

Highs and Lows

Western Lake Superior Water Levels Conference • December 11 • Duluth, MN

Highlighted Resources for Conference Attendees

The Planning Committee for the *Highs and Lows Western Lake Superior Water Levels Conference* is providing this list of resources relating to lake levels and related impacts for your reference. Inclusion of these resources is not any form of endorsement.

December 11th 2019

Materials Provided by Conference Speakers & Organizers

These materials will be provided electronically to all attendees in the conference follow-up email.

- Presentation slides from speakers including:
 - Adam Bechle, Coastal Engineering Outreach Specialist, Wisconsin Sea Grant
 - Brandon Krumwiede, Great Lakes Geospatial Coordinator, National Atmospheric and Oceanic Administration (NOAA)
 - Ceil Strauss, State Floodplain Manager, Minnesota Department of Natural Resources (MNDNR)
 - Joseph Moore, Warning Coordination Meteorologist, National Weather Service Duluth Office
 - Melissa Kropfreiter PE, Hydraulic Engineer, U.S. Army Corps of Engineers
 - Tricia Ryan, Training & Engagement Program Manager, NOAA
- MNDNR: Local Contacts for Coastal Property Owners
- MNDNR: Resources for Minnesota's Coastal Communities
- MNDNR: Resources for Minnesota's Coastal Property Owners
- Wisconsin (WI) Sea Grant: Great Lakes Water Levels Informational Meeting Handout
- WI Sea Grant: Adapting to a Changing Coast for Property Owners
- WI Sea Grant: Adapting to a Changing Coast for Local Officials
- WI Sea Grant and U.S. Army Corps of Engineers: Living on the Coast

Lake Superior Monitoring Data

- Lake Superior National Estuarine Research Reserve Water Quality Monitoring Stations
Monitoring stations around the reserve for water quality and weather conditions.
 - <http://cdmo.baruch.sc.edu/dges/>
- NOAA Duluth Lake Level Station
Real-time data from the Duluth Station including water levels and weather conditions.
 - <http://bit.ly/2sfgRXf>

- NOAA Grand Marais Lake Level Station
Real-time data from the Grand Marais Station including water levels and weather conditions.
 - <http://bit.ly/36jJqSg>
- NOAA Great Lakes Environmental Research Laboratory (GLERL) Great Lakes Coastal Forecasting System
Forecasts of conditions over the next 120 hours within the Great Lakes including water levels, ice conditions, currents, and temperatures.
 - <http://bit.ly/2LEwUVE>
- NOAA GLERL Great Lakes Dashboard:
Monthly average data over the last ten years for each of the Great Lakes.
 - <http://bit.ly/2ru9Ced>
- NOAA GLERL Great Lakes Water Levels:
Provides overview of water level monitoring across Great Lakes and current conditions.
 - <http://bit.ly/2LEwUVE>
- University of Minnesota Duluth Large Lakes Observatory Data Buoys
Monitoring of wind conditions and temperature on in-situ buoys in Western Lake Superior during ice-free conditions.
 - <http://www.d.umn.edu/buoys/>

Lake Superior Water Level Predictions, Modeling & Impacts

- NOAA Lake Level Viewer
Interactive map visualizing changes in water levels across the Great Lakes.
 - <https://coast.noaa.gov/llv/>
 - Lake Superior (direct link): <https://coast.noaa.gov/llv/#/lake/superior>
- North Shore Erosion Mapping Tool
Interactive map (under development) of shoreline & environmental conditions of North Shore MN.
 - <http://bit.ly/2P5tu0b>
- US Army Corps of Engineers Detroit District Water Levels Forecast
Weekly and monthly forecasts for water levels across the Great Lakes based on precipitation and outflows.
 - Weekly forecast: <http://bit.ly/2s7yRmH>
 - Monthly forecast: <http://bit.ly/2t4epDL>
- Wisconsin Shoreline Inventory and Oblique Photo Viewer
Oblique images, historical and current shoreline conditions, and relevant high and low water level conditions along Wisconsin's shoreline.
 - <http://bit.ly/2scAYp0>

Lake Superior Weather & Flood Warnings

- Climate Prediction Center
National Weather Service prediction data for climate conditions across the U.S.
 - <https://www.cpc.ncep.noaa.gov/>
- Midwest Climate Watch

Maps of various weather conditions including temperature and precipitation at different time scales (hourly to monthly) throughout the Midwest.

- <http://bit.ly/2RHqbOF>
- **Midwestern Regional Climate Center**
Quarterly reports for climate conditions across the Midwest.
 - <http://bit.ly/36dFORI>
- **National Weather Service (NWS) Forecast Office Duluth, MN**
NWS Duluth provides updated weather forecasts and warnings for Western Lake Superior.
 - <https://www.weather.gov/dlh/>
- **Northland Alert**
Emergency warning system for the Duluth, MN and St. Louis County area.
 - <https://duluthmn.gov/northlandalert/>
- **Quarterly Climate Impacts & Outlooks**
Reports for climate impacts and outlooks for the Great Lakes region released quarterly.
 - <https://www.drought.gov/drought/resources/reports>

Great Lakes Imagery, Data, and Tools

- **NOAA Coastal Imagery, Elevation, Land Cover, and Other Data**
Access NOAA data including elevation models, imagery, and land cover maps.
 - Digital Coast all NOAA data available: <http://bit.ly/2LDwhM1>
 - Coastal Imagery Viewer: <http://bit.ly/2E80qi9>
 - Data viewer for elevation models, imagery & land cover: <https://coast.noaa.gov/dataviewer/#/>

Other Relevant Resources for the Great Lakes

- **Great Lakes Commission (GLC)**
Representatives from all Great Lakes states and provinces working together to address priorities for the lakes and the surrounding region.
 - Great Lakes Daily News: <https://www.glc.org/dailynews>
 - Email Groups: <https://www.glc.org/email-groups>
- **International Joint Commission (IJC)**
The IJC has appointed chair members that oversee Great Lakes agreements between U.S. and Canada including water level management.
 - <https://www.ijc.org/en>

Training and Technical Assistance for Local Communities

- **Lake Superior National Estuarine Research Reserve**
 - <https://lakesuperiorreserve.org/>
- **Minnesota Sea Grant**
 - <http://www.seagrant.umn.edu/>

- Minnesota’s Lake Superior Coastal Program, MNDNR
 - mndnr.gov/mlscp
- NOAA Digital Coast
 - <http://bit.ly/2PArl6u>
- Wisconsin Coastal Management Program
 - <http://www.coastal.wisconsin.gov>
- Wisconsin Sea Grant
 - <https://www.seagrants.wisc.edu/>

Suggested Videos

- Andrew Gronewold, University of Michigan Great Lakes Low Water Levels
Lecture on what factors contribute to changing lake levels during the low water levels experienced in 2013.
 - Video: <http://bit.ly/2RCgz7M>
- Andrew Gronewold, University of Michigan Great Lakes Water Levels Interview
Short interview (13 minutes) with Andrew Gronewold explaining the recent rise in Great Lakes water levels in 2019.
 - Video: <http://bit.ly/2sX6Cat>
- Great Lakes Water Levels Informational Meeting
Informational meeting (2+ hours) in 2019 hosted by Wisconsin Sea Grant focusing on Lake Michigan Water Levels including presentations by the U.S. Army Corps of Engineers and National Weather Service Milwaukee Office. Meeting discussed current high water levels and forecasting of future precipitation and lake levels, emergency assistance available to communities, and a review of possible adaptation options for properties facing coastal bluff erosion.
 - <http://bit.ly/345yVR5>
 - Video of meeting: <http://bit.ly/340ADDe>

