

# REPORT

of the Great Lakes Research Consortium

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## Scientists Meet to Discuss Lake Ontario

Over one hundred scientists and managers gathered on March 13, 2003 at SUNY ESF to exchange information and set priorities for Lake Ontario science. After a series of morning presentations reviewing the major new Lake Ontario research and management initiatives, participants broke into several discussion sessions to explore common interests and information sharing opportunities, and to identify priority research needs and management issues.

Beyond established agency monitoring efforts, university researchers have initiated several large research programs. The most prominent of the new projects are the International Joint Commission's 5-year study of water level regulation effects on Lake Ontario and the St. Lawrence River, an ecosystem scale study on Lake Ontario embayments sponsored by the National Science Foundation, and a NOAA-funded program on harmful algal blooms. These three efforts alone represent over \$10 million of new science investment in understanding Lake Ontario. In addition, there are a number of more targeted study efforts and agency monitoring like the US EPA's Lake Ontario Atmospheric Deposition Study (LOADS), the Lake Ontario Lower Aquatic Foodweb study (LOLA), and the Great Lakes Environmental Indicators project (GLEI).

Lead researchers from each of these projects presented a synopsis of their research during the conference's morning session (see page 7). Incredibly, some of the projects were collecting data in the same areas and were unaware of each other. In addition to the major new projects summarized during the morning plenary, nearly forty other research and management initiatives were described in abstracts received prior to the conference.

The afternoon sessions were designed to get people talking. One of the goals was to identify key priorities for research and management. Nearly twenty breakout sessions covered an array of topics facing Lake Ontario including hydrology and wetland plant communities, biological communities of bays, policy-making for the coastal zone, paleoecology of the coastal zone, nutrient dynamics in coastal waters, coastline stabilization, fish habitat and water level regulation and many others. According to **Mark Bain**, one of the organizers of the conference, one of the most common priorities identified by these sessions was the need for long term integrated monitoring and research programs. These kinds of data are invaluable for understanding trends and for adapting management to meet the changing nature of the Lakes.

A special issue of the *Great Lakes Research Review* will provide a complete summary of conference findings and conclusions, including an anthology of the current research on Lake Ontario. It's due out this summer. For more information contact **Helen Domske** at NY Sea Grant at [hmd4@cornell.edu](mailto:hmd4@cornell.edu), or visit our website at [www.esf.edu/glrc](http://www.esf.edu/glrc).

### Lake Ontario and St. Lawrence River Water Levels Management study

**Joseph Atkinson**, Director of the Great Lakes Program at the University of Buffalo presented an overview of the IJC's 5-year, \$20 million dollar binational study of water level management on Lake Ontario and the St. Lawrence River. Dr. Atkinson co-chairs the environmental



Useful Information for  
New York's Great Lakes  
Research Community

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# From Description to Prediction

*Commentary from the Executive Director  
Jack Manno*

Many of the early discoveries in ecology took place in the Great Lakes region at the Southern end of Lake Michigan. There, the Indiana Dunes, with their gradient of soil and moisture reflecting the history of wind and sand, provided a magnificent laboratory for the studies of ecological development. "Ecology," Henry Chandler Cowles wrote, "is a study in dynamics, and the task of the ecologist is to discover the laws governing developmental change." From the observations of early plant ecologists came a sense of the inevitability of ecological laws, a step-by-step progression toward some completion, or climax. Such regularity in progress led some to believe that the future state of any ecosystem might be fully predictable. As we learned more about community ecology and ecosystem dynamics, such confidence in predictability was shown to be unfounded. The only thing that was certain was that change was constant. There were to be no steady states in ecology, no climax. Ecology stepped back from prediction and settled instead on description.

In the meantime, in the practical environmental arts, prediction was expected. People constructing dams were required to predict what would happen to the dam and the river given a certain water supply over a given period of time. Fisheries

managers needed to be able to refine stocking practices to predict survival and future populations. Foresters were expected to know what rates of harvest could be sustained, while still leaving a viable forest for future production. When it came to manipulating nature for the production of goods

and services, we got pretty good at prediction. Yet there remained and remains a huge realm of ecological uncertainty even in these productive activities. For all our successes in environmental management, ecosystems have a way of surprising us. And these surprises—things like Botu-

lism outbreaks, the return of anoxic zones in the Central basin of Lake Erie, the sudden appearance of a nuisance species—become the environmental crises that demand answers from scientists.

Prediction in the environmental sciences has been the expectation of modern environmental law and regulation from the beginning. The environmental impact assessment requirements of the National Environmental Protection Act (NEPA) presume that impacts of human activity on the environment can be predicted and assessed. And yet time and again, long after the implementation of NEPA, we have been blind-sided by the unintended destructive consequences of our activities. The new para-

***It's time to move  
into the future of  
ecological science  
in the Great Lakes.***

digm of environmental policy, be it called sustainable development, or smart growth, or appropriate technology, or the ecosystem approach, attempts to take into account a much broader, more complex and more subtle set of interactions between human activities and the natural world. This requires a much more complex and subtle understanding of ecological and social dynamics. In order for the future of environmental policy to be successful, its expectations and predictions must be based, as we often hear, on sound science. We must acquire a much more refined capacity for ecosystem understanding and prediction. Mere description is no longer good enough. This is the challenge for our ecological science.

At the Great Lakes Research Consortium we are committed to advancing our capacity for ecosystem forecasting through improved understanding of the complex interactions between chemical, physical and biological components of the natural world. This requires major improvements in our monitoring and analysis. It requires an ongoing presence on and near the lakes. It requires intellectual advances in conceptualizing and modeling the complexities of lake ecosystems, and the computational ability to translate conceptual into numerical models. It requires continual improvement and the steady reduction in the uncertainty of our models and a persistent effort to observe and describe in real time the real world. Over the years we have made great strides in all of these areas.

Our current efforts, known as the New York Great Lakes Initiative for Science and Education, has as one of its primary goals building the capacity for ecological forecasting. We are establishing shore-based field stations, education outreach centers and education centers throughout New York's Great Lakes region. Our success will have enormous implications for the future of the economy and quality of life in New York State. We hope you will support these efforts in any way you can. For details about this initiative, please visit our website at [www.esf.edu/glrc](http://www.esf.edu/glrc).



#### **GLRC Report**

Editors: J.P. Manno, M.J. Connerton,  
and C.J. Crysler

#### **Great Lakes Research Consortium**

The Consortium's mission is to improve our understanding of the problems facing the Great Lakes. Toward this we have established three goals:

- to facilitate research and scholarship on Great Lakes issues,
- to provide opportunities for training and education of students on Great Lakes-related topics and,
- to aid in the dissemination of information gathered through the research endeavors of the Consortium.

#### **Member Institutions**

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Binghamton University  
SUNY Brockport  
University at Buffalo  
Buffalo State College  
Clarkson University  
Cornell University  
Rochester Institute of Technology  
SUNY College of Environmental  
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# 2003 Student/Faculty Conference

## Annual Conference Biggest Ever!

*This year's conference attendance topped all others as over one hundred and fifty students and faculty gathered on March 14-15, 2003 at SUNY College of Environmental Science and Forestry to learn about and celebrate the marvelous ecosystem of the Great Lakes. A record seventy-five students presented their research on a diversity of topics including chemistry and toxicology, limnology, ecology, engineering, modeling, and policy.*

The conference opened with a keynote address by **Steve Brandt**, Director of NOAA's Great Lakes Environmental Research Laboratory. Steve spoke about future research directions in the Great Lakes and called for integrated, long term monitoring and research programs designed to provide the data needed for forecasting impacts from invasive species, climate warming, and the myriad of other threats to the Great Lakes ecosystem.

### FACULTY PANEL ON EMERGING ISSUES

Each year we invite several members of the Consortium to give their thoughts on areas of research that need the attention of Consortium faculty and their students. In keeping with that tradition, this year's panel featured water levels, botulism, cyanotoxic bacteria, sustainable development, and paleoproductivity as the emerging issues of 2003.

**Joe Atkinson** from the Great Lakes Program at the University at Buffalo provided an overview of a comprehensive, five-year International Joint Commission study that will ultimately provide recommendations to control water levels in Lake Ontario and the St. Lawrence River for the next fifty years. The study will incorporate input from various interests that are directly affected by water levels including recreation and tourism, coastal processes, commercial navigation, hydroelectric power, water users, and the environment. The IJC has formed technical working groups to assess existing outflow regulation and to develop new criteria for the satisfaction of each of these interests. The environmental technical working group, which Joe is leading for the U.S., is collecting and analyzing data to feed into a model that predicts ecological outcomes of various water level regulation scenarios. For more information, contact Joe at [atkinson@eng.buffalo.edu](mailto:atkinson@eng.buffalo.edu).



*Keynote Speaker Steve Brandt*

**Helen Domske** from New York Sea Grant, updated everyone on botulism in the lower lakes, which appears to be spreading. In 2002, botulism type E was found in Lake Erie birds as far west as Ohio, and two of the first confirmed cases were recorded in Lake Ontario on its easternmost shore. This raises new questions about the vectors of botulinum bacteria. Could these gulls have migrated from Lake Erie, or do certain fish species play a role in transferring toxin? Fish have been found with Type E botulism, but researchers are unsure whether fish are susceptible to type-E toxin, or whether the toxin in fish is primarily formed postmortem in carcasses. Although the round goby is suspected to be a primary vector in Lake Erie, research is still needed to determine the current prevalence and distribution of Type E in fish and sediments of Lake Erie as well as other Great Lakes, and to decipher the specific ecological conditions required for Type E toxin production and transfer. Also, as incidences of this dangerous bacterium rise, health officials will need information to communicate with the public on the human health risks from contact with sick or dead birds and fish during outbreaks. For more information, visit New York Sea Grant's website at [www.nyseagrant.org](http://www.nyseagrant.org), or contact Helen at [hmd4@cornell.edu](mailto:hmd4@cornell.edu).

**Greg Boyer** from SUNY ESF discussed a new multi-investigator project that's studying toxic cyanobacteria found in several waters of New York State and the lower Great Lakes. Microcystins are a group of cyanobacteria that can produce neurotoxins linked to the deaths of animals in Lake Champlain and humans in Brazil. Although most lakes and rivers in New York don't contain



# 2003 Student/Faculty Conference

high enough concentrations to be toxic, sampling in 2002 revealed that nearly one third of the sites tested positive for *Microcystis*. Boyer's research group is trying to identify the ecological conditions that lead to the production of toxic cyanobacteria. Zebra mussels may play a role, but exactly how is really unknown. It's possible that they selectively consume competitors, or they may resuspend nutrients favorable for the production of non-nitrogen fixing cyanobacteria like *Microcystis*. Is *Microcystis* really non-nitrogen fixing? Is it the only microcystin producer? Can zebra mussels act as biomonitoring tools for toxic algae? Boyer's group is trying to answer these and other questions and trying to develop rapid assessment techniques so that health officials can respond quickly to water quality concerns as they occur. For more information, contact Greg at [glboyer@esf.edu](mailto:glboyer@esf.edu).

**Charlie Hall**, from SUNY ESF, presented a very provocative argument called the "myth of sustainable development." Sustainable development, which seems to promise a solution to environmental problems while achieving proper economic growth, has been a buzzword in guiding global and national environmental movements and policies since the 1980s. Dr. Hall made the case that economics, as neoclassical textbooks conceive it today, is a farce because the models that economists use do not include the realities of natural resource limitation. National economies are built upon their abilities to sequester and utilize natural resources, and without resources like crude oil, the production of countries decline. The problem with sustainable development is that development is not sustainable, since resources will eventually run out. Agricultural technology, which is often credited with improving efficiencies in national economies, has instead operated mostly by increasing the use of non-sustainable energy. The marginal gains from these fossil fuel-derived inputs have decreased over time, due to biophysical limits. The influence of globalization, structural adjustment and especially neo-classical economics has greatly exacerbated these issues and related environmental costs. For more information contact Charlie at [chall@mailbox.syr.edu](mailto:chall@mailbox.syr.edu).

**Hank Mullins** from Syracuse University has been working on a project that uses sediment cores to discover long-term trends in lake productivity and temperature by deciphering the chemical and biological constituents that

make up the core. The central issue comes down to whether observed environmental changes are of natural and/or anthropogenic origin. Because of the short, temporal nature of historical productivity data, this question is impossible to resolve without longer term proxy records to evaluate natural variability on time-scales of decades to centuries to millennia. By examining cores that reach back ten thousand years, he has documented unprecedented increases in sediment organic matter, phosphorus, calcite and other indicators of lake productivity within the last few decades. Although there is considerable natural variability in some of these indicators, the last 50 to 100 years shows large increases in most. For more information, contact Hank at [htmullin@syr.edu](mailto:htmullin@syr.edu).

**Thanks to all of the Faculty and Students who made this event a success!**

## POSTER SESSION & BANQUET

One of the highlights of the conference every year is the poster session, reception and banquet dinner. This year's event was extra special as over thirty posters were given on unique topics such as reconstructing an ancient beluga whale skeleton from the St. Lawrence River, lake effect snow patterns from Lake Ontario, remote sensing of toxic algal blooms and many others. The

poster session always seem too short since many of us count on that time to get reacquainted, and discuss the day's best papers over a beverage or two. After a delicious dinner catered by Syracuse's original Dinosaur Barbecue, everyone relaxed and enjoyed some stimulating and beautifully performed music by **Colleen Kattau**. Her alternative folk compositions sang of responsibility and devotion to the Earth and all life. Our own Director **Rick Smardon** showed off his little known musical talent when Colleen asked Rick to accompany her in a rendition of the Great Lakes song "Wreck of the Edmund Fitzgerald". Bravo Rick!

For more information about the conference and a copy of the complete program including titles and abstracts of student presentations visit the GLRC website at [www.esf.edu/glrc/conf.htm](http://www.esf.edu/glrc/conf.htm).



# 2003 Student/Faculty Conference

## Students Honored for Outstanding Presentations

Every year at the Conference, the GLRC and New York Sea Grant recognize students for their excellence in presenting their outstanding contributions to Great Lakes Research. On March 15, six awards and a \$100 cash prize each, were given to students in honor of the late Don Rennie, Vice President at the University at Buffalo and a founder of the Great Lakes Research Consortium.

### DON RENNIE MEMORIAL AWARDS

#### Biomonitoring

**Ashley M. Spearin**, Ryerson University, for her presentation "Environmental Evaluation of land Applied Pulp Mill and Municipal Sewage Treatment Plant Biosolids: Monitoring Fate of Sludge Constituents in Forest Ecosystems and Assessing Impact Using Ecologically-Relevant Organisms"

#### Environmental Engineering and Modeling

**Jean Balent**, University at Buffalo, for her presentation "Analytic Modeling of Groundwater Flow in the Great Lakes Basin"

**Samuela Franceschini**, University at Buffalo, for her presentation "Uncertainty Analysis of Modeled Toxic Concentrations in the Niagara River"



*Winners of Outstanding Presentation Award*

#### Water Quality

**Peter D'Aiuto**, SUNY Brockport, for his presentation "The Impact of Stream Nutrient Loading on Metaphyton in Conesus Lake and the Use of Metaphyton Incubation for Measurement In Situ of Changes in Biomass"

#### Best Poster Presentations

**Xinli Ji**, SUNY College of Environmental Science and Forestry, for her poster "A Model to Predict Seston C:P Ratio and Zooplankton Food Quality from Simple Parameters"

**Michael Connerton**, SUNY College of Environmental Science and Forestry, for his poster "Declining Phosphorus and the New Importance of Salmon Migrations to Primary Productivity in Eastern Lake Ontario Tributaries"



*Ron Scudato*

## Consortium Recognizes One of its Founders, Ron Scudato

The banquet featured a fond farewell to Ron Scudato, Director of SUNY Oswego's Environmental Research Center and one of the original founders of the Great Lakes Research Consortium. Ron will be retiring this year after working nearly thirty years on research associated with the problems of inactive hazardous waste sites, sanitary landfills and the contaminants of Lake Ontario. During his tenure, the ERC has developed highly

sophisticated analytical capabilities and has made major advances in the development of remedial technologies for the destruction of PCBs and other toxic compounds. Ron serves on the Superfund Management Board, and the Boards of New York Sea Grant Institute, Environmental Advocates, and the Great Lakes Research Consortium. Ron's dedication to the ideals of the Consortium and his understanding of Great Lakes issues will be missed.



# Research on Lake Ontario

## Continued from p. 1.

component of the Study. He reported on efforts to link changes in the extent and quality of wetlands, and population levels of important bird and fish species with the hydrological changes associated with outflow regulation. He highlighted the modeling approaches being taken to integrate the results of various research projects on different species both up and downstream of the water control structures in order to produce data in a form usable by the water level managers. For more information see the study website at [www.losl.org](http://www.losl.org) or contact Dr. Atkinson at [atkinson@eng.buffalo.edu](mailto:atkinson@eng.buffalo.edu).

## Lake Ontario Lower Aquatic Foodwebs Study

**Fred Luckey** from the U.S. Environmental Protection Agency reported on the project, Lake Ontario Lower Aquatic Foodweb Assessment (LOLA). This study was recently initiated because scientists are seeing Lake Ontario's keystone benthic organism, *Diporeia*, disappearing from many nearshore waters. Some evidence also suggests that *Mysis*, another important food source is declining. These two organisms are prey for important fish species like lake whitefish. The explosion of exotic predatory zooplankton such as *Cercopagis* and *Bythotrephes* is suspected to be the primary cause for the declines. In an effort to develop a better understanding of the status of Lake Ontario's lower food web, this cooperative bi-national project by six institutions in Canada and U.S. will promote increased communication and information sharing among lower foodweb researchers. Fred also hopes that this project will lead to more cooperative long term monitoring approaches between the U.S. and Canada. For more information contact Fred at [luckey.frederick@epa.gov](mailto:luckey.frederick@epa.gov).

## The Lake Ontario Biocomplexity Project

**Mark Bain** of Cornell University reported on the project he leads titled, "Biocomplexity of Lake Ontario Embayments." The project is supported by the National Science Foundation's Biocomplexity in the Environment Program which focuses on the capacity of biological systems for adaptation and self-organizing behavior. The Lake Ontario project focuses on water retention time in a variety of coastal wetlands as a key variable determining whether self-organizing processes determine the ecosystem relationships or whether outside forces overpower the capacity for self-organization. While focusing on contributing to theoretical ecology, the data collection, analysis and modeling effort will have enormous practical application for managers responsible for these embayments. For more information on the project, visit their web site at: <http://ontario.cfe.cornell.edu>

## Algal Blooms in Lake Ontario

**Greg Boyer** of SUNY ESF spoke about the Lower Great Lakes, Monitoring and Event Response for Harmful Algal Blooms (MERHAB) project. This is a five-year program sponsored by the National Science Foundation to develop techniques for monitoring toxic cyanobacteria blooms in the Lower Great Lakes region (LGLR) and alerting public officials about the nature and extent of such blooms when they occur. The project is a partnership between seven institutions including SUNY ESF, SUNY Brockport, SUNY Plattsburgh, Cornell University, University at Buffalo, University of Tennessee and University of Vermont. The research team is investigating the distribution of cyanobacterial toxins in the lower Great Lakes region, and examining the relationship between water chemistry, cyanobacterial density and toxin production. The team is also examining the feasibility of using remote sensing to quickly identify an algal bloom's location. Once spotted, rapid event response teams will sample a suspected toxic bloom. The project is evaluating the role of rapid, field-based assays for toxin monitoring so that these teams can identify a dangerous bloom on site. Dr. Boyer also explained several possible new screening protocols for eventual use at water treatment plants. For more information, contact Dr. Boyer at [glboyer@esf.edu](mailto:glboyer@esf.edu).

## Great Lakes Environmental Indicator Projects

**Jan Ciborowski** of the University of Windsor described the Great Lakes Environmental Indicators Project (GLEI), funded by an EPA STAR grant through the Estuarine and Great Lakes (EaGLe) Initiative. The primary focus of the project is to develop indicators that best characterize and quantify ecosystem status. The project will test proposed indicators to see how well data derived for the indicators correlate with known stressors with measured responses. The result will be a suite of indicators for informing management strategies. The project is divided into various sub-units including Bird/Amphibians, Chemical Contaminants, Diatom/Water Quality, Fish/Macroinvertebrate, Wetland Vegetation, and Remote Sensing. For more information contact Jan Ciborowski at [cibor@uwindsor.edu](mailto:cibor@uwindsor.edu).

## New York State Management Priorities and Science Needs on Lake Ontario

**Don Zelazny** reviewed the New York State Department of Environmental Conservation's role in Great Lakes management. He described three levels of activities: international, state, and local. DEC programs fit into three broad categories. The first is the environmental quality of

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# Great Lakes Research Seminar Series

This year's GLRC Seminar Series featured twenty-five seminars. Nineteen presentations took place at member schools in New York and six at Canadian affiliate schools. Speakers spoke on a wide range of topics including Great Lakes fisheries, toxins, geology, climate change, remote sensing, wetlands, amphibians, and water levels, as well as sustainable development and the politics of Great Lakes environmental protection. As in other years, we are hopeful that our seminars will lead to future collaborative research projects.

We find that these seminars foster good relationships among our members. Feedback from participants was positive. Isidro Bosch from SUNY Geneseo said that Lynda Corkum's speech about GLRC fisheries attracted over 100 undergraduates. According to Bill Romey, Claes Lundgren's talk at SUNY Potsdam was very interesting and hopes that Lundgren will be able to stay longer next time. Jason Schreer from SUNY Potsdam appreciated the quality speaker that the GLRC brought to campus and suggested that more widespread advertisement for future seminars might draw students and professors from nearby institutions.

Thanks to all whose participation once again made our seminar series a success! A list of this year's topics, speakers and locations follows.

- *Climate Change, Fluctuating Water Levels, and Geographic Modeling of Fish and Habitat in the St. Lawrence River*, **Marc Mingelbier** and **Jean Morin** at SUNY ESF
- *Environmental Effects of Water Level Regulation*, **Joe Atkinson** at Clarkson University
- *The Energetics Basis of Fish Population Dynamics*, **Don Stewart** at University of Ottawa
- *Climate Change as Viewed Through Ice Records*, **Kenton Stewart** at University of Ottawa
- *Landscape Pattern of Aquatic Invaders: Assessing the Extent of zebra Mussel Dispersal from Spatial Distributions*, **Clifford Kraft** at University of Windsor
- *Predicting Spread of Invasive, Nonindigenous Species*, **Hugh MacIsaac** at University of Toronto
- *The Myth of Sustainable Development*, **Charles Hall** at University of Toronto
- *Thallium in the Great Lakes*, **Michael Twiss** at SUNY Plattsburgh
- *Sustainable Tourism Development – Is it Possible?* **Wayne Glass** at SUNY Geneseo
- *Scaling of Environmental Variability in Aquatic Ecosystems*, **Helene Cyr** at Binghamton University
- *Modeling Schools of Fish: How Do Individual Actions Influence Group Trajectories?* **William Romey** at Buffalo State College
- *Water Over the Dam: Biologists and Engineers Negotiate Great Lakes Water Level Regulation*, **Jack Manno** at Clarkson University
- *Managing St. Lawrence River Discharge in Times of Climatic Uncertainty: How Water Quantity Impacts Wildlife, Recreation and the Economy*, **Christiane Hudon** at SUNY ESF
- *The Physiology of Breath Hold Diving and Near Drowning*, **Claes Lundgren** at SUNY Potsdam
- *Pesticides that Suppress the Immune System of Leopard Frogs*, **Brian Dixon** at SUNY Brockport
- *Paleoproductivity and Paleoclimatology from Lake Ontario over the Past 12,000 Years*, **Henry Mullins** at Cornell University
- *The Importance of Atmospheric Sources to the Nutrient Loading of Lake Victoria*, **Robert Hecky** at University at Buffalo
- *Manipulating Reproductive Behavior of the Round Goby to Enhance Recruitment of Native Fishes*, **Lynda Corkum** at SUNY Geneseo
- *Invasive Species of the Great Lakes Basin*, **Charles O'Neill** at SUNY Plattsburgh
- *How Do Spatial Sampling Design and Measurement Error Affect Ecosystem Description? A Simulation Approach*, **Phil Graniero** at Rochester Institute of Technology
- *Middle Wisconsin Glacial Events in the Genesee Valley Region*, **Richard Young** at University of Waterloo
- *Behavioral Effects of PCB Exposure*, **David Berger** at SUNY Potsdam
- *The Social Consequences of Environmental Abuse*, **Keith Slater** at Buffalo State College
- *Exposures to Different Chemical Forms Result in Different Toxicological Effects*, **Paul Kostyniak** at SUNY Brockport
- *Properties of Microbial Floc and Films in Engineered and Natural Systems*, **Steven Liss** at University at Buffalo



# Great Lakes Education Initiatives

## Watershed and GIS Focus of 2003 Summer Institute

SUNY Brockport will be hosting this years Great Lakes Summer Institute, "GIS Applications in Ecology and Environmental Science", June 2-27, 2003. Instructors, Dr. Karl Korfmacher, of Rochester Institute of Technology, and Dr. James Zollweg, of SUNY Brockport, will offer the 4 credit course to graduate and upper level undergraduate students in an effort to bring together the common teaching and research interests and strengths of the two neighboring institutions.

The course will include the ecological and water quality issues specific to the Northrup Creek/ Long Pond and Black Creek watersheds and the benefits of using a GIS in an ecological and environmental assessment. Students will evaluate point source and non-point source threats to local watersheds, integrate existing field data with ecological and watershed modeling, and conduct extensive analyses. Types of ecological and environmental analyses in this watershed assessment may include documenting and quantifying wetland loss and forest change, habitat delineation, edge and fragmentation analyses, estimating changes in hydrologic response to landscape change, predicting soil erosion losses, and developing terrain and land use -based pollution models (e.g., phosphorous loss).

Aerial photography, satellite imagery, federal and state digital databases, field surveys, available monitoring data, and GIS-based models will be used to build a temporal GIS database for the watershed to investigate the impacts of landscape alterations on water quality and the basin ecosystems. Students will use the database to conduct independent projects related to water quality and ecosystem impacts within the watershed. As they build the GIS database, students are introduced to analysis techniques, case studies, and digital data issues commonly encountered in a GIS assessment project.

This course was the result of the efforts of the participating faculty and the GLRC Academic Program Task Force, led by GLRC Research Director Jim Haynes. The Summer Institute is slated to be part of an ongoing program that will be hosted at Buffalo and SUNY Brockport in alternate years. The Academic Program Task Force is seeking funds to continue and expand the program. For more information, contact Joseph Atkinson at [Atkinson@eng.buffalo.edu](mailto:Atkinson@eng.buffalo.edu) or Jim Haynes at [jhaynes@brockport.edu](mailto:jhaynes@brockport.edu).



*RV Lake Guardian (photo credit: Phil Hoffman, USEPA)*

## Lake Ontario Great Lakes Science Practicum 2003

An intensive 8-day field practicum will be offered from September 19-26, 2003, to graduate and undergraduate students and teachers interested in obtaining practical and theoretical knowledge of Great Lakes aquatic science. This limnology practicum is a course offered by Clarkson University and is made available through support from the United States Environmental Protection Agency - Great Lakes National Program Office (USEPA-GLNPO) and Clarkson Center for the Environment.

Limnology and Environmental Science of the Great Lakes will be learned during a one-week intensive field course on Lake Ontario onboard the R/V Lake Guardian, a scientific research vessel operated by the USEPA. Practical knowledge of standard and advanced limnological techniques will be learned through the study of fundamental limnology and topics in environmental science that will be examined in the field. Room and board onboard the ship is included with tuition.

The course assumes knowledge of general chemistry. It is appropriate for biology, chemistry, environmental engineering and other students with an interest in environmental science. Teachers (grades 6-12) are encouraged to participate; the focus of teacher instruction will be a synthesis of limnological concepts and its application to the classroom setting. The cost per student will be \$800 (this cost will include tuition, consumable supplies, room and onboard accommodations). Participants are responsible for transportation to and from the ship. Further details are available at: [www.clarkson.edu/lakeontario](http://www.clarkson.edu/lakeontario).



## News from Our Member Campuses...

### **SUNY FREDONIA**

**Alicia Perez-Fuentetaja** reports on recent Great Lakes research being done by SUNY Fredonia. Recently **Mark Clapsadl** of the SUNY-Fredonia Chautauqua-Erie Environmental Center and student Jessica Wuerstle have been examining the native freshwater mussel community of Cassadaga Creek in Chautauqua County, NY. Results so far have included evidence of 15 species of mussels in the creek. Among these species was the first living specimens of the Rayed Bean (*Villosa fabalis*), listed as a NYS endangered species, to be found in Cassadaga Creek. In addition, a recently dead specimen of a federally listed species, the Clubshell (*Pleurobema clava*) was collected. This is the first evidence of a recently living Clubshell in NY since 1919. Plans for future work include a survey of Cassadaga Creek targeted at identifying areas of high mussel densities and a project aimed at identification of fish species that act as hosts for the early life stage of mussels through the use molecular identification techniques.

The SUNY-Fredonia team of Alicia Perez-Fuentetaja, **Ted Lee** and Mark Clapsadl, studying the botulism outbreaks in Lake Erie, is going to start a second year of field research to detect sources of botulism in Lake Erie. Results from the 2002 season will be presented at the IAGLR meeting in Chicago in June. Chemist **Michael Milligan** continues his research on atmospheric pollutant transport across the Great Lakes Region in collaboration with other member institutions of the GLRC. Ecologist **William Brown** is working on the evolution of extraordinary sex ratios in ants and the ways in which male-female conflicts of interest structure mating systems in insects. His students are currently working



*The Sixteen Member Institutions of the GLRC*

on projects involving male risk-taking behavior in sexually cannibalistic mantids and the use of male song to advertise aggressive intent during combat in crickets. Zoologist **Karry Kazial** and her students at SUNY-Fredonia are initiating research on the bat populations in Chautauqua Co. and their role as agricultural pest control agents in the region. Contact: Alicia Perez-Fuentetaja [fuentep@fredonia.edu](mailto:fuentep@fredonia.edu)

### **SYRACUSE UNIVERSITY**

**Harry Lambright** reports that Syracuse University has hired a new environmental economist in the Maxwell School. His appointment is to help further the goals of the Strategic Partnership for Innovative Research and Education (SPIRE) plan of the Vice Chancellor to raise the level of excellence in specific areas of the University. Seed grants for interdisciplinary environmental research may become available, although planning for the SPIRE is still underway.

Syracuse University has several research projects focusing on Great Lakes issues. **Henry T. Mullins**, and Melany McFadden, from the Earth Sciences Department, along with **Don Stewart** from SUNY-ESF, and Bill Patterson from the University of Saskatchewan, are collaborating on a project titled, "Natural History of Lake Ontario Primary Productivity." The primary scientific objective of the research is to determine, using long sediment cores, the long-term natural history of primary productivity of Lake Ontario as a natural baseline against which historical and future changes can be compared. A secondary objective is to determine whether or not the historic (1980's) peak in Lake Ontario productivity was unprecedented in the past 10,000 years of natural history. The project will culminate in the MSc thesis work of Melany McFadden and two papers are forthcoming.

**Christine Mayer**, from the Department of Biology, is collaborating with researchers at the Cornell Biological



## More News from Our Member Campuses...

Field Station to investigate the increasing importance of benthic processes in Lake Ontario. The scientists will experimentally measure the effects of changing light and nutrient levels on benthic primary production in different habitats, assess the historical and current distribution of larger rooted plants, and will also involve a thorough literature evaluation of the effects of *Driessena* introduction on benthic processes as well as a GIS model of changes in benthic habitat that may affect important fish species. This project is funded by Sea Grant and will support a Sea Grant Scholar, Bin Zhu. Dr. Mayer will also collaborate with **Nancy Tisch** of Cornell University on a project funded by the Great Lakes Protection Fund to examine the spatial distribution and foodweb impacts of *Echinogammarus ischnus*, an invasive amphipod, and with researchers at SUNY ESF to examine the effects of several large scale anthropogenic effects such as *Driessena*-induced increases in water clarity and nutrient loading on specific biochemical characteristics of primary producers. Preliminary laboratory data on the effects of water clarity and nutrients on the biochemical composition of benthic algae are currently being collected with assistance from a Syracuse University graduate student, Peibin Qin.

**Harry Lambright**, from the Maxwell School is collaborating with **Brenda Nordenstam** from SUNY ESF to study the policy aspects of climate change and invasive species. Harry Lambright had a small grant from the Canadian Consulate to begin research on this topic. Planning for more extensive efforts are underway involving **Agnes Gereben Schaefer**. Over the summer of 2003, **Bruce Dayton** from Syracuse University is planning to write a case study related to invasive species policy in the St. Lawrence River. Contact:

Harry Lambright at [whlambri@maxwell.syr.edu](mailto:whlambri@maxwell.syr.edu).

### **SUNY POTSDAM**

**Jeff Chiarenzelli** reports that twelve SUNY Potsdam students attended the annual student faculty conference in March. Two new biologists specializing in field-based research will be joining the SUNY Potsdam faculty, and an atmospheric project is underway there. Contact: Jeff Chiarenzelli at [chiarejr@potsdam.edu](mailto:chiarejr@potsdam.edu).

### **UNIVERSITY AT BUFFALO**

**Joe Atkinson** reports on the success of the Lake Ontario Conference. Joe is working on the IJC Environmental Technical Work Group (ETWG) on lake levels. As part of the MERHAB project, he is working on modeling the movement of algae. There are three EPA-funded projects: 1) Link up Hydrodynamics with LOTOX model, 2) A project to develop a mercury submodel for LOTOX, and 3) Buffalo River Sediment Project model up to support dredging decisions. The University at Buffalo has hired an environmental chemist, and a remote sensing specialist. **Helen Domske** is teaching a Great Lakes Geology Course, and was also contacted to work on a new outreach program to middle schools. The University is looking for a new president. Contact: Joe Atkinson at [atkinson@eng.buffalo.edu](mailto:atkinson@eng.buffalo.edu).

### **SUNY PLATTSBURGH**

There is a new provost at Plattsburgh, Dr. Robert Golden; they will get a new president this year. The Lake Champlain Research Institute (LCRI) is in the first year of a \$550,000, three year NSF watershed project for collaborative research with Paul Smith's College and **Chris Cirimo** from Cortland. The REU program continues, as does the MERHAB project collaboration and the Sea Grant program. The facilities program is getting

good support from the city of Plattsburgh. Contact: **Tim Mihuc** at [timothy.mihuc@plattsburgh.edu](mailto:timothy.mihuc@plattsburgh.edu)

### **SUNY BROCKPORT**

**Mark Noll**, Department of Earth Sciences, and **Joseph Makarewicz**, Department of Environmental Science and Biology, received a \$130,000 grant from the Great Lakes Protection Fund to document the "Impact of anoxia and alum on phosphorus cycling from internal loads in the Irondequoit Bay. In a major collaborative effort funded by NOAA, Joe Makarewicz joins with **Greg Boyer** of SUNY ESF, on a project titled, "MERHAB 2002 Tier-Based Monitoring for Toxic Cyanobacteria in the Lower Great Lakes." Other collaborators on this \$3.3 million grant include SUNY Potsdam, the University of Vermont and the University of Tennessee. The first year of work on the USDA funded grant titled "Experimental Manipulation of Entire Watersheds through BMPs: Nutrient Fluxes, Fate and Transport and Biotic Responses," will begin this summer on Conesus Lake. Drs. Makarewicz and **Sid Bosch** serve as Co-PIs on this \$650,000 multidisciplinary project, which includes **Tony Vodacek** from RIT, **Bob Simon** from SUNY Geneseo and Mark Noll, **Jim Zollweg** and **Whitney Autin** from SUNY Brockport. **Jim Haynes** and **Jim Pagano** received funding from the Great Lakes Protection Fund to determine if contaminant levels in mink populations along coastal Lake Ontario have improved. Contact: Joe Makarewicz at [jmakarew@brockport.edu](mailto:jmakarew@brockport.edu)

### **CORNELL UNIVERSITY**

**Ed Mills** reported on Cornell's NSF Biocomplexity Project headed up by **Mark Bain**. The Cornell Biological Field Station has three projects involving the Great Lakes. These include: 1) a joint US and Canada



## Sixteen Member Campuses...

project funded by EPA examining lower trophic levels lakewide in Lake Ontario, 2) a Great Lakes Fishery Commission project examining long-term changes in the Bay of Quinte and Oneida Lake, and 3) a Sea Grant funded project evaluating a process termed "benthification" in large lake ecosystems. A Great Lakes Fishery Commission initiative of synthesizing the last 30 years of ecological change in Lake Ontario is now in press as a "perspectives" article in the Canadian Journal of Fisheries and Aquatic Science. Contact: Ed Mills at [elm5@cornell.edu](mailto:elm5@cornell.edu)

### UNIVERSITY AT ALBANY

Studies by researchers at the University at Albany of PCB cycling in the Hudson River have confirmed that zebra mussels make significant contribution to the retention of PCB in the river. The toxic cyanobacterium *Microcystis* is being investigated to determine the effect of their vertical migration in the water column on microcystin production. Methods for molecular detection of *Microcystis* and the pathogenic protozoa, *Cryptosporidia*, are also being developed. Katherine Alben is tracing food webs with photosynthetic pigments. Contact: G-Yull Rhee at [rhee@wadsworth.org](mailto:rhee@wadsworth.org)

### SUNY OSWEGO

Jim Pagano reports on several Great Lakes projects that SUNY Oswego researchers are currently involved in. One is the Oswego Study funded by ATSDR and NIEHS, to assess the relationship between perinatal exposures to organochlorine mixtures and longitudinal cognitive development in children. The Lake Ontario Air Deposition Study (LOADS) funded by EPA to estimate loadings of critical pollutants to Lake Ontario, is a collaborative project with Clarkson, Oswego and Fredonia. The project on Contaminant Degradation in Contained

Disposal Facilities, funded by NYSGLPF to determine and optimize microbial processes for persistent contaminants, is a collaborative project with Oswego and Albany. Another project, "the role of Lake Effect Precipitation in the Deposition of Organic Contaminants," funded by the GLRC, will determine if lake-effect precipitation is enhancing deposition of organic contaminants to the Tug Hill Plateau, is a collaborative project of Potsdam, Oswego, Clarkson and Fredonia. Researchers from Brockport and Oswego are collaborating on the project, "Population Monitoring and Bioaccumulative Chemicals in the Rochester AOC," which is funded by the NYSGLPF and will improve the understanding of the effects of persistent contaminants on mink populations in the Rochester AOC. Contact: Jim Pagano at [pagano@oswego.edu](mailto:pagano@oswego.edu)

### CLARKSON UNIVERSITY

Clarkson's Great Rivers Institute (GRI) was represented by **Tom Young**, Interim Institute Director, at a briefing held in Washington DC on April 11, 2003. The purpose of the briefing was to apprise staff members from the New York congressional delegation about the New York Great Lakes Initiative for Science and Education and its component facilities, including the GRI. Dr. Young's presentation centered on opportunities for jobs and economic development that will accompany the Institute and its activities. Planning and development activities for the Institute, which will be located on the St. Lawrence River, and its on-campus component, the Great Rivers Center, are ongoing. The current year's activities will have a focus on equipment acquisition and discussions aimed at defining an appropriate research agenda.

One week of ship time onboard the R/V *Lake Guardian* has been made available by the USEPA-GLNPO to conduct an intensive limnology practicum involving 15 university students and grade 6-12 science teachers. Qualified participants will be selected to represent the widest range of representation within the Great Lakes/St. Lawrence River watershed. The course will be offered on Lake Ontario from September 19-26, inclusive. The course curriculum will provide all students fundamental and practical knowledge of limnology. The focus of the exercises will be on microbial ecology and environmental science using traditional sampling techniques and advanced molecular biological techniques that are suited for use onboard the ship to provide real-time measurements. The course will be administered by the Clarkson Center for the Environment at Clarkson University. Further details are available at: [www.clarkson.edu/lakeontario](http://www.clarkson.edu/lakeontario) (also see page 9 of this newsletter).

The last intensive experiment on the Lake Ontario Deposition Study (LOADs) will be conducted in July 2003. This project will provide estimates of loadings of a number of critical pollutants identified in the Lake Ontario LaMP as well as several additional chemicals. Sources of these pollutants will also be identified using advanced source-receptor models. The sampling proposed includes the collection of ambient air samples of Hg (both elemental and reactive gaseous), PCBs, DDE, Mirex, HCB and Dioxin/Furans. The PI of the project is **Tom Holsen** at Clarkson, co-PIs are Jim Pagano at Oswego and Mike Milligan at Fredonia. Contact Tom Holsen at [holsen@clarkson.edu](mailto:holsen@clarkson.edu)



## ...Working Together for the Great Lakes

### **ROCHESTER INSTITUTE OF TECHNOLOGY**

The Center for Imaging Science Director, **Ian Gatley**, was promoted to Dean of the College of Science which includes both the Imaging Science and the Environmental Science majors at RIT. There is a new PhD program in Microsystems Engineering at RIT. **Bob Kremens** of the Center for Imaging Science has been working on developing field-deployable autonomous networked sensors - small environmental sensors that are linked by short distance radio communications. The GLRC Summer Institute will be a collaboration between RIT and SUNY-Brockport, with **Karl Korfmacher** of the RIT Environmental Science program contributing to the instruction. The JGR-Oceans journal will have a special issue featuring work from the KITES project in Lake Superior and the EEGLE project in Lake Michigan. Contact: Tony Vodacek at [vodacek@cis.rit.edu](mailto:vodacek@cis.rit.edu)

### **BINGHAMTON UNIVERSITY**

**Burrell Montz** speaks of a New Research Center to bring together geologists, hydrologists and biologists. This center for integrated watershed studies will focus on Susquehanna and Great Lakes. Contact: Burrell Montz at [bmontz@binghamton.edu](mailto:bmontz@binghamton.edu)

### **SUNY CORTLAND**

**John Lombardo** reports that Cortland has a new president and a new dean in arts and sciences, several new faculty in biology, psychology (studying PCBs in rats), geology (Chris Cirimo). Contact: John Lombardo at [lombardoj@cortland.edu](mailto:lombardoj@cortland.edu)

### **BUFFALO STATE COLLEGE**

**Gordon Fraser** provides the news from Buffalo State College. Mike Galey took a job at USFWS so they replaced the boat captain; John, the new boat captain left for the reserves. There is a new scientist, **Chris Penudo**, with a specialty of wetland watershed ecology. Buffalo State has 25 funded projects – on the Buffalo River, Cayuga Creek, Cazenovia Creek, in situ centrifuge to do sediment analysis, 18-mile creek and Squajacuada Creek water quality projects, carcinogen impacts of environmental toxicology, an eel project to route the eels around the Power Dam at Massena, and the Empire States Development project designed to keep fish away from a blasting project. The facility for boat buildup has moved to the waterfront and a docking facility will be improved for larger boats. Construction has begun. Contact: Gordon Fraser at [frasergs@buffalostate.edu](mailto:frasergs@buffalostate.edu).

## Lake Ontario Research...

### Continued from p. 7.

air, water, remediation, solid and hazardous waste. The second area is natural resource stewardship through wildlife and habitat protection. Third is wetlands protection and restoration. DEC is developing information tools including geospatial databases (GPS/GIS), analytic models, advanced sampling, remediation, other technology, and integrated networks. Don listed some of the DEC's emerging management priorities for Lake Ontario including negotiating an agreement among the states known as Annex 2001 to protect the Great Lakes from out-of-basin diversions and excess consumption, preventing lower food-web degradation, understanding the threat from emerging chemicals of concern and preventing harm from them, preventing type-E botulism outbreaks, understanding effects of climate change, integrating new technology into monitoring and information efforts, and providing security from biochemical and eco-terrorism. For more information contact Don at [dezlazn@gw.dec.state.ny.us](mailto:dezlazn@gw.dec.state.ny.us).

### **LOADS Project**

**Tom Holsen** of Clarkson University described the Lake Ontario Atmospheric Deposition Study (LOADS). This

project is providing estimates of loadings of a number of critical pollutants identified in the Lake Ontario Lakewide Management Plan as well as several additional chemicals. In addition to monitoring, the goal is to be able to identify sources through advanced modeling of pollutant pathways and chemical "fingerprinting". The work will also supplement the ongoing monitoring supported by Environment Canada at Point Petre, Ontario, one of the Great Lakes International Atmospheric Deposition Network (IADN) sites, and the Mercury Deposition Network (MDN). For more information contact Tom Holsen at [holsen@clarkson.edu](mailto:holsen@clarkson.edu).

### **Great Lakes Coastal Wetlands Consortium**

**Joel Ingram** from Environment Canada introduced the Great Lakes Coastal Wetlands Consortium (GLCWC), a group of scientists, policy makers, and other parties dedicated to monitoring the condition of Great Lakes coastal wetlands. The goal of the Consortium is to develop and implement a sustainable, long-term basin-wide monitoring plan for Great Lakes coastal wetlands. A near term goal of the consortium is the creation and synthesis of basin-wide data sets from both the United States and Canada needed for the development of an effective, functional monitoring plan. For more information visit <http://www.glc.org/wetlands/>.



## Projects Initiated by the Consortium in 2003

*Eight projects and education programs were selected this year through the Consortium's (GLRC) small grants program (up to \$25,000 each) and the New York Great Lakes Protection Fund Small Grants Program (up to \$10,000 each). The grants awarded this year will fund a variety of new Great Lakes-related research .*

### Research Seed Grants

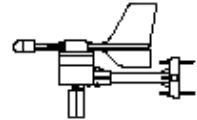
Recent studies conducted along the southeast shore of Lake Ontario and on the Tug Hill Plateau suggest that contaminant levels in the air and sediment are elevated above those expected in rural and remote areas. In particular, PCB concentrations are significantly elevated over those in other areas throughout the Great Lakes Basin. A GLRC Small Grant has been awarded to **Jeff Chiarenzelli**, from SUNY Potsdam, and others from SUNY Oswego to research the role of lake effect precipitation in the deposition of organic contaminants. It is proposed that the enhanced contaminant levels recorded in air and sediment downwind of Lake Ontario are related to contaminants derived from upwind urban and industrial sources by lake-effect precipitation. Comparisons of soil samples will allow for assessment of regional differences in contaminant deposition due to geographic position with respect to potential upwind sources. For more information, contact Jeff Chiarenzelli, SUNY Potsdam, at [chiarejr@potsdam.edu](mailto:chiarejr@potsdam.edu)



Zebra mussels are well established in Lake Champlain and the Great Lakes ecosystem. They filter large volumes of water as part of their daily feeding cycle. **Gregory Boyer**, from SUNY ESF, was awarded a GLRC small grant to investigate zebra mussels as biomonitors for cyanobacteria toxins in the Great Lakes, especially Lake Ontario and Lake Champlain. Zebra mussels would act as excellent biomarkers if they accumulate cyanobacteria toxins in a consistent manner. The basic working hypothesis of this project is that the cyanobacteria toxin concentration measured in zebra mussels is proportional to the amount of toxic cyanobacteria in the water column. As such, these species can be used as surrogate collectors to monitor for cyanobacteria toxins in the plankton. For more information, contact Gregory Boyer, SUNY ESF, at [glboyer@esf.edu](mailto:glboyer@esf.edu)



**James Pagano**, of the SUNY Oswego Environmental Research Center, was awarded a New York State Great Lakes Protection Fund (NYGLPF) small grant to acquire a weather station for the Sterling Nature Center, located on the south shores of Lake Ontario. Site-specific data on wind speed, wind direction, humidity, rainfall, solar radiation, and barometric pressure will be used in support of Great Lakes research and environmental education. Project collaborators, such as the Lake Ontario Air Deposition Study (LOADS), Sterling Nature Center, and SUNY Oswego, will also use the weather station. For more information, contact James Pagano, SUNY Oswego, [pagano@oswego.edu](mailto:pagano@oswego.edu)



Another seed grant was awarded to SUNY College of Environmental Science and Forestry Professor **James Nakas** for his research in the enzymatic removal of xenoestrogens from lower Great Lakes pollution sites. Nakas and fellow researchers at SUNY ESF will examine a process for the enzymatic treatment of a class of compounds generally referred to as endocrine disruptors (EDCs). These compounds are a recognized threat to human health in that they disrupt normal hormonal functions. EDCs are increasingly found as persistent contaminants in the Great Lakes ecosystem. Laboratory scale model systems will be constructed for monitoring EDC removal and extended to sewage plant sludge and their effluents, which affect Great Lakes waters. For more information, contact James Nakas, SUNY ESF, at [jpnakas@mailbox.syr.edu](mailto:jpnakas@mailbox.syr.edu)





## More Projects Initiated by the GLRC in 2003

SUNY Fredonia scientist, **Theodore Lee**, was awarded a NYGLPF grant for research in the molecular identification of coliform bacteria at two Lake Erie beaches, Point Gratiot and Wright Beach, in Chautauqua County, NY. Bacteria serve as indicators of water quality in aquatic ecosystems, and the identification of the bacteria present under different conditions may be a valuable method of characterizing the potential health impacts on users of these ecosystems. The research hopes to link the physical, chemical, and biological factors that influence the dynamics of the bacterial community in the aquatic environment and to investigate the use of these molecular techniques as tools for the identification of organisms. For more information, contact Theodore Lee, SUNY Fredonia, at [Theodore.Lee@fredonia.edu](mailto:Theodore.Lee@fredonia.edu)



*botulinum spores*

Also funded was **Katherine Alben**, from the University at Albany, in collaboration with **Joseph Makarewicz**, from SUNY Brockport. The study involves the use of pigments to trace the utilization of algae by Lake Ontario invertebrates and will be funded by a Great Lakes Research Protection Fund small grant. The intent of this project is to gain insight into pathways for utilization of algae in the benthic-pelagic food webs of Lake Ontario, particularly by non-native zebra and quagga mussels and invertebrates. Samples for this project will be collected primarily in the area near the Rochester Embayment, which is noted for eutrophication and undesirable algae in response to excess nutrients. Algal pigments will enable researchers to understand which classes of algae are being utilized by various species of invertebrates, what type of nutritional value algal pigments have to the invertebrates, and which biochemical factors influence the utilization of algae in Lake Ontario food webs. For more information, contact Katherine Alben, University at Albany, at [alben@wadsworth.org](mailto:alben@wadsworth.org)



*Chlorophyll a*

The NYGLPF small grants program funded another research project, undertaken by **David Carpenter**, of the University at Albany, and **Ronald Scudato** from SUNY Oswego, will generate a geostatistical method of modeling and monitoring air emissions. Toxic chemicals enter the atmosphere through a variety of mechanisms and sources, and then settle into the Great Lakes through direct deposition or run-off from land. Many toxic substances, such as PCBs, have the potential to bioaccumulate in species high on the food chain, posing a health risk for humans. These scientists will collaborate to develop and test a pilot method for modeling and analyzing the spatial distribution and adverse health effects of toxic air emissions of six concern areas throughout New York State. Large-scale implementation of projects like this will be essential to prevent serious adverse effects of toxic air emission to public health and the environment of the Great Lakes region. For more information, contact David Carpenter at [carpent@albany.edu](mailto:carpent@albany.edu).



**Karl Korfmacher**, from the Rochester Institute of Technology, has been funded by the NYGLPF to conduct a study of wetland and streambank buffer zones in the Rochester Embayment. This project will use high-resolution aerial photography, geographic information systems (GIS), and fieldwork to delineate the extent, quality, and threats to six representative wetlands and 50-foot riparian stream buffers in the area. Additional guidance and assistance will be provided by researchers at the Rochester Institute of Technology, the Monroe County Soil & Water Conservation District, the Monroe County Health Department, the Monroe County Environmental Management Council and the municipal conservation boards in the study area. Project results will be used to track progress towards delisting the "loss of fish and wildlife habitat" use impairment in the embayment area. For more information, contact Karl Korfmacher at [kfkscl@rit.edu](mailto:kfkscl@rit.edu)



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A Directory of Great Lakes Researchers

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**[www.esf.edu/glrc](http://www.esf.edu/glrc)**



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