The National Oceanic and Atmospheric Administration (NOAA) provides expertise on Great Lakes issues to coastal constituents and federal, state, and international decision and policy makers. Through its participation in several regional programs—including the Great Lakes Restoration Initiative (GLRI) and the Great Lakes Water Quality Agreement (GLWQA)—NOAA transforms mission-directed research into products and services that people use every day, and helps address the following Great Lakes issues.

**Harmful Algal Blooms (HABs)**
HABs can develop due to degrading water quality and increased water temperatures, leading to unsafe conditions for humans and aquatic life. NOAA research on the formation, extent, duration and toxicity of HABs is used to create products that help the public make informed decisions, such as how to manage drinking water plants or when to go to the beach. Throughout July-October, the Lake Erie HAB Forecast is updated twice-weekly and provides information on the current extent and trajectory of HABs. An animation is produced showing a 5-day forecast of bloom extent, intensity, and movement. Toxin concentrations are available in near realtime from the Environmental Sample Processor (ESP) network. This 'lab in a can' technology autonomously collects and analyzes water samples and sends data back to shore. These real-time predictions can provide water intake managers, anglers, boaters, and beach users timely information for decision-making. Weekly monitoring throughout the western basin of Lake Erie provides essential data for forecasts and provides stakeholders with a snapshot of HAB conditions as they develop.

**Habitat Restoration**
Since 2007, NOAA has awarded over $165 million through the Great Lakes Restoration Initiative (GLRI) to improve fish passage, clean up marine debris and associated contaminants, restore coastal wetlands, and remove invasive species. With more than 110 Great Lakes restoration projects, NOAA has restored over 5,100 acres of habitat for fish and wildlife, removed over 309,000 metric tons of waste and demolition material, and opened over 760 stream miles of river for fish passage.

**Water Levels**
NOAA plays a major role in researching, monitoring, and forecasting water levels in the Great Lakes and prioritizes making water level data and products publicly available. National Weather Service offices throughout the region provide critical warnings to the public in the event of river and lakeshore flooding. A series of cutting edge water level gauges throughout the Great Lakes allow for continuous monitoring of water level fluctuations in real time. NOAA's ongoing research facilitates the development of Great Lakes hydrodynamic models, which produce short-term forecasts of water level changes.

**Aquatic Invasive Species**
From Invasive carps to zebra and quagga mussels, NOAA manages the Great Lakes Aquatic Nuisance Species Information System, conducts research on growth and spread of invasive mussels and works collaboratively with federal, state, tribal and municipal partners to provide modeled information on the impact of Invasive carps if they were to become established in the Great Lakes.

**Climate Resiliency**
NOAA recognizes the importance of preparing communities and economies for disturbances in ecosystems and changes to natural resource production in a changing climate. The agency’s role includes predicting conditions, supporting planning, promoting green infrastructure, and connecting partners with data, tools and technical assistance, in addition to preparing for unexpected natural and man-made hazards—both directly and in partnership with Keystone partners, such as the state coastal zone management programs.

**Vessels**
NOAA provides a fleet of 15 small research vessels that operate throughout the Great Lakes to engage in science and promote stewardship. These vessels range from 23-80 feet in length. NOAA's Great Lakes Environmental Research Laboratory (GLERL) Lake Michigan Field Station in Muskegon, Mich.,serves as home port, with vessels also located in Alpena, MI, Monroe, MI, Cleveland, OH and Superior, WI.