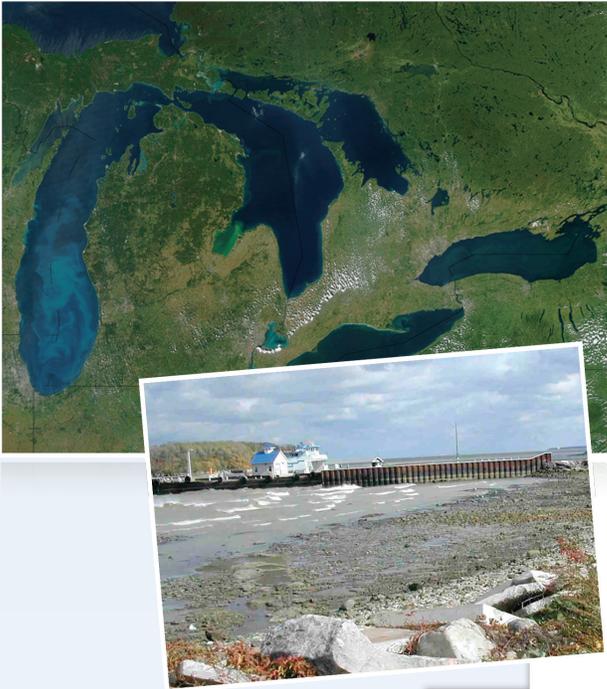


## Safe and Prosperous Transport: Water Level Prediction in the Great Lakes



**Changes in water level have an impact on the shipping industry. For every inch that the water level drops, 270 tons less in cargo can be shipped for a 1,000-foot-long ship. The port authority also loses revenue as a result.**

When low water levels prevail in the Great Lakes, commercial navigation, recreational boating, marinas, beaches, fishing, homeowners, and the aquatic ecosystem are adversely affected. In 2000, during a low level period, lake carriers transporting iron ore, coal, grain, and other commodities were forced to “light load,” carrying 5-8 percent fewer goods. Also, marinas spent millions to dredge boat slips, channels, and harbors.

***Impacts***  
**Enhancing economic value and keeping ships and cargo moving through safe port-to-port transport**

Addressing a need for Great Lakes’ water level prediction, OAR’s Great Lakes Environmental Research Laboratory (GLERL) developed the Great Lakes Operational Forecast System. Deemed operational in 2005, the system provides lake carriers, mariners, port managers, emergency response teams and recreational boaters with present and future conditions of water levels, currents and water temperatures.

The Great Lakes Operational Forecasting System combines two NOAA products: “nowcasts” for present conditions and “forecast” guidance for future conditions. Both use information generated by a three-dimensional hydrodynamic model that uses real-time data for winds and other meteorological parameters to predict water levels, currents and temperatures at thousands of locations throughout the five lakes. Key products include data plots and animated map plots of water levels, currents, and temperatures. “Nowcast” conditions are updated hourly, while 30-hour forecasts are produced four times daily.

The transition of the Great Lakes prediction system to operations at NOAA’s National Ocean Service was a joint effort between OAR’s GLERL, National Ocean Service, private industry (Aqualinks.com), and academia (Ohio State University).

*Images, top to bottom: The Great Lakes; low water levels on the Great Lakes can significantly impact shipping and commerce.*

## ECONOMIC VITALITY

# Alternative Energy: Harvesting the Ocean's Potential

### *Impacts* Exploring the ocean for alternative energy to strengthen U.S. energy security

One way to reduce carbon emissions is to replace carbon-based fuels with an alternative energy source. OAR's Sea Grant Program is putting a menu of possibilities on the table.

At Oregon State University, Sea Grant engineering researchers have been developing wave energy extraction devices for the past two years with funding from NOAA and the National

Science Foundation (NSF). They have created prototypes for three types of buoys for generating electricity from wave energy and have scoped out a site for a pilot wave power plant.

Researchers also are exploring use of a wave energy device currently used off the coast of Scotland. Deployed off Oregon's coast, researchers predict that 200 buoys could potentially power something comparable to the demands of Portland's business district. Oregon State Sea Grant researchers are not alone in considering energy harvested from the ocean. Other coastal states, including Washington, Hawaii, California, Massachusetts, Rhode Island, and Maine, also are exploring ocean energy technologies.

In the mid-Atlantic, Delaware Sea Grant completed a survey looking at Delaware residents' opinions on offshore wind power. Ninety percent of the 949 residents surveyed favor placing wind turbines as high as 40 stories off the Delaware coast, even if their electric bills increased up to \$30 per month. The survey reflects OAR's support for social science research to improve our understanding of the true impact of NOAA research on human lives.

### *About Sea Grant...*

OAR administers the National Sea Grant College Program, a nationwide network of 32 university-based programs that conduct scientific research, education, training, and extension projects designed to foster science-based decisions about the use and conservation of our aquatic resources.

*Image: Oregon Sea Grant supports new wave energy research at Oregon State University.*

One only needs to watch the rhythmic rolling of ocean waves to see their potential as an energy source. The density of ocean water—about 1,000 times that of wind—also is significant to its potential for generating electricity.

