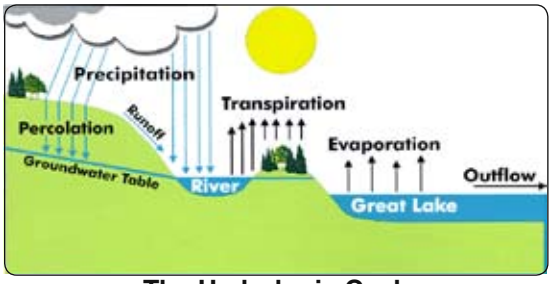
Water Levels of the Great Lakes

Great Lakes water levels have fluctuated throughout their historical record. Levels of Lakes Michigan and Huron, for example, reached record highs in both 1886 and 1986. Lakes Michigan and Huron's record low water levels coincided with climatic events such as the Dust Bowl of the 1930's, a multi-continental severe drought of 1964 (which is the record low for the two lakes), and the most recent and strongest El Niño on record of 1997.

Why Do Lake Levels Fluctuate?

Great Lakes water levels respond to changes in their water supplies, including precipitation falling on the lakes, the runoff from their tributaries' watershed, and evaporation from the lakes' surfaces. The primary driving forces are precipitation and evaporation. Lower precipitation, leads to lower runoff from the basin; similarly, higher evaporation draws water from the lakes causing levels to decline.



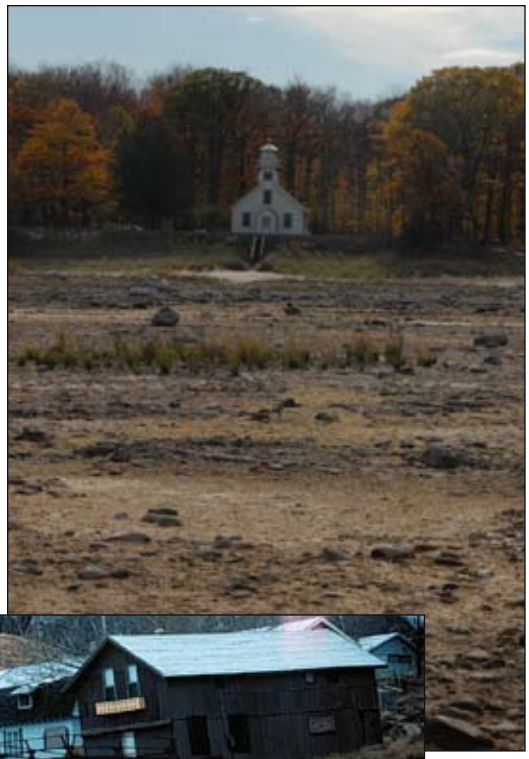
Source: *Living with the Lakes,* U.S. Army Corps of Engineers; Great Lakes Commission, 1999.

The Hydrologic Cycle

Who is Affected by Fluctuating Lake Levels?

Record high water levels of 1986 affected many residents and business located both along the rivers that provide water to the lakes and the lakes' shoreline. In 1986, the Tittabawassee River basin, which eventually empties into Lake Huron, endured an extraordinary amount of rainfall in a short period of time (up to 14 inches in 12 hours) resulting in flooding. Heavy river flooding does not only cause property damage to businesses and residents, but water that runs off the land carries pesticides and nutrients with it. The quality of the runoff water may affect the riverine and lakeshore ecosystems.

Water levels during the recent low episode (1998–2004) affected many interests, including commercial navigation, recreational boating, marinas, beaches, fishing, cottage and homeowners, and the aquatic ecosystem. For example, in the year 2000 the Lake Carriers that transport iron ore, coal, grain, and other raw cargoes were forced into "light-loading," carrying 5-8 percent less goods, sending prices higher. Additionally, marinas spent millions to dredge boat slips, channels, and harbors along Great Lakes coasts. Nuclear and hydropower plants that use Great Lakes water for cooling and energy generation, respectively, either spent millions of dollars to relocate their cooling pipes or didn't generate enough power to meet customers demands.



Low lake levels at Old Mission Point lighthouse, Grand Traverse Bay, Lake Michigan in October 2007.

High lake levels on Lake Michigan in 1986 caused severe erosion.

What are the Present Conditions?

The Great Lakes region has experienced a different climatic regime for the past decade (1997-2007). Along with increasing air temperatures and evaporation, the lakes suffered from decreasing precipitation and ice cover. This decadal change in the hydrologic cycle resulted in decreasing water levels; with Lake Superior, particularly, setting a new record low level for September 2007 and Lakes Michigan and Huron close to their record low in December 2007.

The following four graphs show annually averaged water levels; they are updated through 2008. At present, Lake Superior is 9 inches below average and Lakes Michigan and Huron are 15 inches below average. Lake Erie is 1 inch below average, and Lake Ontario in 1 inch above average.

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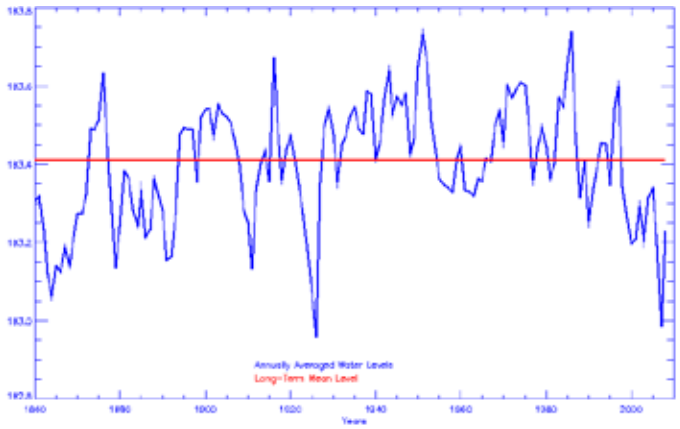
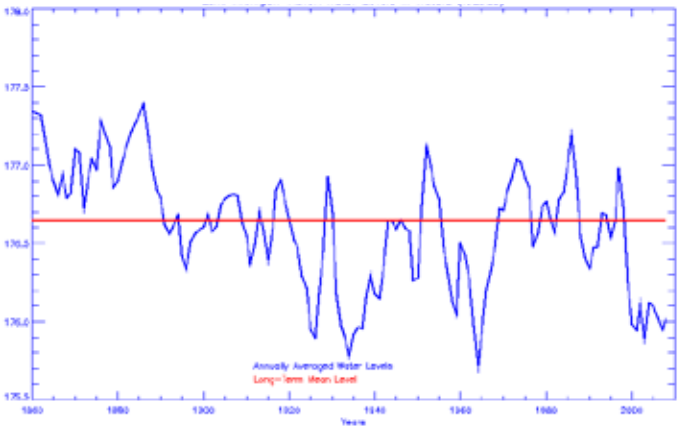
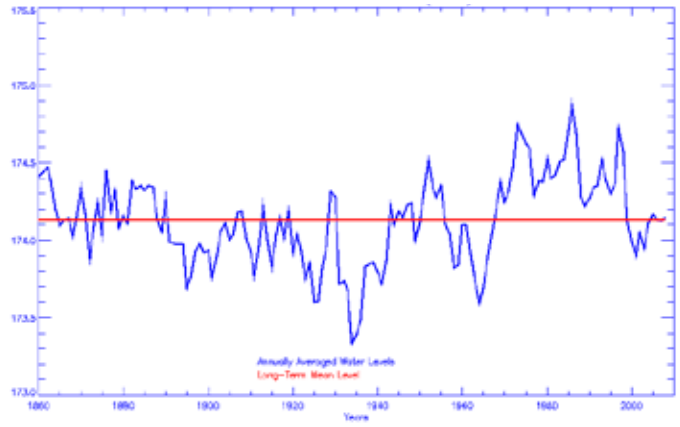
Lake Superior Water Levels in Meters (IGLD85)



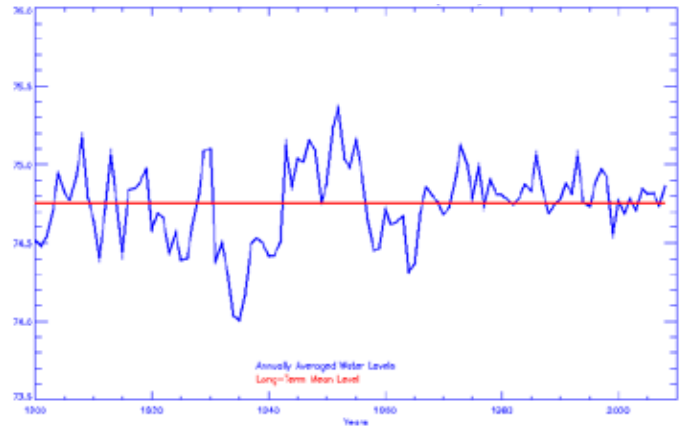
Lake Michigan-Huron Water Levels in Meters (IGLD85)



Lake Erie Water Levels in Meters (IGLD85)



Lake Ontario Water Levels in Meters (IGLD85)

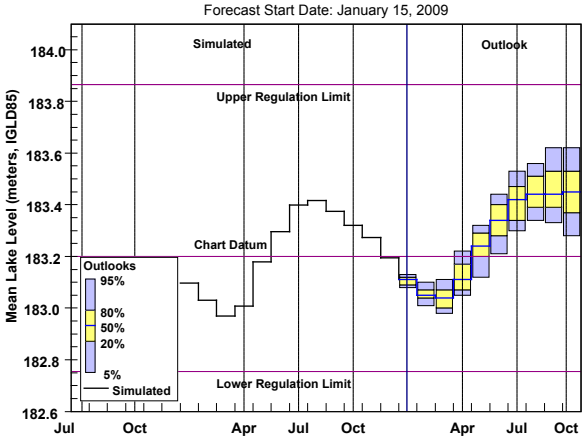


What is the Outlook?

GLERL has the ability to make outlooks for the probability of various ranges of water supply and lake levels 1-12 months into the future based on present basin hydrological conditions combined with seasonal-to-annual-scale climate outlooks produced by NOAA and Environment Canada. La Niña conditions strengthened in late 2008; if they persist, there is a greater likelihood of high temperatures and increased precipitation for the Great Lakes basin. As a result, annual mean lake levels for 2009 will be at or slightly below the levels of 2008.

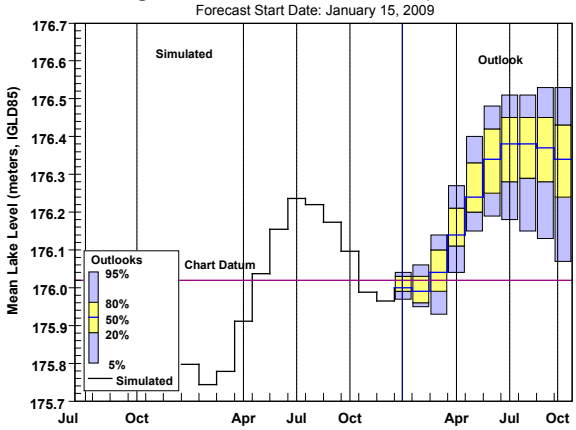
Lake Superior Mean Lake Level (meters, IGLD85)

Forecast Start Date: January 15, 2009



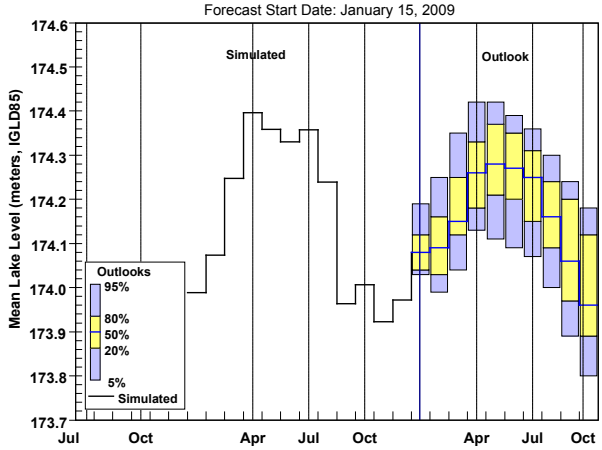
Lake Michigan-Huron Mean Lake Level (meters, IGLD85)

Forecast Start Date: January 15, 2009



Lake Erie Mean Lake Level (meters, IGLD85)

Forecast Start Date: January 15, 2009



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