great lakes observing system

ANNUAL IMPACT REPORT 2016

The Great Lakes Observing System is a network of people and technology coordinated to provide data about the Great Lakes at no cost to users and in a variety of formats and applications. This information informs policy, public health and safety, resource management and research activities.

IOOS Integrated Ocean Observing System

FROM OUR DIRECTOR

CELEBRATING SUCCESS

We're celebrating an anniversary this year: 10 years since the first official board meeting for the Great Lakes Observing System was held in June 2006. It's a great opportunity to reflect and appreciate all of the progress our region has made towards better coordination, expanding monitoring and sharing data.

I came to the organization in 2009 and it's incredible to think back on my time spent with GLOS and how far the organization has come. The region needed coordination, but it wasn't clear how exactly that would work and what technology would be available. GLOS was getting people used to the idea that there could be a single repository for a great deal of data, that the integrity of that data could be maintained, and the value enhanced through sharing with the broadest base of stakeholders.

We're in a good position now, thanks to former executive director Jen Read and her work to put GLOS on the map, and all of our former board members and early partners who made GLOS a part of any serious conversation on data management and the Great Lakes. The region is collectively thinking about what investments and partnerships are needed to advance the use of data and how GLOS can support the effort.

Just this past year alone we've launched a new iteration of the Data Portal, made important progress establishing our Adopt-a-Buoy program, extended our Congressional outreach, and completed the process to become the second certified region of the IOOS program.

But our work is not done. There are still many important information gaps that we want to help address, and hurdles, like funding constraints, which we need to overcome. I have confidence that as long as we can work cooperatively as a unified network towards common goals, we can continue to make progress and eventually serve as a bi-national model for innovation, partnership, and data driven decision making.

Thank you, members and partners, for adding value and strength to this network and we look forward to continuing to work with you as we accelerate progress in the coming years.

Kelli Paige
Executive Director, GLOS

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GREAT LAKES INFORMATION FOR PLANNING, SAFETY AND STEWARDSHIP

The Great Lakes Observing System (GLOS) provides near real-time information and forecasts of conditions bi-nationally and across the Great Lakes. Fishermen, ship captains, meteorologists, emergency response managers, and many other people rely on GLOS every day.

In addition to providing near real-time data, GLOS enables predictions of harmful algal blooms, water quality monitoring, and measurements of ocean acidification. GLOS is a regional partnership of academic institutions, industry, state and federal agencies, and non-government organizations — all collaborating to deliver actionable water and weather information.

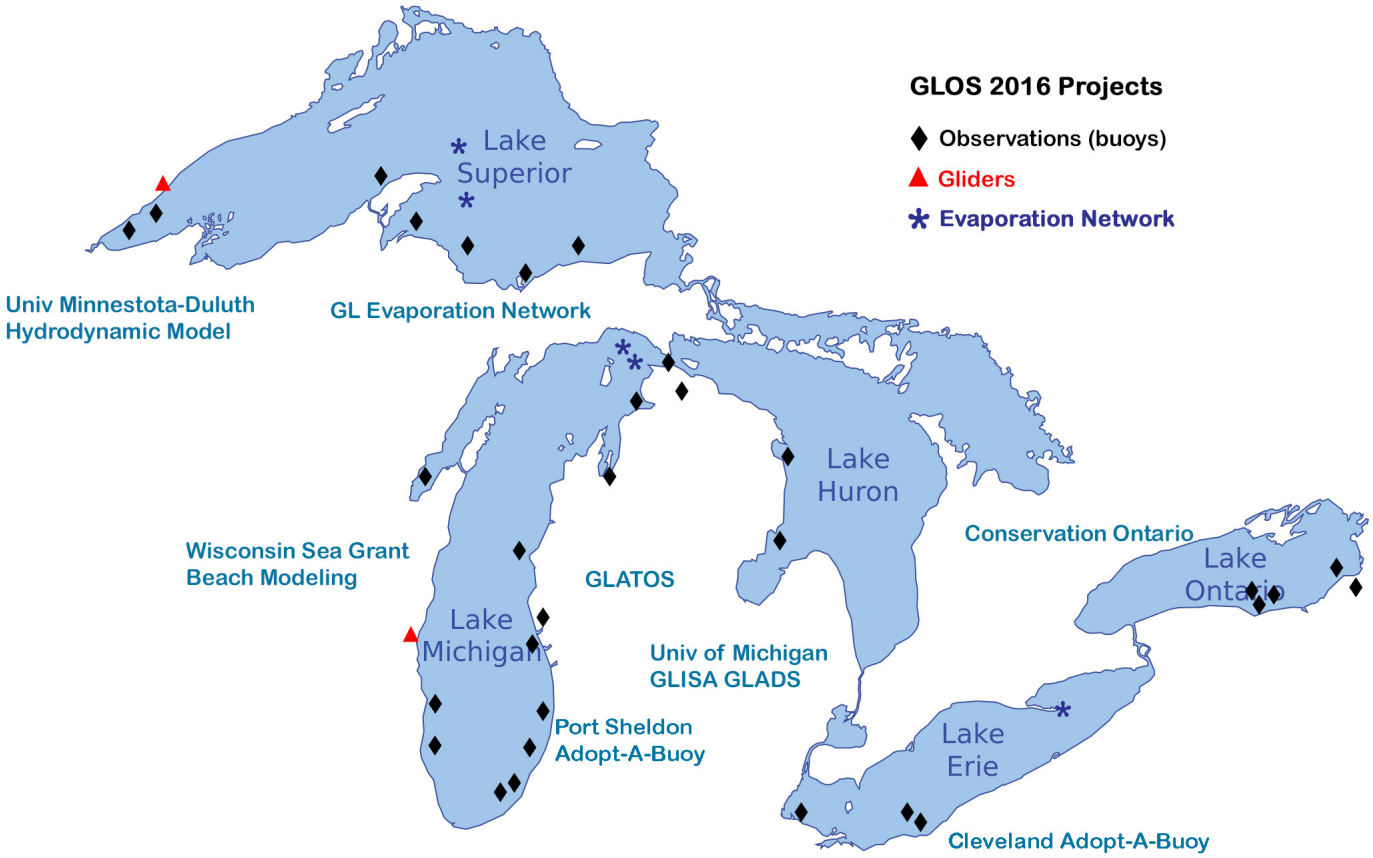
IOOS Integrated Ocean Observing System

GLOS is the Great Lakes node of the Integrated Ocean Observing System (U.S. IOOS), which works with regional partners to ensure compatible and consistent ocean and coastal data collection, management, and information products across the nation.

IOOS Association

The IOOS Association is a non-profit organization formed by the Regional Associations (RAs) for Coastal and Ocean Observing in support of the U.S. IOOS. It works with the 11 RAs, the U.S. IOOS Program Office in NOAA, and other partners to address the nation's need for coastal observing and information.

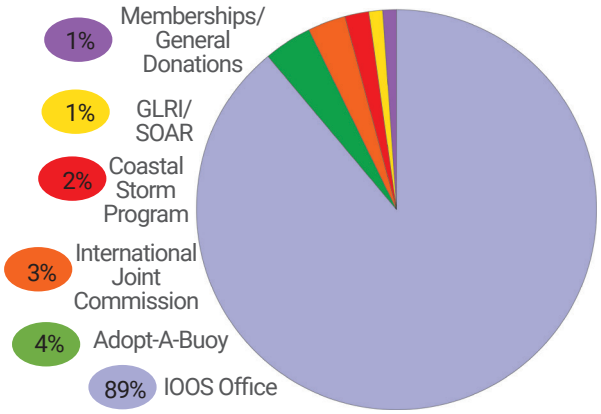
PROJECTS AND FINANCIALS



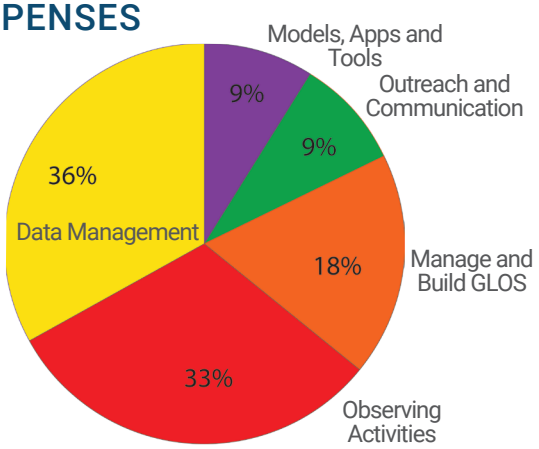
2016 FINANCIALS

GLOS is funded primarily by U.S. IOOS.

INCOME



EXPENSES



The financial information above represents funding allocated in 2015 and how these funds were budgeted to be spent. Our financial year ends June 30th and audited financials will be available at www.guidestar.org.

USER DRIVEN DATA

GETTING AWAY FROM SINGLE-PURPOSED APPLICATIONS

Throughout its history, the Great Lakes Observing System has worked to deliver information that meets the needs and expectation of the Great Lakes community. MyGLOS is a next-level iteration of the GLOS data portal. The portal is a useful tool with large amounts of data available in real, or near-real, time. It allows the user to set parameters to search for information and displays results. In addition to the data portal, GLOS supports several "tools," which are useful parameter-based information products giving specific, topic-based output.

The GLOS data portal holds the same information as any of the tools, and to make things easier for users to effectively build a tool that suits them, MyGLOS adds extra features. A registered user will be able to build and save specific data profiles, recalling them nearly instantly instead of having to input of select parameters every time they return to the portal. A HABs researcher can select specific parameters and areas specific to her concerns, while a commercial fisherman could select parameters for his. With MyGLOS, the next time they return to the portal they can pull up previous sets of parameters, ensuring consistent, easy results from recurring data queries.

ADOPT-A-BUOY

Federal Government programming puts countless pieces of equipment on the ground and in the water every year. The programs that support these items often pay for the initial purchase of expensive monitoring equipment and initial deployment, but not for long term maintenance, seasonal retrievals, and data management. When funding ends for these pieces of equipment they may be shelved or deployed in less strategic areas in an effort to retain at least some of the original intent of the tax payer's investment.

The Great Lakes Observing System assessed the life span of equipment that supplies data to the GLOS Data Portal, and could see that some of the most popular pieces of observation equipment were entering a phase in which they had little or no funding, despite being relied on by countless commercial fishing ventures, local beach managers, and other Great Lakes stakeholders. While it might seem that such important assets would naturally be assumed by one entity or another, there is no planned progression extending the life of the item. In 2015/2016, the Great Lakes Observing System tested two potential scenarios for keeping much needed equipment in the water. One was a partnership with a local utility, and the other was a traditional crowdfunding effort.

- Cleveland: The entity most likely to feel the loss of local buoy's data was Cleveland Water. The water authority was going to have to come up with that information to keep drinking water safe one way or another, so instead of reinventing the wheel; they offered to take on the costs of the management and maintenance.
- Port Sheldon: The Port Sheldon buoy crowdfunding effort was the first GLOS foray into getting the general public involved in financially supporting observation equipment. The effort started with a local meeting, and had an online component that captured individual donations and allowed stakeholders the opportunity to share their passion for the project through their own networks. The end result was truly encouraging in the number of small donors and the comments on the donation page, but ran a little short in dollars. GLOS continues to explore the format for future opportunities.

GLOS seeks to engage the community in supporting assets, and is developing cusomizable peer campaign programs to make it easier for stakeholders to get involved. Whether using the peer-to-peer marketing software or developing an agreement with local utilities or government, GLOS is committed to including all appropriate funders in the process of supporting our observations.

RIGOROUS STANDARDS, GUARANTEED

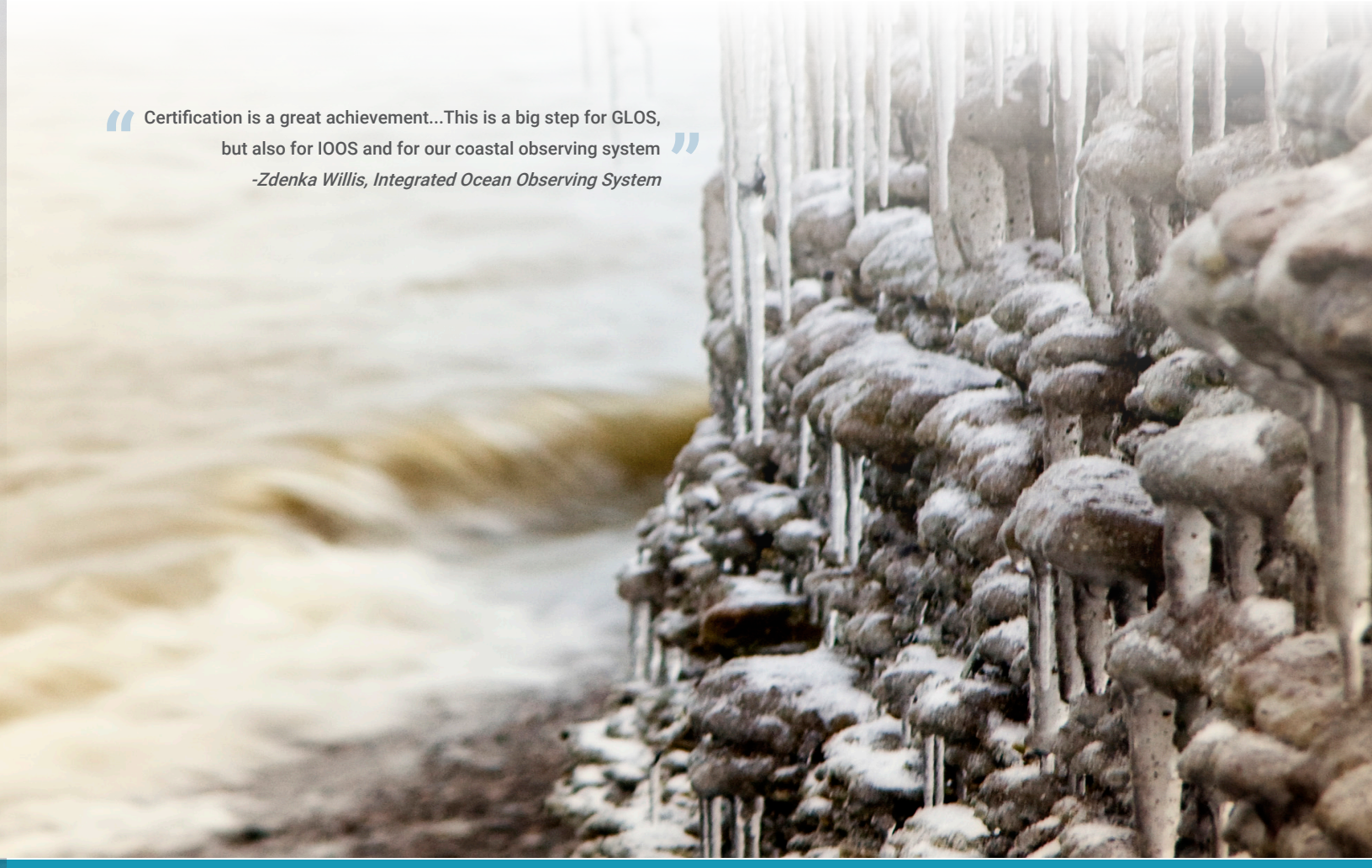
GLOS BECOMES A REGIONAL COORDINATING ENTITY

The Great Lakes Observing System (GLOS) has been certified as a Regional Information Coordinating Entity, one of only two such organizations in the U.S. Integrated Ocean Observing System (IOOS®) network. GLOS is the only IOOS Regional Association operating in fresh water, and the lakes supply drinking water for 40 million people, making up 20 percent of the world's fresh water.

Containing 10,000 miles of coastline, eight states and two provinces, the Great Lakes are a complicated and productive system. Taken regionally, they boast the world's 4th largest economy, with a combined GDP of $4.7 trillion among the eight U.S. states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin) and two Canadian provinces (Ontario and Quebec). The lakes also connect the Atlantic to the industrial Midwest via the St. Lawrence Seaway, and shipping activity alone amounts to $35 billion of annual economic activity. It also puts the system at risk for invasive species, and environmental observations are critical to support the $7 billion fishing industry.

Understandably, the data environment is crowded.

"Being certified means organizational and operational practices, including data management, meet recognized and established standards set by NOAA," said Kelli Paige, Executive Director of GLOS. "The demand for environmental data comes from commercial fishing, municipalities, researchers, and policy makers. It's imperative that the information used to support decisions about public safety and best use of our resources is available to everyone in a simple and reliable format. It also needs to be discoverable, and our large metadata catalog ensures that. This advances our position to be the Data Assembly Center for the region."



> **Certification is a great achievement...This is a big step for GLOS, but also for IOOS and for our coastal observing system**
> ***-Zdenka Willis, Integrated Ocean Observing System***

GLOS SUPPORTS OBSERVATIONS

Programs we plan for the next five years

The Great Lakes Observing System delivers its mission in 5-year increments. GLOS submits projects proposals at several funding levels, and what was approved by IOOS for 2016-2020 follows.

Great Lakes Beaches: Expanding GLOS Data Services for Sustainable Decision-Support

Partners: University of Wisconsin Sea Grant Institute(WISGI), United States Geological Survey- Center for Integrated Data Analytics (CIDA)

WISGI will use an integrated technical/cooperative-extension approach to improve the accuracy and cost-effectiveness of water-quality monitoring and extend the use of "nowcast" models for beaches throughout the region. A suite of enhancements will be made to increase the utility of GLOS data and related services and tools for use in nowcast models, including the Great Lakes Coastal Forecasting System and the Environmental Data Discovery and Transformation web data portal that links data services to the Virtual Beach decision-support software. Adoption of these enhanced tools will be extended to the public health officials, staff, and researchers responsible for monitoring, advisory decisions, and/or risk communications at public beaches along the Great Lakes coasts.

Enabling Ontario's Conservation Authorities (CAs) to Make Data Discoverable and Accessible

Partners: Conservation Ontario, North Bay-Mattawa Conservation Authority, Quinte Conservation Authority, Lake Simcoe Region Conservation Authority, Grand River Conservation Authority

Conservation Authorities collect, store and analyze environmental data employing a variety of observational and remote sensing systems such as ground and surface water monitoring networks, climate stations, and GIS systems. To date, most of these data have been collected and used internally – shared only with project partners in an on-demand fashion and typically not accessed by U.S. entities. GLOS support will enable CAs to make these data discoverable, accessible and available by assisting with their inventory, assessment and preparation. Specific outcomes are an assessment of existing and potential data end-users and data products, making data available through GLOS, and development of tools to assist end-users in utilizing newly available data.

Expanding the Great Lakes Acoustic Telemetry Observation System (GLATOS)

Partners: Great Lakes Fisheries Commission (GLFC), Michigan State University, USGS

The current Great Lakes Acoustic Telemetry Observation System web (GLATOSweb) data system, developed by GLOS in partnership with the GLFC, was designed to promote discovery of individual telemetry research projects to extend their effective range, but it does not provide direct access to data or include mechanisms for quality assurance. The project would update back-end database design to support more efficient data management and access via GLATOSweb, and ensure compliance with IOOS requirements to establish GLATOS as a fully-integrated augmented transition network node for the Great Lakes.

Great Lakes Evaporation Network (GLEN)

Partners: LimnoTech, University of Colorado-Boulder, Environment Canada, National Oceanic and Atmospheric Administration Great Lakes Environmental Research Lan, University of Minnesota-Duluth, Northern Michigan University, University of Michigan, Michigan Technological University

Enhance the existing GLEN infrastructure and (together with significantly leveraged support from NOAA and Environment Canada) and provide a foundation for new partners to contribute observing assets, modeling tools, and outreach. Specific goals of the proposed project include: 1) maintaining and expanding the suite of GLEN observations, proposed activities include fieldwork to support core observation sites, buoys, and glider deployments 2) establishing a coordinated data management and communications system through GLOS, and 3) developing new models and tools to synthesize and communicate GLEN data and improve Great Lakes forecasting.

THROUGH OUR 5-YEAR PLAN

Validating and Expanding the Great Lakes Adaptation Data Suite (GLADS)

Partners: Great Lakes Integrated Sciences and Assessments program is a NOAA-supported University of Michigan's Graham Sustainability Institute, the University of Michigan Climate Center, GLERL, and the Great Lakes Aquatic Habitat Framework. GLISA will build on work previously funded by GLOS to develop a consistent Great Lakes Climate Adaptation Data Suite (GLADS) for the region. During the project period, they will validate and evaluate past work, enhance and expand efforts by adding future climate data to the GLADS, and engage and train six to ten research institutions across the region in synthesizing the GLADS variables into useful and usable information resources for public use and practitioner decision making. The key outcomes and outputs include: improved resources for climate adaptation decision making across the Great Lakes region; improved communication and resource sharing across regional institutions; and the development of a Great Lakes Ensemble for informing future scenario planning across the region.

Hydrodynamic model for the St. Louis River Estuary and Duluth-Superior Harbor system

Partners: University of Minnesota-Duluth (UMD)

UMD will further develop an existing hydrodynamic model of the St. Louis River Estuary/ Duluth-Superior Harbor coupled system used by the EPA and Minnesota Pollution Control Board. This would include the addition of ecosystem and water quality models to the existing model, improvement of the nowcasting capability, and an enhanced web presence for model output, coupled with a coordinated water quality and ecosystem monitoring program to help to ground truth the model. All of these activities would be coordinated with the extensive network of academic, state, federal, tribal, commercial, and non-profit groups who all have a stake in the Harbor-Estuary system, and who all stand to benefit from a community modeling resource.

Nearshore Observations Network

Partners: University of Minnesota-Duluth, Michigan Technological University, University of Wisconsin-Milwaukee, State University of New York, NOAA GLERL, Cooperative Institute for Limnology and Ecosystems Research

The network, in operation since 2008, is comprised of five academic institutional partners along with NOAA-GLERL that work together to operate key observing system and modeling improvements vital to the Great Lakes. This network of observing assets includes an array of integrated nearshore observing buoys that provide continuous, real-time observations on wind, wave, temperature, and currents along with expanded water quality analysis.; Mobile observing platforms, including a glider and autonomous underwater vehicles, to provide detailed three-dimensional observations of thermal structure, and ecological processes throughout each of the Great Lakes, including surveys focused on understanding harmful algal blooms, impacts of invasive species, and coastal nutrient inputs. allows for activities to be tailored to local user-driven needs as well as meeting broader regional needs through incorporation of unique data within the GLOS functional areas. The implementation of the observing activities into data archives and operational models are crucial for improved understanding and decision making regarding ongoing physical, chemical and biologic stressors to the ecosystem.

Coming soon...

Simulating Spill Scenarios for Public Health Protection in the Huron to Erie Corridor

Partners: Southeast Michigan Council of Governments (SEMCOG), Michigan Technological University, Macomb County Health Department

The Huron to Erie Drinking Water Real-Time Monitoring Alliance of Water Treatment Plant operators and county health department officials are interested in developing a menu of protections for source water security, water treatment plan intakes, and public health. Building on existing work funded by GLOS, SEMCOG will coordinate with the alliance group, Michigan Tech and NOAA-GLERL to enhance and extend modeling spill scenarios in the Detroit River and Lake St. Clair. The project will update, redesign, and integrate the Huron to Erie Connecting Waterways Forecasting System -generated model data with existing observing data from GLOS platforms such as the Data Portal and Boaters' Forecast, with significantly more meteorological observing information from along the corridor area. The resulting tools will assist in water quality and spill impact decision making and increase awareness of water security issues.

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GLOS MEMBERSHIP

GLOS is the trusted source of water and weather information in the Great Lakes. GLOS membership is a diverse mix of those interested in obtaining, using, and sustaining the best water and weather information in the region.

The federal funds we receive provide critical base support, but we need your help to keep the system operating and improving. With your membership we will be able to:

- Maintain and repair infrastructure, ensuring continued observations and forecasts,
- Develop new tools to make it easier for people to access and understand the information, and
- Advocate for the national IOOS program to continue base support.

BECOME A MEMBER

Membership in GLOS is an important way to support your regional coastal observing system and can include the following benefits:

- ✓ Subscription to GLOS Real Time News
- ✓ Complimentary registration for Annual Meeting
- ✓ Consultations with GLOS staff

For more information and an application form, please visit:

www.glos.us/membership

GLOS MEMBERS
(as of October 1, 2016)

Associate level (individual):

Dylan Ahern
Gregory Boyer
Thomas Bridgeman
Kathryn Buckner
Mark Burrows
John Carey
Gregory Cutrell
Omar Gates
Nancy Frank
Randy Helland
Tom Johengen
Douglas Kane
Deborah Kern
John Lenters
Carl Lindquist
Benjamin Miller
Steve Ruberg
Tad Slawecki
Ed Verhamme

Associate level (non profit):

Great Lakes and St. Lawrence Cities Initiative
Great Lakes Commission
Great Lakes Research Consortium
International Joint Commission
Lake Carriers' Association
University of Michigan Water Center
USGS Midwest Region

Supporters of the 2016 Great Lakes Data Challenge:

Co-sponsor:
Aquatic Informatics

Sponsors:
LimnoTech
Cooperative Institute of Limnology and Ecosystems Research
AquaHacking 2017 - United for Lake Erie
RPS ASA
Cleveland Water Alliance
Great Lakes Fishery Commission
Large Lakes Observatory at UMN Duluth

GLOS STAFF

Kelli Paige, Executive Director

Becky Pearson, Program Manager

Kristin Schrader, Communications Manager

92 data sets including observations, modeling and remote sensing

7.7 TB of data held on GLOS servers

80 supporters donated to the Port Sheldon Buoy crowdfunding effort

$861,739 total amount awarded to partners in 2015-2016

FOR REAL-TIME GREAT LAKES AND WEATHER DATA AND UPDATES ON GLOS ACTIVITIES, VISIT OUR WEBSITE: WWW.GLOS.US

STAY CONNECTED!

GLOS is your data sharing network. Catch up on news, new services, grant opportunities and more.