

Ohio Department of Natural Resources
Office of Coastal Management ★

Ohio Coastal Management Program
105 West Shoreline Drive, Sandusky
ohiodnr.com/coastal
419.626.7980

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Lake Erie: Our Water Resource

January 6, 2013

Maumee Bay State Park
Oregon, Ohio



i-NeXT Kiwanis Club of Ohio

Grand River Sailing Club @ Grand River Yacht Club



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Lake Erie: Our Water Resource

January 4, 2013

Maumee Bay State Park

Oregon, Ohio



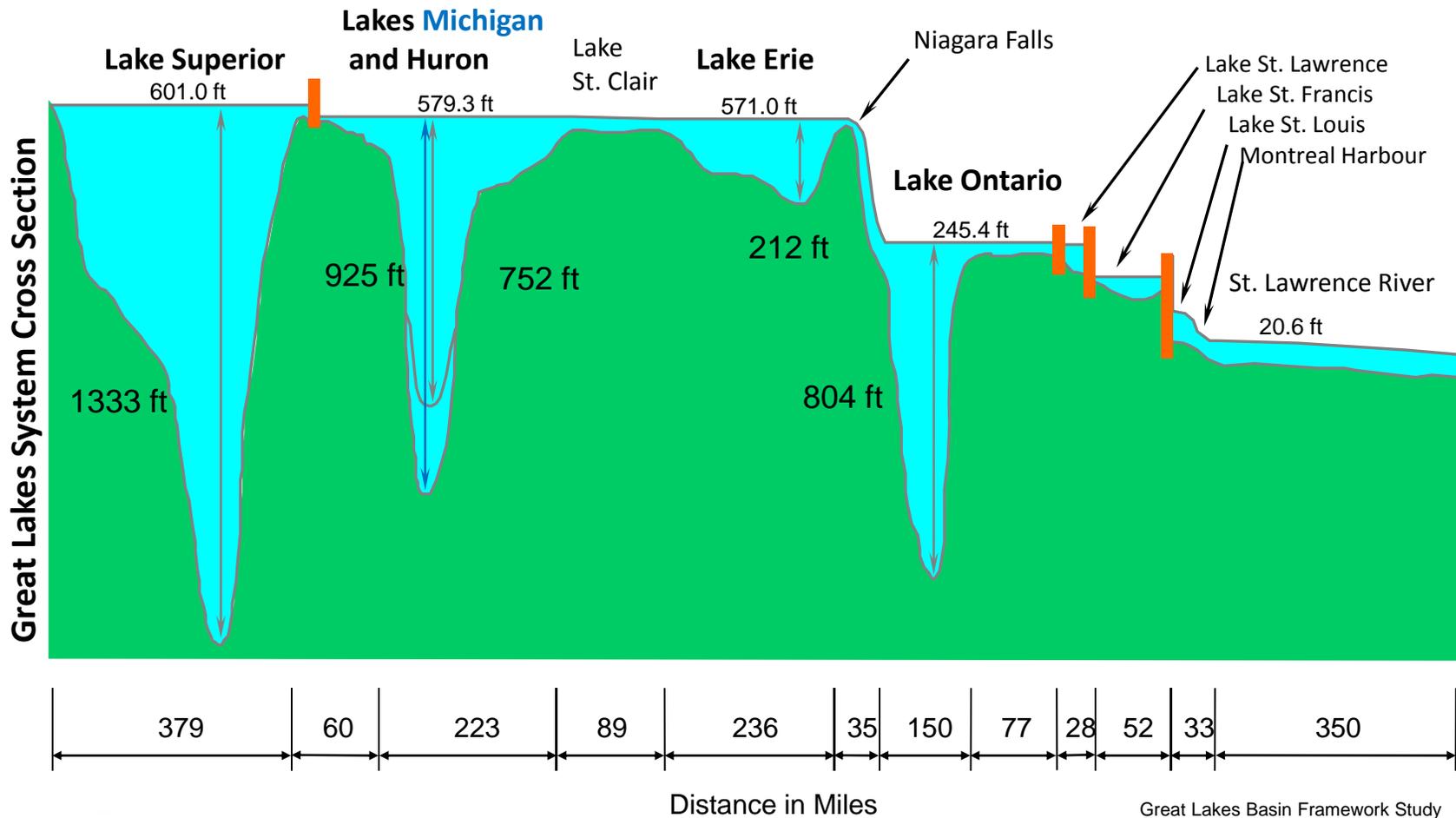
Daughters of the American Revolution – Erie County



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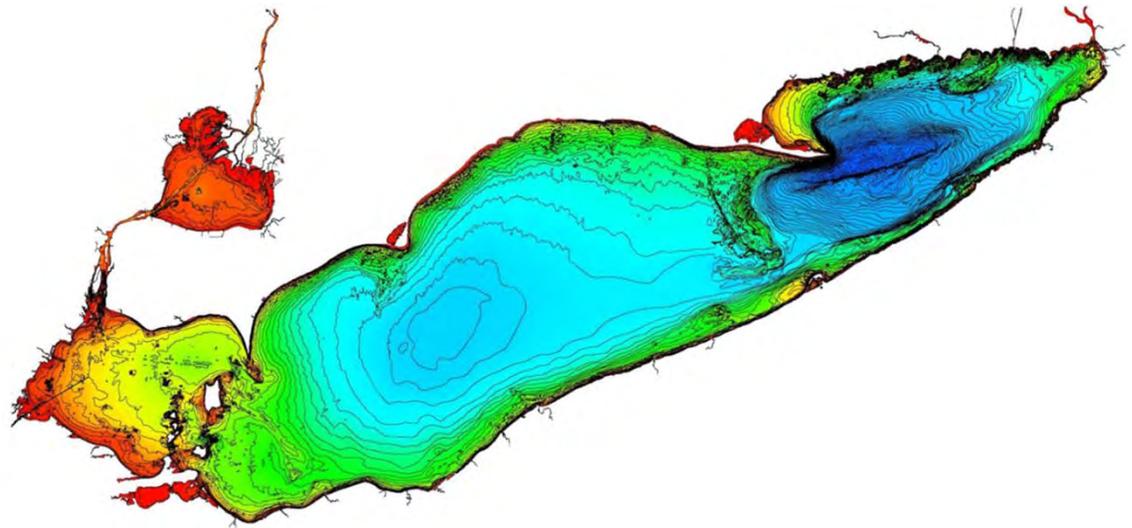
Lake Erie, one of the five Great Lakes, is a body of fresh water with many features.



Lake Erie, one of the five Great Lakes, is a body of fresh water with many features.

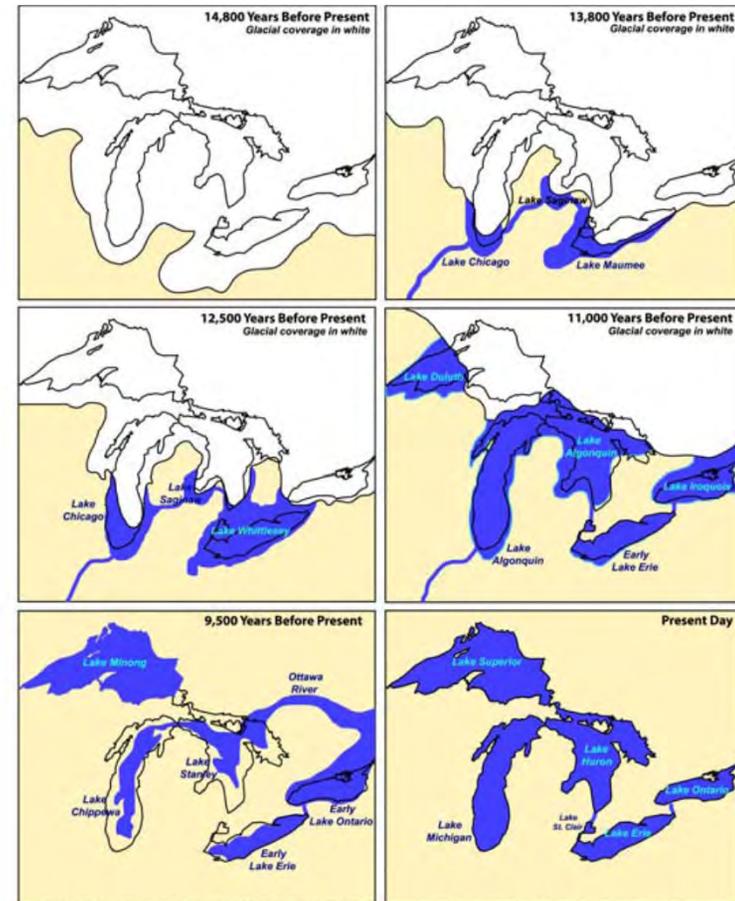
Lake Erie is:

- the shallowest, warmest in summer, first to freeze in winter, and most biologically productive Great Lake.
- connected to the other Great Lakes which together form a watershed that drains to the Atlantic Ocean.
- finite and its resources are limited.



Natural forces formed and continue to shape Lake Erie and its watershed.

- Lake Formation
 - Salt deposits beneath Lake Erie
 - Glacial gouging
 - Isostatic rebound is ongoing
- Lake levels
 - Fluctuate
 - Have been recorded 150+ years
 - can effect erosion and accretion



Natural forces formed and continue to shape Lake Erie and its watershed.

Lake levels

- Fluctuate
- Recorded for 150+ years
- Can effect erosion/accretion

October Averages

LTA: 571.1 feet*
 2012: 570.29 feet*
 (-10" LTA)

December Averages

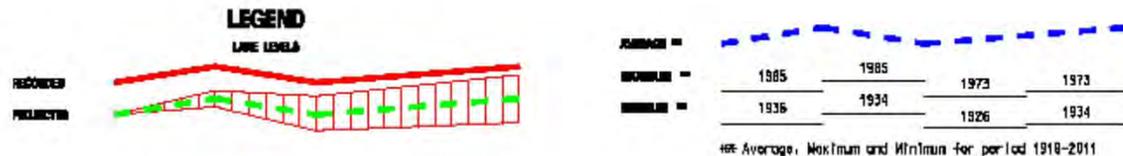
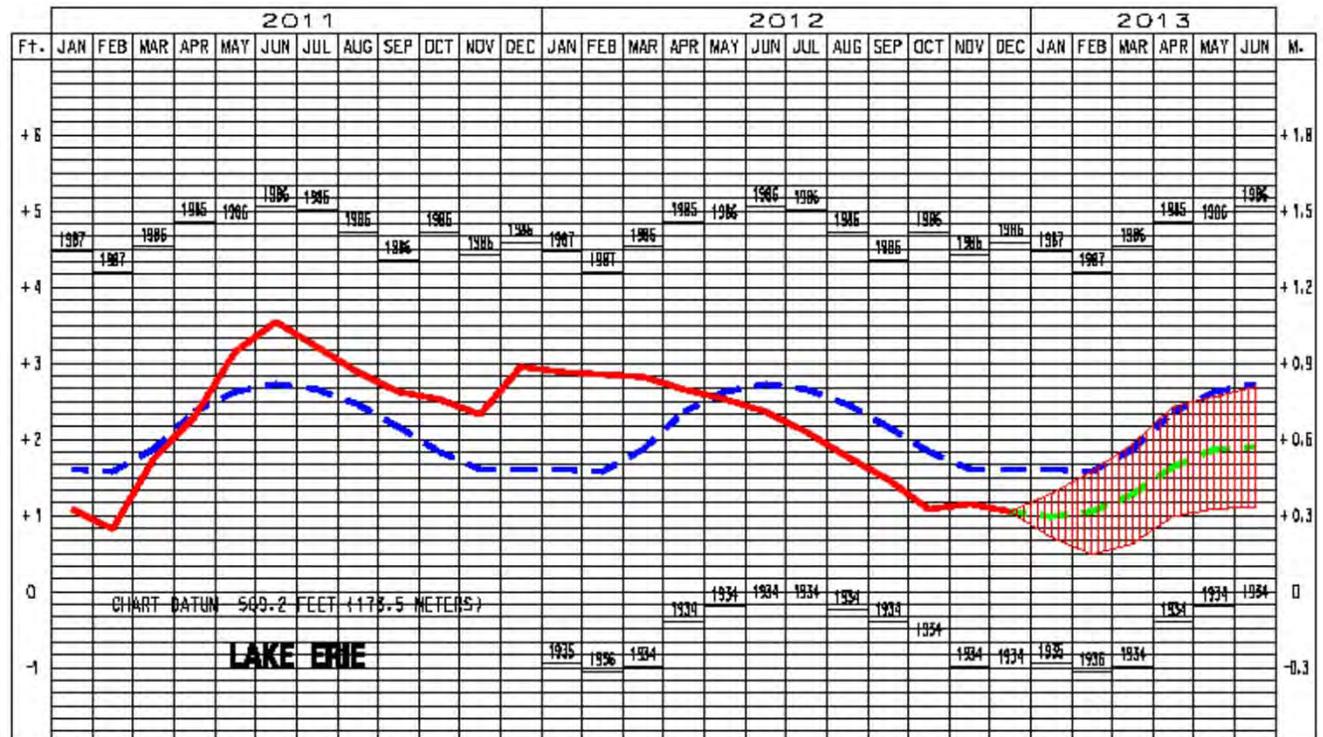
LTA: 570.8 feet*
 2011: 572.19 feet*
 2012: 570.27 feet*

Average all of 2012:

572.13 feet*

* All measurements are IGLD 1985

LAKE ERIE WATER LEVELS - JANUARY 2013



Lake Erie influences local and regional weather and climate.

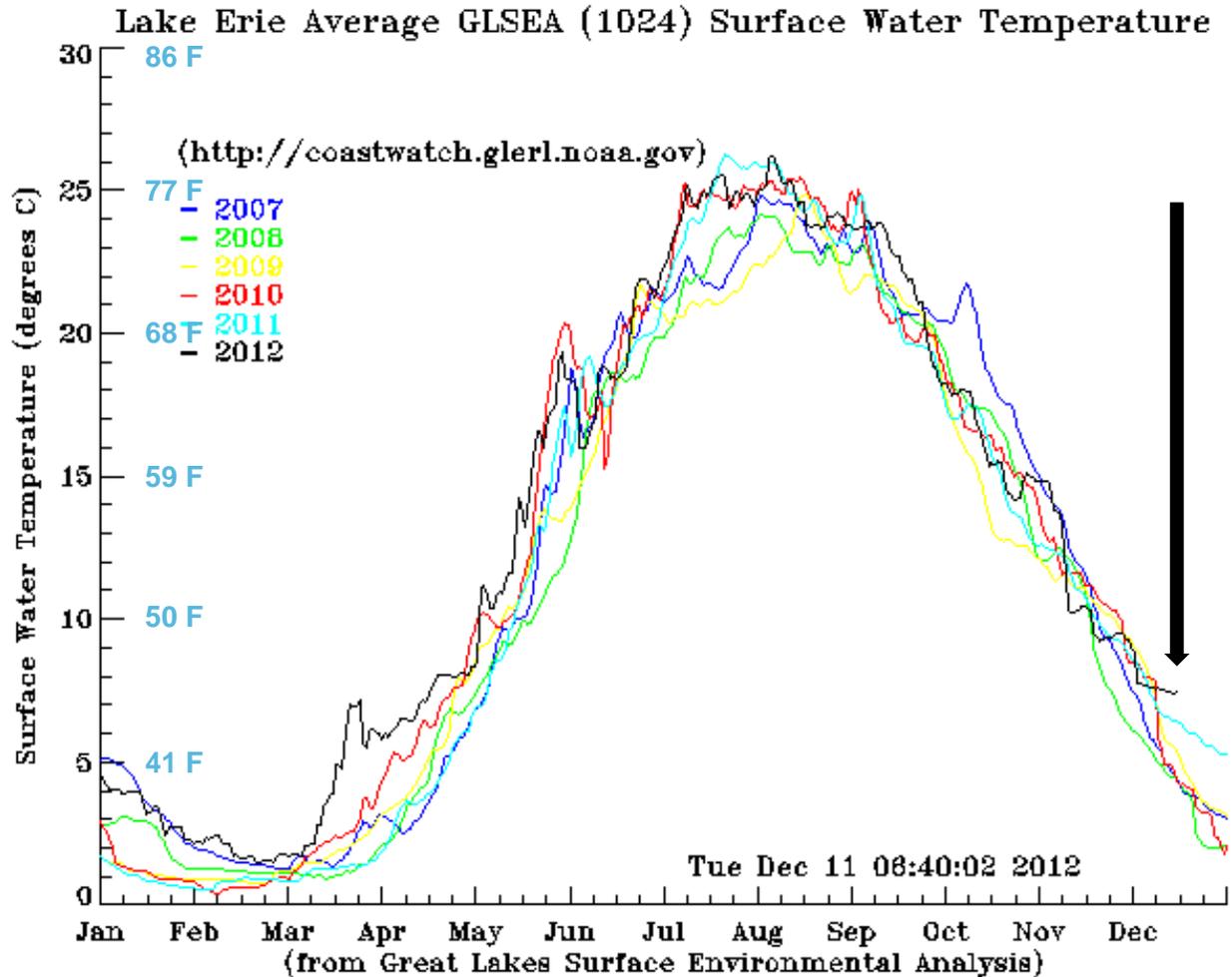
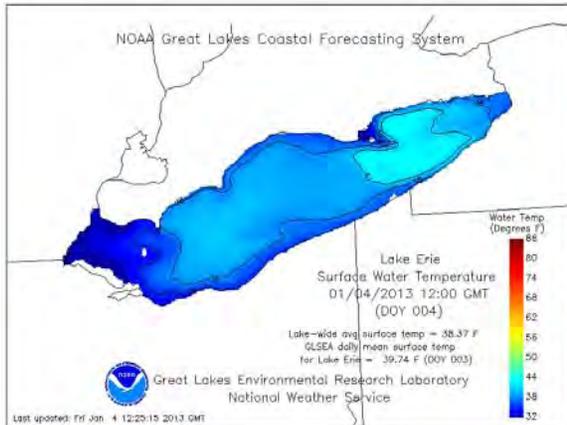
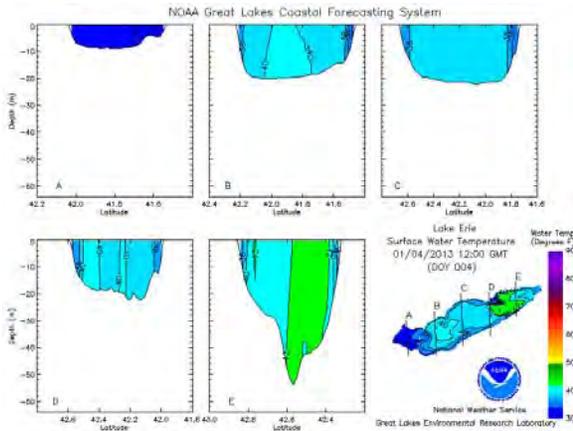
- Lake Erie's moderates the local climate
- Changes in Lake Erie's circulation, water temperature and ice cover can produce changes in local weather
 - Snow belt from Cleveland to Buffalo
 - Precipitation can be traced to water evaporated from Lake Erie
- Lake Erie is influenced by global weather patterns and climate change

Weather
what is happening
outside right now.

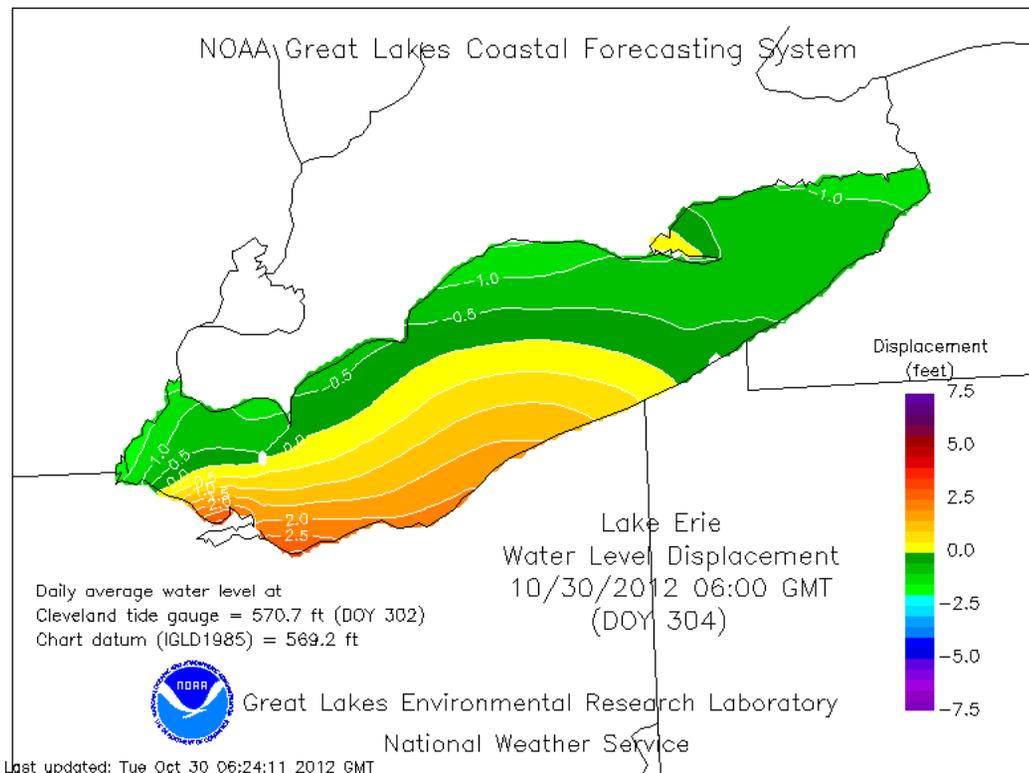
Climate
average weather in a
location over a long
period of time.



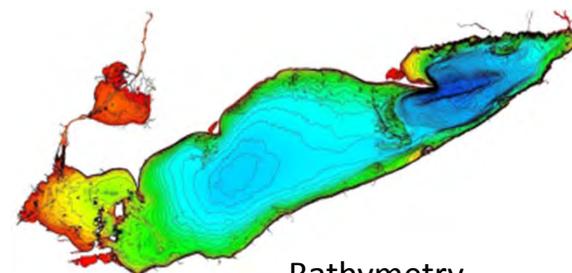
Lake Erie influences local and regional weather and climate.



Lake Erie amplified national/regional weather: Superstorm Sandy – 10/29 to 10/31/2012)



Water Level Displacement along shore ~2.5 feet

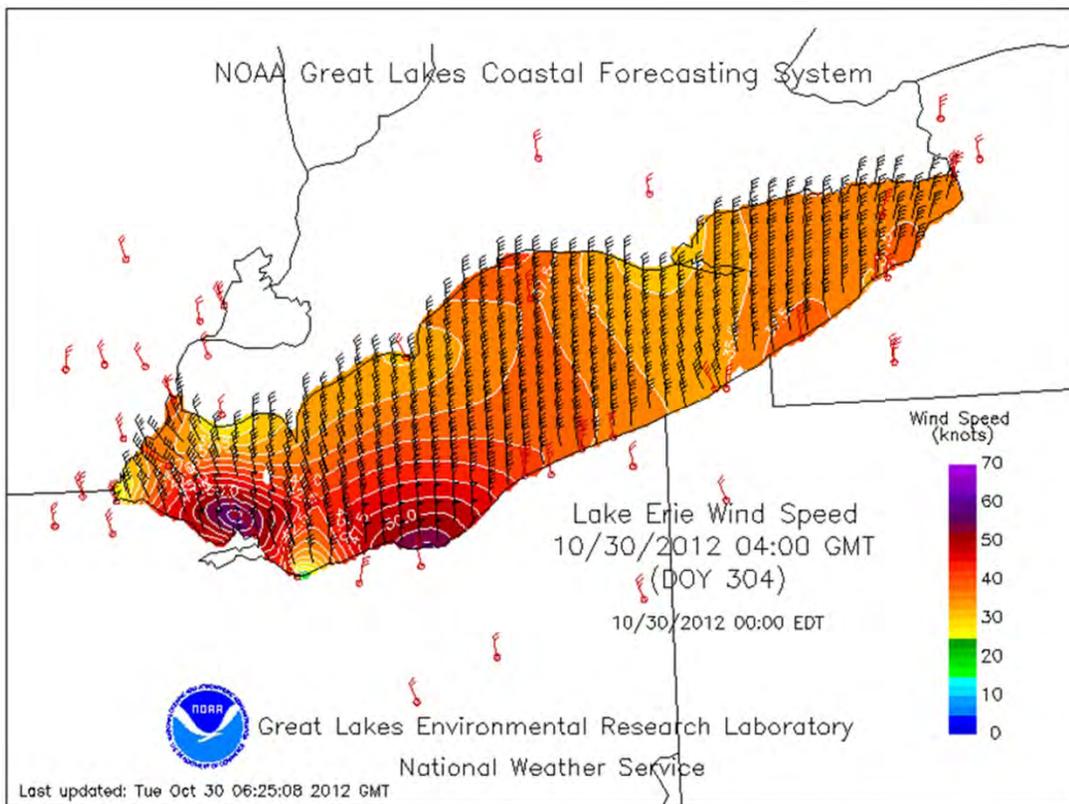


Bathymetry
red =shallowest
dark blue = deepest



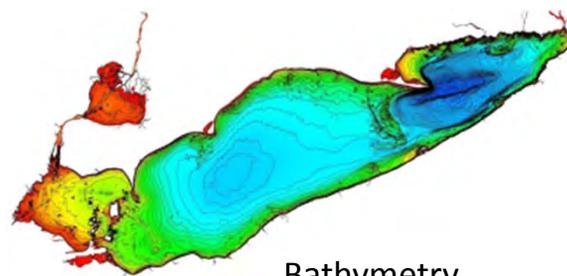
Marblehead Lighthouse

Lake Erie amplified national/regional weather: (Superstorm Sandy - 10/29 to 10/31/2012)



1 knot = 1.15 mph

55 knots = 63.3 mph

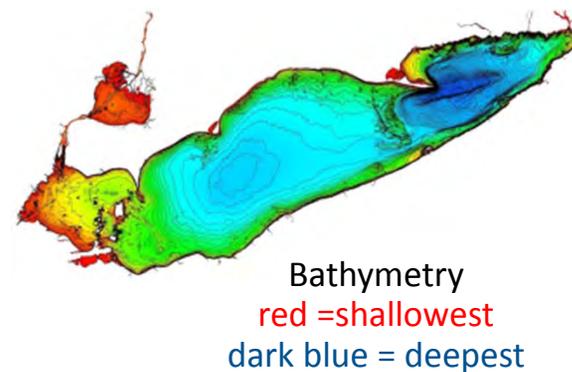
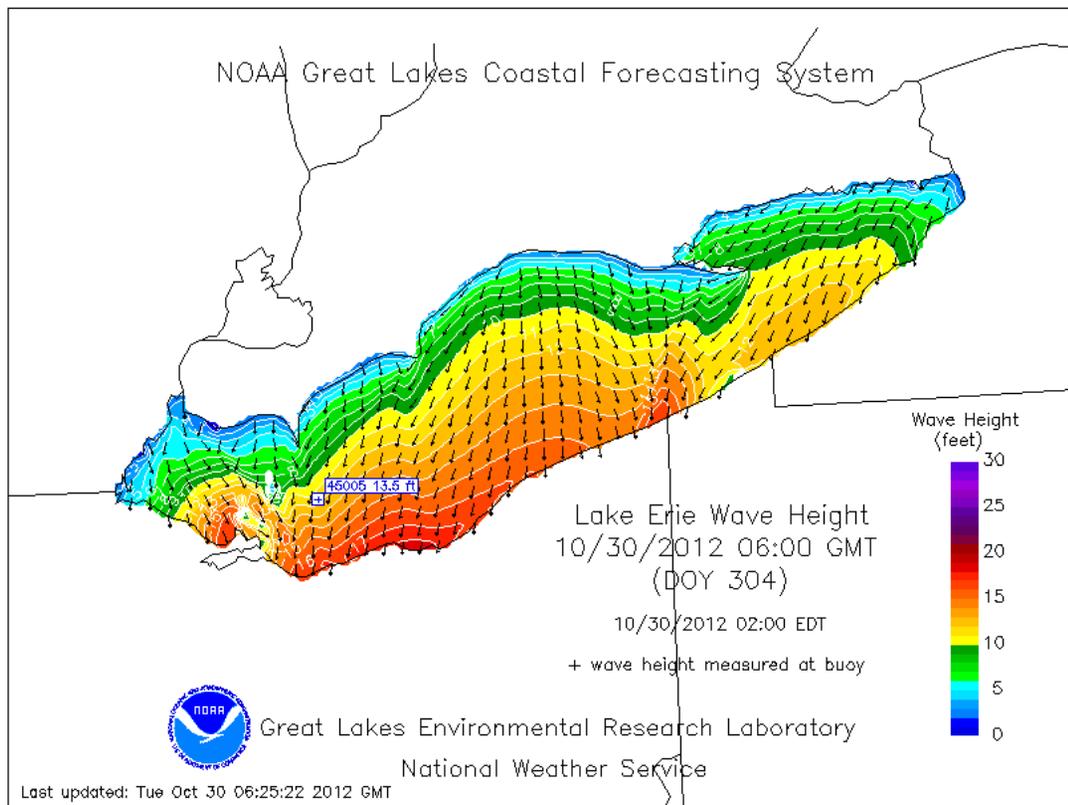


Bathymetry
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Marblehead Lighthouse

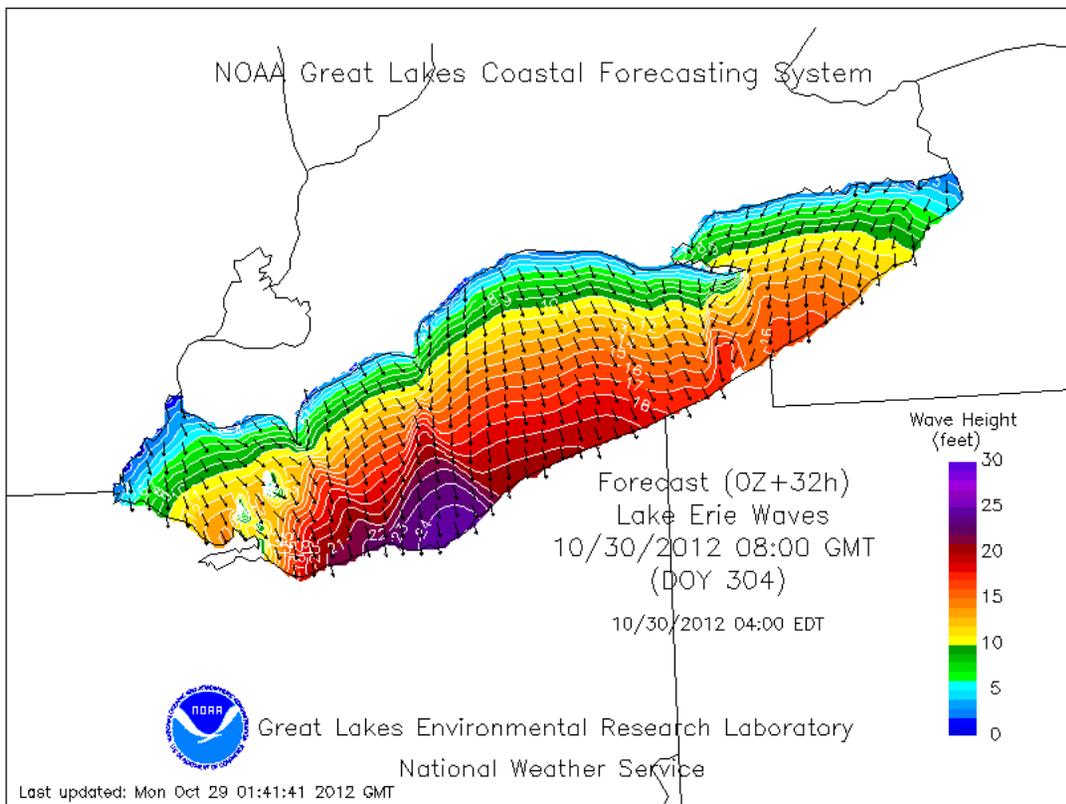
Lake Erie amplified national/regional weather: Superstorm Sandy – 10/29 to 10/31/2012)



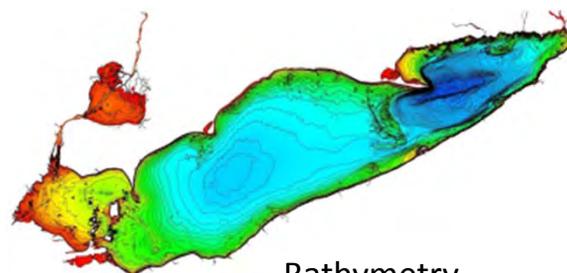
Wave height measured at buoy = 13.5 feet
Wave height estimated nearshore Cleveland = ~18 feet

Marblehead Lighthouse

Lake Erie amplified national/regional weather: Superstorm Sandy - 10/29 to 10/31/2012)



Wave Height Forecast along shore = > 24 feet



Bathymetry
red = shallowest
dark blue = deepest



Marblehead Lighthouse

10/27-30/12



12/02-05/12



NOS Water Level Observation Network Great Lakes Water Level Station Cleveland 9063063

Water Levels (same scale)

Wind Speed and Direction: 20 knots = 23.016 mph

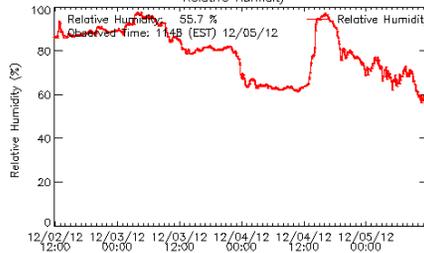
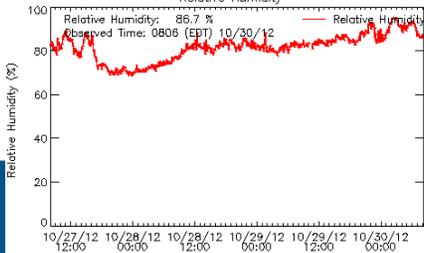
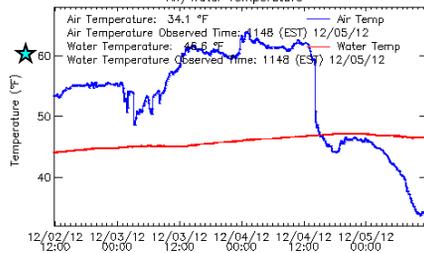
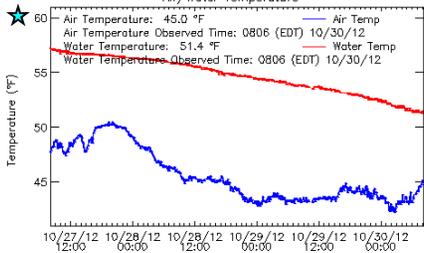
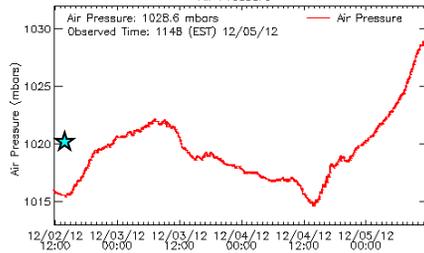
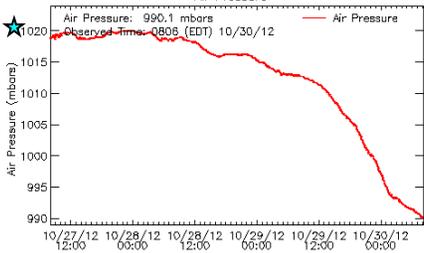
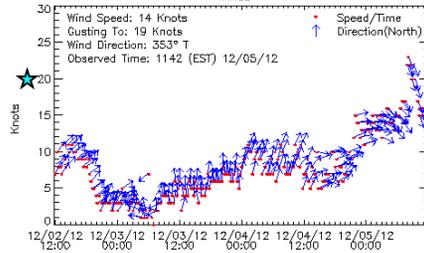
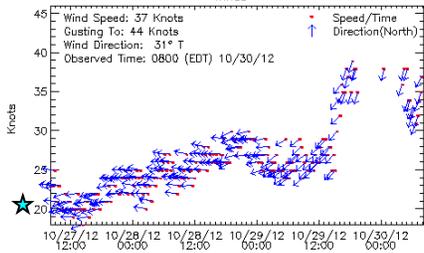
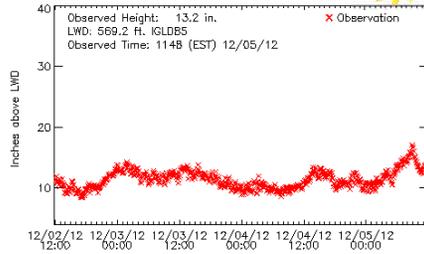
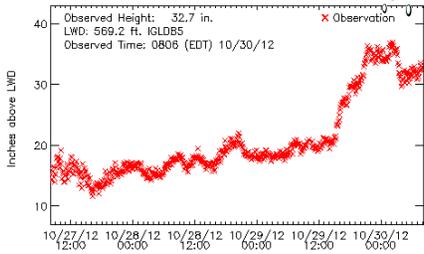
- October scale (left) is from 20 to 45 knots.
- December scale (right) is from 0 to 30 knots.

Air Pressure:

- October scale is numbered 990 to 1020.
- December scale is numbered 1015 to 1030.

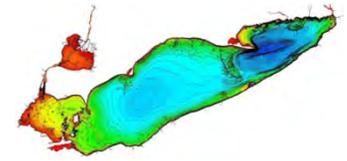
Air Temperature (blue)
Water Temperature (red)

Relative humidity (same scale)



Lake Erie amplified weather patterns

Superstorm Sandy – 10/29 to 10/31/2012)



South Bass Island – west side
10/29/12



Miller Ferry Dock, Catawba
Island (Ottawa County)



State Route 163/Perry Street,
Port Clinton (Ottawa County)



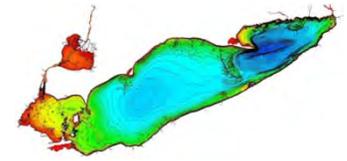
07/02/12



Miller Ferry Dock from water 06/29/12

Lake Erie amplified weather patterns

Superstorm Sandy – 10/29 to 10/31/2012)



Marblehead Lighthouse
10/29/12



Mazurik Access (Ottawa County)



East Harbor State Park 10/30/12



Marblehead Lighthouse
06/29/12



Mazurik Access 07/16/12



East Harbor State Park 06/21/12
571.66 ft IGLD85



Old Woman Creek mouth and beach, Huron (Erie County) 10/03/12



11/01/12



05/10/12



11/16/12



Sheldon Marsh 11/03/12



West end of the Vermilion Breakwater 10/29/12



Sherod Park, Vermilion (Erie County) 10/29/12



Sheldon Marsh 10/04/12



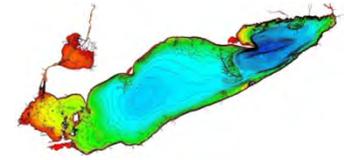
Vermilion 08/20/12 (H₂O = +10)



Sherod Park 11/01/12



Lake Erie amplified regional weather: *Superstorm Sandy – 10/29 to 10/31/2012)*



CLSP - Edgewater Pier 10/29/12



Cleveland Harbor Lighthouse



CLSP – East 55th Street Marina



CLSP - Edgewater Stat Park
11/9/12



Cleveland Harbor Lighthouse
6/13/09



CLSP – East 55th Street Marina
11/09/12



Madison Twp Park (Lake County)
10/29/12



Madison Twp Park (Lake County)
10/29/12



Conneaut Twp. Park (Ashtabula
County) 10/29/12



Madison Twp Park (Lake County)
11/08/12



Arcola Creek Estuary (Lake
County) 11/08/12



Walnut Beach (Ashtabula
County) 11/08/12

Superstorm Sandy's Wake



Edgewater Marina:

- docks and other infrastructure were destroyed.
- 29 boats sank.
- 50+ boats extensively damaged (estimated that 75 percent are beyond repair)
- Insurance adjusters are still assessing damage



Superstorm Sandy's Wake



Whiskey Island Marina

- Boat damage
 - 30+ boats piled in one spot.
- Infrastructure damage including scouring
- Trash and debris

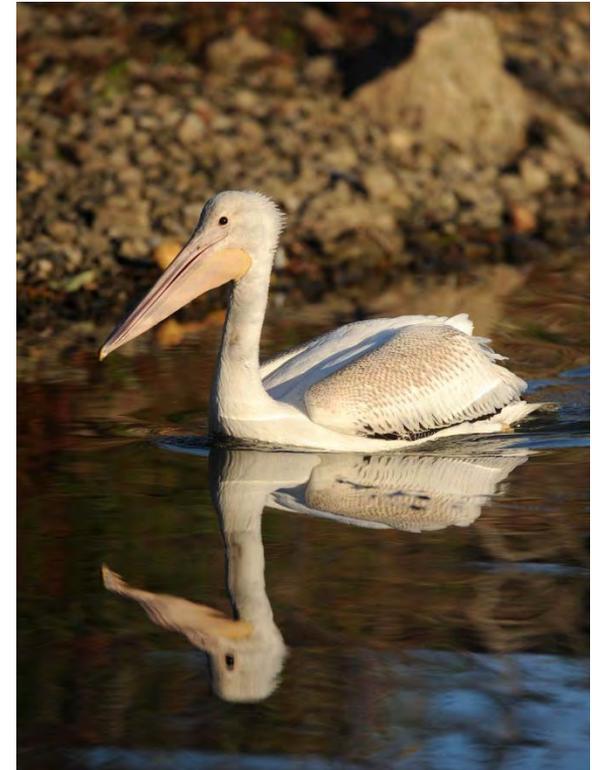
Superstorm Sandy's Wake

Birds Blown Off-course

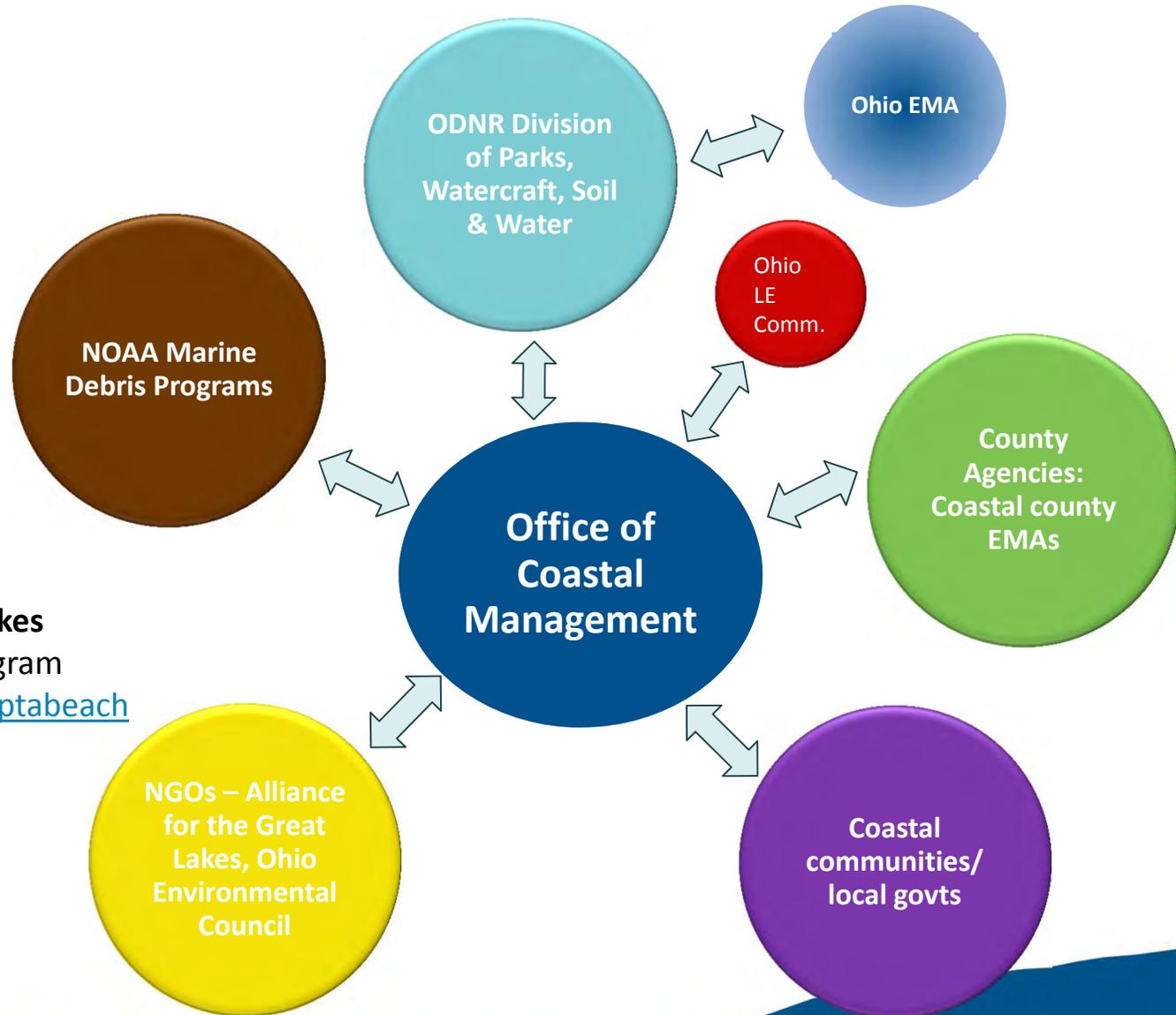
- White Pelican in Sandusky

East 55th Street

- Infrastructure damage including scouring and water moving heavy boulders



Superstorm Sandy's Wake: Collaboration



Alliance for the Great Lakes
Ohio Adopt-a-Beach Program
www.greatlakes.org/adoptabeach

Hyle Lowry
HLowry@greatlakes.org

Coastal Cleanups – 11/10/12

Bradstreet's Landing

- 9 volunteers x 2 hours = 18 VH
- 126 pounds of trash



Rocky River Park

- 8 volunteers x 2 hours = 20 VH
- 250 pounds of trash



East Harbor State Park

- 3 volunteers x 2 hours = 6 VH
- 60 pounds of trash

Gordon Park

- 4 volunteers x 2 hours = 8 VH
- 280 pounds of trash



Coastal Cleanups – 11/10/12

Wendy Park/Whiskey Island

CLSP Euclid Beach + Villa Angela

- 51 volunteers x 2.5 hours = 127.5 VH
- 466 pounds of trash

CLSP East 55th Street Marina

- 25 volunteers x 2.5 hours = 62.5 VH
- 1,201 pounds of trash

CLSP Edgewater Marina

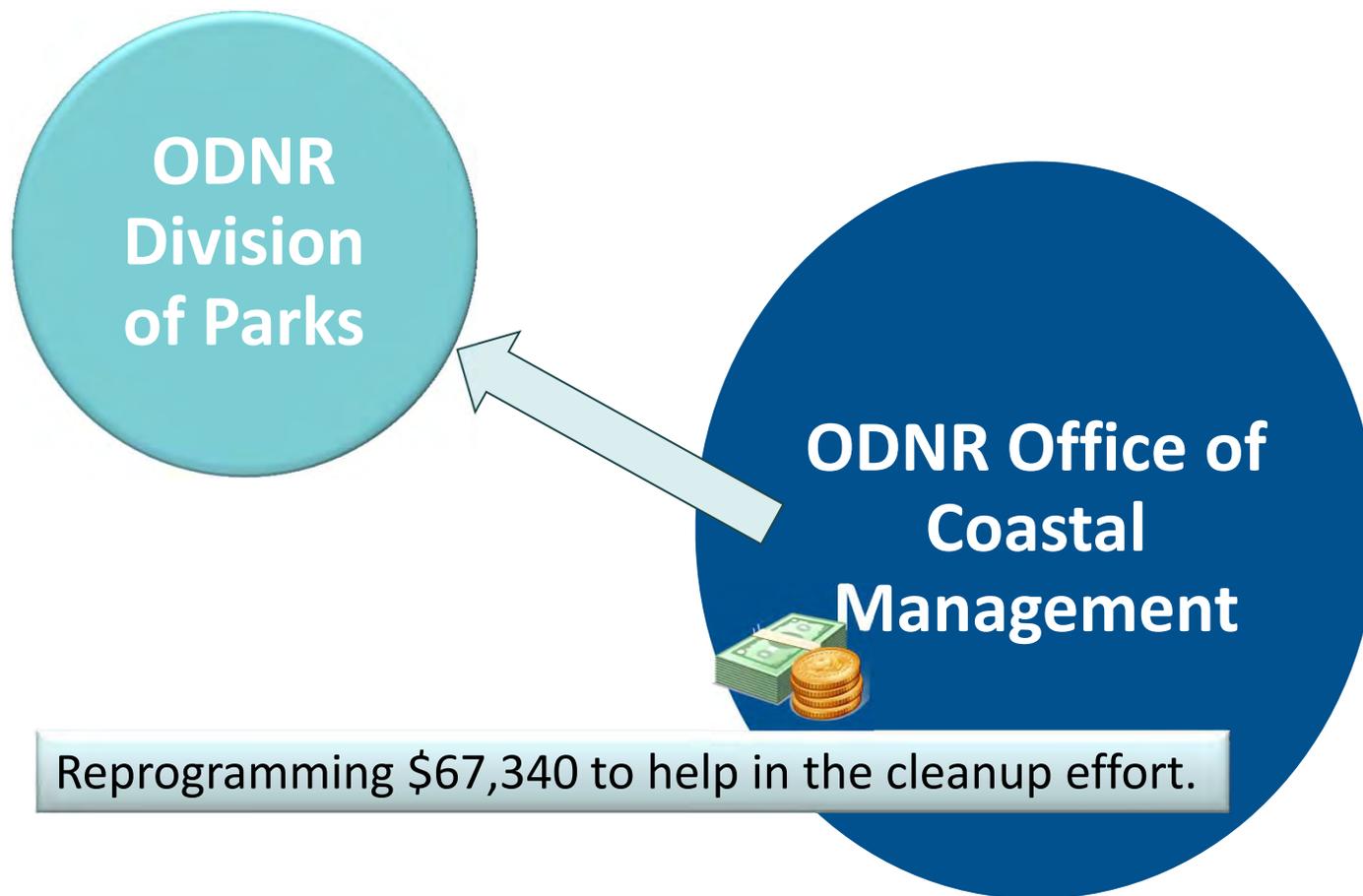
- 21 volunteers x 5 hours = 105 VH
- 4,260 pounds of trash
- Sea Scout 504

TOTALS: 121 volunteers (343 VH)

~ 6,643 pounds of trash collected



Superstorm Sandy's Wake: Collaboration



Lake Erie is socially, economically & environmentally significant.

SOCIALLY:

- A key element in the formation of the United States: Northwest Ordinance, War of 1812 Battle of Lake Erie, Civil War/Underground Railroad.
- Festivals, community celebrations, pro-sports teams
- Recreation, fitness challenges, family outings

ENVIRONMENTALLY:

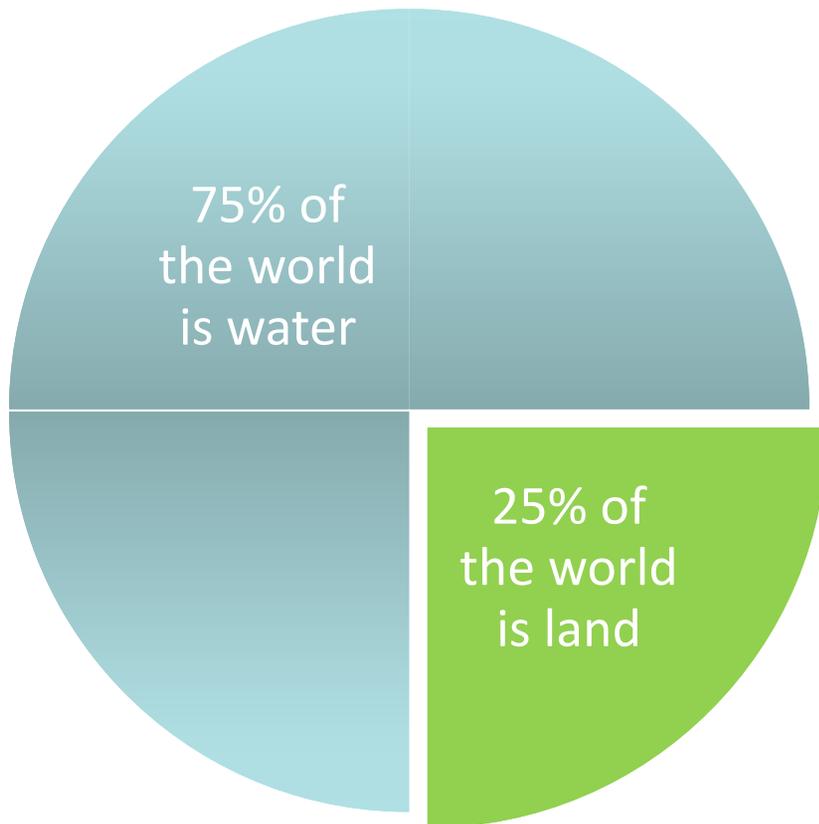
- A representative model for environmental management
- Smallest Great Lake = problems appear/solutions work first.

ECONOMICALLY:

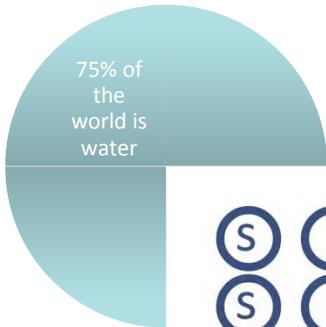
- More than 119,000 Ohio jobs are directly linked to Lake Erie-region visitors who spend more than \$10.7 billion annually.
 - Birding, Boating, Island visitors, Camping, Fishing
- Shipping – Great Lakes Carriers Association



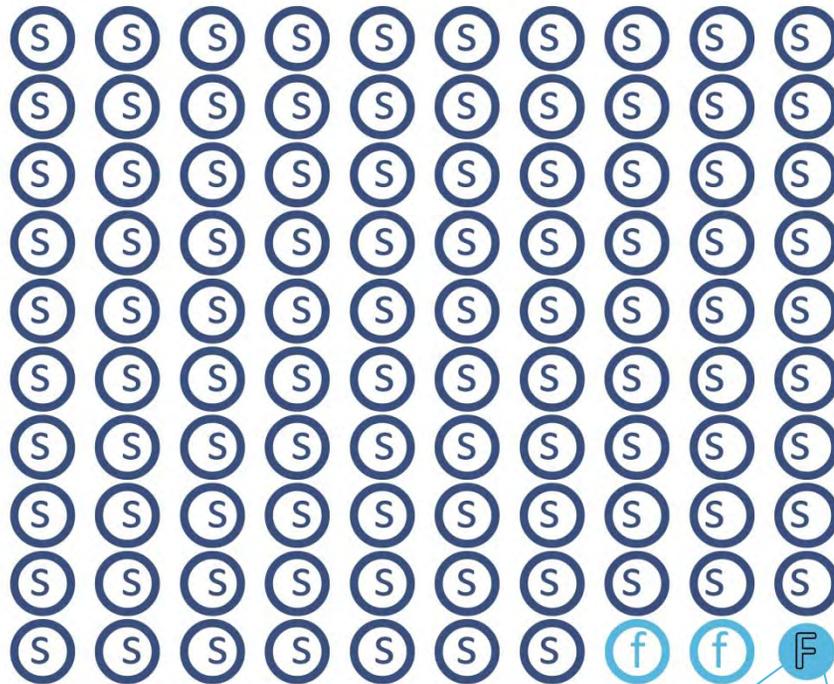
*Water makes Earth habitable;
Fresh Water sustains life on land.*



Water makes Earth habitable; Fresh Water sustains life on land.



s = salt water
f = fresh water
F = Fresh, usable water

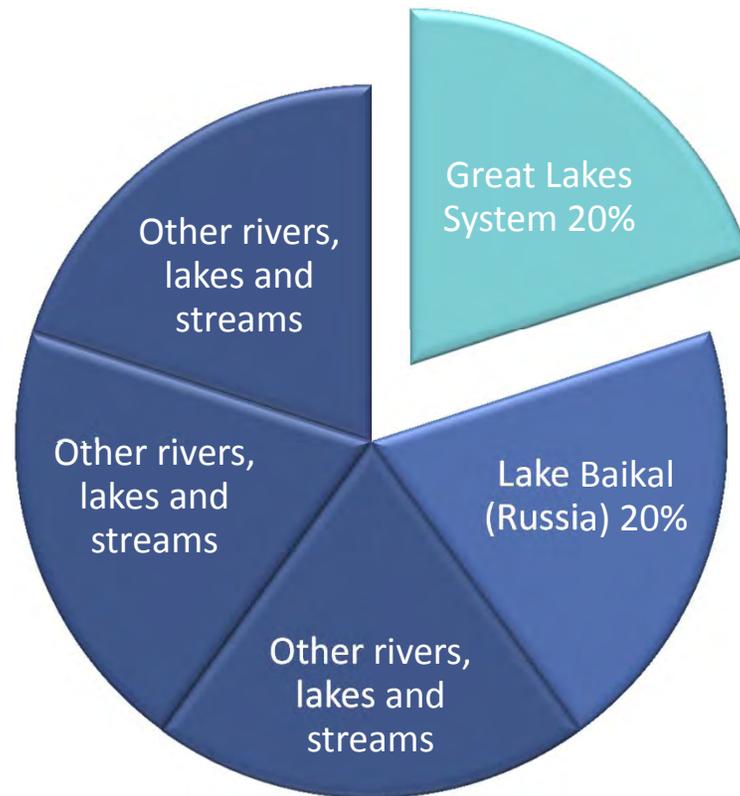


Surface Water

Ground Water



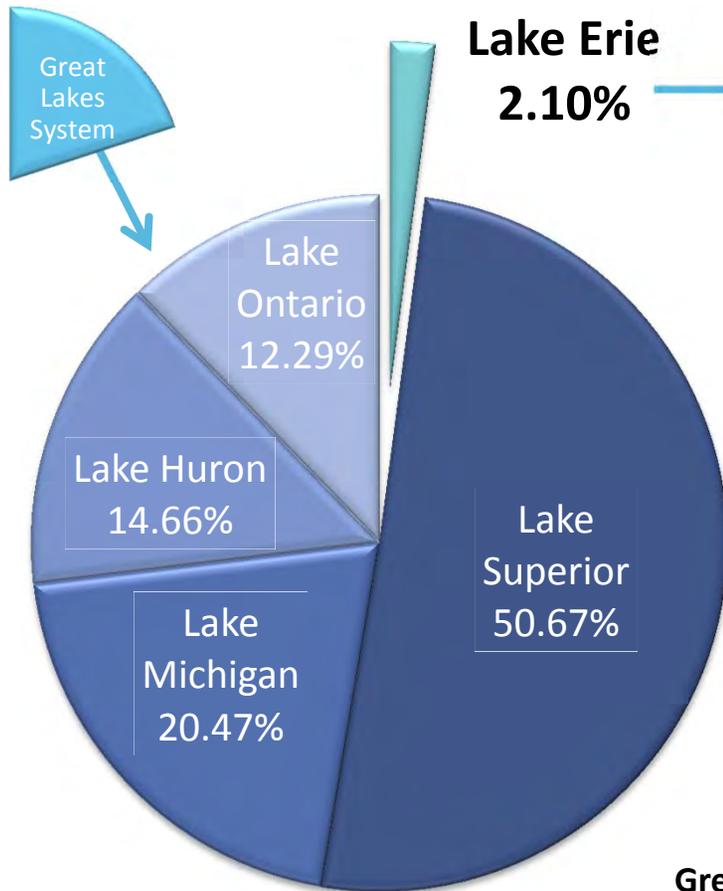
Water makes Earth habitable; Fresh Water sustains life on land.



Of the **FRESH, USABLE, SURFACE** water, 20% is found in the Great Lakes system



Water makes Earth habitable; Fresh Water sustains life on land.



Lake Erie
2.10%

drinking water for
11 million people

3 million Ohioans

Great Lakes: 6 quadrillion gallons

- Superior – 3 quadrillion
- Erie – 127.7 trillion gallons



Lake Erie supports a great diversity of life and ecosystems.

Life in Lake Erie ranges in size from the smallest blue-green bacteria to the largest animal, lake sturgeon.

Life cycles in Lake Erie have been altered by invasive plant and animal species.

More fish are caught out of Lake Erie every year than the other four Great Lakes combined.

Lake Erie's ecosystem provides habitat for species to thrive.



Lake Erie and humans in its watershed are connected.



Lake Erie impacts us.

We impact the lake and watershed.



Supplies freshwater

Influences the weather, culture & human health.

Source of food, minerals, energy, recreation and jobs.

Transportation highway

Plays a role in national security.

Lake Erie is affected by decisions and actions of people throughout its watershed.

Moderates the climate

Anything in the watershed can be washed by rain into a river... and then into Lake Erie.



August 29, 2011



August 29, 2012

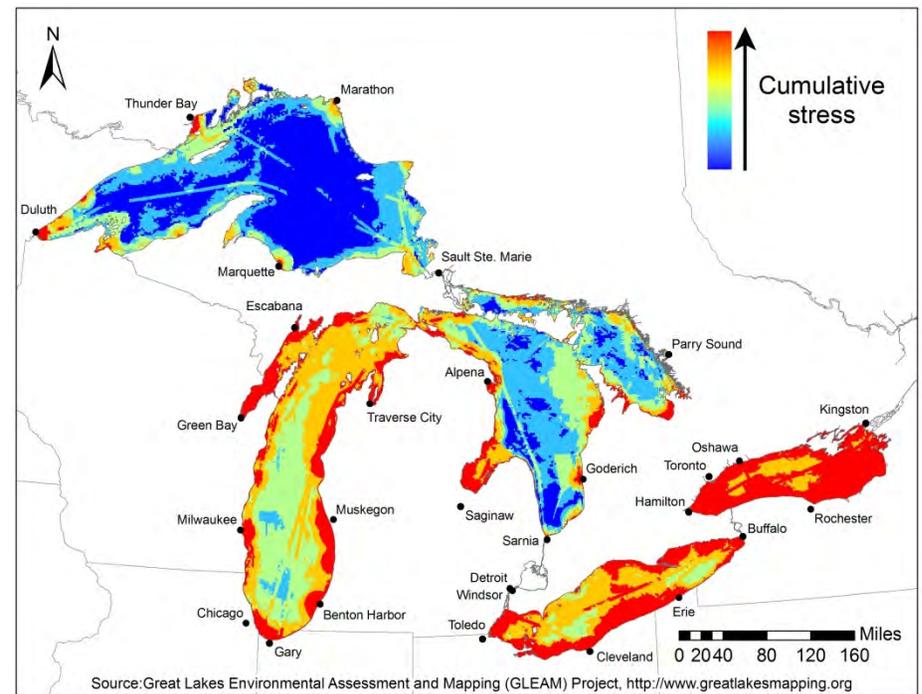
Lake Erie and humans in its watershed are connected.

Great Lakes Environmental Assessment and Mapping Project (GLEAM)

- a bi-national team of researchers from academia and environmental organizations
- 3-year research project ranking stressors to ecosystem health.
 - Surveys of 161 researchers and natural resource managers.
 - 34 ecosystem services mapped.
 - Cumulative stress index developed from individual maps (right).
 - Report released 12/17/12
www.greatlakesmapping.org

Ecosystem services: the ways Lake Erie benefits us. (i.e. the ways we use the lakes)

Stressors: how we impact Lake Erie/ Great Lakes (i.e. human impacts are physical, chemical or biological disruptions that potentially have adverse effects on people, plants and animals)



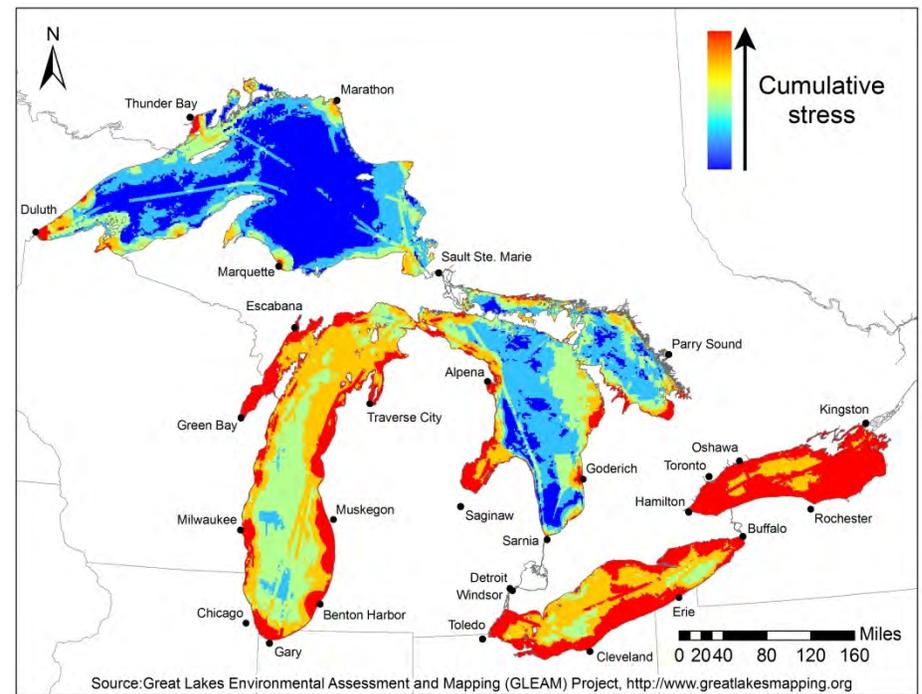
Lake Erie and humans in its watershed are connected.

Great Lakes Environmental Assessment and Mapping Project (GLEAM)

- Report released 12/17/12
www.greatlakesmapping.org
- Ecosystem stress is highest closer to shore & extends offshore in some areas.
- Large sub-regions of moderate to high cumulative stress were found in lakes Erie and Ontario as well as in Saginaw and Green bays, and along Lake Michigan's shores.
- Offshore areas of the Great Lakes where the coasts are less populated and developed experience lower stress.

Ecosystem services: the ways Lake Erie benefits us.
(i.e. the ways we use the lakes)

Stressors: how we impact Lake Erie/ Great Lakes
(i.e. human impacts are physical, chemical or biological disruptions that potentially have adverse effects on people, plants and animals)



Lake Erie and humans in its watershed are connected.

CHALLENGES We impact the lake and watershed

- Changing water levels over a range of scales
 - Long-term
 - Seasonal
 - Short-term
- Climate change impacts
 - Water levels
 - Storm frequency and magnitude
 - Temperature
 - Timing
- Water level regulation
- Land-use change
- Loadings/water quality degradation
- Shoreline development
- Erosion and irreversible lakebed downcutting
- Sand management
- Public access
- Habitat loss and degradation
- Invasive species



Departmental Priorities are connected.

Addressing

We impact the lake and watershed

- Changing water levels over a range of scales
 - Long-term
 - Seasonal
 - Short-term
- Climate change impacts
 - Water levels
 - Storm frequency and magnitude
 - Temperature
 - Timing
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- Land-use change
- Loadings/water quality degradation
- Shoreline development
- Erosion and irreversible lakebed downcutting
- Sand management
- Public access
- Habitat loss and degradation
- Invasive species



Departmental Priorities

Addressing the challenges

- Loadings/water quality degradation



HAB

- Harmful algal blooms (HABs)



ohioalgaefinfo.com or 1-800-OHBEACH



duck weed

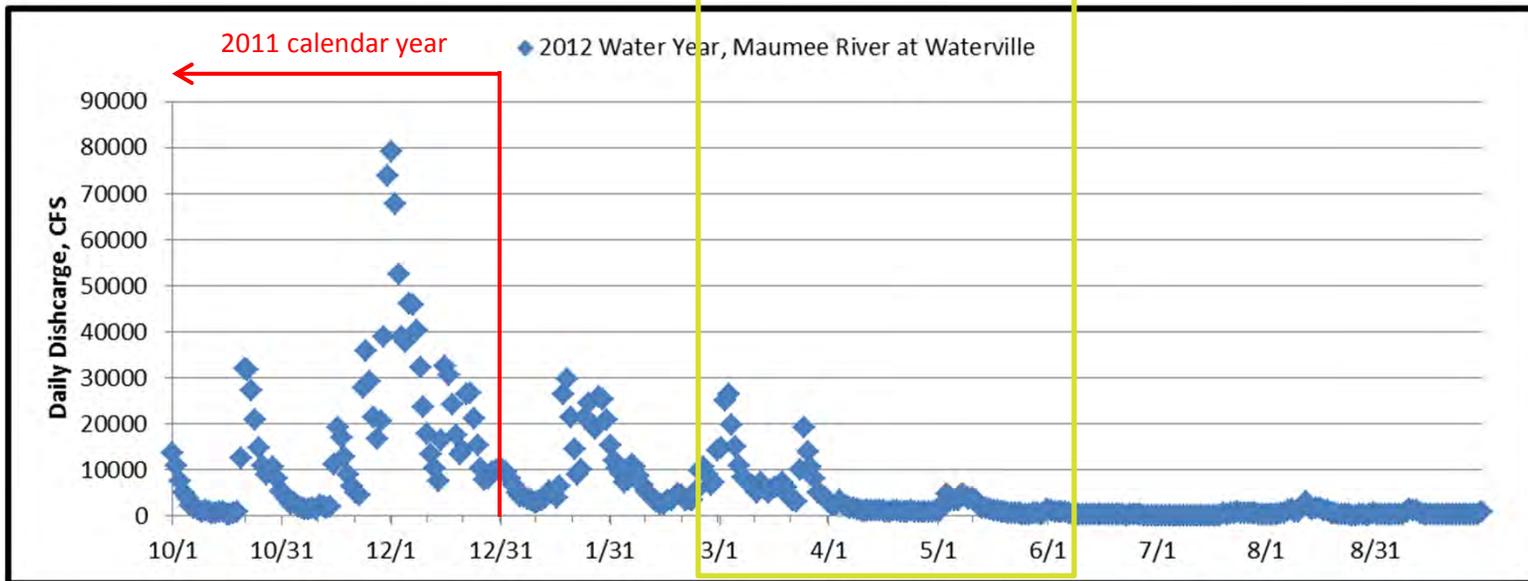
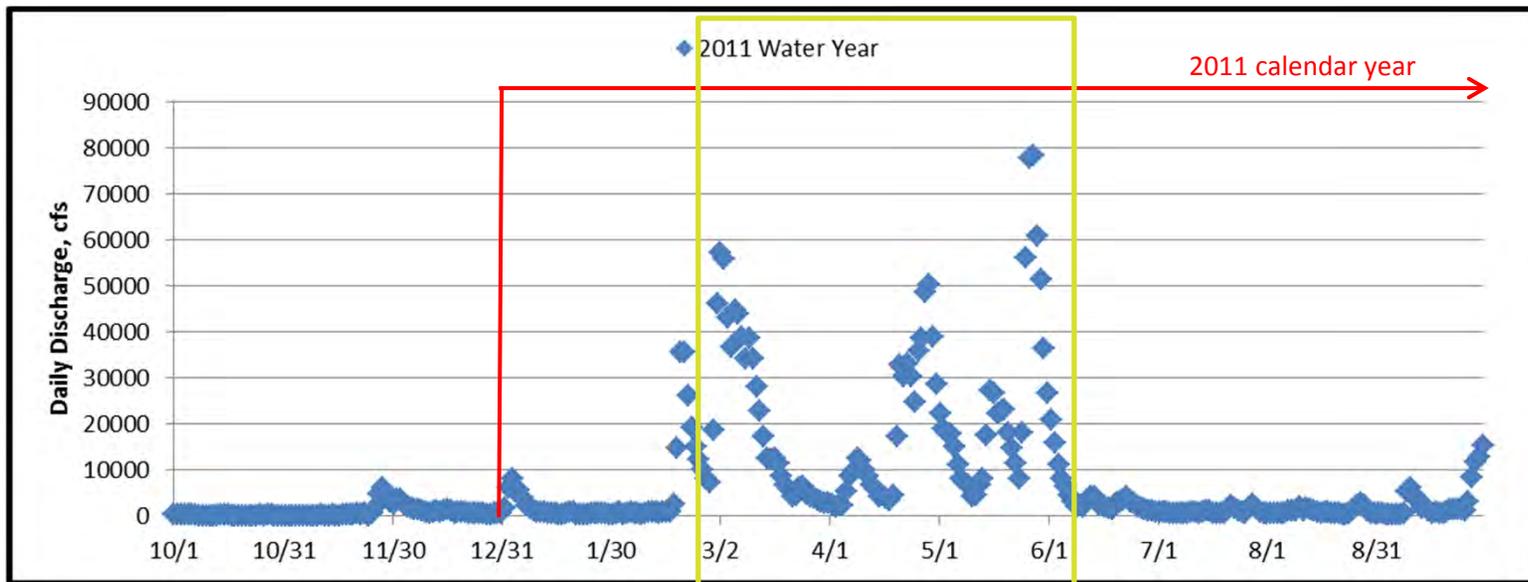
The following Table is based on a download of USGS daily discharge data on 12/17/2012.

Maumee River at Waterville Time Period	Volume of discharge		TP load	DRP Load
	CFS-days	million m ³	metric tons	metric tons
2011 WY, 10/1/2010-09/30/2011	2,545,457	6,229	2,780	570
2012 WY, 10/01/2011-09/30/2012	2,458,644	6,016	2,250	607
2011 calendar year	3,910,072	9,568	3,841	
2012 calendar year (partial)	1,130,426*	2,766*	859**	
*Discharge through 12/16/2012		** Phosphorus load through 9/30/2012		

Annual discharge of rivers is usually based on water years, with the 2011 Water Year beginning on 10/01/2010 and ending on 09/30/2011. For the 2012 Water Year the inclusive dates are 10/01/2011 to 09/30/2012. The above table indicates that water years 2011 and 2012 had very similar total discharges, as well as similar loads of total phosphorus (TP) and dissolved reactive phosphorus (DRP).

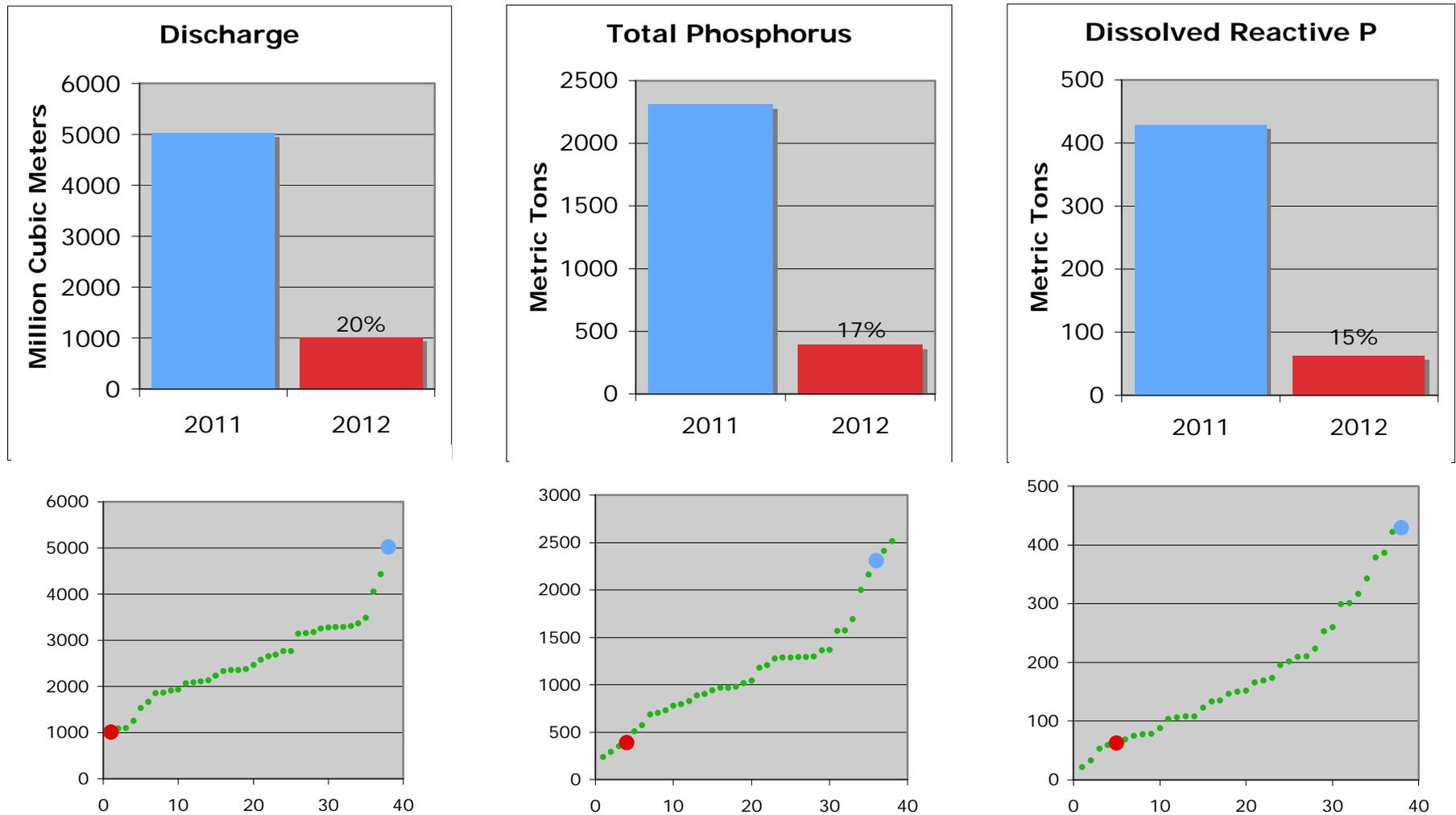
The explanation for the large difference between the water year comparisons and the calendar year comparisons is shown on the next page.

Data and graphs provided by the Heidelberg U. NCWQR (DBB)



These graphs show the average daily discharge for each day in the 2011 and 2012 water years. In 2011, most of the discharge came in the **March through June period**. In the 2012 water year, most of the discharge came in the October through December period. Although these storm events came in different water years, they came in the same calendar year (2011). **Blue green algal blooms respond primarily to storm event loading in the March through June period.** Data are from USGS daily discharges. Most of the total phosphorus load occurs during storm events.

March-June comparisons of 2011 and 2012 discharges and phosphorus loads.



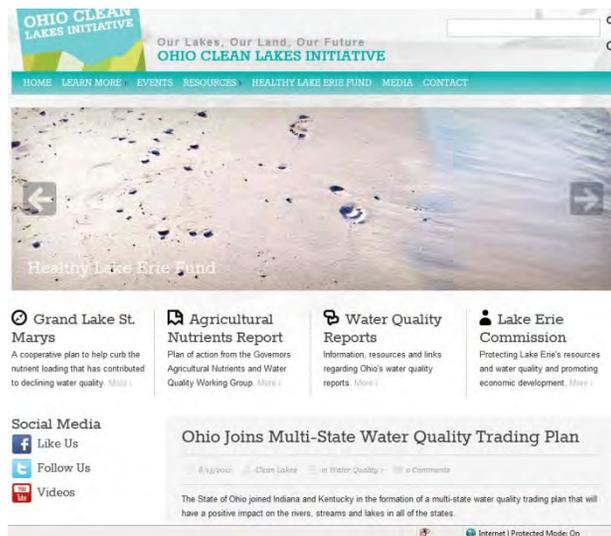
As the top row of graphs illustrate, the Maumee River discharges and phosphorus loads were much smaller in 2012 than in 2011. The rankings of discharge, TP loads and DRP loads for our 35 year period of record are shown in the lower row of graphs with the red dots representing the 2012 March –June values and the blue dots the 2011 March –June values. The 2011 blue-green algal blooms were apparently the most severe ever observed while the 2012 blooms were very limited. These results suggest that spring loads of phosphorus from agricultural runoff in the Maumee River are more important than internal loading or Detroit city discharges as a cause of blue green algal blooms. Graphs by Peter Richards.



Departmental Priorities

Addressing the challenges

- Loadings/water quality degradation



- Harmful algal blooms (HABs)
 - ohioalgaeinfo.com
- Clean Lakes Initiative (ODNR, OEPA, ODA)
 - www2.ohiodnr.com/cleanlakes
- Healthy Lake Erie Fund (\$3 million)
 - for projects in the Western Lake Erie Basin that help address the Ag nutrient issue
 - monitor the condition of Lake Erie
 - testing for the soil in the Western Lake Erie Basin
 - support innovative pilot projects to reduce nutrient loadings and control algal growth
 - assist farmers in soil testing, developing of Nutrient Management Plans, training on fertilizer application, growth of cover crops and instillation of controlled drainage devices.



Departmental Priorities

Addressing the challenges

- Loadings/water quality degradation



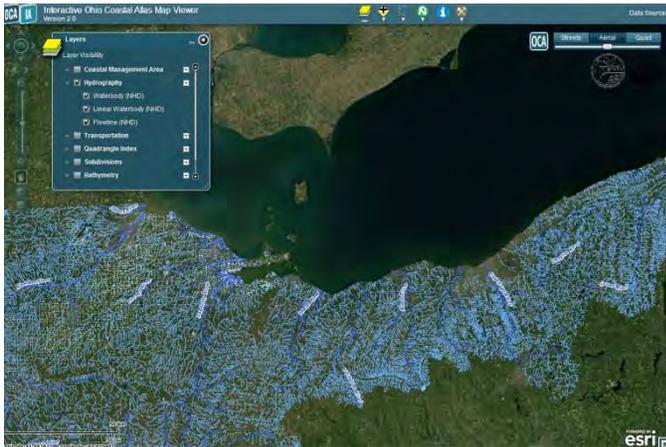
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 - www2.ohiodnr.com/cleanlakes
- Healthy Lake Erie Fund (\$3 million)
- “4R” program (source, rate, time, place)
 - www.nutrientstewardship.com



Departmental Priorities

Addressing the challenges

- Loadings/water quality degradation



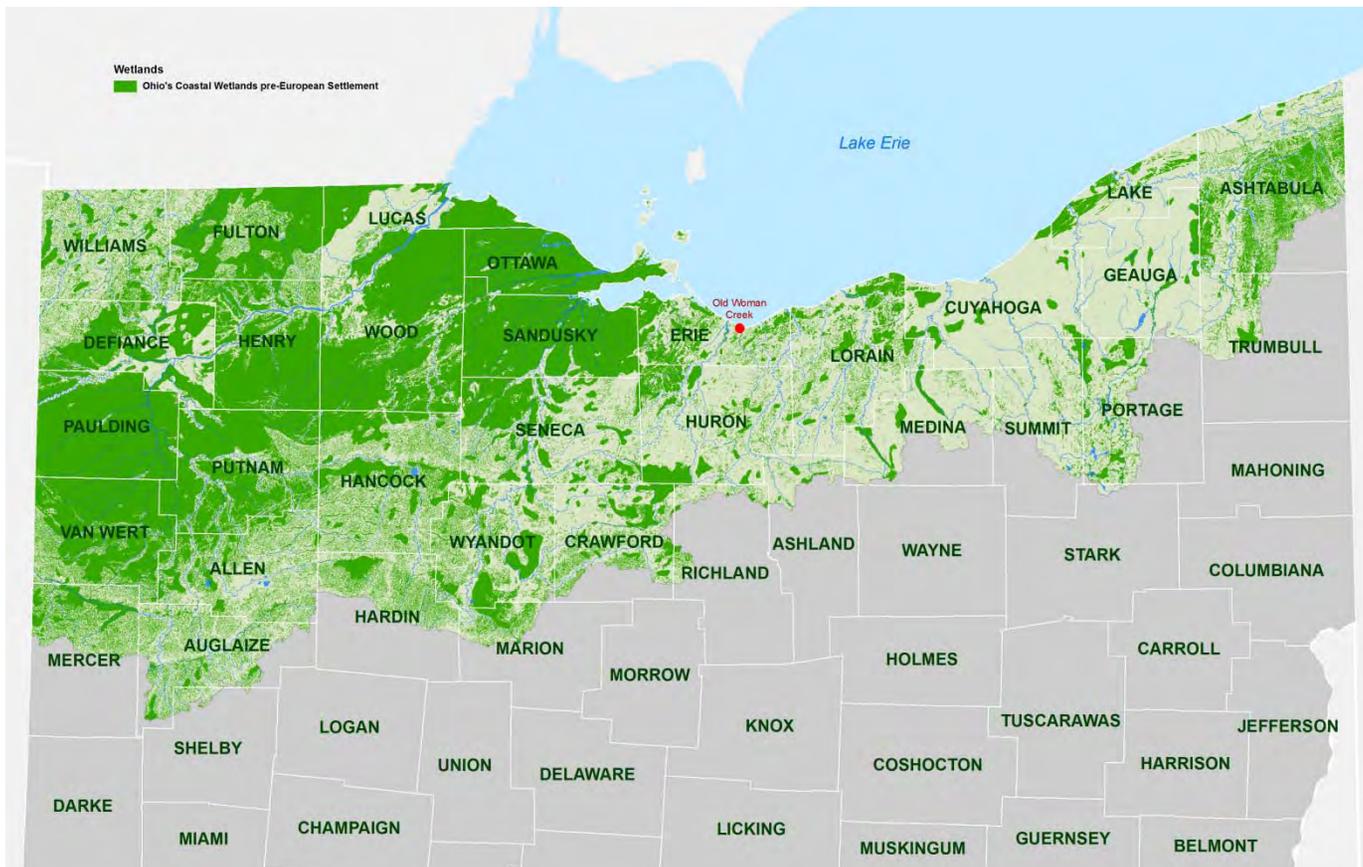
- Harmful algal blooms (HABs)
 - ohioalgaeinfo.com
- Clean Lakes Initiative (ODNR, OEPA, ODA)
 - www2.ohiodnr.com/cleanlakes
- Healthy Lake Erie Fund (\$3 million)
- “4R” program (source, rate, time, place)
 - www.nutrientstewardship.com
- Restoration of natural flow regimes (control drainage devices)



Departmental Priorities

Addressing the challenges

- Habitat loss and degradation → More than 90 percent of Ohio's wetlands have been destroyed.



Wetlands

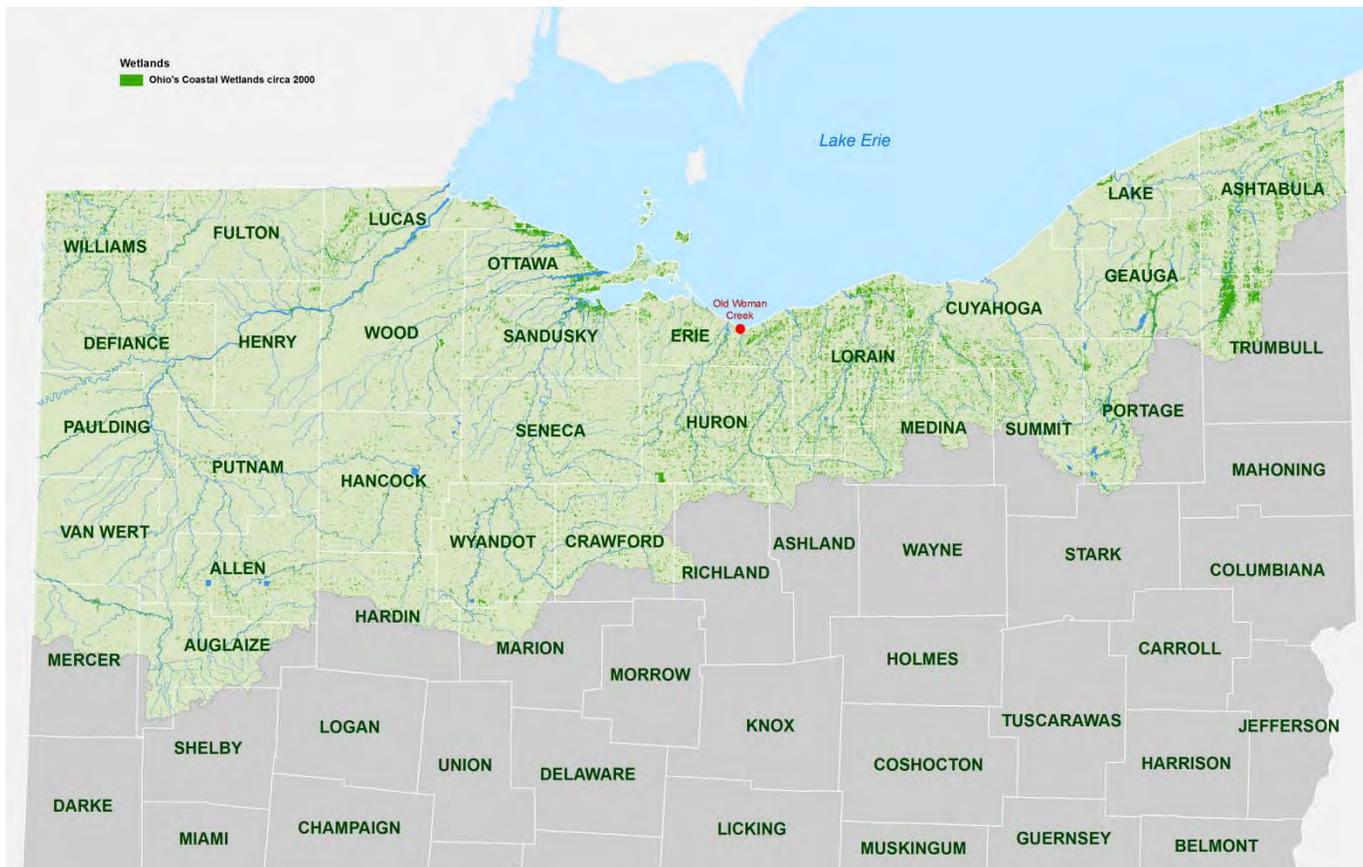
- ecosystem services valued at \$300,000 /acre
- Store flood waters
- Purify water (retain up to 80% nitrates and 92% phosphorus.
- Homes for wildlife and plants.
- Enjoyed by people..



Departmental Priorities

Addressing the challenges

- Habitat loss and degradation → More than 90 percent of Ohio's wetlands have been destroyed.



Wetlands

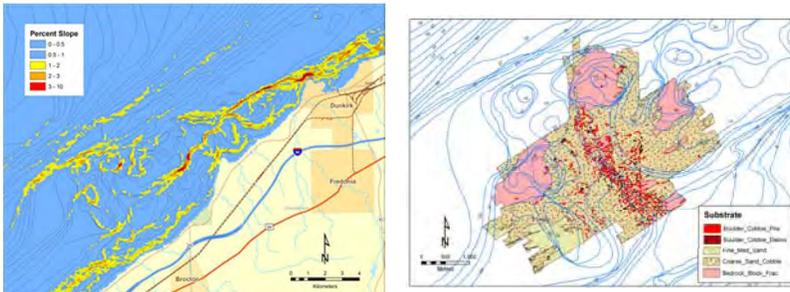
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- Store flood waters
- Purify water (retain up to 80% nitrates and 92% phosphorus.
- Homes for wildlife and plants.
- Enjoyed by people..



Departmental Priorities

Addressing the challenges

- Habitat loss and degradation
 - More than 90 percent of Ohio's wetlands have been destroyed.
 - Urban sprawl
 - Nearshore habitat changes

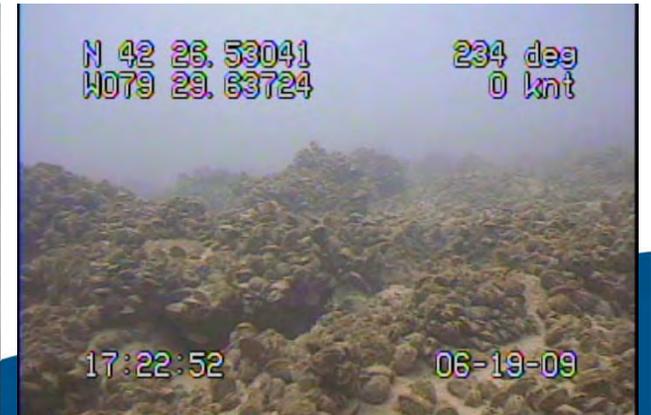
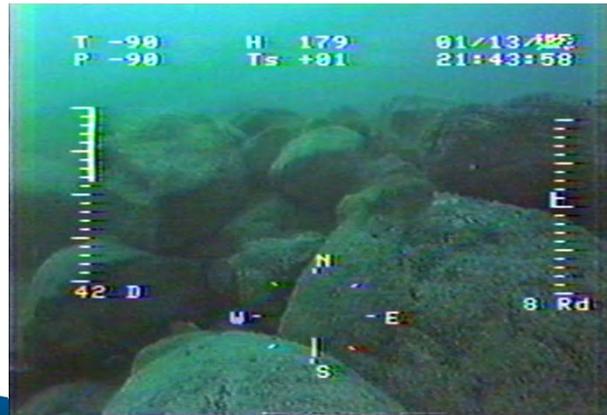


Brocton Shoal Habitat Structure

Sidescan Sonar

June 1987

June 2009





Departmental Priorities

Addressing the challenges

- Invasive species



- eDNA, Asian Carp

- www.ohiodnr.com/tabid/24070/Default.aspx

- Stop Aquatic Hitchhikers: Clean. Drain. Dry.



**STOP AQUATIC
HITCHHIKERS!**

Prevent the transport of nuisance species.
Clean all recreational equipment.
www.ProtectYourWaters.net

- Continue to manage and maintain a world-class sport-fishery

- Ohio's Lake Erie Fishery value: \$800 million annually.





Departmental Priorities

Addressing the challenges



Exploration and understanding of Lake Erie is ongoing.

- New technologies expand our ability to explore.
- Ecosystem models help us understand the complexity of Lake Erie and its role in the Great Lakes and the Earth.
- Collaboration Required
- Better resource protection and conservation

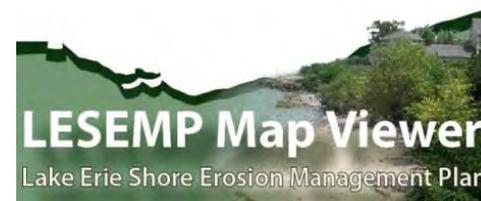




Office of Coastal Management Initiatives

- **Lake Erie Shore Erosion Management Plan**
 - Reaches identified by coastal characteristics and erodibility.
 - Provides information to coastal property owners and guidance as to appropriate methods of erosion control by coastal reach.
 - Various reaches finalized and factsheets are online.
 - Reach from Vermilion to Cleveland Harbor is under development.

<http://LakeErie.ohiodnr.com/Erosion>



Office of Coastal Management - Programs

click on a region in the above map or in the right column to go to that region's webpage. Select the "LESEMP Map Viewer" logo at right for an interactive map of the coast.

Regional approach. Voluntary adoption.

Lake Erie Shore Erosion Management Plan

To assist property owners in their efforts to control lake-based erosion, the ODNR is developing the Lake Erie Shore Erosion Management Plan (LESEMP). By viewing erosion on a regional scale, the LESEMP products are able to incorporate multiple characteristics of Ohio's coast, including shore and nearshore geology, as well as habitat for a myriad of species.

- LESEMP Home Page
- Public Involvement
- Introduction
- Region IIII: Maumee Bay
- Region III: Sandusky Bay
- Region II: Vermilion, Erie County
- Region I: Vermilion, Erie County
- Region III: Sandusky Bay

Region Description: Cedar Point to Vermilion, Erie County

Lake Erie Shore Erosion Management Plan

Cedar Point to Vermilion Introduction LESEMP

About the Program

In an on-going effort to assist property owners along Ohio's Lake Erie coast by providing them technical assistance, the Lake Erie Shore Erosion Management Plan (LESEMP) is being developed by the Ohio Department of Natural Resources through a partnership between the Office of Coastal Management, Division of Wildlife and Division of Geological Survey.

The LESEMP identifies the causes of erosion in specific areas called reaches which are stretches of shore with similar site conditions. The LESEMP then outlines the most likely means of successful erosion control based on reach specific erosion issues, geology and habitat. The objective of the reach-based approach is erosion control in a simplified decision process while enhancing the effectiveness of solutions to prevent related costs.

The LESEMP does not contain any regulatory oversight provisions.

Introduction

The Lake Erie Shore Erosion Management Plan (LESEMP) is a voluntary program that will assist property owners along the Lake Erie coast in the Vermilion, Erie County, Ohio reach. The LESEMP identifies the causes of erosion in specific areas called reaches which are stretches of shore with similar site conditions. The LESEMP then outlines the most likely means of successful erosion control based on reach specific erosion issues, geology and habitat. The objective of the reach-based approach is erosion control in a simplified decision process while enhancing the effectiveness of solutions to prevent related costs.

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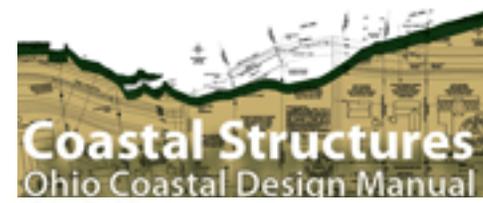


Office of Coastal Management Initiatives

- **Ohio Coastal Design Manual**

- Demonstrates how structures along the shore of Lake Erie should be designed and how coastal engineering principles are best applied.
- Printed manual can be downloaded online or viewed as a webpage.
- Additional chapters being developed.

[http:// LakeErie.ohiodnr.com/Design](http://LakeErie.ohiodnr.com/Design)



Design Drawings



Example D: Concrete Block Seawall (Call out on sheet 1 of 9) [Download](#)

Example D: Concrete Block Seawall (Call out on sheet 2 of 9) [Download](#)

Example D: Concrete Block Seawall (Call out on sheet 3 of 9) [Download](#)



Example D: Concrete Block Seawall (Call out on sheet 4 of 9) [Download](#)

Example D: Concrete Block Seawall (Call out on sheet 5 of 9) [Download](#)

Example D: Concrete Block Seawall (Call out on sheet 6 of 9) [Download](#)



Example D: Concrete Block Seawall (Call out on sheet 7 of 9) [Download](#)

Example D: Concrete Block Seawall (Call out on sheet 8 of 9) [Download](#)

Example D: Concrete Block Seawall (Call out on sheet 9 of 9) [Download](#)



Project Site Map (Plan View) [Download](#)

Building Site Plan (Cross Section) [Download](#)

Building Site Plan (Cross Section) [Download](#)



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coastal@dnr.state.oh.us

Learn more
www.ohiodnr.com

Ohio Coastal Design Manual, 2011

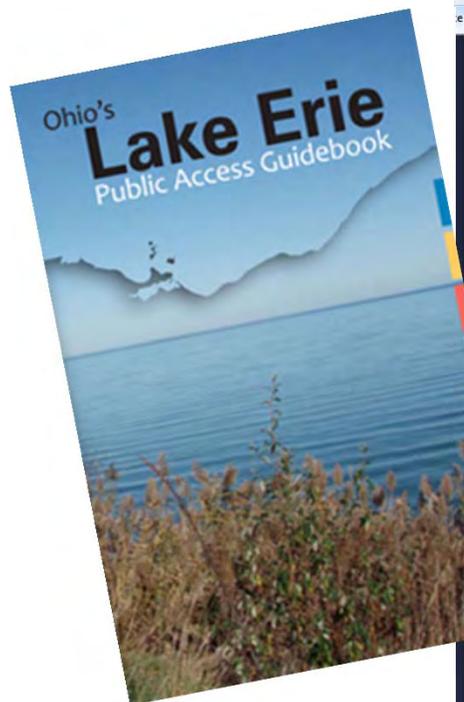




Access to the Coast . . . and Watershed

Coming soon: a companion Document focusing on Public Access Sites on Ohio's main Lake Erie Tributaries:

- Ottawa River
- Maumee River
- Toussaint River
- Portage River
- Sandusky River
- Huron River including West Branch
- Vermilion River
- Black River with East & West branches
- Rocky River with East & West branches
- Cuyahoga River
- Chagrin River
- Grand River
- Ashtabula River
- Conneaut Creek



The screenshot shows the website for the Ohio's Lake Erie Public Access Guide. The main heading is "Ohio's Lake Erie Public Access Guide". Below the heading is a map of Lake Erie with various public access sites marked with colored dots. The text on the page includes: "Explore Ohio's 312-mile Shore", "Ohio's Lake Erie Public Access Guide is your resource for exploring Ohio's Great Lake coast. From trail nature preserves and scenic vistas to sandy swimming beaches and prime fishing spots, Ohio's coast has something for everyone.", "As of May 1, 2012 - Ohio has 167 public access sites along Lake Erie.", "Each of the 169 public access locations in the 8 coastal counties along Ohio's 312-mile coast that are/will open to the public in July 1, 2012, are illustrated with a map, narrative, list of amenities, photographs, address and location coordinates in the printed guide. Full information about each site is found online, geographically arranged within their respective county.", "Printed Guidebook: Sized to fit in backpacks, glove boxes and tackle boxes (8.5\"/>

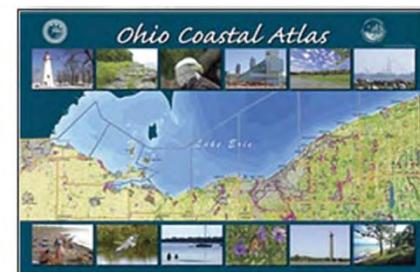
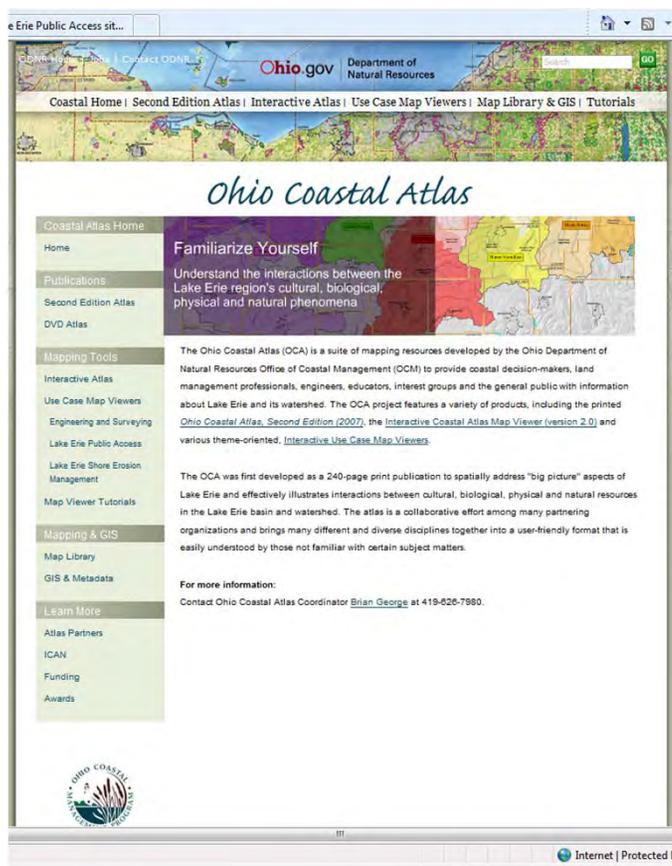
<http://LakeErie.ohiodnr.com/GoCoast>



Ohio Coastal Atlas

Available Data Layers

- [Engineering and Surveying](#)
- [Lake Erie Environment](#)
- [Lake Erie Public Access](#)
- [Lake Erie Shore Erosion Management](#)
- [Lake Erie Watershed](#)
- [Ports, Harbors and Recreational Boating](#)
- [School Districts](#)
- [Population \(census\)](#)
- [More!!](#)



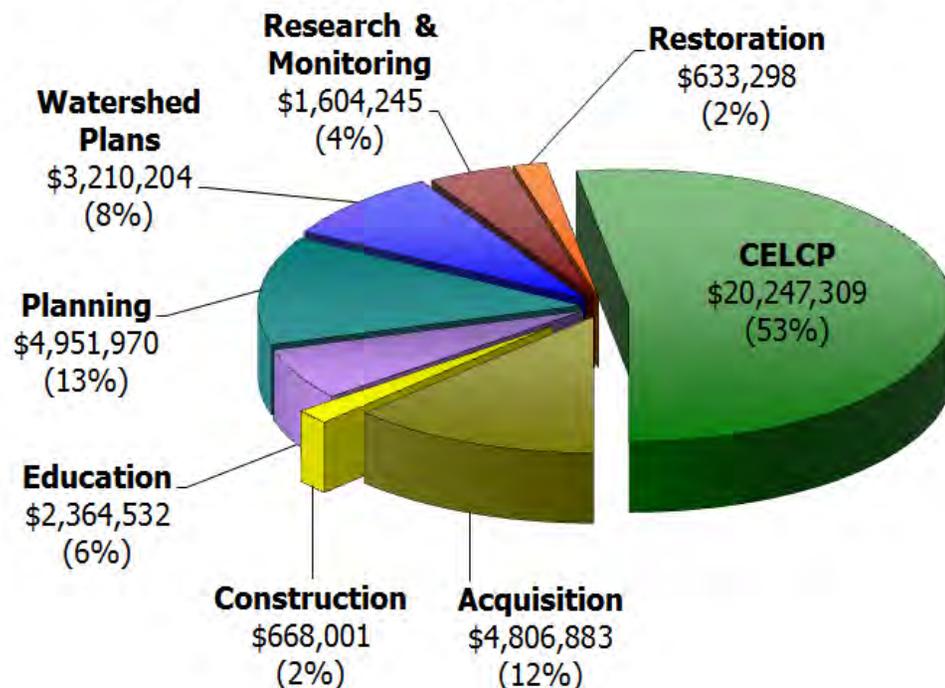
<http://LakeErie.ohiodnr.com/Atlas>

ohiodnr.com/coastal



Office of Coastal Management Initiatives

Ohio Coastal Management Grants by Award Category 1998-2012



Coastal Management Assistance Grants

FY2014 Priorities:

- Water Quality
- Coastal Planning
- Coastal Resource Management Education and Outreach
- Research and Data Collection

<http://LakeErie.ohiodnr.com/Grants>



Office of Coastal Management Initiatives: Outreach and Education

LELP 1 - [Lake Erie, one of the five Great Lakes, is a body of fresh water with many features.](#)

LELP 2 [Natural forces formed and continue to shape Lake Erie and its watershed.](#)

LELP 3 - [Lake Erie influences local and regional weather and climate.](#)

LELP 4 - [Water makes Earth habitable; fresh water sustains life on land.](#)

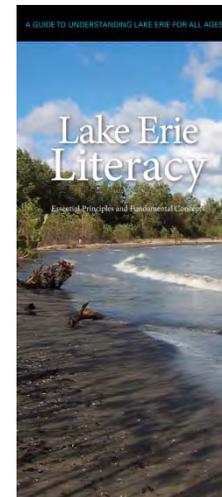
LELP 5 - [Lake Erie supports a broad diversity of life and ecosystems.](#)

LELP 6 - [Lake Erie and humans in its watersheds are inextricably interconnected.](#)

LELP 7 - [Much remains to be learned about Lake Erie.](#)

LELP 8 - [Lake Erie is socially, economically and environmentally significant to the region and nation.](#)

- Lake Erie Literacy Principles and Concepts finalized, presented at CZ2011 and aligned with the National Science Education Standards.
- Were used to write a monthly full-page feature story in a newspaper distributed to more than 32 schools (K-6) in 3 of Ohio's coastal counties which won national awards.
- Has been used TODAY. Do the headings at left look familiar?



[http:// Ohiodnr.com/LakeErieLiteracy](http://Ohiodnr.com/LakeErieLiteracy)

Ohiodnr.com/coastal



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