Handling High Waters: Your Guide to Rising Lake Levels

michigan municipal league

Deanna Apps, Lead Forecaster, US Army Corps of Engineers

Nick Bonstell, Director of Emergency Management, Ottawa County

Ronda Wuycheck, Coastal Management Program Manager, Water Resources Division, Department of Environment, Great Lakes, and Energy

We love where you live.

Today's Presenters:

Deanna Apps,
Lead Forecaster
US Army Corps of Engineers

Nick Bonstell,
Director of Emergency Management,
Ottawa County

Ronda Wuycheck,
Coastal Management Program Manager
Water Resources Division
Department of Environment, Great Lakes, and Energy

GREAT LAKES WATER LEVELS

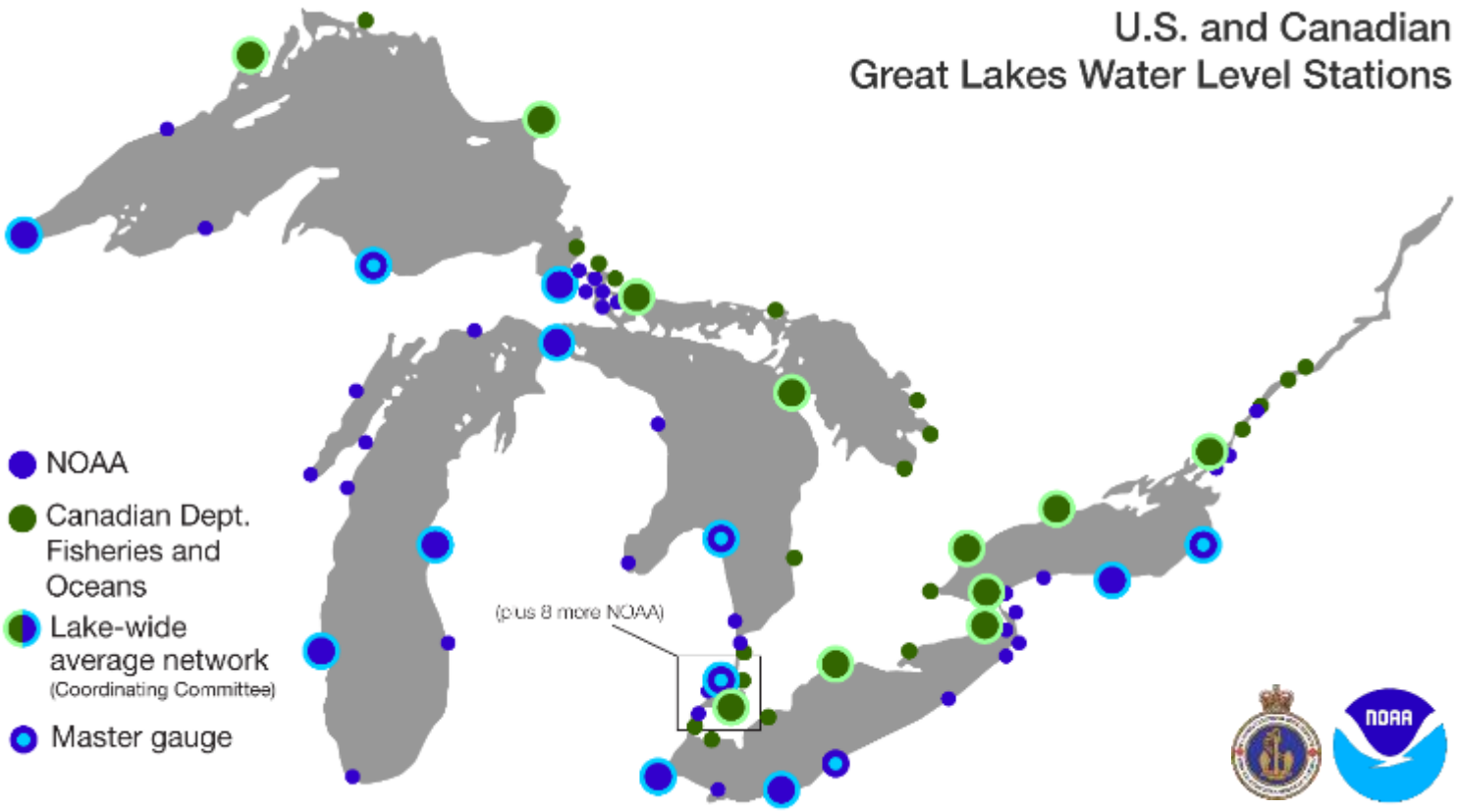
Deanna Apps

Hydraulics and Hydrology Office
Detroit District, Corps of Engineers
14 July 2020

NWS-GRR

US Army Corps of Engineers®

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

MONITORING GREAT LAKES WATER LEVELS

Current Daily Water Levels

Great Lakes Water Levels (Feet)

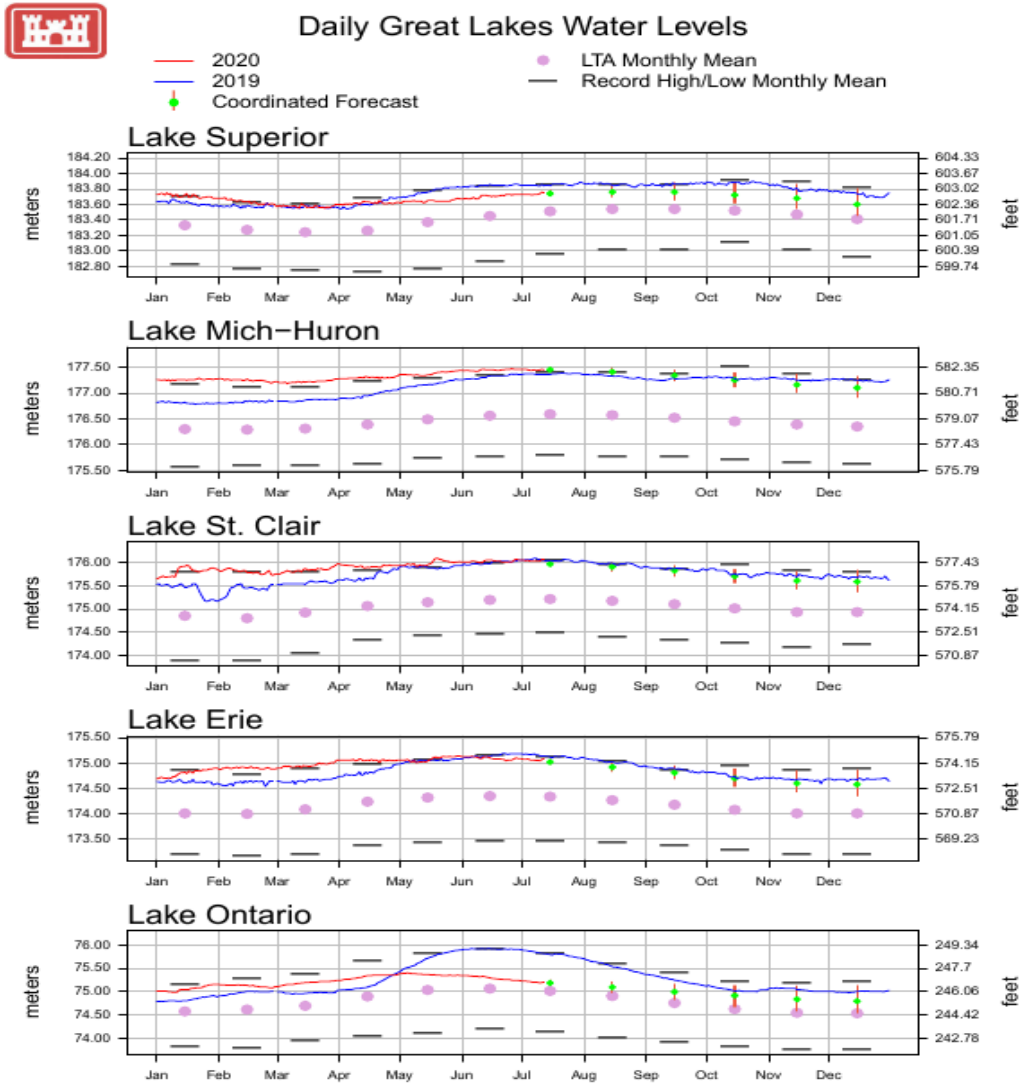
Great Lakes Water Levels

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-JUL-2020	602.78	582.21	577.58	574.42	246.80
02-JUL-2020	602.79	582.20	577.55	574.39	246.78
03-JUL-2020	602.78	582.20	577.54	574.38	246.78
04-JUL-2020	602.78	582.18	577.54	574.40	246.77
05-JUL-2020	602.77	582.16	577.51	574.36	246.75
06-JUL-2020	602.76	582.16	577.50	574.35	246.73
07-JUL-2020	602.79	582.16	577.49	574.32	246.71
08-JUL-2020	602.80	582.16	577.51	574.31	246.70
09-JUL-2020	602.80	582.14	577.50	574.31	246.68
10-JUL-2020	602.82	582.18	577.50	574.28	246.67
11-JUL-2020	602.87	582.20	577.62	574.37	246.68
12-JUL-2020	602.87	582.19	577.65	574.44	246.70
Mean:	602.80	582.18	577.54	574.36	246.73

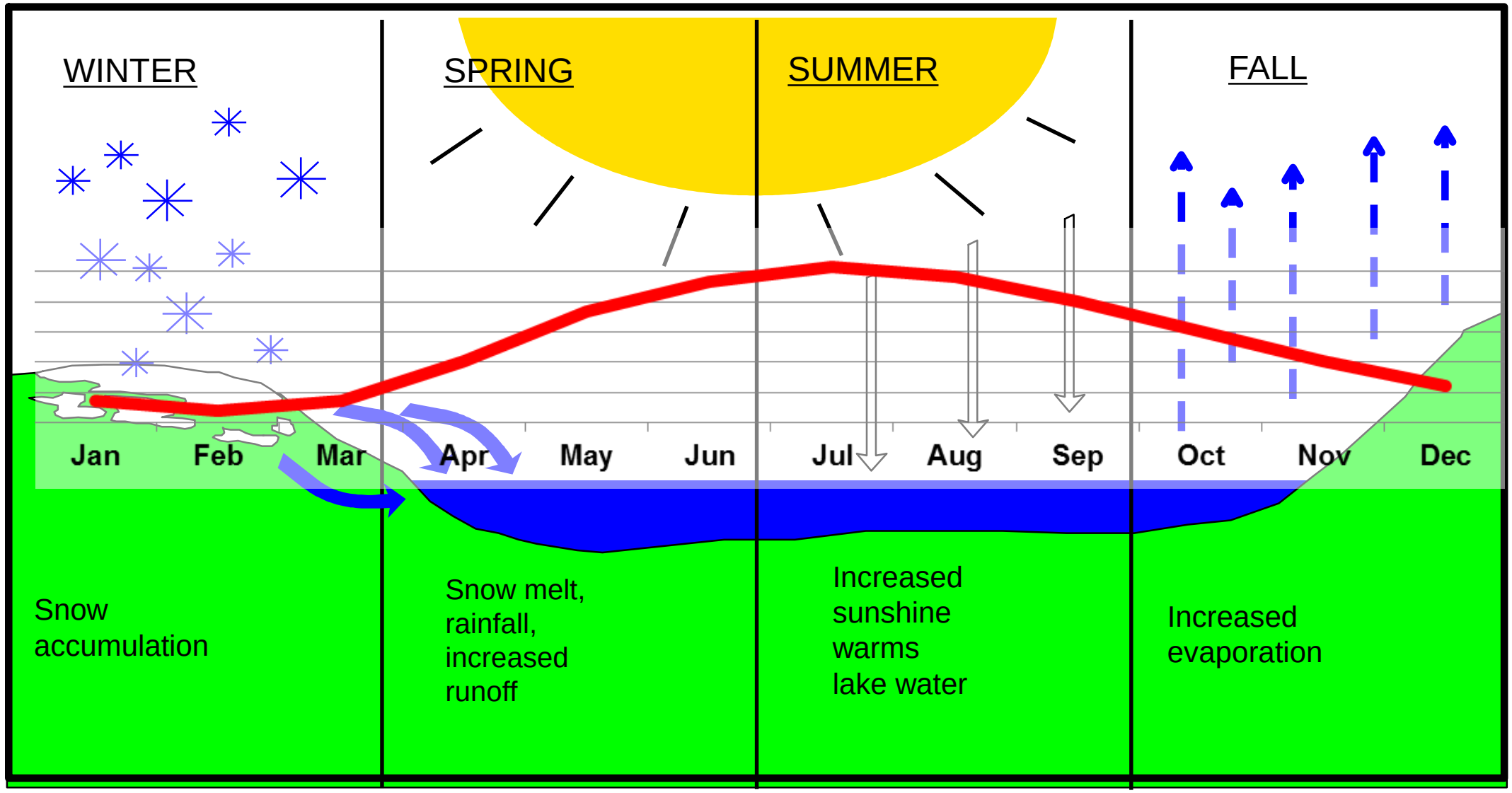
July Statistics	*Historic Water Levels*				
	Superior	Michigan Huron	St. Clair	Erie	Ontario
Avg Last Month	602.70	582.18	577.48	574.46	247.01
Avg Last Year	603.20	581.93	577.56	574.59	248.69
Minimum	600.26 (1926)	576.71 (1964)	572.51 (1934)	569.06 (1934)	243.24 (1934)
Maximum	603.22 (2019)	581.99 (1986)	577.56 (2019)	574.57 (2019)	248.69 (2019)
Long Term Avg**	602.07	579.36	574.84	571.98	246.1

* Mean levels are calculated by averaging the best available gage data at report generation and are subject to change.
** Period of Record 1918 - 2019

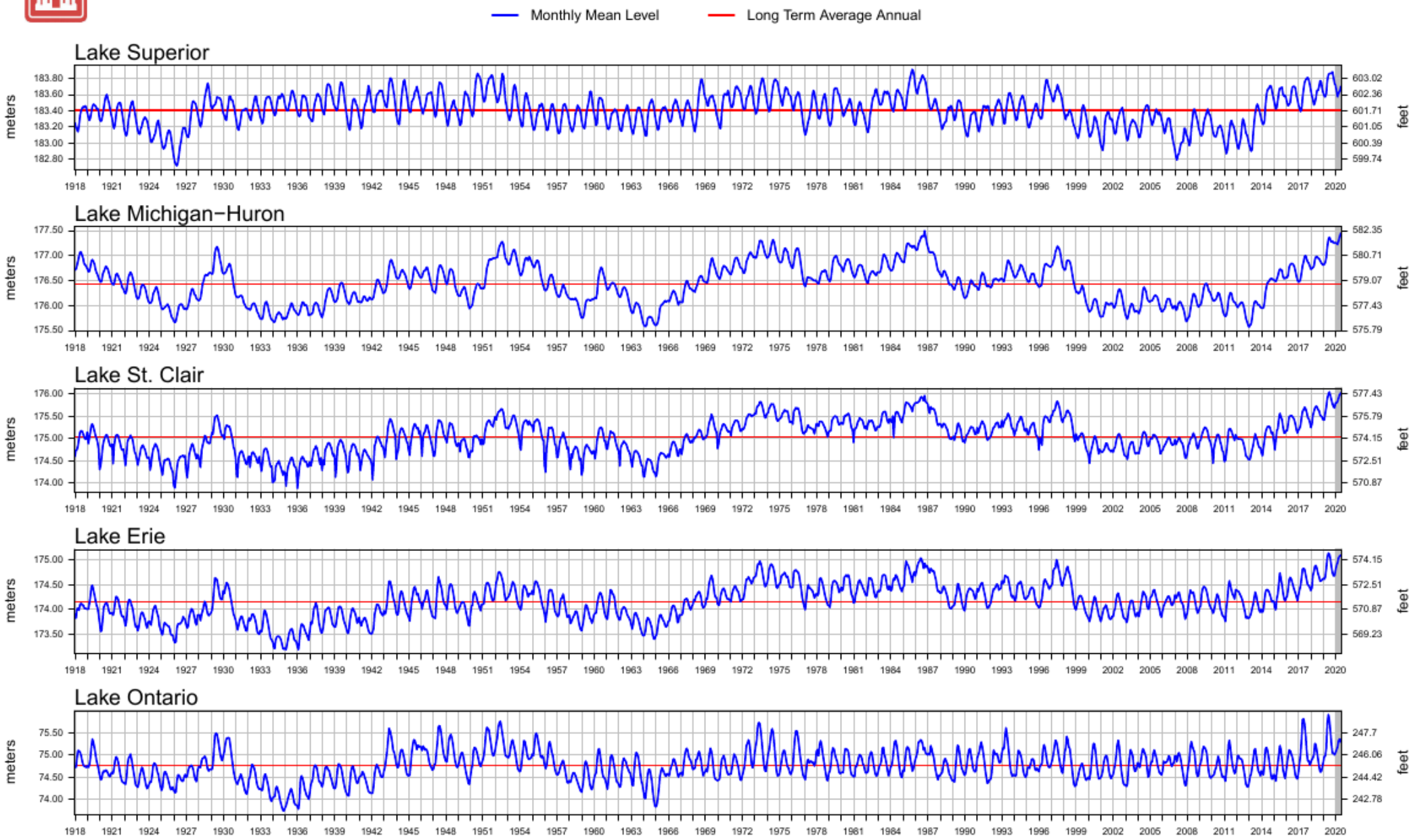


https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Information-2/Water-Level-Data/

ANNUAL WATER LEVELS AND THE HYDROLOGIC CYCLE



Great Lakes Water Levels (1918–2020)



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).

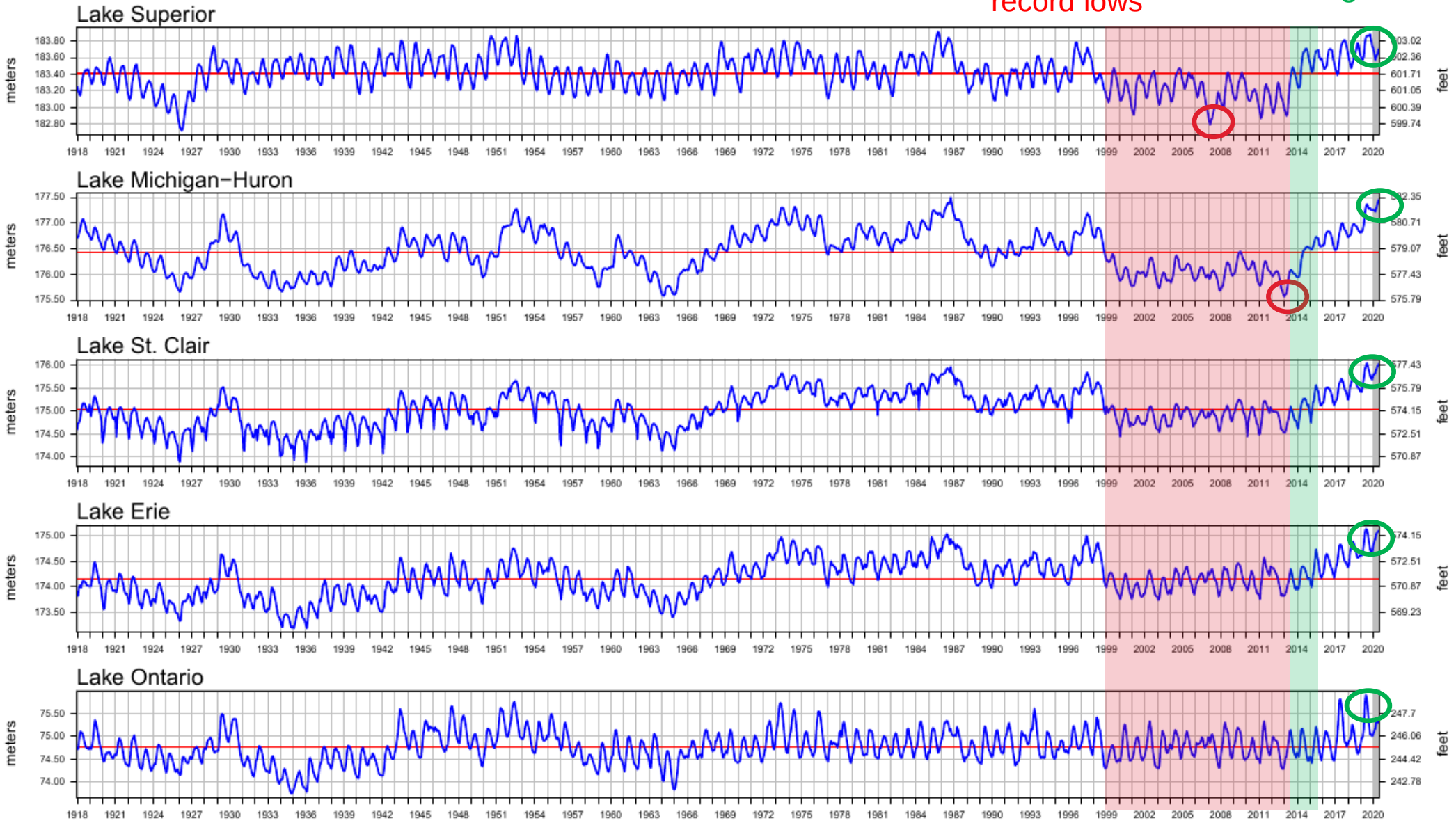
Water levels have been coordinated through 2019. Values highlighted in gray are provisional.

Great Lakes Water Levels (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).

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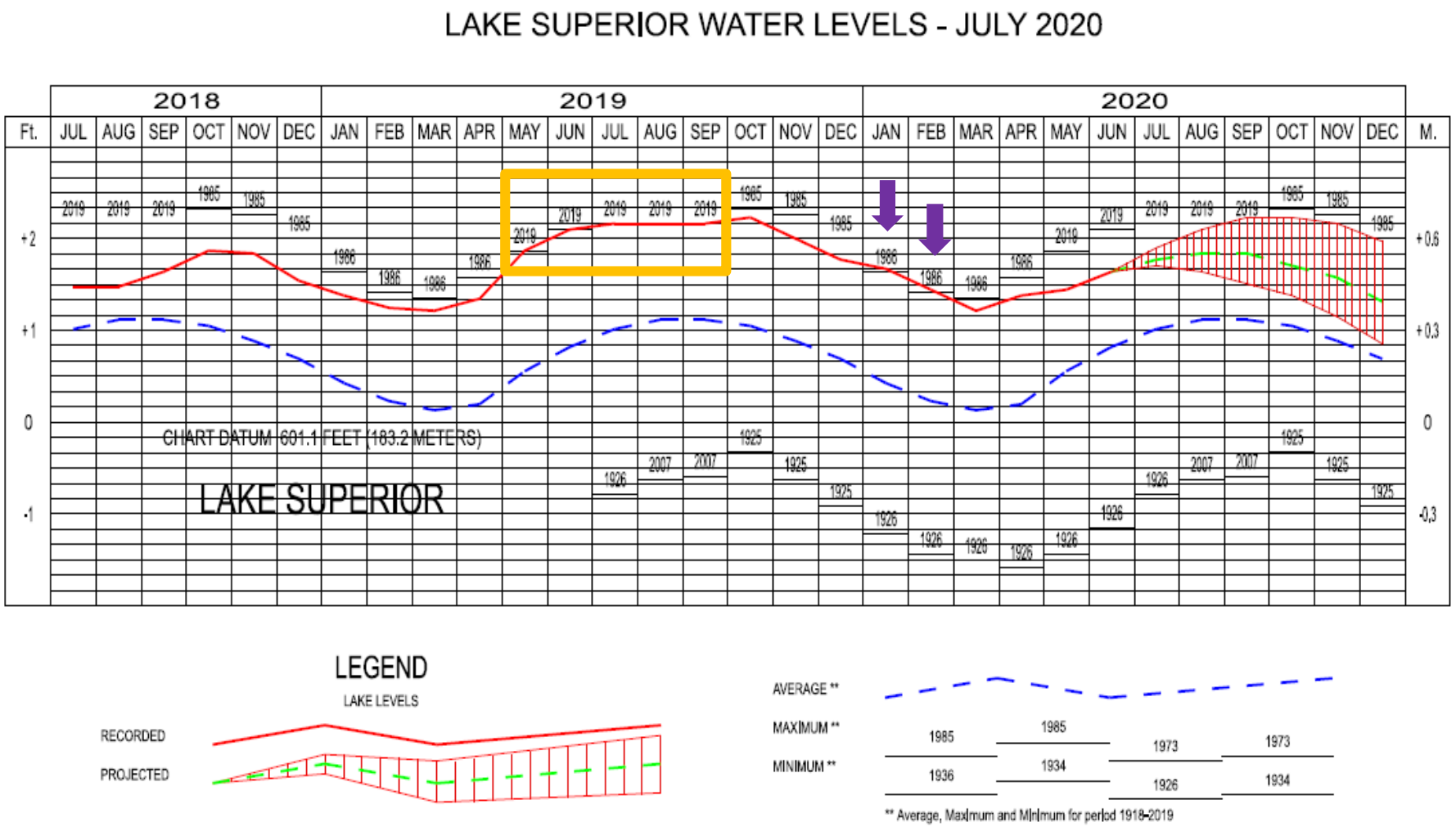
6-MONTH FORECAST (JULY-DECEMBER)



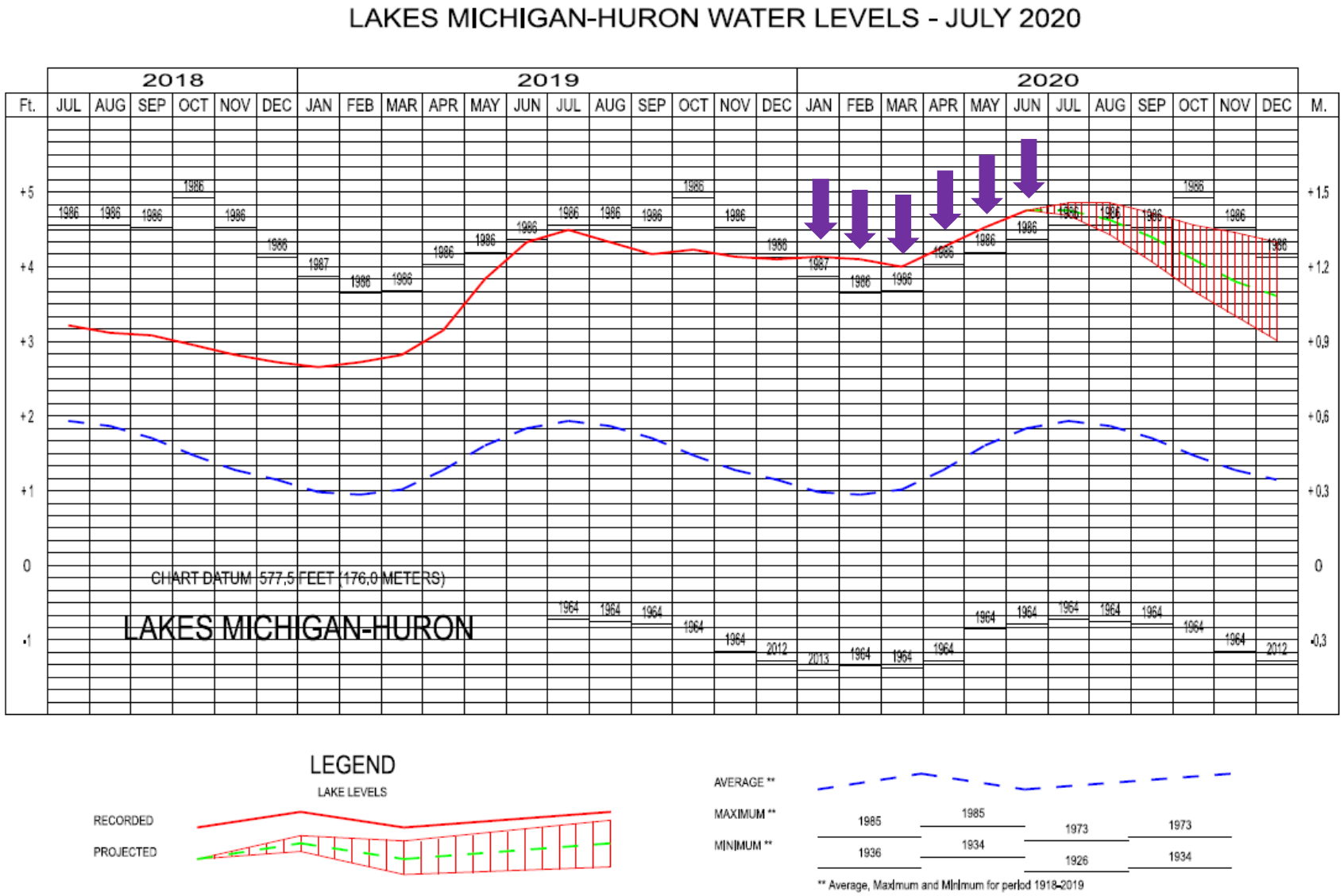
- 2019 Records
- 2020 Provisional Record

Projected Levels (dashed green line):

- In period of seasonal rise
- June 2020 level was 6 inches below June 2019 level.
- Forecast to be 4 to 8 inches below record high levels over next 6 months.

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

6-MONTH FORECAST (JULY-DECEMBER)



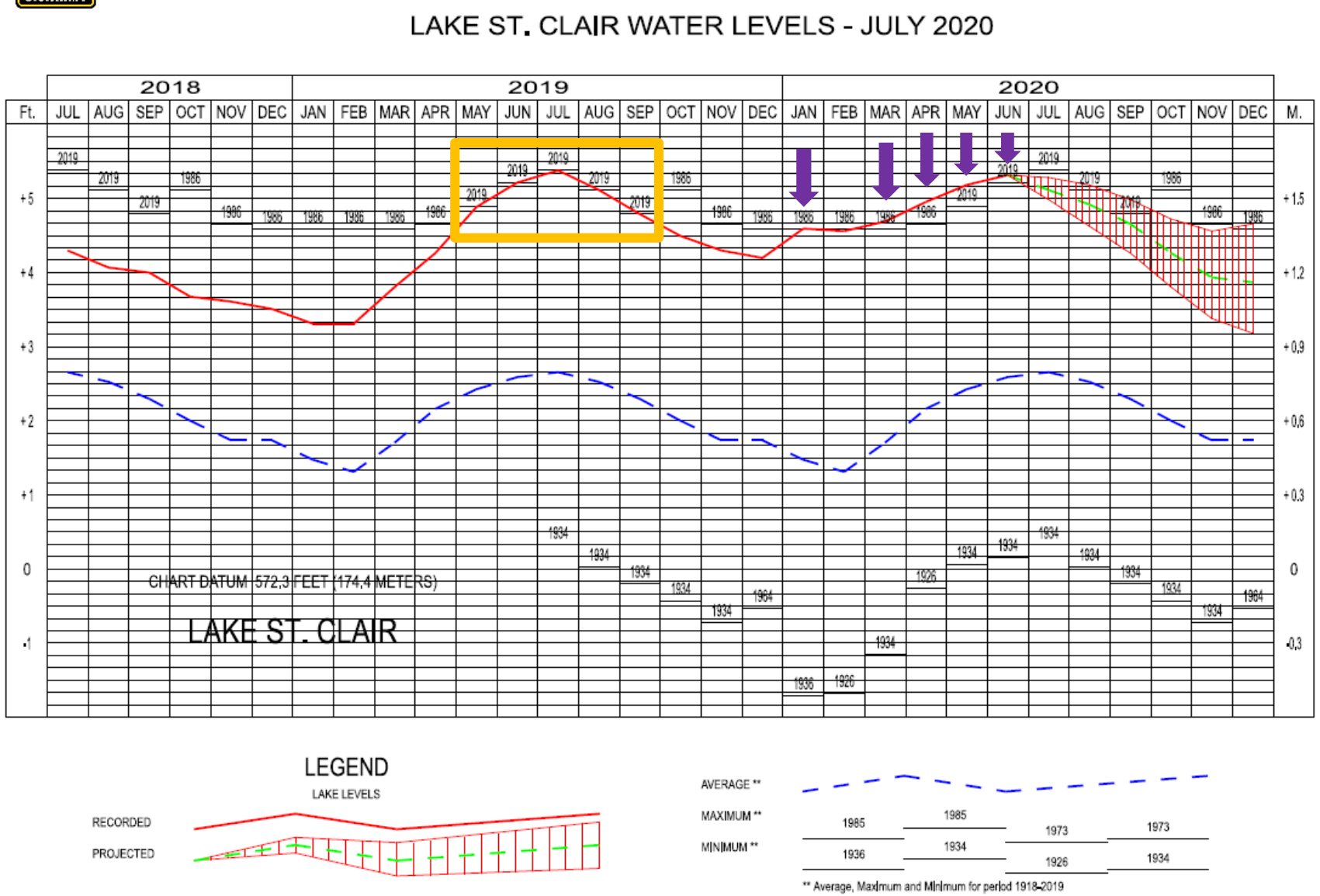
- 2019 Records
- 2020 Provisional Record

Projected Levels (dashed green line):

- Water level forecast to remain fairly steady this month
- June 2020 level was 5 inches above the June 2019 level.
- Forecast to be 1 to 2 inches above record high levels through August, 2 inches below record high in Sept., and 6 to 10 inches below record high levels Oct. to Dec.

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

6-MONTH FORECAST (JULY-DECEMBER)



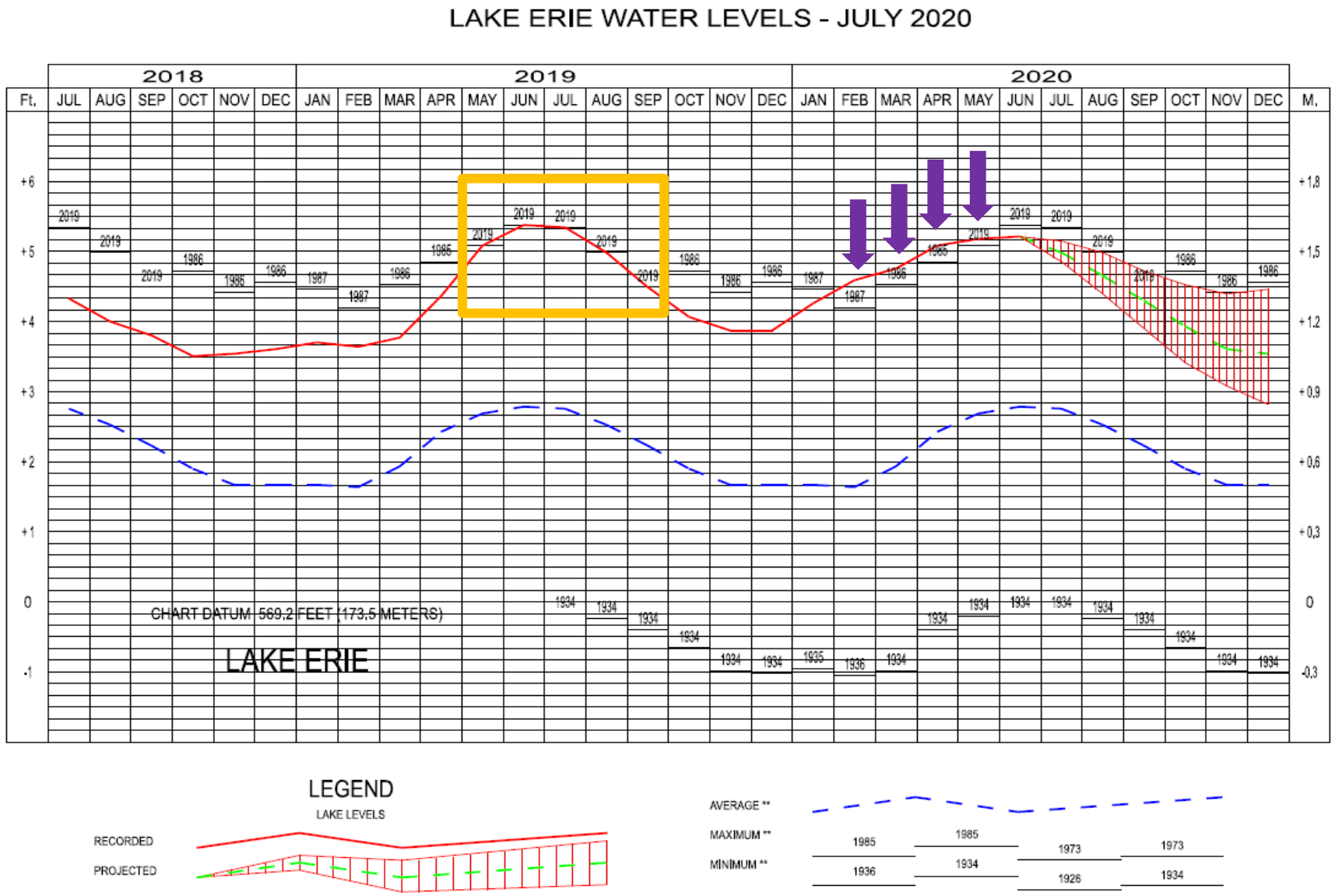
- 2019 Records
- 2020 Provisional Record

Projected Levels (dashed green line):

- Beginning period of seasonal decline
- June 2020 level was 1 inch above the June 2019 level.
- Forecast to be 2 to 3 inches below record highs from July to Sept., and 9 to 10 inches below record high levels Oct. to Dec.

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

6-MONTH FORECAST (JULY-DECEMBER)



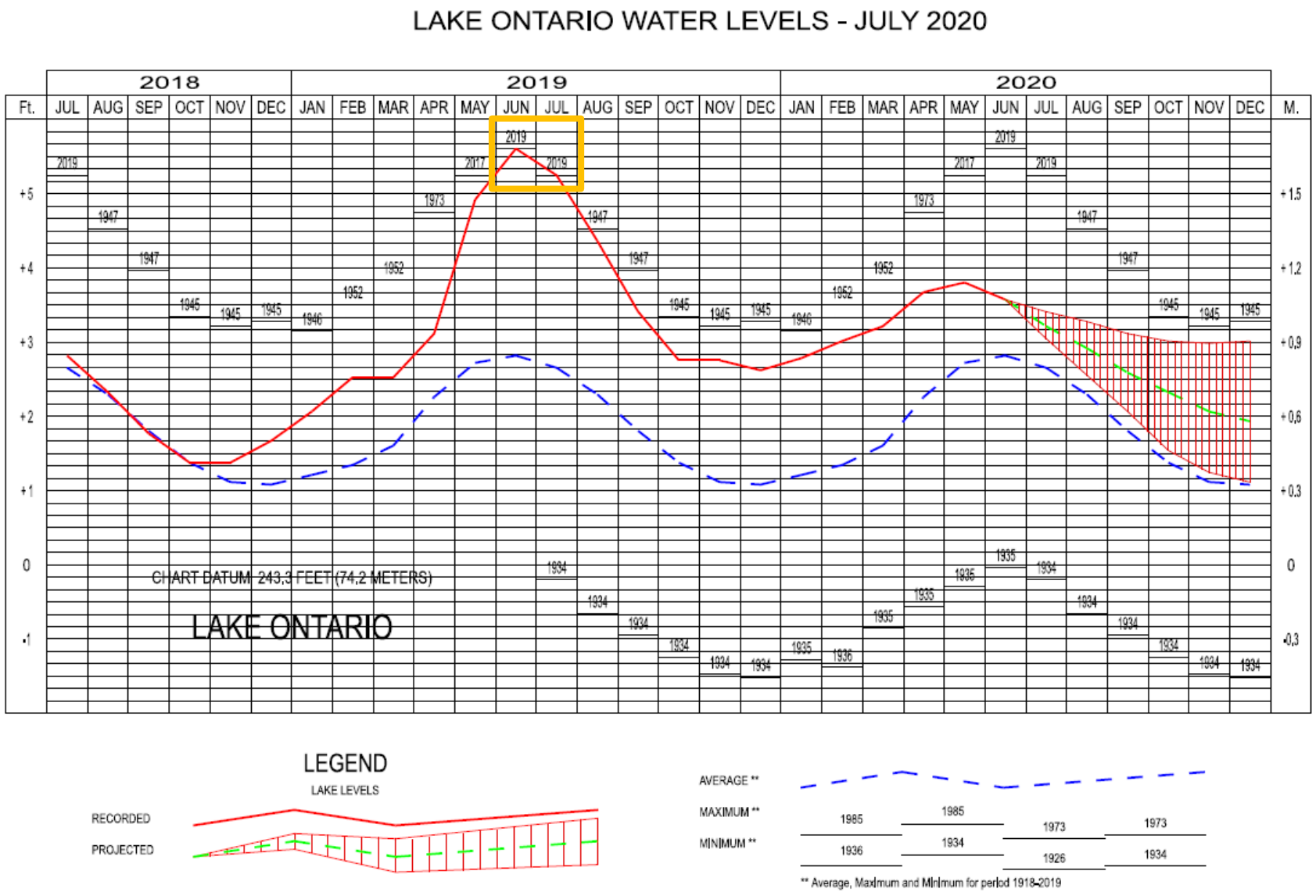
- 2019 Records
- 2020 Provisional Record

Projected Levels (dashed green line):

- Beginning period of seasonal decline
- June 2020 level was 2 inches below the June 2019 level.
- Forecast to be 2 to 4 inches below record high levels July through Sept., and 9 to 12 inches below record high levels Oct. to Dec.

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

6-MONTH FORECAST (JULY-DECEMBER)



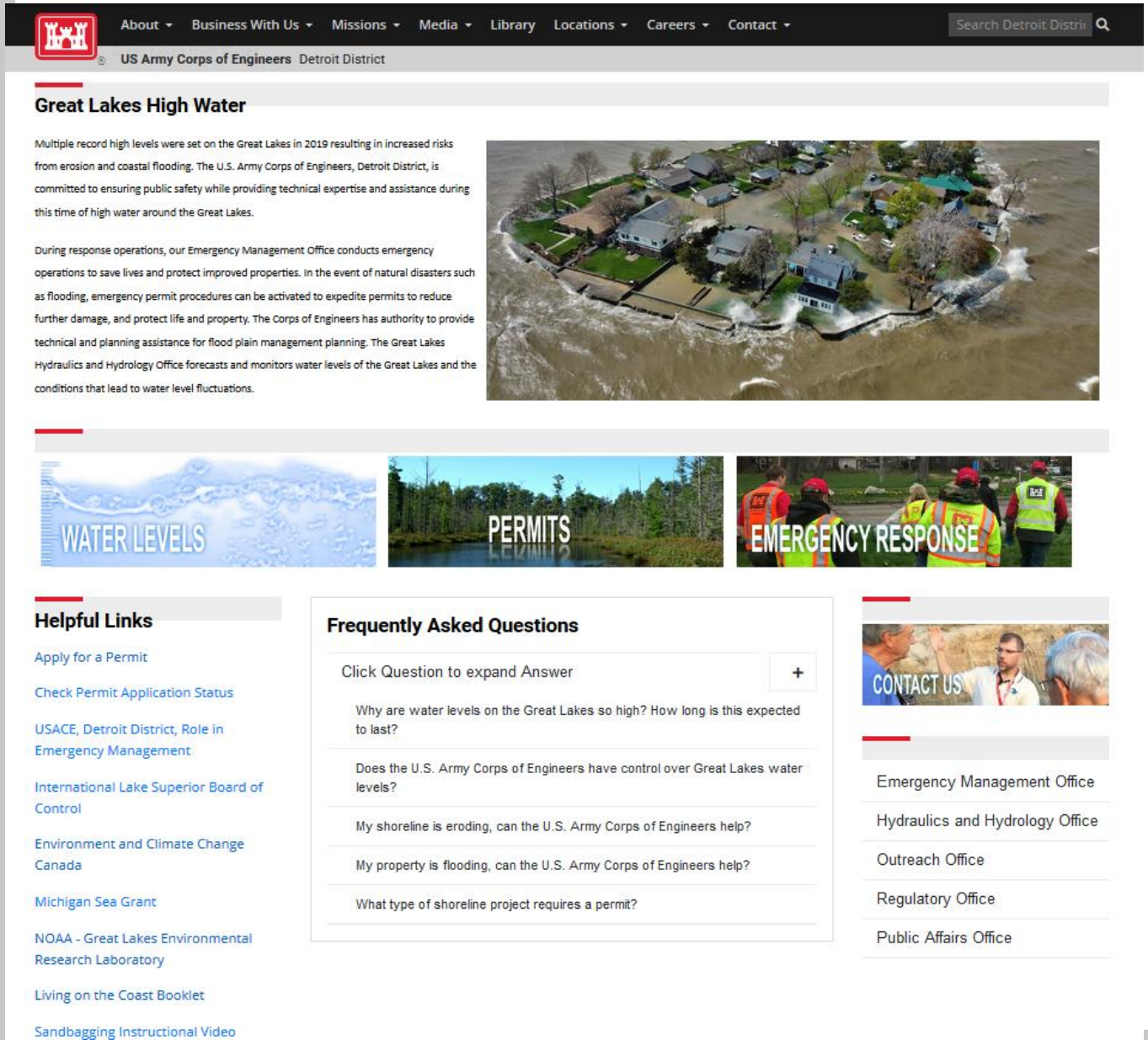
- 2019 Records
- 2020 Provisional Record

Projected Levels (dashed green line):

- In period of seasonal decline
- June 2020 level was 24 inches below the June 2019 level.
- Forecast to be 12 to 24 inches below record high levels, but 7 to 11 inches above average levels over the next 6 months.

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

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



Water Level Contacts

John Allis
313 226 2137
John.t.allis@usace.army.mil

Deanna Apps
313 226 2979
Deanna.Apps@usace.army.mil

How can the Army Corps of Engineers help my community?

1. Immediate emergency assistance
2. Long-term solutions

USACE DISASTER RESPONSE

- USACE has the authority to provide disaster response assistance to communities in response to flooding
  - Technical Assistance: knowledge products (e.g. data, maps, training)
  - Direct Assistance: flood fight supplies (e.g. sandbags, HESCO) on a reimbursable basis

- **Erosion cannot be addressed by USACE under emergency response authorities**

- A request for assistance must be made from the State Emergency Management Agency to USACE

- Questions about emergency management?
  - Contact your local emergency management agency (city or county)
  - USACE Detroit District Emergency Management: CELRE-EOC@usace.army.mil

USACE RESPONSE TO EROSION

- USACE is a regulatory agency that has permitting authority for work along the lakeshore in conjunction with EGLE
  - For more information visit: https://www.lre.usace.army.mil/Missions/Regulatory-Program-and-Permits/Apply-For-A-Permit

- USACE also has the ability to complete studies and/or construction to address erosion and/or other flood mitigation issues at the community level under non-emergency authorities
  - To learn more about the full catalog of USACE programs visit: https://www.lre.usace.army.mil/Missions/Planning/Technical-Planning-Assistance/

Emergency Management for Coastal Communities

How did we get here?

Record Rainfall

(1, 3, and 5 Year)

2019-2020

High Lake Michigan Water Levels combined with Strong Storms

Historic Erosion and Long Term Flooding

Lakeshore Erosion

- First noticed Erosion in Early June, 2019

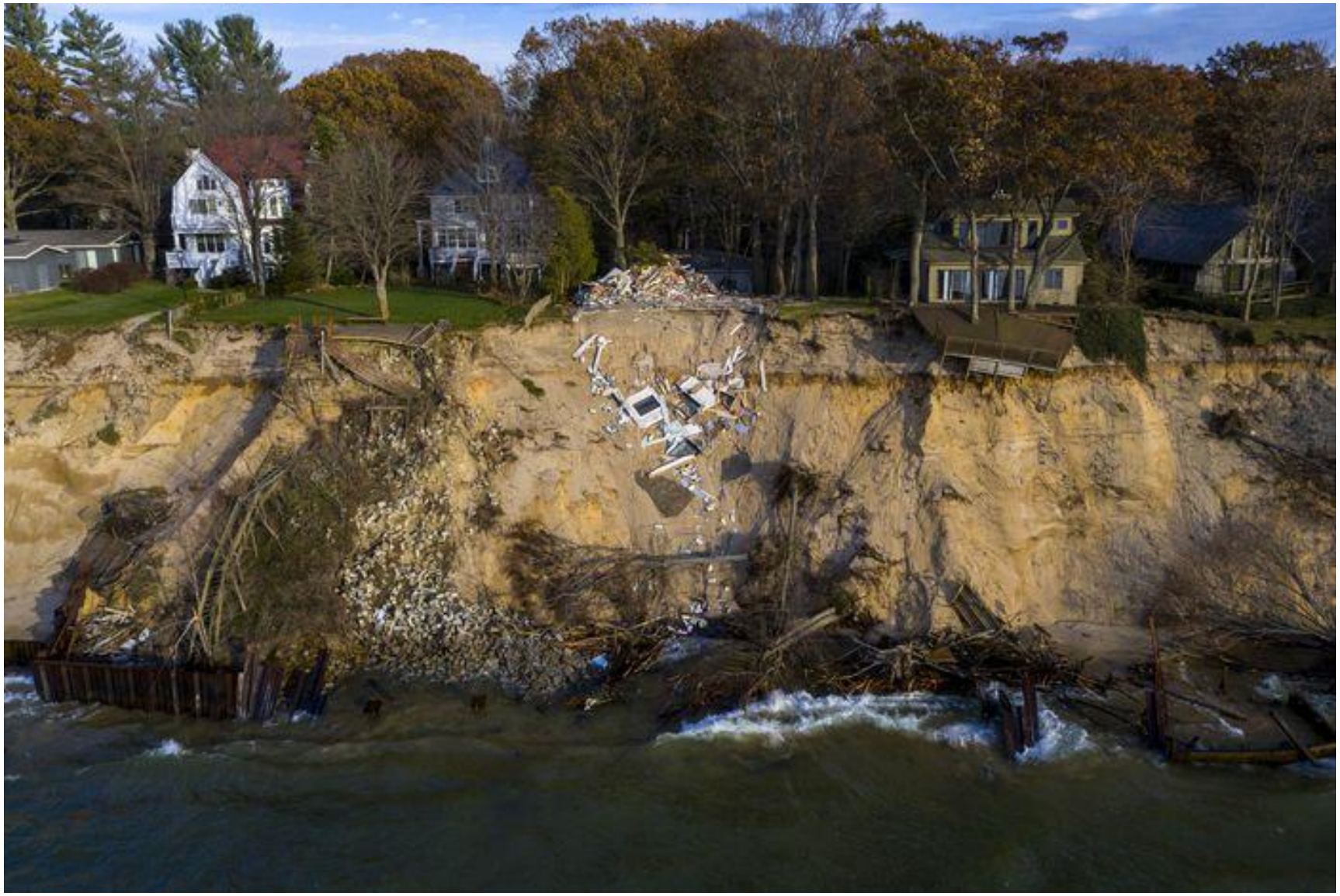
Lakeshore Erosion

Lakeshore Erosion

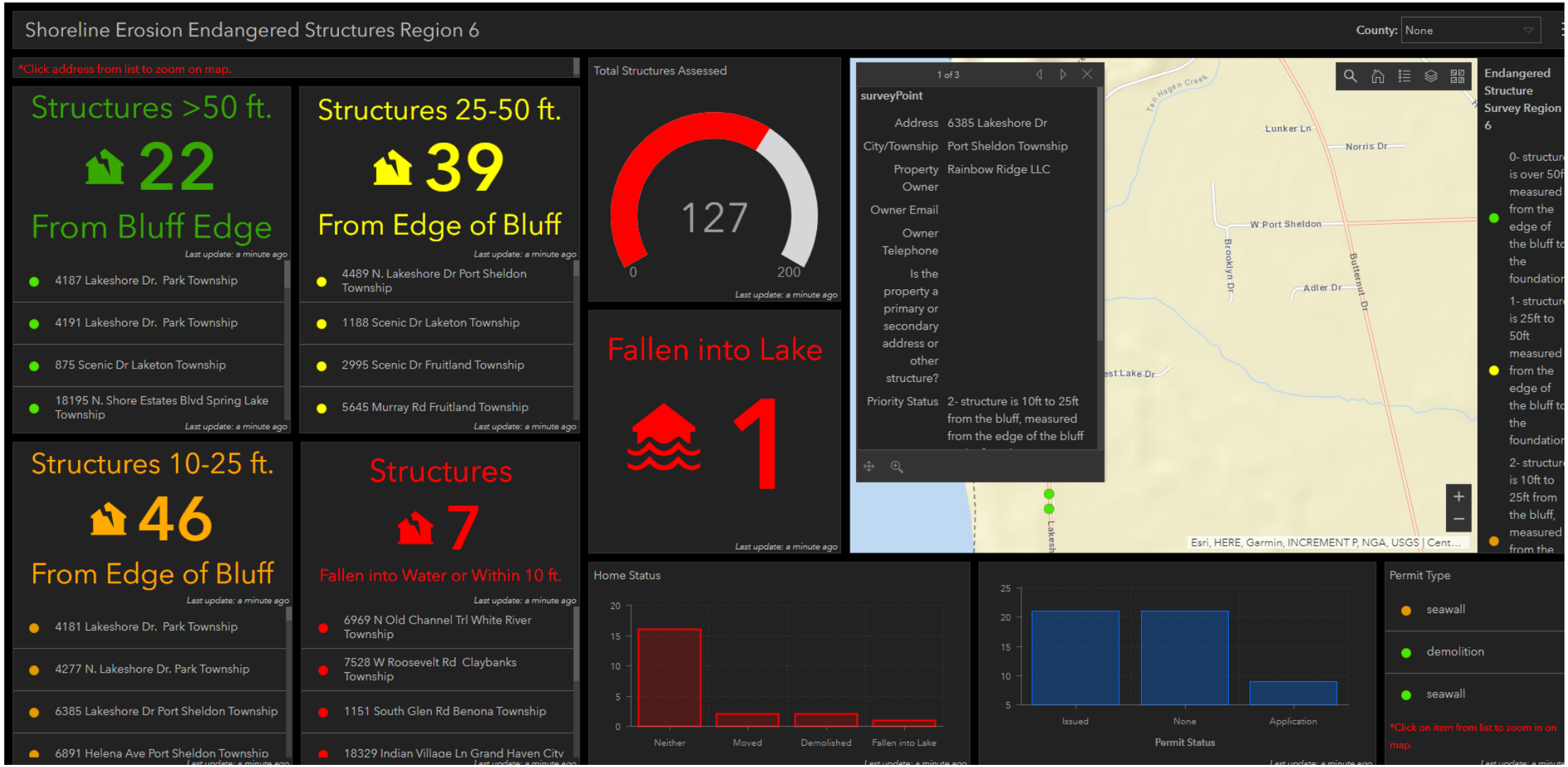
Lakeshore Erosion

Lakeshore Erosion

Lakeshore Erosion



Lakeshore Erosion



Lakeshore Erosion

WebEOC | nbonstell@miottawa.org | County of Ottawa MGT EM Coordinator | 2019-2020-Statewide-Ongoing Great Lakes Shoreline Floodi... | Log Out

JUVARE

*Statewide Shared Activities | Damage Assessment

Michigan Statewide Shared Activities

MI-CIMS

Incident: 2019-2020-Statewide-Ongoing Great Lakes Shoreline Flooding and Erosion

Actions

Agency: Show All | Priority: Show All | Region: Show All | Toggle RSS Feeds | Collapse All | Expand All | Search: | Search | Clear Search

County of Berrien MGT EM Coordinator - 92897 — Low Priority — Last Update: 02/13/2020 09:40:12 — Hide

ESF #05 - Information & Planning

Created: 2020-01-29 20:19

Rockey Adams (County of Berrien)
radams1@berriencounty.org | 269-313-0492

Region: 5

Attachment: EOC Situation Report - Update 1 01 31 2020 EMHSD Situation Report Update 1 2019 and 2020 Shoreline Wave Action and Flooding.pdf

Attachment: 01 31 2020 Update 1.2 EMHSD Standard EMHSD Municipal Summary Shoreline Erosion.pdf

Shared Statewide

Correction: 2/6/2020 was date of Lincoln Twp Update.
****Rockey Adams - County of Berrien MGT EM Coordinator - radams1@berriencounty.org at 09:39:50 on 02/13/2020****

From 2/4/2020 Initial SitRep received from Lincoln Township:
Endangered Properties entered into State Dashboard:

5488 Sunset Path, Stevensville 11-12-0020-0012-08-7
2nd Residence. (2) structure 10-25 ft. from bluff, measured from edge of bluff to the foundation.
Permitted occupancy. Unknown Insured/Unknown permit type/status.

3980 Lake Forest Path, Stevensville 11-12-0009-0019-00-5
2nd Residence. (2) structure 10-25 ft. from bluff, measured from edge of bluff to the foundation.
Permitted occupancy. Unknown Insured/Unknown permit type/status.

MSP EMHSD DC Region 6 - 93068 — Low Priority — Last Update: 02/10/2020 09:32:45 — Hide

ESF #13 - Public Safety & Security

Created: 2020-02-10 09:25

Orville Theaker (MSP)
theakero@michigan.gov | 269-953-6099

Region: State

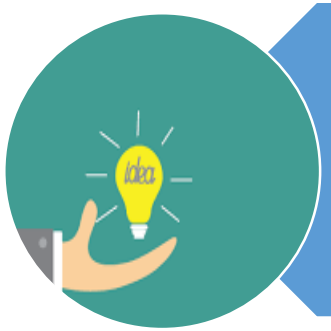
The following dates MSP aviation conducted shoreline survey flights to support the shoreline erosion incident:

8/1/19- survey flight over Ottawa, Muskegon, Oceana, and part of Mason Counties.
10/25/19- survey flight over Ottawa and half of Muskegon Counties.
12/20/19- survey flight over Allegan, Ottawa, Muskegon, Oceana, Mason, Manistee, Grand Traverse, and Leelanau Counties
****Orville Theaker - MSP EMHSD DC Region 6 - Theakero@michigan.gov at 09:25:22 on 02/10/2020****

OTTAWA COUNTY EMERGENCY MANAGEMENT

Lakeshore Erosion

Further Assessment of Critical Infrastructure



Determine a way to ensure access to Section 19 Funds and other Programs as Created

Continue Overflights and Ongoing Documentation with the State of Michigan

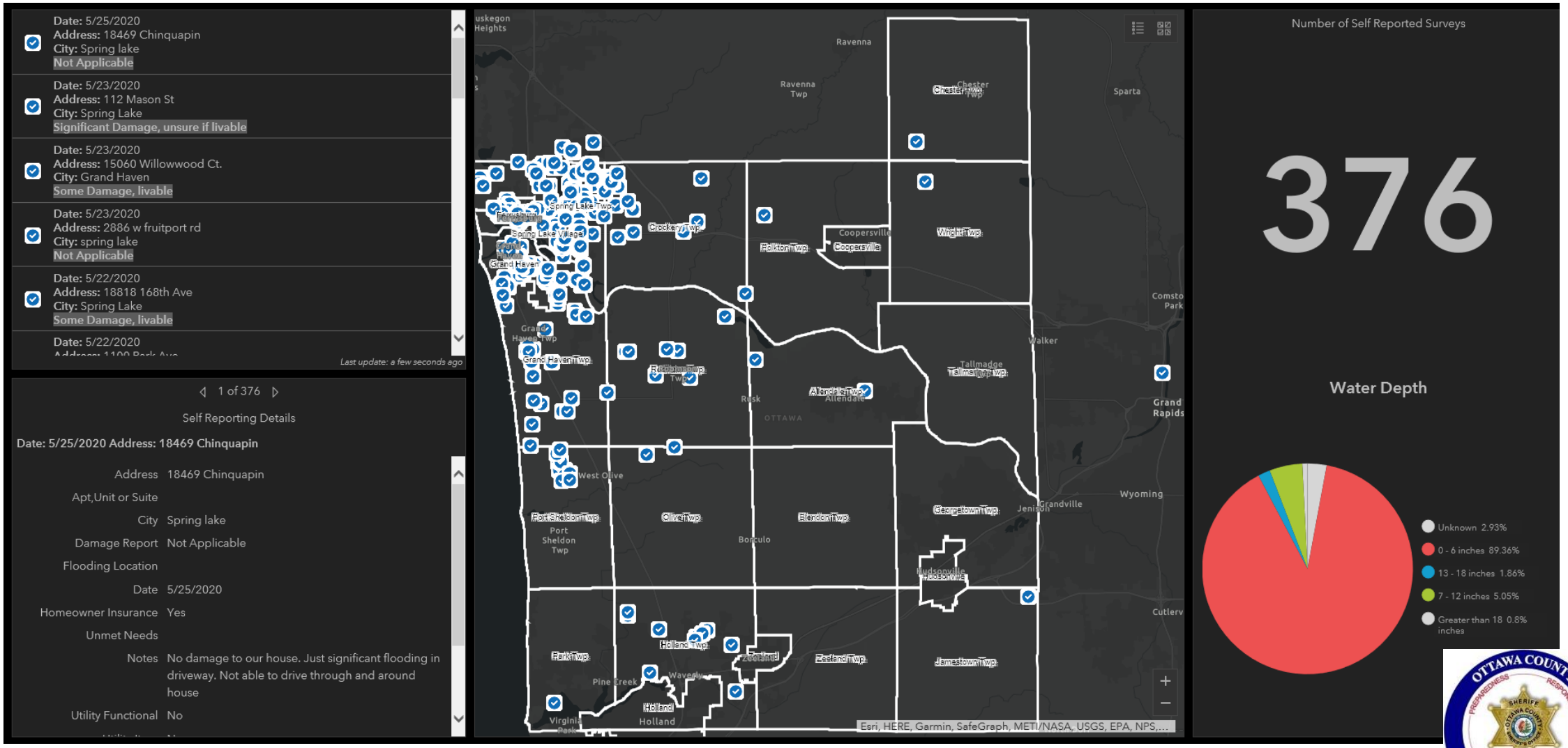
Flooding

Flooding

Flooding

Flooding

Flooding


Date: 5/25/2020
Address: 18469 Chinquapin
City: Spring lake
Not Applicable
Date: 5/23/2020
Address: 112 Mason St
City: Spring Lake
Significant Damage, unsure if livable
Date: 5/23/2020
Address: 15060 Willowwood Ct.
City: Grand Haven
Some Damage, livable
Date: 5/23/2020
Address: 2886 w fruitport rd
City: spring lake
Not Applicable
Date: 5/22/2020
Address: 18818 168th Ave
City: Spring Lake
Some Damage, livable
Date: 5/22/2020
Last update: a few seconds ago
1 of 376
Self Reporting Details
Date: 5/25/2020 Address: 18469 Chinquapin
Address 18469 Chinquapin
Apt,Unit or Suite
City Spring lake
Damage Report Not Applicable
Flooding Location
Date 5/25/2020
Homeowner Insurance Yes
Unmet Needs
Notes No damage to our house. Just significant flooding in driveway. Not able to drive through and around house
Utility Functional No
Ravenna
Ravenna Twp
Sparta
Spring Lake Twp
Spring Lake Village
Grand Haven
Crockery Twp
Coopersville
Wright Twp
Grand Haven Twp
Grand Haven Twp
Tallmadge Twp
Walker
Grand Rapids
Rusk
OTTAWA
West Olive
Fort Sheldon Twp
Port Sheldon Twp
Olive Twp
Blendon Twp
Georgetown Twp
Grandville
Wyoming
Borculo
Hudsonville
Cutlerv
Park Twp
Holland Twp
Zeeland Twp
Jamestown Twp
Pine Creek
Holland
Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS,...
Number of Self Reported Surveys
376
Water Depth
Unknown 2.93%
0 - 6 inches 89.36%
13 - 18 inches 1.86%
7 - 12 inches 5.05%
Greater than 18 inches 0.8%

Partnerships

US Army Corps of Engineers

EGLE

U.S. Small Business Administration

Contact

Nicholas Bonstell
nbonstell@miottawa.org

MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Resilient Coastal Communities

Living with the Highs and Lows on Michigan's Coast

Michigan Coastal Management Program
Water Resources Division
Ronda Wuycheck, Program Manager
517-420-5921| wuycheckr@michigan.gov

Michigan Coastal Management Program

Celebrating 40+ years on the fresh coast

Michigan Coastal Management Program

- Michigan Coastal Program established in 1978
- A state-federal partnership with the National Oceanic and Atmospheric Administration
- Federal-state-local partnership structure
- Coastal communities are key

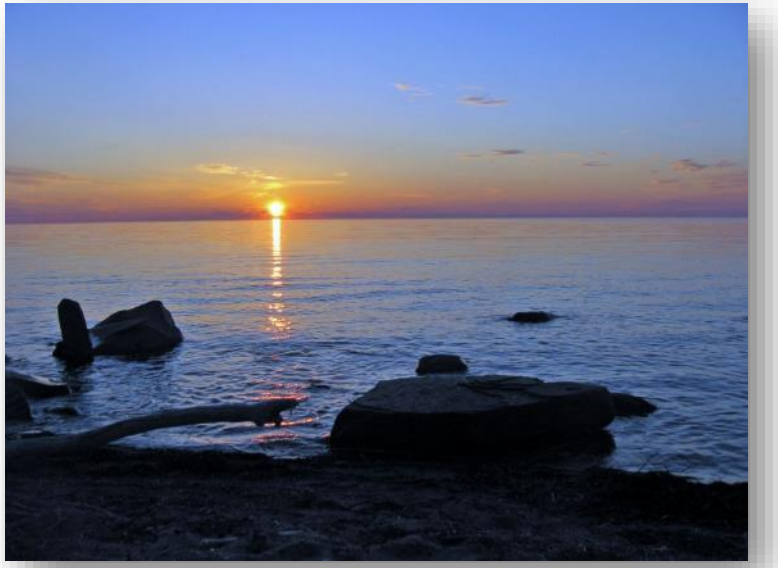
EGLE

Mission

To protect, preserve, restore, enhance, and wisely develop the coastal natural resources and cultural heritage on the nation’s longest freshwater coastline.

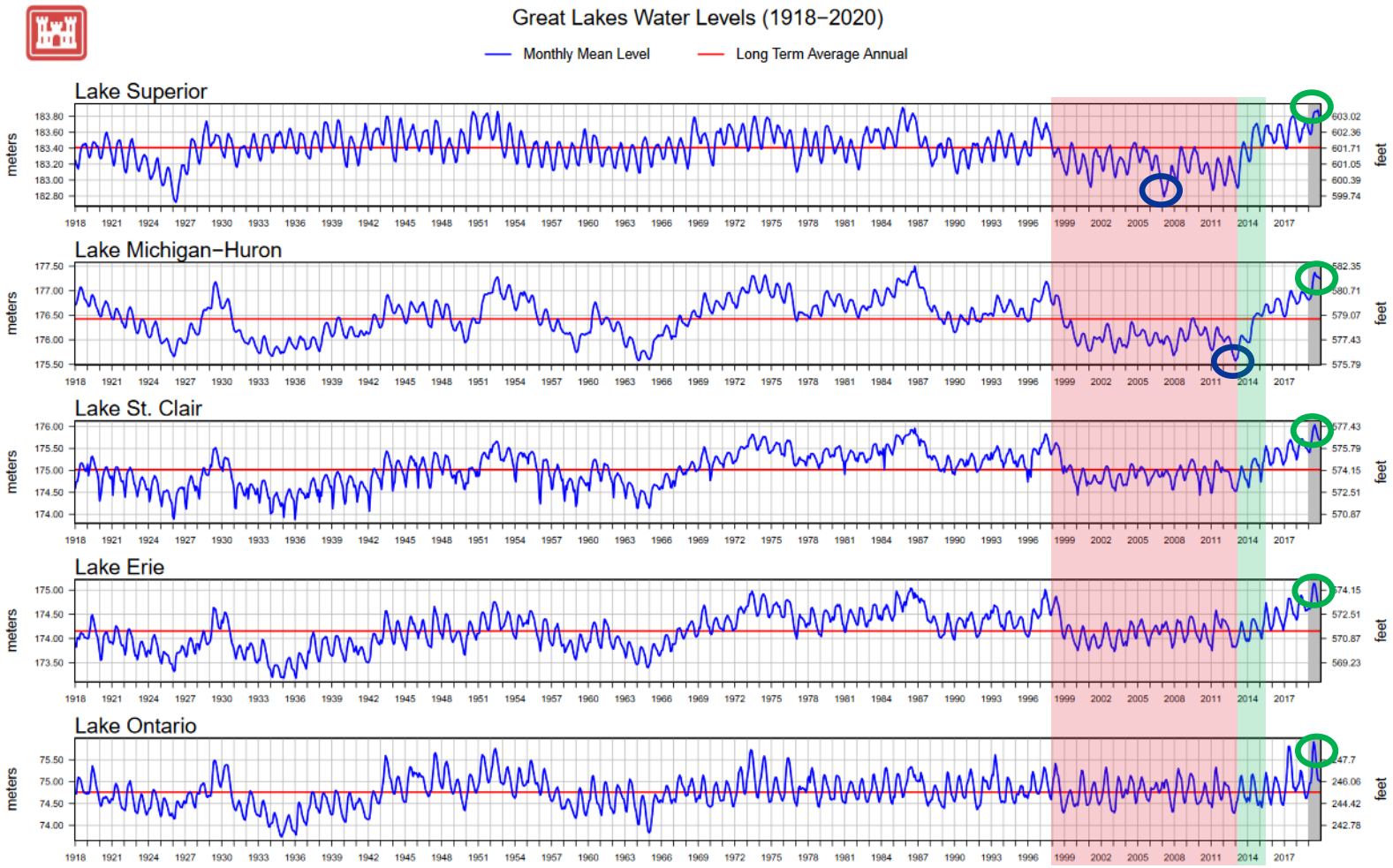
EGLE

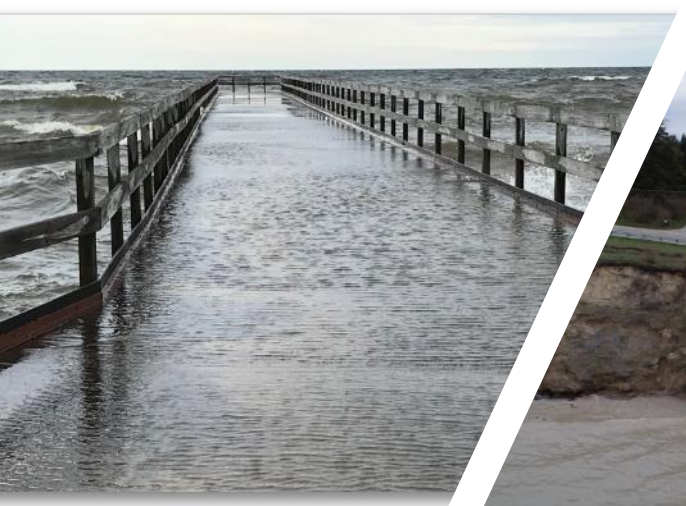
Great Lakes Water Levels



- Water levels are cyclical with periods of low and high water
  - Influenced by Weather
    - precipitation, ice cover, air temperatures, and evaporation
- All the Great Lakes are currently at or near record highs

EGLE


Great Lakes Water Levels (1918–2020)
Monthly Mean Level
Long Term Average Annual
Lake Superior
Lake Michigan–Huron
Lake St. Clair
Lake Erie
Lake Ontario
meters
feet



Impacts

EGLE

Lake Michigan Water Levels and Shore Erosion

What Are the Lanes?

National Weather Service

Weather Forecasts
Winds, Waves, Rain
Potential/Expected Impacts of Weather

US Army Corps of Engineers

Great Lakes Water Levels
Measuring, Reporting, Forecasting
Record Keeping - Declaring Record Levels

https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/

Michigan Department of Environment, Great Lakes and Energy

Shoreline Protection

http://michigan.gov/ShoreLands

EGLE Action – Assisting Customers

- New webpage: Great Lakes High Water Levels (Michigan.gov/HighWater)
  - General water level information
  - Contractor List
  - Permit application assistance
  - FAQ document

- Customer assistance on-call (8:30-4:30, M-F):
  - Environmental Assistance Center (800-662-9278 or EGLE-assist@Michigan.gov)
  - Identify that you are calling about high-water levels

EGLE

Consequences of Hardened Shore Structures


Ottawas Lane, Baldwin Twp, Iosco Co.

Hardened shore protection structures (e.g., sea walls, revetments) minimize coastal erosion.

BUT ALL hard shore protection structures

- Eventually fail, imposing great costs to repair, enlarge, move, or remove;
- AND ALL armoring severely degrades and even eliminates entirely the natural beach in the meantime.

Dr. Richard Norton – U of M

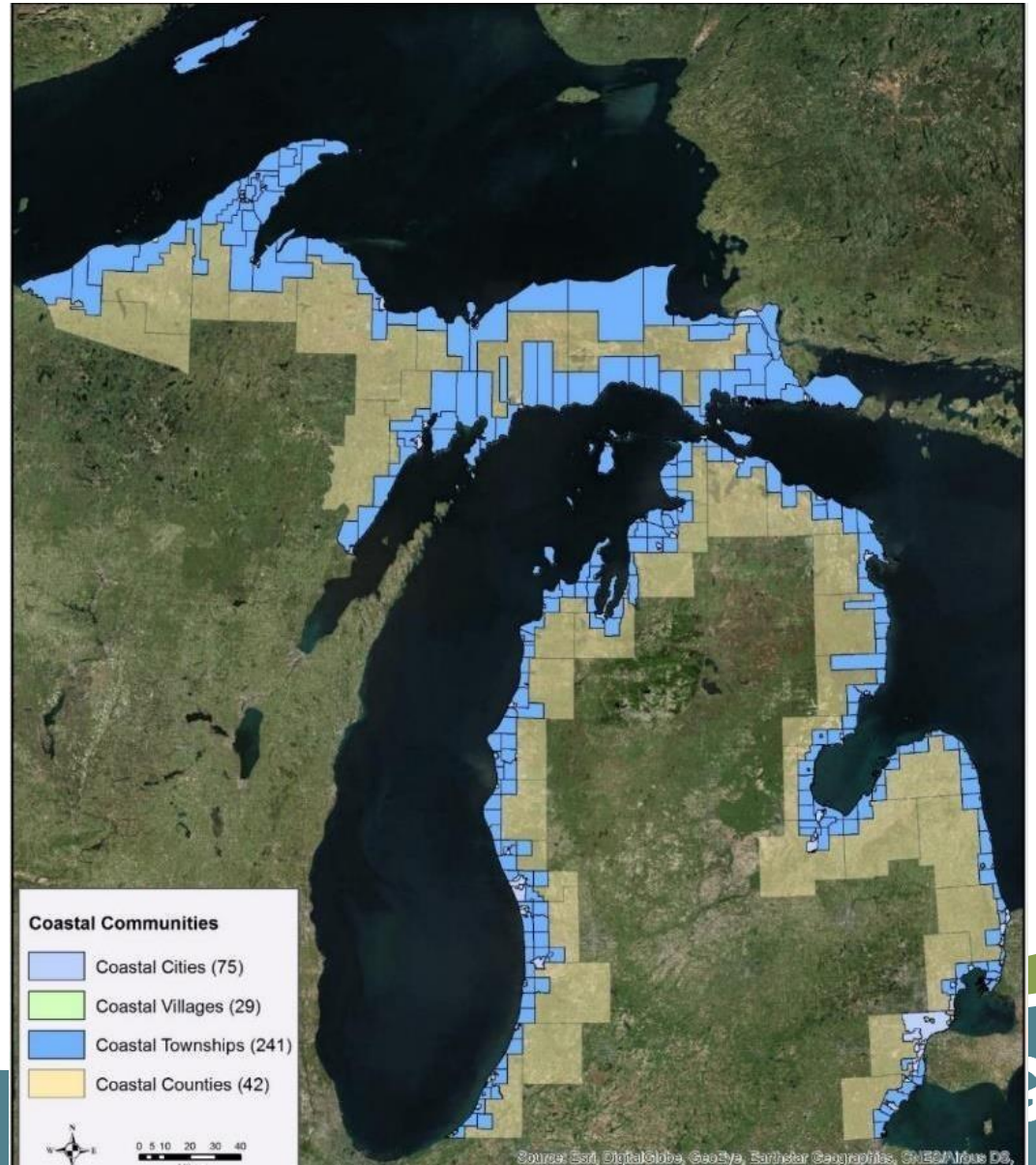
Public Access to Public Trust Resources

(Beaches and Great Lakes Bottomlands)

EGLE

Leaning In: Building Coastal Community Resilience

Community resilience is defined as the sustained ability of a community to understand and use available resources to respond to, withstand, and recover from adverse situations.



A hazard-ready community is able to absorb, adapt, and rebound from changes in Great Lakes water levels, coastal storms and floods.

Managing Coastal Hazards

Manage coastal hazards by developing scenario-based decisions that protect lives and property, and improving hazard understanding and awareness.

EGLE

The Coastal Resilience Team (CRT)

American Planning Association
Michigan Chapter

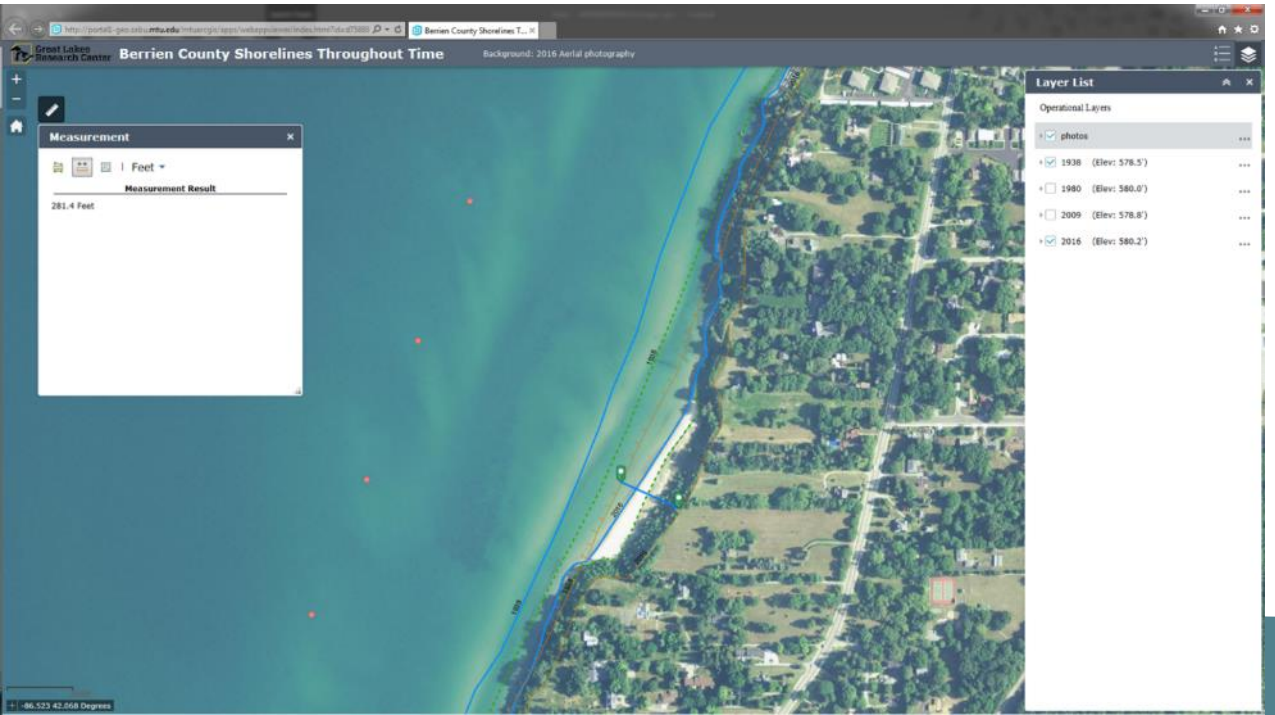
LIAA

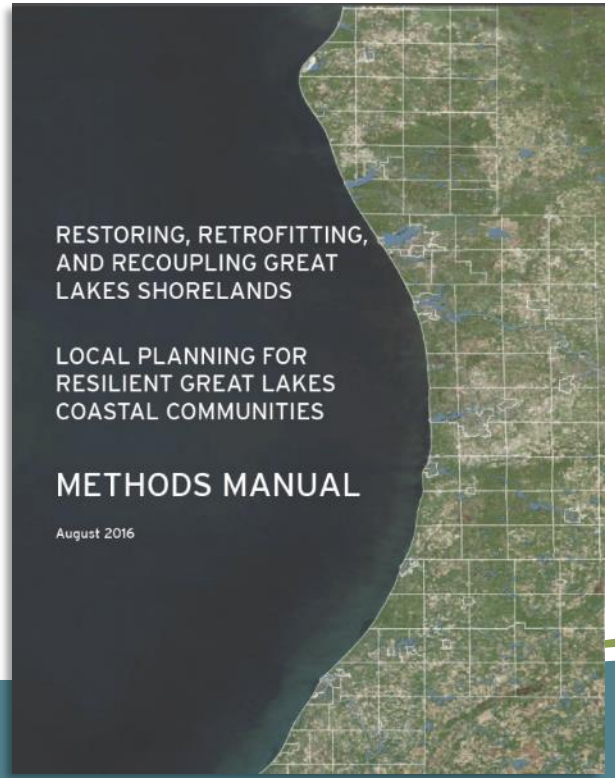
1885
Great Lakes Research Center
Michigan Technological University

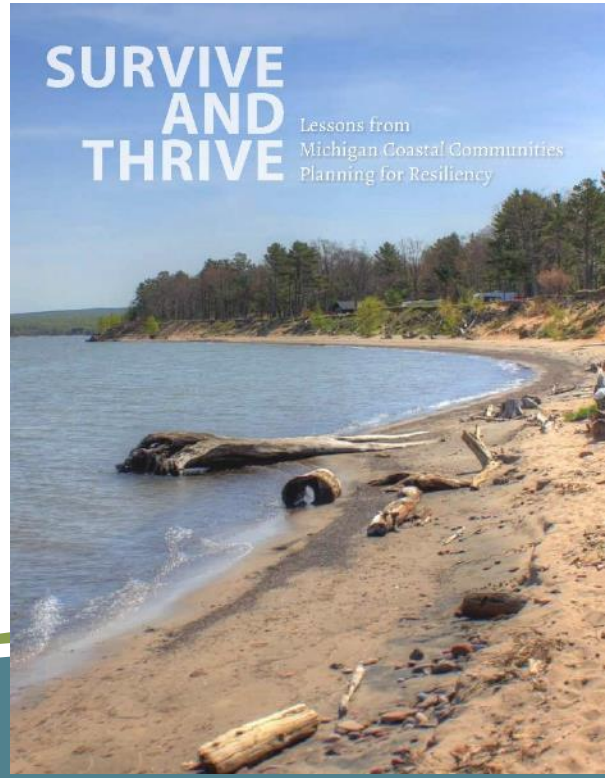
TAUBMAN COLLEGE
architecture + urban planning
University of Michigan

Partnering to Create Hazard-Ready Coastal Communities

- Incorporate resilience principles into plans and ordinances.
- Create information and resources supporting local action.

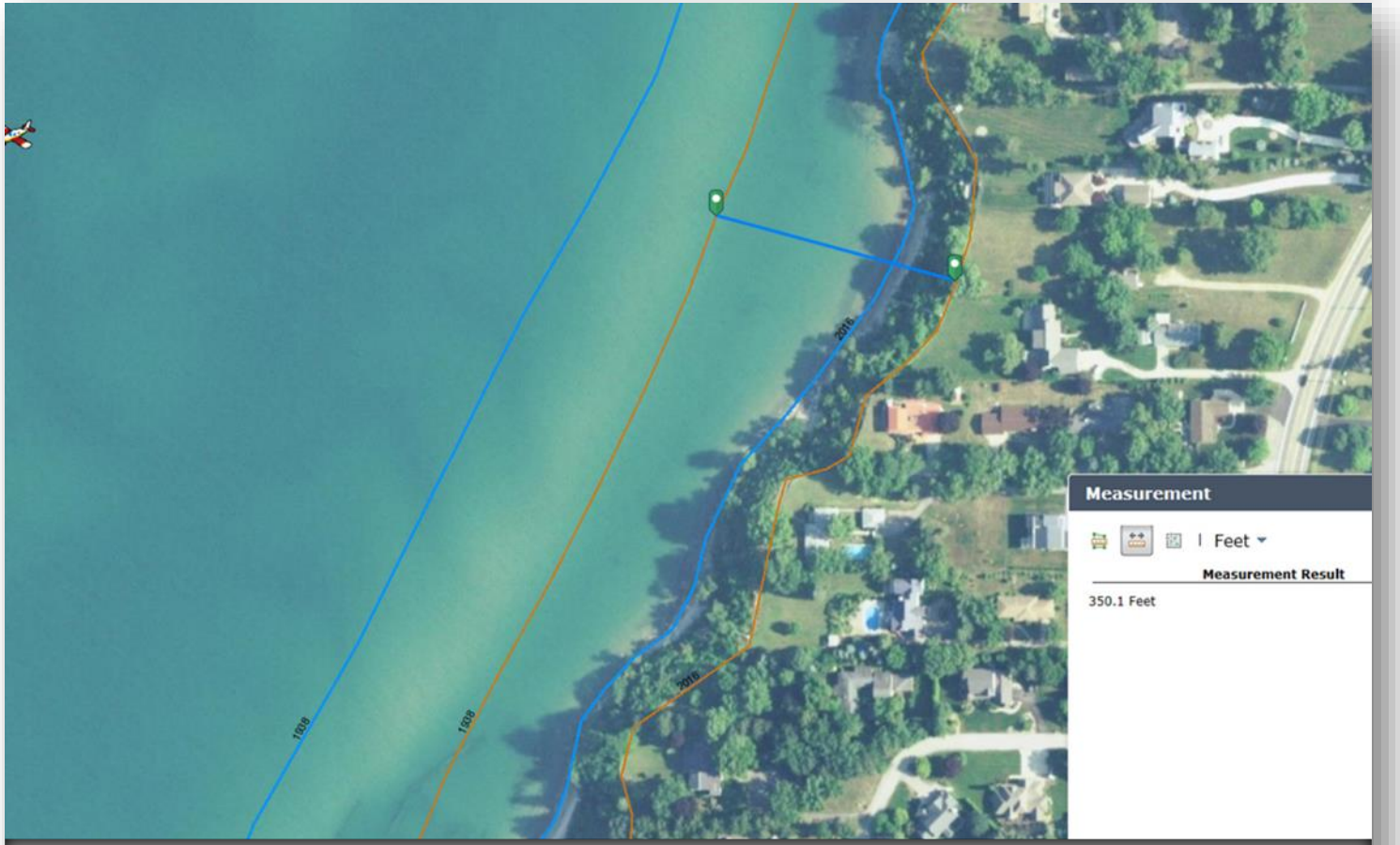






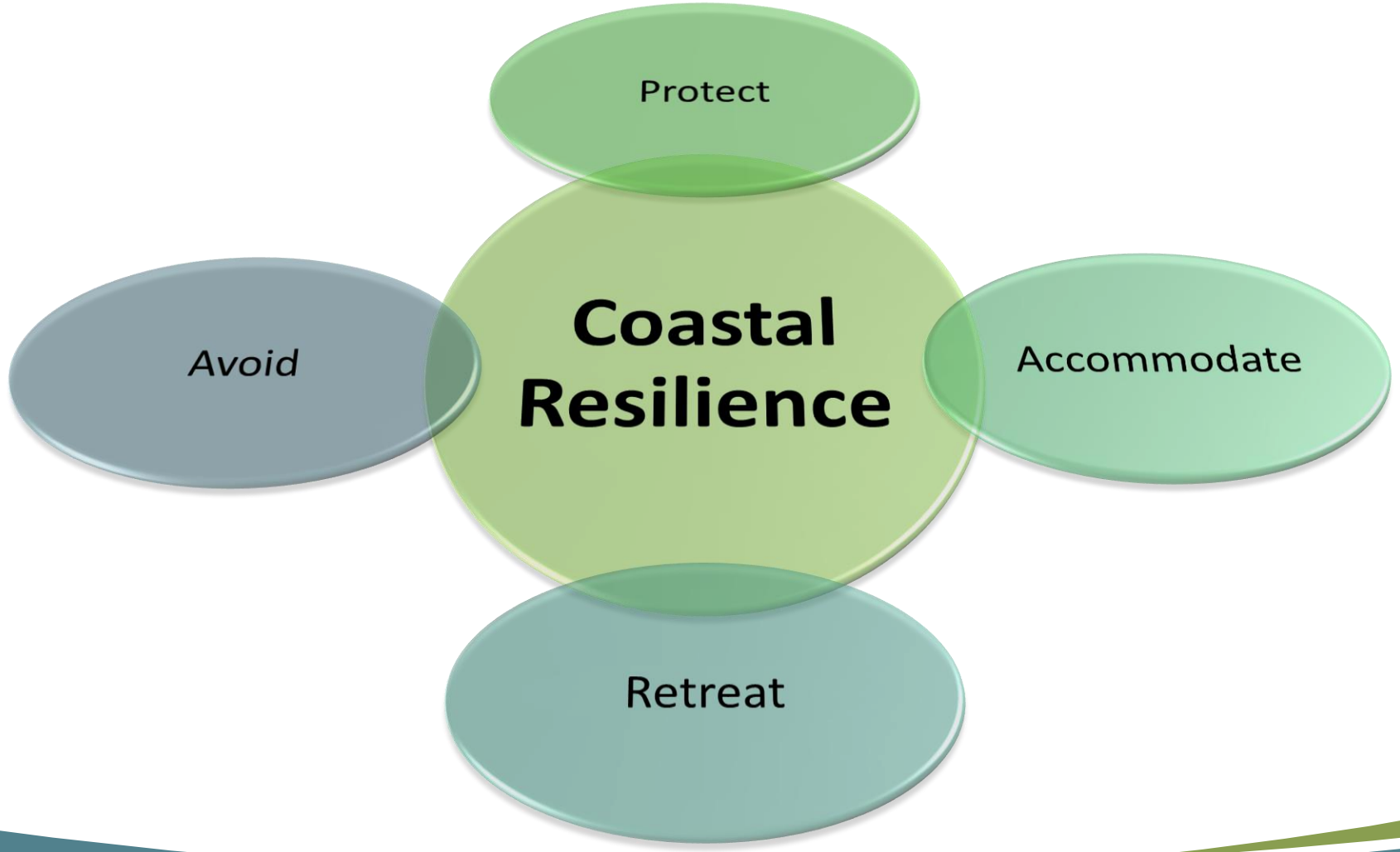
“80-Year View” of Coastal Change

- Bluff and shoreline positions
  - 1938
  - 1980
  - 2009
  - 2016
- Complete for Lower Peninsula Lake Michigan and Huron



http://geospatialresearch.mtu.edu/czmp

Adaptation Strategies



Protect

EGLE

Setback Ordinance

- Prevent damage to private property
- Preserve public trust lands

ASCE | KNOWLEDGE & LEARNING

FEMA T.B - Breakaway Walls

- Refer to FEMA Technical Bulletin 9

Design and Construction Guidance for Breakaway Walls

Below Elevated Buildings Located in Coastal High Hazard Areas in accordance with the National Flood Insurance Program

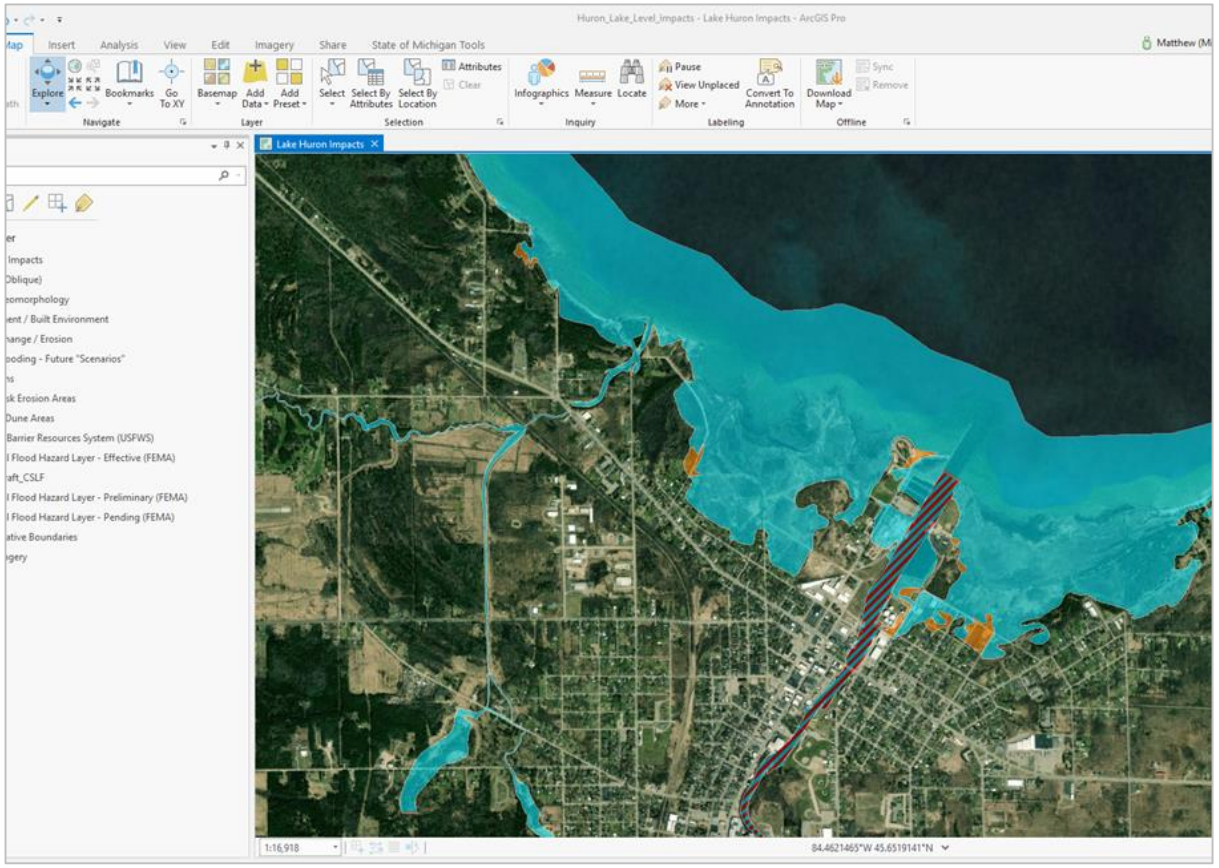
Technical Bulletin 9 / August 2008

FEMA

Accommodate

EGLE

Retreat


Huron_Lake_Level_Impacts - Lake Huron Impacts - ArcGIS Pro
Insert
Analysis
View
Edit
Imagery
Share
State of Michigan Tools
Explore
Bookmarks
Go To XY
Basemap
Add Data
Add Preset
Select
Select By Attributes
Select By Location
Attributes
Clear
Infographics
Measure
Locate
Pause
View Unplaced
More
Convert To Annotation
Download Map
Sync
Remove
Navigate
Layer
Selection
Inquiry
Labeling
Offline
Lake Huron Impacts
Impacts
Oblique)
omorphology
ent / Built Environment
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ooding - Future "Scenarios"
sk Erosion Areas
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Barrier Resources System (USFWS)
l Flood Hazard Layer - Effective (FEMA)
aft_CSLF
l Flood Hazard Layer - Preliminary (FEMA)
l Flood Hazard Layer - Pending (FEMA)
ative Boundaries
1:16,918
84.4621465°W 45.6519141°N

Avoid

MCMP Grant Assistance

- Who is Eligible: : Eligible applicants include coastal communities (e.g., local units of government, cities, counties, villages, and townships), regional planning agencies, educational institutions, Tribal governments, and not-for-profits 501(c) organizations located within the approved programmatic boundary.

- Grant Amount: Planning projects can be no less than $10,000 and no greater than $100,000. Site-specific low-cost construction projects can be no less than $10,000 and no greater than $200,000.

- How to Apply: Grant Funding Opportunities are released annually in October with a December application due date.

- Who do I contact for questions: For general or technical questions, the Focus Area Coordinators listed on the MCMP webpage.

- For more information, visit the Coastal Management Program webpage: www.michigan.gov/coastalmanagement.

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Follow us at: Michigan.gov/CoastalManagement

Follow us at: Michigan.gov/EGLEConnect

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Environment, Great Lakes, and Energy

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Questions?

EGLE

Upcoming Webinars

Register for the upcoming webinars here: **http://www.mml.org/coronavirus**

10 am, July 22, 2020 - What's Happening Inside MDOT's Local Agency Program

1:30 pm, July 23, 2020 - Coronavirus Emergency Supplemental Funding Town Hall

12 pm, July 27, 2020 - MML Monday Morning Live