



Established in 1974 in Ann Arbor, MI, NOAA's Great Lakes Environmental Research Laboratory (GLERL) conducts high-quality research and provides scientific leadership on important issues in both Great Lakes and marine coastal environments leading to new knowledge, tools, approaches, awareness and services.

The lab provides coastal constituents and Federal, state, and international decision- and policy-makers with scientific understanding of the sources, pathways, and effects of toxic contaminants; natural hazards such as severe waves, storm surges, and ice; ecosystems and foodweb interactions including threat and impact of aquatic invasive species; changes in lake water levels; and regional effects related to global climate change.

GLERL science helps protect life and property, economic well-being, and sustained ecosystem health of the Great Lakes and other U.S. coastal ecosystems. The Great Lakes are one fifth of the Earth's surface fresh water supply and 90% of U.S. surface quantities.

### For more Info:

#### GLERL Homepage

<http://www.glerl.noaa.gov/>

#### GLERL Research Programs

<http://www.glerl.noaa.gov/res/>

#### Brochures

<http://www.glerl.noaa.gov/pubs/brochures>

#### Real-time weather data

<http://www.glerl.noaa.gov/metdata/>

#### Marine Instrumentation Lab

<http://www.glerl.noaa.gov/pubs/brochures/mil/milprojects.pdf>  
<http://www.glerl.noaa.gov/mil/>

#### CoastWatch satellite data

<http://coastwatch.glerl.noaa.gov/>

#### Great Lakes Forecasting

<http://superior.eng.ohio-state.edu/>

#### National Center for Research on Aquatic Invasive Species

<http://www.glerl.noaa.gov/res/Programs/ncrais/>

#### Partnerships

<http://www.glerl.noaa.gov/par/>

#### Publications

<http://www.glerl.noaa.gov/pubs/>

#### About Our Lakes

<http://www.glerl.noaa.gov/pr/ourlakes/>

#### Photogallery

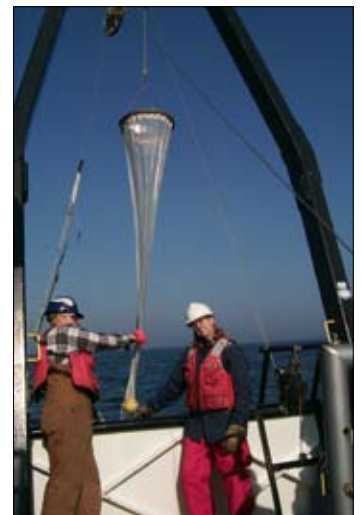
<http://www.glerl.noaa.gov/pubs/photogallery/>

### From an Ecosystem Focus to an Ecological Forecasting Capability

Since its inception, GLERL has been staffed with a wide array of scientific disciplines and expertise, enabling it to take a unique ecosystem research focus. This multidisciplinary approach has produced valuable insight into underlying physical, chemical, and biological processes in the lakes and how they affect ecosystem dynamics. In the future, the challenge is to build on such valuable knowledge and expertise and use lab, field, and modeling research to build new process-level models and novel forecasting tools. While GLERL has been highly successful at studying and explaining Great Lakes and coastal ecosystem dynamics, we feel that it's now time to take a bold step forward and develop the capability to predict where such ecosystems might be headed in the immediate and long-term. Such outlooks will give resource managers and policymakers an early warning on emerging changes and threats and allow them to take pre-emptive measures to protect ecosystem integrity, life and property, and economic well-being.

### Great Lakes Observing System - Toward a Basin-wide Real-time Capability

As GLERL moves toward development of new ecological forecast tools it is also working to develop a basin-wide Great Lakes Observing System featuring real-time, internet-accessible data on Great Lakes physics, chemistry, and biology. This system will be integrated with existing CoastWatch and monitoring and assessment programs. These expanded databases will enable GLERL scientists to develop and test more detailed ecological forecast models, leading to more accurate and reliable predictions.



## GLERL Research

- Identify sources, pathways, and fate of toxic contaminants as they are cycled through aquatic ecosystems.
- Observe, explain, and predict the natural forces driving waves, currents, storm surges, seiches and related physical phenomena.
- Explain and predict changes in water resources, lake water levels, and flows.
- Document, understand, and predict the distribution and extent of ice on the lakes over winter.
- Develop remote sensing programs such as CoastWatch, which downloads imagery from NOAA environmental satellites and makes such data available to a diverse user community.
- Use acoustical (sonar-based) methods and bioenergetics models to study fish populations and production.
- Produce high-resolution mapping (bathymetry) of lake bottom regions.
- Develop and apply radioisotope techniques to chronicle historical changes in Great Lakes and coastal sediments.
- Support and promote education and training of next-generation Great Lakes scientists.
- Monitor, understand, and predict changes in abundances and structure of aquatic plant and animal communities.
- Track the spread of invasive (exotic) species and determine their impact on Great Lakes and coastal ecosystem health.
- Observe, describe and understand the role of episodic events and their impact on physical, chemical and biological processes.
- Collect and build long-term databases of physical, chemical, and biological information with an integrated Great Lakes Observing System.
- Provide scientific expertise, advice, reviews and recommendations.
- Examine the potential impact of climate and global change on Great Lakes water quantity and quality.
- Investigate nearshore hydrodynamic processes affecting protection of health, life, property, and environmental quality.
- Study how changes in Great Lakes foodwebs affect nutrient cycling and ecosystem production.



## Types of Forecasts that Form the Core of GLERL's Work

- Offshore Wave Heights & Currents
- Coastal Erosion
- Rip Currents
- Nearshore Wave Heights & Condition
- Ice Thickness & Extent
- Fog
- Spill/Search & Rescue
- Storm Surge
- Temperature
- Lake Water Levels
- Tributary Flows (floods)
- Water Turbidity/Clarity
- Water Taste & Odor
- Near Shore Vegetation
- Bacteria Concentrations
- Chemical Concentrations
- Beach Closings (bacteria)
- Fish Contaminants
- Harmful Algal Blooms (toxin concentrations)
- Fish Size, Condition & Distribution
- Wetlands Extent
- New Non-Native Species Introductions



## What's Ahead?

For 30 years GLERL has faced many exciting challenges, and will continue to rely on a diverse and rich collection of partnerships to reach goals. As we embark on our effort to develop new forecast tools, we need to make sure that these resources will be sought out and readily used by our constituents. That means that we need to be fully tuned in to their needs at start-up of the development process. For example, in 2001, GLERL, working with the Great Lakes Sea Grant Network and National Program successfully established a GLERL-based Sea Grant Extension Agent position with the role of strengthening communication and coordination between GLERL and the seven Great Lakes Sea Grant programs. Through this new partnership, GLERL scientific products, services, and expertise are now becoming more available to constituents via Sea Grant's extensive outreach infrastructure. At the same time, Sea Grant Extension Agents based in communities across the Great Lakes region, have provided GLERL with valuable input on needs of constituents, allowing the lab to plan and adjust its research to meet such needs. An Ecological Forecasting Workshop organized by Sea Grant has provided useful feedback from constituents on what sort of forecast information would be most valuable.

**For further information or to order additional materials, visit our website or contact:**

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