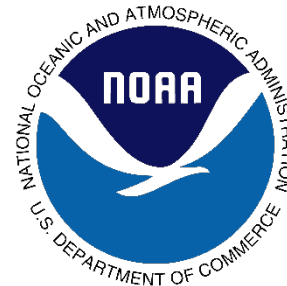


Lake Michigan Coastal Program Overview



Jenny Orsburn
Lake Michigan Coastal Program
Program Manager

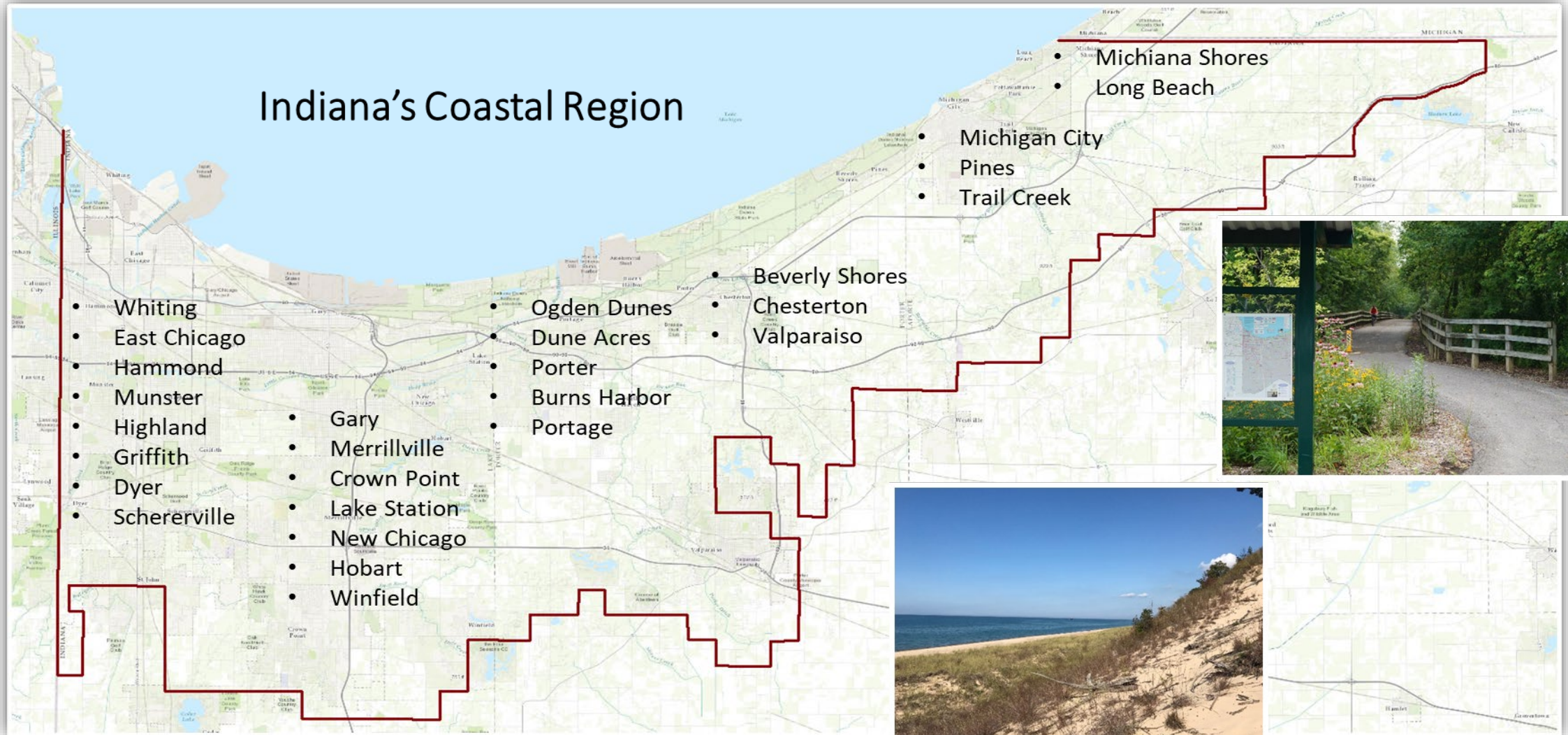
Lake Michigan Coastal Program

Approved Coastal Zone Management Act program since 2002

Program Area – Lake Michigan watershed and 45 miles of Lake Michigan shoreline (15 miles National Park)

Coordinated program housed in the Indiana DNR Division of Nature Preserves

Based on existing laws and created a grant program



The mission of the Lake Michigan Coastal Program is to protect and enhance **coastal resources** by providing technical and financial assistance to partners.

Public Land & Water



Natural Resources



Historical Resources





Our Partners

Federal Agencies

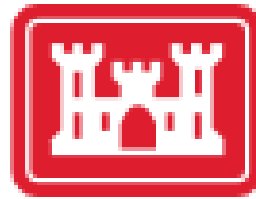
State Agencies

Counties

Cities & Towns

Universities & Schools

Non-profit Organizations



ALLIANCE for the GREAT LAKES



LMCP Priorities

NOAA

Vision:

Through a strong federal, state, and territory partnership, the nation's oceans and coasts are economically vibrant, resilient, and healthy for this and future generations.

LMCP and NOAA

- Indiana coastal communities are effectively planning and preparing for change
- Coastal ecosystems are protected, preserved, and restored for use and improved public access

Program Focus Areas

CZM Section 306

CELCP / IIJA

CZM Section 306a

CZM Section 6217

CZM Section 309

Federal Consistency

Program Focus Areas

Planning/Education

High quality habitat

Public Access

Water quality

Program Improvement

Federal Activities

Program Implementation Partners

EPA

Army Corps of Engineers

Coastal States Organization



Great Lakes Commission



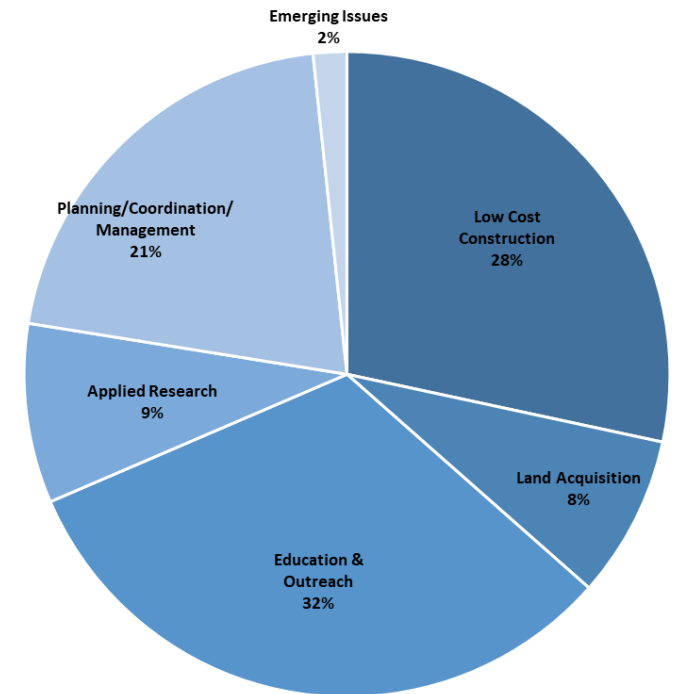
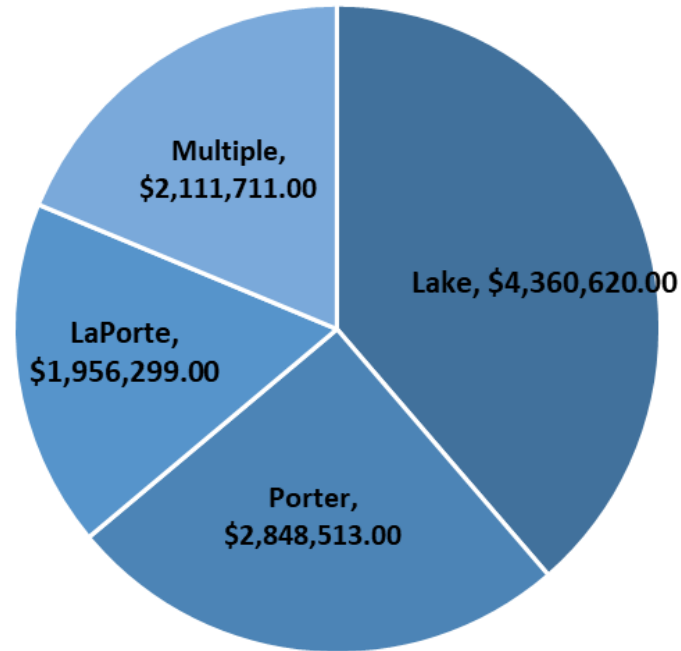
Great Lakes St. Lawrence Seaway
Water Resources Council



Council of Great Lakes Governors

LMCP Grants

- Annual competitive Pass-Through grants program
- Since 2002 invested \$22,000,000 in Northwest Indiana
- With match approximately \$44M investment





Town of Long Beach

Trail Creek
Michigan City



Washington Park
Michigan City

Cheney Run Recreation Amenities Public Meeting



Wednesday, January 29 | 6-8 p.m. | Krueger Memorial Hall
801 Liberty Trail, Michigan City, IN 46360

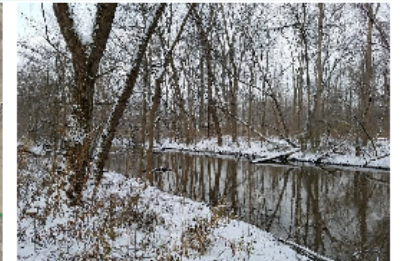
You're invited! Share your ideas!

Do you like to hike, fish, bike, boat, or bird watch?
The Michigan City Sanitary District wants to hear about it.

Join us to provide your input on plans to construct a new trail system at Cheney Run and Karwick Nature Park, and discuss opportunities for improvements on site, like fishing piers, restrooms, seating areas, improvements to accessibility, and interpretive signage.

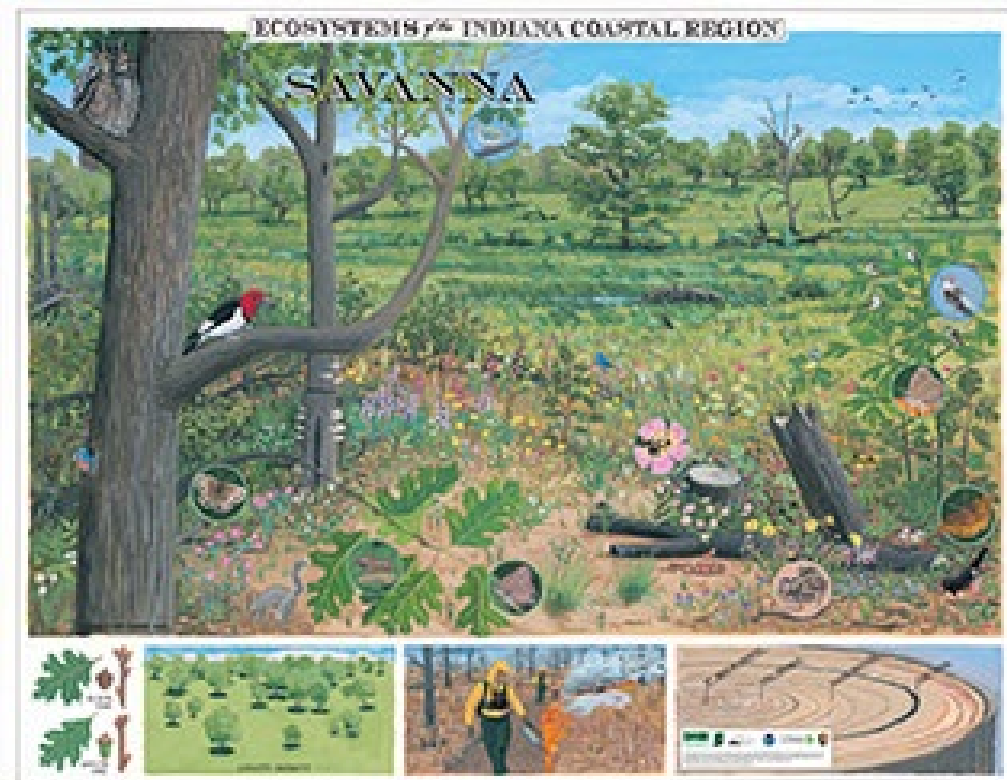
This meeting is a forum for residents to share what they want to see in a new trail system and which recreational amenities will best serve the community.

Survey materials to provide input for the project will be available at the meeting and online at <https://bit.ly/2T2HY3d> starting January 29.



Funding for this project was provided in part by the National Oceanic and Atmospheric Administration and the Indiana Department of Natural Resources Lake Michigan Coastal Program.

Ecosystem Poster Series



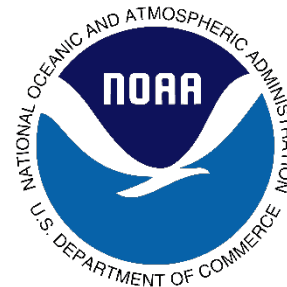
Coastal Advisory Board

The Coastal Advisory Board provides a public forum for diverse stakeholders to assist with the implementation of the Lake Michigan Coastal Program.

The DNR will also form a stakeholder advisory group to provide input for the Coastal Grants Program. The stakeholder advisory group will consist of representatives from Northwest Indiana. The Board will be both geographically representative, as well as representative of the broad range of interests and experience in the coastal region.

- **Make recommendations** to the DNR Director on priorities and guidance for the Coastal Grants Program with the assistance of the Lake Michigan Coastal Program staff and the public.
- **Serve as informed advisors** to both the LMCP and their representative stakeholder group on regional issues affecting Lake Michigan coastal resources to assist the LMCP on its purpose

Lake Michigan Coastal Program Indiana Lake Michigan Coastal Atlas



Ashley Sharkey
Special Projects Coordinator
Division of Nature Preserves
Lake Michigan Coastal Program

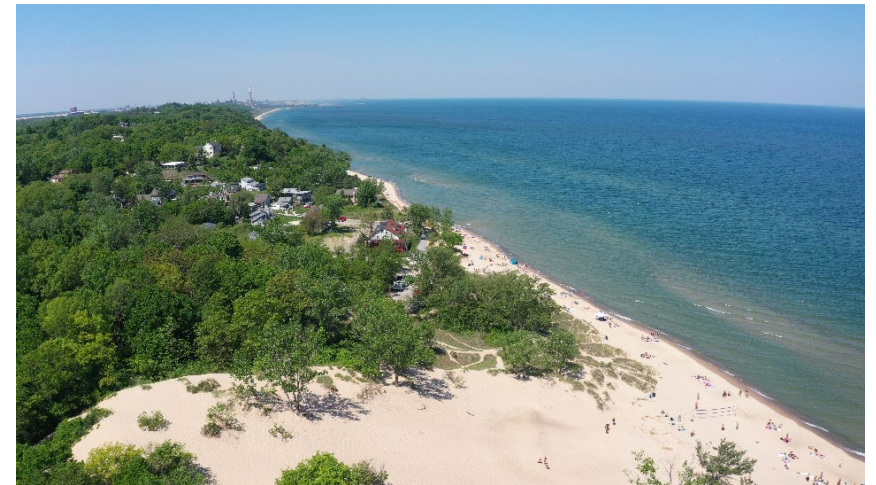
Background Information

- Discussion for an atlas product began in 2011. Funding was secured in 2019 and 2020 to develop the atlas.
- LMCP partnered with Sanborn Map Company to develop an online ArcGIS Hub product that would allow for multiple functionalities such as StoryMap and tools such as dashboards. It would also allow for future flexibility



Coastal Atlas Project

- Current Section 309 Project – Developing and Implementing an Indiana Coastal Atlas
- Project kickoff was February 8, 2022
- Phase I includes an LMCP Overview, Wetlands, Flooding Hazards, and Coastal Imagery viewers



Section 309 Coastal Atlas Project

- Phase I focused on what the DNR owns and putting it out for public use
 - Wetlands: Information about coastal region wetlands and includes the recently updated NWI map for the region
 - Flooding, Erosion, and Waves: Information about riverine and coastal flooding and unique coastal hazards
 - Imagery: Best imagery available of the region



The Wisconsin Coastal Atlas is one of the existing atlases that we looked at and used as a template of what we wanted to create

Creating an Accessible Product

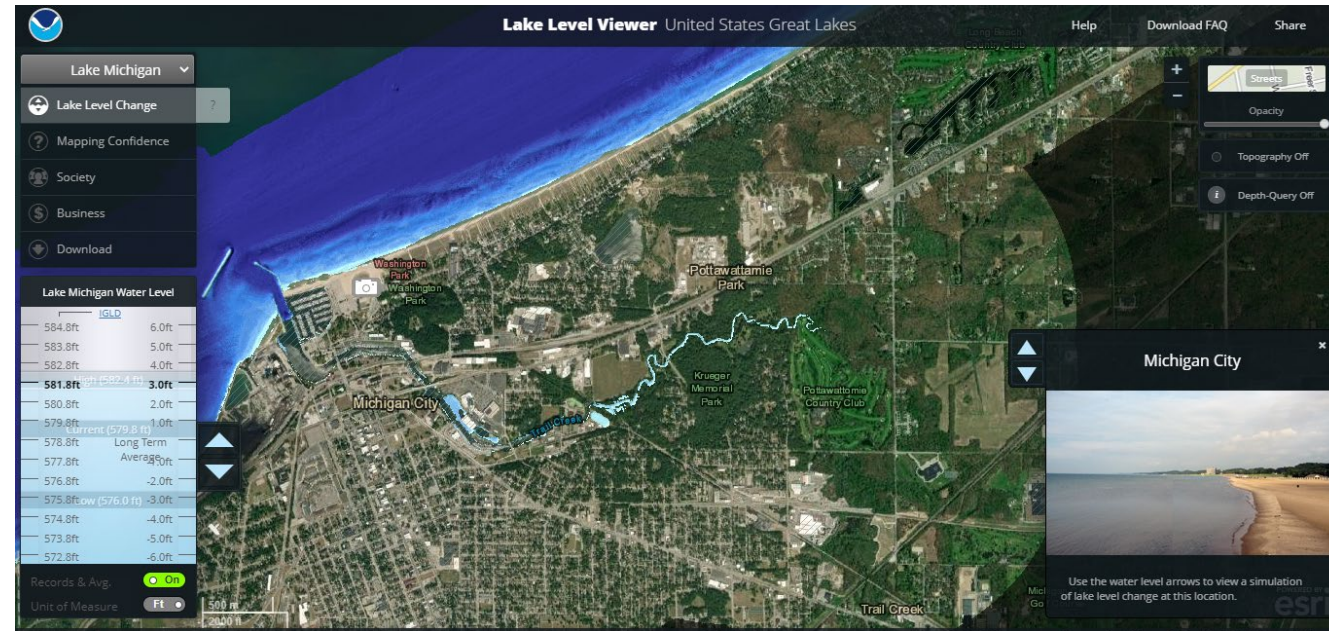
- The landing page needed to be integrated with the existing DNR website so that it can be easily found
- An important aspect was ensuring our webpage is assessable to those with disabilities
- Indiana is working towards being more inclusive and adaptable with those who need additional considerations



Coastal Atlas landing page: <https://indiana-coastal-atlas-2-indnr.hub.arcgis.com/>

Section 309 Coastal Atlas Project

- Next Steps
 - Phase II will focus on developing tools and additional functionalities of the atlas
- Potential Ideas include:
 - Mapping of public areas and trails
 - Coastal Area NP Showcase
 - Purdue Coastal Erosion Project and Model
 - Historic Inventory
 - Modeling Lake Levels



NOAA Great Lakes Levels Viewer – a tool we are looking at adapting to our atlas and creating a more Indiana-centric view and usage

Contact Information

Ashley Sharkey, LMCP Special Projects Coordinator

Email: ASharkey@dnr.in.gov

Phone: 219-921-0863/219-299-4388

Indiana Dunes State Park

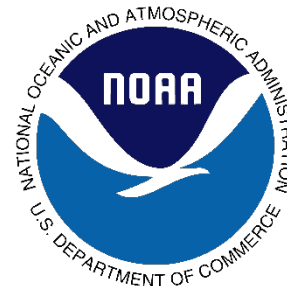
1600 North 25 East

Chesterton, IN 46304

Questions?

Coastal Hazards Resiliency

Lake Michigan Coastal Program Enhancement Project

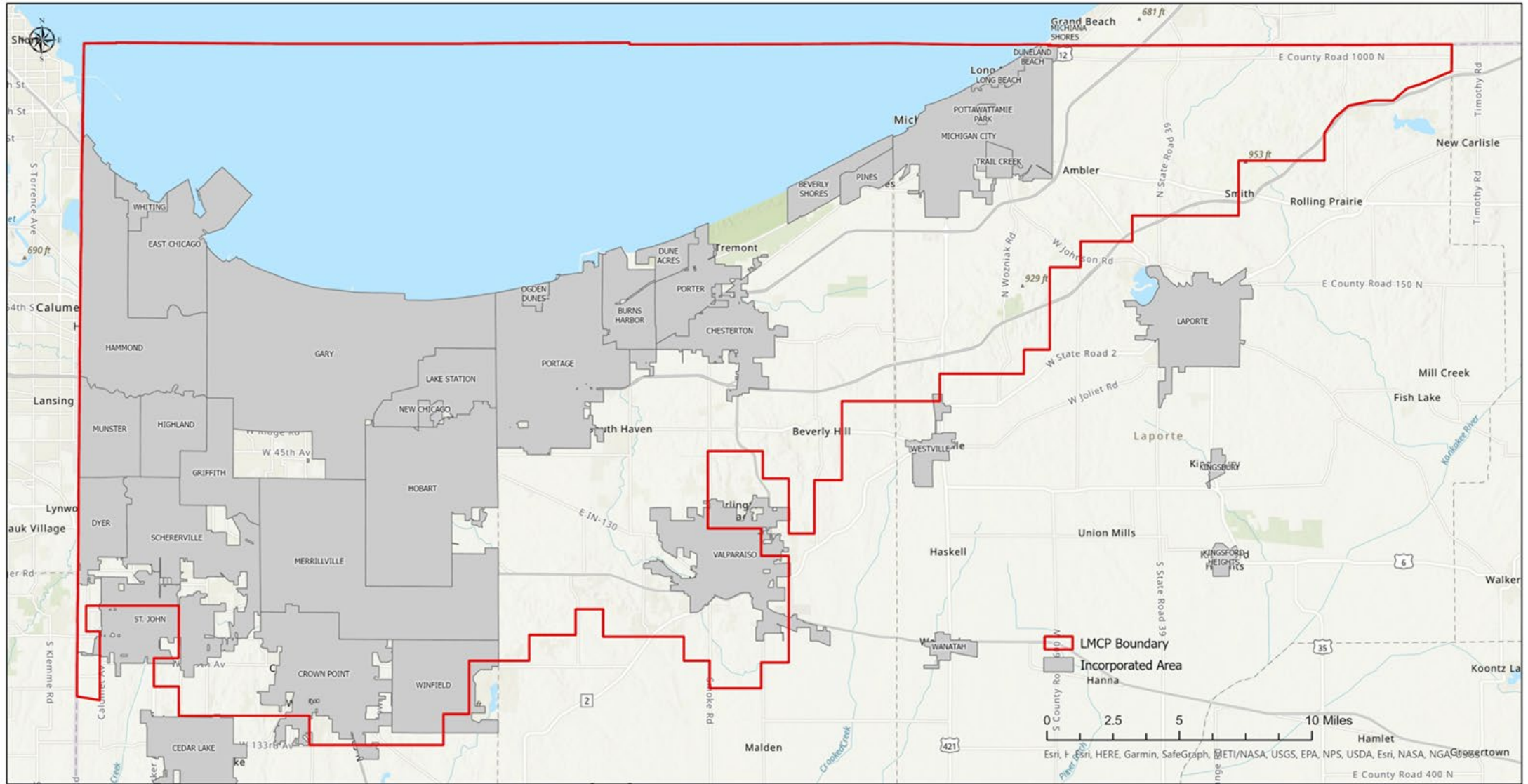


Joe Exl
Coastal Resources Coordinator
Lake Michigan Coastal Program

Develop Technical Resources for the State of Indiana & Lake Michigan Coastal Communities to Prevent or Reduce Coastal Hazard Risks

Project Purpose

Project Area



What Are The Coastal Hazards?

- Flooding
- Erosion
- Lake Level Change
- Coastal Storms



Program Enhancement Strategies

- Community Needs Assessment
- Shoreline Imagery Acquisition (Coastal Monitoring Program)
- Shoreline Structural Assessment
- Coastal Atlas Buildout
- Living Shorelines



Community Needs Assessment

Gather Baseline Information to Guide Program Enhancement Actions

Community Self-Assessment & Listening Sessions

- Understanding Coastal Watershed Hazard Impacts
- Hazard Mitigation Planning
- Local Government Planning
- Local Ordinances
- Implementing Best Practices
- Public Education & Engagement
- Shoreline and Fluvial Erosion Protection
- Stormwater Management
- Natural Areas, Open Space, and Public Access
- Marinas



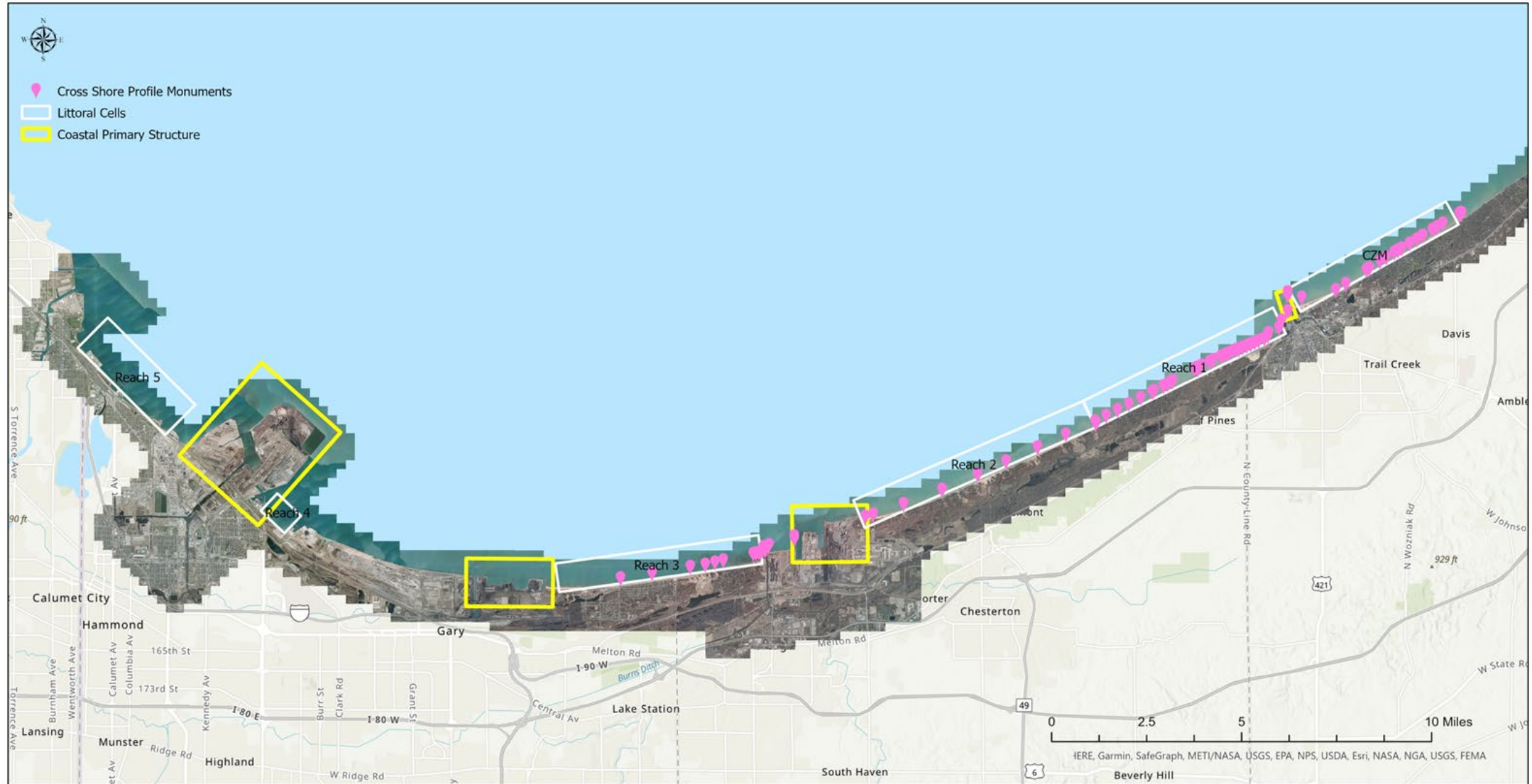
Coastal Monitoring Program

Coastal Monitoring Program

- Evaluate Coastal Processes & Responses
- Support State & Coastal Community Needs w/ Data Driven Science



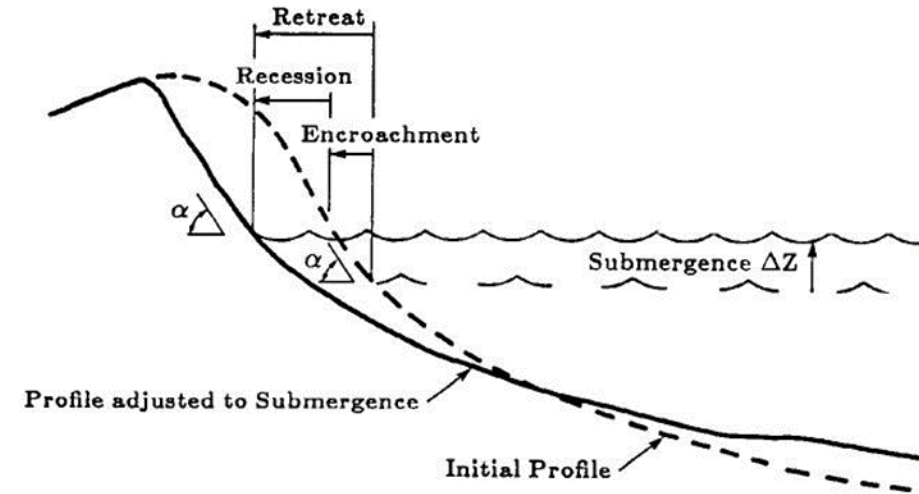
Coastal Monitoring Project Area



Coastal Situation Report (1998)

Objectives

- Determine Dune/Bluff & Water's Edge Change
- Evaluate Sediment Transport At Major Shoreline Structures
- Assess Shoreline Conditions (Use, Coastal Hazards, Stability)
- Wave Climatology
- Coastal Processes & Responses
- Establish Plan for Permanent Coastal Erosion Monitoring Program

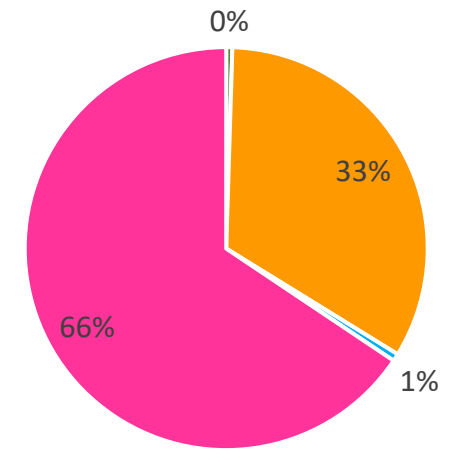
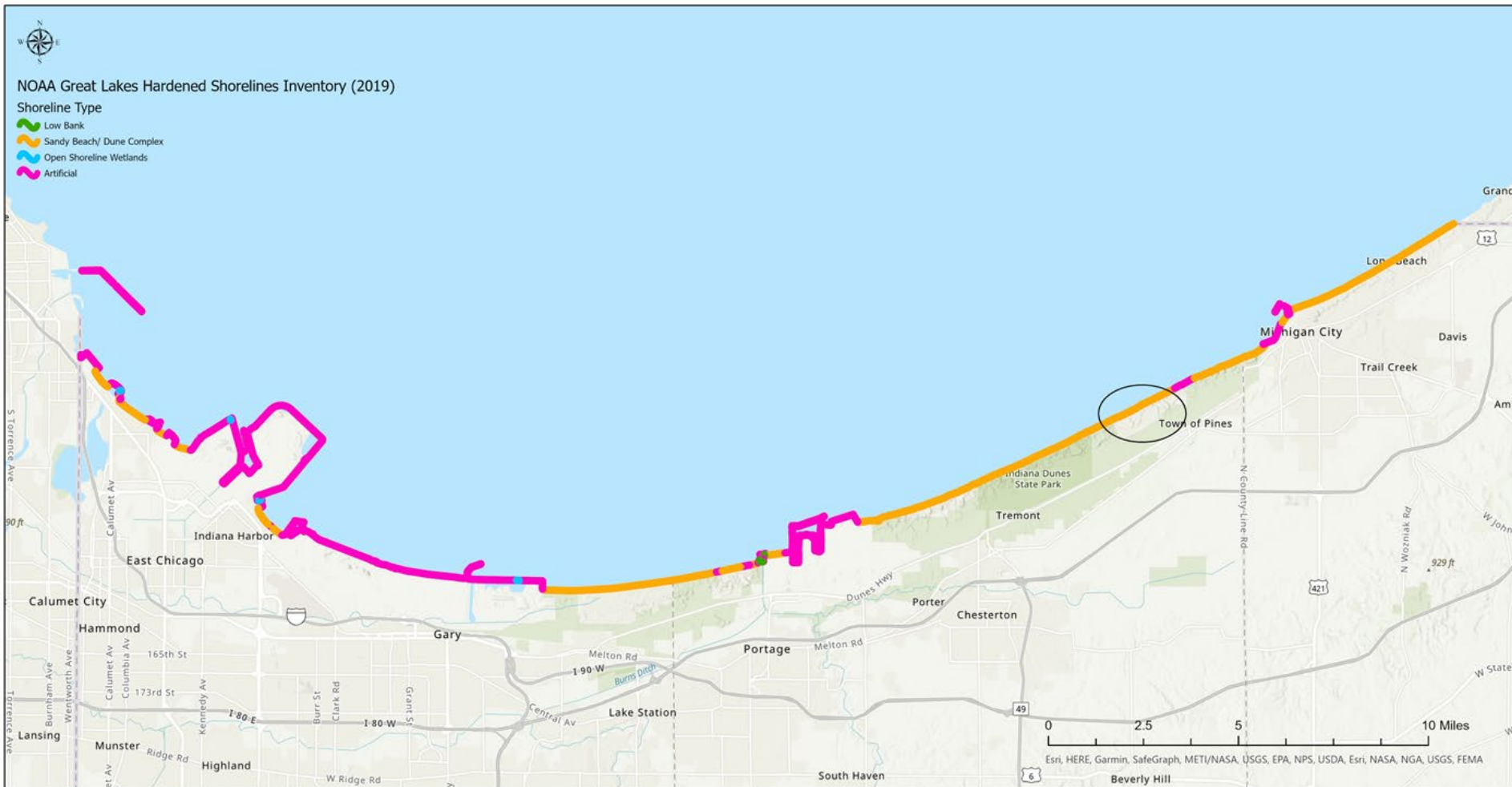


$$\text{RETREAT} = \text{ENCROACHMENT} + \text{RECESSION}$$

Figure 7-2: Definition Diagram Depicting Three Concepts of Spatial Shoreline Change: Retreat, Encroachment and Recession

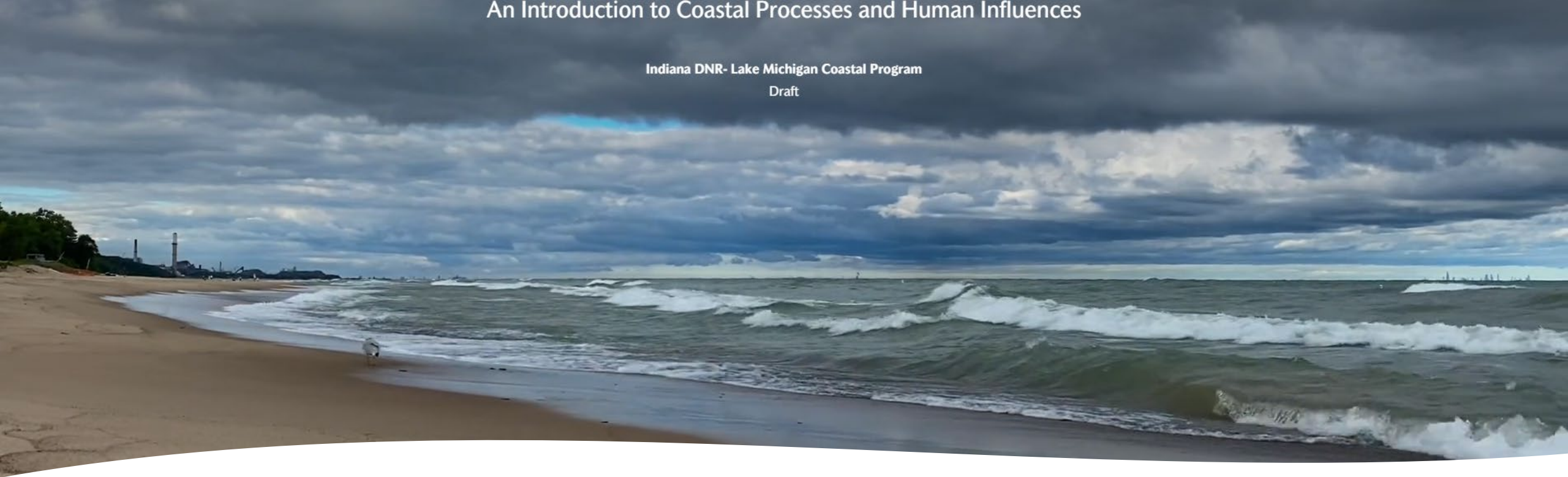
Shoreline Structural Inventory

NOAA Hardened Shoreline Inventory (2019)



- Low Bank
- Sandy Beach/ Dune Complex
- Open Shoreline Wetland
- Artificial

Indiana Coastal Atlas Buildout



Indiana's Dynamic Lake Michigan Coastline

- Confluence of Nature and Human Activity
- Virtual Shoreline Tour
- Coastal Features
- Water Levels and a Dynamic Great Lakes
- Wind, Waves and Currents
- Sand Transport Along the Coast
- Coastal Structures
- Monitoring Coastal Changes



Wetland Acres

39.2k

Our Coastal Wetlands

Wetlands provide a variety of functions that are beneficial to both people and wildlife. Examples include floodwater storage, shoreline stabilization and waterbird habitat. However, not all wetlands provide the same functions or level of functions. This is because wetland functions are influenced by a variety of factors, including but not limited to, the wetland's position in the landscape, its shape or physical form, and how water flows in and out of it.

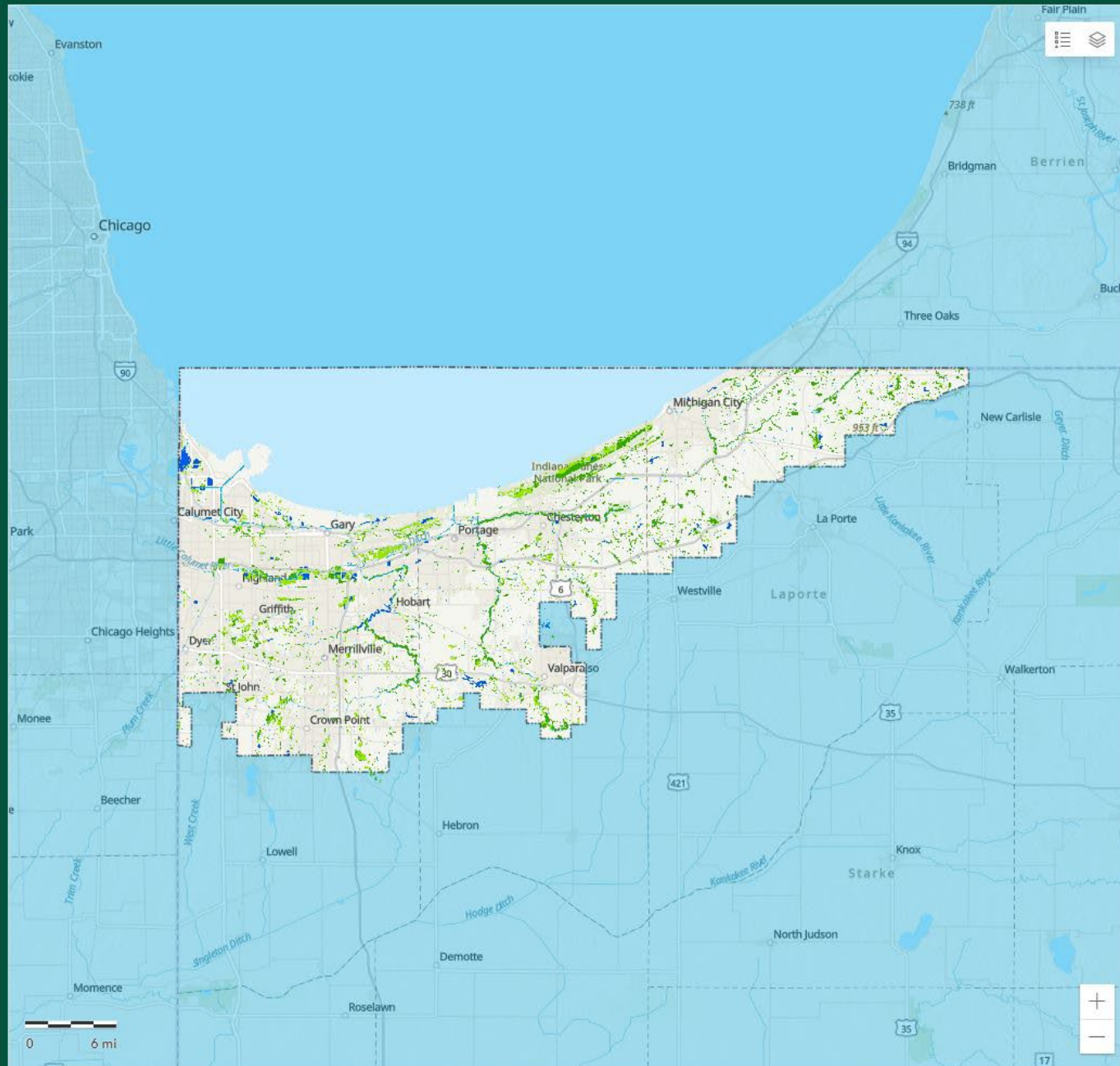
This dashboard presents wetland data collected as part of a functional assessment for the Lake Michigan Coastal Program area in an interactive map and pie charts. Ten wetland functions were evaluated as part of the project.

Interact with Dashboard Features:

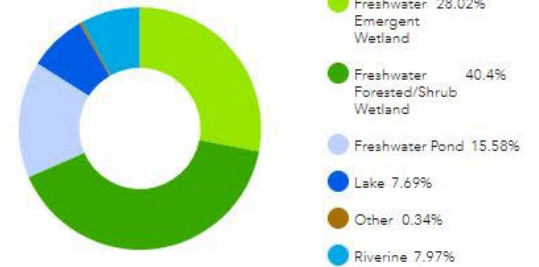
- Filter the data by watershed or municipality using the dropdowns in the upper right
- Zoom in or out within the map using the +/- buttons or your mouse wheel
- Pan to an area of interest within the map by holding down the left click button on your mouse
- Click on wetland features within the map for popups that contain additional information
- View additional pie charts by clicking the left or right arrows next to the chart description
- Hover over the slices in the pie charts for additional information
- Click on individual slices within a pie chart to show the locations of these features within the map
- Open a list of definitions by clicking on the arrow to the middle far left of the dashboard

How Were Wetland Functions Predicted?

The U.S. Fish & Wildlife Service National Wetlands Inventory (NWI) dataset was enhanced by adding landscape position, landform, waterflow path, and waterbody type (LLWW) descriptors to predict wetland functions. When the LLWW classifications are added to the standard NWI database, an NWI+



Wetland Type



Wetland Landscape Position

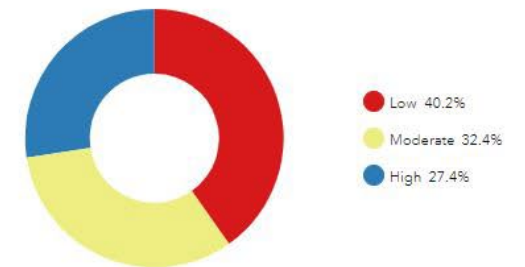


Wetlands classified as riverine are not assigned a landscape position.

1) Landscape Position

2) Landform Type

Flood Storage Function



1) Flood Storage



Shoreline Classification

This dashboard depicts NOAA's hardened shoreline classifications for the U.S. Great Lakes. The data has been filtered to only show data for Indiana by the Indiana DNR Lake Michigan Coastal Program. The database consists of shoreline segments classified as either artificial or natural, along with structure type and condition. The data were created by digitizing the shoreline using National Agriculture Imagery Program imagery from 2014 through 2017 and comparing it with oblique imagery. The shoreline is considered to be the line where water meets the land or artificial structure at the time the aerial image was taken. This line changes over time depending on Great Lakes water levels. The data presented is intended for screening or planning level purposes.

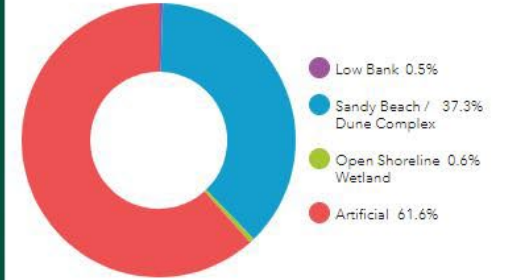
To interact with the dashboard features:

- Filter the data by location or primary structure type using the dropdowns in the upper right
- Zoom in or out within the map using the +/- buttons
- Pan to an area of interest within the map by holding down the left click button on your mouse
- Click on shoreline segments within the map for popups that contain further information
- Hover over the chart elements for additional information
- Click on individual slices within the Primary Structure Type pie chart or bars within the Primary Structure Quality bar chart to show the locations of these features within the map

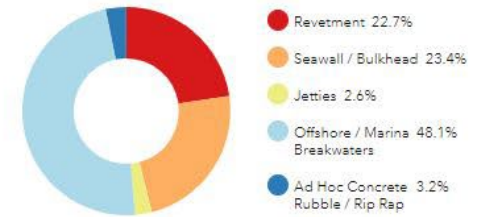


Esri, CGIAR, USGS | Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS | NOAA Office for Coastal Management | Indiana Department of Natural Resources, Lake Michigan Coastal Pr... Powered by Esri

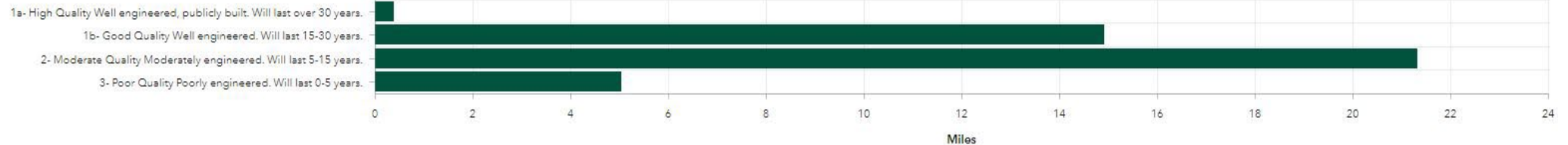
General Shoreline Type



Primary Structure Type



Primary Structure Quality



Shoreline Classification Datasource: Office for Coastal Management, 2022: Great Lakes Hardened Shorelines Classification 2019, <https://coast.noaa.gov/digitalcoast/data/hardened-shorelines.html>.

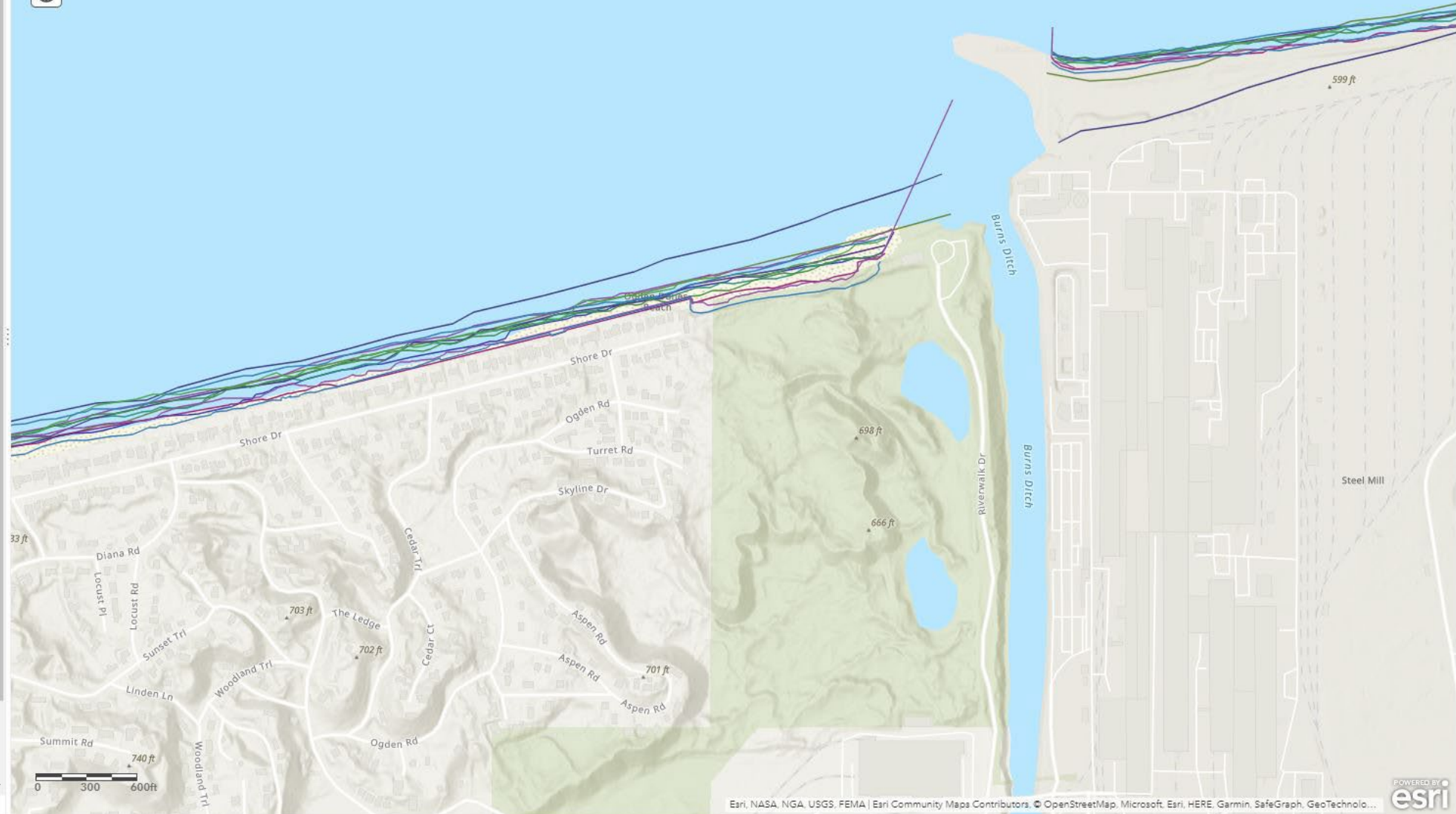
Disclaimer: These data are distributed "AS-IS" without warranties of any kind, either expressed or implied, including but not limited to warranties of suitability of a particular purpose or use. These data

 Details  Add ▾  Basemap  Analysis

 Save ▾  Share  Print ▾  Directions  Measure  Bookmarks 

 About  Content  Legend

- Legend
- Shoreline 2020 
 - Shoreline 2017 
 - Shoreline 2013 
 - Shoreline 2011 
 - Shoreline 2008 
 - Shoreline 2005 
 - Shoreline 2003 
 - Shoreline 1999 
 - Shoreline 1998 
 - Shoreline 1987 
 - Shoreline 1973 



Living Shorelines

Living shorelines connect the land and water to stabilize shorelines, reduce erosion, and provide valuable habitat that enhances coastal resilience. – NOAA Fisheries

Decision Support Tool

HOW GREEN OR GRAY SHOULD YOUR SHORELINE SOLUTION BE?

GREEN - SOFTER TECHNIQUES

GRAY - HARDER TECHNIQUES

Living Shorelines

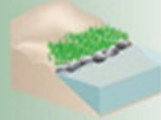
Coastal Structures



VEGETATION ONLY - Provides a buffer to upland areas and breaks small waves. Suitable only for low wave energy environments.



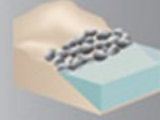
EDGING - Added structure holds the toe of existing or vegetated slope in place.



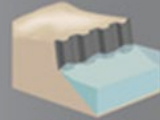
SILLS - Parallel to existing or vegetated shoreline, reduces wave energy, and prevents erosion. Suitable for most areas except high wave energy environments.



BREAKWATER - (vegetation optional) - Offshore structures intended to break waves, reducing the force of wave action, and encourage sediment accretion. Suitable for most areas.



REVETMENT - Lays over the slope of the shoreline and protects it from erosion and waves. Suitable for sites with pre-existing hardened shoreline structures.



BULKHEAD - Vertical wall parallel to the shoreline intended to hold soil in place. Suitable for areas highly vulnerable to storm surge and wave forces.



Source: <https://www.fisheries.noaa.gov/insight/understanding-living-shorelines>

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