



## NOAA's Great Lakes Environmental Research Laboratory (GLERL)

Information Sheet  
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GLERL is a fact-finding and fact-interpretation agency that provides coastal and Great Lakes environmental information and develops management and information tools in support of State and Federal resource managers and regulatory agencies. GLERL represents and carries out, in the Great Lakes and other coastal areas, NOAA's *Environmental Assessment and Prediction* and *Environmental Stewardship* missions to *conserve and manage wisely the Nation's coastal and marine resources, and to describe and predict changes in the Earth's environment to ensure sustainable economic opportunities.*

- GLERL's broad spectrum of research expertise under one roof is unique in the Great Lakes. Many Great Lakes science programs were shut down or scaled-back during the 1980s, with loss of over 500 scientific and technical staff, many of whom left the area. Investment in GLERL over the last 21 years has produced a world-class level of expertise that cannot be readily duplicated by any other Great Lakes institution or easily rebuilt if lost. For example, GLERL is the only U.S. research laboratory in the Great Lakes with the staff and equipment to make extensive physical limnological measurements, and which has the capability to examine physical phenomena, such as currents, ice cover, water levels, in concert with biogeochemical/ecosystem and water quality studies.
- GLERL helps the Federal government meet its scientific, ecosystem-understanding, and management responsibilities under the Great Lakes Water Quality Agreement with Canada. Federal oversight is required in the Great Lakes because they span eight states, two provinces, and contain a 1000 mile international border.
- GLERL's does not have a regulatory mission; it develops and provides scientific information and scientific expertise that assist regulatory agencies in making better, more informed, decisions in response to environmental issues. GLERL is one of only two non-regulatory Federal lake/coastal-waters-related environmental research labs in the Great Lakes basin (EPA labs primarily support EPA's regulatory mission, the National Biological Service-Great Lakes Science Center, which is the other non-regulatory Federal lab, performs research which is generally focused on fish, and it doesn't have the physical and biogeochemical capabilities provided by GLERL; USGS labs in the Great Lakes primarily focus on tributaries and ground water, not the lakes).
- Academic research projects are typically of short-duration - a few years at most, and are often single-investigator/single-discipline. GLERL's multidisciplinary research capability provides integrated expertise, experience, and data that contribute to a greater and more skilled understanding of the ecosystem and the environmental processes important to regulatory considerations. Information generated by GLERL is a significant part of the information base upon which regulatory agencies at the state and Federal level identify priority activities and make informed decisions.

GLERL's research activities relate directly to primary coastal ecosystem and environmental issues, such as protection of life and property, water quantity and quality, contaminated sediments, and ecosystem impacts of human activities and nonindigenous species. For example:

- GLERL's field measurements and environmental models continue to improve on our understanding of the role of contaminants stored in sediments. For example, there is presently about 10 times as much PCB entering the water column by resuspension of sediments in Lake Michigan as enters Lake Michigan from all other sources. Understanding and incorporating this type of information into predictions on which regulatory actions will be taken is essential if such regulations are to make sense and be effective. GLERL provides scientific leadership, and GLERL scientists are continually sought by academic colleagues and other Federal agencies for their expertise in this area.
- GLERL developed and continues to improve the rainfall/runoff models for all 121 Great Lakes watersheds and the lake thermodynamics models for all 7 Great Lakes basin water bodies that are used for forecasting and simulation of climate effects, and as tools for testing various management options and land-use alternatives.

GLERL work has influenced regulators NOT to increase regulation — (over)

- GLERL's nutrient dynamics and modeling work contributed to saving over \$10 billion dollars of ineffective additional sewage treatment (note: at the present GLERL appropriation of ~\$6M per year, these savings are equivalent to over 1000 years of GLERL funding).
- Cargo sweeping on the Great Lakes....GLERL's expertise and research related to contaminated sediments were key to the findings and recommendations of a scientific panel (also led by GLERL scientists) that the Coast Guard relax their proposed regulations, thus saving the shipping industry millions of dollars in lost time and additional costs.

### GLERL's work has contributed to minimizing loss of life and damage to property —

- GLERL built and continues to improve hydrologic and water resources forecast and lake levels prediction models for the entire Great Lakes hydrologic system in support of lake-level regulation responsibilities of the International Joint Commission and the US Army Corps of Engineers. This enables better regulation for protection of riparian property, navigation, water supplies, recreation, and hydroelectric power generation.
- Our PATHFINDER model for oil/chemical spill trajectory is used operationally on the Great Lakes by NOAA HAZMAT, and by Coast Guard to help guide search and rescue operations.
- Our Great Lakes seiche model allows local emergency preparedness units to predict and provide advanced warning of high water due to storm surges.
- The Great Lakes Wave Model developed at GLERL is used operationally on the Great Lakes by the National Weather Service. This model improved the accuracy of wind-wave forecasts, thus increasing recreational boater safety and decreasing potential for recreational boater loss of life.
- A prototype Great Lakes Coastal Forecast System, representing the next generation of physical environmental models after those noted above, was developed for Lake Erie and is scheduled to become operational at the National Weather Service in FY96. Future work is planned to extend this system to the other lakes.

### GLERL research products directly and indirectly support private industry and shoreline communities —

- Products from GLERL's long-term Great Lakes ice data base are used by the National Weather Service to make long-range operational forecasts of freeze-up and ice cover that affects the winter navigation/shipping season, the design of water intakes and shoreline facilities; this data set is scheduled to be updated and revised over the next few years.
- Daily surface water temperature maps for the Great Lakes, made available through GLERL's CoastWatch node and distributed via Sea Grant Outreach Services, are used extensively by Great Lakes fishers to locate prime fishing areas.
- GLERL's intensive Nearshore Hydrodynamics Program for Milwaukee Harbor will contribute to the prevention of future outbreaks of drinking water contamination and mass illness (over 400,000 people affected), as occurred in 1993. Future projects like this will not be possible if the physical processes expertise now available at GLERL is lost from the Great Lakes community.
- Our five-year program to examine the ecosystem effects of zebra mussels in Saginaw Bay also provides scientific data and information needed by the State of Michigan and the USEPA in relationship to the Saginaw River/Bay Area of Concern and the Saginaw Bay National Watershed Initiative.

### GLERL's research expertise has broad application and contributes to solutions to coastal problems nationwide —

- Several GLERL senior scientists were specifically sought-out for their expertise on coastal nutrient and biogeochemical processes, to work jointly with academic and other NOAA scientists on the problem of hypoxia (low oxygen) in the waters off the coast of Louisiana (Nutrient Enhanced Coastal Ocean Productivity Program).
- GLERL scientists are working with State (Florida), other Federal, and academic scientists on the problems in Florida Bay and the Everglades stemming from modifications and diversions of the natural fresh water system in that area.
- GLERL scientists have been sought out to participate in research on the ecosystems and environmental problems of Lake Champlain, Puget Sound, Chesapeake Bay, the South Atlantic Bight, and the coastal waters of southern California.