CELEBRATING 50 YEARS OF RESEARCH

Buffalo State
Great Lakes Center

1966–2016

Annual Report 2015-2016

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CONTENTS

MISSION

The Great Lakes Center (GLC) mission is to improve the quality of the environment by providing the best possible science to decision-makers concerned with the health and sustainability of resources, with a primary focus within the Great Lakes and their watersheds. This is accomplished through high quality research, informed and current graduate and undergraduate education, and dissemination of information to the public through outreach. The Center is committed to improving human-environment interactions in the Great Lakes ecosystem guided, in part, by an understanding of the evolutionary and ecological processes and patterns acting on the system. Although the main focus of the research in the GLC concentrates on the Great Lakes basin, nation-wide and international projects are also considered of high priority as they expose GLC scientists to the cutting edge of modern science, facilitate collaboration, and greatly increase visibility of the Center's activity in the scientific community.

HIGHLIGHTS

Over the last year, the Great Lakes Center saw sustained activity and productivity in research, education and service. We continued our excellence in research conducted by GLC personnel and in collaboration with other faculty from SUNY Buffalo State, as well as other institutions in North America, Europe, and South America.

- In October 2015, we hosted the 2nd International Meeting on Biology and Conservation of Freshwater Bivalves, where over 80 scientists from 19 countries and four continents presented results of their studies.
- On April 15th, 2016 we celebrated **50 years of research** at the Great Lakes Center. Over 140 people attended our celebration ceremony. Several speakers indicated the importance of GLC research in addressing urgent environmental issues of the Great Lakes, including Katherine Conway-Turner, President of SUNY Buffalo State; Melanie Perreault, Provost; Mark Severson, Dean of School of Natural and Social Sciences; and Alexander Karatayev, Director of the GLC. Guest speakers were represented by Congressman Brian Higgins, Senator Marc Panepinto, and Assemblymember Sean Ryan, among others. Event pictures and historical pictures.
- Over the last year our researchers have published **9** peer-reviewed papers, **8** papers were submitted for publication.
- We presented **36** talks, including: **21** at national/international/regional conferences, **10** invited talks, and **5** presentations in non-refereed venues.
- We submitted **5** grant proposals (total requested amount **$1,908,432**).
- **Nine** projects for research and education (including multi-year grants) are currently funded in the GLC totaling **$8,650,999**, including **$4,546,953** for Buffalo State.
- WNY PRISM (Partnerships for Regional Invasive Species Management) Coordinator Andrea Locke was extremely productive during the last year.
- **Twenty-four** students were enrolled in Great Lakes Ecosystem Science MA and MS programs.
- **Two** issues of GLC newsletters were produced over the last year.

I. Staff

Our senior research scientist, Dr. Subodh Kumar, officially retired in May of 2016 after 33 years working for Buffalo State. It is our pleasure to congratulate Subodh and wish him a wonderful and well-deserved retirement.

GLC Personnel

Director:	Alexander Karatayev
Research Scientists:	Lyubov Burlakova
	Mark Clapsadl (Field Station manager)
	Knut Mehler
	Subodh Kumar (part time)
	Christopher Pennuto
	Alicia Pérez-Fuentetaja
Research Technicians:	Susan Daniel
	Joshua Fisher
	Kit Hastings
	Brianne Tulumello
Secretary:	Susan Dickinson
WNY PRISM Coordinator:	Andrea Locke
WNY PRISM Seasonal Employees:	
	Adam Haines (Rochester Institute of Technology)
	Alexandra Wagner (SUNY Geneseo)
	Emily Dyett (University at Buffalo)
	Ian Sansone (University at Buffalo)
	Laura Kerrigan (Ithaca College)
	Lucy Nuessle (University at Buffalo)
	Mathew Bilz (SUNY Buffalo State)
	Patricia Shulenburg (University at Buffalo)
	Tyler Christensen (SUNY Fredonia)

Student Research Assistants:

Jacob Bajdas (SUNY Buffalo State)
Sonya Bayba (SUNY Buffalo State)
Eric Bruestle (SUNY Buffalo State)
Anthony Cevaer (SUNY Buffalo State)
Sara Clark (SUNY Buffalo State)
Jacob Cochran (SUNY Buffalo State)
Marisa Dyckma (SUNY Buffalo State)
Lee Evans (SUNY Buffalo State)
Steven Fleck (SUNY Buffalo State)
Krystal Harris (SUNY Buffalo State)
Jo Johnson (SUNY Buffalo State)
Chris Kalinowski (SUNY Buffalo State)
Meghan Kocher (SUNY Buffalo State)
Colleen Kolb (SUNY Buffalo State)
Tasha Mumbrue (University at Buffalo)
Rhudwan Nihlawi (SUNY Buffalo State)
Mike Olejniczak (SUNY Buffalo State)
Chris Osborne (SUNY Buffalo State)
Keith Pawlowski (SUNY Buffalo State)
Dalaikshan Rajendran (SUNY Buffalo State)
Kaitlyn Rath (SUNY Buffalo State)
Jennifer Taylor (SUNY Buffalo State)
Stephen Tentinger (SUNY Buffalo State)
Anthony Urena (SUNY Buffalo State)
Chloe Wasteneys (University at Buffalo)
Morgan Zyzik (SUNY Buffalo State)

GLC Affiliates (at SUNY Buffalo State)

- Catherine Lange, Associate Professor, Earth Sciences and Science Education Department
- Daniel L. Potts, Associate Professor, Biology Department
- Gary Pettibone, Professor, Biology Department
- Howard Riessen, Professor, Biology Department
- Jill Singer, Professor, Earth Sciences and Science Education Department and Director of the Office of Undergraduate Research
- Kelly Frothingham, Chair of the Geography and Planning Department
- Mary Perrelli, GIS Lab Supervisor, Geography and Planning Department
- Randal Snyder, Professor, Biology Department
- Richard Johnson, Manager, Sponsored Programs
- Robert J. Warren, Assistant Professor, Biology Department
- Stephen Vermette, Professor, Geography and Planning Department
- Susan McCartney, Director, Small Business Development Center

GLC Adjunct Professors

- Dimitry Gorsky, Fish Biologist, U.S. Fish and Wildlife Service
- Martin A. Stapanian, Research Ecologist, U.S. Geological Survey
- Zy Biesinger, Fish Biologist, U.S. Fish and Wildlife Service

Collaborators

In New York State

- Amy Mahar, NYS Department of Environmental Conservation, Avon
- Andrew Hannes, U.S. Army Corps of Engineers
- Clifford Craft, Department of Natural Resources, Cornell University
- Daniel Molloy, State University of New York at Albany
- Dawn Dittman, U.S. Geological Survey, Great Lakes Science Center, Tunison Laboratory of Aquatic Science, Cortland
- Diana Aga, Chemistry Department, State University of New York at Buffalo
- Dianna Padilla, Department of Ecology and Evolution, State University of New York, Stony Brook University
- Donald Einhouse, NYS Department of Environmental Conservation
- Gregory Boyer, State University of New York, College of Environmental Science and Forestry, Syracuse
- Howard Lasker, Department of Geology, State University of New York at Buffalo
- James Watkins, Cornell Biological Field Station, Cornell University
- Jenny Landry, Region 8 Bureau of Wildlife, NYS Department of Environmental Conservation, Avon
- Jim Haynes, Biology & Environmental Science,

SUNY College at Brockport, Brockport
- Joe Atkinson, Environmental Engineering, State University of New York at Buffalo
- Katherine Alben, Wasdworth Institute, Albany
- Kerry Gallo, Buffalo Niagara Riverkeeper
- Kofi Fynn-Aikins, U.S. Fish and Wildlife Service
- Lars Rudstam, College of Agriculture and Life Sciences, Department of Natural Resources, Cornell Biological Field Station, Cornell University
- Mary Alice Coffroth, Department of Geology & Graduate Program in Evolution, Ecology and Behavior, State University of New York at Buffalo
- Michael Wilkinson, NYS Department of Environmental Conservation
- Mike Goehle, U.S. Fish and Wildlife Service
- Renata Kraft, Buffalo Niagara Riverkeeper
- Robert Baier, State University of New York at Buffalo
- Tim DePriest, NYS Department of Environmental Conservation

At other U.S. Institutions

- Arnoldo Valle-Levinson, Civil and Coastal Engineering Department, University of Florida, Gainesville, Florida
- Ashley Baldridge, NOAA Great Lakes Environmental Research Laboratory, Ann Arbor, Michigan
- Astrid Schwalb, Department of Biology/ Aquatic Station, Texas State University, San Marcos, Texas
- Bob Krebs, Department of Biology, Geology, Environmental Science, Cleveland State University, Cleveland, Ohio
- Christine Mayer, Department of Environmental Sciences and Lake Erie Center, University of Toledo, Ohio
- Daelyn Woolnough, Biology Department, Institute for Great Lakes Research, Central Michigan University, Mount Pleasant, Michigan
- Darren Bade, Kent State University, Kent, Ohio
- David Berg, Department of Zoology, Miami University, Ohio
- David Campbell, Department of Natural Sciences, Gardner-Webb University, Boiling Springs, North Carolina
- David De Marini, Environmental Carcinogenesis Division, U.S. EPA, Triangle Park, North Carolina
- David Zanatta, Biology Department, Institute for Great Lakes Research, Central Michigan University, Mount Pleasant, Michigan
- Dima Beletsky, Cooperative Institute for Limnology and Ecosystems Research, University of Michigan, Ann Arbor, Michigan
- Don Schloesser, U.S. Geological Survey, Great Lakes Science Center, Ann Arbor, Michigan
- Donald Jerina, Laboratory of Bioorganic Chemistry NIDDK, National Institutes of Health, Bethesda, Maryland
- Elizabeth Hinchey Malloy, U.S. EPA Great Lakes National Program Office, Chicago, Illinois
- Elizabeth Meyer, Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, Pennsylvania
- Euan Reavie, Natural Resources Research Institute, University of Minnesota, Duluth, Minnesota
- Glenn Warren, U.S. EPA, Great Lakes National Program Office, Chicago, Illinois
- Jack Kramer, National Center for Water Quality Research, Heidelberg University, Tiffin, Ohio
- Jacob Boehler, National Center for Water Quality Research, Heidelberg University, Tiffin, Ohio
- Jake Vander Zanden, Center for Limnology, University of Wisconsin, Madison, Wisconsin
- Jill Scharold, U.S. EPA, National Health and Environmental Effects Research Laboratory, Mid-Continent Ecology Division, Duluth, Minnesota
- Joe Conroy, Ohio Department of Natural Resources
- Joel Hoffman, US EPA, National Health and Environmental Effects Research Laboratory, Mid-Continent Ecology Division, Duluth, Minnesota
- Jonathan Bossenbroek, Department of Environmental Sciences, University of Toledo,

Toledo, Ohio
- Kenneth Krieger, National Center for Water Quality Research, Heidelberg University, Tiffin, Ohio
- Mary Walsh, Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, Pennsylvania
- Paris Collingsworth, Illinois–Indiana Sea Grant and Department of Forestry and Natural Resources, Purdue University, West Lafayette, Indiana
- Pawel Michalak, Bioinformatics Institute, Virginia Tech, Blacksburg, Virginia
- Richard Barbiero, CSC, Chicago, Illinois
- Richard Kraus, Lake Erie Biological Station, Great Lakes Science Center, U.S. Geological Survey, Sandusky, Ohio
- Serghei Bocaniov, Graham Sustainability Institute, University of Michigan, Ann Arbor, Michigan
- Thomas Miller, Lamar Bruni Vergara Environmental Science Center, Laredo Community College, Laredo, Texas
- Thomas Nalepa, The Graham Sustainability Institute, University of Michigan, Ann Arbor, Michigan
- Tom Bridgeman, University of Toledo, Toledo, Ohio
- Vadim A. Karatayev, Department of Environmental Science & Policy, University of California, Davis, California

International Collaborators

- Anne Yagi, Ontario Ministry of Natural Resources, Ontario, Canada
- Demetrio Boltovskoy, University of Buenos Aires, Argentina
- Frances Lucy, Institute of Technology, Sligo, Ireland
- Frank Collas, Department of Environmental Science, Institute for Water and Wetland Research, Radboud University, Nijmegen, The Netherlands
- Jan Ciborowski, Department of Biological Sciences, University of Windsor, Windsor, Ontario, Canada
- Manuel Lopes-Lima, ICBAS - Abel Salazar Biomedical Sciences Institute, Laboratory of Ecophysiology, CIIMAR - Interdisciplinary Centre of Marine and Environmental Research, University of Porto, Portugal
- Norman Yan, York University, York, Ontario, Canada
- Renata Claudi, RNT Consulting Inc., Ontario, Canada
- Richard Soare, Department of Geography and Planning, Concordia University, Montreal, Canada
- Rob Leuven, Radboud University, Nijmegen, The Netherlands
- Ron Griffiths, Aquatic Ecostudies Limited, Dutton, Ontario, Canada
- Sergey Mastitsky, RNT Consulting Inc., Picton, Ontario, Canada
- Tamara Makarevich, Department of General Ecology, Belarusian State University, Minsk, Belarus

Subodh Kumar (left) and guests celebrating Subodh's retirement party at the Field Station on May 6, 2016.

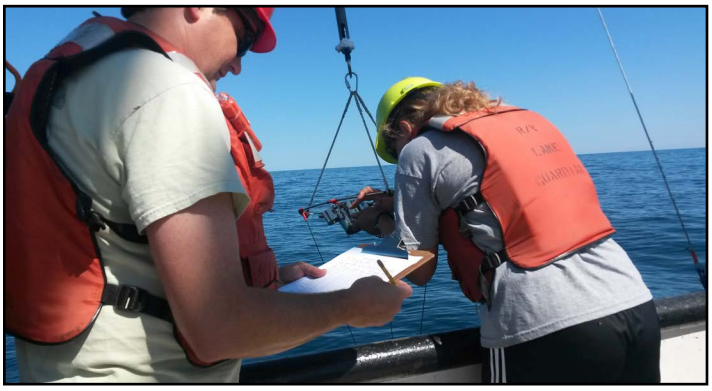
II. Research Activities

Current Projects

Monitoring of benthic invertebrates in Great Lakes

The GLC, in collaboration with Cornell University, was awarded a U.S. EPA Great Lakes Long-term Biological Monitoring grant for 2012-2017. The EPA Monitoring Program is designed to provide managers access to biological data on zooplankton and benthos to support decision-making. During this project we collect benthos (Buffalo State), zooplankton and chlorophyll data (Cornell University) across the five Great Lakes from 2013 through 2017, analyze this data, and make it available to environmental and fisheries managers. Additional research projects include evaluation of an early detection system for aquatic invasive species, and evaluation of biotic indices of ecosystem health. We identified benthic samples collected onboard the EPA R/V *Lake Guardian* in 2012, 2013, and 2014 from all Great Lakes. Based on these data we have made nine presentations at various meetings and conferences, including the 59th Annual Conference of the International Association for Great Lakes Research in Guelph, Canada (June 2016), and at the forthcoming 32nd Congress of the International Society of Limnology in Italy (August 2016).

Susan Daniel and Annie Scofield (Cornell) elutriating a benthic sample aboard the R/V *Lake Guardian*..



Jim Watkins (Cornell) and a technician calibrate the flow meter for the zooplankton nets.

Changes in Lake Erie benthos over the last decades: Historical perspectives, current status, and main drivers

During the last 50 years, the ecosystem of Lake Erie has experienced major environmental changes, from anthropogenic eutrophication in 1930-1960s, to nutrient and pollution abatement in the 1970s, and then the introduction of exotic dreissenids in the 1980s. Currently, the lake-wide benthic community is dominated by dreissenids. The number of exotic species increases every decade, and their impact has had enormous consequences for the whole ecosystem. In summer of 2014 and 2015, within project "Lake Erie & Lake Michigan Benthos: Cooperative Science & Monitoring Initiative," we conducted a lake-wide survey of benthic community using traditional (Ponar grabs, SCUBA) and modern (underwater video) methods, and are currently working on species identification. Data from this lake-wide survey will be compared to historical data to assess changes in benthic community and trends in dreissenid populations that have important management implications.

Sasha Karatayev measuring dreissenid mussels aboard the R/V *Lake Guardian*. More pictures on the back cover.

Mapping *Dreissena* distribution in Lake Michigan using underwater video

Almost every study of *Dreissena* in the Great Lakes has relied on bottom grabs to characterize mussel

presence and biomass, but until now, the scale at which mussel cover varies has largely been unknown. In 2015, in collaboration with the U.S. EPA, University of Michigan, and NOAA, we collected 469 ponar grab samples from 158 sites, and 616 underwater video images to estimate the spatial distribution of quagga mussels in Lake Michigan. We developed a novel method, which analyses video footage recorded from a GoPro camera on a towed benthic sled, to estimate dreissenid cover and biomass. Across 40 sites sampled in Lake Michigan in 2015, we compared *Dreissena* cover and biomass estimates based on three replicate ponars versus 500m-long video transects. Overall, replicate ponar samples were biased and yielded very high errors in estimates of dreissenid presence, especially at sites with moderate to high mussel cover, because replicate bottom grabs collect samples at smaller spatial scales than those at which mussel cover typically varies. As a result, this method offers a straightforward, inexpensive method to drastically reduce uncertainty in lake-wide estimates of *Dreissena* presence, especially in regular monitoring surveys which study a small (<50) number of sites. CSMI Michigan photos.

Biomonitoring of hypoxic zones using invasive *Dreissena* species in Lake Erie

Lake Erie has the longest history of colonization by both *Dreissena polymorpha* and *D. rostriformis bugensis* in North America, and is therefore optimal for the study of long-term dynamics of dreissenid species. Distribution of dreissenid species in Lake Erie varied depending on the time since the initial invasion, depth, and lake basin. During 2014, quagga mussels were found at various depths and in all basins, while zebra mussels were common in the western basin only, and were limited in the central and eastern basins to a very few spots in shallow depths, resulting in almost complete replacement of *D. polymorpha* with *D. r. bugensis*. We found that a deep, offshore hypoxic zone restricts *Dreissena* population to shallow areas of the central basin. Deeper than 20 m, where bottom hypoxia routinely develops, only a small number of young of the year mussels were found, indicating restricted survival of >1 year old mussels. In the western basin of Lake Erie, with occasional episodes of severe oxygen depletion, all mussels were < 3 years old, suggesting die-offs once every 2-3 years. We suggest that monitoring of *Dreissena* occurrence and length-frequency distribution can be a cheap and effective tool in mapping of the extent and frequency of hypoxia in freshwater.

Round goby impacts on tributary stream leaf litter decomposition

The round goby has been implicated in the alteration of both macroinvertebrate and fish communities in tributary streams to the Great Lakes. This project assessed whether this invasive invertivorous, benthic fish impacted crayfish foraging, leading to a change in leaf litter decomposition. We used a field mesocosm manipulation to assess whether round gobies or crayfish had different impacts on the benthic macroinvertebrate community and then, indirectly, on leaf mass loss. Graduate student Stephen Tentinger is quantifying the results for his Master's thesis in Biology.

Stream restoration effects on fish and macroinvertebrate communities

This project compared fish and macroinvertebrate communities in Elton Creek before and after an in-stream and riparian zone restoration project. The original restoration work was intended to improve trout habitat along a 1 km reach. We sampled fish and invertebrates several months prior to the project onset, and at six and 12 months post-project. Sculpins did not respond to the restoration, but trout numbers in the restoration section improved slightly. Macroinvertebrate community response is still being assessed.

Former graduate student Steve Sliwinski and undergraduate Tom Garlock assess their containment net just prior to beginning an electrofishing run in Elton Creek.

Investigating lake sturgeon habitat use, feeding ecology, and benthic resource availability in the lower Niagara River

Great Lakes Center researchers have been awarded a grant by the Niagara Greenway Ecological Fund to

investigate lake sturgeon habitat use, feeding ecology and benthic resource availability in the lower Niagara River for 2014-2017. The lower Niagara River provides habitat to one of the few remnant populations of lake sturgeon in the lower Great Lakes. Evidence shows that this population may be in recovery, but essential information about sturgeon ecology in this unique system is lacking. In this project we study the diversity, distribution and density of benthic forage resources and the biology and ecology of lake sturgeon in the lower Niagara River. We also determine lake sturgeon movement patterns, habitat use, and diet and relate it to our benthic habitat analysis to determine substrate and habitat preferences and to predict a carrying capacity for lake sturgeon in the lower Niagara River. To date, we collected over 250 benthic samples and produced a habitat map which will be the basis for future habitat restoration projects in the river. Our study will produce an assessment of food availability and habitat preferences of lake sturgeon in relation to restoration of the local population to aid researchers and managers in developing opportunities to protect and enhance habitat to advance lake sturgeon recovery in the lower Niagara River. The results of this work were presented at the 59th IAGLR meeting in June 2016.

Graduate students Anthony Cevear and Eric Bruestle collecting samples in the lower Niagara River.

Long-term changes in the distribution range and population size of endangered Rio Grande endemic mollusc *Popenaias popeii*

The Texas Hornshell (*P. popeii*) is listed as a Species of Greatest Conservation Need in Texas and New Mexico, as Endangered in both states, and is a candidate for listing under the Federal Endangered Species Act. Using an opportunity provided by U.S. FWS for a bilateral species conservation effort in New Mexico and Texas, in 2011-2014 we studied the current distribution and population densities of P. popeii in Texas, and developed a method to reconstruct the historical range and population size of species to evaluate changes in the population's size and distribution range over the last 100 years. Sampling over 250 sites in four rivers, constituting the entire historical range of *P. popeii* in Texas, we found that the species has been extirpated from two rivers, a 75% decrease in the combined total length of the rivers populated by the mussel, and experienced a 72% overall decline in the population size. The results of this project, published in two papers and presented at national and international scientific meetings, were recently used by U.S. Fish and Wildlife Service for Species Status Assessment under the Endangered Species Act.

Emerald shiner habitat conservation and restoration study in the upper Niagara River: Importance for sport fish, common terns and public education

In this project we study the emerald shiner's use of the upper Niagara River for spawning, nursery habitat, pathways of migration and year-class formation. Results from habitat use by the shiner will be used to determine restoration needs to provide enhanced spawning and nursery areas and to diminish impediments to fish movement in the river, such as high water velocity areas from altered river shorelines (bulkheads, pilings, etc.). We are also studying food availability to larval, young-of-the-year, and adult shiners, as well as their contribution to the diets of sport fish, adult common terns and their offspring. Our focus is to determine critical habitat for the shiners reproduction and migration, and to evaluate the influence that these fish have on local sport fish and on the brood success of the common tern. Our results will answer questions about habitat conservation, restoration or possible modification to ensure the long-term success of emerald shiners, sport fish and common terns in the system.

Bioaccumulation of flame retardants and emerging contaminants on fish and wildlife in the Niagara River

We collected and analyzed samples at different trophic levels to determine the prevalence of contaminants in

the Niagara River's fish and wildlife, in particular those that contain halogenated compounds with a tendency to bioaccumulate. These contaminants are analyzed in water collected near wastewater treatment plants' outflow into the river, and in predatory fish and avian and mammal wildlife. In particular, we are focusing on pharmaceuticals that enter the river routinely and may affect animal behavior. Our focus will include one of the most commonly prescribed antidepressants, selective serotonin reuptake inhibitors (SSRIs), which may cause impairments in fish and wildlife.

Long-term monitoring on Lake Erie

The GLC has been an active member of the Forage Task Group of the Great Lakes Fishery Commission with Dr. Alicia Perez-Fuentetaja as the Buffalo State representative. As part of the Forage Task Group we have participated in a long-term monitoring study in eastern Lake Erie. Since our participation began in 2008, Kit Hastings has taken a leading role in the implementation of this project by conducting most of the monitoring work at the two eastern Lake Erie sites. From May through October, we collect physical limnology data, water samples, and plankton samples biweekly, and benthos monthly. Our efforts represent a significant contribution towards building a database of biotic and abiotic information from sampling stations throughout Lake Erie that describes annual trophic conditions.

Implementation of the Great Lakes Observing System

Since spring of 2012, the GLC has been a participating member of the Great Lakes Observation System (GLOS). GLOS consists of a varied membership of universities and government agencies that operate a system of observation stations throughout the five Great Lakes. Our contribution to the GLOS is made by operating an observation buoy five miles offshore of Dunkirk, New York. This buoy records and transmits real- time measurements of water temperature, wind speed, wave height, and dissolved oxygen, as well as several other parameters. This buoy is the only GLOS buoy operating in eastern Lake Erie, making it an important source of information for a variety of stakeholders.

The shiner crew, graduate students John Lang, Jacob Cochran, and Christopher Osborne.

Graduate student Jo Johnson with Ba Zan Lin from Buffalo Niagara Riverkeepter, sharing a table at Great Lakes Awareness Day. This event was hosted by NOAA NewYork Sea Grant at the Aquarium of Niagara.

Grants and Funding

Ongoing grants, including two newly received in 2015-2016 (Total $8,650,999, including $4,546,953 for Buffalo State)

1. Karatayev, A. Y., L. E. Burlakova, and D. Gorsky. Investigating lake sturgeon habitat use, feeding ecology, and benthic resource availability in the lower Niagara River. Greenway Ecological Standing Committee. **$835,829**. 2014-2017.
2. Karatayev, A. Y. and M. Clapsadl. Implementation of the Great Lakes Observing System. U.S. Department of Commerce. **$87,678**. 2011-2015.
3. Karatayev, A. Y. and L. E. Burlakova. Lake Erie and Lake Michigan benthos: Cooperative Science and Monitoring Initiative. U.S. EPA. **$500,000**. 2014-2016.
4. Mukherjee, J. J., and S. Kumar. Alcohol and PAH-induced carcinogenesis. National Institutes of Health. **$147,000**. 2012-2015.
5. Pennuto, C. M. Administration of the Western New York PRISM (Partnership for Regional Invasive Species Management). Department of Environmental Conservation, New York State. **$1,100,768**. 2012-2017.
6. Pérez-Fuentetaja, A., M. Clapsadl, R. Snyder, T. DePriest, M. Wilkinson, D. Einhouse, A. Hannes, R. Kraft, K. Hastings, and S. Delavan. Emerald shiner habitat conservation and restoration study in the upper Niagara River: Importance for sport fish, common terns and public education. Niagara Greenway Ecological Fund. **$766,488**. 2014-2016.
7. Pérez-Fuentetaja, A., M. Clapsadl, R. Snyder, T. DePriest, M. Wilkinson, D. Einhouse, A. Hannes, R. Kraft, K. Hastings, and S. Delavan. Emerald shiner habitat conservation and restoration study in the upper Niagara River: Importance for sport fish, common terns and public education. Great Lakes Remedial Action Plan. U.S. Army Corps of Engineers. **$1,331,247** (Funds are in-kind). 2014-2016.
8. Rudstam, L., A. Y. Karatayev, and L. E. Burlakova. Great Lakes Long-term Biological Monitoring Program. U.S. EPA. **$3,867,525** (**$1,094,726** for Buffalo State). 2012-2017.
9. Tang, T. and C. Pennuto. The use of low-altitude unmanned helicopter remote sensing to detect invasive plant species in the Erie Canal System: Method development applied to water chestnut (*Trapa natans*). New York Great Lakes Protection Fund Small Grants Program. **$14,464**. 2015-2016.

Submitted in 2015-2016 (Total $1,908,432)

1. Karatayev, A. Y., and L. E. Burlakova. Lake Superior benthos: Cooperative Science and Monitoring Initiative. U.S. EPA, U.S. Geological Survey. **$150,000**. 2016-2018 (pending).
2. Karatayev, A. Y., and M. Clapsadl. National Atmospheric and Oceanographic Administration. Implementation of a regionally distributed observing network to support critical stakeholder needs for the 2016-2020 GLOS-RA. Cooperative Agreement, SUNY ESF. **$100,000**. 2016-2020 (pending).
3. Mehler, K., A. Y. Karatayev, L. E. Burlakova, D. Gorsky, and Z. Biesinger. Mapping the Niagara River: Generating multi-layer habitat maps for fish and benthic resources assessment and management in the upper Niagara River. Greenway Ecological Standing Committee Proposal. **$499,969**. 2017-2018 (pending).
4. Pennuto, C. and A. Locke. Pulling together initiative – The WNY PRISM invasive species strike team (ISST) project. National Fish & Wildlife Foundation. **$122,419** (not funded).
5. Pérez-Fuentetaja, A., M. Clapsadl, R. Snyder, T. DePriest, B. Hinterberger, D. Aga, and R. Kraft. Recovering ecosystem function in the upper Niagara River to facilitate habitat restoration and overcome impairments in water quality, fish and wildlife. Niagara Greenway Ecological Fund. **$1,036,044**. 2017-2019 (pending).

Publications and Presentations

Last year the researchers of the GLC were very active in publishing papers and presenting their results at international and national meetings and conferences. Nine manuscripts were published, another eight were submitted to peer-reviewed journals. A total of 36 presentations were made by the GLC researches, including: 21 presentations at national/international/regional conferences, 10 invited talks, and 5 presentations made in non-refereed venues.

Refereed Journal Publications (published)

1. Crane, D., C. Killourhy, and M. Clapsadl. 2016. Effects of three frozen storage methods on wet weight of fish. *Fisheries Research*, 175: 142-147.
2. Karatayev, A. Y., L. E. Burlakova, T. D. Miller, and M. F. Perrelli. 2015. Reconstructing historical range and population size of an endangered mollusc: Long-term decline of *Popenaias popeii* in the Rio Grande, Texas. *Hydrobiologia*, DOI: 10.1007/s10750-015-2551-3.
3. Karatayev, A. Y., L. E. Burlakova, and D. K. Padilla. 2015. Zebra versus quagga mussels: A review of their spread, population dynamics, and ecosystem impacts. *Hydrobiologia*, 746: 97–112. DOI: 10.1007/s10750-014-1901-x.
4. Lopes-Lima, M., R. Sousa, J. Geist, D. C. Aldridge, R. Araujo, J. Bergengren, Y. Bespalaja, E. Bodis, L. Burlakova, D. Van Damme, K. Douda, E. Froufe, D. Georgiev, C. Gumpinger, A. Karatayev, U. Kebapci, I. Killeen, J. Lajtner, B. M. Larsen, R. Lauceri, A. Legakis, S. Lois, S. Lundberg, E. Moorkens, G. Motte, K.-O. Nagel, P. Ondina, A. Outeiro, M. Paunovic, V. Prie, T. von Proschwitz, N. Riccardi, M. Rudzīte, M. Rudzītis, C. Scheder, M. Seddon, H. Sereflisan, V. Simić, S. Sokolova, K. Stoeckl, J. Taskinen, A. Teixeira, F. Thielen, T. Trichkova, S. Varandas, H. Vicentini, K. Zajac, T. Zajac, and S. Zogaris. 2016. Conservation status of freshwater mussels in Europe: State of the art and future challenges. *Biological Reviews*, DOI: 10.1111/brv.12244. Article first published online: Jan. 4, 2016.
5. Mackintosh, S. A., J. S. Wallace, M. S. Gross, D. D. Navarro, A. Pérez-Fuentetaja, M. Alaee, D. Montecastro, and D. S. Aga. 2015. Review on the occurrence and profiles of polybrominated diphenyl ethers in the Philippines. *Environment International*, 85: 314-326.
6. Pérez-Fuentetaja, A., S. A. Mackintosh, L. R. Zimmerman, M. D. Clapsadl, M. Alaee, and D. S. Aga. 2015. Trophic transfer of flame retardants (PBDEs) in the food web of Lake Erie. *Canadian Journal of Fisheries and Aquatic Sciences*, 72: 1886-1896.
7. Paterson, W. L., T. A. Griffith, L. E. Burlakova, R. W. Krebs, and D. T. Zanatta. 2015. An evaluation of the genetic structure of mapleleaf mussels (*Quadrula quadrula*) in the Lake Erie watershed. *Journal of Great Lakes Research*, 41: 1123-1130.
8. Pennuto, C. M. and M. Smith. 2015. From midges to spiders: Mercury biotransport in riparian zones near the Buffalo River Area of Concern (AOC), USA. *Bulletin of Environmental Contamination & Toxicology*, 95: 701-706.
9. Pennuto, C. M. and S. A. Rupprecht. 2016. Upstream range expansion by invasive round gobies: Is functional morphology important? *Aquatic Ecology*, 50: 45-57.

Refereed Journal Publications Submitted (in review)

1. Allen, I. W., S. K. Delavan, A. R. Hannes, and A. Pérez-Fuentetaja. Potential barriers to upstream fish passage caused by anthropogenic river modifications: A computer modeling study of Emerald Shiners in the upper Niagara River. Submitted to *Ecological Engineering*.
2. Bossenbroek, J. M., L. E. Burlakova, T. C. Crail, A. Y. Karatayev, R. A. Krebs, and D. T. Zanatta. Using ecological niche modelling to detect unionid refuges in the Laurentian Great Lakes, 25 years after the *Dreissena* invasion. Submitted to *Aquatic Conservation: Marine and Freshwater Ecosystems*.
3. Collas, F. P. L., A. Y. Karatayev, L. E. Burlakova, and R. S. E. W. Leuven. Experimental quantification of boat hull mediated overland dispersal of dreissenid mussels. Submitted to *Hydrobiologia*.

4. Dascher E. D., L. E. Burlakova, A. Y. Karatayev, D. F. Ford, T. Bonner, and A. N. Schwalb. How does the distribution of unionid freshwater mussels in Texas relate to the distribution of host fishes? Submitted to *Hydrobiologia*.
5. Karatayev, A. Y., L. E. Burlakova, and D. K. Padilla. Can introduced species replace lost biodiversity? A test with freshwater molluscs. Submitted to *Freshwater Biology*.
6. Mehler, K., L. E. Burlakova, A. Y. Karatayev, Z. Biesinger, A. Valle-Lewinson, C. Castiglione, and D. Gorsky. Sonar technology and underwater video analysis can enhance invasive *Dreissena* distribution assessment in large rivers. Submitted to *Hydrobiologia*.
7. Pérez-Fuentetaja, A. and F. Goodberry. Daphnia's challenge: Survival and reproduction when calcium and food are limiting. Submitted to *Journal of Plankton Research*.
8. Sood, S., S. K. Delavan, A. Pérez-Fuentetaja, and A. R. Hannes. Anthropogenic turbulence and velocity barriers for upstream swimming fish: A field study on emerald shiners (*Notropis atherinoides*) in the upper Niagara River. Submitted to *Ecological Engineering*.

International/National/Regional Conference Presentations

1. Burlakova, L. E., A. Y. Karatayev, B. L. Tulumello, R. Krebs, D. Zanatta, D. W. Schloesser, W. L. Paterson, T. Griffith, M. W. Scott, and T. Crail. Competitive replacement of invasive congeners may relax impact on native species: Interactions among zebra, quagga, and native unionid mussels. Ecological Society of America, 100th Annual Meeting. Baltimore, Maryland. August 9-14, 2015.
2. Karatayev, A. Y., L. E. Burlakova, and D. K. Padilla. Predicting the spread of aquatic invaders: What can we learn from 200 years of continuous invasion by zebra mussels? Ecological Society of America, 100th Annual Meeting. Baltimore, Maryland. August 9-14, 2015.
3. Karatayev, A. Y., L. E. Burlakova, and D. K. Padilla. Endangered or invaders? Molluscs – the most imperiled group of freshwater invertebrates includes the highest number of invaders. 2nd International Meeting on Biology and Conservation of Freshwater Bivalves. Buffalo, New York. October 4-8, 2015.
4. Burlakova, L. E., A.Y. Karatayev, V. A. Karatayev, T. Miller, and M. F. Perrelli. Conservation of endangered unionids in high-flowing fragmented rivers: Historical changes and metapopulation dynamics of the Rio Grande endangered endemic *Popenaias popeii*. 2nd International Meeting on Biology and Conservation of Freshwater Bivalves. Buffalo, New York. October 4-8, 2015.
5. Collas, F. P. L., A. Y. Karatayev, L. E. Burlakova, and R. S. E. W. Leuven. Boat hull mediated overland dispersal chance of dreissenid mussels. 2nd International Meeting on Biology and Conservation of Freshwater Bivalves. Buffalo, New York. October 4-8, 2015.
6. Dascher E., J. Olson, L. E. Burlakova, A. Y. Karatayev, T. Bonner, and A. N. Schwalb. How does the distribution of unionid freshwater mussels in Texas relate to the distribution of fishes? 2nd International Meeting on Biology and Conservation of Freshwater Bivalves. Buffalo, New York. October 4-8, 2015.
7. Mehler, K., A. Y. Karatayev, and L. E. Burlakova. Estimation of exotic bivalve distribution and abundance in a large river using traditional sampling, remote sensing, and GIS-derived benthic habitat maps. 2nd International Meeting on Biology and Conservation of Freshwater Bivalves. Buffalo, New York. October 4-8, 2015.
8. Karatayev, A. Y. Lake Erie and Lake Michigan benthos: Cooperative Science and Monitoring Initiative. 9th Biennial State of Lake Michigan/15th Annual Great Lakes Beach Association Joint Conference. Acme, Michigan. October 28-30, 2016.
9. Burlakova, L. E., R. P. Barbiero, A. Y. Karatayev, and S. E. Daniel. What's on the bottom? Spatial gradients and temporal changes in Great Lakes benthic communities. 59th Annual Conference on Great Lakes Research. Guelph, Ontario, Canada. June 6-10, 2016.
10. Karatayev, A. Y., L. E. Burlakova, K. Mehler, V. A. Karatayev, T. F. Nalepa, A. K. Baldridge, and E. K. Hinchey. Underwater video is an effective tool to reveal *Dreissena* spatial distribution and biomass. 59th Annual Conference on Great Lakes Research. Guelph, Ontario, Canada. June 6-10, 2016.

11. Mehler, K., L. E. Burlakova, A. Y. Karatayev, and A. G. Cevaer. Benthic invertebrate assessment in the lower Niagara River: Distribution and community structure. 59th Annual Conference on Great Lakes Research. Guelph, Ontario, Canada. June 6-10, 2016.
12. Daniel, S. E., L. E. Burlakova, and A. Y. Karatayev. The effect of *Dreissena* on vertical distribution and abundance of Oligochaeta in Lake Erie. 59th Annual Conference on Great Lakes Research. Guelph, Ontario, Canada. June 6-10, 2016.
13. Cevaer, A. G., K. Mehler, L. E. Burlakova, and A. Y. Karatayev. Historic and current benthic macroinvertebrate community in the Niagara River. 59th Annual Conference on Great Lakes Research. Guelph, Ontario, Canada. June 6-10, 2016.
14. Vanderploeg, H. A., J. F. Cavaletto, A. K. Baldridge, L. E. Burlakova, H. J. Carrick, A. Y. Karatayev, G. A. Lang, J. R. Liebig, D. M. Mason, T. F. Nalepa, S. A. Pothoven, M. D. Rowe, E. S. Rutherford, and D. J. Wells. Spatial organization of pelagic and benthic food webs in southern Lake Michigan in 2015. 59th Annual Conference on Great Lakes Research. Guelph, Ontario, Canada. June 6-10, 2016.
15. Pérez-Fuentetaja, A., M. Clapsadl, R. Snyder, J. Cochran, and P. Michalak. The emerald shiner (*Notropis atherinoides*) as a key food web link in the upper Niagara River. American Association of Limnology and Oceanography (ASLO). Santa Fe, New Mexico. June 7, 2016.
16. Clapsadl, M., Pérez-Fuentetaja, A., Snyder R., Lang, J., Cochran, J., Osborne, C., and J. Fisher. Seasonal comparison of energy content of emerald shiners (*Notropis atherinoides*) from four different systems in the Great Lakes. American Association of Limnology and Oceanography (ASLO). Santa Fe, New Mexico. June 7, 2016.
17. Snyder, R., A. Pérez-Fuentetaja, M. Clapsadl, C. Osborne, J. Lang, and J. Cochran. Growth and mortality of emerald shiners in the upper Niagara River, NY. Association of Limnology and Oceanography (ASLO). Santa Fe, New Mexico. June 7, 2016.
18. Johnson, R. J., S. Fleck, A. Pérez-Fuentetaja, M. Clapsadl, and R. Snyder. Emerald shiner prey item analysis in the upper Niagara River. 59th Annual Conference on Great Lakes Research. Guelph, Ontario, Canada. June 6-10, 2016.
19. Fleck, S., A. Pérez-Fuentetaja, R. Snyder, and M. Clapsadl. Habitat use of larval fish in the macrophyte beds of Niagara River wetlands. 59th Annual Conference on Great Lakes Research. Guelph, Ontario, Canada. June 6-10, 2016.
20. Pennuto, C. M. and S. Sliwinski. Non-target fish community exhibits a moderate response to in-stream habitat improvements in Elton Creek, New York. 59th Annual Conference on Great Lakes Research. Guelph, Ontario, Canada. June 6-10, 2016.
21. Tetinger, S. and C. M. Pennuto. Does a new benthic predator alter leaf litter breakdown by crayfish in a heterotrophic stream? 59th Annual Conference on Great Lakes Research. Guelph, Ontario, Canada. June 6-10, 2016.

Invited Talks

1. Burlakova, L. E., A. Y. Karatayev, S. Daniel, and R. P. Barbiero. Integrating environmental effects of multiple stressors in the Great Lakes: Drivers and dynamics of Oligochaete Trophic Index. Case Western Reserve University Seminar, Cleveland, Ohio. July 13, 2015.
2. Karatayev, A. Y. Buffalo State Great Lakes Center. Celebrating 50 years of research (1966-2016). ICE meeting. Buffalo, New York. September 24, 2015.
3. Karatayev, A. Y., K. Mehler, V. Karatayev, and L. E. Burlakova. Aliens, GoPros, and popcorn: Counting invasive mussels on the bottom of Lake Michigan. EPA Great Lakes National Program Office. Chicago, Illinois. February 17, 2016.
4. Karatayev, A. Y., K. Mehler, and L. E. Burlakova. Lake Erie and Lake Michigan benthos: Cooperative Science and Monitoring Initiative. EPA Great Lakes National Program Office. Chicago, Illinois. February 17, 2016.
5. Burlakova, L. E., A. Y. Karatayev, and R. P. Barbiero. Spatial and temporal changes in Great Lakes benthic

communities, 1997-2013. EPA Great Lakes National Program Office. Chicago, Illinois. February 17, 2016.

6. Burlakova, L. E., A. Y. Karatayev, and T. Miller. Long-term decline of *Popenaias popeii* in the Rio Grande drainage, Texas. Expert Meeting for Species Status Assessments under the Endangered Species Act. U.S. Fish and Wildlife Service. Austin, Texas. October 26 – 27, 2015.
7. Karatayev, A. Y. Buffalo State Great Lakes Center. Celebrating 50 years of research (1966-2016). Burchfield Penney Art Center. Buffalo New York. April 15, 2016.
8. Pennuto, C. M. Use of drones in invasive species surveillance. WNY PRISM spring partnership meeting. Tifft Nature Preserve. Buffalo, New York. April 2016.
9. Pennuto, C. M. Round goby invasion dynamics. Lake Oneida Watershed Association annual meeting. Cicero, New York. April 2016.
10. Pennuto, C. M. Fish invasions: A story of goby woes and stream ecosystem resiliency. Hobart & William Smith College Seminar Series. Geneva, New York. October 2015.

Conference Presentations (non-refereed)

1. Daniel, S., L. E. Burlakova, and A. Y. Karatayev. Effect of *Dreissena* on profundal Oligochaeta community. 16th Annual Faculty/Staff Research and Creativity Fall Forum, Buffalo State College, October 29, 2015 (poster).
2. Mehler, K., A. Y. Karatayev, L. E. Burlakova, and Z. Biesenger. Estimation of exotic bivalve distribution and coverage in a large river using traditional sampling, remote sensing, and GIS-derived benthic habitat maps. 16th Annual Faculty/Staff Research and Creativity Fall Forum, Buffalo State College, October 29, 2015 (poster).
3. Hastings, K. Observations from Lake Erie long-term monitoring sites. 16th Annual Faculty/Staff Research and Creativity Fall Forum, Buffalo State College, October 29, 2015 (poster).
4. Fisher, J. Identification of larval fishes of the Niagara River. 16th Annual Faculty/Staff Research and Creativity Fall Forum, Buffalo State College, October 29, 2015 (poster).

Publications in media

1. Burlakova, L., K. Mehler, A. Karatayev, and M. Lopes-Lima. 2nd International Meeting on Biology and Conservation of Freshwater Bivalves. Newsletter of the Freshwater Mollusk Conservation Society, 17 (4), December 2015.

III. Education

The GLC fulfills its educational mission directly through the classes its researchers teach, through its Master of Art and Master of Science graduate programs in Great Lakes Ecosystem Science, through the support we offer to faculty teaching classes pertaining to environmental sciences, through the seminar speakers we sponsor, and through our educational activities in the community.

Great Lakes Center M.S. and M.A. Graduate Programs

The GLC administers two interdisciplinary applied environmental science programs in Great Lakes Ecosystem Science (GLES). The GLES programs provide an opportunity for students to pursue graduate studies through a thesis-based Master of Arts (M.A.) and an internship-based Master of Science (M.S.). Both programs provide students with the opportunity to attain a broad understanding of the physical, chemical, biological, and social factors that comprise the Great Lakes ecosystems. GLES graduates are prepared to provide a leadership role as they address a broad range of problems and issues related to the management of resources within the Great Lakes and surrounding watersheds.

Students enrolled in GLES Administered by the GLC in 2015-2016:

Master of Art:	**Master of Science:**
Lee Evans	Heather Lewis
Michael Borrelli	Chad Schuster
Andrew Lenox	Jason Paeplow
Eric Bruestle	Julie Berlinski
Jacob Cochran	Keith Pawlowski
Colleen Kolb	Anthony Cevaer
Jo Johnson	Susan Daniel
YingYu Zhang	Leah Santasiero
Chenliuli Jiang	Mary Pokorski
Jiazhen Zhang	Ashley Perez
	Michael Radomski
	Sean Ryan
	Zach Adams
	Yusheng Ye

Integrative Graduate Education and Research Traineeship Ph.D. Program at SUNY Buffalo State:

Student:	**Advisor:**
Isabel Porto Hannes	Burlakova, L.

Advising Undergraduate and Graduate Students

- Lyubov Burlakova was the major professor for the Integrative Graduate Education and Research Traineeship Ph.D. Program (Isabel Porto Hannes) and a committee member for Brandon Sansom (2015-present), Ph.D. student, State University of New York at Buffalo. She was also a faculty Mentor/ Advisor for Susan Daniel and Keith Pawlowski, and a member of the graduate committee for Anthony Cevaer and Erik Bruestle in the Great Lakes Ecosystem Science Graduate Program at Buffalo State.
- Alexander Karatayev was a member of the Graduate Committee for a Ph.D. student at State University of New York at Buffalo (Isabel Porto Hannes).
- Mark Clapsadl was a committee member for six graduate students.

- Knut Mehler was the major advisor professor for Anthony Cevaer and a member of the Graduate Committee for Eric Bruestle in the M.A. Great Lakes Ecosystem Science Graduate Program. He was also the instructor of GLC 600 Seminar – Spring Semester 2016.
- Chris Pennuto was the advisor of two graduate students from the Biology Department (Hilary McNaughton, Stephen Tentinger). He was also MA thesis committee member for five graduate students.
- Alicia Pérez-Fuentetaja was a committee member for eight graduate students (six at Buffalo State and two at State University of New York at Buffalo).

Seminars

In order to facilitate collaboration between the GLC personnel and leading experts in aquatic ecology and related sciences, and to increase visibility of the Center in 2015-2016, we invited five speakers to present talks at our seminar series, including:

1. Serghei Bocaniov, Graham Sustainability Institute, University of Michigan. "Three-dimensional modeling: A powerful tool for the improved scientific understanding and management of Lake Erie." October 15, 2015.
2. Katya Kovalenko, University of Minnesota, Duluth. "Coastal biota and anthropogenic stress in the Great Lakes." January 21, 2016.
3. Mary-Alice Coffroth, State University of New York at Buffalo. "Coral-algal symbioses." March 4, 2016.
4. Jonah Withers, U.S. Fish and Wildlife Service. "Listening in on lake sturgeon in the Buffalo Harbor." March 29, 2016.
5. Ashley Baldridge, National Oceanic and Atmospheric Administration (NOAA) Great Lakes Environmental Research Laboratory. "Dreissenid mussel population trajectories and associated patterns in mussel growth and condition." March 3, 2016.

Recent GLES M.S. graduate John Grabowski and Daniel Potts (Biology faculty) working on a riparian restoration monitoring project. during the summer of 2015.

IV. Outreach and Service Activities

In October 2015, we hosted the 2nd International Meeting on Biology and Conservation of Freshwater Bivalves where over 80 scientists from 19 countries and four continents presented results of their studies. Various important issues of the ecology and conservation of freshwater molluscs were presented, including: biology and ecology; threats and conservation needs; invasive species; biogeography and taxonomy; phylogeny and genetic diversity; physiology and reproduction; ecosystem services and functioning. Conference photos.

In collaboration with the Cornell Biological Field Station, we organized a PRIMER workshop presented by Dr. Bob Clarke, "Analysis of multivariate data from ecology and environmental science, using PRIMER v7," at the Cornell Biological Field Station, Oneida Lake, Bridgeport, New York, on November 2-6, 2015. Nineteen participants attended, including Buffalo State students and GLC faculty.

All members of the GLC have been actively involved in the outreach and service to the profession, to the College, and to the community.

Lyubov Burlakova:

- Coordinator of the Great Lakes Center and Biology Department Seminar Series.
- Member of the Organizing Committee for the 2nd International Freshwater Bivalves Conference. Buffalo, October 4-8, 2015.
- Member of Organizing Committee for the celebration of the 50th Anniversary of Great Lakes Center held on April 15, 2016.
- Assisted in organization of Great Lakes Center Open House (November 2015).
- Assisted in preparation of the Great Lakes Center 2014-2015 Annual Report (November 2015).
- Wrote articles for GLC Newsletter series.
- Editor of the Special Issue of *Hydrobiologia* on Ecology and Conservation of Freshwater Bivalves (2016).
- Co-chair of one session at the 59th Annual Conference on Great Lakes Research. June 6-10, 2016.
- Co-chair of one session at the 32nd Congress of the International Society of Limnology, July 31 – August 5, 2016, in Turin, Italy.
- Submitted session proposal for ASLO Aquatic Sciences Meeting in Honolulu, Hawaii, February 26 – March 3, 2017.
- Attended meeting with GLNPO in Chicago to present current progress on the ongoing projects and discuss future research and grant opportunities.
- Participated in the Expert Meeting for Species Status Assessments under the Endangered Species Act. U.S. Fish and Wildlife Service, Austin, Texas, October 26-27, 2015.
- Participated in multiple phone conferences with EPA, NOAA, USGS etc. about current research and potential future projects.
- Participated in meetings with our partners from Cornell University on the Great Lakes Long-term Biological Monitoring Program.
- Reviewed *Popenaias popeii* Species Status Assessment under the Endangered Species Act for U.S. Fish and Wildlife Service, March, 2016.
- Helped in organizing a PRIMER workshop presented by Dr. Bob Clarke at the Cornell Biological Field Station, Oneida Lake, Bridgeport, New York, on November 2-6, 2015.
- Member of the American Society of Limnology and Oceanography, the International Association of the Great Lakes Research, the Freshwater Mollusc Conservation Society, and the Ecological Society of America.

- Reviewed manuscripts for *BMC Ecology*, *Freshwater Science*, *Aquatic Conservation*, *Oceanologia*, *PeerJ*, and *Siberian Journal of Sciences*.

Mark Clapsadl:

- Participated in and supervised the Lake Erie Long-term Lower Trophic Level Monitoring Project.
- Served as Science Advisor on the Environmental Committee of the Niagara Musky Association.
- Provided significant support to numerous GLC research projects, as well as support to outside agencies and organizations.
- Member of Organizing Committee for the celebration of the 50th Anniversary of Great Lakes Center held on April 15, 2016.
- Met with New York State Senator Marc Panepinto to discuss and promote educational outreach activities at SUNY Buffalo State.
- Conducted several radio interviews with WBFO.

Susan Daniel:

- U.S. Student Board Member, International Association of Great Lakes Research.
- Wrote articles for GLC Newsletter series.
- Participated in meetings with our partners from Cornell University on the Great Lakes Long-term Biological Monitoring Program.
- Assisted in taxonomic training of new employees.
- Member of the International Association of the Great Lakes Research.

Susan Dickinson:

- Member of the Organizing and Scientific Committees for the 2nd International Freshwater Bivalves Conference held in Buffalo, October 2015.
- Member of Organizing Committee for the celebration of the 50th Anniversary of Great Lakes Center held on April 15, 2016.
- Assisted in preparation of the Great Lakes Center Annual Report for publication.
- Assisted in preparation of the booklet "Buffalo State Great Lakes Center: Celebrating 50 Years of Research" for publication.
- Assisted in publication of Great Lakes Center posters.
- Organized Great Lakes Center Open House.
- Assisted in preparation of the Great Lakes Center and Biology Department Seminar Series.
- Treasurer, CSEA Local 640, Buffalo State College.
- Participated as a beta tester for the rollout of the new Adobe license on campus.
- Participated in a CPR/AED class provided at Weigel Health Center.
- Volunteer, SPCA of Niagara.

Joshua Fisher:

- Captained the R/V *John J. Freidhoff* and provided field technical support for the Lake Erie Long-term Lower Trophic Monitoring Project.
- Planned and implemented field studies with Buffalo State faculty, researchers, and staff for the Niagara River Emerald Shiner Project.
- Updated, organized, and repaired various pieces of sampling equipment so they are more effective in their

sampling and accessible to researchers.

- Processed larval fish by phylogenetically identifying, organizing, and documenting samples collected for the Emerald Shiner Project.
- Assisted in coordinating the use of field station boats, vehicles, buildings, and equipment for Buffalo State faculty, staff, students, collaborating agencies, organizations, and other universities.
- Assisted in coordinating the use of field station grounds by the U.S. Navy, the West Side Rowing Club, and Buffalo Niagara Riverkeeper.
- Provided field and laboratory procedures instructional support for several Buffalo State classes.

Kit Hastings:

- Participated in field collection and laboratory studies in multiple projects conducted at the Field Station.
- Implemented the Lake Erie Long-term Lower Trophic Level (LTLA) Monitoring Project.
- Member of the Buffalo State Institutional Animal Care and Use Committee.
- Member of Buffalo State Sustainability Council.
- Played a key role in producing two issues of GLC Newsletters (editor) and maintaining the GLC website.
- Assisted in preparation of the booklet "Buffalo State Great Lakes Center: Celebrating 50 Years of Research" for publication. Made three posters and a slideshow for the Great Lakes Center 50th Anniversary celebration.
- Member of the Organizing Committee for the 2nd International Freshwater Bivalves Conference held in Buffalo in October of 2015, as well as designing and maintaining the website.
- Assisted in lab work associated with the Great Lakes Long-term Biological Monitoring Program and Lake Erie CSMI project (mounted oligochates and chironomids slides).
- Participated in collecting samples within the Great Lakes Long-term Biological Monitoring Program project aboard the Lake Guardian.
- Provided instructional support on field sampling procedures for multiple Buffalo State classes.
- Participated in the Emerald Shiner Habitat Restoration and Conservation Study.
- Member of NYS GIS Association and WNY GIS Users Group.
- Trained volunteer for the CommuniTree Steward Project, a collaboration between Cornell Cooperative Extension of Erie County and the City of Buffalo.

Alexander Karatayev:

- Chair of the Organizing Committee for the 2nd International Freshwater Bivalves Conference. Buffalo, October 4-8, 2015.
- Chair of the Organizing Committee for the celebration of the 50th Anniversary of Great Lakes Center held on April 15, 2016.
- Member of the Ph.D. Committee for Isabel Porto Hannes, in the Ecosystem Restoration through Interdisciplinary Exchange (ERIE) IGERT Program, State University of New York at Buffalo (2011 – present).
- Organized Great Lakes Center Open House (November 2015).
- Published Great Lakes Center 2014-2015 Annual Report (November 2015).
- Wrote multiple articles for GLC Newsletter series.
- Attended meeting with GLNPO in Chicago to present current progress on the ongoing projects and discuss future research and grant opportunities.
- Participated in multiple phone conferences with EPA, NOAA, USGS etc. about current research and potential future projects.

- Participated in the Expert Meeting for Species Status Assessments under the Endangered Species Act. U.S. Fish and Wildlife Service, Austin, Texas. October 26-27, 2015.
- Presented results of invasive species monitoring in Great Lakes ports at HELKOM teleconference, September 2015.
- Participated in meetings with our partners from Cornell University on the Great Lakes Long-term Biological Monitoring Program.
- Co-editor of the Special Issue of *Hydrobiologia* on Ecology and Conservation of Freshwater Bivalves.
- Co-chair of one session at the 59th Annual Conference on Great Lakes Research. June 6-10, 2016.
- Co-chair of one session at the 32nd Congress of the International Society of Limnology, July 31 – August 5, 2016, in Turin, Italy.
- Campus Representative for the Great Lakes Research Consortium.
- Submitted session proposal for ASLO Aquatic Sciences Meeting in Honolulu, Hawaii, February 26 – March 3, 2017.
- Participated in Graduate School meetings.
- Advisory Board Member, International Journal of Aquatic Invasions.
- Multiple interviews for various mass media.
- Reviewed *Popenaias popeii* Species Status Assessment under the Endangered Species Act for U.S. Fish and Wildlife Service, March, 2016.
- Member of the American Society of Limnology and Oceanography, the International Association of the Great Lakes Research, the Freshwater Mollusc Conservation Society, and the Ecological Society of America.
- Reviewed manuscripts for *Freshwater Biology* and *Hydrobiologia*.

Knut Mehler:

- Member of organizing committee for the 2nd International Meeting on Biology and Conservation of Freshwater Bivalves in Buffalo, October 2015.
- Instructor of GLC 600 Seminar – Spring Semester 2016.
- Co-editor of the Special Issue of *Hydrobiologia* on Ecology and Conservation of Freshwater Bivalves (2016).

Christopher Pennuto:

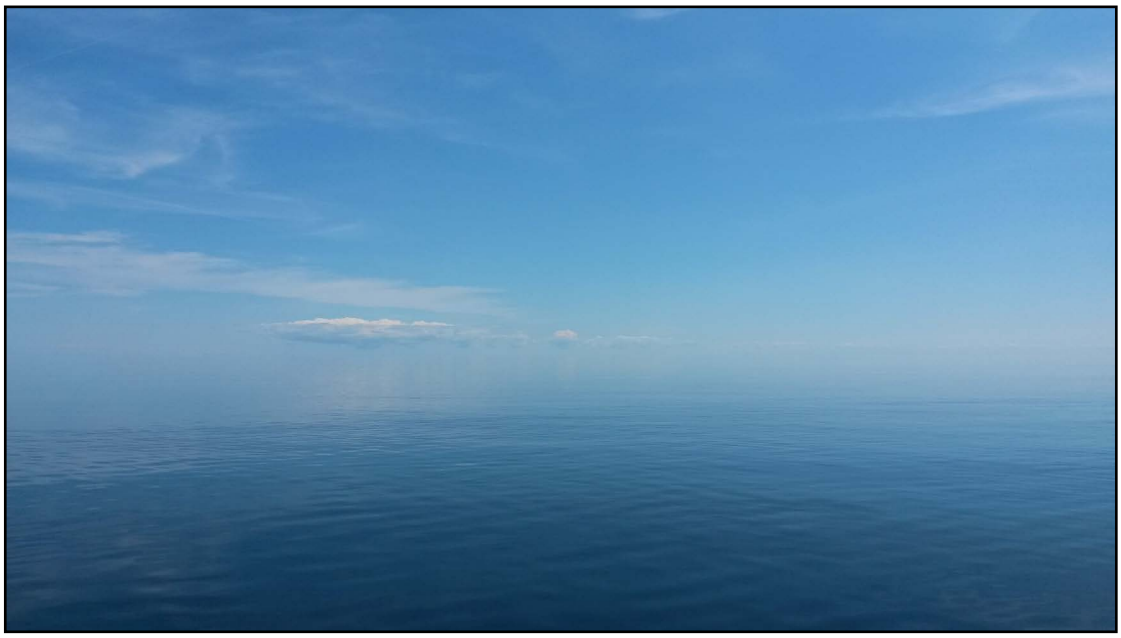
- Graduate Advisory Council member.
- Assessment Committee member, Biology Department.
- Curriculum Committee member, Biology Department.
- Admissions Committee Chair for GLES Master Programs.
- Graduate Open house night, April 12 (representing GLES).
- Hooder, Biology Department, Buffalo State Commencement Ceremony, May 2016.
- Reviewed manuscripts for *Journal of Environmental Pollution*, *Journal of Insect Science*, and *Biological Invasions*.

Alicia Pérez-Fuentetaja:

- Member of Graduate Committee, Biology Department.
- Advisor Graduate Comprehensive Exam students in Biology.
- International Association of Great Lakes Research (IAGLR) Committee Member for determining the Chandler-Misener Best Paper Award (most prestigious), Best Early Career Paper Award and Best Student

Paper Award.

- International Association of Great Lakes Research (IAGLR) Committee Member to determine the recipient of the Rodgers Scholarship Award.
- Research Advisor to the Lake Erie Forage Task Group. This international multi-agency group reviews fisheries data on the lower food web organisms in Lake Erie and reports to the Great Lakes Fishery Commission.
- Run an intensive outreach program to inform and involve the public on the research we are doing in the Niagara River and promote rehabilitation and conservation of the ecosystem. I have a graduate student that is our outreach specialist (Jo Johnson) and with my direction and supervision maintains a webpage, and informs the public about our research progress through public presentations, Twitter, and Instagram.
- Expert advice on the implications of the invasion of the round goby for botulism type E outbreaks in Lake Winnebago (WI): Email communications and phone interview with Scott Van Egeren, Department of Natural Resources (WI) to produce a risk assessment overview for the State (June 2016).
- Reviewed article for *Journal of Great Lakes Research Aquatic Sciences*.



An extremely calm day on Lake Huron during the EPA's annual summer survey of all five Great Lakes. There are many times during this survey where there is no land in sight.

V. Professional Development Activities

Lyubov Burlakova:

- Attended workshop on nonparametric multivariate statistics by Dr. Bob Clarke on November 2-6, 2015.

Susan Daniel:

- U.S. Student Board Member, International Association of Great Lakes Research.

Joshua Fisher:

- Attended the American Fisheries Society Fish ID workshop on October 6-7, 2015.

Alexander Karatayev:

- Attended workshop on nonparametric multivariate statistics by Dr. Bob Clarke on November 2-6, 2015.

Knut Mehler:

- Attended workshop on nonparametric multivariate statistics by Dr. Bob Clarke on November 2-6, 2015.

Brianne Tulumello:

- Completed SUNY Research Foundation Ethics Training (March 2016).
- Completed Fish Identification Workshop hosted by USFWS (October 2015).

Attendees of the PRIMER workshop on led by Dr. Bob Clarke at the Cornell Biological Field Station on November 2-6, 2015.

VI. Field Station Activities

The bulk of the ecosystems/fisheries research is carried out at the GLC Field Station. The Field Station is located at the head of the Niagara River on Lake Erie and is capable of supporting high-level research in a variety of disciplines. It houses a fully-automated aquaculture system, a variety of data loggers and automated sampling equipment, and microscopes. We continue to update and maintain our research support systems. Additionally, the GLC Field Station houses the Partnership in Regional Invasive Species Management (PRISM) office.

Research Vessels

This year we added a 21' Sea Arc jon boat to our fleet. This boat was provided to us free of charge as part of an agreement between SUNY ESF, the Greenway Commission and Research Foundation. This boat is an excellent addition to our fleet and is particularly useful on the Niagara River, where much of our recent work has been taking place. We have a regular maintenance program in place and as a result of this program and the ability to store the boats in the "boat shed," the vessels are all in good working order.

Instructional Support

- Provided support for Dr. Reissen's Limnology Class, Pymatuning, Pennsylvania field trip.
- Dr. Standora's Ecology class was given a limnology equipment demonstration and lecture in the fall.
- Dr. Bergslien's GES 460 was given a limnology equipment demonstration and lecture in the spring.
- Facilities were provided for Dr. Anselmi's Anthropology class experiments.
- Provided laboratory support for six graduate student projects.

Research Activities

- Extensive involvement with "Emerald Shiners in the Upper Niagara River."
- Published preservation methods study in peer reviewed journal
- Provided vessel and technician support for "Lake Erie CSMI."
- Provided vessel and technician support for Early Detection of Alien Species in Harbors project.
- Provided vessel and technician support for "Investigating Lake Sturgeon habitat use, feeding ecology, and benthic resource availability in the lower Niagara River."
- Installed and operated the GLOS (Great lakes Observing System) buoy in Lake Erie off Dunkirk, New York.
- Continued long-term sampling of the eastern basin of Lake Erie for the Lower Trophic Level Assessment, adding to fifteen years of data.
- Assisted Jill Singer with logistics for her Buffalo River current sonar modeling project.

Mark Clapsadl using a calorimeter to determine the energy content of emerald shiners. Calorimetry was also used for the preservation methods study.

- Provided support to Drs. Tang and Pennuto with *Hydrilla* survey project.
- Provided Support to USFWS fish tracking project.
- Facilitated access to the boat launch for NYS DEC and U.S. Fish and Wildlife Service.

Graduate student Jo Johnson and Josh Fisher electrofishing for emerald shiners.

Outreach

- Hosted ICE meeting.
- Hosted multiple Buffalo Niagara Riverkeeper kayaking touring events for public education.
- Hosted Helen Domske with Sea Grant outreach event.
- Met with Senator Marc Panepinto.
- Mark Clapsadl conducted multiple interviews for broadcast on WBFO.
- Provided access and assistance to the U.S. EPA with Buffalo River sediment analysis projects.
- Provided access and support to the NYS DEC with multiple fisheries and Common Tern projects.
- Provided field station access and support to the U.S. Army Corps of Engineers.
- Provided access and support to the U.S. Navy Supply Center.

Kit Hastings taught Dr. Standora's Ecology class how to use limnological sampling equipment such as plankton nets, ponars, and multiparameter sondes.

VII. Western New York PRISM Activities

WNY PRISM is a partnership organization focused on invasive species management. Our mission is to address invasive species priorities using a coordinated partnership network, for which we provide leadership, information management, and collaboration opportunities. WNY PRISM's goal is to improve, restore, and protect local aquatic and terrestrial resources by improving the effectiveness of invasive species management efforts and increasing awareness of invasive species issues throughout our eight county region. Invasive species pose a significant threat to our environment, economy, and human health. By fostering regional collaboration, the impact of invasive species will be minimized and the natural resources and beauty of Western New York will be preserved. Visit our website for more information on WNY PRISM and the invasive species impacting Western New York.

WNY PRISM is a sponsored program through the Research Foundation at Buffalo State, and is hosted by the Great Lakes Center. Funding is provided by the Environmental Protection Fund, through a contract with NYS Department of Environmental Conservation.

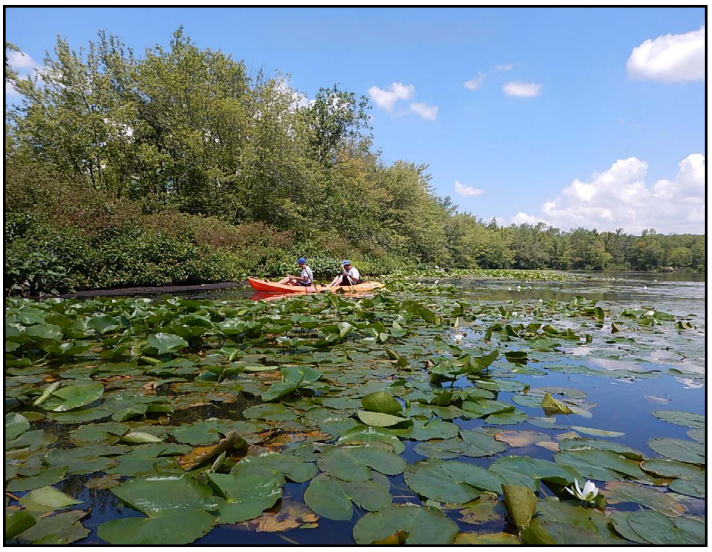
The WNY PRISM Strategic Plan identifies six goals including:

1. Partner/Network Coordination,
2. Information Management,
3. Education and Outreach,
4. Prevention, Early Detection,
5. Management,
6. Habitat Restoration

The following is a brief description of WNY PRISM accomplishments within the past year, provided by WNY PRISM coordinator, Andrea Locke, on all six major goals.

Partner/Network Coordination

- Facilitated and attended PRISM Leader's meetings and conference calls.
- Hosted and participated in monthly PRISM Invasive Species Public Webinars.
- Participated in Great Lakes Action Agenda meetings.
- Participated in working group for development of WNY Native Plant Nursery.
- Met with regional partners to discuss projects and management planning.
- Participated in Cornell Cooperative Extension (CCE) Invasive Species In-Service.
- Participated in NYS Invasive Species (IS) Priorities Setting meeting.
- Participated in Town of Amherst IS Taskforce meeting, appointed member.
- Attended conferences, workshops and meetings including NYS Turf & Ground Expo, NEANS Panel, seminar on resistance to biological invasion, and others.
- Assisted region with applications for DEC AIS Spread Prevention program.
- Provided Letters of Support for Partner grant applications.
- Hired 2016 seasonal crew.

WNY PRISM crew conducting the Chautauqua Lake Outlet survey to search for water chestnut (*Trapa natans*) and *Hydrilla* with help from partners in July 2015.

Information Management

- Held Working Group meetings.
- Finalized Invasive Species Priorities for Terrestrial, Aquatic and Early Detection.
- Distributed information to the partnership through listserve including press releases, regional events, species information and PRISM updates.
- Assisted Partners with advertising there IS related events.
- Surveyed Partners for Research Needs and Priorities, submitted to NYS.
- Worked with CCE and iMapInvasives to have Black Stem Borer (*Xylosandrus germanus*) added to species database.
- Reviewed iMapInvasives report on early detection and approaching region species to determine information gaps.

Education and Outreach

- Events were attended by over 200,000 people, with >3000 direct contacts.
- Developed Terrestrial Priorities Keep A Lookout! flier.
- Developed Aquatic Plant Priorities Keep A Lookout! flier.
- Completed and distributed WNY PRISM Fall e-Newsletter.
- Staffed WNY PRISM Outreach Display at numerous regional events.
- Worked with Roger Tory Peterson Institute and additional Partners to develop and implement Educational Workshop Series in connection with National Invasive Species Awareness Week.
- Provided information/interviewed for newspaper articles on Stella Niagara, Emerald Ash Borer, and IS Spread Prevention.

- Presented for the Niagara Frontier Botanical Society, WNY Farm Show, Rural Landowners Workshop, WNY Iris Society, Chautauqua Co. Landscapers, Great Lakes Center Seminar, and Erie Co. Envirothon, among others.
- Updated website with blog posts and new invasive species information.

Prevention

- Finalized Invasive Species/Erie Canal Prevention report for Energetics, Inc.
- Participated in statewide watercraft stewardship program/AIS spread prevention planning meetings.
- Discussed Boat Stewardship programs with Parks, DEC and Buffalo Niagara Riverkeeper (BNR), ways to achieve better communication, efficiency and increase coverage for 2016.
- Began development of Boot Brush Stations Pilot Program in Partnership with PlayCleanGo, FL-PRISM, DEC, Bergen Swamp Preservation Society (BSPS), WNY Land Conservancy, and EC E&P.
- Accepted an AIS Student Intern for 2016 Spring Semester from UB.

Early Detection and Rapid Response

- Mapped Invasive Species at sites throughout WNY.
- Removed water chestnut from Chautauqua Lake Outlet.
- Reviewed 2007 NYS Early Detection, Approaching Region Lists and compared with information within iMap to development of updated list for WNY PRISM.
- Began development of WNY rapid response protocol for priority species.
- Discussed Water Hyacinth (*Eichhornia crassipes*) and Starry Stonewort (*Nitellopsis obtusa*) with USGS staff, plan to report on potential persistence in locations where Water Hyacinth was found over the past two years.
- Worked with the PA Chapter of The Nature Conservancy on HWA efforts, ensuring inclusion of NYS protocols within trainings for attendees from WNY.

Christopher Pennuto along with Invasive Species Management Assistants Lexy Wagner and Lucy Nuessle, electrofishing for oriental weatherfish (*Misgurnus anguilliacaudatus*).

- Compiled list of sites to monitor for early detection species Water Hyacinth (*Eichhornia crassipes*), Water Lettuce (*Pistia stratiotes*) and Mile-A-Minute (*Persicaria perfoliata*).

Management and Habitat Restoration

- Continued to work with Erie County Parks and Environment and Planning on invasive species management at Seneca Bluffs and Red Jacket Parks along the Buffalo River, attending multiple meetings and site visits.

- Implemented invasive species removal at multiple locations including Seneca Bluffs, Niagara Escarpment Preserve, Tifft Nature Preserve, and Kenneglenn.
- Assisted USACE and DEC with hydrilla survey in Tonawanda Creek/Erie Canal.
- Collected Galerucella beetles for purple loosestrife biocontrol program.
- Assisted with coordinating ash seed trainings, surveys and collections in WNY.
- Implemented Japanese knotweed project, side-by-side removal method comparison, at Great Lakes Center Field Station.
- Provided iMap Survey Summaries, reports and management options for Partners.
- Attended WNY Land Conservancy planning meetings for restoration of Stella Niagara Preserve and Clarence Oak Openings.
- Hosting DEC Giant Hogweed Staff for 2016 season.

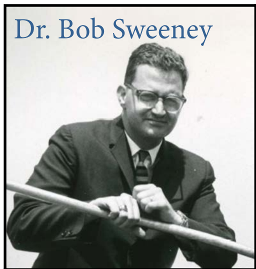
Additional Program Elements

- Submitted proposal to NFWF Pulling Together Initiative (PTI) for establishment of IS Strike Team, including significant match commitments from Partners.
- Developed outreach and flier to recruit volunteers.
- Completed 2016 Annual Work Plan.
- Completed 2015 Annual Report.
- Worked with Host Organization (Great Lakes Center at Buffalo State) to provide WNY PRISM information for 50th Anniversary publication.

Above, Mat, Lexy, Patricia and Lucy get their waders on for *Galerucella* beetle collection. At right, Lucy and Lexy using aspirators to collect *Galerucella* beetles off of purple loosestrife plants.

GLC History

Dr. Robert Sweeney: 1966-1981


Dr. Bob Sweeney


Great Lakes Cruiser


Great Lakes Laboratory At State College Approved

Will Carry On Water Conservation And Pollution Research on 8-Acre Site

Establishment in Buffalo of a Great Lakes Laboratory at the State University College at Buffalo was approved Thursday by the State University Board of Trustees in New York City.

It will occupy an eight-acre site at the foot of Porter Ave. to do research in aquatic sciences and public service areas such as water conservation and water pollution.

The laboratory chief will be Dr. Howard G. Sengbusch, director of the college's Arts & Sciences Division. He has been on the faculty since 1951.

He said the establishment of the water research center is an indication of the continuous growth of the Elmwood Ave. college, especially in the arts and sciences.

"The acquisition has tremendous potential in opening the door to constructive research in water resources and expanding the educational offerings of the college," he said.

He remarked that the college will play a significant role "in co-operation with the community in water resources management."

The site included 3.3 acres owned by the New York Central Railroad and 4.6 acres owned by the State Office of General Services.

DR. HOWARD SENGBUSCH
Named Lab Director


R/V *C.A. Dambach* as it appears today (photo credit)


Captain Barry Wech


Friday, February 25, 1977 The RECORD Page THREE

Great Lakes Lab grows to largest in country

By NANCY ROBERTI
of The Record Staff

The Great Lakes Laboratory (GLL), is a unit within Buffalo State College under the Natural and Social Sciences. Last year they took in $1.3 million, primarily from grants and contracts from federal agencies.

Established in 1966 by Board of Trustees at Buffalo State, GLL began its work in a building on the Black Rock Channel, a waterway that parallels the Niagara River to Scajaquada Creek. They started out with a staff of three in the field station at the foot of Porter Avenue. They were then given one lab in the New Science Building. Later they moved to labs in the basement of Perry Hall, and after spending a year and a half in the Campus School, GLL is now situated in 10,000 square feet of lab, office and storage space in the New Science Building.

Now they are the largest university-affiliated aquatic research program in the Great Lakes basin. They have 60 staff members on campus: 31 full-time, while the others are part-time during the academic year and full-time during the summer.

The director of the GLL, Dr. Robert A. Sweeney, helped to explain what is going on in and around the GLL.

The lab is divided into several units; biological, where they study the organisms and plants; chemical, where they analyze chemical pollutants and processes; the field, where samples are collected; data processing; the support unit, which operates ships.

A regular navy

"We have a regular navy," says Sweeney, in reference to six small outboard-powered boats, an "amphibious landing craft" called "Duck" which can function in or out of the water, and the GLL research vessel, the "Charles A. Dambach."

In use since 1970, "CA Dambach" is a ...

THE C.A. DAMBACH, a 66-foot research vessel, is one of the mainstays of the Great Lakes Lab operation.

the GLL's $1.5 million dollars worth of equipment.

Director minimizes chaos

Sweeney, who calls himself "The director in charge of minimizing chaos," explained ...

amount of credit to the practical experience given them here."

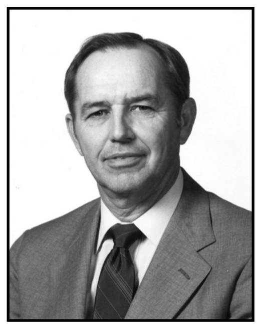
More than 125 credited research projects have been generated by GLL staff.

John Reuter and Glenn Millner are two graduate students who are working in the ...

lake, lowering phytoplankton growth," says Reuter, involved in GLL since 1975. He is currently in the process of writing his thesis for his master's degree.

During the summer months they take samples and analyze them, looking for water ...

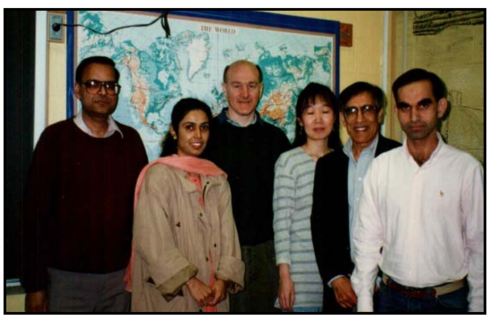
Dr. Charles Beasley: 1988-1992


Dr. Charles Beasley

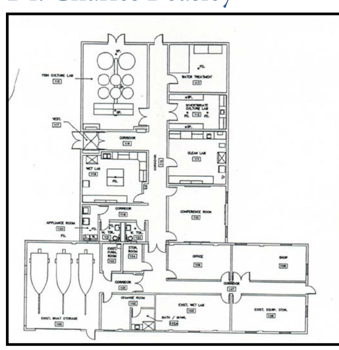

R/V *Hutchinson*

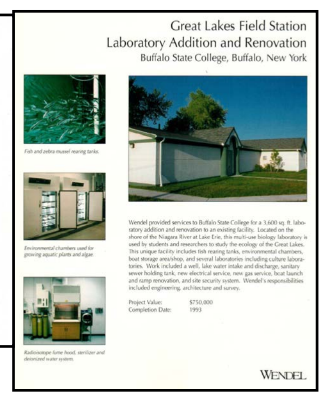
Dr. Harish Sikka: 1982-1987


Dr. Harish Sikka


Members of the Environmental Chemistry and Toxicology Lab, including Dr. Subodh Kumar (left)

R/V *Markham III* (photo credit: USACE)


Field Station renovation


Great Lakes Field Station
Laboratory Addition and Renovation
Buffalo State College, Buffalo, New York

Fish and zebra mussel rearing tanks.

Environmental chambers used for growing aquatic plants and algae.

Radioisotope fume hood, sterilizer and deionized water system.

Wendel provided services to Buffalo State College for a 3,600 sq. ft. laboratory addition and renovation to an existing facility. Located on the shore of the Niagara River at Lake Erie, this multi-use biology laboratory is used by students and researchers to study the ecology of the Great Lakes. This unique facility includes fish rearing tanks, environmental chambers, boat storage area/shop, and several laboratories including culture laboratories. Work included a well, lake water intake and discharge, sanitary sewer holding tank, new electrical service, new gas service, boat launch and ramp renovation, and site security system. Wendel's responsibilities included engineering, architecture and survey.

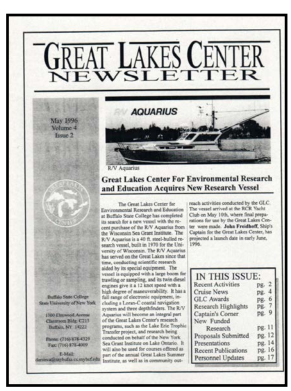
Project Value: $750,000
Completion Date: 1993

WENDEL

Dr. Stephen Brandt: 1994-1997


Dr. Stephen Brandt


R/V *Aquarius*


GREAT LAKES CENTER NEWSLETTER

May 1996
Volume 4
Issue 2

R/V AQUARIUS

R/V Aquarius

Great Lakes Center For Environmental Research and Education Acquires New Research Vessel

The Great Lakes Center for Environmental Research and Education at Buffalo State College has completed its search for a new vessel with the recent purchase of the R/V Aquarius from the Wisconsin Sea Grant Institute. The R/V Aquarius is a 40 ft. steel-hulled research vessel, built in 1970 for the University of Wisconsin. The R/V Aquarius has served on the Great Lakes since that time, conducting scientific research aided by its special equipment. The vessel is equipped with a large boom for trawling or sampling, and its twin diesel engines give it a 12 knot speed with a high degree of maneuverability. It has a full range of electronic equipment, including a Loran-C coastal navigation system and three depthfinders. The R/V Aquarius will become an integral part of the Great Lakes Center's research programs, such as the Lake Erie Trophic Transfer project, and research being conducted on behalf of the New York Sea Grant Institute on Lake Ontario. It will also be used for courses offered as part of the annual Great Lakes Summer Institute, as well as in community outreach activities conducted by the GLC. The vessel arrived at the RCR Yacht Club on May 10th, where final preparations for use by the Great Lakes Center were made. **John Freidhoff**, Ship's Captain for the Great Lakes Center, has projected a launch date in early June, 1996.

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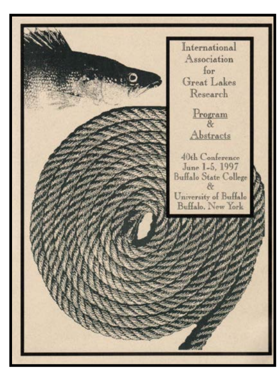
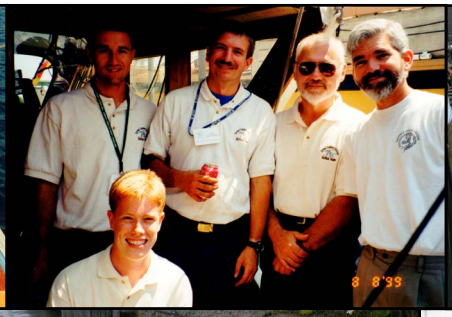
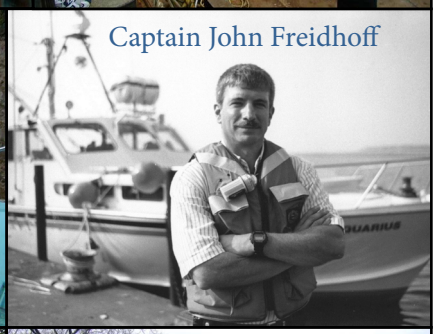


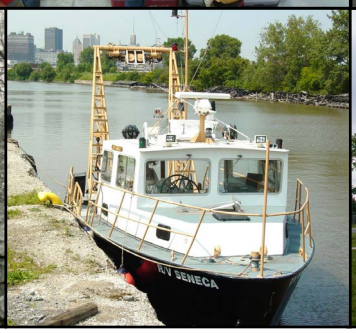
Dr. Gordon Fraser: 1998-2007

Dr. Gordon Fraser





Captain John Freidhoff



R/V *Seneca*

Dick Smith Teaching Pavilion

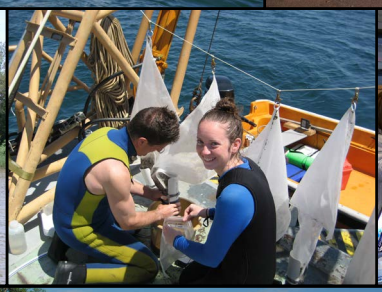
R/V *Pisces*

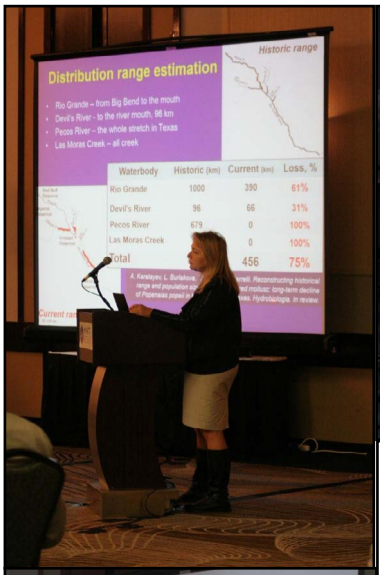
Dr. Alexander Karatayev: 2007 - present

Dr. Sasha Karatayev

R/V *John J. Freidhoff*

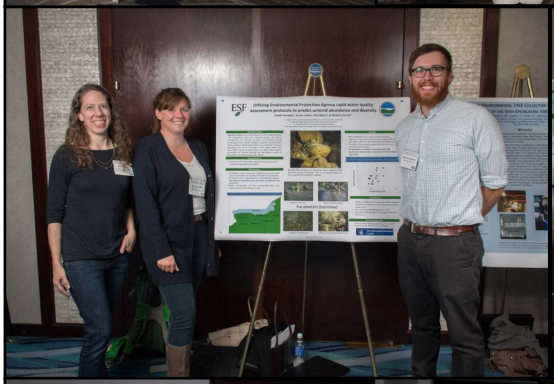
R/V *Seiche*

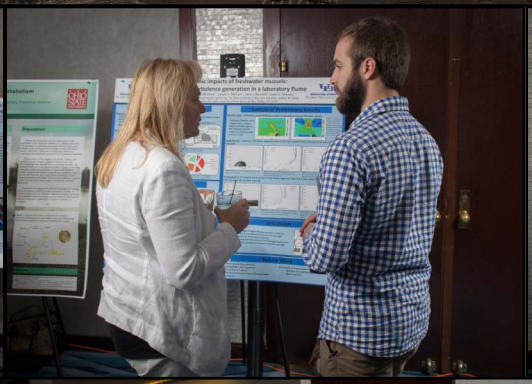


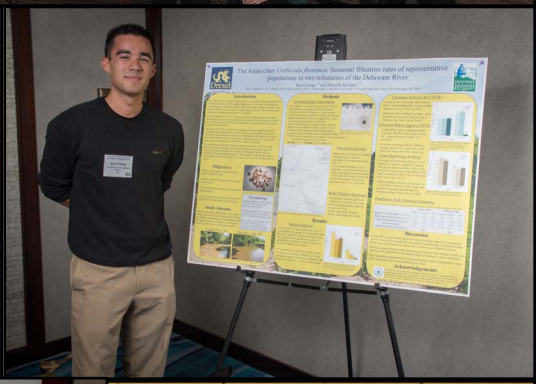


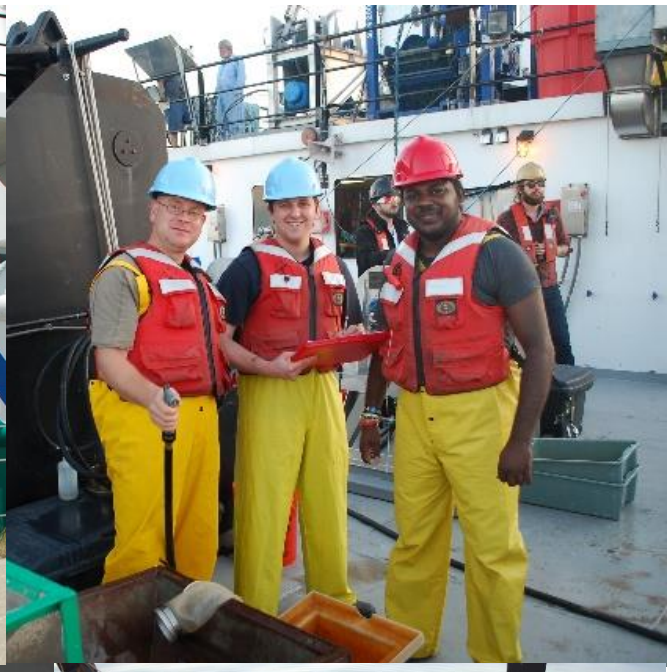
BUFFALO NY, USA, 4-8 OCTOBER 2015

2nd
INTERNATIONAL MEETING ON BIOLOGY AND
CONSERVATION OF FRESHWATER BIVALVES









Lake Michigan Benthos: Cooperative Science & Monitoring Initiative 2015