



Michigan Coastal Management Program

Office of the Great Lakes



Matt Warner – Coastal Hazards Specialist

3,224



- NOAA Shoreline Website:
<https://shoreline.noaa.gov/index.html>
- NOAA-NGS Continually Updated Shoreline Products (CUSP):
<https://www.ngs.noaa.gov/CUSP/>



Coastal Program Overview

- Protect, preserve, restore, and enhance coastal resources and communities
- Established 1978
- state-federal partnership with the National Oceanic and Atmospheric Administration

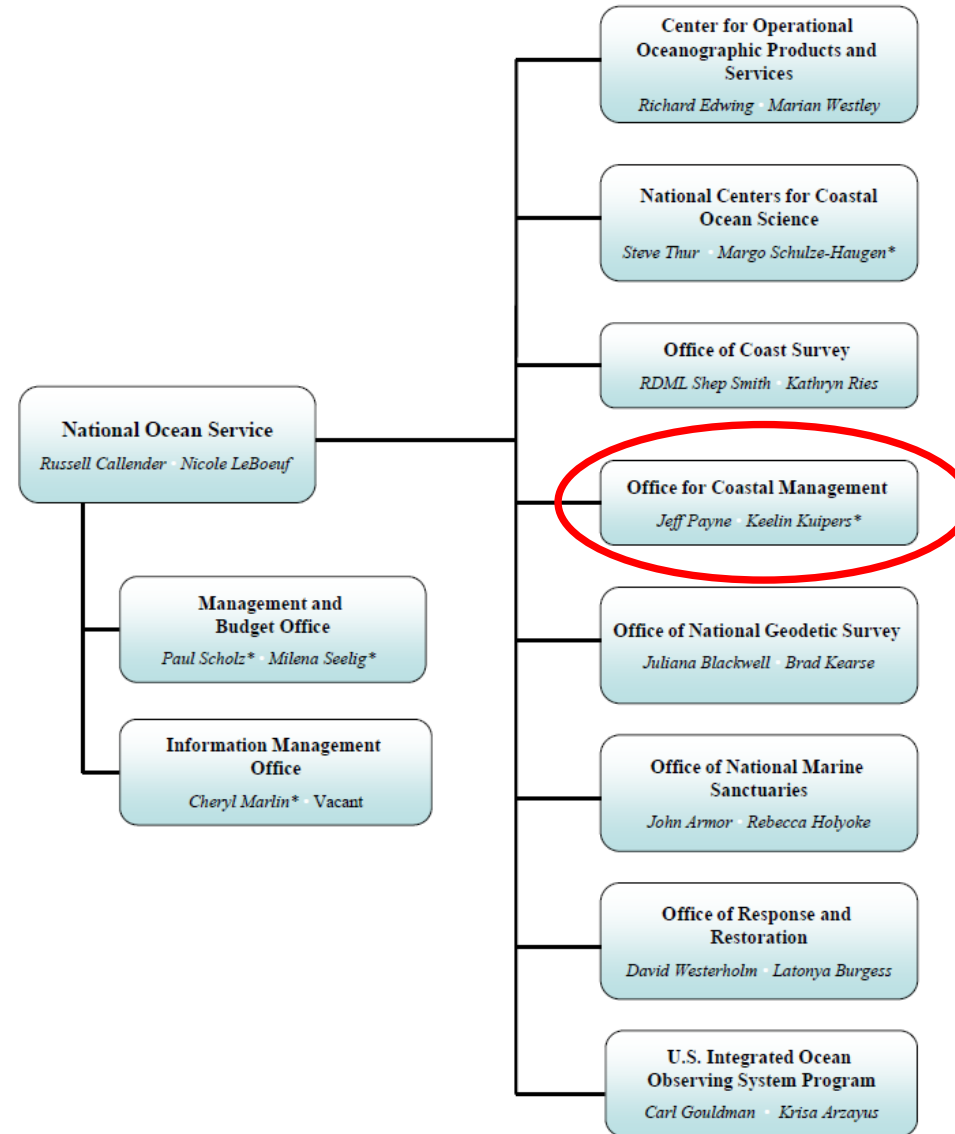
Our ties to NOAA



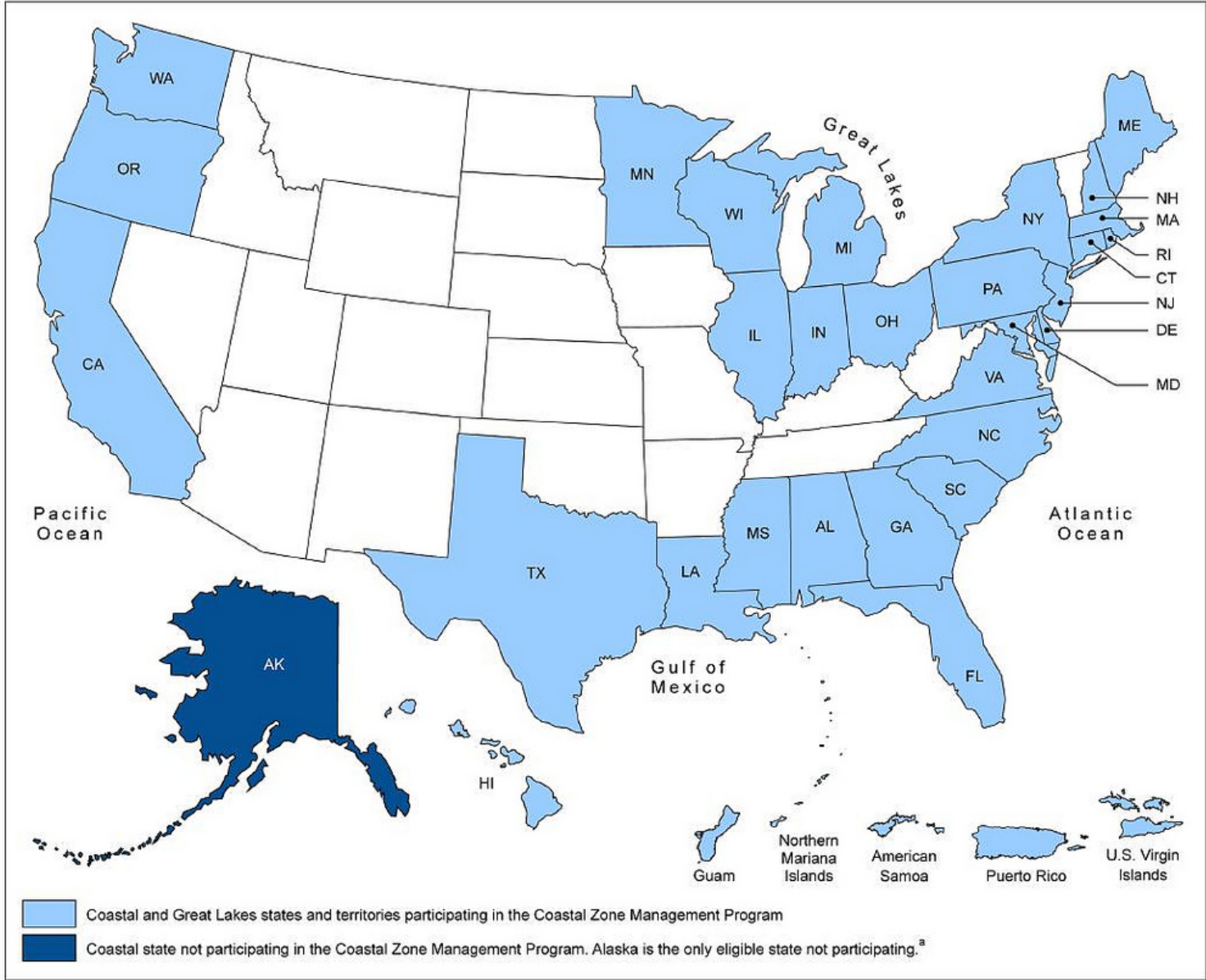
Our ties to NOAA

National Ocean Service Organization Chart

Positioning America for the Future



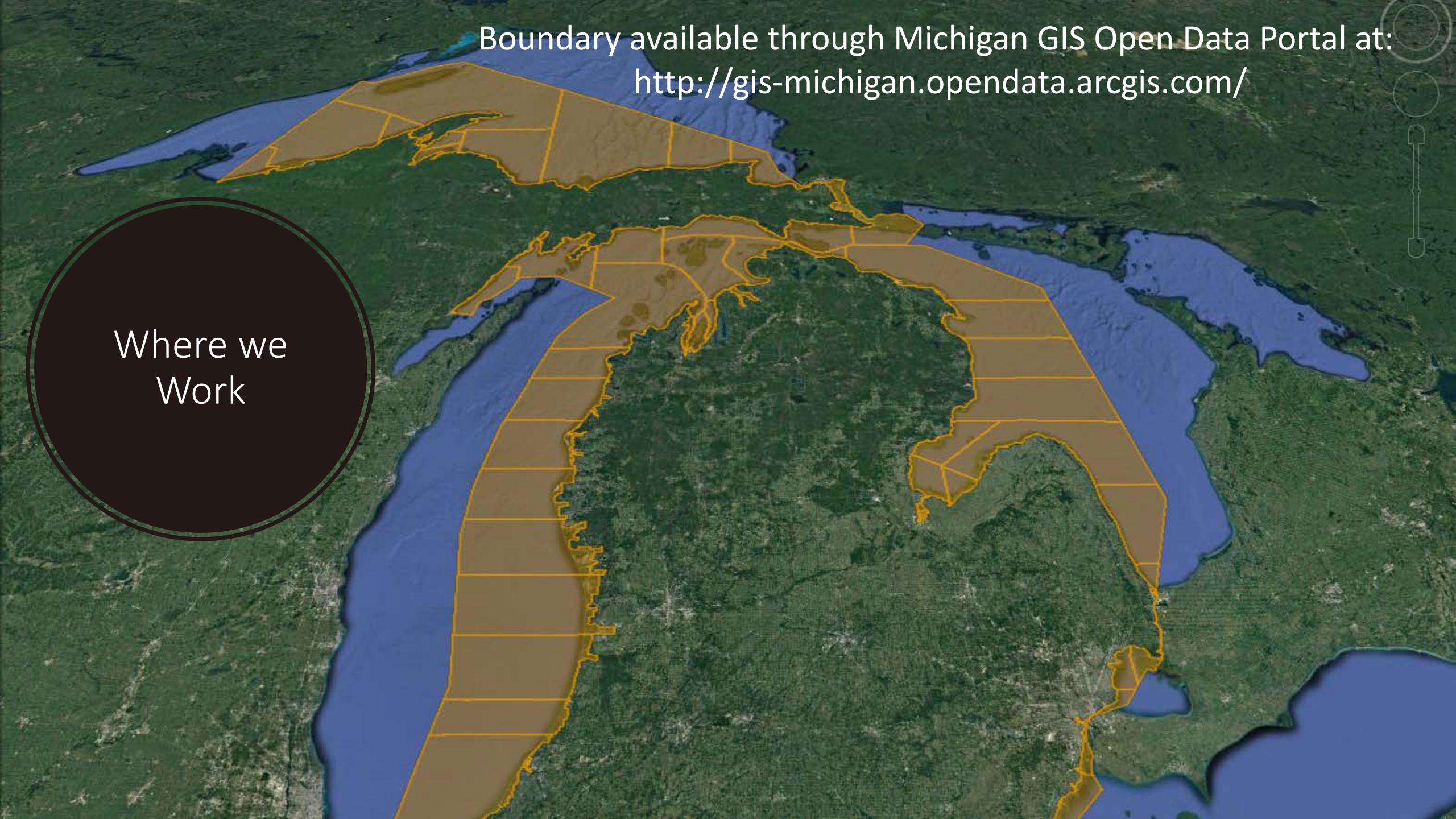
National Coastal Zone Management Programs



Sources: National Oceanic and Atmospheric Administration; Map Resources (map). | GAO-14-592

Boundary available through Michigan GIS Open Data Portal at:
<http://gis-michigan.opendata.arcgis.com/>

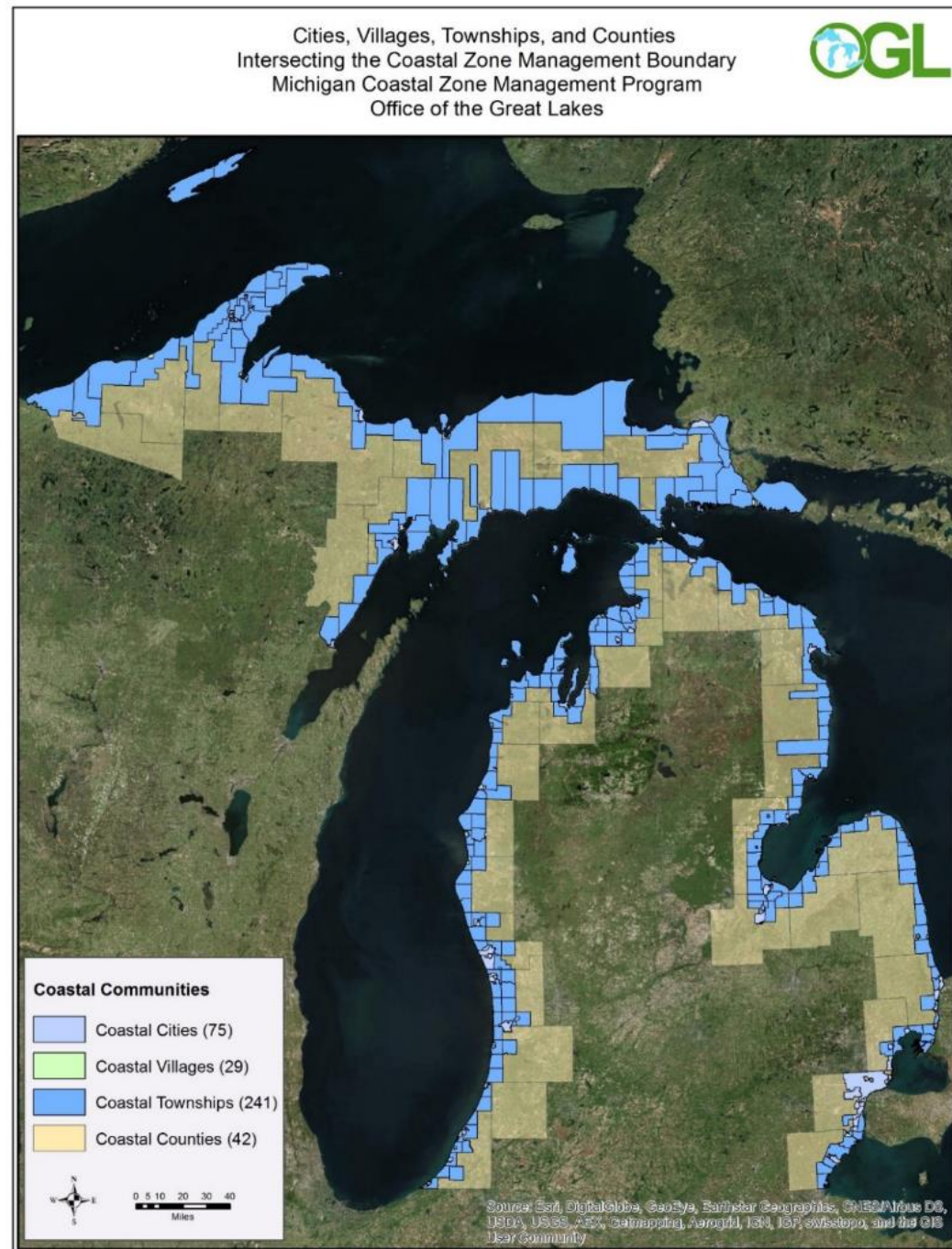
Where we
Work



Challenge #1 - A Vast & Diverse Coast

387 Coastal
municipalities
to work with...

...along more
than 3,200
miles of coast!



The Michigan Coastal Management Team!



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[Twitter.com/MichiganOGL](https://twitter.com/MichiganOGL)



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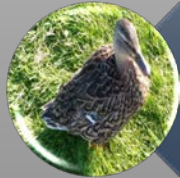
Coastal Management Focus Areas



Coastal Community Planning & Zoning



Coastal Public Access



Coastal Habitat



Coastal Water Quality



Coastal Hazards



How we Work

- Provide technical expertise
- Competitive grant funding
 - Supports community coastal projects in five key focus areas
 - Grant Opportunity released each October
- Program enhancement initiatives
 - Currently focused on coastal community resilience



A Sample of Michigan CZM Projects that Include GIS Components

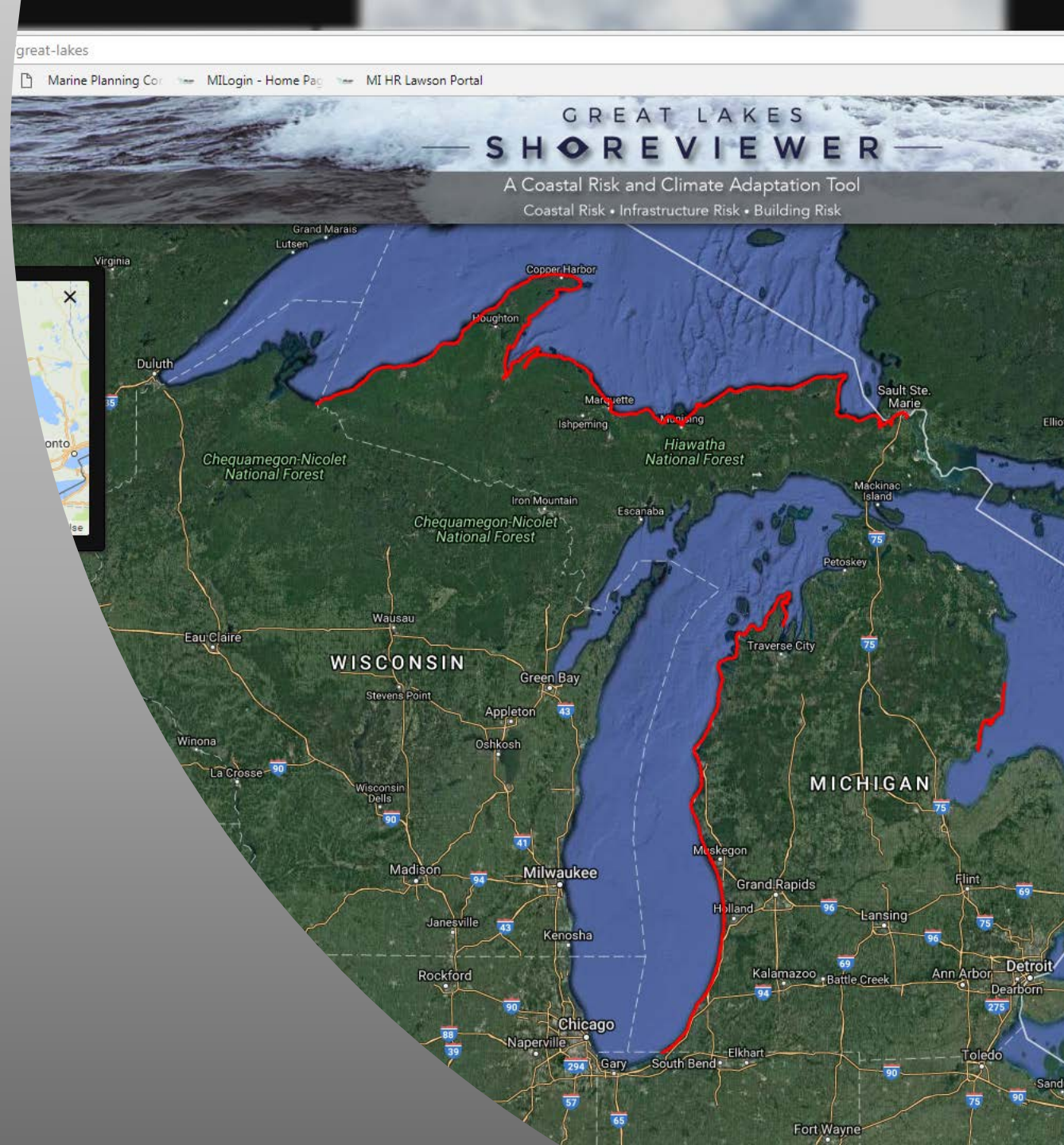
Getting to Know our Coast

Great Lakes Shoreviewer

- Project completed 2015
- Covers 1,000 miles of Michigan's coast
- Collected:
 - Ortho-imagery (4-band, 1-foot res.)
 - Low-altitude, high-resolution coastal oblique images
- www.greatlakesshoreviewer.org



906 Technologies



Addressing Coastal Erosion through
Expansion of the Great Lakes Shoreviewer
MICHIGAN COASTAL ZONE MANAGEMENT
PROGRAM GRANT



2015 Aerial Imagery

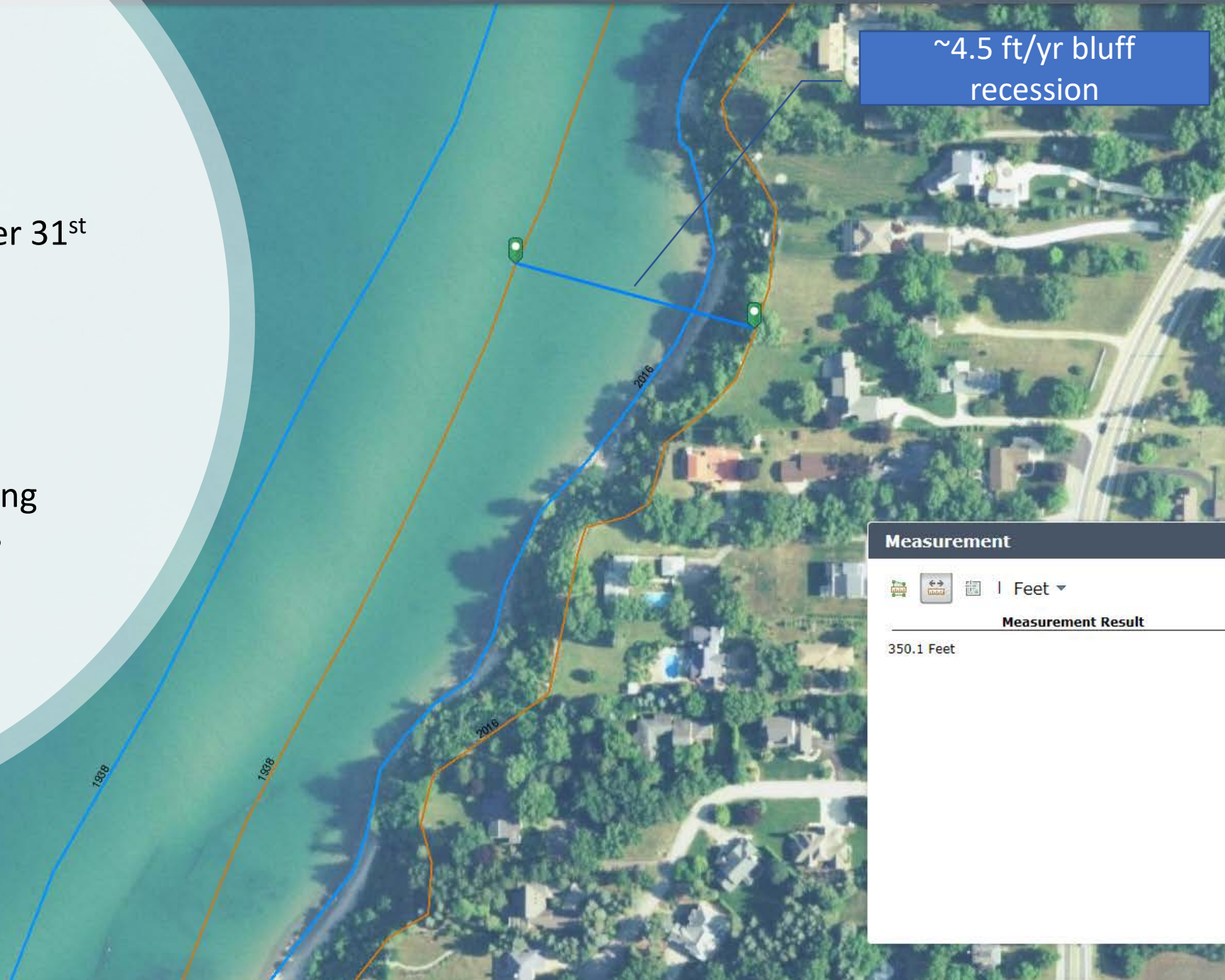
Financial assistance for this project was provided, in part by the MI Coastal Zone Management Program, Office of the Great Lakes, Department of Environmental Quality, under the National Coastal Zone Management Program, through a grant from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce.





“80-Year View” of Coastal Change

- To be completed by December 31st
- Digitizing bluff and shoreline position
 - 1938
 - 1980
 - 2016
- To inform local planning/zoning officials and property owners
- Lake Michigan Coast



~4.5 ft/yr bluff recession

Measurement

1 Feet

Measurement Result

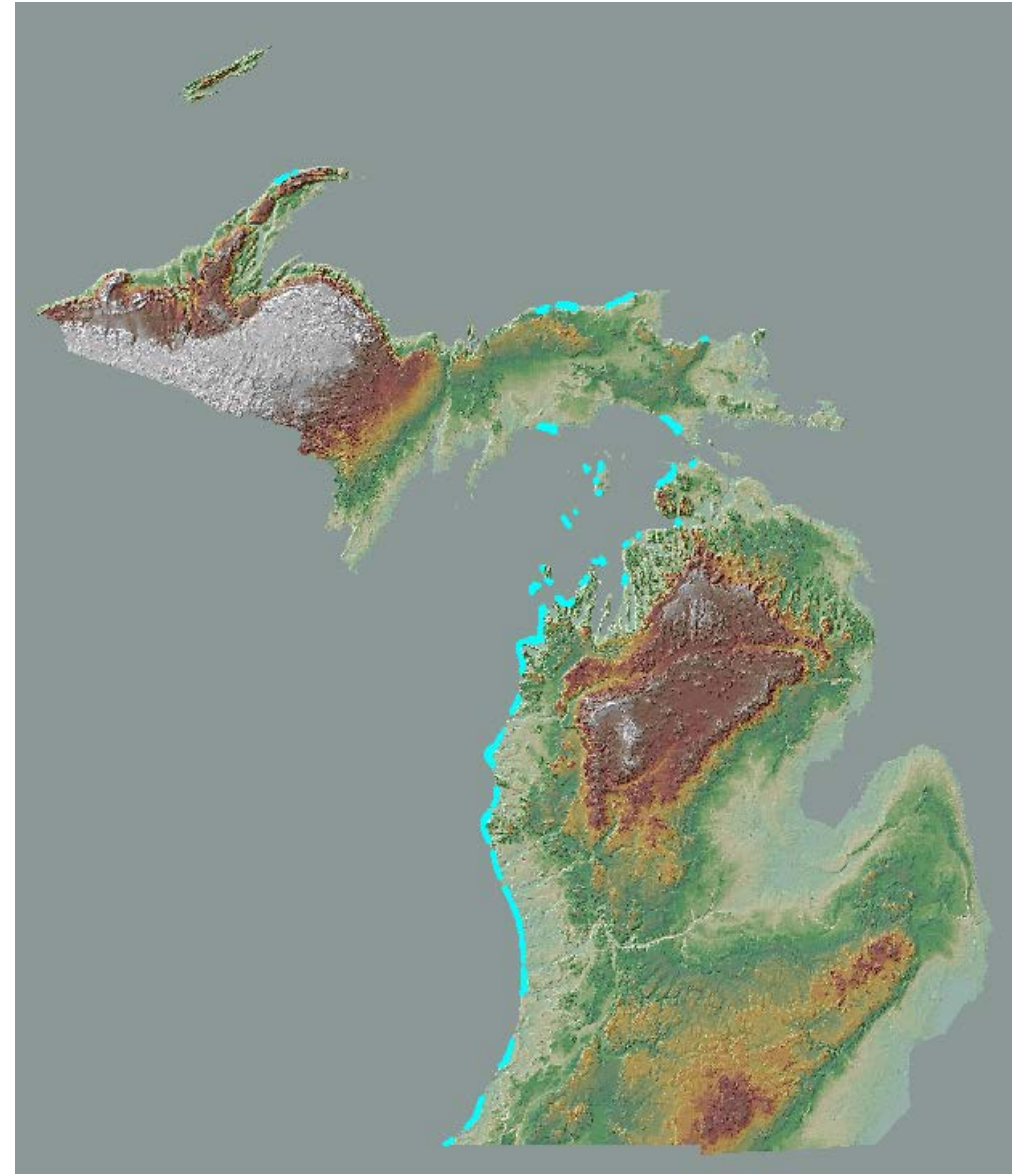
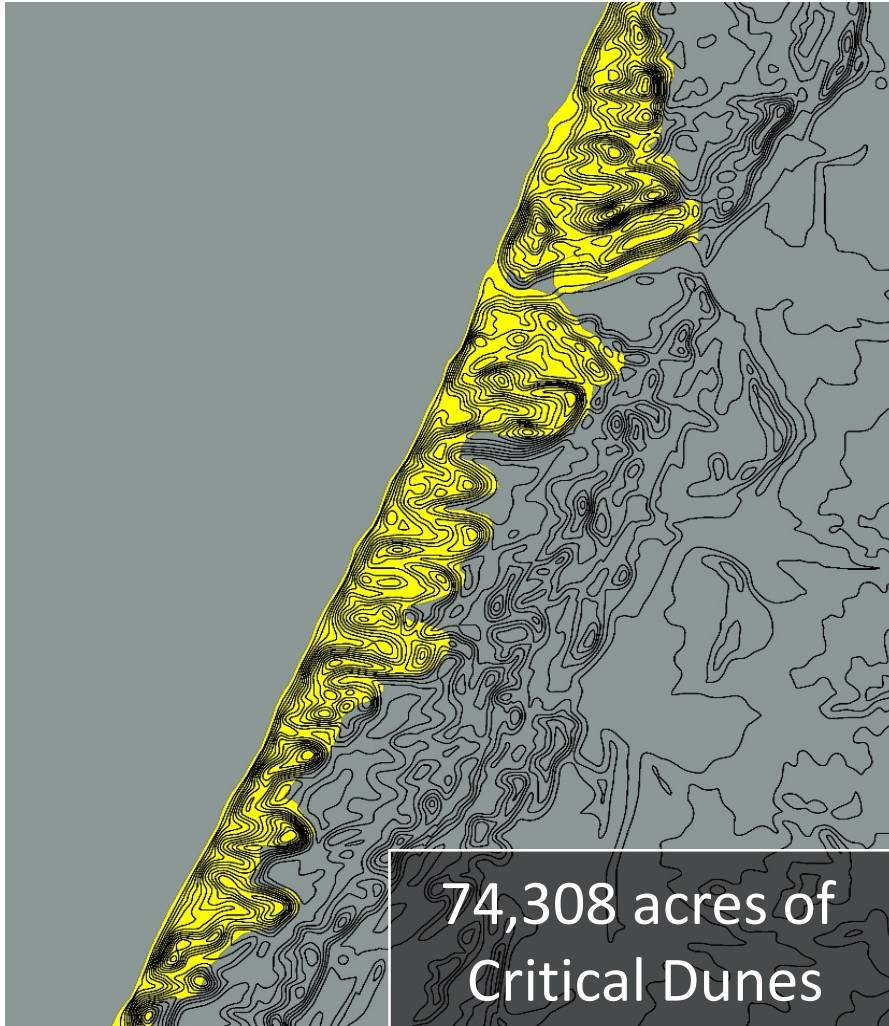
350.1 Feet



VALUING MICHIGAN'S COASTAL DUNES:

GIS Information and Economic
Data to Support Management
Partnerships

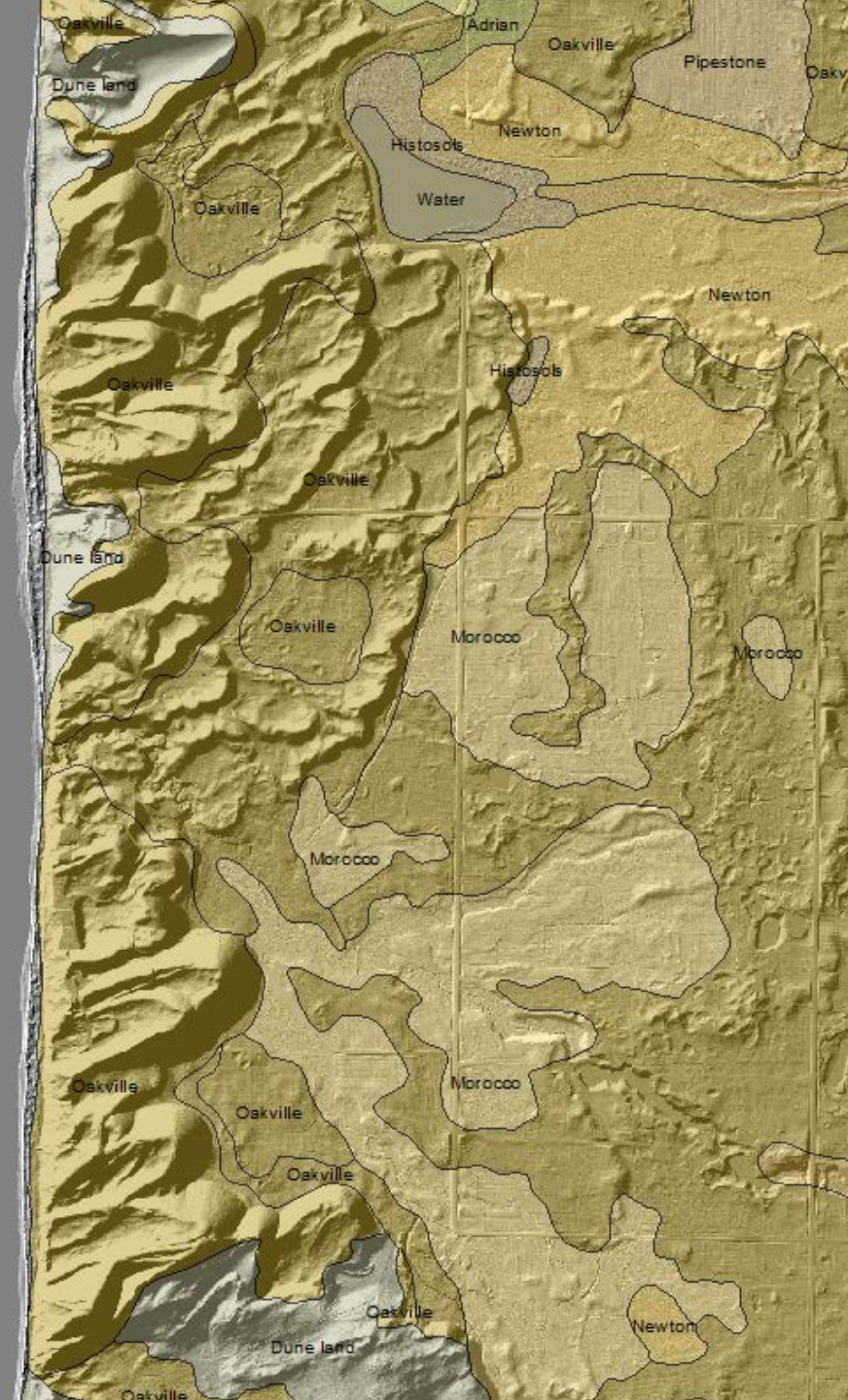
Previously Mapped Critical Dunes



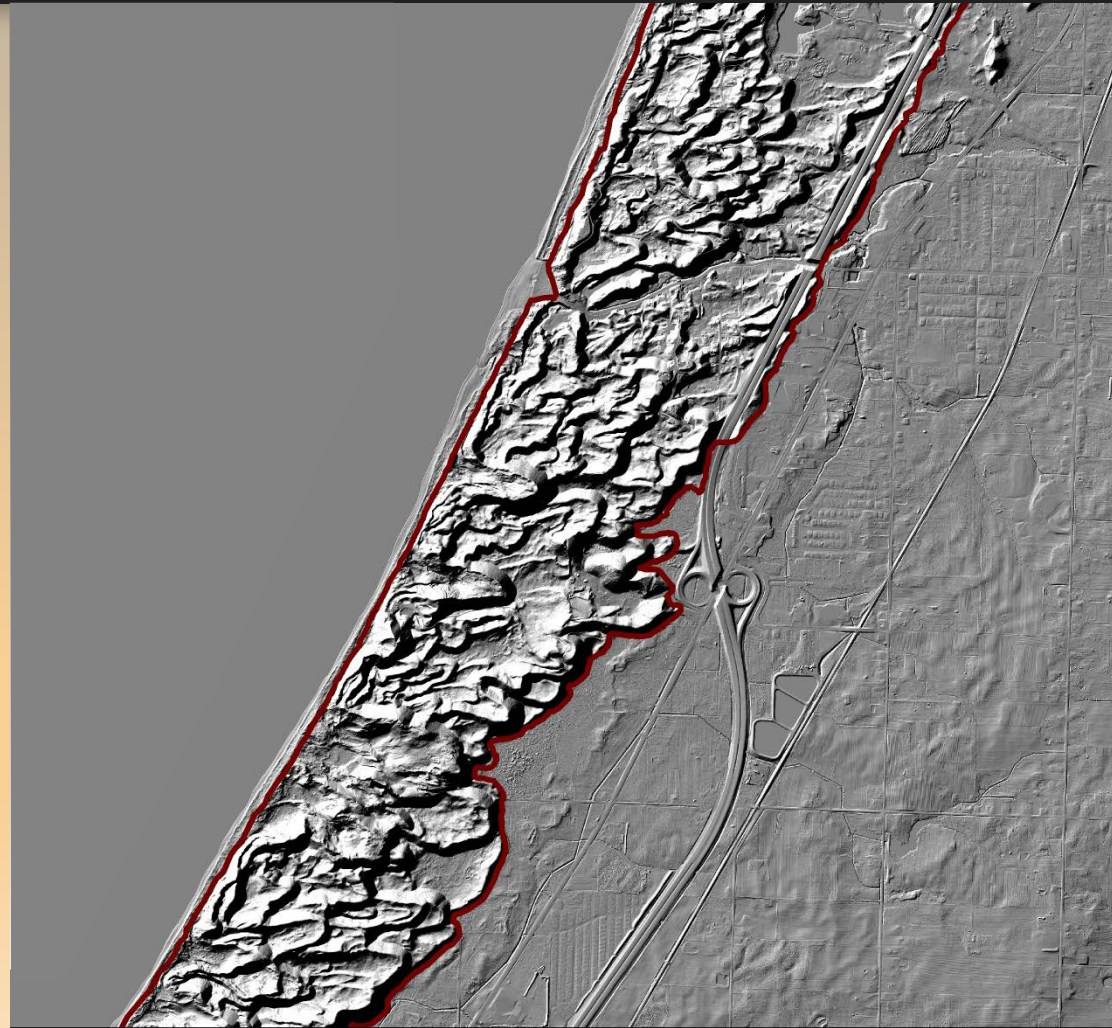
Study Methods

Definition: Coastal sand dunes are physically identifiable features comprised of wind-blown sand

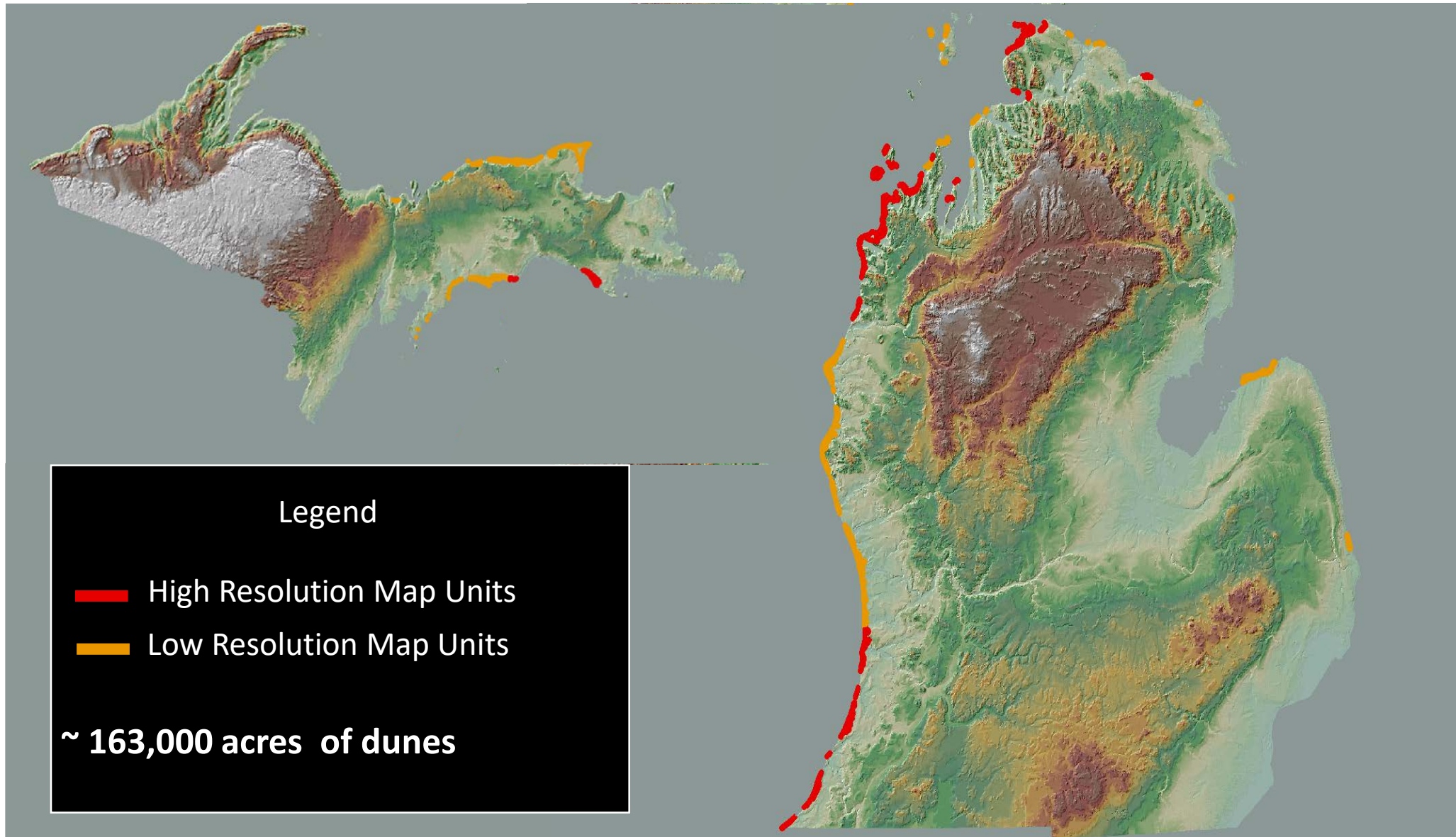
- Digital Elevation Model of coastal counties
 - Digitize dunes based on morphology
- NRCS soil survey
 - SSURGO soils data to help inform decisions and check
- Critical Dunes map
 - Used to help inform decisions
- Other data sources as applicable
 - Help inform decisions



High-Res Mapping Results



New Comprehensive Coastal Dune Mapping



Improving Beach Safety from Rip Currents and Other Dangerous Nearshore Currents (DNC)



Additional information:
www.dangerouscurrents.org



DANGER
Stay Alive – Avoid Piers

Danger Zone – No Swimming

- Swim in designated area, away from this structure.
- If trapped, call for help.
- Call for someone to throw life ring or anything that floats.
- Get to ladder, if possible.

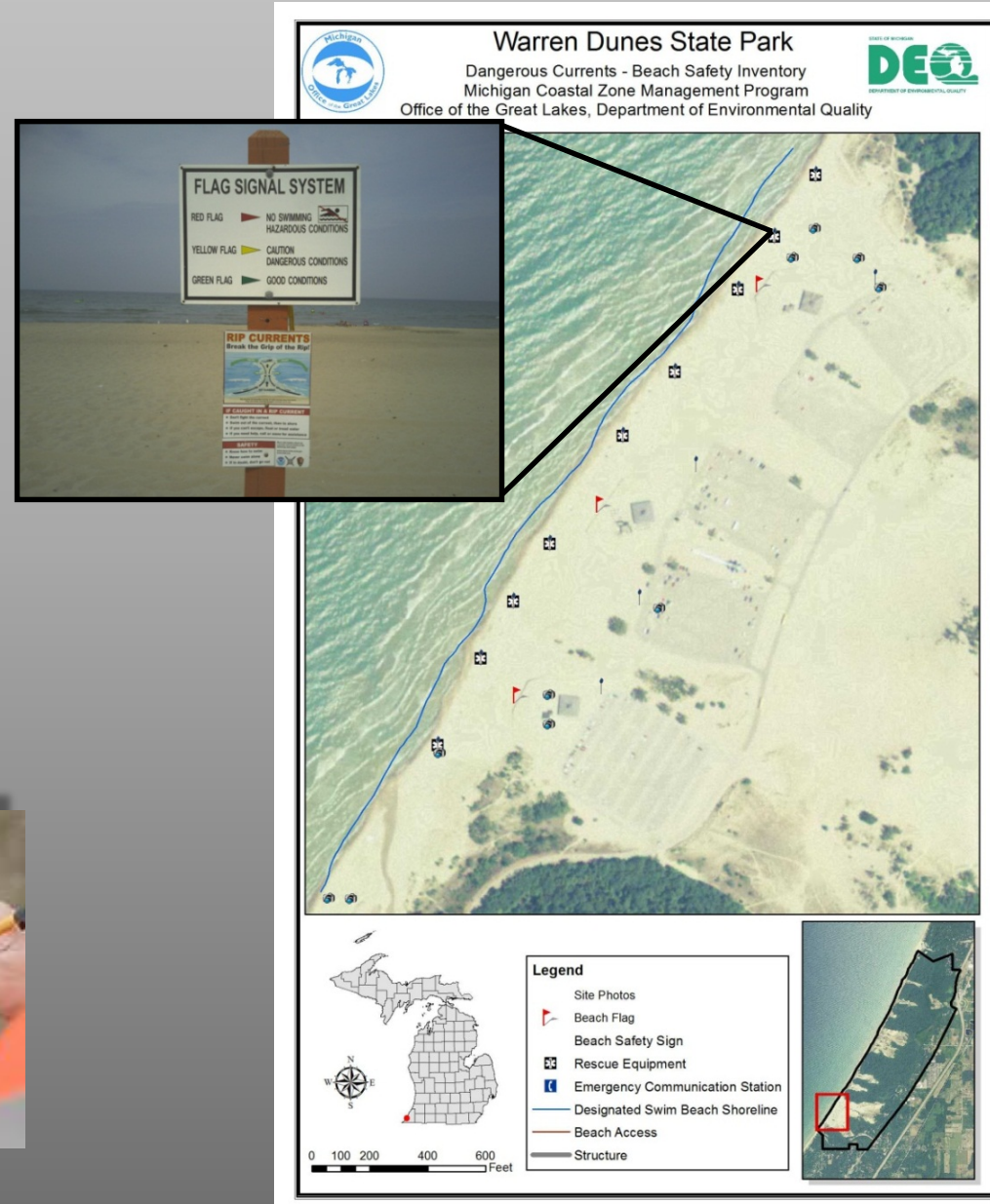
www.dangerouscurrents.org DEa OGL



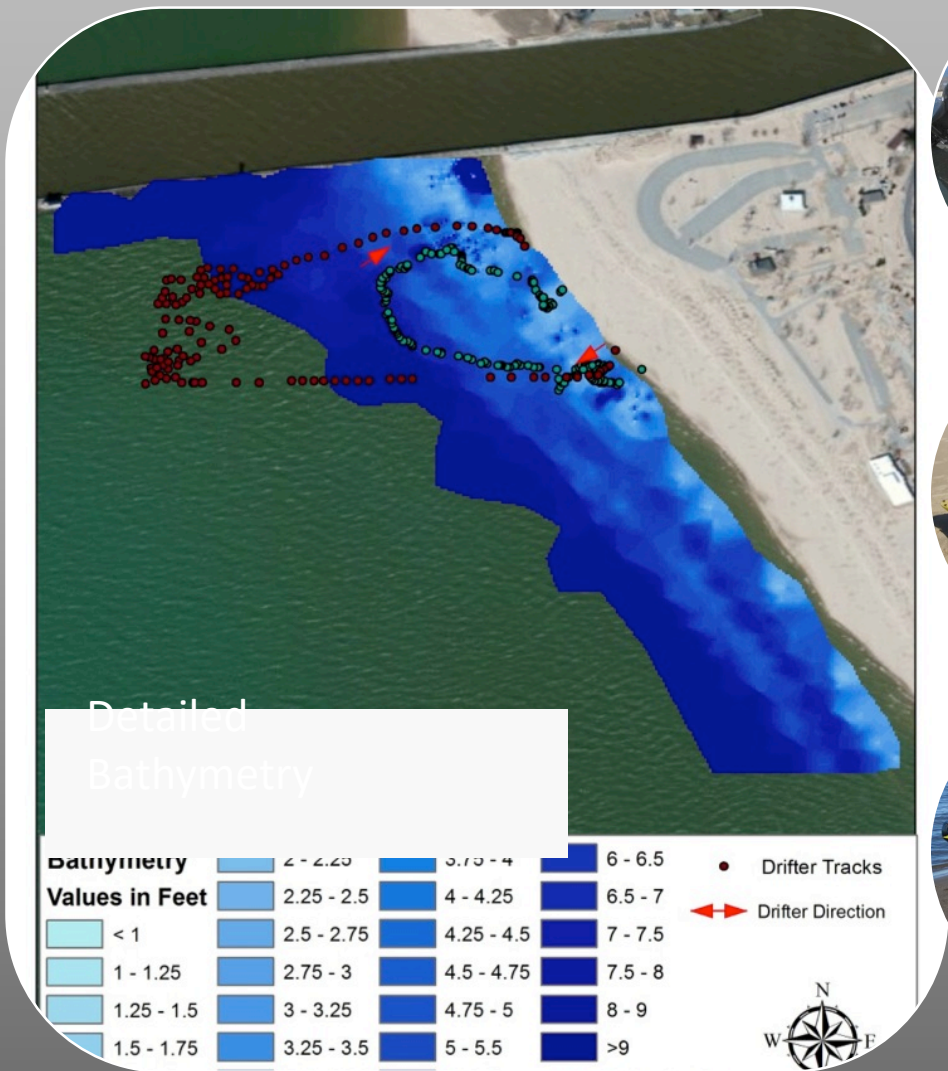
Beach Safety Inventory Mapping

GPS positions & Photographs for:

- Beach flags
- Beach safety signs
- Rescue equipment
- Extent of buoyed swim areas



“ASSAULT ON THE BEACHES”: ADVANCING FORE-CASTING THROUGH PERISHABLE DATA RECOVERY



Sonar



Bathyboat



Autonomous Underwater Vehicle

NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME FORECAST PAST WEATHER SAFETY INFORMATION EDUCATION NEWS SEARCH ABOUT

Local forecast by
City, ZIP or ZIP code
Enter location Go [Read More...](#)
[Location Help](#)

Great Lakes Beach Hazards

Beach Forecasts Incident Database & Stats Beach Safety Great Lakes Water Quality Additional Information

Swim Risk
(Hover for definitions)

- Low
- Moderate
- High

Beach Hazards Statement in Effect

About Great Lakes Beach Forecasts & Statements

- Issued seasonally for the U.S. side of Lake Erie, Lake Huron, Lake Michigan, Lake Ontario, and Lake Superior from roughly Memorial Day weekend through Labor Day weekend (weather dependent).
- Contains beach forecast information, including a daily "swim risk" - which is based on that day's threat of high waves and dangerous currents. Beach Hazards Statements provide additional hazard details on high swim risk days (weather dependent).

Page issues and suggestions should be relayed to Evan Bentley (evan.bentley@noaa.gov)

! DANGEROUS CURRENTS

Sea Grant Michigan

Home Currents 101 Types of Currents Be Safe at the Beach Incident Database Research Resources

Great Lakes Current Incident Database

Search Database:

From Year: 2002 To Year: 2014
Lake: MICHIGAN
Beach Name:
State/Prov: BERRIEN
Type of Current:

Search

Export to Excel

Clear

Search Tips:

- Leave search boxes blank to retrieve all incident records.
- Click the date for more information on that specific incident.
- Information has been collected since 2002 and is updated annually.
- Some records are more complete than others.

Learn more about the database with the Dangerous Currents Database Users Guide (PDF)

GLCID Search Totals			
Type of Current	# of Fatalities	# of Rescues	# of Incidents
CLASSIC RIP	10	13	
CLASSIC RIP/OUTLET	2	2	
CLASSIC RIP/STRUCTURAL	6	3	
STRUCTURAL	3	10	
total:	21	28	

Average Incidents per Year by Lake			
LAKE	Average # of Fatalities	Average # of Rescues	Average # of Incidents
ERIE	2.7	2.2	4.9
HURON	1.6	0.8	2.4
MICHIGAN	6.3	18.7	25.0
ONTARIO	1.6	1.2	2.8
SUPERIOR	1.2	3.1	4.3

Average Incidents per Year			
Average # Fatalities	Average # Rescues	Average # Incidents	
11.1	23.6	34.7	

GLCID Search														
ID	Year	Date	Fatalities	Rescues	Beach Name	County	State/Province	Lake	Type Of Current	Wave Direction	Wave Height (ft)	CWA	GPS Lat	GPS Lon
11	2003	07-04-2003	1	0	CHERRY BEACH	BERRIEN	MICHIGAN	MICHIGAN	CLASSIC RIP/STRUCTURAL	NW	3 TO 4	IWX	41.87	-86.6488
12	2003	07-04-2003	1	0	CHERRY BEACH	BERRIEN	MICHIGAN	MICHIGAN	CLASSIC RIP/STRUCTURAL	NW	3 TO 4	IWX	41.87	-86.6488

Beach forecast and Rip current incidents:
<https://www.weather.gov/greatlakes/beachhazards>



NOAA Office for Coastal Management
Products

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¹The Baldwin Group at NOAA Office for Coastal Management

²NOAA Office for Coastal Management

Utilizing Geospatial Data and Tools for Analysis and Visualization in the Great Lakes





Digital Coast



MORE THAN JUST DATA

Dive into the Digital Coast to Get the Data, Tools, and Training Communities Need to Address Coastal Issues.

- <https://coast.noaa.gov/digitalcoast/>
- Excellent source for coastal data & more
- Landcover
- Topo-bathy LiDAR
- Stories from the coast
- ...and more

What is Digital Coast?

NOAA-sponsored website is focused on helping communities address coastal issues. The website has become one of the most-used resources in the coastal management community. Through the dynamic Digital Coast Partnership, whose members represent the coastal management user groups, keeps the effort focused on customer needs.

...section, or just dive in. And please provide feedback as you go. Your input is what makes the Digital Coast work.

Top **5** Popular Staff Picks New

1. Sea Level Rise Viewer
2. Data Access Viewer
3. Introduction to Lidar
4. Historical Hurricane Tracks
5. Flood Exposure Mapper



Digital Coast Updates

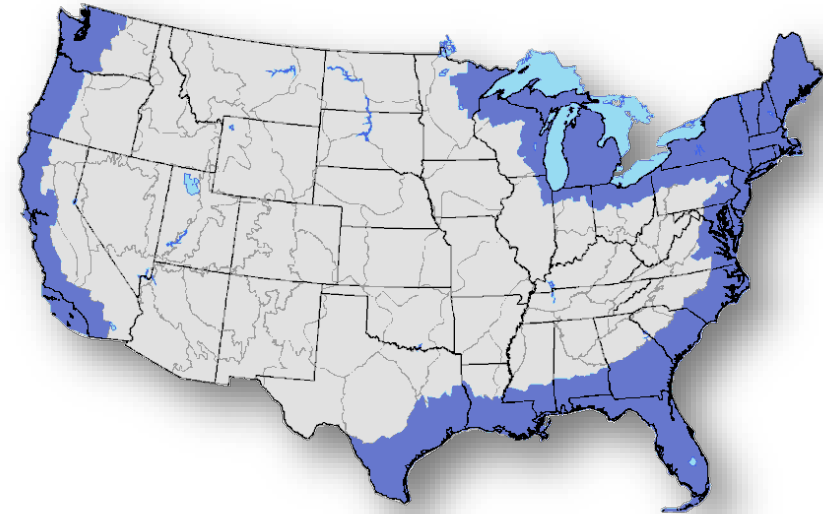
- Coastal Change Analysis Program (C-CAP)
 - 2016 Updated MI, MN, and WI 30 meter products available.
 - High res work on Lake Superior NERR, IL, IN, OH, PA, and NY underway.
- Lake Level Viewer (LLV)
 - New extended coverage now available.
 - New data and services available directly through Digital Coast and Data Access Viewer (DAV).
- Other Updates
 - 2107 datasets, 78 tools, 194 training resources, 145 stories.

Coastal Change Analysis Program (C-CAP)



What is the Coastal Change Analysis Program (C-CAP)?

- Coastal Land Cover & Change data
- NOAA maps 25% of the contiguous U.S.
- Coastal expression of the NLCD (National Land Cover Database): ***NLCD is 95% C-CAP in coastal areas***
- Added focus on wetlands detail
- Updated every 5 years
- High resolution available*



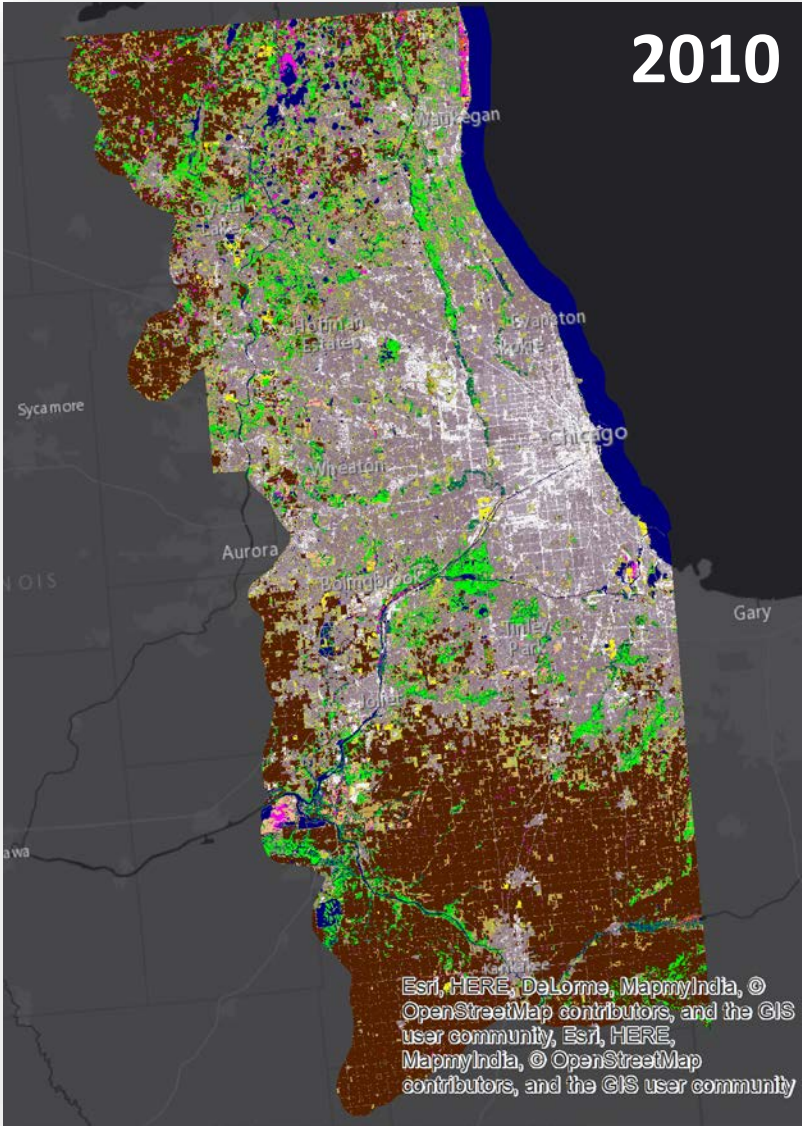
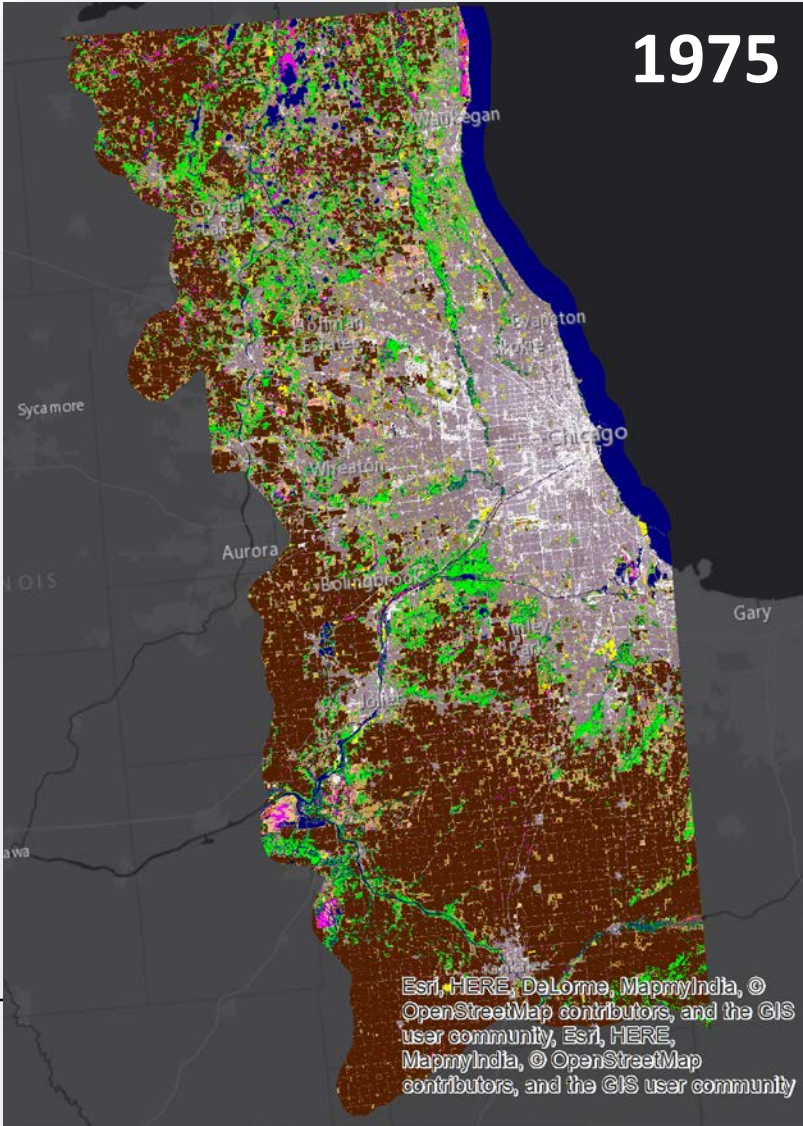
C-CAP in the Great Lakes Region

	1975	1985	1996	2001	2006	2010	2016
Illinois	✓	✓	✓	✓	✓	✓	HRD
Indiana	✓	✓	✓	✓	✓	✓	HRD
Michigan	✓	✓	✓	✓	✓	✓	✓
Minnesota	✓	✓	✓	✓	✓	✓	✓
New York	✓	✓	✓	✓	✓	✓	HRD
Ohio	Pending	✓	✓	✓	✓	✓	HRD
Pennsylvania	✓	✓	✓	✓	✓	✓	HRD
Wisconsin	✓	✓	✓	✓	✓	✓	✓

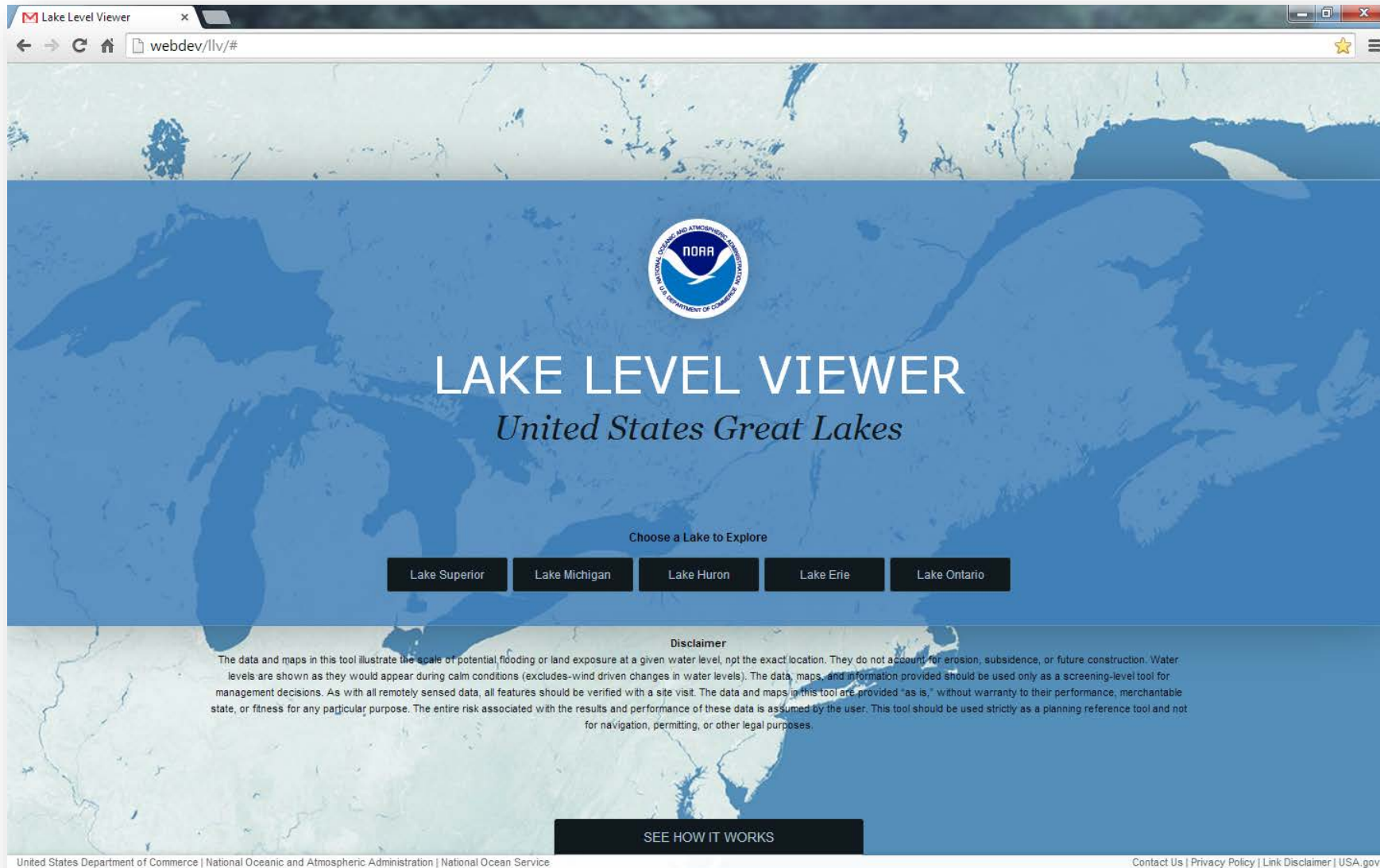
HRD = High Resolution Development Underway



C-CAP in the Great Lakes Region



Lake Level Viewer (LLV)



The screenshot shows a web browser window with the title "Lake Level Viewer" and the URL "webdev/llv/#". The main content area features a blue-tinted map of the Great Lakes region. At the top center is the NOAA logo, which includes the text "NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION" and "U.S. DEPARTMENT OF COMMERCE". Below the logo, the title "LAKE LEVEL VIEWER" is displayed in large white capital letters, followed by the subtitle "United States Great Lakes" in a smaller, italicized font. Underneath, the text "Choose a Lake to Explore" is centered above five dark blue buttons labeled "Lake Superior", "Lake Michigan", "Lake Huron", "Lake Erie", and "Lake Ontario". A "Disclaimer" section follows, containing a paragraph of text: "The data and maps in this tool illustrate the scale of potential flooding or land exposure at a given water level, not the exact location. They do not account for erosion, subsidence, or future construction. Water levels are shown as they would appear during calm conditions (excludes wind driven changes in water levels). The data, maps, and information provided should be used only as a screening-level tool for management decisions. As with all remotely sensed data, all features should be verified with a site visit. The data and maps in this tool are provided 'as is,' without warranty to their performance, merchantable state, or fitness for any particular purpose. The entire risk associated with the results and performance of these data is assumed by the user. This tool should be used strictly as a planning reference tool and not for navigation, permitting, or other legal purposes." At the bottom center, there is a dark blue button labeled "SEE HOW IT WORKS". The footer of the page contains the text "United States Department of Commerce | National Oceanic and Atmospheric Administration | National Ocean Service" on the left and "Contact Us | Privacy Policy | Link Disclaimer | USA.gov" on the right.



What is the Lake Level Viewer?

- First official release in November 2014
- Funded by the Great Lakes Restoration Initiative
- Fills a critical information data gap:
 1. 40% of Coastal Storms Program survey respondents said current data on future lake level changes are inadequate
 2. Only 26% said existing tools to work with or visualize these data are adequate

Source: 2013 Shoreline Change Workshop: Perspectives on the Great Lakes Survey



What is the Lake Level Viewer?

The Impacts of Changing Water Levels



What is the Lake Level Viewer?

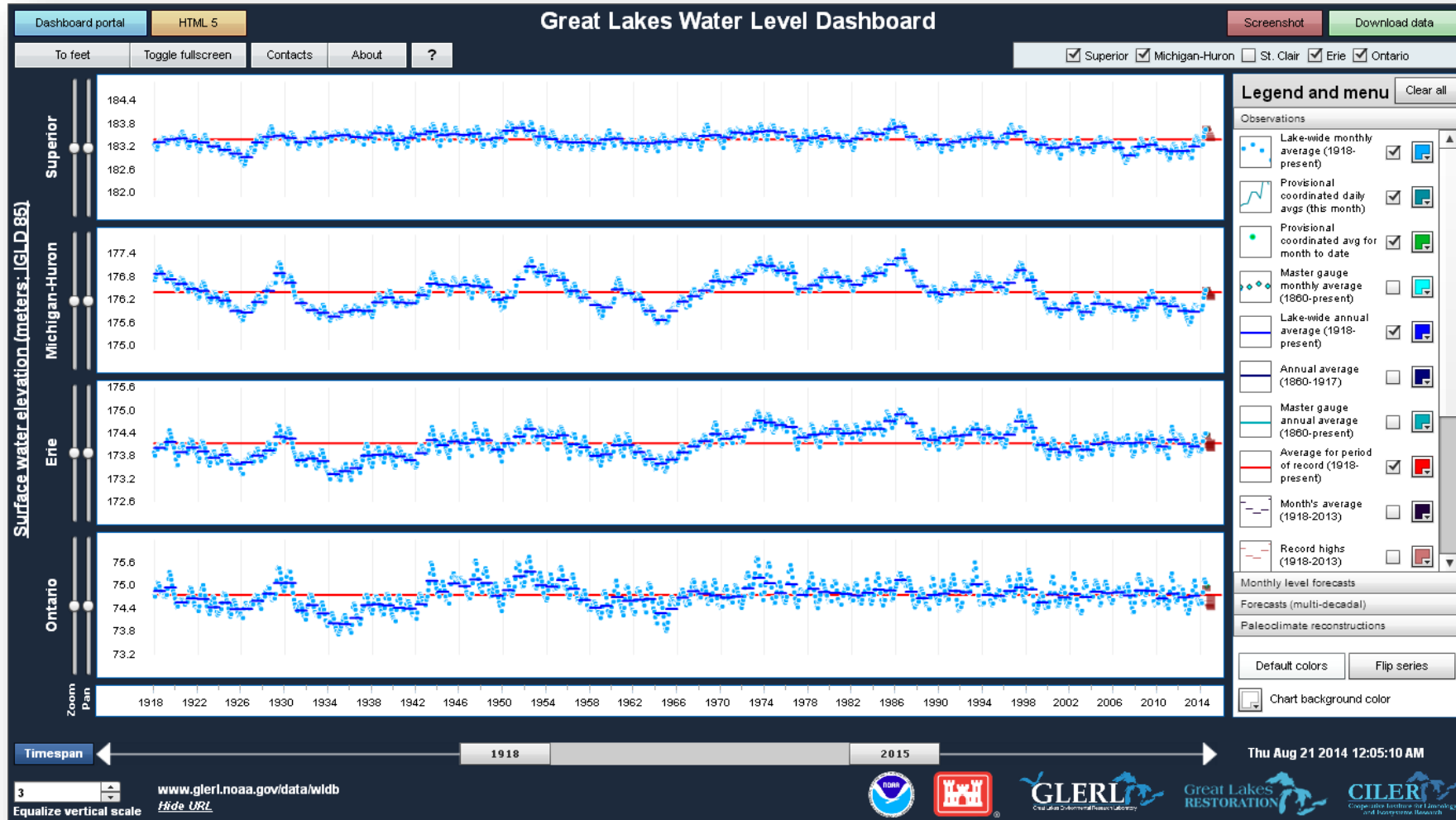
Water Levels

6.4 feet range in Min – Max water levels!!!

Lake	Low Water Datum (ft)	Min Elevation (ft)	Year	Max Elevation (ft)	Year	Long Term Average (ft)
Superior	601.1	599.5	1926	603.4	1986	601.1
Michigan-Huron	577.5	576.0	1964	582.4	1986	578.4
St. Clair	572.3	570.5	1934	577.3	1986	573.8
Erie	569.2	568.2	1934	574.3	1986	571.1
Ontario	243.3	241.9	1935	248.6	1952	245.0



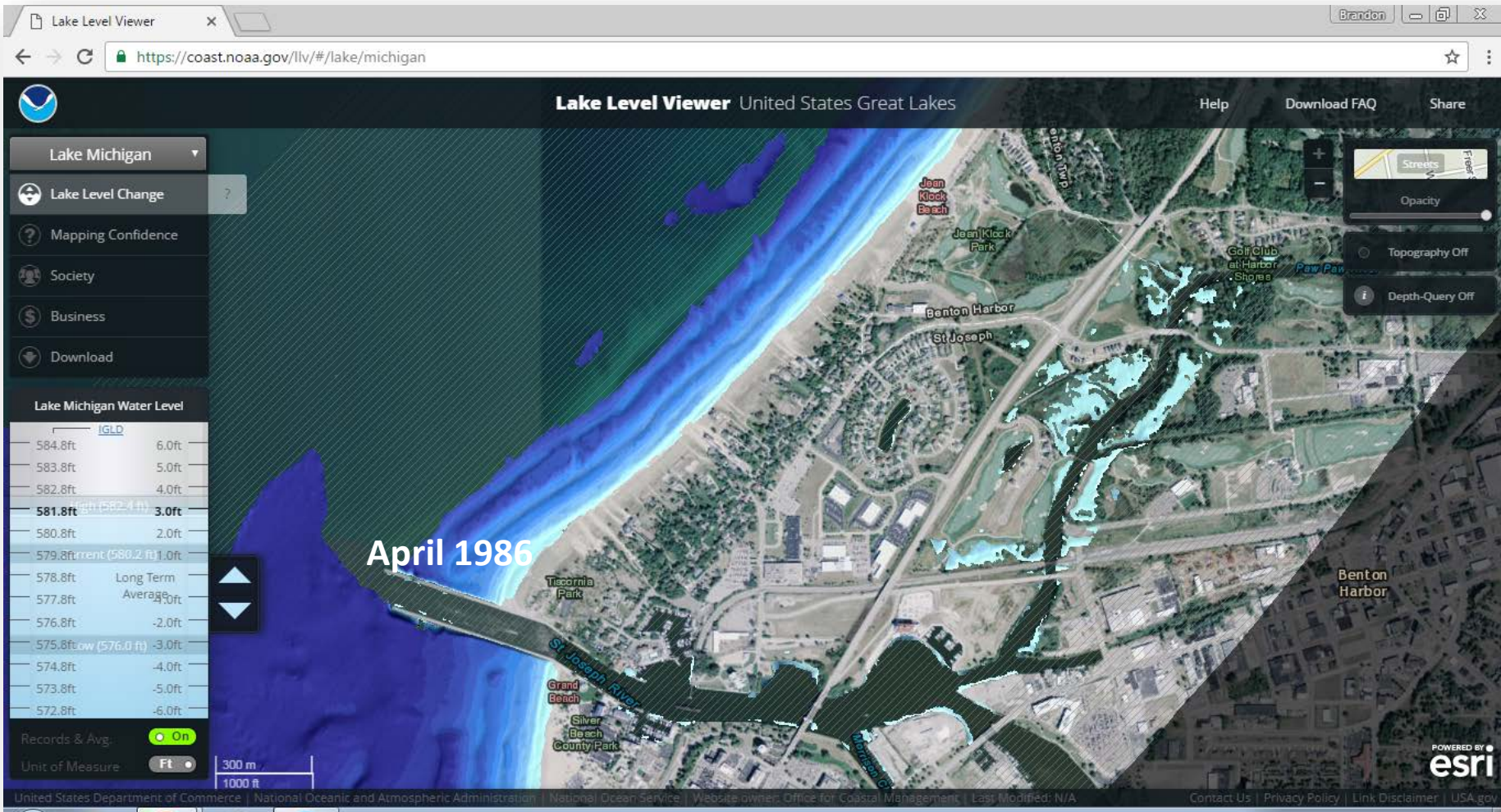
What is the Lake Level Viewer?



Use this data...



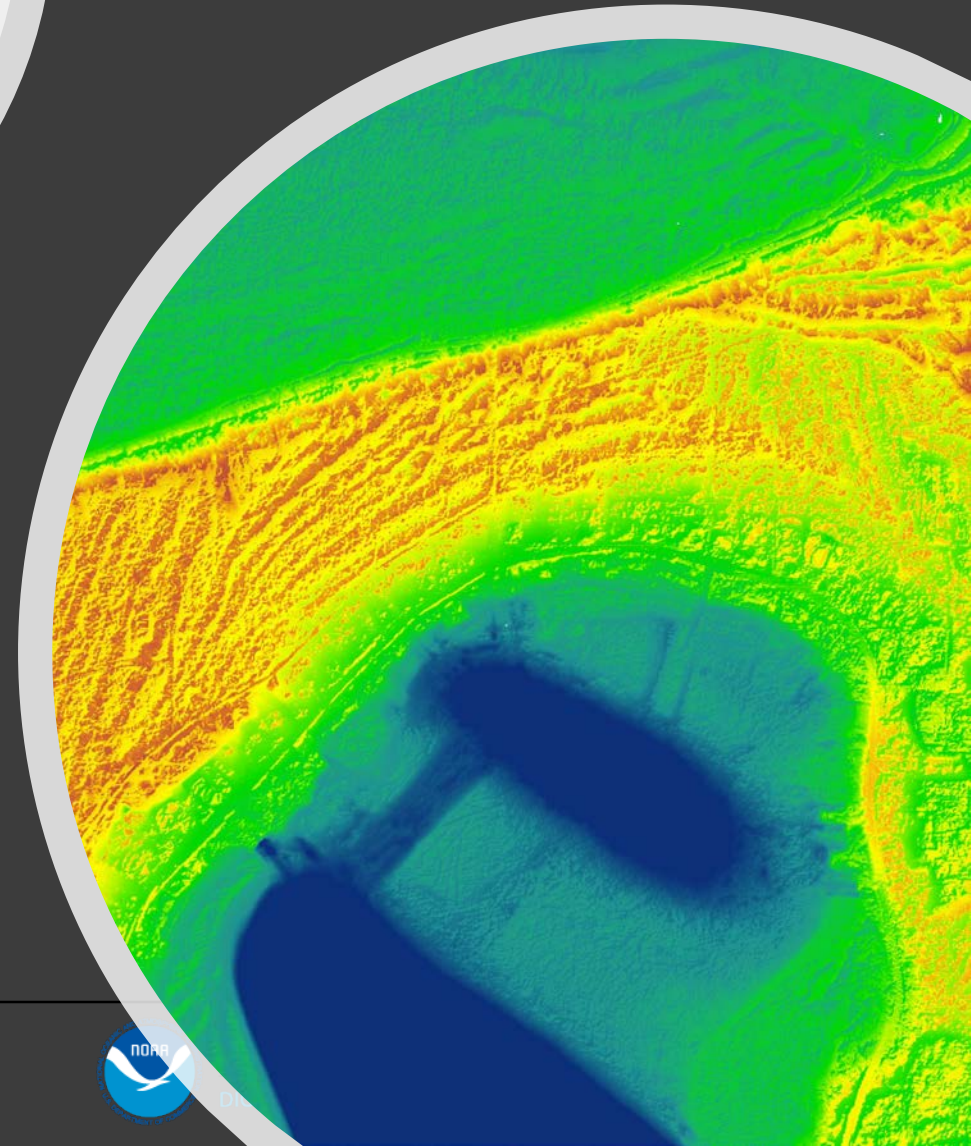
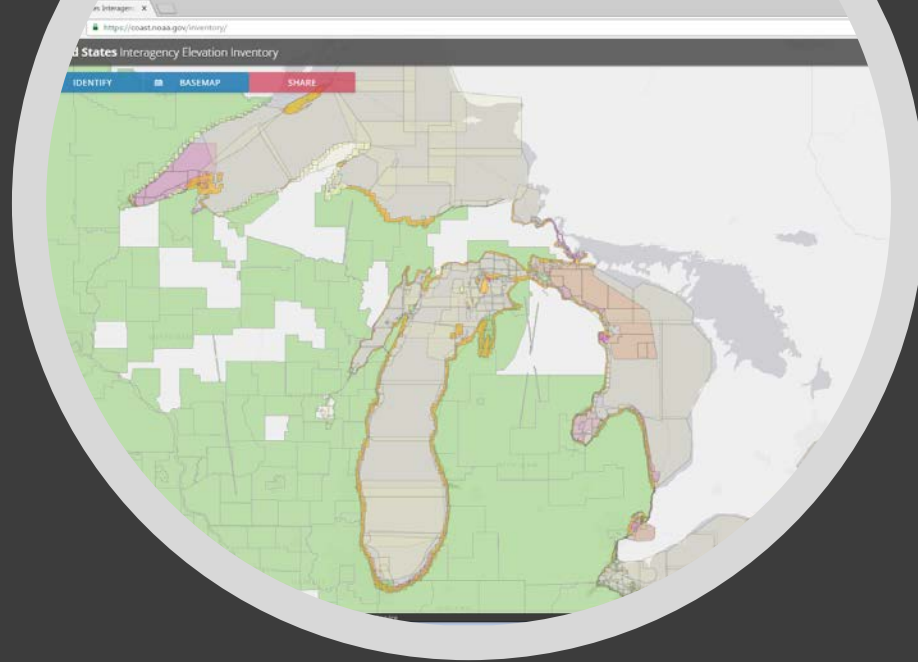
What is the Lake Level Viewer?



...to visualize the impacts



US Interagency Elevation Inventory



DOI

NOAA Office for Coastal Management Digital Coast

coast.noaa.gov/digitalcoast

Coastal Change Analysis Program

coast.noaa.gov/ccapftp/ (Data)

coast.noaa.gov/ccapatlas/ (Land Cover Atlas)

Lake Level Viewer

coast.noaa.gov/llv

US Interagency Elevation Inventory

coast.noaa.gov/inventory/

Resources





Thank You!

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**Michigan Coastal Management Program
Office of the Great Lakes
Department of Natural Resources**