



# Great Lakes Environmental Research Laboratory

## *Stewards of the Great Lakes*



The Great Lakes are one fifth of the world's surface fresh water supply and 95% of U.S. quantities. Intelligent care of these resources is vital to the Nation's sustained economic and environmental well being.



Declining Lake Michigan water levels to near-record lows during 1999-2003 have led to widening beaches, while at the same time creating costly problems for commercial shipping, recreational boating and marinas.



Storm-driven high waves and currents in Great Lakes coastal areas pose threats to life and property and require the risk and damage to reduce the risk and damage of such hazards.

### What does the Great Lakes Environmental Research Laboratory do for the Nation?

Great Lakes Environmental Research Laboratory (GLERL) science helps protect life and property, economic well-being, and sustain the ecosystem health of the Great Lakes and other U.S. coastal ecosystems. GLERL provides coastal constituents and Federal, State and international decision and policy makers with scientific understanding of the sources, pathways, fates, and effects of toxicants; natural hazards such as severe waves, storm surges, and ice; ecosystems and their interactions, including the threat and impact of invasive species (e.g. zebra mussels); changes in water levels of the Great Lakes; and regional effects related to global climate change. GLERL's research is mandated by 12 Federal statutes, one Executive Order, and the U.S.- Canada Great Lakes Water Quality Agreement.

GLERL's mission is to "conduct 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." Key research activities include:

- Explaining and predicting changes in water resources, lake water levels, and ice cover.
- Examining measures to prevent introduction of aquatic invasive species (AIS) and determining their impact on Great Lakes and coastal ecosystem health.
- Identifying sources, pathways, and fate of toxic contaminants and nutrients as they are cycled through food webs in aquatic ecosystems.
- Examining the potential impact of climate and global change Great Lakes water quantity and quality.
- Investigating nearshore hydrodynamic processes affecting protection of health, life, property and environmental quality.

### Recent Accomplishments:

- NOAA has established a new GLERL-based National Center for Research on Aquatic Invasive Species. ***Payoffs: Allows NOAA to more effectively organize and coordinate its aquatic invasive species research efforts while ensuring that resources are focused on priority problems nationwide.***
- Completion of Episodic Events Great Lakes Experiment (EEGLE) - ***Payoffs: This 5-year study provided the most comprehensive insight ever on how Lake Michigan episodic events (spring storms) affect lake currents and circulation, the transport and transformation of biogeochemically important substances and their ecological consequences particularly regarding the cycling of nutrients and toxic contaminants.***

1315 East West  
Highway  
Silver Spring, MD 20910  
(301) 713-1671  
[www.oar.noaa.gov](http://www.oar.noaa.gov)

- Establishment of operational fully implemented workstation-based version of the Great Lakes Coastal Forecast System. **Payoffs: Lake wave and circulation forecasts are now available to NWS forecasters at their workstations. GLCFS was the prototype for development elsewhere. The GLCFS will benefit water supply and wastewater management, power plant sitings, shipping, recreational and commercial boating and fishing, identifying areas of potential shoreline erosion and redistribution of sedimentary material.**
- Research on disappearance of Diporeia and effects on Great Lakes fishes - Diporeia is an historically dominant benthic invertebrate in the upper Great Lakes and keystone component of a food web supporting important commercial and sportfish stocks. **Payoffs: Knowledge of the extent, outlook, and possible causes of Diporeia's decline is critical for developing sound management strategies to ensure sustainable Great Lakes fisheries.**

## What's next for GLERL?

**Expand Ecosystem Forecasting Capabilities** - Over its 30-year history, GLERL's ecosystem focus and multidisciplinary approach toward understanding Great Lakes physical, chemical, and biological processes have produced unique scientific products and long-term observations. In the future, this valuable knowledge and expertise, coupled with laboratory, field and modeling research will provide for development of new process-level ecological models and novel forecasting tools, and resultant societal and economic benefits that they will provide. As part of its effort to design and create reliable and accurate ecological forecasting capabilities, GLERL has consolidated its research activities within four components:

- **Physical Environment Prediction** - nearshore and open-lake hydrodynamics, water resources research, climate change and variability, episodic events research;
- **Ecological Prediction** - foodweb dynamics, long-term examination of specific foodweb components or habitat, application of knowledge to understand/predict causes, effects, and solutions to problems such as eutrophication, toxic contaminants, invasive species and habitat modification;
- **Aquatic Invasive Species** - research addressing prevention of AIS introduction, research to evaluate/understand biology and ecological impact of AIS;
- **Great Lakes Observing System** - integrated long-term monitoring and assessment, Great Lake Coastwatch, Integrated Great Lakes Coastal Observing System.

## Research Partnerships:

The Cooperative Institute for Limnology and Ecosystems Research (CILER) is NOAA's only Joint/Cooperative Institute dedicated to freshwater research. Established in 1989, CILER promotes collaborative research between GLERL, the University of Michigan, Michigan State University and other academic institutions throughout the Great Lakes Basin.

The Cooperative Institute for Climate and Ocean Research (CICOR), established in 1999 works with the NOAA laboratories and the Woods Hole Oceanographic Institution. CICOR research focuses on coastal ocean and nearshore processes, the ocean's role in climate and climatic variability, and marine ecosystem processes. GLERL is the host NOAA institution.

Additionally, through partnerships, GLERL conducts collaborative research with a wide array of over 150 research institutions at the state, regional, national and international levels.

## Budget and Staff

The FY 2003 enacted budget for the GLERL budget lines totaled \$8.4M, and its request for FY 2004 totaled \$8.9M. GLERL has 54 federal employees, 1 contractor, and 20 Joint Institute employees.



**For more information, contact:**  
**Dr. Stephen Brandt, Director**  
 Great Lakes Environmental Research Laboratory  
 2205 Commonwealth Blvd  
 Ann Arbor, MI 48105-2945  
 Phone: (734)741-2244  
<http://www.glerl.noaa.gov>