect to send another 6-7 plates within the next year containing the following major groups: Annelida (true worms), Nematomorpha (horsehair worms), Nemertea (ribbon worms), Cnidaria (Hydra), Bryozoa (moss animals), Turbellaria (flatworms), and Gastropoda (freshwater snail). This grant has truly been a group effort with many people in the GLC chipping in to collect various targeted species, as well as several collaborators from across the state, the country, and Canada.

More information about this project can be found in “Building a DNA barcode reference library” in [GLC Newsletter Fall 2017 \(PDF, 4MB\)](#). •



Flat-whorled Pondsnaail. Credit: Susan Daniel

GLES by the numbers

by Kelly Frothingham, GLES Program Coordinator

This spring semester marks the end of the sixth year of the Great Lakes Center administering the [Great Lakes Environmental Science \(GLES\) M.A. and M.S. programs](#). Both programs are scheduled to undergo periodic program review in 2019-2020 and in preparation for that review, a self-study was started this semester, which allowed us to reflect on the past six years. Since the programs started in fall 2013:

- The GLES Graduate Admissions Committee reviewed a total of 56 applications and 46 applicants were offered admission into one of the programs, resulting in an 82% admission rate
- Thirty-eight students started in either the GLES M.A. or M.S. program
- The majority of GLES students completed their undergraduate degree at Buffalo State (39%) or another SUNY institution (26%)
- The most common undergrad majors for GLES students have been biology, geography, or environmental science/studies
- GLES students have completed graduate coursework offered by the GLC and the departments of Biology, Earth Sciences & Science Education, Economics & Finance, Geography & Planning, and Mathematics (M.S. PSM courses)
- Seven students have graduated from the M.A. program and they were advised by faculty in GLC and the Biology and Geography & Planning Departments
 - Thesis research has addressed invasive species, land use and land cover, and fish ecology
- Fifteen students completed a M.S. and they, too, were advised by faculty in GLC and the Biology and Geography & Planning Departments
 - Internships have been completed at Buffalo Niagara Waterkeeper, Ecology and Environment, WNY PRISM, Tiftt Nature Preserve, Erie County Department of Environment and Planning, and the Great Lakes Center
- GLES administrators are aware of job placements for 21 of the 22 graduates and 100% of those graduates are either working in the environmental science field or in a Ph.D. program
 - Five GLES M.A. graduates are working in the field and one is in a Ph.D. program
 - All 15 M.S. students are working in the environmental science field
- Currently, two students are working on their M.A. and eight students are working on their M.S.

The GLES programs were designed as interdisciplinary environmental science programs and, by the numbers, it appears that students are benefitting from programs that offer depth and breadth in coursework, practical and applied experiences, and job opportunities in the field after graduation. •

Treating the treatment: Examining cost effective methods to further clean sewage effluent

by Benjamin Szczygiel and Amy Cavanaugh, Biology M.A. graduate students

We are starting a series of experiments that examine the effectiveness of advanced oxidation processes (AOPs) at breaking down pharmaceuticals and personal care products (PPCPs) in treated sewage effluent. Bioassays will be conducted with *Daphnia magna* as well as fish to better understand the impact of toxic chemicals that persist in regularly treated effluent and whether additional treatment of these effluents can improve water quality for fish and other aquatic organisms. We will test the response of *Daphnia* and fish by examining their metabolomics when directly exposed to effluent treated in various ways to further reduce toxicity. The AOPs that we will use are a secondary processing of the treated effluent with mixtures of peracetic acid, ultraviolet light and hydrogen peroxide. The large amount of pharmaceuticals and personal care products that enter our lakes and rivers in this region have been a subject of concern (see research by our advisor, [Dr. Pérez-Fuentetaja](#)) and this experiment will help evaluate the effectiveness of low-cost potential solutions that could be implemented in local wastewater treatment plant protocols. •



Ben Szczygiel feeds a goldfish in a tank with an algae culture that will be used as food for the *Daphnia*. The goldfish provides nutrients to the water so the lab doesn't need to use chemicals to grow algae.

Linking fun and work: State of Lake Superior Meeting, Houghton, Michigan

by Knut Mehler

On October 7, 2018, Sasha Karatayev and Knut Mehler took the 800-mile drive to Houghton, Michigan to attend IAGLR's State of Lake Superior meeting. Distinct from [IAGLR's annual Conference on Great Lakes Research](#), the [State of Lake conferences](#) focus on the issues relevant to a specific lake and follow the rotating schedule of the [CSMI research efforts](#). The meeting was held on the campus of [Michigan Technological University](#), right on the Keweenaw Waterway. More than 200 researchers came together to discuss the results of the latest Lake Superior scientific research and monitoring efforts, and what it signifies to communities and people across the Lake Superior basin.

Knut Mehler gave a presentation about trends in Lake Superior benthos with emphasis on the amphipod *Diporeia spp.*, based on results from the 2016 CSMI survey. In contrast to the lower Great Lakes, *Diporeia* is still the most abundant benthic invertebrate in Lake Superior. However, at 22 of the 25 previously sampled stations we found a significant decline of *Diporeia* densities in 2016 compared to 1994, and at three of these 25 stations *Diporeia* completely disappeared. In contrast to other Great Lakes, *Dreissena spp.* have not established in Lake Superior and therefore cannot be a reason for *Diporeia* decline, suggesting that benthivorous fish predation or other environmental factors might have caused the changes. This decline in nearshore *Diporeia* density should be checked against inter-annual variation. The decline also stresses the importance of annual monitoring of permanent stations to detect significant temporal trends.

Sasha Karatayev talked about progress made in processing benthic samples for the [Barcode of Life Database](#) (BOLD) DNA barcoding reference library. The development of more complete species-specific libraries of DNA signatures is an essential step to enable more taxonomically rich and spatially extensive species surveillance and monitoring programs in the Laurentian Great Lakes. Some of the rare benthic species, mollusca in particular, have not been added to BOLD, so Sasha and Knut took the opportunity from the long drive to stop at several locations along the way to collect more samples. Benthos was live-picked at each sampling location and both Sasha and Knut were rewarded every time with beautiful scenery. One evening when both were running out of time, the hotel room was quickly converted into a lab. Research never ends! •



Lake Superior shoreline near Marquette, MI.



Sasha Karatayev is live-picking benthos for barcoding in Alpena, MI.

Updates

by Kit Hastings

Website photo galleries SAMC construction

You may have noticed some changes on the GLC website. Buffalo State is [implementing standards](#) for all official websites to maintain accessibility for all, including those with vision, motor, or hearing impairments. In order to comply with [Web Content Accessibility Guidelines \(WCAG\) 2.0 Level AA](#), the old multimedia page had to be completely removed. I am in the process of restoring the content in a format that complies with the new accessibility standards, so stay tuned as I add albums documenting our research and events to the [Photos page](#).

Construction on the final phase of the [Science and Mathematics Complex](#) is going along on schedule. Last summer, construction began on Phase 4 and over the fall we watched as building took shape. The two parts of the building were tied together over spring break and soon the outer part of the building will be complete. Then the construction will move inside to complete the interior, and landscaping will be the final touch. Completion is projected for Fall/Winter 2020. One of the neatest parts of construction so far was the construction



The south side of SAMC Phase 4.

of the steel globe that will become the [Whitworth Furgeson Planetarium](#). You can view [pictures of the construction](#) on our website. Questions about the SAMC construction project can be emailed to vpfm@buffalostate.edu. •

Introducing WNY PRISM's expanded watercraft inspection program

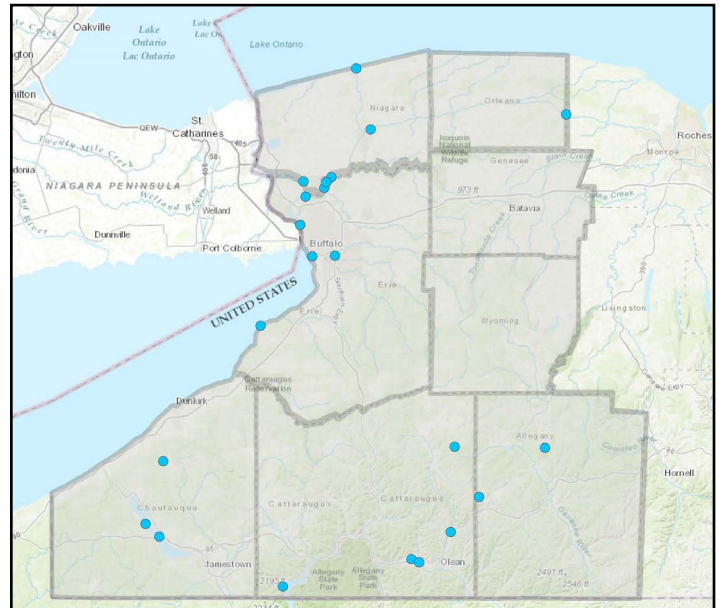
by Kristin King

This summer, over 20 Boat Stewards and Lead Boat Stewards will head out to launches to educate the public about the importance of stopping the spread of aquatic invasive species (AIS). [WNY PRISM](#) is excited to take the program from only two interns last summer to over 20 staff members working at 20 different launches throughout western New York.

The boat stewards will spend their summers performing voluntary watercraft inspections to remove visible aquatic plants and animals from all types of watercraft. This helps prevent the transport and spread of AIS both into and out of western New York. These programs are voluntary, and boaters do not have to participate if they choose not to. The inspections are easy and conducted quickly to ensure the boater does not miss much time enjoying the water. Last summer across the state, steward programs conducted 155,000 inspections with an acceptance rate of 97%.

This program is run in coordination with our many other partner boat steward programs throughout New York. The stewards collect data on their interactions with boaters to better track the movement of AIS throughout the state. Additionally, stewards are responsible for public education and distributing educational materials at their respective launches. Launch locations were strategically selected to maximize interactions with the public and focus on waterways most at risk of invasion. Stewards will be trained to correctly identify some of this region's early detection priority species such as *Hydrilla verticillata*, *Eichhornia crassipes*, and *Pistia stratiotes*. Catching these species early before they become established saves money and limits environmental degradation.

We are excited to take this large step to help stop the spread of aquatic invasive species. If you come across one of our boat stewards this summer, make sure to let them know you always "Clean, Drain, and Dry" your recreational equipment and are committed to preserving our valuable water resources here in western New York. •



The boat steward launch sites are scattered throughout the region.

Lake Ontario *Cladophora* assessment

by Dr. Chris Pennuto

Cladophora is a green alga that grows attached to hard substrate surfaces in many aquatic habitats throughout the region, growing over a meter in length under optimal conditions. In the recent decade, this alga has resurged as a nuisance along the shorelines of the lower Great Lakes. As part of the 2018 CSMI year in Lake Ontario, US EPA divers collected benthic algal samples to begin an assessment of biomass and coverage over the summer growing season. They documented the highest south shoreline biomass in areas near Olcott, NY. As a follow-up to the 2018 assessment, Dr. Chris Pennuto, GLC research scientist and professor of Biology, was awarded a \$103,000 grant from the USGS to document water quality conditions in and near *Cladophora* beds throughout the growing season. The resulting data will be shared with GIS and satellite spectral imaging experts to refine models predicting *Cladophora* biomass from satellites. Joining Dr. Pennuto on the project are James (Jay) Wagner, Biology graduate student, Kyle Glenn, Biology undergraduate, and two yet to be named students. It will be a busy summer on the lake. •



Diver over a dense *Cladophora* bed. [Photo: NOAA GLERL. CC BY-SA 2.0.](#)

GLC hosted CSMI 2019 Lake Erie workshop

by Knut Mehler



Participants of the Lake Erie Planning Workshop. From left to right: Sonya Bayba (GLC), Joe Connolly (Cornell), Knut Mehler (GLC), Lyuba Burlakova (GLC), Sasha Karatayev (GLC), Lars Rudstam (Cornell), Richard Kraus (USGS), Leon Katona (Wright State), Katie Bockwold (EPA), Janet Nestlerode (EPA), and Beth Hinchey (EPA).

The Great Lakes Center hosted the CSMI 2019 Lake Erie workshop on March 14 and 15, 2019. The purpose of this workshop was to plan the upcoming benthic survey of Lake Erie this summer. Scientists from GLC, EPA's Great Lakes National Programs Office, Cornell University, Wright State University, and USGS gathered at the GLC to talk about survey dates, logistics, equipment, and collaborations.

Several presentations were given about planned research activities during the 2019 CSMI survey. Leon Katona (Wright State) is planning to collect benthic algae to study the difference in algae biomass on soft sediment vs. *Dreissena* shells, and to assess the contribution of benthic algae to sediment organic matter. Joe Connolly (Cornell) will continue sampling of Harpactacoida copepods to study their distribution in the Great Lakes. Joe is also interested in using this microbenthic order to assess the regulations of ballast water because it is a common path of introduction for invasive species. Janet Nestlerode (EPA) gave a presentation about the application of a sediment profile camera in Lake Erie to study changes at the sediment-water interface of the seafloor and how this information could be linked to benthic community structure.

Sasha Karatayev and Knut Mehler (GLC) talked about the application and advantages of underwater imagery including the use of a dropdown camera system in the Great Lakes. During last year's CSMI survey in Lake Ontario, videos from the dropdown camera in nearshore areas provided an excellent possibility to survey invasive *Dreissena* mussels. Based on those results, workshop participants decided to use the dropdown camera not only in shallow areas but on every sampling station during 2019 CSMI survey. A major advantage of using this kind of camera setup is the instant availability of data that could further be used to generate preliminary *Dreissena* coverage maps at the end of the survey. •



Workshop participants discussing the application of dropdown camera to generate *Dreissena* coverage maps.

Great Lakes Center
Buffalo State College
1300 Elmwood Avenue
SAMC 319
Buffalo, NY 14222
Phone: (716) 878-4329
Fax: (716) 878-6644
greatlakes@buffalostate.edu

GLC Personnel

Director

Alexander Karatayev

Research Scientists

Lyubov Burlakova

Mark Clapsadl

Knut Mehler

Christopher Pennuto

Alicia Pérez-Fuentetaja

Research Technicians

Susan Daniel

Brian Haas

Erik Hartnett

Kit Hastings (Newsletter editor)

Brianne Tulumello

WNY PRISM

Brittany Herson

Kristin King

Andrea Locke (coordinator)

Lucy Nuessle

Emily Thiel

Secretary

Susan Dickinson