

## Chapter 2

# Coastal Awareness

The narrow coastal fringe that comprises 17 percent of the nation's contiguous land area is home to more than half of its population. (*Population density values exclude Alaska because its extensive coastal land area dilutes the national average*). In 2003, approximately 153 million people (53 percent of the nation's population of approximately 290 million people) lived in the 673 U.S. coastal counties, an increase of 33 million people since 1980. *There are 30 coastal states in the United States containing 673 coastal counties, boroughs, parishes or county equivalents. The National Oceanic and Atmospheric Administration's (NOAA) Special Projects office defines a county as coastal if one of the following criteria is met: (1) at a minimum, 15 percent of the county's total land area is located within a coastal watershed or (2) a portion of or an entire county accounts for at least 15 percent of a coastal cataloging unit. NOAA determines coastal watersheds as those with cataloging units (i.e. 8-digit Hydrologic Unit Codes) that are adjacent to ocean and Great Lakes coasts.*

Coastal counties average 300 persons per square mile, much higher than the national average of 98 persons per square mile. By the year 2008, coastal county population is expected to increase by approximately 7 million for a total of 160 million. These numbers do not

include seasonal population increases due to summer homes and vacationers attracted to the coastal region.

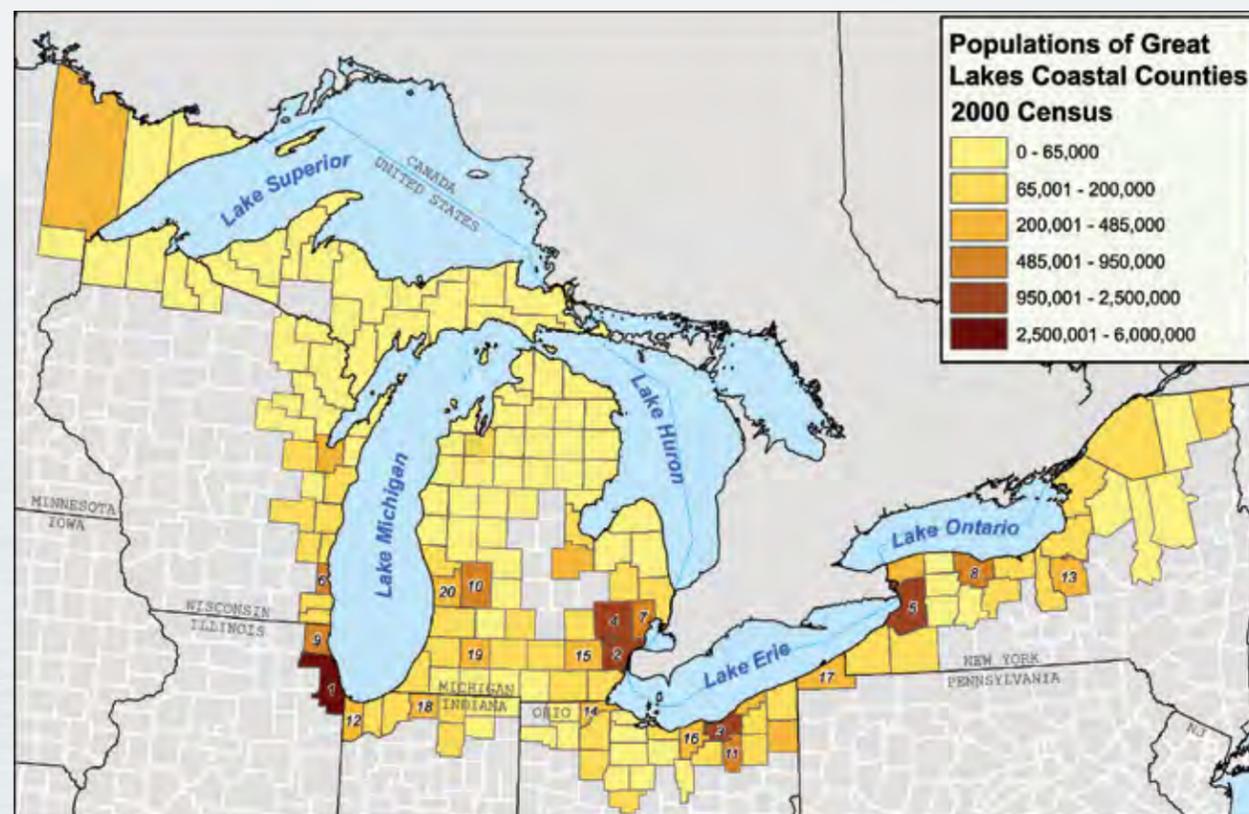
While U.S. coastal areas are home to a wealth of natural and economic resources, they are also some of the most developed areas in the nation. Population increase and coastal development produce numerous economic benefits; however, they also may result in the loss of critical habitat, green space and biodiversity. Because the nation's coastal and ocean resources are under increasing pressure from population growth and development, there is an increased need for sound coastal management.

## What is coastal management?

Coastal management is a cooperative effort by federal and state agencies, political subdivisions, local groups and individuals who are dedicated to the comprehensive management of the nation's coastal resources. This includes monitoring activities that affect the resources, and ensuring resource protection while balancing often competing national economic, cultural and environmental interests.

## Where does coastal management take place?

Coastal management occurs not only in Ohio, but also in 34 other coastal U.S. states and territories with coasts on the oceans and Great Lakes.



Eighteen percent of the U.S.'s coastal population lives in Great Lakes coastal counties.

Map 5 GIS data citation in Appendices

## Most Populated Great Lakes Coastal Counties (2000 Census)

Rank	County	State	Seat
1	Cook	Illinois	Chicago
2	Wayne	Michigan	Detroit
3	Cuyahoga	Ohio	Cleveland
4	Oakland	Michigan	Pontiac
5	Erie	New York	Buffalo
6	Milwaukee	Wisconsin	Milwaukee
7	Macomb	Michigan	Mt. Clemens
8	Monroe	New York	Rochester
9	Lake	Illinois	Waukegan
10	Kent	Michigan	Grand Rapids
11	Summit	Ohio	Akron
12	Lake	Indiana	Crown Point
13	Onondaga	New York	Syracuse
14	Lucas	Ohio	Toledo
15	Washtenaw	Michigan	Ann Arbor
16	Lorain	Ohio	Elyria
17	Erie	Pennsylvania	Erie
18	St. Joseph	Indiana	South Bend
19	Kalamazoo	Michigan	Kalamazoo
20	Ottawa	Michigan	Grand Haven

Top 20 counties identified on map (rank corresponds with numbers on map)

## What is the federal CZMA?

In recognition of the increasing pressures of development on the nation's coastal resources, Congress enacted the Coastal Zone Management Act (CZMA) in 1972. The Act has been amended several times, and is found in U.S. Code Title 16 Chapter 33, Section 1451 through Section 1465.

The CZMA defines coastal management as:

*"Achieving the wise use of the land and water resources of the coastal zone giving full consideration to ecological, cultural, historic and aesthetic values and the need for compatible economic development."*

The CZMA encourages states to develop state-specific programs to preserve, protect, develop, and, where possible, restore and enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands and coral reefs, as well as the fish and wildlife using those habitats. Approved state programs are expected to consider or undertake the following:

- Protecting natural resources.
- Managing development in high hazard areas.
- Managing development to achieve good water quality within coastal waters.

- Giving development priority to coastal-dependent uses.
- Having orderly processes for the siting of major facilities.
- Locating new commercial and industrial development in, or adjacent to, developed areas.
- Providing public access for active and passive recreation.
- Redeveloping urban waterfronts and ports, and preserving and restoring historic, cultural and esthetic coastal features.
- Simplifying and expediting government decision-making actions.

- Coordinating state and federal actions.
- Giving adequate consideration to the views of federal agencies.
- Assuring the public and local governments have a say in coastal decision-making.
- Comprehensively planning for and managing living marine resources

The CZMA entrusts day-to-day management decisions to states and territories containing the 95,376 U.S. shoreline miles (99.9 percent) managed by coastal programs. Participation in the coastal program is voluntary. To encourage



# Coastal Management



Office of Coastal Management, Sandusky



Lakeshore Park, Conneaut



East Harbor State Park, Ottawa County



Point Park, Ashtabula



Map 6 GIS data citation in Appendices

the coast, it is now necessary to better manage the lake's resources and activities along the coast in an effort to protect, restore and enhance what remains. Coastal management seeks to balance the forces competing for limited resources and find solutions to problems affecting the Lake Erie coastal region. This is accomplished in part by examining the big picture of Ohio's entire coast and helping communities and residents undertake individual improvements that contribute to the economic welfare of the coast while preserving and enhancing coastal resources.

## When was the Ohio Coastal Management Program developed?

Practices of coastal management have existed in Ohio since the United States and Canada joined to sign the Boundary Waters Treaty of 1909. The treaty recognized that degradation of the Great Lakes by any state, province or nation could have widespread effects upon the lakes and coastal residents. The International Joint Commission (IJC) is an independent bi-national organization established by the Boundary Waters Treaty. Today the IJC continues to help prevent and

resolve disputes relating to the use and quality of Great Lakes' boundary waters. Within Ohio law, the 1917 passage of the Fleming Act marked the first time coastal policies regarding the Lake Erie Public Trust were written in the books.

After passage of the federal Coastal Zone Management Act and the Clean Water Act, in 1972, Ohio Governor James Rhodes placed the responsibility for developing a coastal management program with ODNR. Grants from the federal Office of Ocean and Coastal Resource Management helped ODNR accomplish this task. During

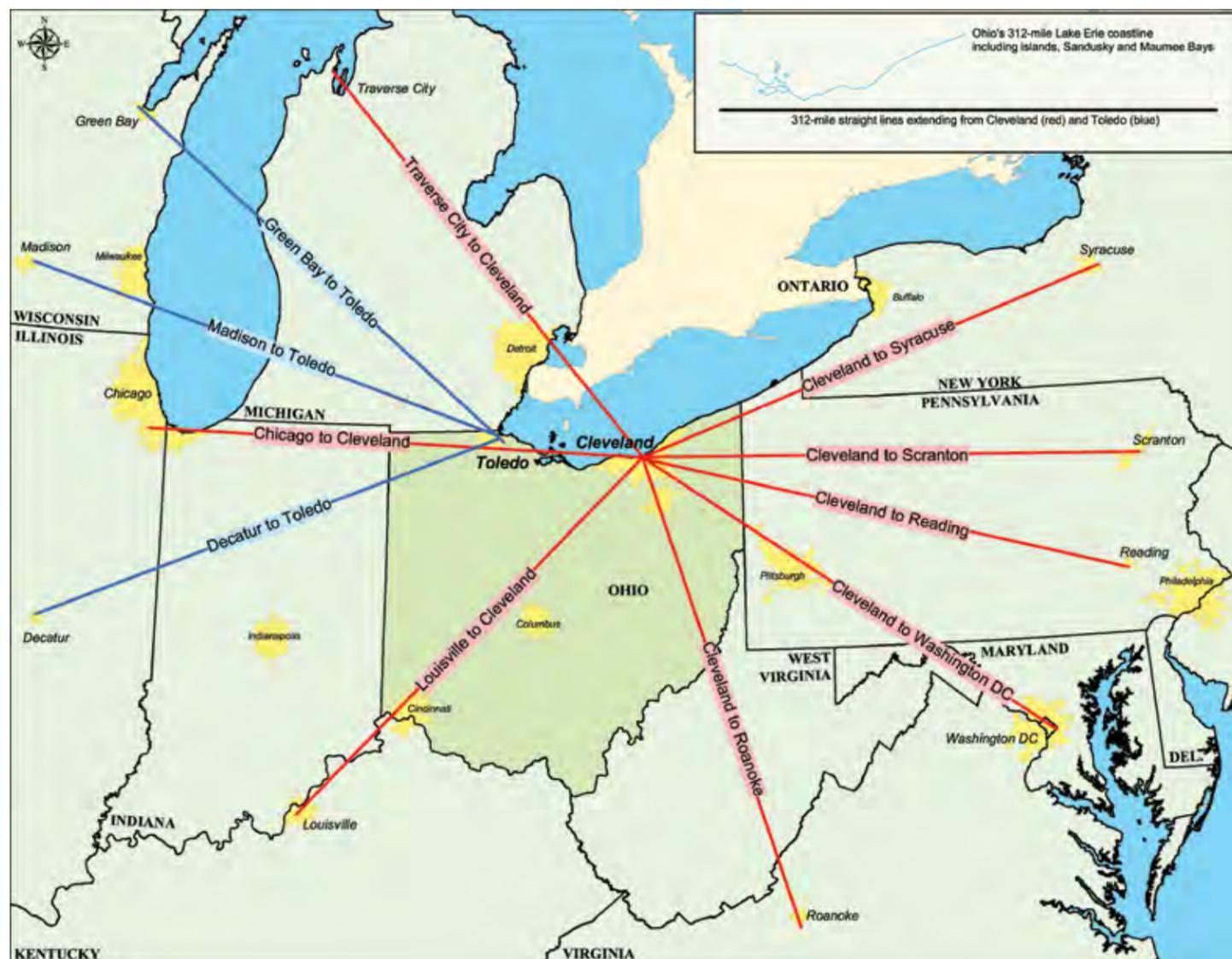
the program's development process, ODNR listened intently to the concerns and suggestions of thousands of Ohio residents and professional experts, integrating their comments into the plan. In 1988, the Coastal Management Law was unanimously approved by Ohio's legislature. The Ohio Coastal Management Program was given federal approval by the Department of Commerce's National Oceanic and Atmospheric Administration in 1997.

## What is included in the Ohio Coastal Management Program?

The Ohio Coastal Management Program defines the Ohio Coastal Management Area; describes state and federal coastal legislation and management policies for Lake Erie; links state programs, regulations and laws from various state agencies in a coastal network; and organizes state laws and regulations into nine issue areas including:

1. Coastal Erosion and Flooding,
2. Water Quality,

# Coastal Management



**How far is 312 miles?**

*The approximate straight-line distance between the easternmost point of the Ohio-Michigan boundary and the northernmost point of the Ohio-Pennsylvania boundary is 152 miles. However the actual 'line' connecting the two points, Ohio's Lake Erie coast, is anything but straight. Ohio's coast, including islands, bays, peninsulas and other diverse features, is 312-miles\* long. This distance, if stretched into a straight line, would link Cleveland with locations as far away as Washington, DC, Chicago, Syracuse, New York, Louisville, Kentucky, Roanoke, Virginia and Traverse City, Michigan. If extended from Toledo, the 312-mile straight line would reach Green Bay or Madison, Wisconsin.*

*\*Ohio's 312-mile coast was derived by NOAA under a study performed in 1975 and under previous studies by the U.S. Department of Commerce in 1953 and 1970.*

**When/Why was the Office of Coastal Management created?**

Since the approval of the Ohio Coastal Management Program, ODNR has continued to listen to concerns of coastal residents and decision makers and, when possible, adjust the Coastal Management Program and its administration to better serve Ohioans and protect Lake Erie. One important step was creating the Office of Coastal Management in July 2002. The coastal office, the only ODNR division or office to be headquartered outside of Columbus, was located in Sandusky to be able to better serve constituents and care for coastal resources.

**What does the Office of Coastal Management do?**

The Office of Coastal Management is responsible for administering the Ohio Coastal Management Program, performing federal consistency reviews, administering Ohio law and administrative code regarding coastal management, and executing numerous initiatives targeted toward improving the region. Prior to the formation of the Office of Coastal Management, various divisions within ODNR shared these responsibilities. The Office of Coastal Management also annually administers grants from the federal government to assist state and local agencies, communities and nonprofits with improving the Lake Erie Coastal Region.

**For more information/Sources:**

ODNR Office of Coastal Management  
105 W. Shoreline Drive  
Sandusky OH 44870  
Tel: 888-64-om/coastal

U.S. Department of Commerce  
Web: commerce.gov

National Oceanic and Atmospheric Administration (NOAA)  
Web: noaa.gov

NOAA National Ocean Service (NOS)  
Web: oceanservice.noaa.gov

NOAA NOS Office of Ocean and Coastal Resource Management (OCRM)  
N/ORM 10th floor SSMC4  
1305 East-West Highway  
Silver Spring MD 20910  
Web: coastalmanagement.noaa.gov

NOAA NOS OCRM Coastal Programs Division  
Web: coastalmanagement.noaa.gov/cpd

NOAA Coastal Zone Management Program  
Web: coastalmanagement.noaa.gov/czm

Department of Energy, Environmental Policy and Guidance  
Web: homer.ornl.gov/oepea

Coastal Zone Management Act Of 1972 as amended through P.L. 104-150, The Coastal Zone Protection Act of 1996 § 1451 to § 1465.

Population Trends Along the Coastal United States (1990-2008), NOAA NOS Management and Budget Office, Special Projects 2004  
Web: oceanservice.noaa.gov/programs/mb/supp\_cstl\_population.html

3. Wetlands and other Ecologically Sensitive Resources,
  4. Ports and Shoreline Development,
  5. Recreation and Cultural Resources,
  6. Fish and Wildlife Management,
  7. Environmental Quality,
  8. Energy and Mineral Resources, and
  9. Water Quantity.
- What is the Ohio Coastal Management Area?**
- Ohio's designated Coastal Management

Area is defined in Ohio Revised Code Chapter 1506.01 as the waters of Lake Erie, the islands in the lake, the lands under and adjacent to the lake, including transitional areas, wetlands and beaches and extending in Lake Erie to the international boundary line and extending landward only to the extent necessary to include shorelands, the use of which have a direct and significant impact on coastal waters as determined by the director of natural resources.

**What is the importance of Ohio's Coastal Management Area?**

The Coastal Management Area is important for a variety of reasons including being eligible for sources of federal Coastal Management funding. The coastal management area is also subject to coastal management program policies and to federal and state consistency requirements. Coastal Management Assistance Grant projects must be located entirely within the Coastal

Management Area or must demonstrate that the project will have direct substantial benefits to lands within the Area. All Coastal Management Assistance Grants for construction and acquisition projects must be within the Coastal Management Area boundary.

**Office of Coastal Management**

**MISSION**  
Achieve a balance between use and preservation of Lake Erie's coastal resources in collaboration with our partners, by effectively administering the Ohio Coastal Management Program.

**VISION:**  
Working with our public and private partners, we will attain a healthy Lake Erie region with vital ecosystems and prosperous coastal communities.

# Great Lakes



Map 7 GIS data citation in Appendices

## Appreciating the Great Lakes

The Great Lakes – Superior, Michigan, Huron, Erie and Ontario – are an important part of the physical and cultural heritage of North America. Spanning more than 750 miles from west to east, these vast inland freshwater seas provide water for consumption, transportation, power, recreation and a host of other uses for the more than 30 million people who live in the Great Lakes basin.

The Great Lakes are the largest system of fresh water on earth, containing roughly six quadrillion gallons of water or about 95 percent of the United States' fresh surface water and 18 percent of the world's freshwater supply. Only the polar ice caps contain more fresh water.

The magnitude of the Great Lakes water system is difficult to appreciate, even for those who live within the basin. The lakes cover a total surface area of 94,000 square miles. This is

the equivalent to the combined land area of Ohio (40,953 square miles), Pennsylvania (44,820 square miles) and New Hampshire (8,969 square miles). If the entire volume of water in the Great Lakes was spread evenly over the continental United States, it would cover the land with about 10 feet of water.

Dubbed "the nation's fourth sea-coast," the U.S. Great Lakes shore is more than 4,500 miles long, longer than the Atlantic Coast. The total Great Lakes shore is more than 10,000 miles long,

including 35,000 islands.

Despite their large size, the Great Lakes are sensitive to the effects of a wide range of pollutants. The sources of pollution include the runoff of soils and farm chemicals from agricultural lands, the waste from cities, discharges from industrial areas and leachate from disposal sites. The large surface area of the lakes also makes them vulnerable to direct atmospheric pollutants that fall with rain or snow on the lake surface.

Outflows from the Great Lakes are relatively small (less than 1 percent per year) in comparison with the total volume of water. Pollutants that enter the lakes— whether by direct discharge along the shores, through tributaries, from land use or from the atmosphere— are retained in the system and become more concentrated with time. Pollutants also remain in the system because of resuspension (or mixing back into the water) of sediment and cycling through biological food chains.

## Flow Chart

Lake Superior flows out the St. Marys River to Lake Huron. The water from Lake Michigan flows to Lake Huron through the Straits of Mackinac. These straits are deep and wide, resulting in Lakes Michigan and Huron standing at the same surface elevation. From Lake Huron, water flows down the St. Clair River to Lake St. Clair before venturing down the Detroit River and into Lake Erie. The outflow of Lake Erie is via the Niagara River and the Welland Canal into the Niagara River and Lake Ontario. Once leaving Lake Ontario, the water flows through a series of smaller lakes including St. Lawrence, St. Francis, St. Louis and Montreal Harbor before entering the St. Lawrence River, Gulf of St. Lawrence and the Atlantic Ocean.

## Great Lakes by Size

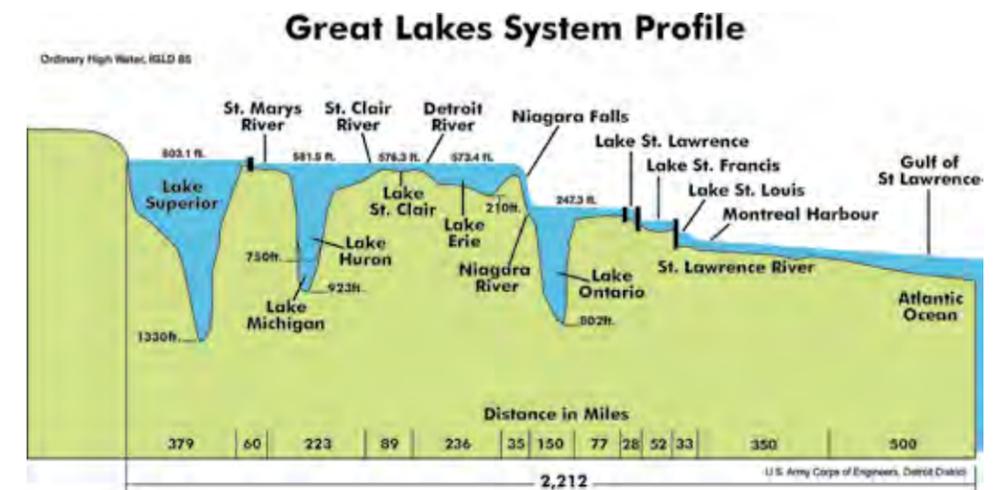
Lake Superior is the largest Great Lake by volume. It is also the deepest and coldest of the five. Superior could contain all the other Great Lakes and three more Lake Eries. Most of the Superior basin is forested, with little agriculture occurring because of a cool climate and poor soils. The forests and sparse population result in relatively few pollutants entering Lake Superior, except through the air.

Lake Michigan, the second largest, is the only Great Lake entirely within the United States. The northern part is in the colder, less developed upper Great Lakes region. Its watershed is sparsely populated, except for the Fox River Valley, which drains into Green Bay. This bay has one of the most productive Great Lakes fisheries but receives the wastes from the world's largest concentration of pulp and paper mills. The more temperate southern basin of Lake Michigan is among the most urbanized areas in the Great Lakes system. It contains the Milwaukee and Chicago metropolitan areas. This region is home to about eight million people or about one-fifth of the total population of the Great Lakes Basin.

Lake Huron, which includes the Georgian Bay, is the third largest lake by volume. Many Canadians and Americans own cottages on the shallow, sandy beaches of Huron and along the rocky shores of the Georgian Bay. The Saginaw River basin is intensively farmed and contains the Flint and Saginaw-Bay City metropolitan areas. Saginaw Bay, like Green Bay, contains a very productive fishery.

Lake Ontario, although slightly smaller in area, is much deeper and contains a larger volume of water than its upstream neighbor, Lake Erie. Ontario's average depth is 283 feet. Major urban industrial centers, such as Hamilton and Toronto, are located on its shore. The U.S. shore is less urbanized and is not intensively farmed, except for a narrow band along the lake.

Lake Erie, the shallowest of the five with an average depth of only 62 feet, is exposed to the greatest effects from urbanization and agriculture. You can read more about Lake Erie throughout the Atlas.



# Great Lakes

## Great Lakes Facts

Great Lakes Water Surface Area vs. U.S. States Total (land and water) Surface Area

- Lake Ontario: 7,340 sq. mi. ≈ Connecticut 48th (5,544 sq. mi.) and Rhode Island 50th (1,545 sq. mi.)
- Lake Erie: 9,910 sq. mi. ≈ Vermont 45th (9,623 sq. mi.)
- Lake Huron: 23,000 sq. mi. ≈ West Virginia 41st (24,230 sq. mi.)
- Lake Michigan: 22,300 sq. mi. ≈ Massachusetts 44th (10,555 sq. mi.) and Maryland 42nd (12,407 sq. mi.)
- Lake Superior: 31,700 sq. mi. ≈ South Carolina 40th (32,020 sq. mi.)

- The Great Lakes contain about six quadrillion gallons of water, approximately 95 percent of the United States' total fresh water.
- The Great Lakes provide drinking water for more than 40 million people in the United States and

Canada. If distributed evenly, Great Lakes water could cover the entire contiguous United States in 10-feet of water.

- Lake Michigan is the only Great Lake entirely within the United States. Each of the four other lakes is shared with the Canadian province of Ontario.
- At 31,700 square miles, Lake Superior is the world's largest freshwater lake by total surface area. It contains as much water as all the other Great Lakes combined plus three extra Lake Eries.
- From a hydrological standpoint, Lake Michigan and Lake Huron are essentially two giant lobes of one single lake. They are separated by the five-mile wide Strait of Mackinac and both have the same surface elevation of 581.5 feet IGLD85.
- Lake Huron boasts more than 30,000 islands, more than any other Great Lake. These include Manitoulin Island, Ontario, the largest freshwater island in the world.
- The oldest lighthouse on the American Great Lakes side sits at Fort Niagara, N.Y. along Lake Ontario. It was built in 1818. The oldest lighthouse in

continuous operation is the Marblehead Lighthouse on Lake Erie at Marblehead, Ohio. It has been in operation since 1822.

- Gordon Lightfoot's 1976 song "Wreck of the Edmond Fitzgerald," which reached number two on the Billboard charts, tells the story of the most famous Great Lake maritime disaster. The 729-foot long, 75-foot wide freighter and its crew left Superior, Wisconsin carrying 26,000 tons of iron ore pellets, bound for Detroit when they became victims of an immense storm on Nov. 10, 1975, in Lake Superior.
- Middle Island, situated between Kelleys Island, Ohio, to the south and Pelee Island, Ontario, to the north in Lake Erie, marks the southernmost Canadian point.

Sources:  
[www.yourexpedition.com/umbrella/pages/pressroom/gl\\_facts.shtml](http://www.yourexpedition.com/umbrella/pages/pressroom/gl_facts.shtml)  
[www.glerl.noaa.gov/pr/ourlakes/](http://www.glerl.noaa.gov/pr/ourlakes/)  
[www.census.gov/main/www/cen2000.html](http://www.census.gov/main/www/cen2000.html)  
[www12.statcan.ca/english/census01/home/index.cfm](http://www12.statcan.ca/english/census01/home/index.cfm)

## Nighttime Lights

The nighttime lights map of the Great Lakes region shows cities, towns, industrial sites and momentary events such as fires (if any) as seen from space. (U.S. Geological Survey, 1996-1997)



## Shaded Relief

The shaded relief map illustrates the terrain of the Great Lakes region. (U.S. Geological Survey EROS Data Center)



## Great Lakes Coastal City Populations

City	State/Province	Population*	Water Body
Chicago	Illinois	2,896,016	Lake Michigan
Toronto	Ontario	2,481,494	Lake Ontario
Detroit	Michigan	951,270	Lake St. Clair
Hamilton	Ontario	662,401	Lake Ontario
Mississauga	Ontario	612,925	Lake Ontario
Milwaukee	Wisconsin	596,974	Lake Michigan
Cleveland	Ohio	478,403	Lake Erie
Toledo	Ohio	313,619	Lake Erie
Buffalo	New York	292,648	Lake Erie
Rochester	New York	219,773	Lake Ontario
Windsor	Ontario	208,402	Lake St. Clair
Niagara Falls	New York & Ontario	134,408	Niagara River
Thunder Bay	Ontario	109,016	Lake Superior
Erie	Pennsylvania	103,717	Lake Erie
Gary	Indiana	102,746	Lake Michigan
Green Bay	Wisconsin	102,313	Green Bay
Sault Ste. Marie	Michigan & Ontario	91,018	St. Marys River
Kenosha	Wisconsin	90,352	Lake Michigan
Duluth	Minnesota	86,918	Lake Superior

\* Population sources - 2000 U.S. Census and 2001 Census of Canada

## Great Lakes Physical Features

	Superior	Michigan	Huron	Erie	Ontario
Elevation (OHWM IGLD85)	603.1 feet	581.5 feet	581.5 feet	573.4 feet	247.3 feet
Dimensions (mi.)	350 x 160	307 x 118	206 x 183	241 x 57	193 x 53
Average Depth	489 feet	279 feet	195 feet	62 feet	283 feet
Maximum Depth	1,333 feet	923 feet	750 feet	210 feet	802 feet
Volume (cu. mi.)	2,935	1,180	849	116	393
Shore Length (including islands)	2,730	1,640	3,830	871	712
Water Surface Area (sq. mi.)	31,700	22,300	23,000	9,910	7,340
Retention Time	191 years	99 years	22 years	2.6 years	6 years
Outlet(s)	St. Marys River	Straits of Mackinac & Chicago Sanitary Ship Canal	St. Clair River	Niagara River & Welland Canal	St. Lawrence River
Outlet Destination(s)	Lake Huron	Lake Huron & Mississippi River via the Des Plaines and Illinois Rivers	Lake Erie via Lake St. Clair and the Detroit River	Lake Ontario	Atlantic Ocean

# Lake Erie



Cleveland West Pierhead Lighthouse, Cleveland



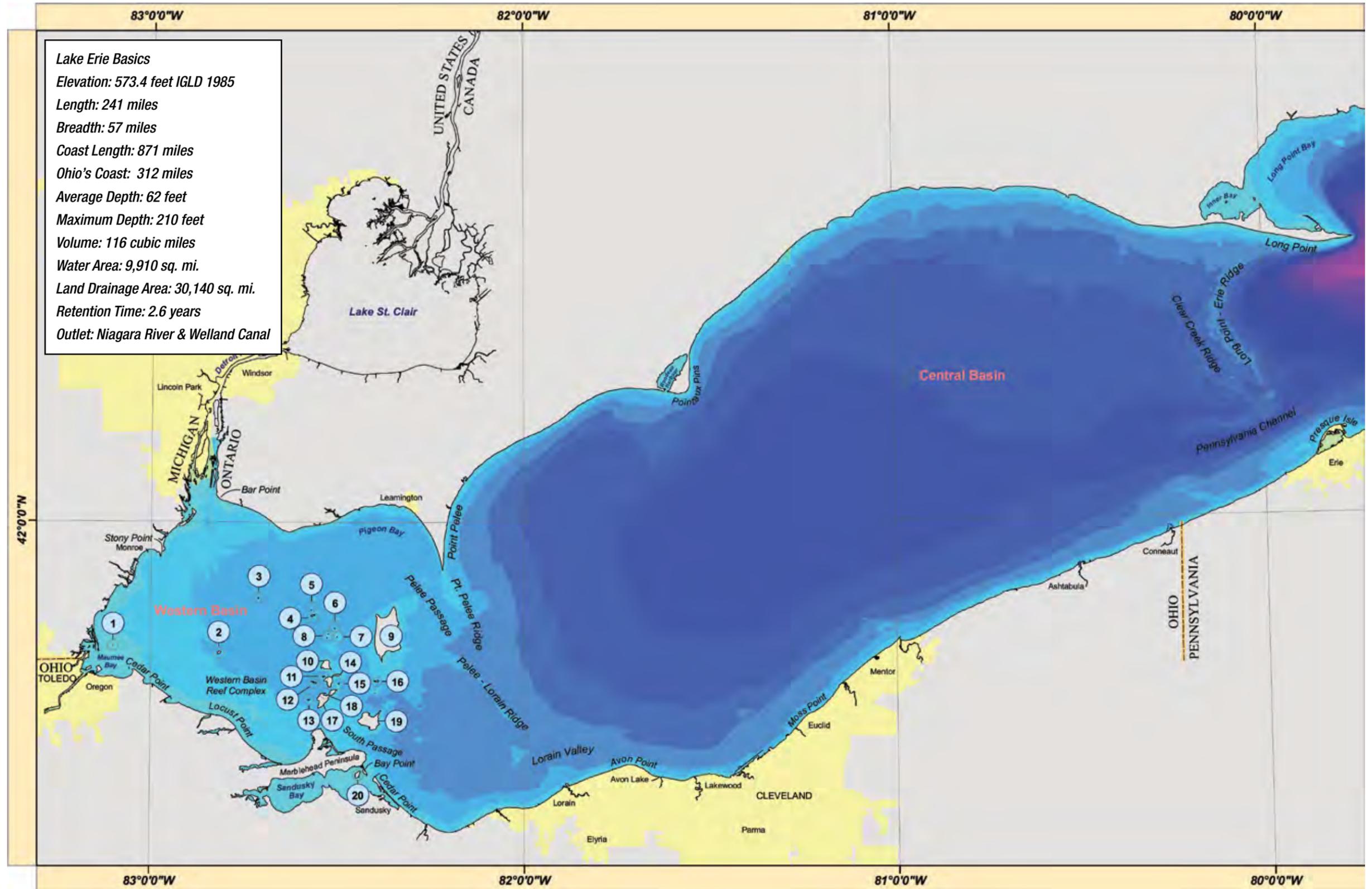
Maumee Bay State Park, Lucas County



Middle Bass Island, Ottawa County

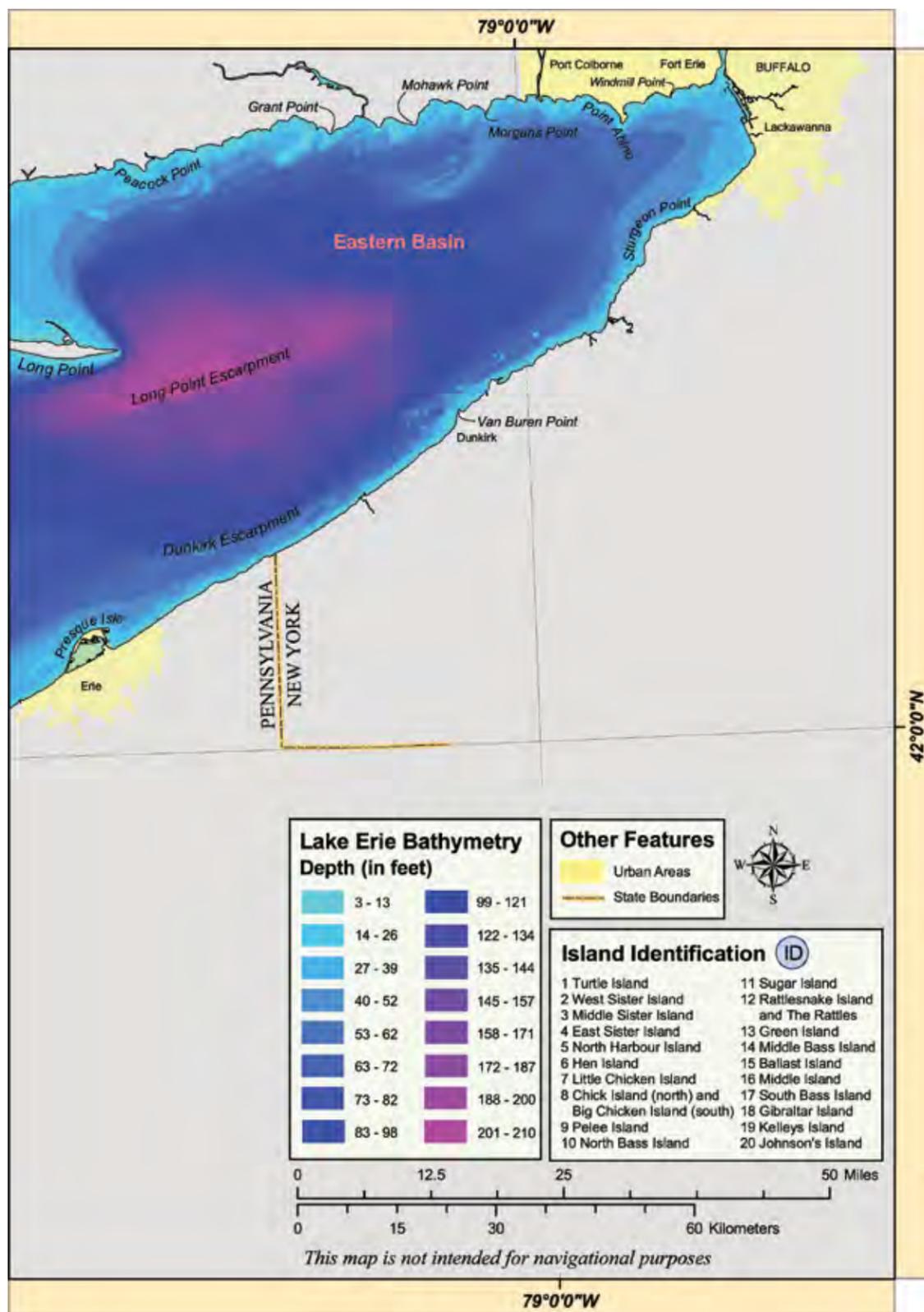


Geneva State Park, Geneva-on-the-Lake



Map 8 GIS data citation in Appendices

# Lake Erie



Map 8 GIS data citation in Appendices

Details of Lake Erie's bathymetry are shown on this map. The bathymetry map serves to extend the theme of surface topography into Lake Erie, which is the shallowest, southernmost, warmest, most biologically diverse and most productive of the five Great Lakes. Although smallest by volume, Erie is the fourth largest Great Lake in total surface area and is in the top 15 largest lakes in the world. Erie has the shortest retention time of the Great Lakes, with water moving through the lake in roughly 2.6 years. With an average depth of only 62 feet, the lake warms rapidly in the spring and summer and frequently freezes in winter.

The Western Basin, extending from Toledo to Huron, comprises about one-fifth of the lake and is very shallow with an average depth of 30 feet and a maximum depth of 62 feet. The Central Basin, extending from Huron to Erie, Pennsylvania, has an average depth of 60 feet. At the western end of the Central Basin, the Pelee-Lorain ridge separates the Sandusky Sub-basin from the rest of the Central Basin. The remainder of the lake comprises the Eastern Basin with an average depth of 80 feet and contains the deepest point of 212 feet off the tip of Long Point, Canada. Ohio's portion of Lake Erie includes the shallower Western Basin and part of the deeper Central Basin.

Lake Erie was the first modern Great Lake to form after the retreat of the glaciers. Of the Great Lakes, Erie is exposed to the greatest effects from urbanization and agriculture. Because of the fertile soils surrounding the lake, the area

is intensively farmed. The lake receives runoff from the agricultural area of southwestern Ontario and parts of Ohio, Indiana and Michigan. Seventeen metropolitan areas with populations over 50,000 are located within the Lake Erie basin, making it the second most densely populated Great Lake behind shores of Lake Michigan in the Chicago area.

Lake Erie is a dynamic body of water noted for the ferocity of its storm waves and the havoc they wreak along the shore. Waves, currents, shore erosion and flooding are all problems that must be dealt with in coastal areas.

Because Lake Erie is shallow, the effects of storm-driven waves are amplified. The axis of the lake runs from southwest to northeast, corresponding to the direction of prevailing winds. Strong winds can push water toward one end of Lake Erie (setup) and may create a difference in elevation of more than 15 feet from Toledo to Buffalo. When the wind stops, the water will rebound (seiche effect) causing the water to move back and forth across the lake. Strong winds or northeasters can also be a problem, driving storm waves opposite their normal path.

Lake Erie is subject to annual, seasonal and periodic lake level fluctuations, elevations that have been recorded since the 1860s. Seasonal fluctuations are related to spring rains and water entering the basin raising lake levels and to evaporation from late summer until the lake freezes. During the early fall, evaporation can exceed more than one inch of water per week. Researchers estimate that one inch

of water on the lake is approximately 23 billion gallons.

The annual average water level of Lake Erie from 1918-2002 was 571.33 feet IGLD85. However, Erie's monthly average has topped the Ordinary High Water Mark elevation of 573.4 feet IGLD85 more than 40 times since the 1970s.

Annual water level fluctuations, like seasonal changes, relate to how much water is flowing into Lake Erie from both its watershed and from the upper Great Lakes and how much water is evaporating. It is estimated that 80 to 95 percent of the water in Erie comes from the upper Great Lakes. When the Great Lakes Basin has colder winters, the upper Great Lakes will freeze and not as much water will evaporate. Increased snowfall rates in the upper Great Lakes also result in more water flowing into Lake Erie from the Detroit River in the spring. Over periods of time, the annual water level fluctuations have their highs and lows, with low periods occurring during the 1930s, followed by higher water in the 1950s, lower water in the 1960s, and higher water followed by slightly lower levels in the '70s, '80s and '90s.

Lake Erie is unmatched as a recreational and sport-fishing location, with more fish caught each year in Lake Erie than the other four Great Lakes combined. Annually, numerous national fishing tournaments are held here. In fact, the Western Basin city of Port Clinton claims to be the walleye capital of the world and holds an annual New Year's Eve party complete with a giant fiberglass walleye fish drop over the town's square.

The special climate created by Lake Erie in nearshore areas makes the coast an ideal location for cultivation of grapes and peaches. Many communities along the coast can trace their heritage to the cultivation of these and other crops. In the early days of the nation, during the 1700s and 1800s, Lake Erie was also a quick means of transportation for men engaged in the fur trade as well as settlers hoping to improve their fortunes in the Ohio Country. Erie's importance grew during the 1810s and 1820s as Americans began to build canals. The completion of the Erie Canal, connecting the Hudson River in New York with Lake Erie, provided the first navigable water route from the Atlantic Ocean to the upper Midwest.

During the War of 1812, both the English and the American militaries hoped to gain exclusive control over the lake to have an easier time sending troops and supplies in an invasion of the other's territory. On September 10, 1813, the Battle of Lake Erie occurred just northwest of Put-in-Bay Harbor. An American fleet under the command of Oliver Hazard Perry defeated a British fleet, securing control of the waterway for the United States and helping the United States win the war.

Today 11.5 million people live in the entire Lake Erie watershed with the majority (10 million) living in the United States. In Ohio, 4.65 million people (41 percent of Ohio's population) live in the state's portion of the Lake Erie Watershed. Of those, 2.6 million people (23 percent) live in the coastal counties.

# Areas of Concern and Remedial Action Plans



Ashtabula port facilities, Ashtabula



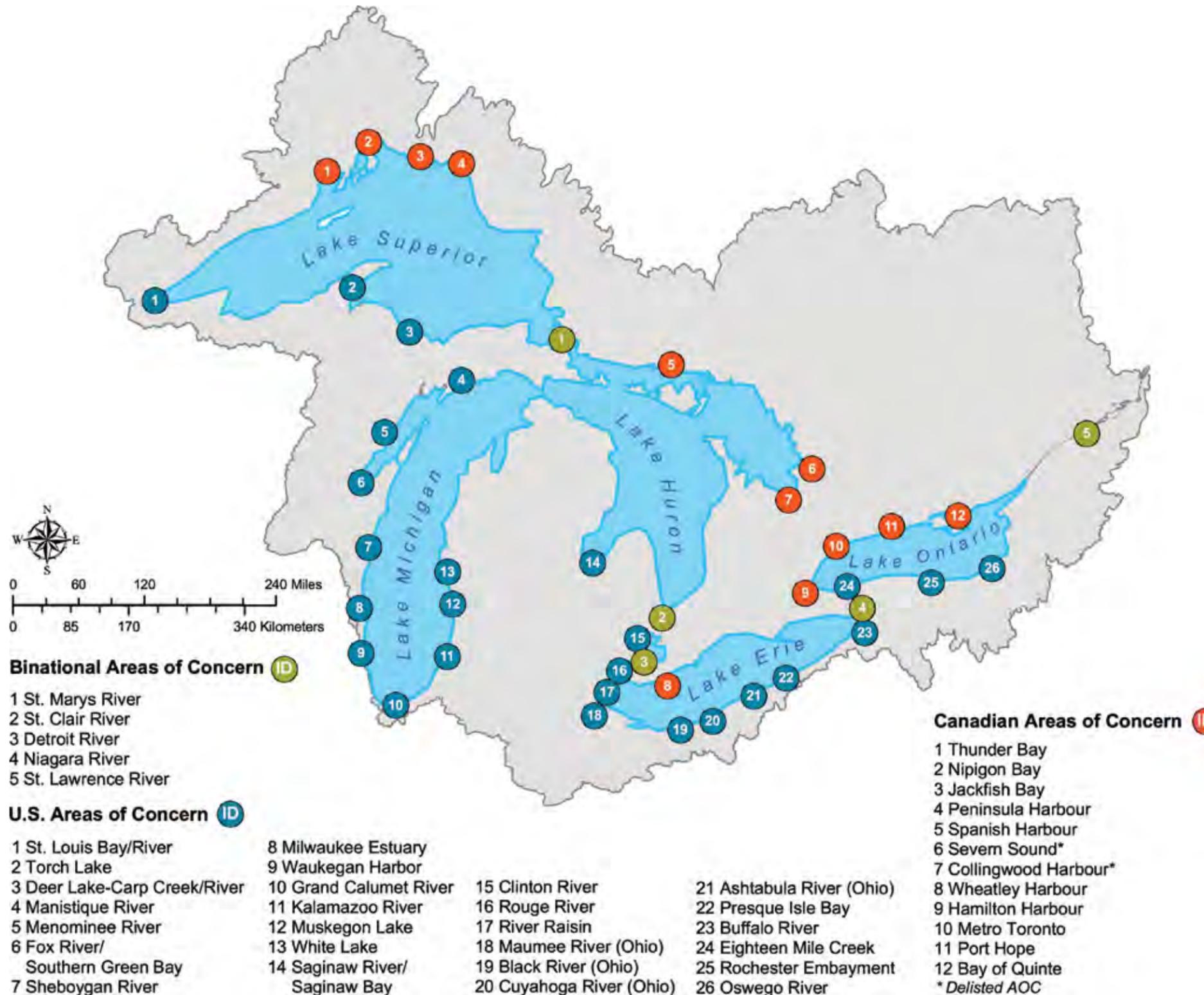
Black River, Lorain



Cuyahoga River, Cleveland



Maumee River, Toledo



Map 9 GIS data citation in Appendices

## Areas of Concern and Remedial Action Plans

**Ohio Coastal Management Program:**  
 “It is the policy of the State of Ohio to coordinate the development and implementation of Remedial Action Plans for Ohio’s four Lake Erie Basin Areas of Concern as identified in the International Joint Commission’s reports on Great Lakes water quality.”

## Areas of Concern

For decades, many of the same river segments were repeatedly identified as the most contaminated tributaries around the Great Lakes. The adoption and implementation of environmental laws and regulations significantly reduced the discharge of pollutants, but these areas continued to experience severe environmental degradation.

In 1974, the Water Quality Board of the International Joint Commission (IJC) began identifying problem areas along the Great Lakes in its reports on Great Lakes water quality. Then in 1985, the IJC Board designated specific locations as Areas of Concern (AOCs) and recommended the development of comprehensive remedial action plans (RAPs) to concentrate on the cleanup and restoration of beneficial uses to these areas. This request became a requirement of the Great Lakes Water Quality Agreement in 1987 and a statutory requirement under the Great Lakes Critical Act amendment 33 U.S. Code 1268 to the 1990 Clean Water Act.

Forty-three Areas of Concern were identified in the Great Lakes Basin: 26 located within the United States; 12 located in Canada; and five shared by both countries as illustrated on this map. Two Canadian locations in the Georgian Bay have been delisted.

# Areas of Concern and Remedial Action Plans

## Remedial Action Plans

Remedial Action Plans are in various stages of development and implementation for each of these Areas of Concern to address impairments to any one of 14 beneficial uses. An impaired beneficial use means a change in the chemical, physical or biological integrity of the Great Lakes system sufficient to cause any of the following:

1. Restrictions on fish and wildlife consumption
2. Tainting of fish and wildlife flavor
3. Degradation of fish and wildlife populations
4. Fish tumors or other deformities
5. Bird or animal deformities or reproduction problems
6. Degradation of benthos
7. Restrictions on dredging activities
8. Eutrophication or undesirable algae
9. Restrictions on drinking water consumption, or taste and odor problems
10. Beach closings
11. Degradation of aesthetics
12. Added costs to agriculture or industry
13. Degradation of phytoplankton and zooplankton populations
14. Loss of fish and wildlife habitat

The Ohio EPA is responsible for the preparation of Remedial Action Plans for Ohio's four Areas of Concern. These areas include the lower Maumee, Black, Cuyahoga and Ashtabula rivers and harbors.

Remedial Action Plans are developed and implemented through an ecosystem based, multi-media approach for assessing and remediating impaired uses. The Remedial Action Plan process is a model of grassroots environmental democracy, stressing empowerment of the affected public within Areas of

Concern. In Ohio, significant local community involvement is critical to the Remedial Action Plan process. The affected community, which is closest to and most directly affected by the resource, in concert with other stakeholders, is empowered to create a future vision for the Area of Concern.

Ohio's Remedial Action Plan development and implementation teams include representatives from local, state and federal government agencies, elected officials, industry and business, nonprof- its, academia and the general public.

Remedial Action Plans are developed in three stages: Stage I identifies and assesses use impairments, and identifies the sources of the stresses from all media in the Area of Concern; Stage II identifies proposed remedial actions and their method of implementation; and Stage III documents evidence that uses have been restored. It is important to note that, in practice, these stages often overlap, and that the Remedial Action Plans often become iterative documents, representing the current state of knowl- edge, planning and remedial activity in the Area of Concern.

Ohio's teams have all completed Stage I Remedial Action Plan reports and are now in various Stage II and III activi- ties. The U.S. Environmental Protection Agency hosts a website for each of the Areas of Concern in the United States with information on Remedial Action Plan progress. Links to the site for Ohio's Areas of Concern are:

Ashtabula River (Ashtabula County) – [www.epa.gov/glnpo/aoc/ashtabula.html](http://www.epa.gov/glnpo/aoc/ashtabula.html)

Black River (Lorain County) – [www.epa.gov/glnpo/aoc/blackriver.html](http://www.epa.gov/glnpo/aoc/blackriver.html)

Cuyahoga River (Cuyahoga County) – [www.epa.gov/glnpo/aoc/cuyahoga.html](http://www.epa.gov/glnpo/aoc/cuyahoga.html)

Maumee River (Lucas County) – [www.epa.gov/glnpo/aoc/maumee.html](http://www.epa.gov/glnpo/aoc/maumee.html)

It is important to note that solu- tions for problems in Areas of Concern and other local, geographically focused efforts do not fall into the "one size fits all" category. Each of these areas will have a unique blend of circumstances and solutions based upon the complexi- ties of the issues that must be addressed. The success of the Remedial Action Plans will ultimately be measured by the degree to which all beneficial uses in the Area of Concern are restored and protected. Progress is celebrated with the completion of each of the individual implementation projects.

### Sources:

U.S. EPA – [www.epa.gov/glnpo/aoc/rap.html](http://www.epa.gov/glnpo/aoc/rap.html) and [www.epa.gov/glnpo/aoc/index.html](http://www.epa.gov/glnpo/aoc/index.html)

Ohio Coastal Management Program Document

International Joint Commission's *Special Status Report of Restoration Activities in Great Lakes Areas of Concern (2003)* [www.ijc.org](http://www.ijc.org)

Ohio EPA's *Delisting Targets for Ohio's Areas of Concern (2005)* [epa.state.oh.us/dsw/rap/DelistingTargetsOhioAOC\\_Final\\_June20-2005.pdf](http://epa.state.oh.us/dsw/rap/DelistingTargetsOhioAOC_Final_June20-2005.pdf)

Environment Canada [www.on.ec.gc.ca/water/raps/intro\\_e.html](http://www.on.ec.gc.ca/water/raps/intro_e.html)

## Special Management Areas

The Ohio Coastal Management Program recognizes various coastal areas for the special conditions that exist in these natural resource sites. Some of these are site specific others are broad groups of coastal areas facing similar problems for which general use priorities can be devised.

The table on this page organizes the Special Management Areas recognized in Part II Chapter 6 of the Ohio Coastal Management Program document.

**Special Management Area (SMA)** designation provides the basis for prioritizing local, state and federal government actions concerning the special needs of certain areas.

**Areas of Particular Concern (APC)** designations are areas for which the Ohio Coastal Management Program provides for the establishment of use priorities for a broad range of similar or generic areas. Specific sites may also be designated as APCs, but all initial Ohio Coastal Management Program designated areas are generic.

**Area for Preservation and Restoration (APR)** designation is used for specific sites requiring aggressive management to preserve or restore their conservation, historical, recreational, ecological or aesthetic values. Federal funds available pursuant to the Coastal Zone Management Act may be used for construction, restoration or acquisition purposes for designated APRs.



Dupont Marsh State Nature Preserve, Erie County

### Special Management Areas (SMA)

Areas of Particular Concern (APC)		Areas for Preservation and Restoration (APR)
Specific	Generic	Site Specific
	Critical Fish Habitat (Policy 27)	Dupont Marsh State Nature Preserve, Erie County
	Ports and Harbors	Headlands Dunes State Nature Preserve, Lake County
	State Nature Preserves and Wildlife Areas (Policies 13, 14 and Fish and Wildlife Management)	Old Woman Creek National Estuarine Research Reserve and State Nature Preserve, Erie County
	Coastal Erosion and Flood Hazard Areas (Policies on Coastal Erosion and Flooding)	Lakeside Daisy - Collen "Casidy" Taylor and Ruth E. Fiscus - State Nature Preserve, Ottawa County
	Public Parks and Access Areas (Policies 21, 22 and 23)	Mentor Marsh State Nature Preserve, Lake County
	Wetlands (Policy 12)	Sheldon Marsh State Nature Preserve, Erie County
	Historic and Archaeological Sites (Policy 26)	Lorain Harbor Breakwater Lighthouse, Lorain County
	Areas of Concern (Policy 16)	