



# Water Levels of the Great Lakes

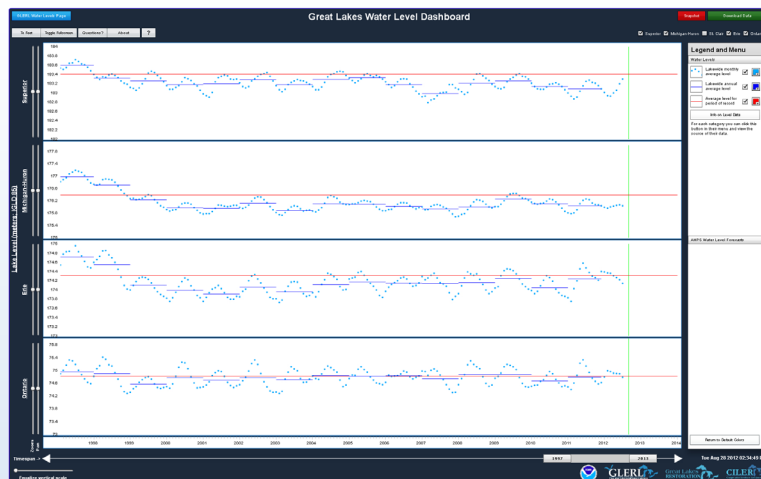
September 2012

The Great Lakes, their connecting waterways, and their watersheds, comprise the largest surface freshwater system on the planet. The monthly, seasonal, and annual surface water elevations of the lakes fluctuate in response to a variety of factors. This brochure provides a brief overview of those historical patterns and current water levels, as well as NOAA, Great Lakes Environmental Research Laboratory's (GLERL) seasonal research-based water level forecasts. This brochure also describes a new web-based tool for examining Great Lakes water level data and forecasts across a variety of time scales.

## A NEW Interactive Tool for Great Lakes Water Levels

With support from EPA (through the Great Lakes Restoration Initiative), NOAA-GLERL recently developed an interactive web-based tool that facilitates the viewing and analysis of monthly and annual lakewide average water level data and forecasts. The tool is intended to improve public understanding of natural Great Lakes water level variability and the inherent uncertainty in model-based water level forecasts.

Future iterations of the dashboard will include additional data products such as hydroclimate data (precipitation, evaporation, runoff, net basin supplies), paleological water level data, long term water level forecast projections from climate model studies, and ice cover data.



## Great Lakes Water Level Dashboard

<http://www.glerl.noaa.gov/data/now/wlevels/dbd/>



## How are water levels predicted?

Forecasts of Great Lakes water levels are typically based on computer simulation models. One example is the Great Lakes Advanced Hydrologic Prediction System (AHPS), run by GLERL, which combines historical meteorological data with a series of mathematical models and climate forecasts from NOAA's Climate Prediction Center (CPC) to simulate multiple variables. The most important variables are overlake precipitation, overlake evaporation, and rainfall-induced runoff. The sum of these variables (also referred to as the "net" supply of water to the basin) is routed through the lakes and their interconnecting channels using models that reflect flow patterns in those channels and the regulation rules that guide operation of water level control infrastructure.

### FOR MORE INFORMATION

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#### GLERL Homepage

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

#### Real-time Weather Data

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

#### Great Lakes Web Cams

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

#### CoastWatch Satellite Data

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

#### Great Lakes Coastal Forecasting

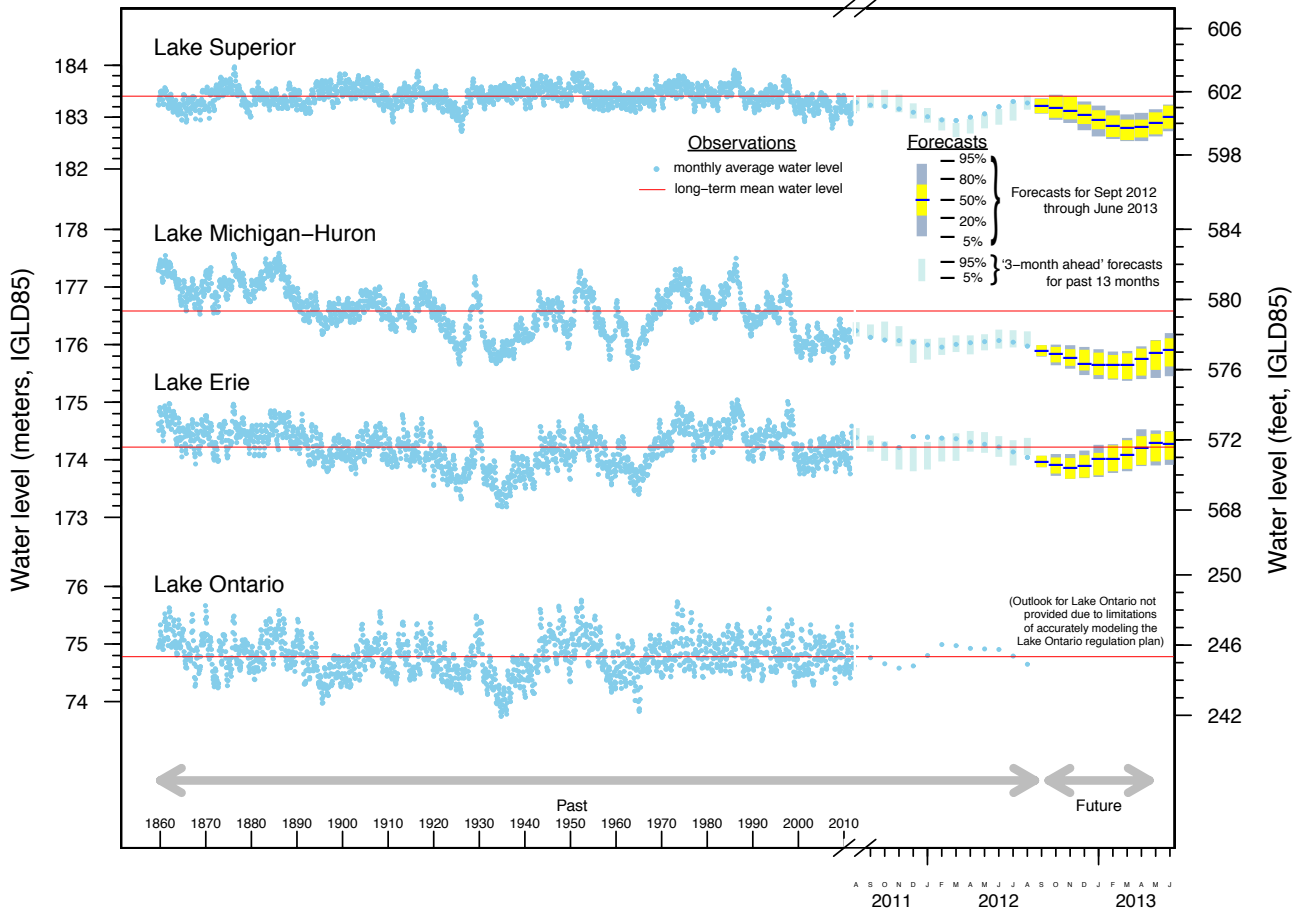
<http://www.glerl.noaa.gov/res/glcfs/>



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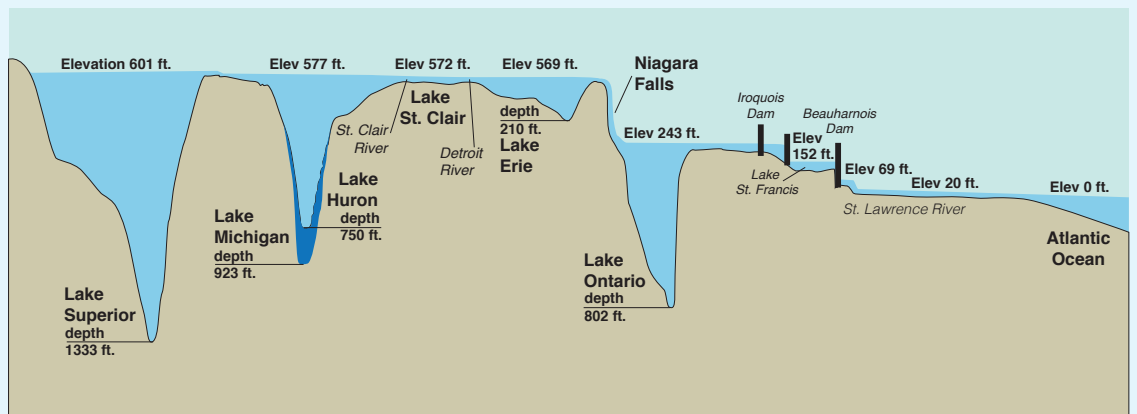
# The Current Outlook for Great Lakes levels

The outlook generated by GLERL's AHPS on September 17th indicates that Lakes Superior and Michigan-Huron are expected to remain below the long-term mean. Lake Erie, which has declined consistently since December 2011, is now more than a foot below its late summer 2011 level. The uncertainty expressed in the forecasts shown here is based on observed weather patterns and Great Lakes water levels from 1948 to present, along with NOAA Climate Prediction Center's regional forecasts. The 5 and 95% bands, for example, are expected to contain the observed water level 90% of the time (<http://www.glerl.noaa.gov/wr/ahps/curfcst/curfcst.html>).



## GREAT LAKES SYSTEM PROFILE

The Great Lakes, their respective watersheds and waterways, and the ocean are all connected. Within the Great Lakes system, water flows from Lake Superior via the St. Marys River into Lake Huron. Lakes Michigan and Huron are joined at the Straits of Mackinac, which allows these two lakes to act as one hydrologic system. The upper lakes meet the lower lakes at the Huron-Erie corridor, which is comprised of the St. Clair River, Lake St. Clair, and the Detroit River. Lake Erie flows over Niagara Falls and into Lake Ontario before flowing through the St. Lawrence River into the Atlantic Ocean.



## What is IGLD85?

IGLD85 refers to the International Great Lakes Datum, an elevation benchmark (reference point) against which all water level gauging stations in the Great Lakes are compared. This reference point was last established in 1985. It is important because the land surface around the Great Lakes is constantly changing in elevation due to the 'bounce back' of the earth's crust following the retreat of the glaciers during the last ice age (also referred to as isostatic rebound).