

Water Levels of the Great Lakes



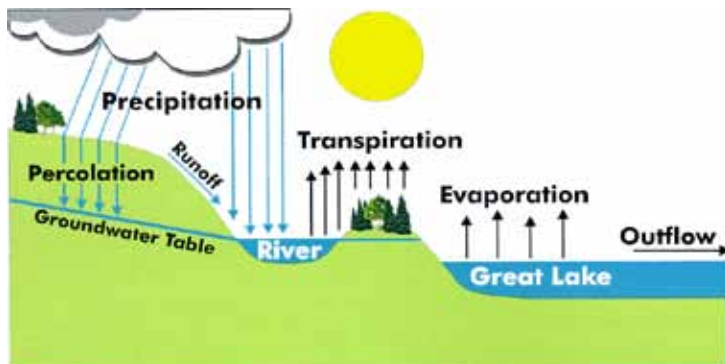
Water levels have fluctuated throughout the history of the Great Lakes. Research has indicated that several thousand years ago water levels became so low that the lakes were no longer interconnected as they are currently. More recently, record low levels coincided with the dust bowl years of the 1930s and a severe drought in 1964. The lakes experienced extremely high levels in 1986 and since that time levels have generally been declining. This decline has been a concern because lower water levels are consistent with most global climate change forecasts.

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



Why Do Lake Levels Fluctuate?

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



The Hydrologic Cycle

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

Who is Affected by Changing Lake Levels?

Record high water levels of 1986 affected many residents and businesses located along the rivers that provide water to the lakes and along the shoreline of the lakes themselves. 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 not only causes property damage to businesses and residents, but water that runs off the land carries pesticides and nutrients with it. Water quality of the runoff water may affect the riverine and lakeshore ecosystems.

Water levels during the recent low episode (1997–2007) affected many interests, including commercial navigation, recreational



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

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.

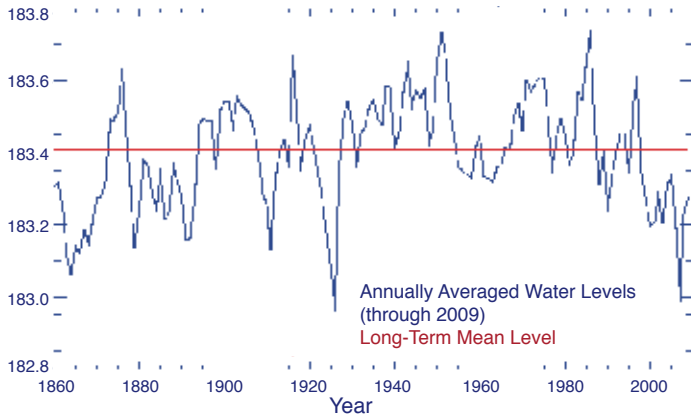
What are the Present Conditions?

The Great Lakes experienced unusually low levels from 1997-2007, hitting near record lows in late 2007. This decline eased in 2008, and there was a general increase in levels from 2008-2009. In February 2010, an ice jam dropped levels in Lake St. Clair; levels have since rebounded with the removal of the jam. As of March 2010, the lakes are at the level, or slightly below, where they were in March 2009.

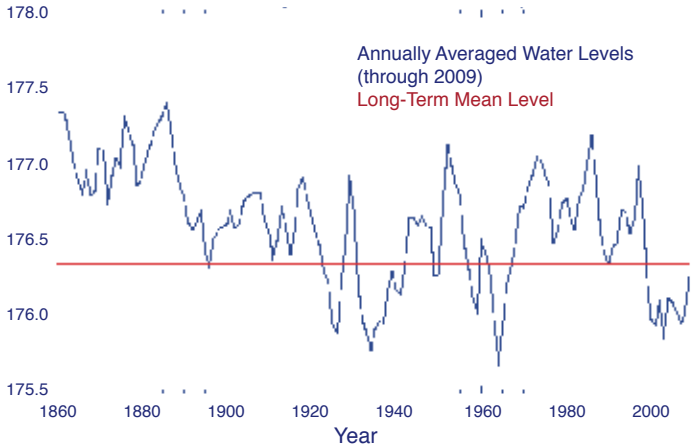
The four graphs on the next page show yearly-averaged water levels; they are updated through 2009.

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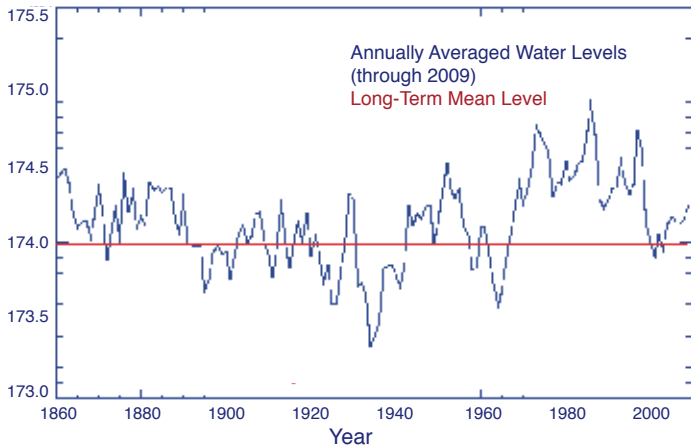
Lake Superior Water Levels in Meters (IGLD85)



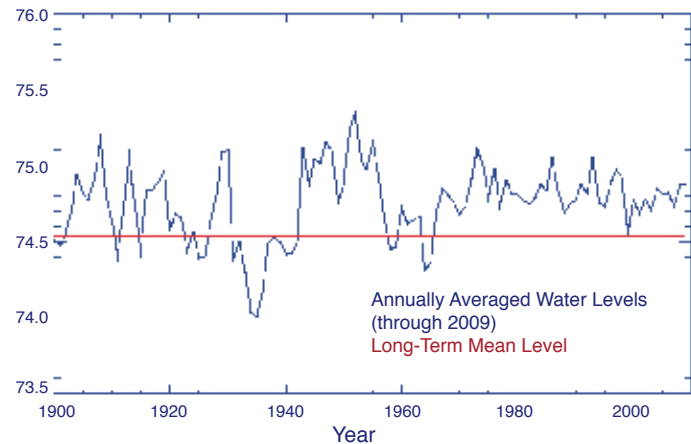
Lake Michigan-Huron Water Levels in Meters (IGLD85)



Lake Erie Water Levels in Meters (IGLD85)



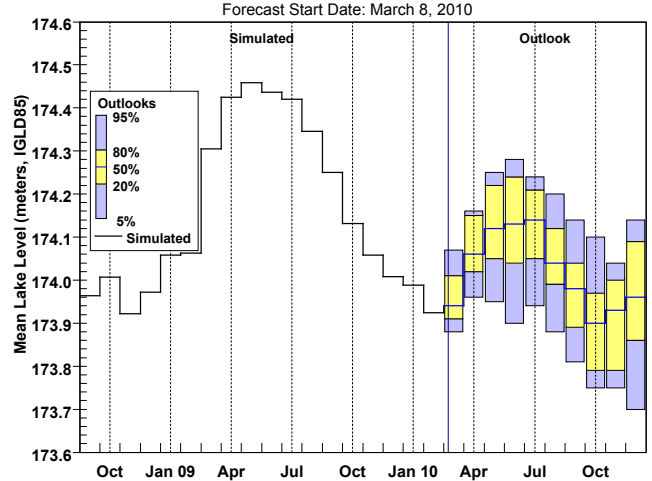
Lake Ontario Water Levels in Meters (IGLD85)



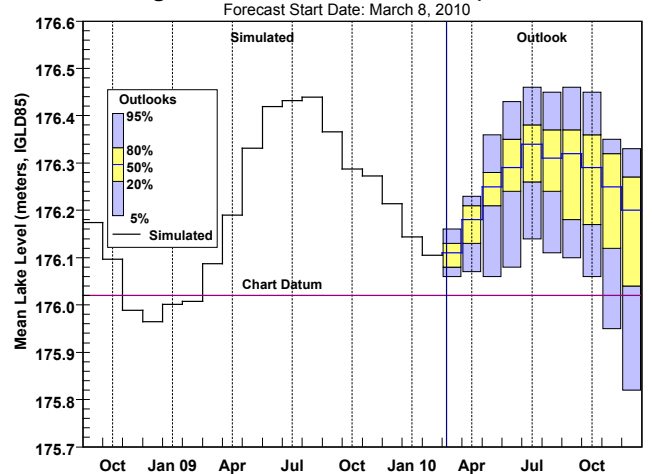
What is the Outlook?

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. Precipitation has been at or below normal through most of the Great Lakes basin, and the winter of 2009-10 has generally been mild. Consequently, mean lake levels are expected to be at or slightly below the levels of 2009.

Lake Erie Mean Lake Level (meters, IGLD85)



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



Lake Superior Mean Lake Level (meters, IGLD85)

