great lakes observing system

2024 Annual Report

A Letter From Our CEO

2024 brought both dynamic challenges and remarkable progress for the Great Lakes Observing System. From testifying before Congress to supporting search and survey missions and expanding data intake pipelines, GLOS has remained committed to strengthening and advancing Great Lakes observations.

As the world's largest freshwater ecosystem, the Great Lakes are invaluable to regional and global water security and sustainability. GLOS, the Regional Association for the **Integrated Ocean Observing System** (IOOS), delivers critical real-time data on weather, water conditions, wind, waves, and biological and chemical parameters. This information supports the regional marine economy, improves coastal safety, and supports decision-making for a wide range of stakeholders. Understanding how environmental changes impact stakeholder communities is essential for mitigating risks to coastal economies, water quality, commercial fisheries, and navigation safety.

As extreme weather events and costly flood hazards become more frequent, the need for accurate, accessible Great Lakes data has never been greater. Our work—**building a resilient data network and filling critical information gaps**—helps strengthen communities, support marine industries, and protect ecosystems.

I am pleased to announce that GLOS launched several key initiatives in 2024: repairing and upgrading aging observation infrastructure, deploying the first real-time SmartFlux evaporation monitoring station in the Great Lakes, and beginning development of a new tool focused on enhancing recreational safety on the Great Lakes.

Our achievements would not be possible without the dedication of our partners and supporters. We are especially grateful to those who have advocated for GLOS and championed our mission. Whether you contribute data, maintain buoys, conduct water-quality research, fish, boat, surf, or simply enjoy the shoreline, you are part of the network that makes the Great Lakes so remarkable. Together, we are shaping a future where data-driven insights safeguard this vital ecosystem.

As we reflect on 2024, we also look ahead to an exciting milestone: our **20th anniversary in 2025**. This year will bring growth, a new five-year strategic plan, and expanded capacity to meet evolving needs. We invite you to continue following our work as we celebrate two decades of impact and set the course for the years ahead. **Thank you for being part of the GLOS community. Here's to another year of progress, collaboration, and innovation.**

Sincerely,

Jennifer R. Boehme

Jennifer Boehme
Chief Executive Officer

The Value of GLOS

Every year, GLOS grows and evolves to take on new projects based on changing needs and conditions in the Great Lakes. And 2024 was no exception.

Throughout this evolution, we remain grounded in who we are and what we do in **our mission** to make Great Lakes information accessible to and usable by those that need and want it.

"GLOS is an extremely valuable organization for promoting community awareness and for assessing the overall health of the Great Lakes."
- Michael Zorn | Green Bay, WI

"Data and reports generated by GLOS are essential for the efficient management of the Great Lakes ecosystem. Further, much of the information is available to the millions of citizens that use the lakes for recreation like myself. This information makes their use of the lakes safer and more enjoyable." **- Donald Arcuri | Oberlin, OH**

"I depend on the Great Lakes Observing System and near shore buoys to help understand when it's safe to engage a lake that is as powerful and unpredictable as any ocean or sea." **- Gabe Vehovsky | Evanston, IL**

"Spending time on the lakes is foundational to our way of life in this region and data provided by GLOS allows people to make informed and safe decisions about their time on these large, and often unpredictable, lakes."
- Tori Field | Grand Rapids, MI

"This data cannot be replaced by other means, and if gone leaves a huge data gap in the Great Lakes that could lead to the loss of life."
- Ketzel Levens | Duluth, MN

Smart Great Lakes

Since the release of the **Common Strategy for Smart Great Lakes** in 2021, the **Smart Great Lakes initiative** (SGLi) partners have continued to work towards the strategy's goals to improve the way our region learns about and responds to lake events, inform critical policy, and direct future science and innovation.

In 2024, the SGLi partners analyzed results from a 2023 survey that was created to better understand data accessibility, quality, ownership, and use, with the goal to **improve discoverability of data in the region**. This first iteration of the survey allowed for the SGLi partners to gather information in open ended questions to better categorize responses in future surveys. The results from this survey and future surveys will be shared with existing data platform managers to improve overall data discoverability in the Great Lakes region.

The SGLi leadership team continues working to evaluate current goals and rework them into a **'Smart Great Lakes 2.0'** to consider the ever evolving and advancing technology and address changing needs of the Great Lakes region.

Scan To Learn About Technology Improving Our Understanding Of The Great Lakes

smart great lakes

Cultivating the Next Generation of Great Lakes Stewards

Common Mission Project's Hacking for Impact

GLOS was a 2024 sponsor for a **Common Mission Project's** Hacking for Impact challenge for Northwestern University. The Common Mission Project seeks to develop mission-driven professionals to solve critical national security, civic, and social challenges. By pairing learning institutions with government, business, and nonprofit groups, the Common Mission Project is building partnerships around problems, prototypes, and solutions to face urgent challenges facing our nation.

The GLOS student team exceeded all expectations. With initial guidance from GLOS staff, the team went on to establish many contacts of varied expertise around the Great Lakes and identified valuable resources, mostly in the form of existing indices, that they used to provide GLOS with a list of communities most in need of data for coastal resilience and severe weather readiness.

1.

Teaching Great Lakes Literacy

GLOS participated as a scientific partner for the Teaching Great Lakes Literacy project with **Michigan SeaGrant** in which we worked with high school science and math teachers from **Ogemaw Heights High School** to develop lesson plans around harmful algal blooms utilizing observational data from the Seagull platform. The complete set of lessons are available for use by anyone seeking to teach about harmful algal blooms utilizing Great Lakes observation data.

Seagull | Data and Information Management

In 2024, the GLOS team continued to enhance GLOS' information technology platform **Seagull** in order to better serve our users. Users of Seagull include a wide range of people including anglers (private and commercial), small craft operators, tour operators, scuba divers, boating enthusiasts, beach goers, water treatment managers, researchers, and cruise ship companies. We've been adding many new features, responding to user feedback, improving performance, adding new data, and increasing stability, scalability in a Cloud based infrastructure.

Features Developed And Released In 2024

- Users can now easily share key information such as map visualizations and buoy data trends from inside Seagull to **social media platforms**. This feature will allow our users to share important data findings within their relevant networks.
- Seagull now has a **dedicated, centralized space** for all important announcements on the webapp. This allows us to notify our users on planned or unplanned downtimes, key events or any other appropriate events.
- The data providers can now embargo their **datasets/platforms on Seagull** until they are ready for their assets to be published. This feature provides a medium for our partners to use the Seagull platform to park, assess and view their datasets and/or platforms privately or share them with a small group of users.
- Seagull now has a special **Beta workspace** for our users with more advanced data and information needs. The workspace allows users to visualize historical data, compare various parameters for a platform or across platforms. The workspace is currently in its beta phase and is expected to get more features soon.
- Users can now set their **preferred units** for almost all the parameters through the new and improved preferences section under their accounts.

Expect to see even more platforms, more features, and more Seagull in the future!

'Omics Data Made Accessible

A subset of key **harmful algal bloom** (HAB) 'omics data from **GLAMR** (**Great Lakes Atlas for Multi-omics Research**) is now conveniently accessible via a new Seagull 'omics layer.

Large HABs occur annually in the **Laurentian Great Lakes**, particularly in the western basin of Lake Erie. HABs occur when certain types of algae or cyanobacteria grow rapidly in aquatic systems, often producing toxins that can harm aquatic life, ecosystems, and even pose risks to human health. **'Omics data** have become increasingly valuable in understanding and addressing issues related to these blooms.

The **'omics layer** provides access to abundance information for organism and toxin-biosynthesis genes, geographical information, and environmental and water quality information.

2.

Scan To Access Real Time Data

Seagull.glos.org
Seagull.app

Seagull | Observations and Data Analytics

129k
Engaged And Active Users

121k
US Users | Chicago Led With 21k

3,500 Users
Created Seagull accounts allowing for a personalized experiences and alerts.

In Season (May-October)

- **4M** page views
- **105k** total users
- Avgerage of **2.5k** users weekly
- Peak of **~11k weekly** in Aug. and Sept.
- Peak of **~3.7k** daily users in August

Off Season (Jan-April & Nov-Dec)

- **~27.5k** total users
- **460k** page views

230
Active Stations

60
New Datesets

99.9%
Uptime Maintained

70+
Seagull Data Contributors

320
Near Real Time Datastreams (archived or streaming)

Great Lakes Observations

Refurbishing Platforms And Adding New Observations

Over the past two years, several organizations around the Great Lakes were able to refurbish and/or add additional observing capacity. These upgrades and additions will help with our ability to **monitor coastal conditions and improve the resiliency of the observing system.**

Many observing platforms, such as buoys and meteorological towers, rely on instruments that have aged and, in some cases, have exceeded their operational life. Dedicated funding focused on **repairs and upgrades** allowed information to be provided more reliably and every tax dollar to be better leveraged.

Notable upgrades include brand new buoy superstructures, updated weather stations, temperature sensors, and water quality monitoring equipment, as well as improved data loggers and modems for better communication of data.

Examples of **new observing capabilities** include the first real-time Smartflux evaporation station on the Great Lakes, carbon dioxide sensors to expand the suite of water quality sensors in the regions, and cabled underwater observatories.

Enhancing Observing Systems For Targeted Great Lakes Insights

Some major **coastal hazard events**, such as meteotsunamis, are currently not well observed. GLOS is working with partners to help test technology in measuring and assessing these events, as well as developing a toolkit for community use.

Direct observations are valuable; integrating those observations into products that people already use amplifies that value. GLOS is working with regional modelers, forecasters, and product developers to add fit-for-purpose observations into the information ecosystem

In 2024, GLOS kicked off a community **ice thickness data project** to gather ice thickness measurements from ice anglers on the Great Lakes. These data will be used by regional modelers to validate and improve ice models.

Mapping The Great Lakes

Lakebed 2030

Since 2019, the **Lakebed 2030** initiative has grown from a grassroots effort to a network of organizations, multi-jurisdictional agencies, and individuals who recognize the importance to the economy and environment by having the remaining 85% of the Great Lakes lakefloor fully explored and mapped to modern standards and in high density.

In 2024, GLOS continued as a leader of the Lakebed 2030 initiative, and supported the Lakebed 2030 Conference in September. **The Lakebed 2030 initiative remains committed to comprehensive and high resolution underwater exploration for the entirety of the Great Lakes.**

Leadership

GLOS is at the heart of the Lakebed 2030 initiative. With government and academic partners (NOAA and Northwestern Michigan College), GLOS is helping to draft a **strategic plan** for the compilation of resources, data and support for complete, high density exploration of the lakefloor.

Convening a large working group of industry and multijurisdictional partners, GLOS will continue to provide leadership for this important initiative going forward.

Ahoy!

New Marine Geospatial Analyst

Mike Sutherland joined the GLOS team as the new **Marine Geospatial Analyst** in March of 2024 with the intent to advance the development of the visual portrayal of coverage of lakefloor data in the Great Lakes.

Mike also supports the geospatial practice at GLOS, building new data pathways between the public and private sectors to the federal government and supporting missions specific to search and discovery of wrecks in the Great Lakes.

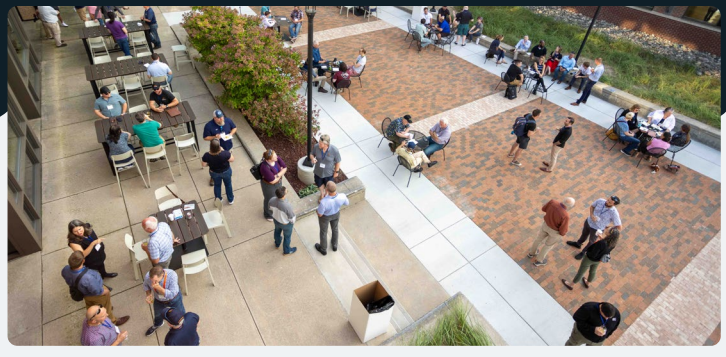
Public Outreach and Advocacy

GLOS contracted **Great Lakes Outreach Media** to produce a short video on the importance and potential impact of the Lakebed 2030 initiative. The final video was premiered at the **Lakebed 2030 Conference** in Traverse City, on September 17th and is now available on the the GLOS YouTube channel and **Lakebed 2030 website.**

Expanding Lakefloor Depth Data Volunteering

Also called **Crowdsourced Bathymetry** (CSB), GLOS initiated this project as a public/private partnership in 2021. Led by GLOS and contracted vendor Orange Force Marine, there are now over **2 dozen vessels outfitted with equipment and data transmission capabilities** for this type of depth data.

GLOS is looking to continue to expand this program with more vessels and increased data pipeline capabilities.



Understand Water Health

Discover Cultural Sites

Protect Homes + Infrastructure

The Great Lakes Mapping Act

Representatives Lisa McClain (MI, 9) and Debbie Dingell (MI, 6) introduced the **Great Lakes Mapping Act** to the United States Congress on January 17, 2024. The Great Lakes Mapping Act would direct the National Oceanic and Atmospheric Administration (NOAA) to conduct high-resolution mapping of the lakebeds of the Great Lakes. The bill would authorize **$200M** in appropriations and would require the agency to complete the mapping project by 2030. GLOS supported Congresswoman Lisa McClain's office with subject matter expertise to assist them with the drafting and review of the legislation text. As an extension of IOOS, GLOS was positioned as a coordinating body that would assist with mission coordination, planning, data harvesting, processing, product generation, and data sharing.

On March 21, 2024, the U.S. House Committee on Natural Resources, Subcommittee on Water, Wildlife and Fisheries held a congressional hearing to learn more about proposed legislation related to marine systems. The Great Lakes Mapping Act, H.R. 7020, was one of four bills being discussed. GLOS CEO Jennifer Boehme was called to testify on behalf of the mapping initiative community.

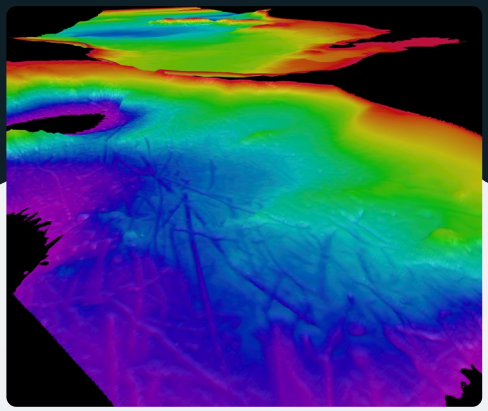
In her testimony, Jen highlighted the value of regional partnerships to support investment in mapping the Great Lakes. A complete mapping of the lakebed would increase understanding of the lakes' response to a variable climate, support Great Lakes jobs and economies, enable discoveries, both human and natural, and improve models of coastline erosion that impacts our Great Lakes communities.

Although the Act was introduced to Congress, no action was taken on it in 2024. It is expected to be reintroduced in 2025.

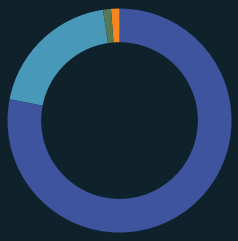
NCAR Missing Plane Search

Led by the **Smart Ships Coalition** and launched from Michigan Technological University in Houghton, MI, a large area search mission took place from September 9th-13th. The search was for a National Center for Atmospheric Research (NCAR) plane that went missing in 1968. The search of the area in Western Lake Superior doubled as a technology demonstration and mapping opportunity to showcase the capabilities of Automated Surface Vessels (ASV) in bathymetric surveys.

In addition to data intake and storage, post mission, GLOS streamed the event live from the crewed mission vessel. Despite the lack of affirmative discovery, the mission was a success, marking the first time such high-quality mapping with an ASV has been conducted in the Great Lakes region. Preliminary sonar data identified a number of targets, including a number of objects with a form factor that could suggest a vessel or large debris. GLOS continues to assess the data with other participating groups and may be broadcasting follow up target inspections come the spring of 2025.



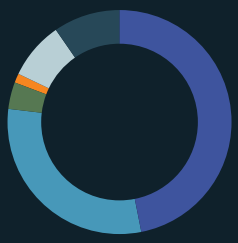
2024 GLOS Financials



Revenue:

- NOAA IOOS Core Program Fund $3,306,497 (78%)
- NOAA IOOS Bipartisan Infra. Bill Fund $861,609 (20%)
- In-kind Contributions $32,712 (1%)
- Other Income $22,435 (1%)

07.01.23 to 06.30.24
Program Revenue:
$4,235,808



Expenses:

- Grants and Contracts $1,909,441 (47%)
- Personnel $1,258,965 (30%)
- Office Operations $146,302 (4%)
- Travel and Meetings $48,599 (1%)
- Capital Equipment $328,887 (8%)
- Data Management $406,041 (10%)

Program Expenses:
$4,098,235

A Special Thanks To Our Supporters

We truly value and appreciate all those that donated in 2024 to help support our mission to observe, protect, and preserve the waters within the Great Lakes basin. You all are WHY we do it and HOW we are able to continue doing it.

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1. Photo of Outreach at National Museum of the Great Lakes by Ashley Streichert Lovejoy
2. Photo of Little Traverse Bay Buoy by Russ Miller
3. Photo of Lakebed 2030 Conference by Jacqueline Southby Photography

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IOOS Integrated Ocean Observing System

GLOS is one of the **11 regional associations** that make up the **Integrated Ocean Observing System**: ioos.noaa.gov

glos.org

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