

## Implementation of the Great Lakes Observing System, 2011-2015

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<http://www.glos.us>

## LONG-TERM GOALS

A fully integrated Great Lakes Observing System that provides products and services to decision-makers, resource managers and other data users with input from members and partners, to foster understanding and inform decision-making related to the Great Lakes and St. Lawrence River System.

### Objectives:

**Objective One: Program Planning and Management:** Data and information needs of regional resource managers and policy makers are addressed through the coordination, management and governance of GLOS.

**Objective Two: Data Management and Integration:** GLOS users have ready access to high quality, interoperable data and associated products that meet IOOS criteria.

**Objective Three: Observations:** GLOS users benefit from timely, reliable and sustained observations that meet regional needs and priorities.

**Objective Four: Model and Tool Development:** GLOS provides its users with specific products and services that are efficient, accurate, cost effective and capable of future growth.

**Objective Five: Outreach and Education:** Input from identified major stakeholders – users, members and partners – is systematically and routinely integrated into program planning and evaluation.

- Improved source water protection for Great Lakes drinking water;
- Improved implementation and evaluation of water quality and ecosystem restoration activities under the U.S.-Canada Great Lakes Water Quality Agreement, the Great Lakes Restoration Initiative and binational fisheries management activities;
- Improved spill response planning and support for emergency response to spill events;
- State of the science support for planning and implementing climate adaptation strategies in vulnerable communities;
- More effective beach management, including data for beach quality forecasts and support for source contaminant identification;
- More efficient allocation of resources for port and harbor infrastructure maintenance;
- Improved data to support ecological forecasting models to address changes in water quality and food-webs in response to multiple stressors;
- Improved wind and wave observations and forecasts to promote safety among commercial shippers and recreational boaters; and
- Improved development of remote sensing products to provide synoptic (or regional scale) analysis of water quality and ecosystem health.

## **APPROACH AND WORK PLAN**

*Program Management and Planning* (Jennifer Read, Executive Director; Kelli Paige and Sara Maples, Program Coordinators; Elyse Larsen, Business Manager)

GLOS staff will work to process and manage all sub-awards and contracts including partner coordination, program management, and reporting activities. Staff will also continue to participate in partner initiatives, e.g., IOOS and NFRA committees, the Can-Am GEO Great Lakes Testbed and related efforts in order to ensure that programmatic planning is in line with the standards and priorities of regional and IOOS community partners, and to foster organizational maturity.

The Executive Director, and other staff as needed, will facilitate the GLOS RA Board of Directors monthly conference calls that set policy direction for the organization. The GLOS Board will continue to seek additional members which are geographically, sectorally and nationally representative. The GLOS Board, on the advice of the Executive Director, will appoint the first members to the GLOS Technical Advisory Panel. Members of the panel will be selected for their technical expertise and act in advisory capacity for activities such as RFP review, contractor selection, service on project advisory committees, and provide technical advice as requested by the Executive Director and Board of Directors.

*Data Management* (Kelli Paige, Program Coordinator; Contractor TBD at time of award receipt; as of November 1, 2011, a team led by LimnoTech Inc., and including ASA and the Great Lakes Commission was under contract)

The DMAC team will identify baseline information for measuring progress; continue integration of existing priority data sets into GLOS DMAC system; and identify priority opportunities for data standards, quality management system, and protocol development.

In addition, contractors will be responsible for completing outstanding data product development, specifically the GLOS Data Catalog/GLOS Data Discovery Portal. Activities will also include evaluation and development of plans to implement any necessary updates to other existing products or applications such as the OBS Explorer, Metadata Catalog, HECWFS viewer, and THREDDS Catalog as needed for transition to updated GLOS website and/or to facilitate transition to contractor for easy operations and maintenance.

Observations (Kelli Paige, Program Coordinator; Tom Johengen, CILER Observation Coordinator; Greg Boyer, SUNY-EFS; Guy Meadows, University of Michigan; Robert Shuchman, Michigan Tech Research Institute; )  
The Observations team will ensure that resources and plans are in place for ongoing operation of existing GLOS assets and continued management of the GLOS Observing Subsystem in accordance with IOOS standards and protocols.

Observations are being conducted via our partnership with regional universities through the Cooperative Institute for Limnology and Ecosystem Research (CILER) and with NOAA's Great Lakes Environmental Research Lab (GLERL). Funds for this activity will be distributed by IOOS to these program partners on GLOS behalf.

Modeling and Tools (Sara Maples, Program Coordinator)

The Modeling and Tools team will continue to refine and enhance existing tools as needed and identify emerging opportunities for model and tool development.

GLOS staff will serve as secretariat and facilitator of the Ecosystem Forecasting Modeling Framework Pilot that has been proposed for Lake Michigan. At a regional meeting of agency, academic and private sector modelers in December 2010, GLOS was identified as the regional entity that could bring together all the actors with an interest in modeling to support ecosystem forecasting – resource managers, policy makers and modelers – and provide a neutral location for all concerns to be addressed. This process is envisioned to be driven by user needs as identified by the Lake Michigan LaMP and the Lake Michigan Committee (of Great Lakes fishery managers). The GLOS role will be to use these priorities to bring together the agency, university and private sector modelers who can integrate the various physical, chemical and biological models into an ecosystem forecasting framework that addresses key management questions. A report from the workshop is currently under review and will guide the development of a workgroup/steering committee and their initial activities.

GLOS activities will be augmented with the addition of Sara Katich as a Program Coordinator to support the Modeling and Tools sub-system and the Outreach/Education sub-system.

Outreach and Education (Sara Maples, Program Coordinator)

The Outreach and Education team will identify priority targets for membership, initiate evaluation of existing tools, and sustain promotion and engagement activities. GLOS staff will develop and maintain website content, including quarterly newsletters, updates on meetings and events, and when appropriate, news stories that highlight specific GLOS projects.

Staff will oversee activities of sub-awards with the Great Lakes Sea Grant Network. Sea Grant partners will evaluate existing fishery tools and provide training. An initial evaluation of existing needs assessment activities conducted for municipal/regional and infrastructure planners will refine the assessment process and potentially allow GLOS to develop tool concepts for use in year two. Sea Grant partners will also continue to improve *Teaching with Great Lakes Data* website by adding additional data sets, enhance current inquiry resources and improve background materials. Teachers trained on the curriculum at the site will be leveraged, possibly as “master teachers,” and their feedback used to plan the next round of improvements to the site.

## **WORK COMPLETED**

Program Management and Planning

GLOS ED and staff worked to process all contracts and sub-awards as needed and continued participation in relevant partner initiatives. Preparations were made to begin planning the 2012 Annual Meeting for March 21 and 22 in Cleveland, Ohio.

### Data Management and Communications

An RFP for DMAC services was released in August and proposal review was carried out in September. Interviews for top selected firms were scheduled for early October and a final recommendation was submitted to the Board of Directors by the proposal review team. LimnoTech was selected at the recommended firm and development of a scope of work/contract was finalized in early November.

The scope of work for LimnoTech includes regular operations and maintenance of the GLOS DMAC system and development evolution of existing data access tools towards one integrated data portal. LimnoTech developed an annual workplan for DMAC activities which was approved by GLOS and initiated activities identified in the workplan.

### Observations

Funds for FY11 were not processed in time for PIs to deploy equipment using resources from this grant. As in the past they have leveraged other projects and IOOS funding which lags up to one year in order to meet project commitments.

The Observations Team planned the annual PI meeting scheduled for January 21 and 22 in Ann Arbor, MI.

### Modeling and Tools

The preliminary meeting of the GLOS facilitated, Lake Michigan Ecosystem Forecasting Working Group has been set for January 11 and 12, 2012 in Ann Arbor, MI.

### Outreach and Education

Sub-contracts for the education work have been processed but work has not yet commenced. Staff are refining an RFP for climate needs assessment that will support both GLOS needs as well as the NOAA Coastal Storms Program in the Great Lakes.

## **RESULTS**

None to date given late receipt of funds.

## **IMPACT AND APPLICATIONS**

### **Economic Development**

Multiple aspects of the GLOS program support economic development either directly, such as through the development of new technologies by regional private sector partners of our PIs, or more commonly through indirect means by improving efficiencies in the region. As this effort is just getting underway, there are no specific impacts associated with this grant to report at this time.

### **Quality of Life**

The Great Lakes Observing System supports ecosystem restoration activities in the Great Lakes. Improved ecosystem health directly impacts the quality of life of those living, working and playing on and near the Great Lakes. Specifically, GLOS observations will support improved Harmful Algal Bloom forecasts in the western basin of Lake Erie, improved spill response in the St. Clair River and other efforts. However, as this effort is just getting underway, there are no specific impacts associated with this grant to report at this time.

## **Science Education and Communication**

GLOS works with the Great Lakes Sea Grant network to leverage their curriculum development and teacher training activities. To date these efforts have led to a curriculum website, Teaching with Great Lakes Data <http://greatlakeslessons.com/>. Over the course of the next five years, we anticipate additional significant advances of Great Lakes curriculum utilizing these partnership. However, as this effort is just getting underway, there are no specific impacts associated with this grant to report at this time.

## **TRANSITIONS**

Note that due to the early stage of this grant, there are no transitions to report at this time.

## **RELATED PROJECTS**

### **GLOS Great Lakes Tributary Monitoring Project**

The GLOS Observations Team (PIs listed above) drafted a five-year plan to develop enhanced tributary and nearshore monitoring to improve the collection, integration, and delivery of data for use in managing and decision-making in the Great Lakes. This was completed specifically for priority Areas of Concern identified in the Great Lakes Restoration Initiative Action Plan in preparation for submitting an observing systems proposal to the United States Environmental Protection Agency's, Great Lakes Restoration Initiative solicitation in January 2010.

The project goal is to expand, enhance, and coordinate the Great Lakes network of monitoring and observing systems to provide a comprehensive assessment of the Great Lakes ecosystem for use in monitoring Beneficial Use Impairments in high priority Areas of Concern (AOC).

GLOS Principal Investigators are undertaking a variety of monitoring activities to support decision-making by local AOC, Lakewide area Management Plan (LaMP), and other stakeholder groups. The data collected will allow managers and decision-makers to monitor the benefits of restoration activities and track trends and changes in ecosystem health. Specific monitoring activities include:

#### **St. Louis River/Estuary**

##### **Shore-based monitoring stations (3)**

Parameters: Currents, turbidity, temperature, and fluorometric measurements will allow assessment concentrations of cyanobacteria, CDOM (Colored Dissolved Organic Matter) and Chlorophyll-A.

#### **Green Bay**

##### **AUV missions**

Mapping wide spread hypoxic conditions including parameters such as phosphate, oxygen, turbidity, thermal structure, and currents.

##### **Buoy (1)**

Parameters: Nutrients, carbon, persistent toxics (PCBs)

#### **Saginaw Bay**

##### **AUV missions**

Parameters: Benthic habitat and algal growth, turbidity, dissolved oxygen, temperature, conductivity, Chlorophyll-A, CDOM and phycocyanin. Spatial surveys for source contributions, fate and transport of benthic muck using side-scan sonar and underwater video. Mapping water quality and water chemistry, producing full three-dimensional maps of the physical, chemical and biological structure of the Bay waters.

#### **BathyBoat-Autonomous survey vessel**

Larval fish counts and sizes using fishery acoustics.

#### **Maumee River**

##### **Moored station (1)**

Continuous real-time observations of dissolved reactive phosphorus concentrations, light intensity, turbidity, chlorophyll, phycocyanin, CDOM, dissolved oxygen, temperature, and conductivity.

##### **Field data**

Along with conductivity, temp, depth (CTD) profiles at each sample site, field samples will be analyzed for TP, SRP, TSS, chlorophyll, phycocyanin, dissolved organic carbon, Microcystis abundance, and microcystin concentration.

#### **Genesee/ Rochester**

##### **Shore based (hut/pump) system (1)**

Basic water quality parameters and real time phosphate and nitrate sensors.

##### **Buoy (1)**

Thermistor string, along with epilimnetic sensors for conductivity, turbidity, and chlorophyll, meteorological data, monitor the movement of water, surface water plume and the resulting plunging of the Genesee River.

##### **AUV missions**

Map the outflow of the river in regards to the spring thermal bar and the resulting spread of the plume, monitor for Cladophora distribution.

#### **Remote sensing- All Locations**

Synoptic maps of lake chlorophyll (chl), dissolved organic carbon (doc), suspended sediment (sm) values offshore of the AOCs, monthly average of optical attenuation, weekly ice cover maps, daily surface wind speeds, and mapping of harmful algae blooms (HABs).

**Remote sensing data maps now available for preview: [www.glosaocmapping.org](http://www.glosaocmapping.org)**