

GREAT LAKES WATER LEVELS

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Hydraulics and Hydrology Office
Detroit District, Corps of Engineers
October 2020



US Army Corps
of Engineers®

NWS-GRR



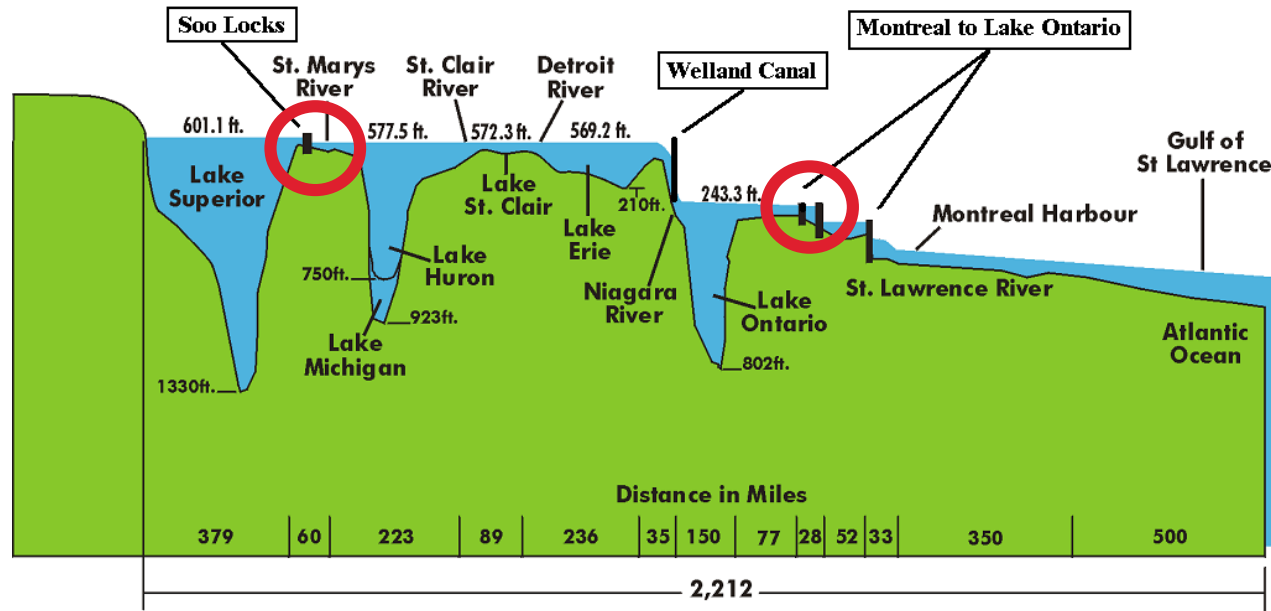
MONITORING GREAT LAKES WATER LEVELS


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The Great Lakes Basin

- 14,000 miles of shoreline
- 95,000 square miles of water
- 200,000 square miles of land
- 8 States & 2 Provinces



 Outflow regulation





MONITORING GREAT LAKES WATER LEVELS

Current Daily Water Levels

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Great Lakes Water Levels

The United States Army Corps of Engineers collects and disseminates this water level data in cooperation with NOAA and the Canadian Hydrographic Service. All data are provisional and are referenced to IGLD 1985. Blanks indicate data that are missing or not yet available.

Date	Superior*	Michigan Huron*	St. Clair*	Erie*	Ontario*
	Daily Mean	Daily Mean	Daily Mean	Daily Mean	Adj. Daily Mean
01-OCT-2020	603.03	581.67	576.62	573.34	245.28
02-OCT-2020	602.97	581.64	576.68	573.37	245.26
03-OCT-2020	602.94	581.64	576.71	573.40	245.27
04-OCT-2020	602.93	581.62	576.72	573.35	245.26
05-OCT-2020					
Mean:	602.97	581.64	576.68	573.37	245.27

October Statistics	Historic Water Levels				
	Superior	Michigan Huron	St. Clair	Erie	Ontario
Avg Last Month	603.00	581.83	577.02	573.58	245.59
Avg Last Year	603.26	581.65	576.67	573.29	246.19
Minimum	600.72 (1925)	576.44 (1964)	571.75 (1934)	568.57 (1934)	242.19 (1934)
Maximum	603.38 (1985)	582.35 (1986)	577.30 (1986)	573.95 (1986)	246.78 (1945)
Long Term Avg**	602.1	578.9	574.18	571.13	244.82

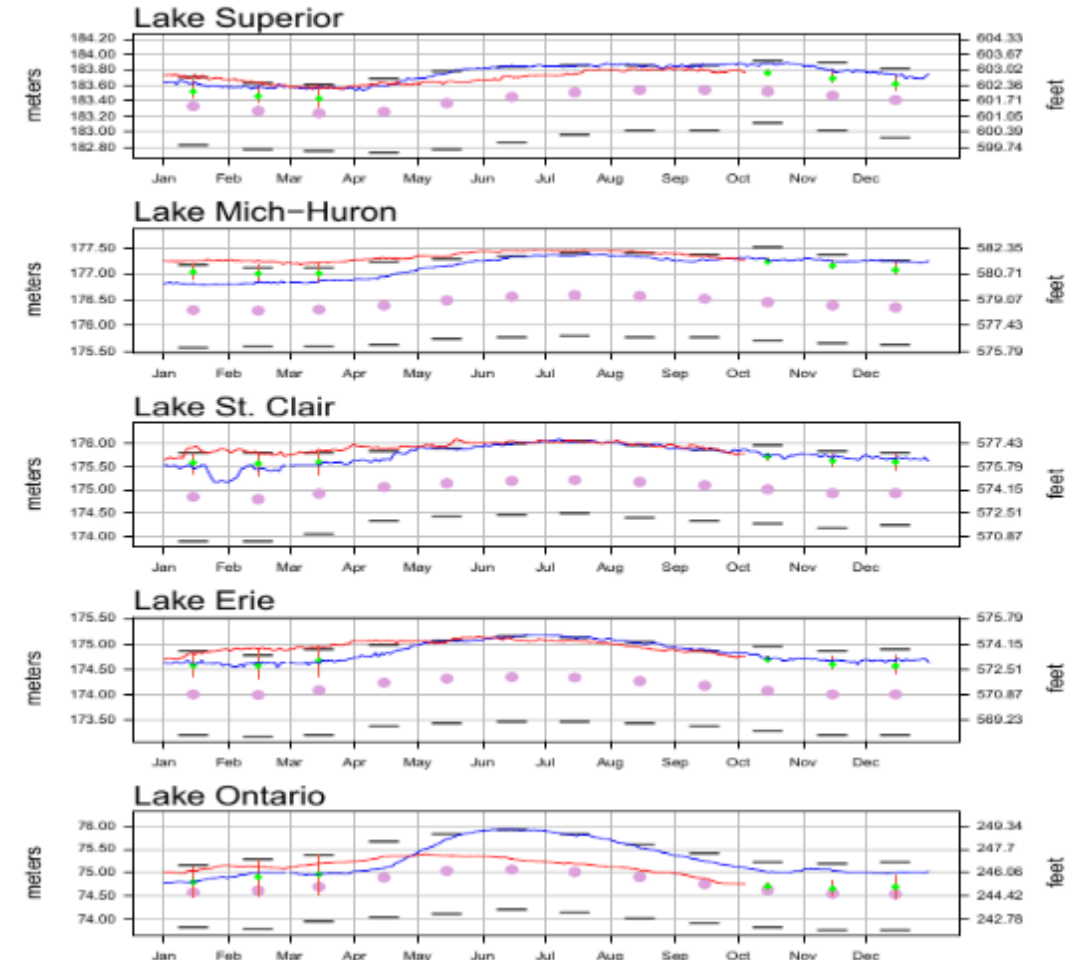
* Mean levels are calculated by averaging the best available gage data at report generation and are subject to change.

** Period of Record 1918 - 2019



Daily Great Lakes Water Levels

— 2020
— 2019
● Coordinated Forecast
● LTA Monthly Mean
— Record High/Low Monthly Mean



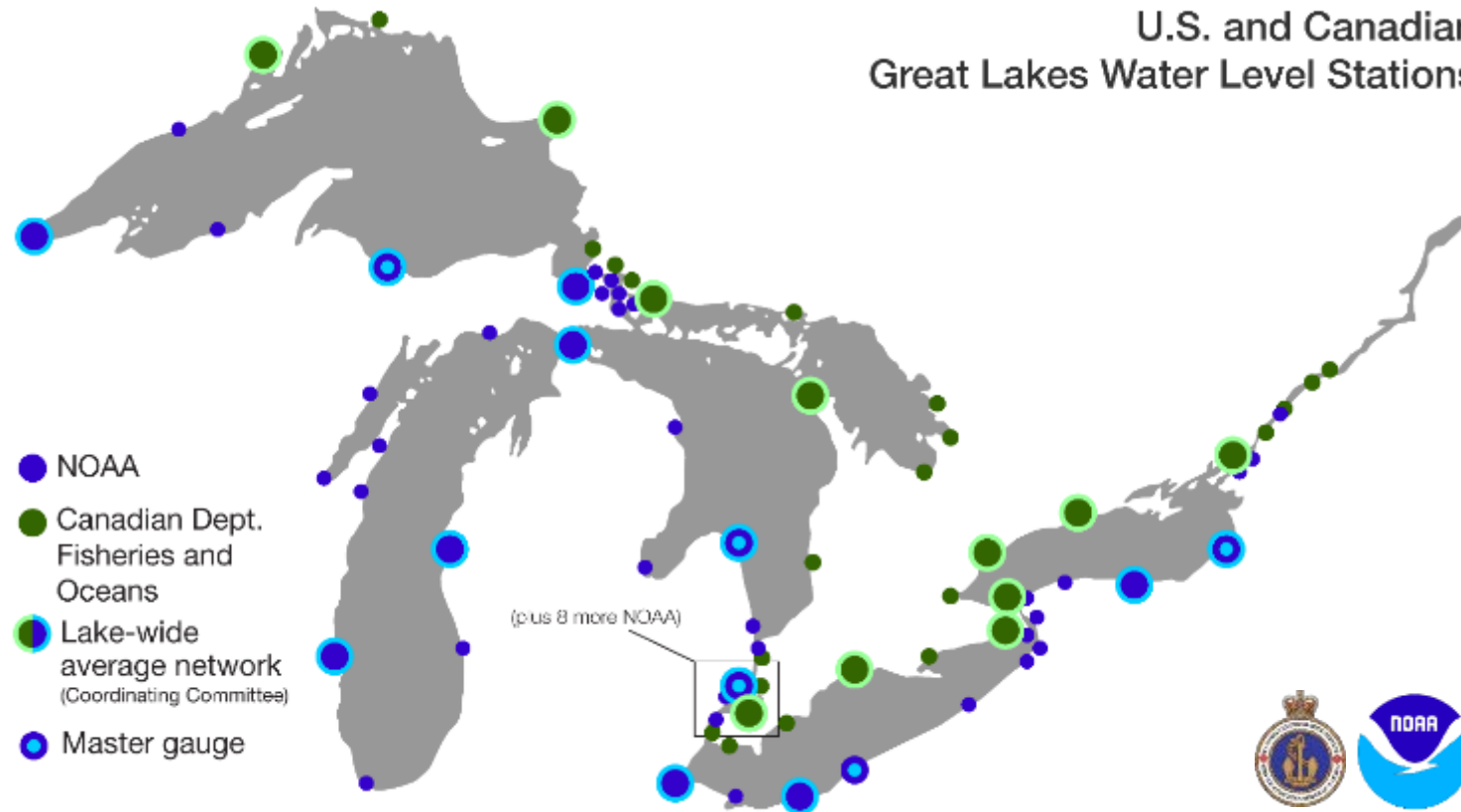
Lakewide average levels are based on a network of water level gages located around the lakes.
LTA and record levels are computed from a period of record of 1918 to 2019
Elevations are referenced to the International Great Lakes Datum (1985).

Updated 2020-10-05

MONITORING GREAT LAKES WATER LEVELS



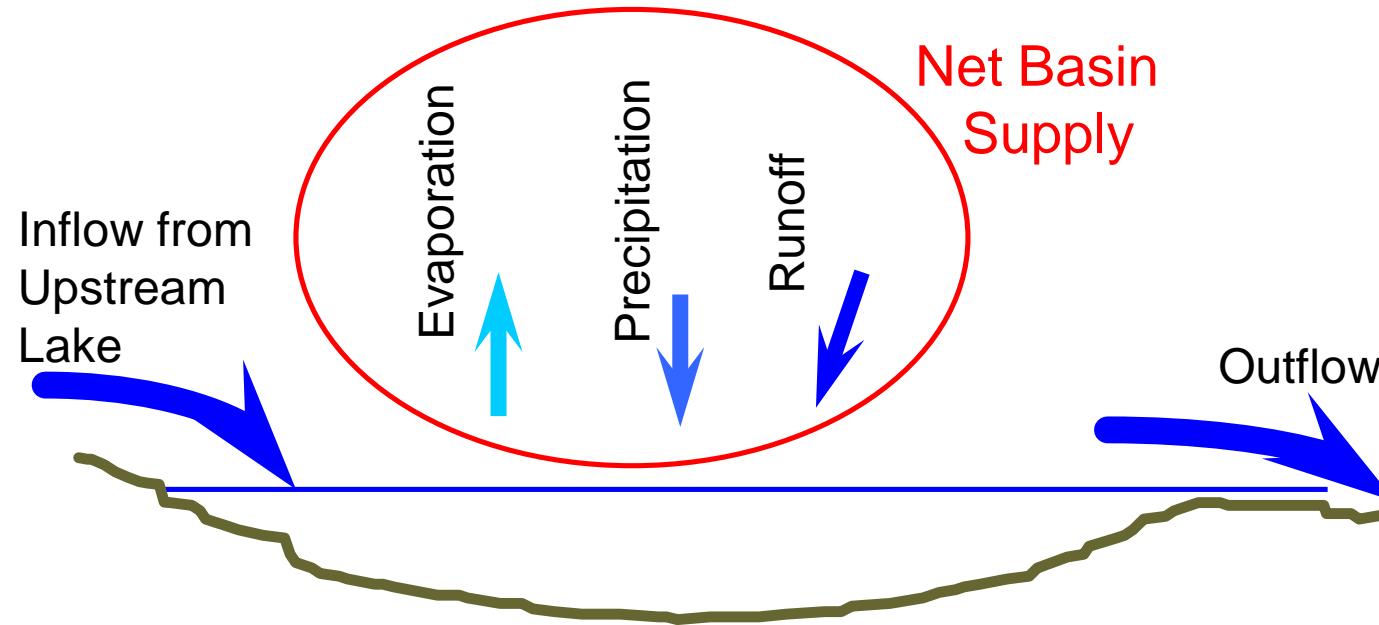
U.S. and Canadian Great Lakes Water Level Stations



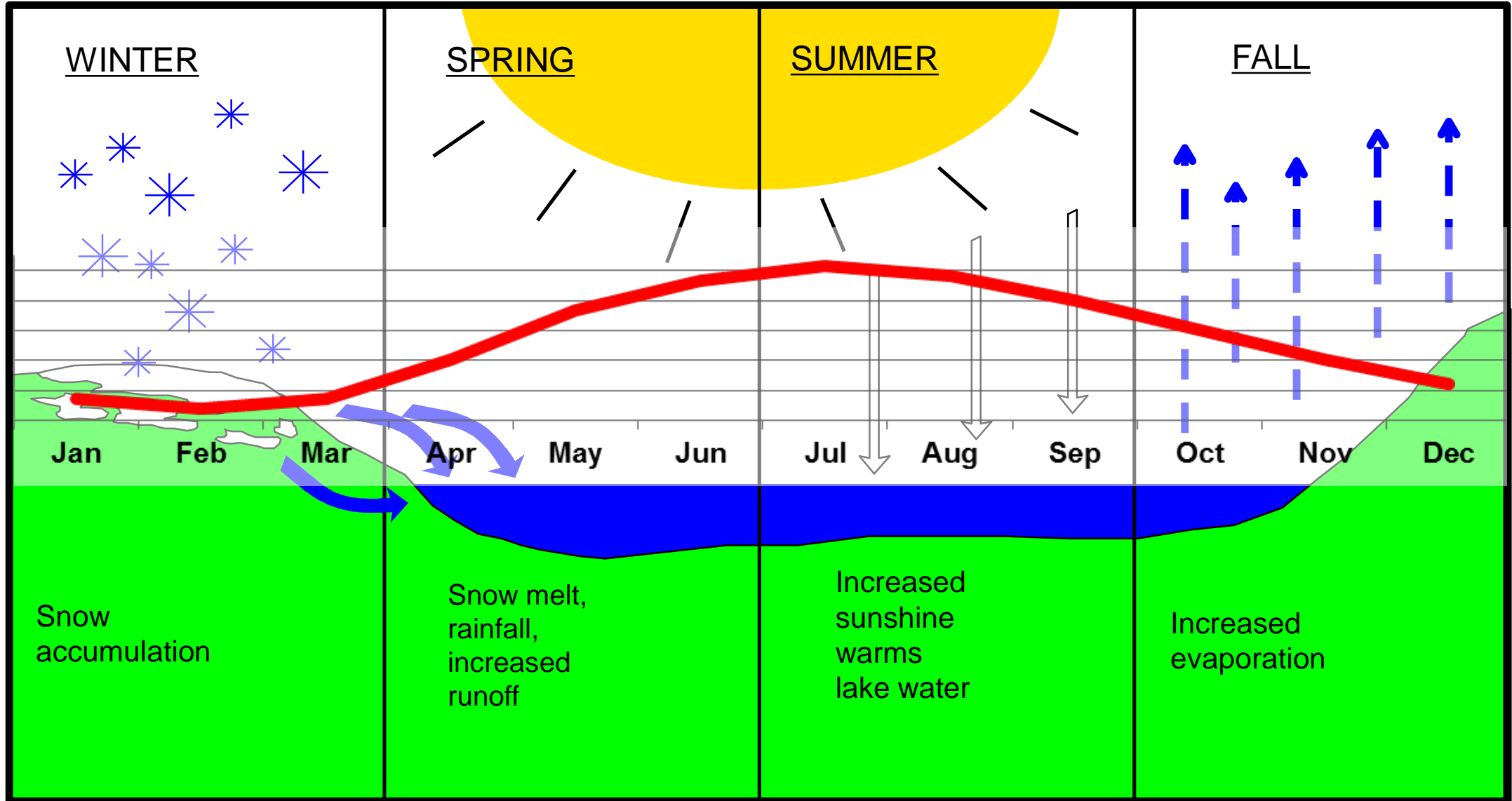
Daily Average Water Levels Based on Lake-Wide Average Network

- **Lake Superior:** Duluth, Marquette, Pt. Iroquois, Thunder Bay, Michipicoten
- **Lakes Michigan-Huron:** Harbor Beach, Ludington, Mackinaw City, Milwaukee, Tobermory, Thessalon
- **Lake St. Clair:** St. Clair Shores, Belle River
- **Lake Erie:** Toledo, Cleveland, Port Stanley, Port Colborne
- **Lake Ontario:** Oswego, Rochester, Toronto, Kingston, Port Weller, Cobourg

FACTORS IMPACTING WATER LEVELS



ANNUAL WATER LEVELS AND THE HYDROLOGIC CYCLE



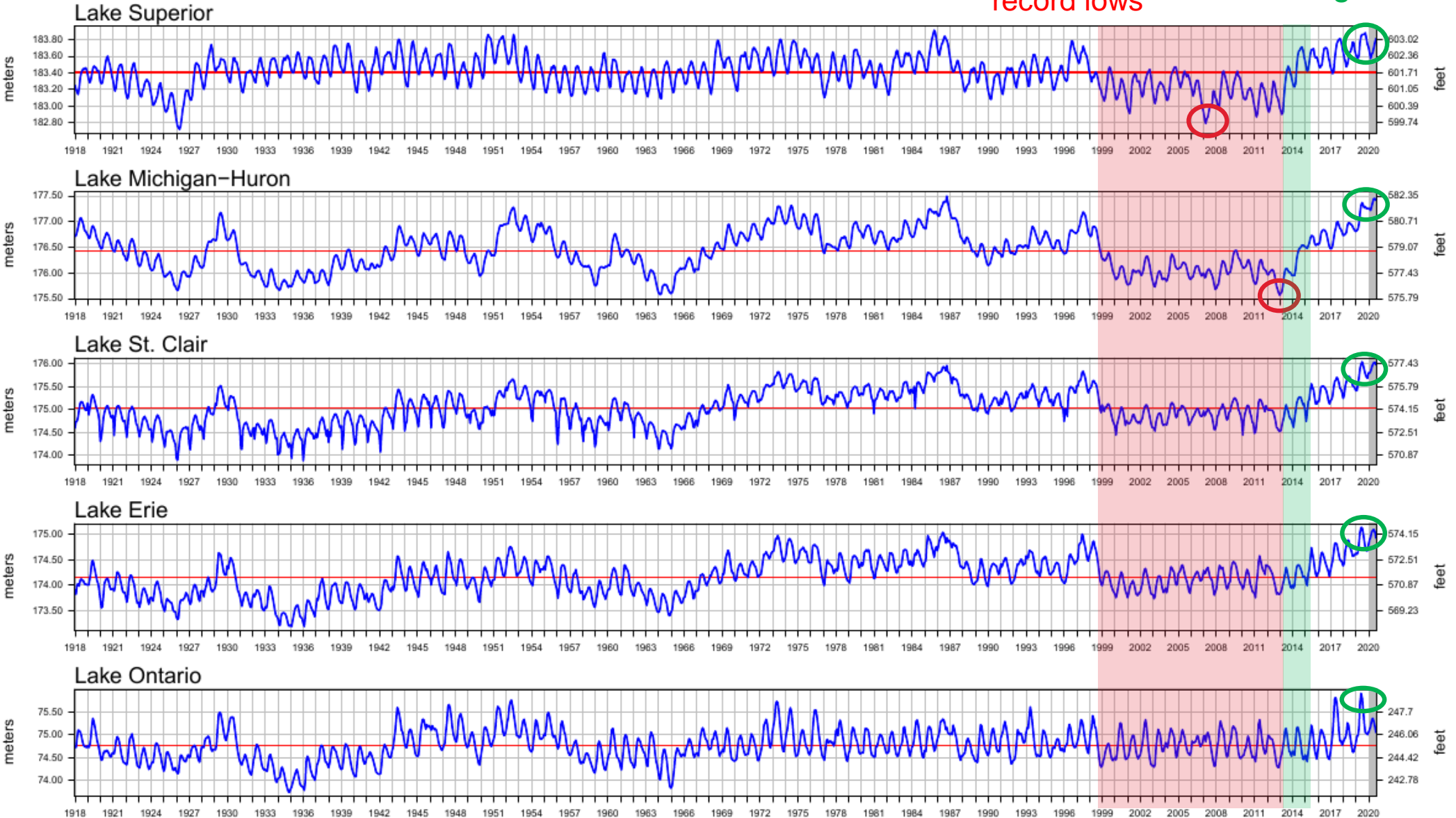


Great Lakes Water Levels (1918–2020)

— Monthly Mean Level — Long Term Average Annual

Decade plus of
low water with
record lows

Record rise and
record highs

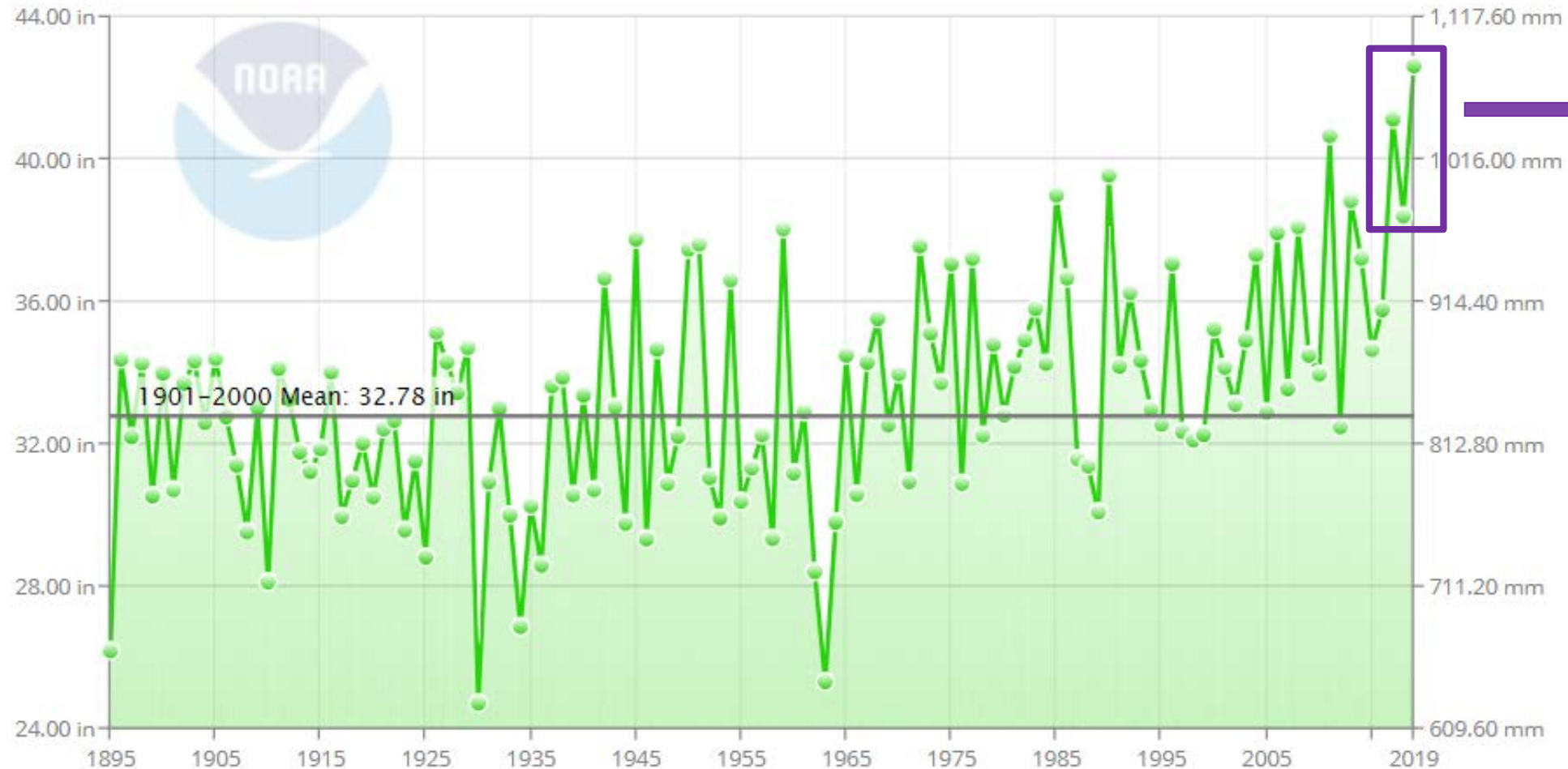


The monthly average levels are based on a network of water level gages located around the lakes. Elevations are referenced to the International Great Lakes Datum (1985).

Water levels have been coordinated through 2019. Values highlighted in gray are provisional.

WHY ARE LEVELS SO HIGH? – WET PATTERN

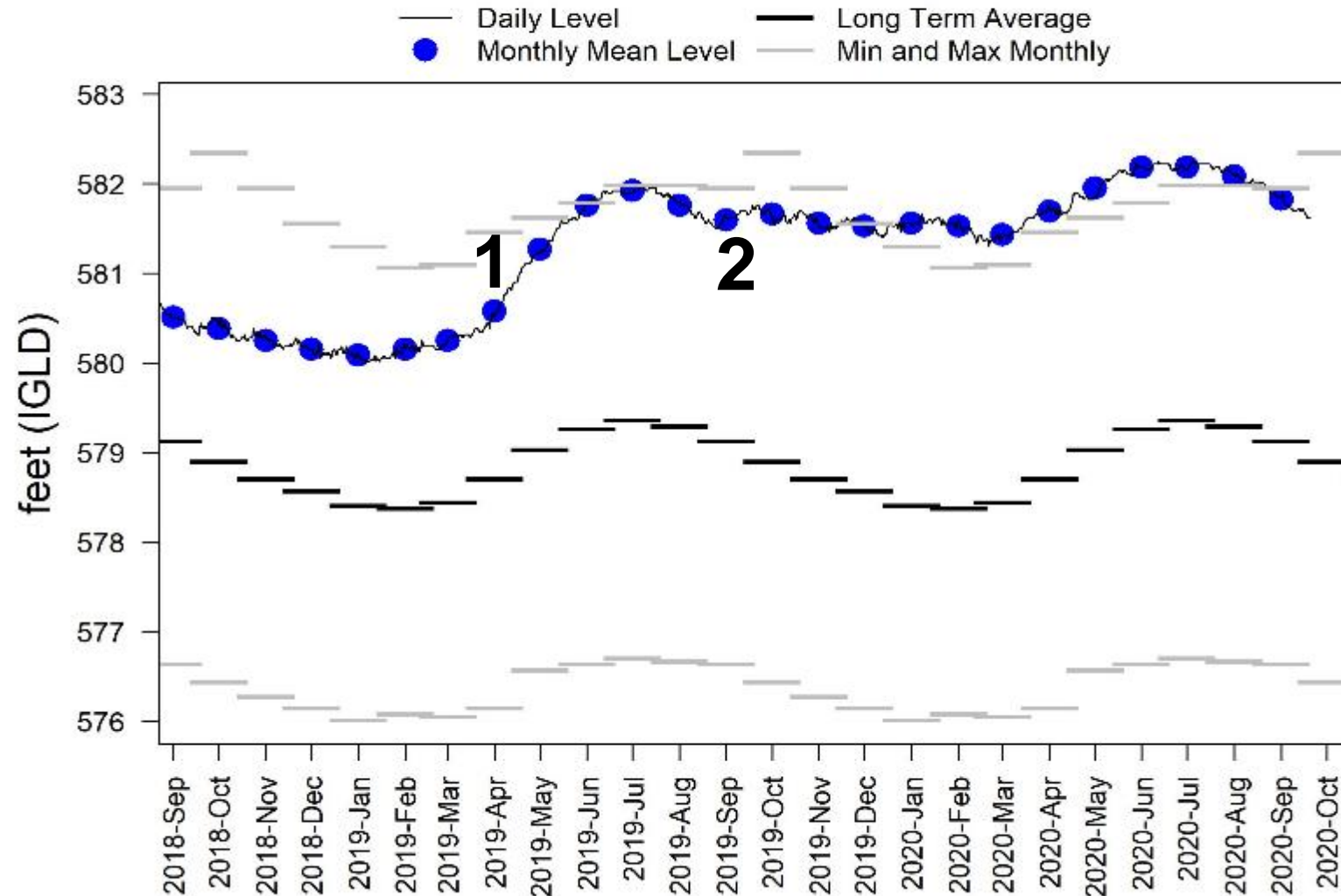
Great Lakes Basin Precipitation
January–December



Last 3 years (2017-2019), exceptionally wet for the Great Lakes Basin.

RECENT LAKE MICHIGAN-HURON WATER LEVELS

Lake Michigan-Huron Water Levels



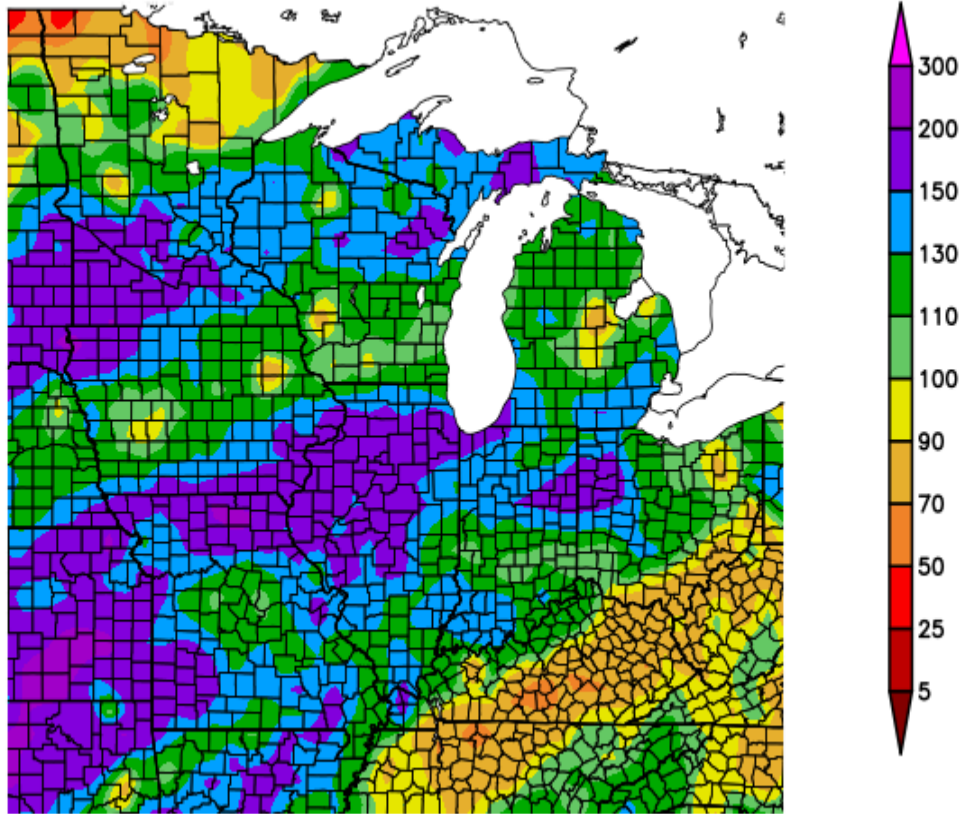
1. Spring of 2019 large seasonal rise due to increased precipitation.

2. Lack of seasonal decline in the fall of 2019 due to wet Sep. & Oct. and warm beginning of winter.

1. 2019 SEASONAL RISE

Above Normal Precipitation

Percent of Normal Precipitation (%)
3/1/2019 – 5/31/2019










High Streamflows

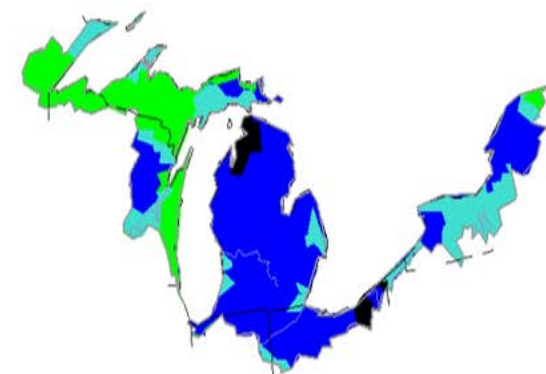
April

May



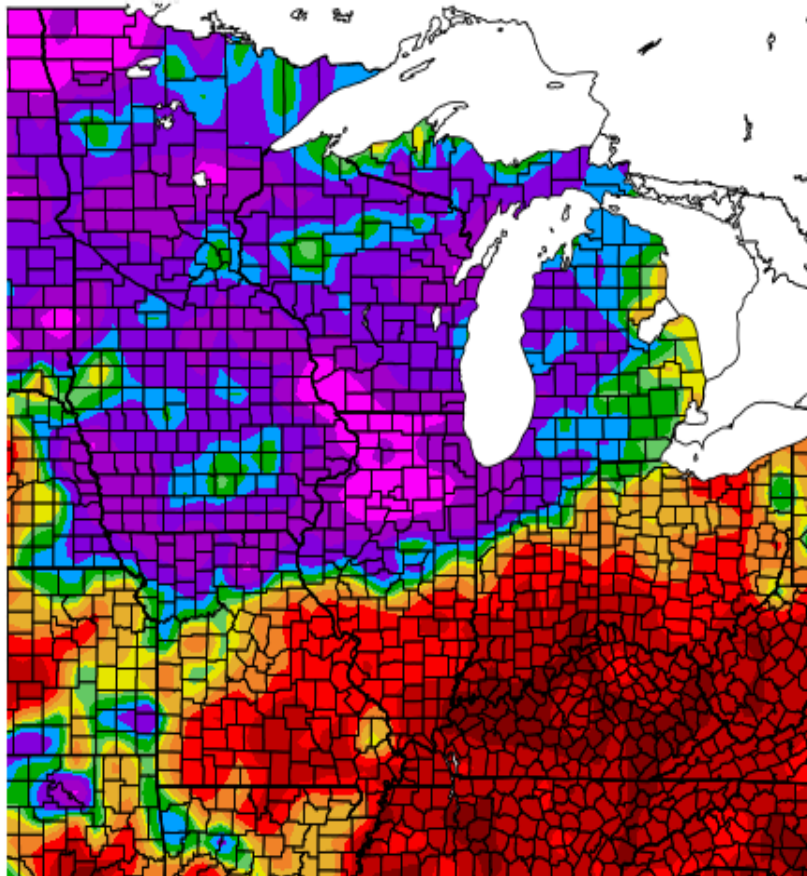
Explanation - Percentile classes							
							
Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		

June

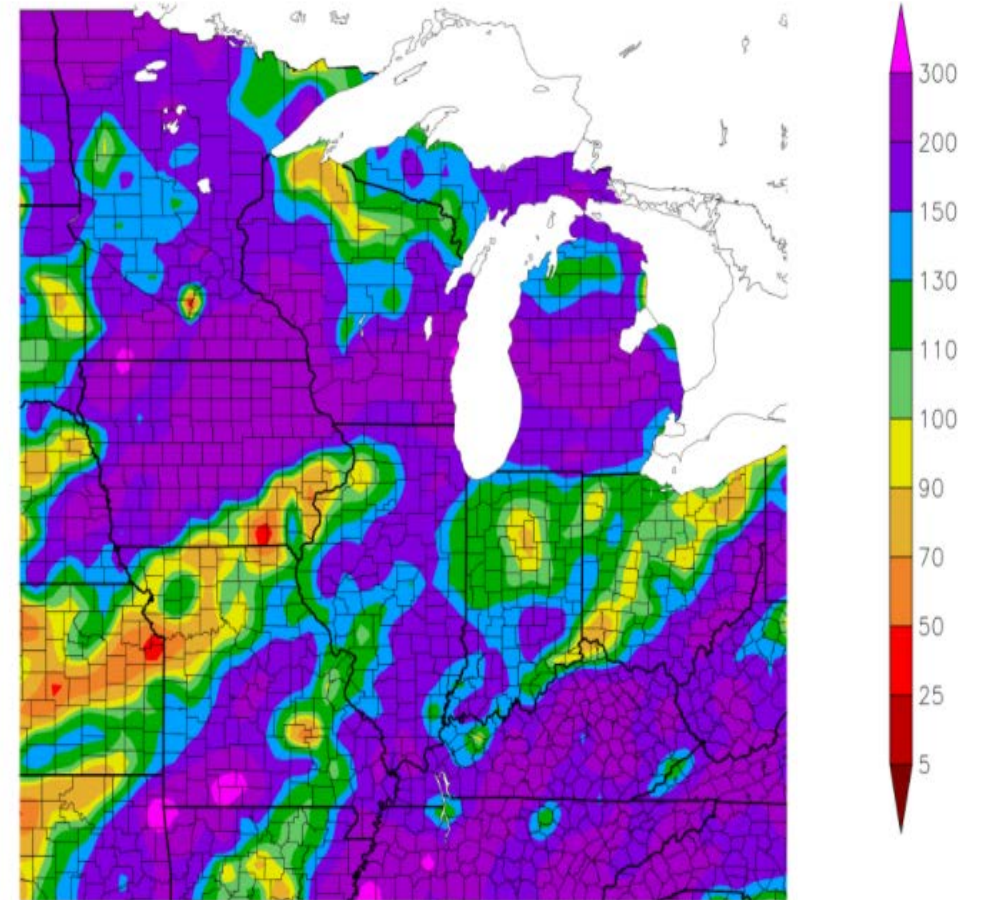


2. MARGINAL SEASONAL DECLINE

Percent of Normal Precipitation (%)
9/1/2019 – 9/30/2019



Percent of Normal Precipitation (%)
10/1/2019 – 10/31/2019



2. MARGINAL SEASONAL DECLINE

High Streamflows

Winter Temperature Above Average

September 2019

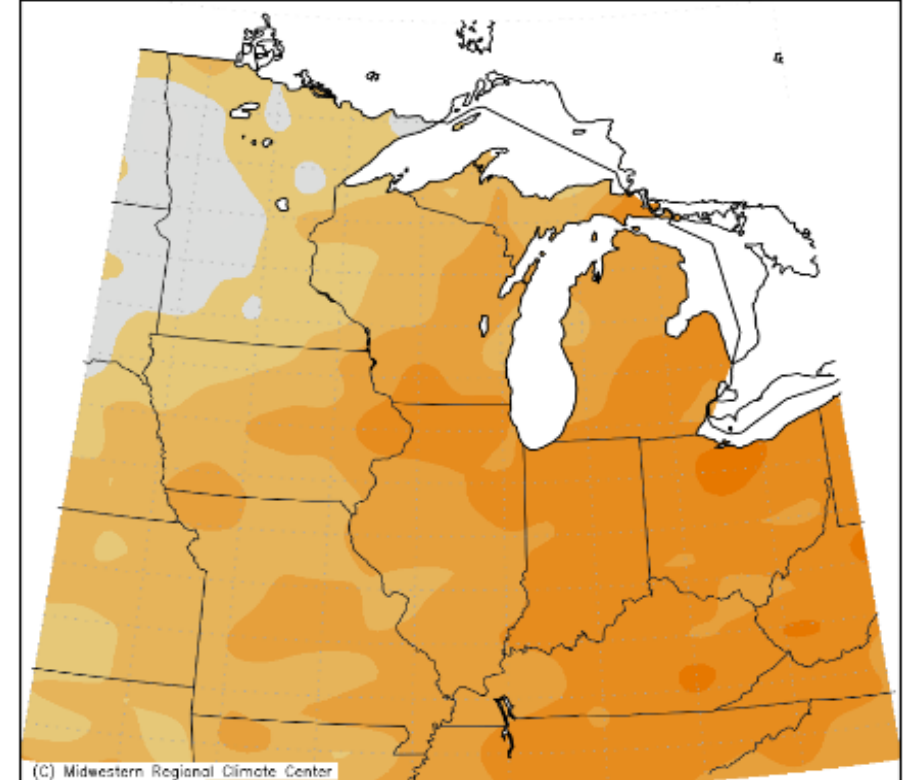
October 2019

USGS

Explanation - Percentile classes

Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		

Average Temperature (°F): Departure from Mean
December 1, 2019 to February 29, 2020



Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana–Champaign

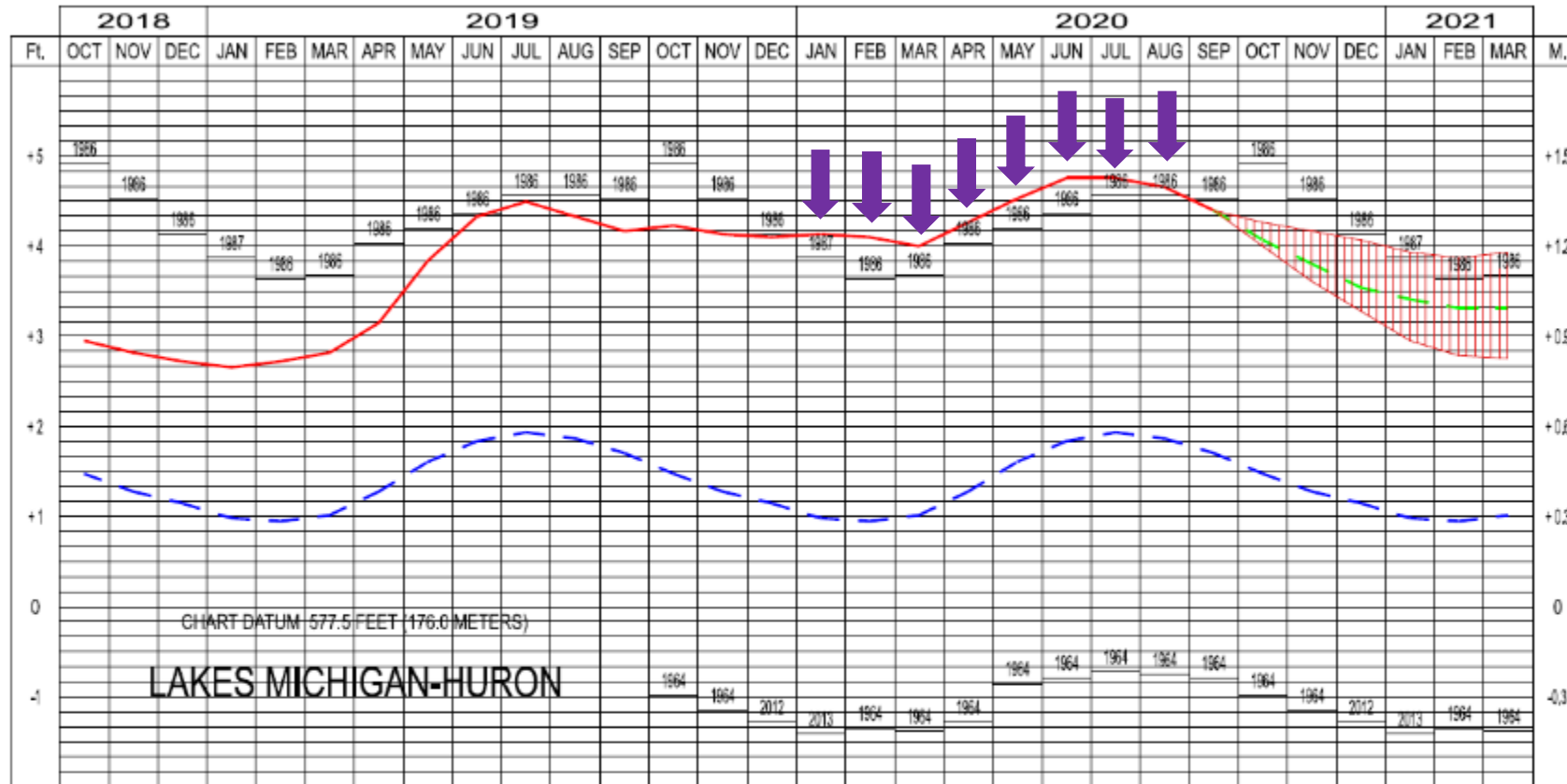


6-MONTH FORECAST (OCTOBER-MARCH)

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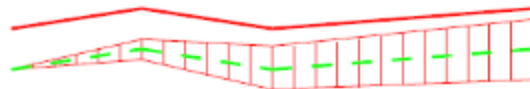
LAKE MICHIGAN-HURON WATER LEVELS - OCTOBER 2020



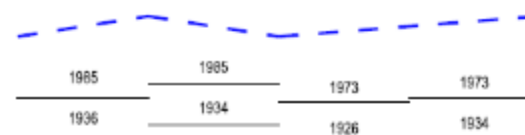
LEGEND

LAKE LEVELS

RECORDED
PROJECTED



AVERAGE **
MAXIMUM **
MINIMUM **



** Average, Maximum and Minimum for period 1918-2019



• 2020 Provisional Record

Projected Levels (dashed green line):

- In period of seasonal decline
- September 2020 level was 3 inches above the September 2019 level.
- Forecast to be 7 to 10 inches below record high levels through Dec. and remain 8 to 9 inches below provisional 2020 record highs Jan to March.

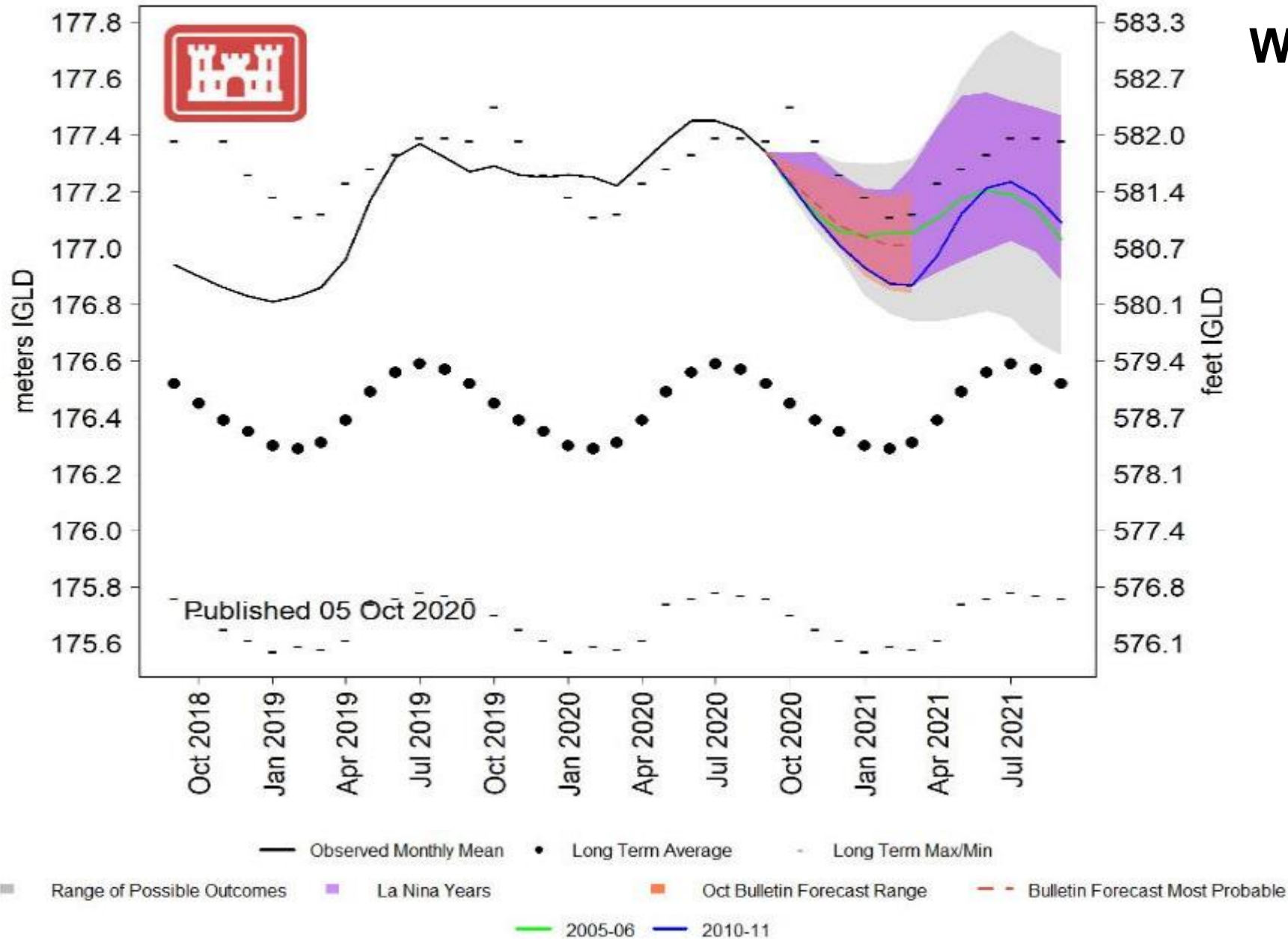


Lake Michigan-Huron Monthly Mean Water Levels

Water Level Outlook (12 Months)

What if.....

Scenario driven
based on
historical supplies





GREAT LAKES WATER LEVEL RESOURCES AND CONTACT INFORMATION

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Websites

USACE Detroit District

Link at the top of the page provides USACE resources related to high water levels

<https://www.lre.usace.army.mil>

Water level forecasts

Monthly Bulletin of Great Lakes Water Levels (6-month forecast)

<https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Water-Levels/Water-Level-Forecast/>

Weekly Great Lakes Water Levels

(update on current conditions and forecast for next month)

Great Lakes Water Level Outlook (Scenario-based 12-month outlook)

Connecting Channels Forecast (channel depths for next month)

Water level observations

Current Conditions (preliminary daily lake-wide average levels and connecting channel water levels)

<https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Water-Level-Data/>

Historical Data (long term average, maximum, and minimum Great Lakes water levels)

Basin Conditions and Other Great Lakes Information

Water Level Summaries (lake-by-lake summaries of recent conditions)

<https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Basin-Conditions/>

Great Lakes Update Articles (periodic publications on various Great Lakes topics)

Living on the Coast

Brochure on coastal impacts

<https://www.lre.usace.army.mil/Portals/69/docs/GreatLakesInfo/docs/CoastalProgram/Living%20on%20the%20Coast%20Booklet.pdf?ver=2016-06-06-105107-683>

Contact Information

Water level forecasts

- John Allis, Chief Office of Great Lakes Hydraulics and Hydrology (313-226-2137)
- Deanna Apps (313-226-2979)



US Army Corps
of Engineers.





HTTPS://WWW.LRE.USACE.ARMY.MIL/ABOUT/GREAT-LAKES-HIGH-WATER/

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US Army Corps of Engineers Detroit District

Great Lakes High Water

Multiple record high levels were set on the Great Lakes in 2019 resulting in increased risks from erosion and coastal flooding. The U.S. Army Corps of Engineers, Detroit District, is committed to ensuring public safety while providing technical expertise and assistance during this time of high water around the Great Lakes.

During response operations, our Emergency Management Office conducts emergency operations to save lives and protect improved properties. In the event of natural disasters such as flooding, emergency permit procedures can be activated to expedite permits to reduce further damage, and protect life and property. The Corps of Engineers has authority to provide technical and planning assistance for flood plain management planning. The Great Lakes Hydraulics and Hydrology Office forecasts and monitors water levels of the Great Lakes and the conditions that lead to water level fluctuations.



Helpful Links

- [Apply for a Permit](#)
- [Check Permit Application Status](#)
- [USACE, Detroit District, Role in Emergency Management](#)
- [International Lake Superior Board of Control](#)
- [Environment and Climate Change Canada](#)
- [Michigan Sea Grant](#)
- [NOAA - Great Lakes Environmental Research Laboratory](#)
- [Living on the Coast Booklet](#)
- [Sandbagging Instructional Video](#)

Frequently Asked Questions

Click Question to expand Answer



Why are water levels on the Great Lakes so high? How long is this expected to last?

Does the U.S. Army Corps of Engineers have control over Great Lakes water levels?

My shoreline is eroding, can the U.S. Army Corps of Engineers help?

My property is flooding, can the U.S. Army Corps of Engineers help?

What type of shoreline project requires a permit?



- Emergency Management Office
- Hydraulics and Hydrology Office
- Outreach Office
- Regulatory Office
- Public Affairs Office

Water Level Contacts

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