GREAT LAKES WATER LEVELS

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Detroit District, Corps of Engineers
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US Army Corps of Engineers®

HIGH WATER PHOTOS FROM ACROSS THE GL

Canal Park
Near Duluth,
MN (NWS)

South Haven, MI
(NWS)

Stony Point, MI
Lake Erie
(Port of Monroe)

Oswego, NY
(Bill Foley)

The high water levels are a Great Lakes wide event.

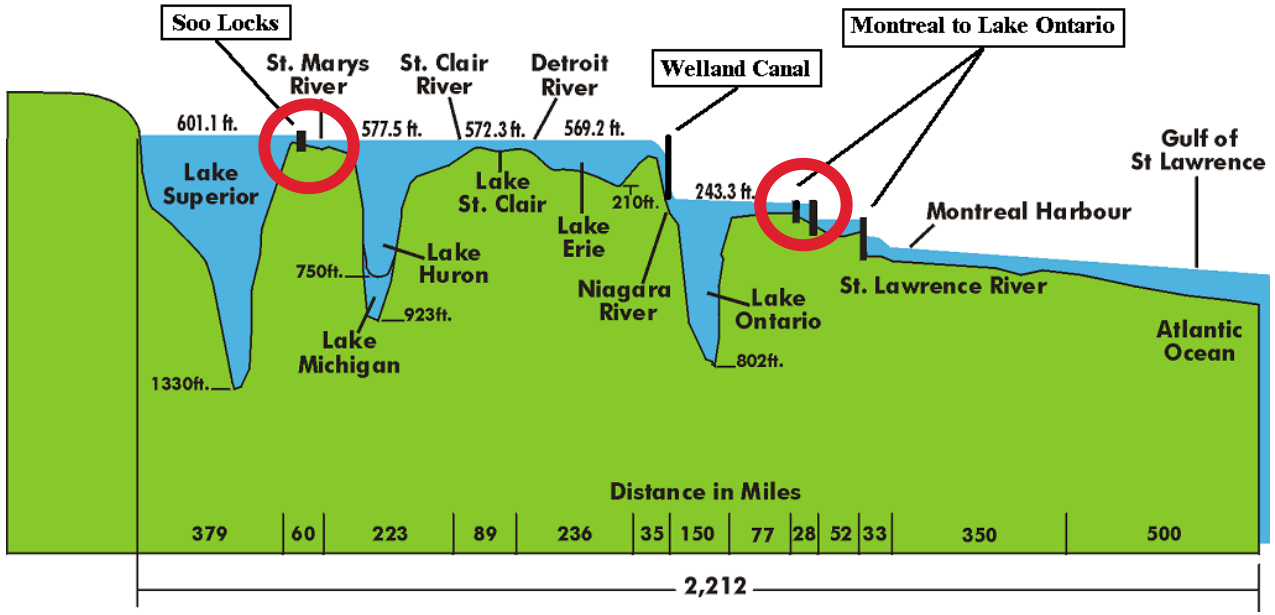
NOTES ABOUT GREAT LAKES WATER LEVELS

- Not a depth, but an elevation above sea level, IGLD 1985
- Michigan and Huron = One lake
- Lake-wide daily means → Lake-wide monthly means
- Based on still water, not influenced by meteorological forcing
- Based on a network of water level gauges
- Detroit District Corps of Engineers = keeper of official monthly water level statistics from 1918-2019
- Coordination occurs with Environment and Climate Change Canada
- **Primary drivers of water level fluctuations are changing weather patterns and resulting fluctuations in water supply**

MONITORING GREAT LAKES WATER LEVELS

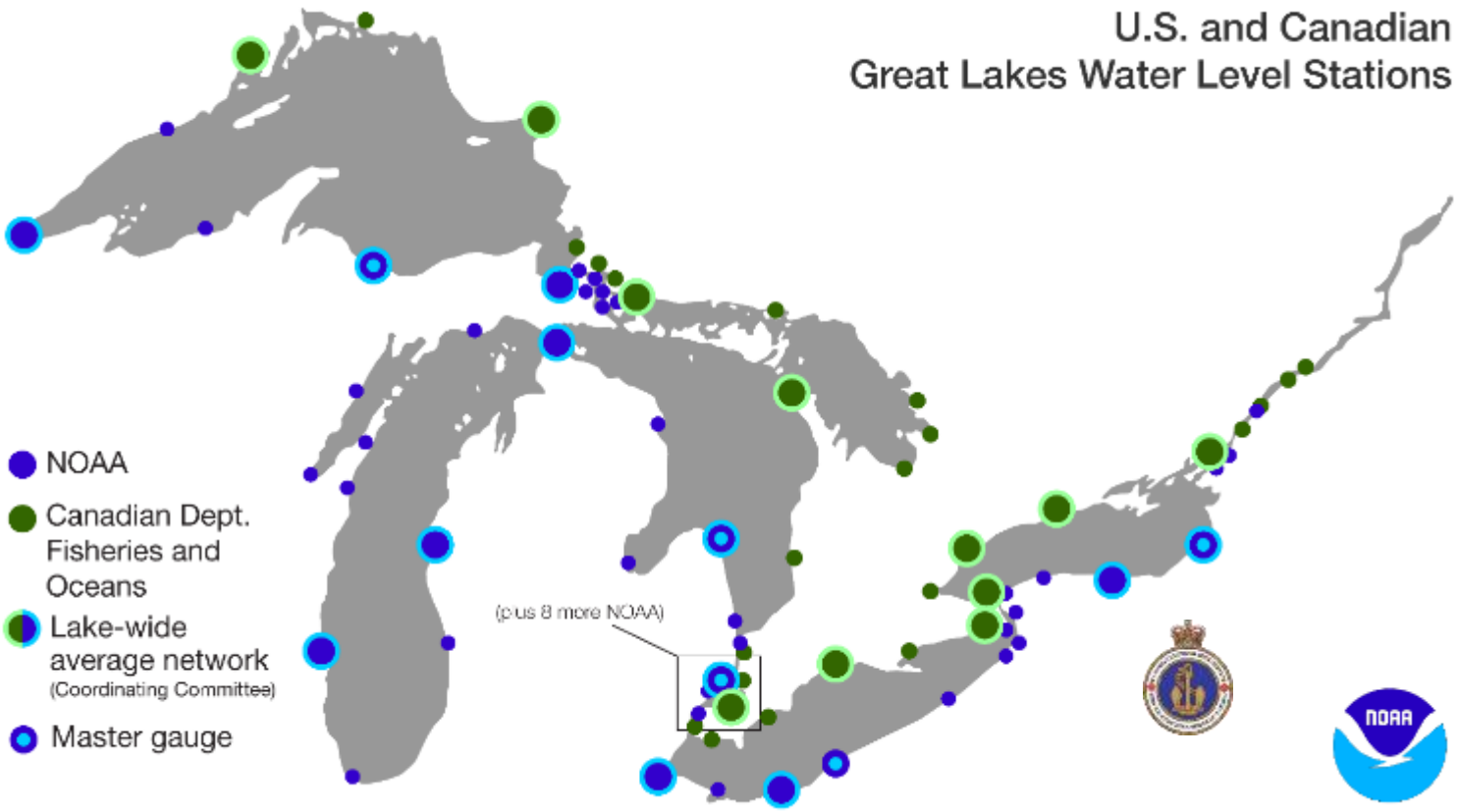
The Great Lakes Basin

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



Outflow regulation

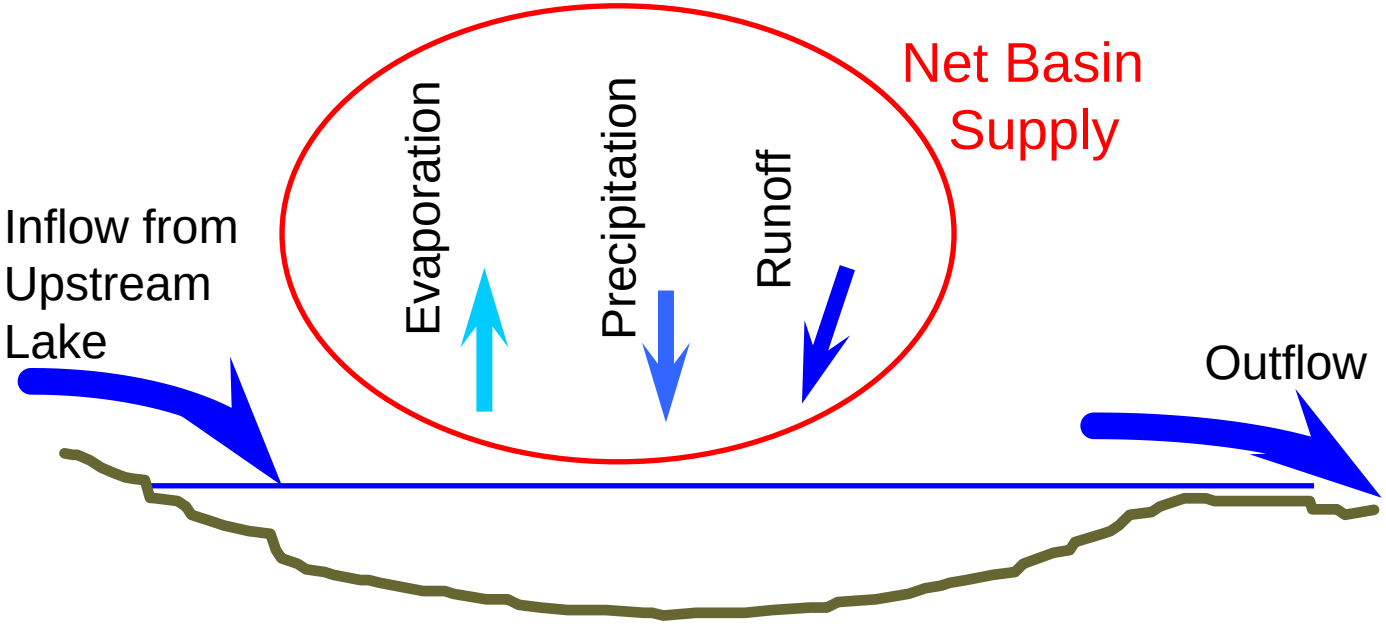
MONITORING GREAT LAKES WATER LEVELS



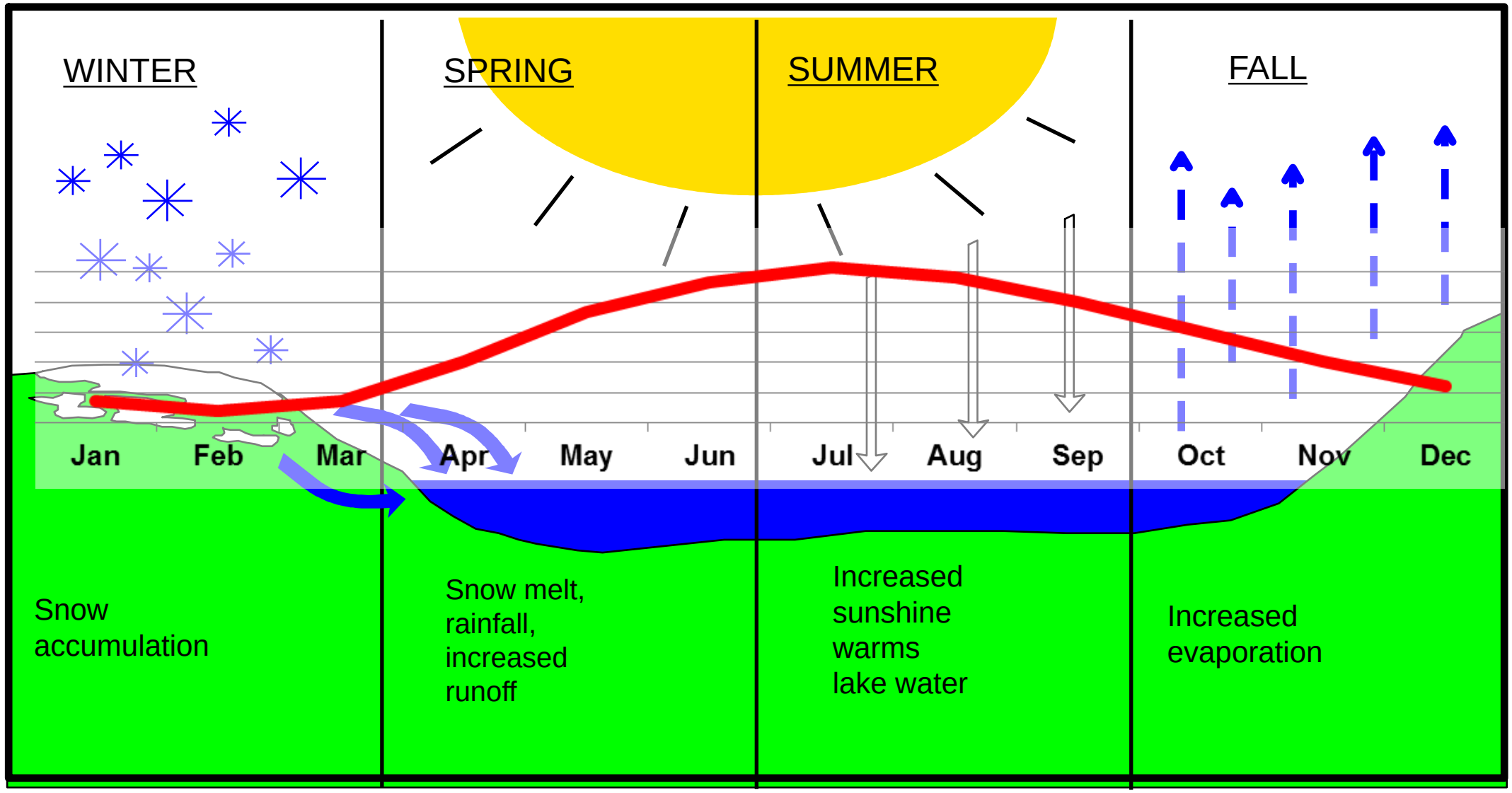
Daily Average Water Levels Based on Lake-Wide Average Network

- **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



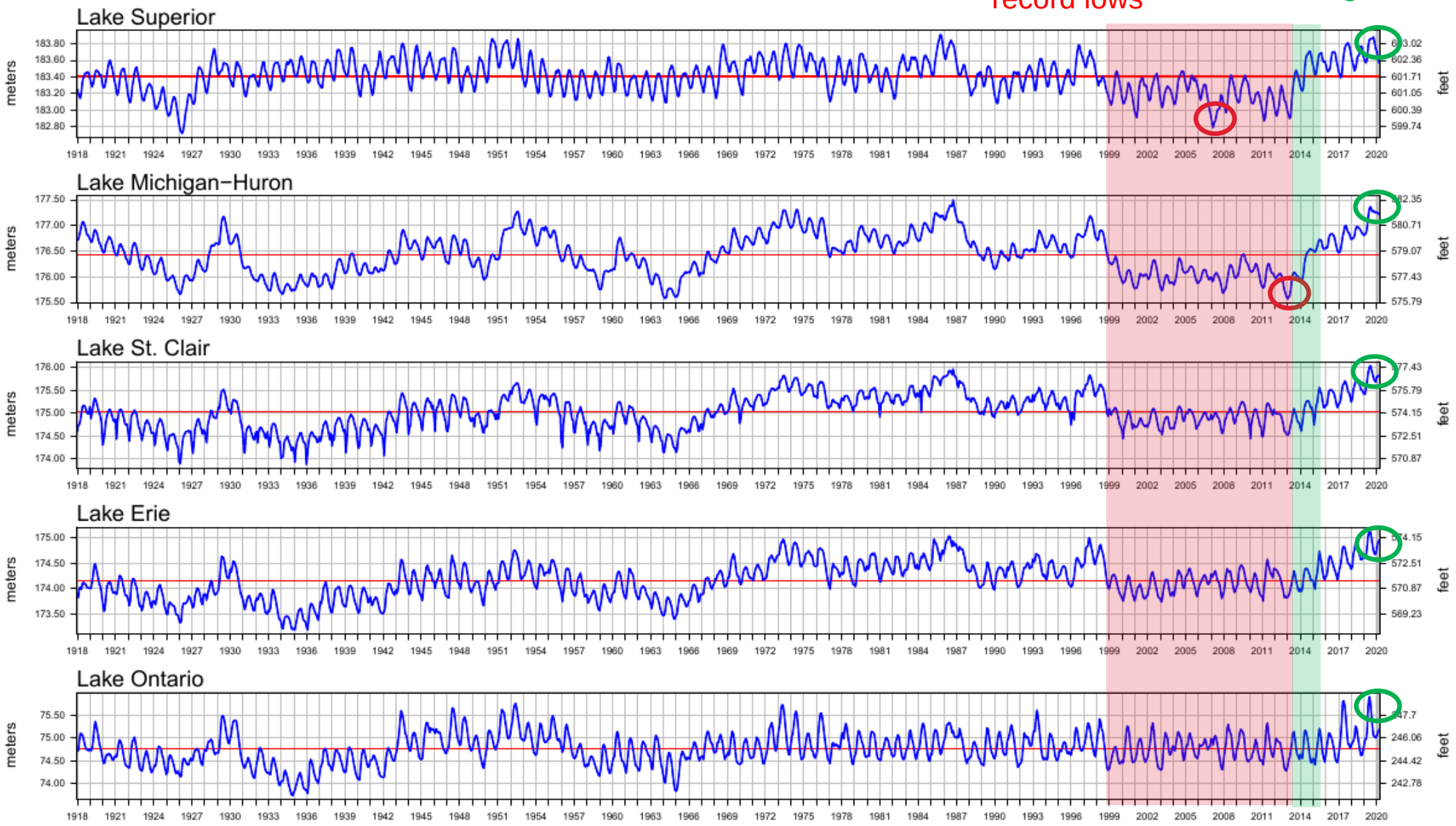
ANNUAL WATER LEVELS AND THE HYDROLOGIC CYCLE



Great Lakes Water Levels (1918–2020)

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.

GREAT LAKES WATER LEVELS

New Record Highs in 2019

- May: Superior, St. Clair, Erie
- June: Superior, St. Clair, Erie* and Ontario*
- July: Superior, St. Clair*, Erie and Ontario
- Aug: Superior (tied), St. Clair and Erie
- Sep: Superior (tied), St. Clair and Erie
- Oct: None (within 1 inch on Superior)
- Nov: None
- Dec: None (within 1 inch on Michigan-Huron)

New Record Highs in 2020

- Jan: Superior, Michigan-Huron, St. Clair (tied)
- Feb: Superior, Michigan-Huron, Erie
- Mar: Michigan-Huron, St. Clair, Erie

*highest monthly mean on record for all months

WHY ARE LEVELS SO HIGH? – WET PATTERN

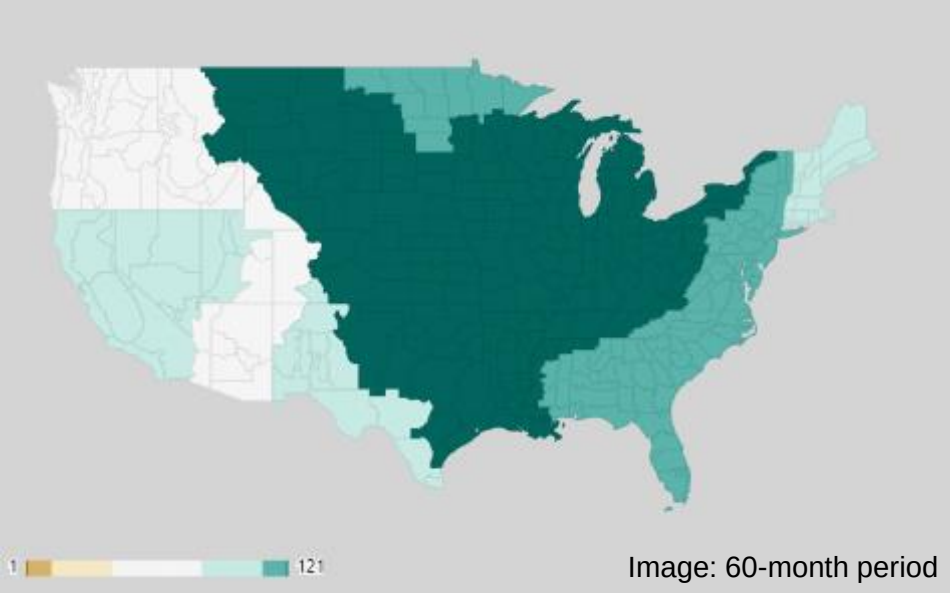


Image: 60-month period

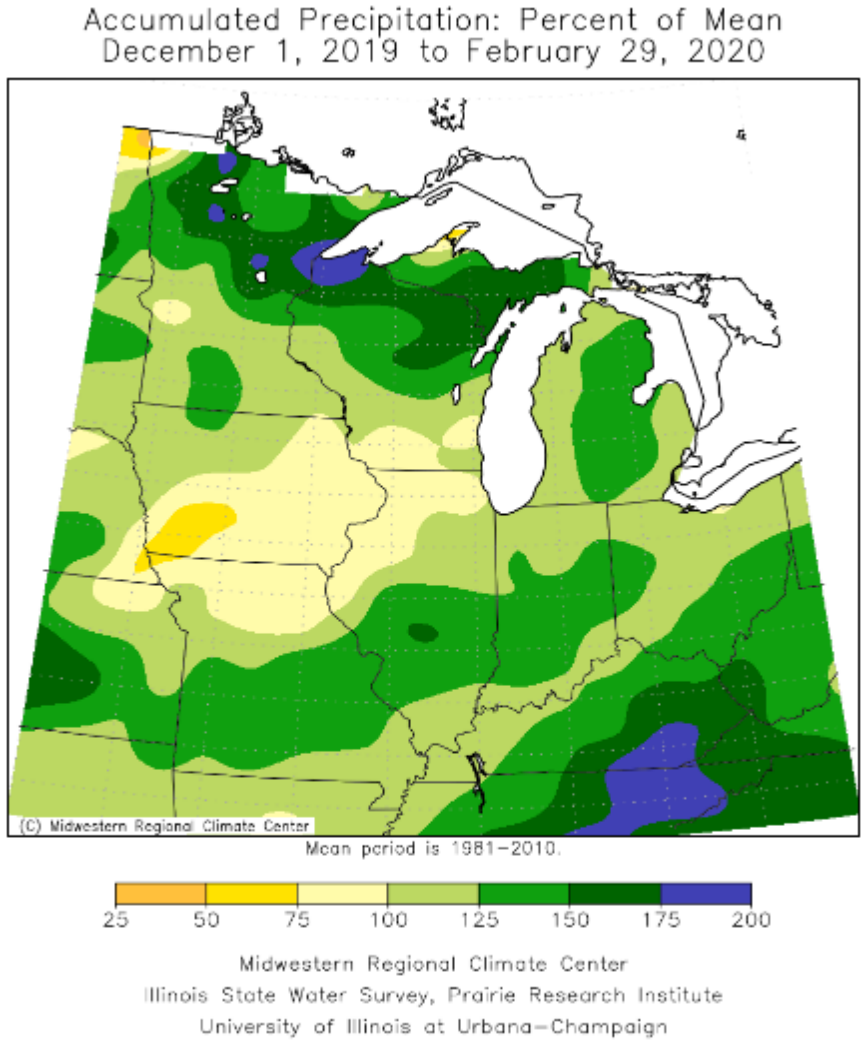
Wettest 12 – 60 month periods in 120 plus years for the Great Lakes

PERIOD	VALUE	1901-2000 MEAN	ANOMALY	RANK (1895-2020)	WETTEST/DRIEST SINCE	RECORD
Apr 2019–Mar 2020 12-Month	42.61" (1,082.29mm)	32.75" (831.85mm)	9.86" (250.44mm)	125th Driest	Driest since: 2019	1931
				1st Wettest	Wettest to Date	2020
Oct 2018–Mar 2020 18-Month	59.98" (1,523.49mm)	46.23" (1,174.24mm)	13.75" (349.25mm)	124th Driest	Driest since: 2019	1964
				1st Wettest	Wettest to Date	2020
Apr 2018–Mar 2020 24-Month	81.88" (2,079.75mm)	65.50" (1,663.70mm)	16.38" (416.05mm)	124th Driest	Driest since: 2019	1964
				1st Wettest	Wettest to Date	2020
Apr 2017–Mar 2020 36-Month	121.48" (3,085.59mm)	98.27" (2,496.06mm)	23.21" (589.53mm)	123rd Driest	Driest since: 2019	1965
				1st Wettest	Wettest to Date	2020
Apr 2016–Mar 2020 48-Month	158.07" (4,014.98mm)	131.04" (3,328.42mm)	27.03" (686.56mm)	122nd Driest	Driest since: 2019	1937
				1st Wettest	Wettest to Date	2020
Apr 2015–Mar 2020 60-Month	196.27" (4,985.26mm)	163.78" (4,160.01mm)	32.49" (825.25mm)	121st Driest	Driest since: 2019	1935
				1st Wettest	Wettest to Date	2020

NOAA National Centers for Environmental information, Climate at a Glance

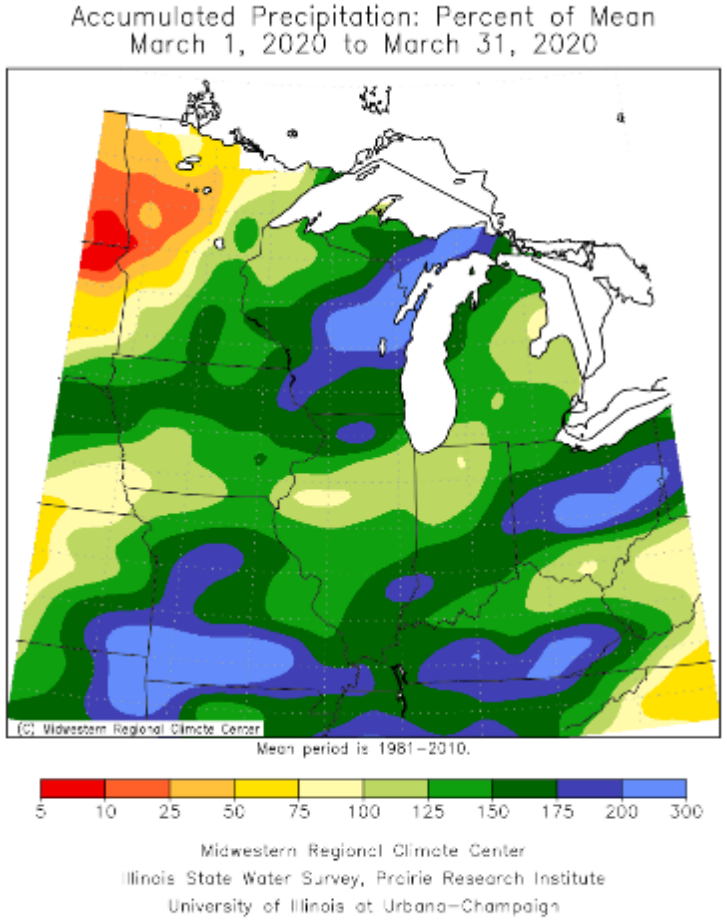
WINTER PRECIPITATION CONDITIONS

Winter Precipitation Above Average



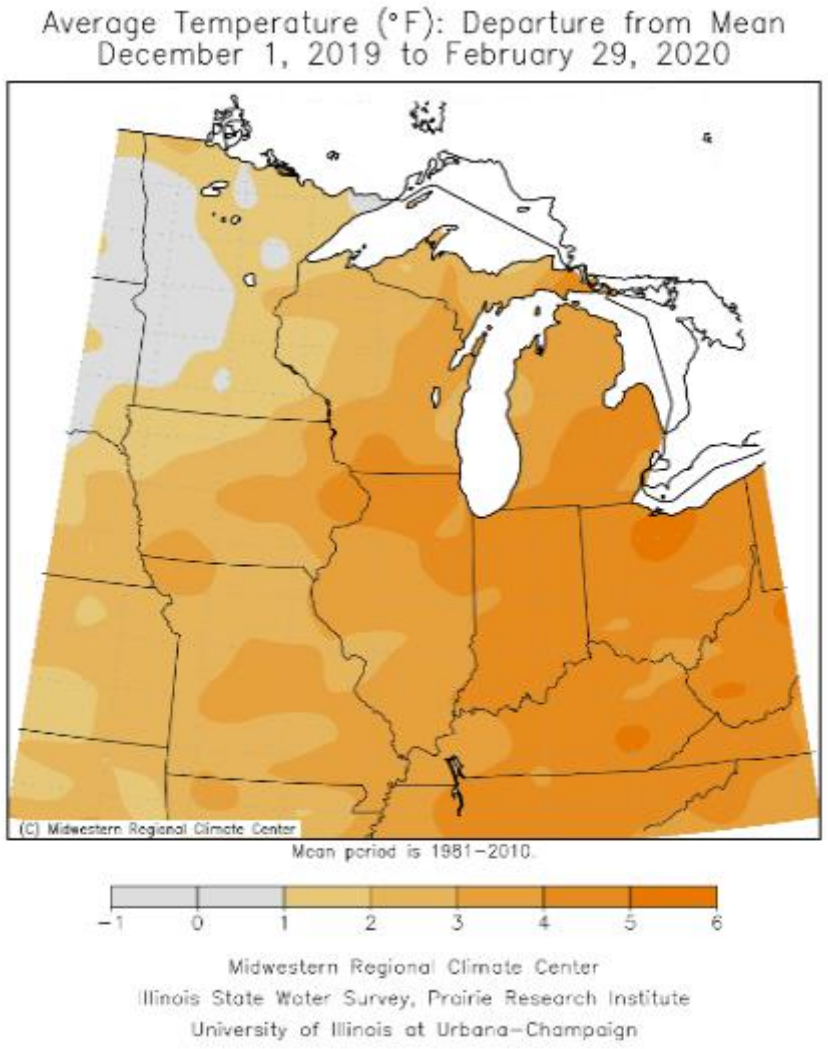
- December and January were generally wetter than average
- February precipitation was well below average

March Precipitation Above Average



WINTER TEMPERATURE CONDITIONS

Winter Temperature Above Average



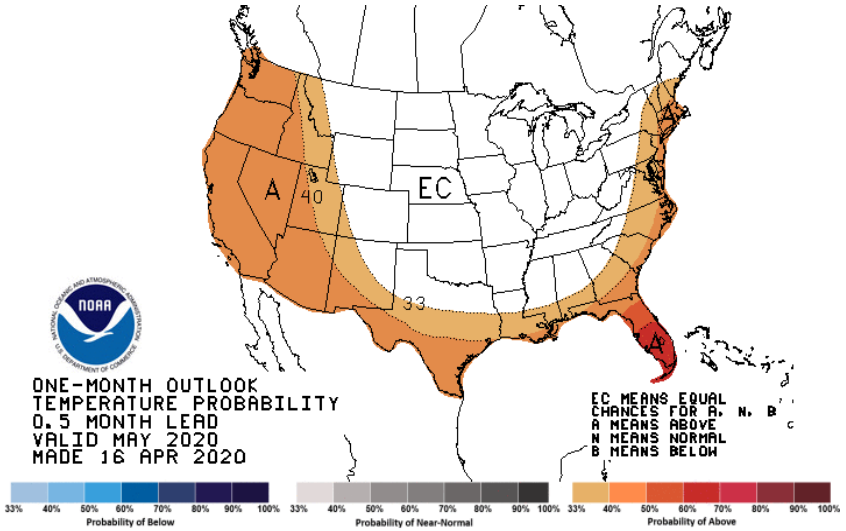
- Warmer than average temperatures in December and January reduced the amount of evaporation off of the lakes.
- Although February was also warmer than average over the entire month, a few cold air outbreaks during the month led to increased evaporation.
- March also had above average temperatures throughout the month.

MONTHLY AND SEASONAL OUTLOOKS

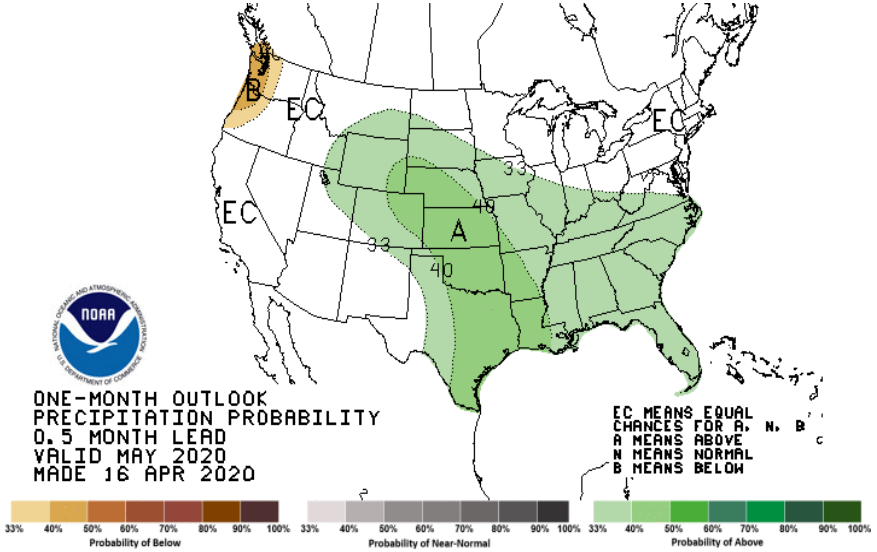
ONE MONTH OUTLOOK

May

TEMPERATURE

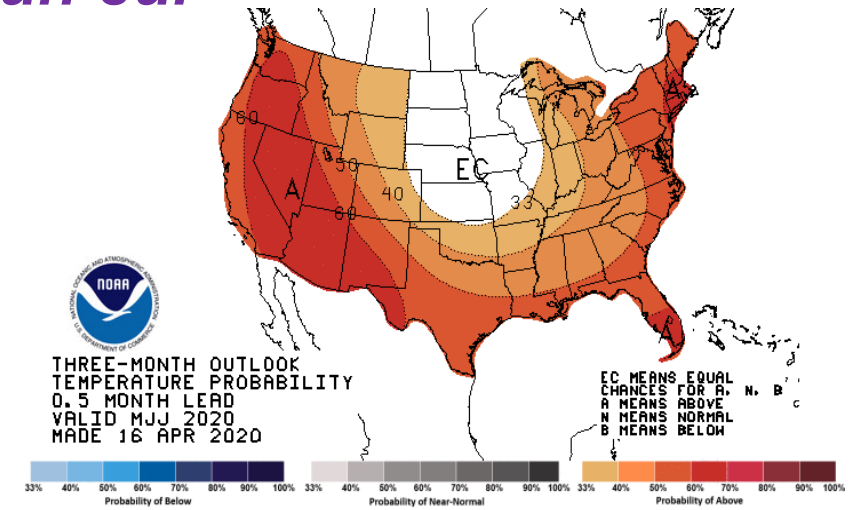


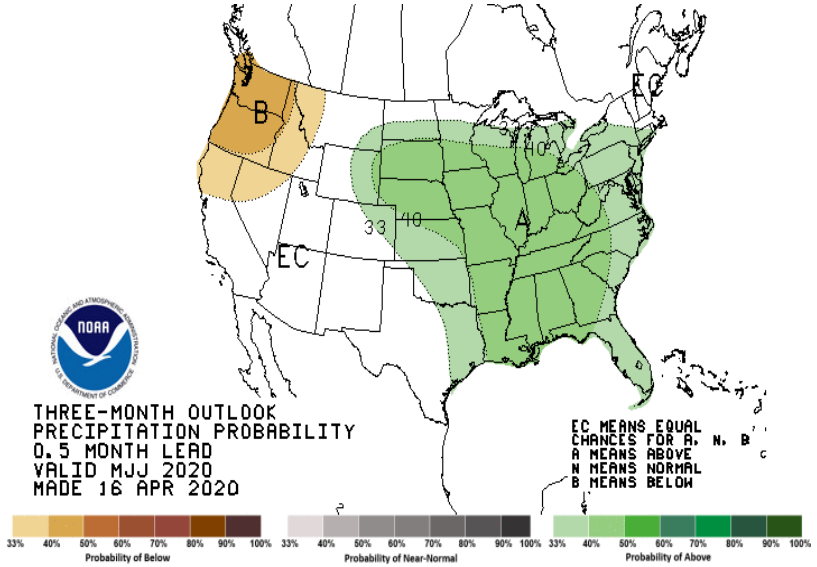
PRECIPITATION



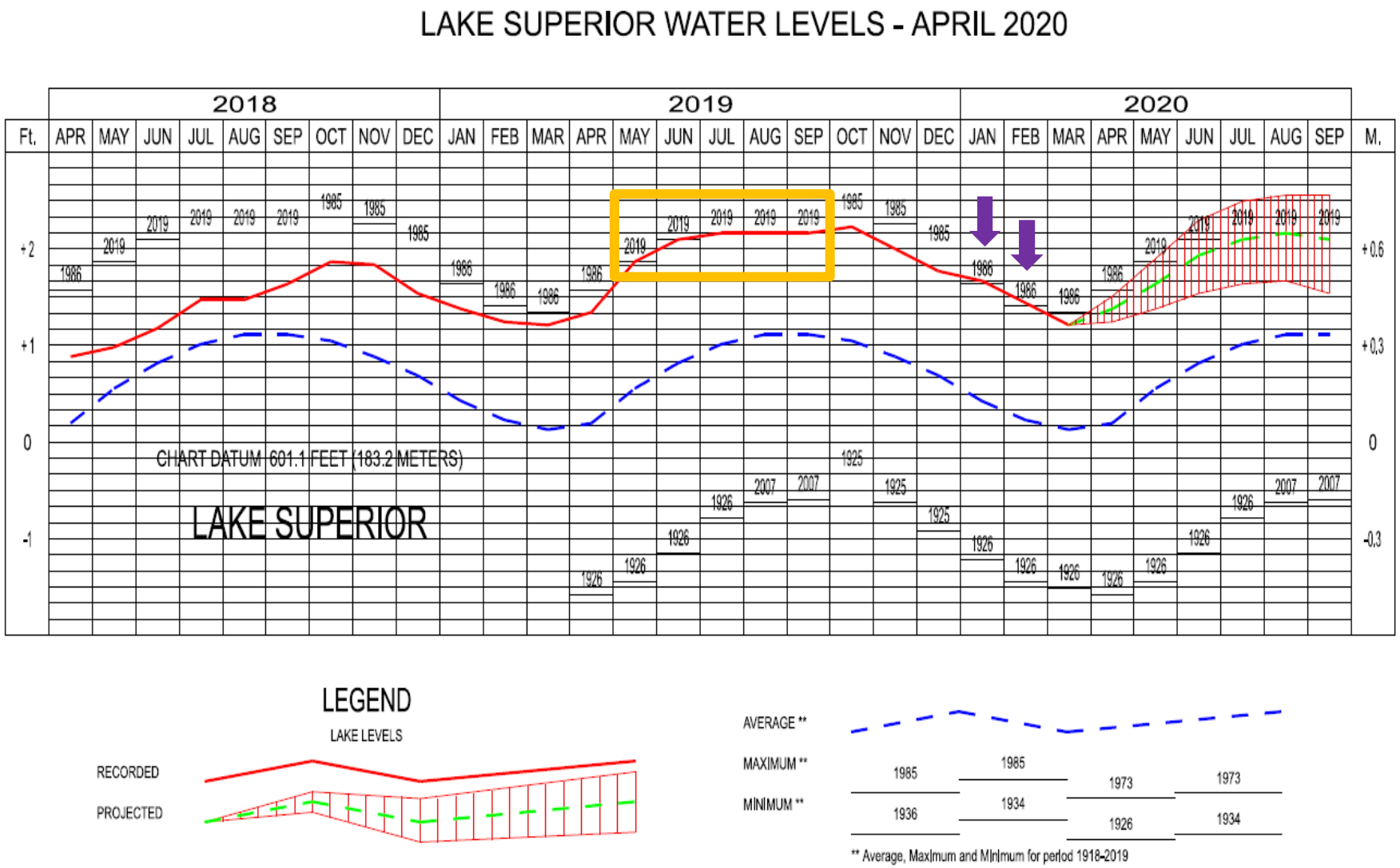
THREE MONTH OUTLOOK

May-Jun-Jul





6-MONTH FORECAST (APRIL-SEPTEMBER)



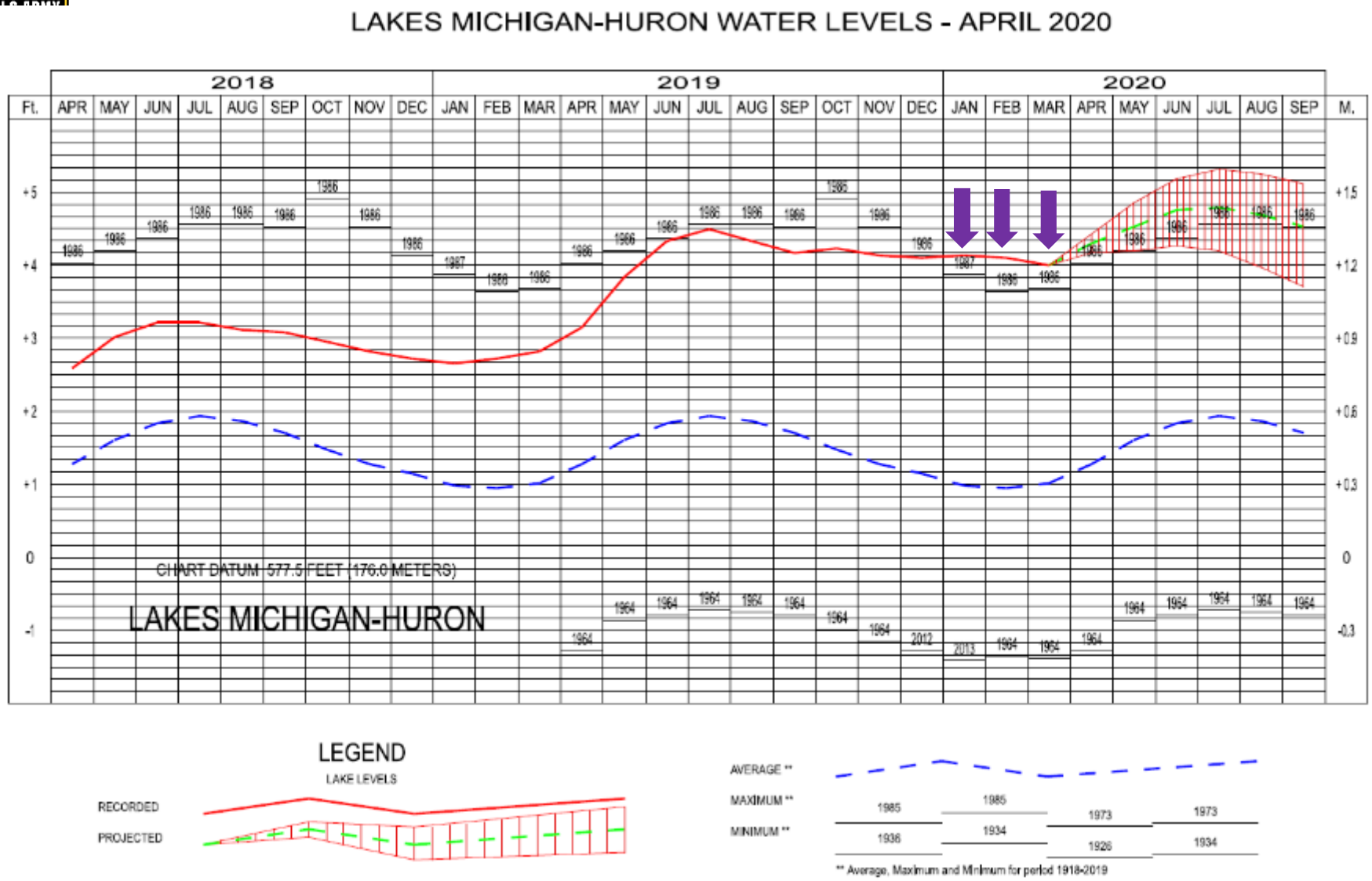
- 2019 Records
- 2020 Provisional Record

Projected Levels (dashed green line):

- Forecast to begin seasonal rise in April.
- March 2020 level was the same level as it was in March 2019.
- Forecast to peak in August at the record high level set in August 2019.

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

6-MONTH FORECAST (APRIL-SEPTEMBER)



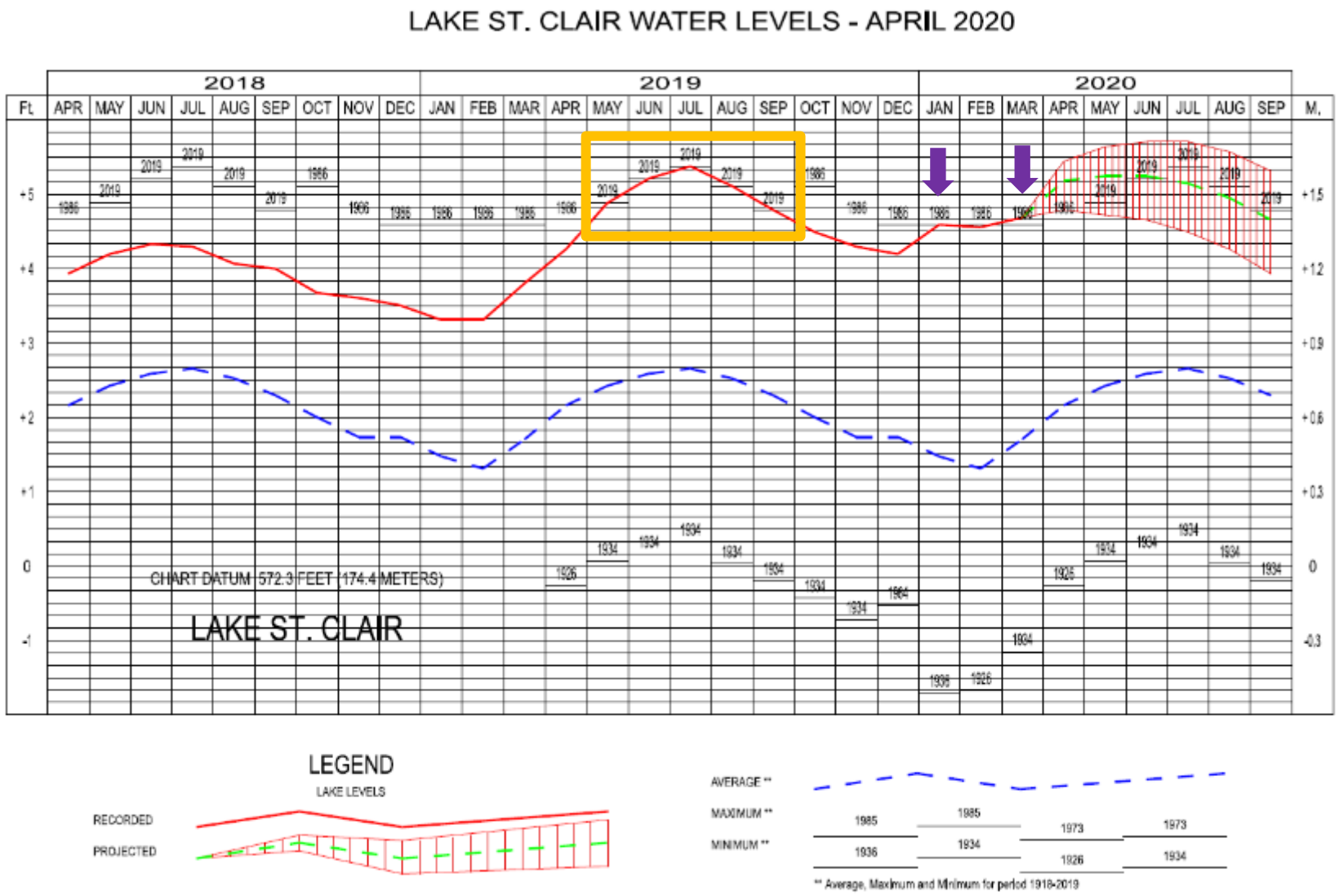
- 2019 Records
- 2020 Provisional Record

Projected Levels (dashed green line):

- Forecast to begin seasonal rise in April.
- March level was 14 inches above March 2019 level.
- Forecast to be 2 to 5 inches above record high monthly levels through August and match the record high in Sept.

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

6-MONTH FORECAST (APRIL-SEPTEMBER)



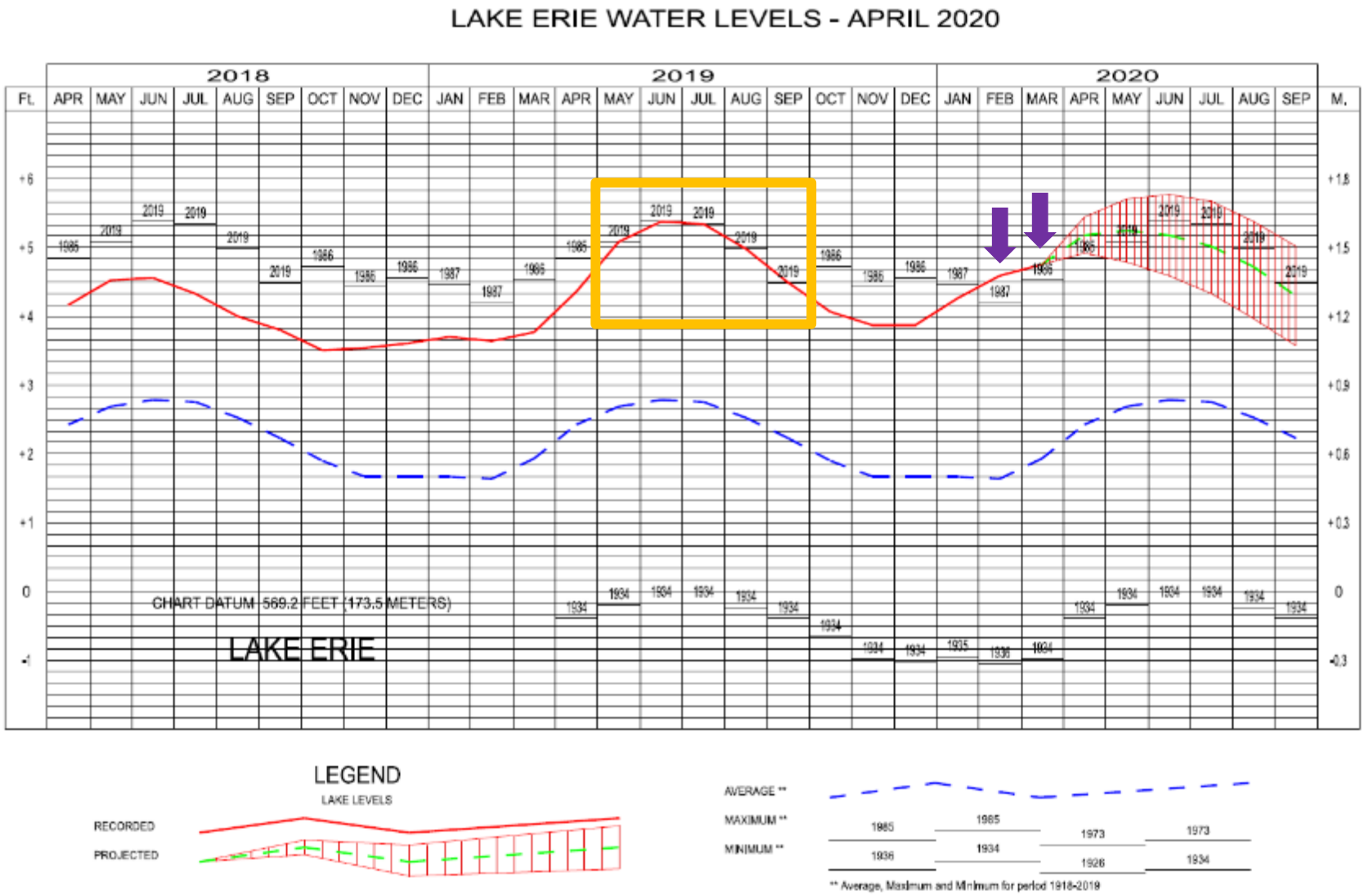
- 2019 Records
- 2020 Provisional Record

Projected Levels (dashed green line):

- In period of seasonal rise
- March level was 11 inches above March 2019 level.
- Forecast to be 4 to 6 inches above record high monthly levels in April and May, less than an inch above the record high June level, and 2 to 3 inches below record high levels July through September.

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

6-MONTH FORECAST (APRIL-SEPTEMBER)



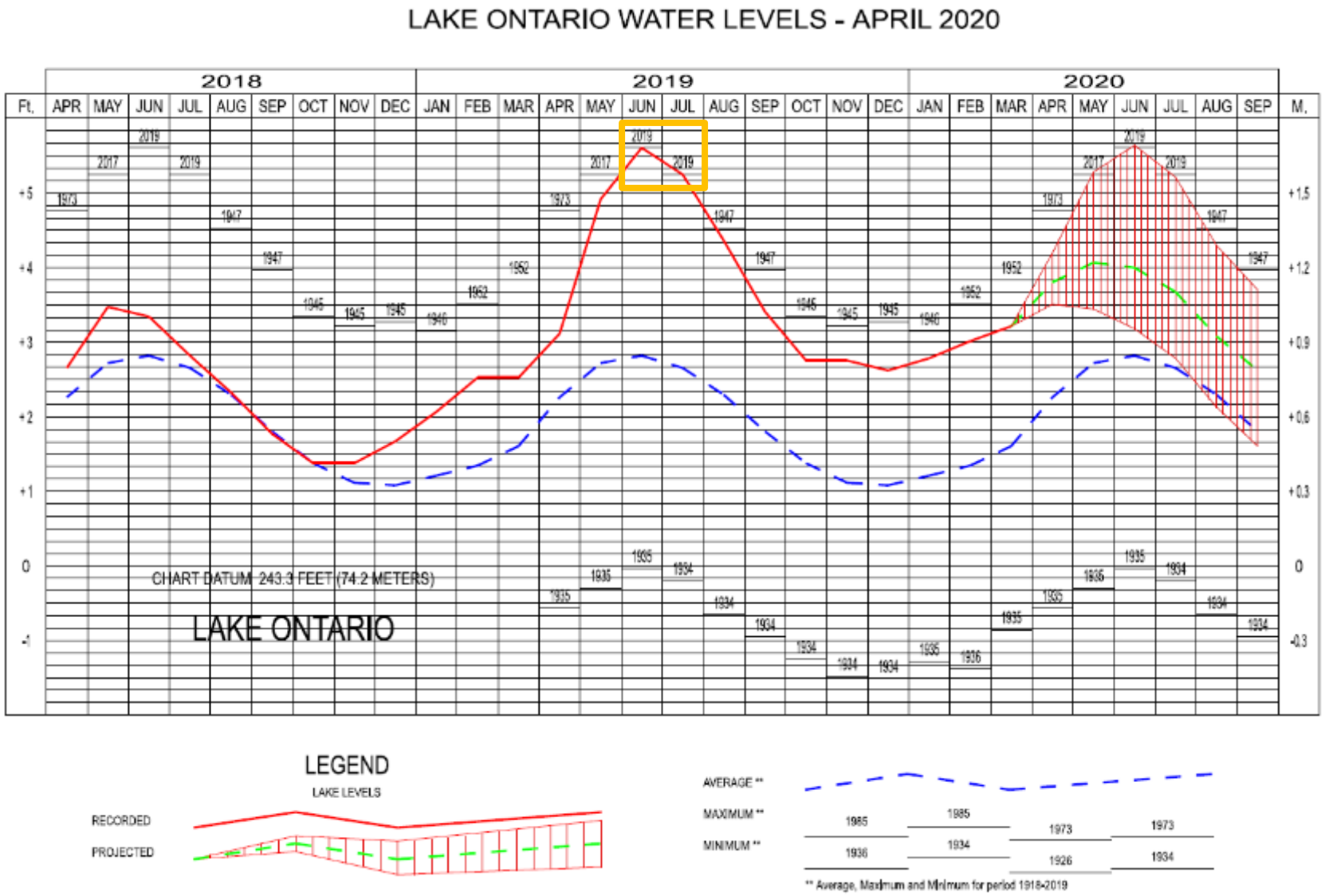
- 2019 Records
- 2020 Provisional Record

Projected Levels (dashed green line):

- In period of seasonal rise
- March level was 12 inches above March 2019 level.
- Forecast to be 2 to 4 inches above record high levels in April and May, then 2 to 4 inches below record high levels June through Sept.

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

6-MONTH FORECAST (APRIL-SEPTEMBER)



- 2019 Records
- 2020 Provisional Record

Projected Levels (dashed green line):

- In period of seasonal rise
- March level was 8 inches above March 2019 level.
- Forecast to be 9 to 19 inches above long-term average levels over next 6 months.

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

KEY POINTS

- Water levels on all the Great Lakes started 2020 higher than 2019.
- Lakes St. Clair, Erie, and Ontario are forecast to peak below 2019 levels. Lakes Superior and Michigan-Huron are forecast match or exceed peak levels of last year.
- Water level fluctuations are primarily driven by weather patterns
- Regulation of outflows (St. Marys and St. Lawrence) cannot prevent extreme high or low water levels nor fully control water levels
- Impacts of high water to be felt across the basin well into 2020…this will be a long duration event.

WATER LEVEL RESOURCES

GREAT LAKES WATER LEVEL RESOURCES AND CONTACT INFORMATION

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) 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)	https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Water-Levels/Water-Level-Forecast/
Water level observations	Current Conditions (preliminary daily lake-wide average levels and connecting channel water levels) Historical Data (long term average, maximum, and minimum Great Lakes water levels)	https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Water-Level-Data/
Basin Conditions and Other Great Lakes Information	Water Level Summaries (lake-by-lake summaries of recent conditions) Great Lakes Update Articles (periodic publications on various Great Lakes topics)	https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Basin-Conditions/
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

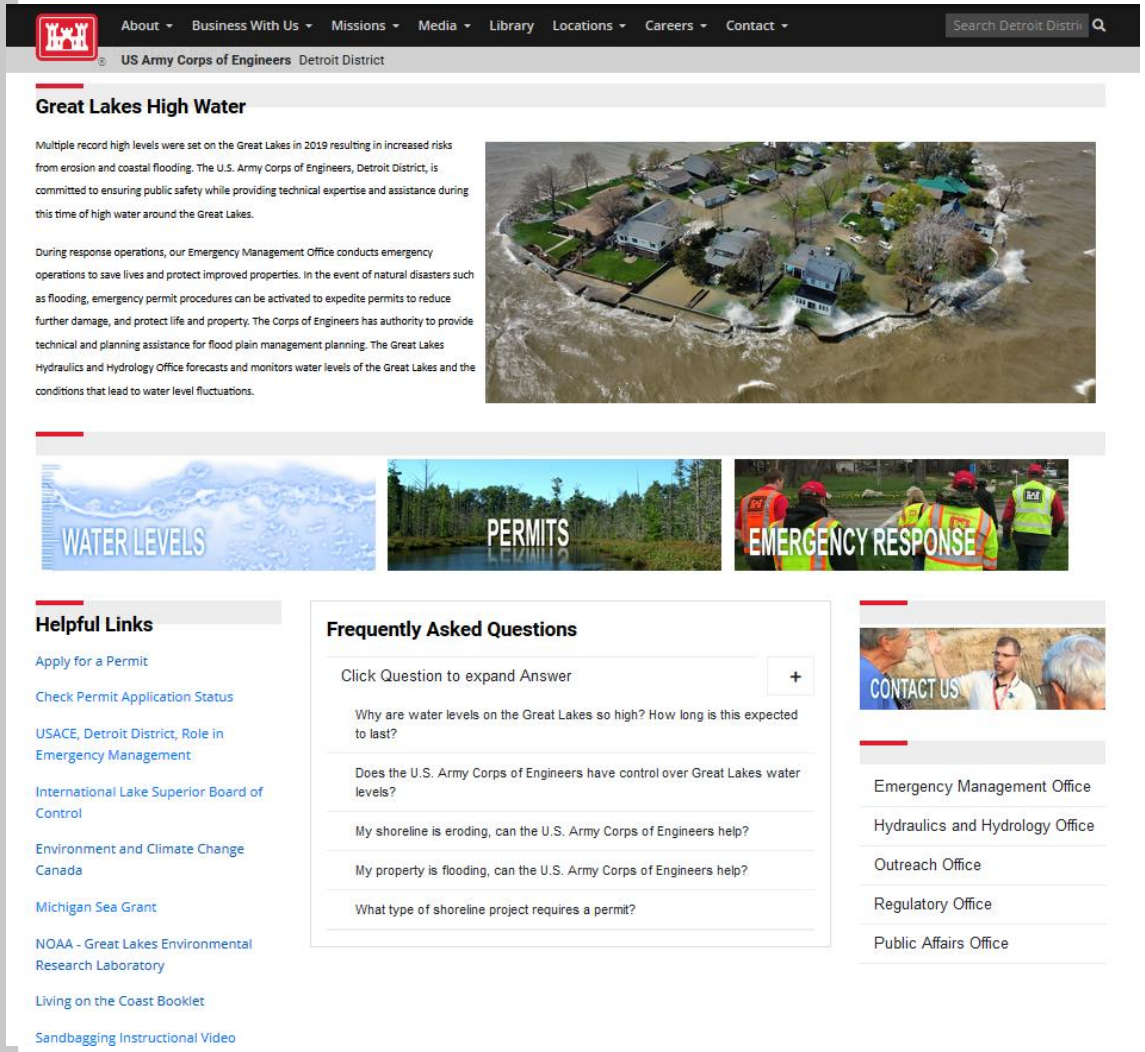
Contact Information

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/



Water Level Contacts

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