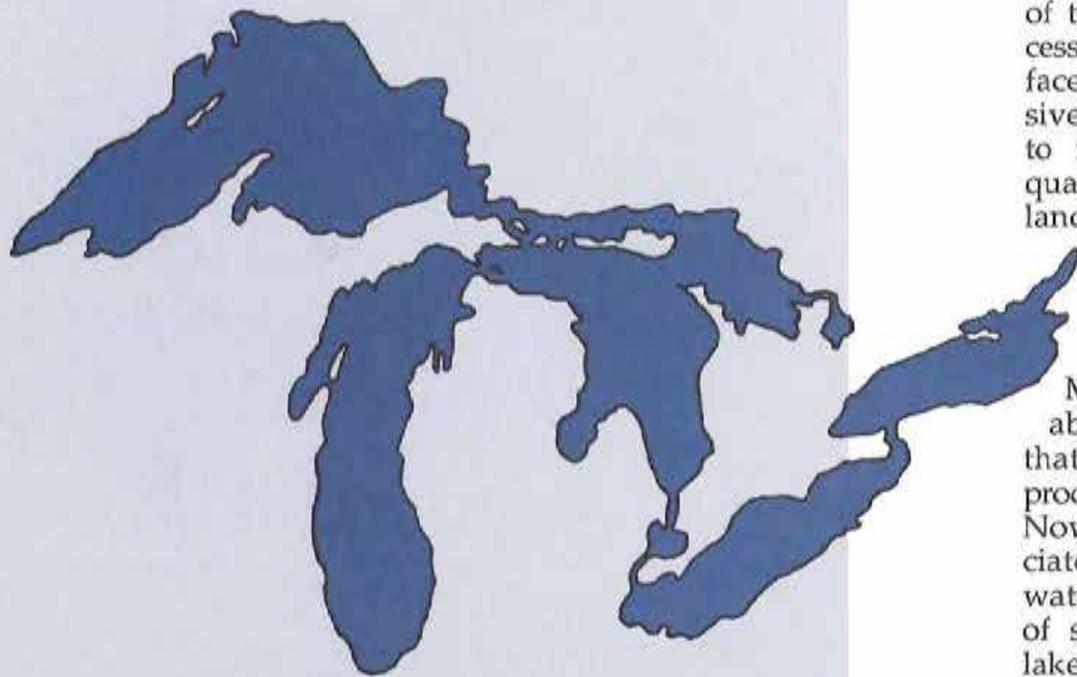
A scenic sunset over a lake. The sky is a gradient of orange and yellow. In the foreground, a dark silhouette of a beach curves along the water's edge. Several people are standing on the beach, their forms silhouetted against the bright water. In the distance, a small boat is visible on the water, and a dark landmass or hill is on the horizon.

# Celebrate The Great Lakes!

State of the  
Great Lakes  
1988-89

# State of the Great Lakes

Annual Report  
for 1988-89



## A Message

Welcome to a celebration.

This year, I invite you to join with me to *Celebrate the Great Lakes!* In past years, State of the Great Lakes reports have outlined some of the major challenges we successfully tackled and those we still face. We have profiled progressive state and regional programs to improve Great Lakes water quality, manage fragile shoreland resources, and ensure a

healthy and productive sport fishery.

As Governor, I have deeply enjoyed working with Michigan citizens who care about the Great Lakes to ensure that the lakes remain healthy and productive for generations to come. Now it is time to pause and appreciate the lakes. Sparkling blue waters, rolling sand dunes, miles of sandy beaches and pebbled lakeshore, and year-round sport fishing are some of the treasures you can find in and around the Great Lakes.

Over the years, we have learned that Great Lakes protection is not a luxury, but the foundation of Michigan's future. The health and vitality of the lakes ensures that our state is a great place for people to live, play, and do business. Our investment in the Great Lakes has paid off with a \$15 billion tourism industry, clean water and land for industry, a drinking water supply for half of Michigan's residents, and 120 miles of state park shoreline open to the public. We can maintain these benefits only if we are willing to invest in protecting the lakes for the future.

Prepared by  
The Office of the Great Lakes  
Michigan Department of Natural Resources  
Pursuant to Public Act 128 of 1985  
for Governor James J. Blanchard.

# from the Governor

During 1988, we made several major investments in our future. We completed and moved toward implementation of clean up plans for Great Lakes pollution hotspots and made significant progress in implementing regional agreements to control toxics pollution and enhance emergency response to spills. We acquired ownership to nearly 150 Great Lakes islands--an investment that will be enjoyed by our grandchildren and their grandchildren. In addition, we have developed a new funding mechanism for recreational boating facilities, the benefits of which will be felt along the shoreline for years to come.

In the summer of 1988, we were faced with one of the greatest threats ever to the long-term integrity of the lakes--water diversion. When Illinois' Governor James Thompson proposed to divert Lake Michigan water to the Mississippi River to ease commercial shipping problems caused by the summer's drought, I quickly stepped forward in opposition. While sympathetic to the impact of the drought on other states, I rejected Great Lakes diversion because it was a dubious solution that appeared to have few benefits, but great risks for the resource. With assistance from Attorney General Frank Kelley and staff from the Department of Natural Resources, we carefully outlined reasons for Michigan's long-standing opposition to diversion. The proposal was not only inconsistent with the Great Lakes Charter, but it threatened the Great Lakes ecosystem and the critical need for Great Lakes water within the Basin. The request for diversion was eventually denied. But this is not the last time we will have to protect this valuable resource against such short-sighted proposals.

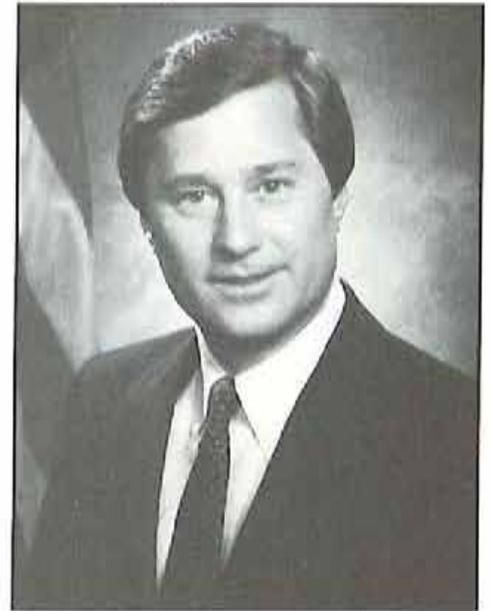
One of the most significant investments we made in 1988 was the Quality of Life Bond proposal. By an overwhelming margin, Michigan voters approved \$800 million in bonds for environmental protection and recreational development so that our future can be cleaner, healthier and more productive. Of this \$800 million, \$25 million will be used to establish the Great Lakes Protection Fund. In February 1988, I joined with the other Great Lakes governors to begin development of this permanent endowment for Great Lakes protection and research. This is a unique fund. I thank the voters of Michigan who had the foresight to support the fund through Proposal C. Year after year, earnings from the fund will be available for state and regional clean up and applied research projects. In 1989, we will seek final authority for Michigan to participate in this regional initiative.

The Great Lakes Protection Fund is one of several issues that will require our attention in the coming months. As we *Celebrate the Great Lakes!*--and take time to enjoy their great beauty and splendor--we should continue to work for a better future. The next few years offer a wealth of opportunities for enhanced Great Lakes protection and management--opportunities that, once realized, will allow future generations to *Celebrate the Great Lakes!* as well.

*James J. Blanchard*

*As Governor of Michigan  
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Now it is time to  
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James J. Blanchard,  
Governor



# Introduction

## *Enjoying the Bounty*

*"A lake is  
the landscape's  
most beautiful  
and expressive  
feature.  
It is the soul's eye,  
looking into  
which the  
 beholder measures  
the depth  
of his own nature."*

Henry David Thoreau

In our modern world--where movies and television can transport us to the farthest reaches of the earth, where computers can ask questions and solve problems, where unmanned spaceships can orbit the planet--very little seems impressive or awe-inspiring. It takes grander and grander things to grab our attention, turn our heads, or take our breath away.

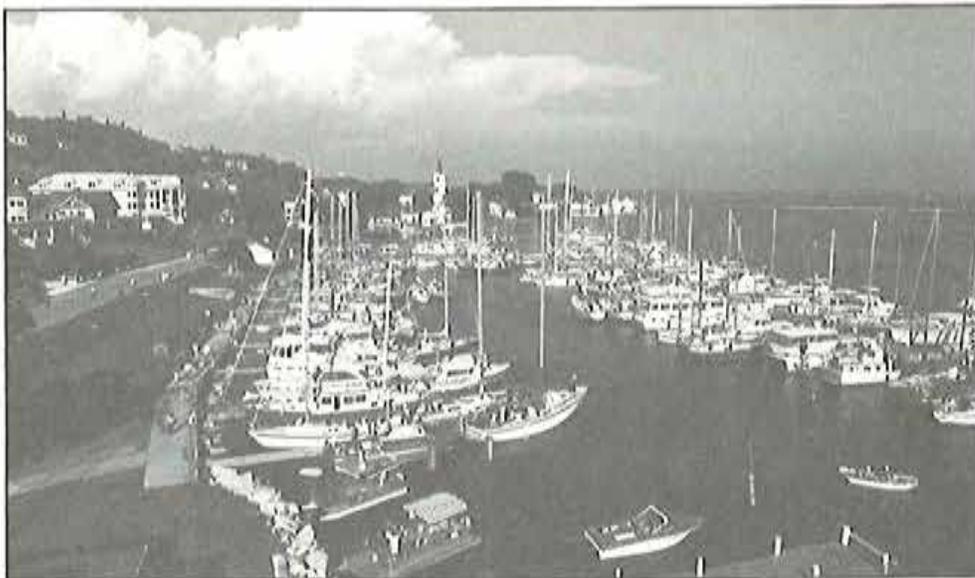
Yet, each time we stand on the shores of the Great Lakes, created well over 12,000 years ago, we are truly inspired. To see the sun shimmering on the water like diamonds, to feel the cool mist against our skin, or to hear the waves crash violently against the shore, is to enjoy a timeless experience, one which was the same for the first humans who saw the lakes. It is an experience we must preserve for all our children.

Seventy percent of our world is covered with water, yet only three percent is fresh water. Of that three percent, one fifth--over six quadrillion gallons of water--is contained in the Great Lakes. Their collective shorelines equal half the circumference of the earth; and their basins support one-fifth of U.S. industry. If the waters were spread

evenly across the continental United States, the Great Lakes would submerge the entire country in up to twelve feet of water. No technology or industry ever could or will create something so spectacular.

No matter where you go in Michigan you will never be more than 84 miles from a Great Lake. They affect our lives in countless ways, yet we often seem to take for granted these immense bodies of water. The lakes have lapped at their shorelines for thousands of years--providing huge portions of two countries with drinking water, endless recreational opportunities, transportation routes, and electrical power--yet we tend to forget how rare and unusual they are.

This year, the Department of Natural Resources and the Office of the Great Lakes would like to invite you to join in celebrating these inland seas. We will take you on a tour of each body of water, sharing with you some of the features that set these lakes apart from all others on earth. And along the way, we will explore the many reasons to "Celebrate the Great Lakes," in particular their outstanding recreation and tourism opportunities.



# *of Michigan's Great Lakes*

As we celebrate the Great Lakes, we must keep in mind that our behavior can significantly affect their health; they are a precious trust, resilient but not impervious to human ignorance and insult. The U.S.-Canadian International Joint Commission has identified 42 areas on the Great Lakes as pollution hotspots. These areas have been harmed by pollution and we can no longer enjoy them as generations before us did. Evidence of adverse impacts from toxic fallout mounts. The silly and unnecessary threat of winter navigation refuses to go away. Irresponsible and short-sighted calls for considering diversion continue. Sand dunes and wetlands along the Great Lakes shores are being destroyed by mining, draining, and improper use.

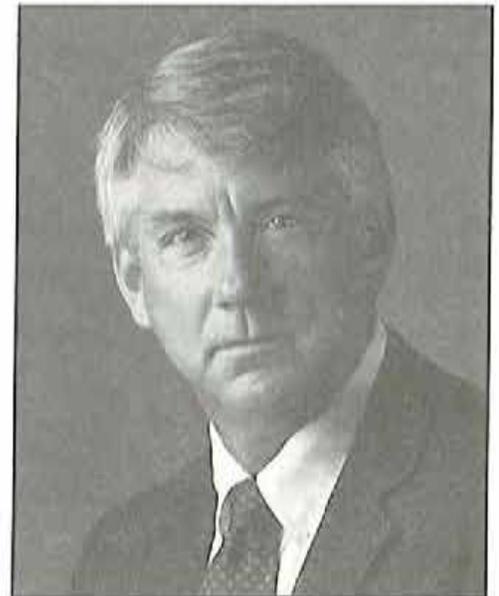
Our celebration this year must include a renewed vigilance against these threats and a strong commitment to preserving and protecting these spectacular natural features. I would be honored to have you join us in this adventure.

David F. Hales



Director

Department of Natural Resources



# Great Lakes Basin



Minnesota

Lake Superior

Michigan

Wisconsin

Michigan

Muskegon

Bay City

St. Clair Sho

Detroit

Lake Michigan

Illinois

Indiana

## Characteristics

**Volume:** 6 quadrillion gallons of fresh-water; one-fifth of the world's fresh surface water. Spread evenly across the continental United States, the Great Lakes would submerge the country under nine to twelve feet of water.

**Total Area:** Over 94,000 square miles (more than the states of New York, New Jersey, Connecticut, Rhode Island, Massachusetts, Vermont, and New Hampshire).

**Total Coast:** U.S. and Canada - 9,400 miles. U.S. coastline alone, 4,503 miles, longer than the U.S. Atlantic and Gulf of Mexico coasts combined; Michigan's Great Lakes coast totals 3,200 miles, more than the coastline of any state but Alaska.

## Great Lakes

Lake Superior has the largest surface area of any fresh water lake in the world. Lake Huron, the second largest of the Great Lakes, is the fifth largest lake in the world. Lake Michigan, the only Great Lake wholly within the U. S., is the world's sixth largest lake. Lake Erie, the eleventh largest lake in the world, has the second most productive fishery in the Great Lakes. Lake Ontario, the only Great Lake which does not touch the shores of Michigan, is the smallest of the system. Together, the Great Lakes cover an area equal to Scandinavia. The lakes look and behave much like oceans, thus their nickname, "the inland seas."

| Key   |                         |
|-------|-------------------------|
| ..... | International Border    |
| ----- | State/Provincial Border |
| ..... | Basin Boundaries        |



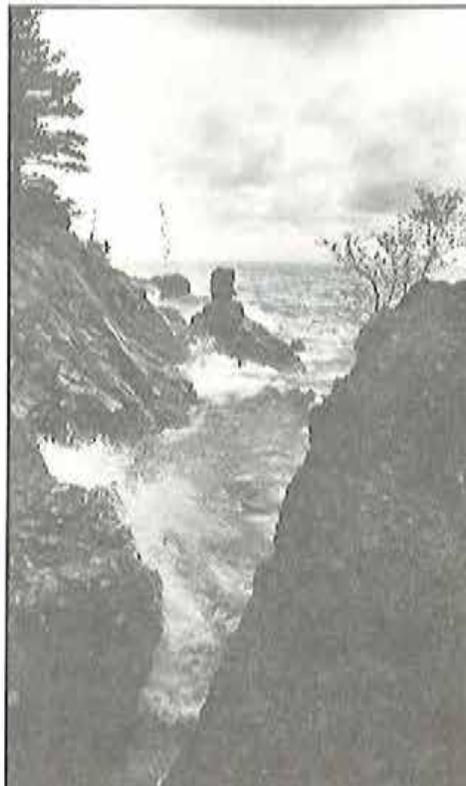
# Lake Superior



Throughout history, the largest of the five Great Lakes has been called by many names. The early French explorers dubbed it Le Lac Supérieur, meaning the uppermost or most northern body of water in the system; the Chippewa Indians christened it Kitchigammi, the big lake; and Longfellow immortalized the name Gitchee Gummee, meaning the big sea water. It also has been called the Grand Lac, Lac Tracy, Lac Conde', and Mer Douce du Nord. But the name it carries today--Lake Superior, meaning the lake above all others--is by far the most fitting. In so many ways Superior truly is exceptional, unequaled not only in surface area but also in rustic beauty.

The Lake Superior basin is richly blessed with natural resources, most of which have been exploited by humans at one time or another throughout history. In the mid-1700s the resource of choice was fur, particularly beaver pelts. After fur trading came lumbering and a few years after lumbering was under way (but before the famed California Gold Rush), the mining boom began in the Lake Superior region. Settlers discovered that the land on the edge of the great inland sea was rich with copper and iron deposits. Mining is still a viable activity today. There is a working mine at White Pine near the base of the Keweenaw Peninsula, and the Mesabi Range in Minnesota continues to produce iron ore in great quantities. Today, the Lake Superior basin provides the nation with 80 percent of its iron ore and is a large producer of pulp, paper, firewood, and board.

This grand lake is bordered by three states, two nations, and some of the country's loveliest cities--Silver Bay and Duluth in Minnesota; Superior and Ashland in Wisconsin; and Marquette, Munising and Sault Ste. Marie in Michigan are just a few examples.

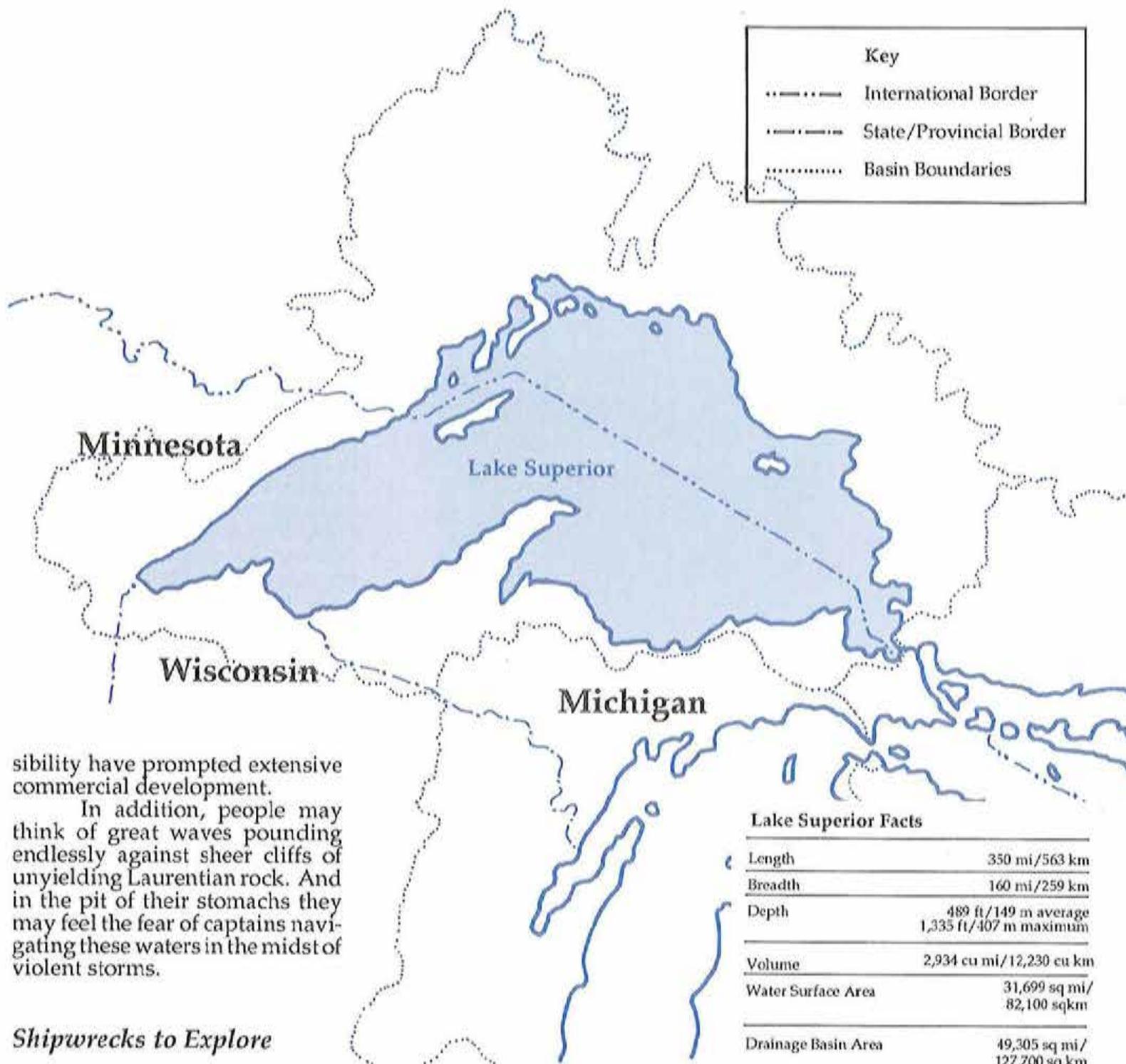


*Lake Superior's Canadian north shore is the most rugged and spectacular coast on the Great Lakes. Sheer cliffs plunge abruptly to the water, and the northern tributaries find their way to the lake through steep and wooded ravines. Waves of crystal clear water sweep past fantastically shaped offshore boulders and crash against the shore, much of which is inaccessible and remains absolutely untouched.*

Jonathon Ela,  
*The Faces of  
the Great Lakes*

## *A Lake of Many Images*

When someone says Lake Superior, a number of images immediately may come to mind. For example, most people picture an immense expanse of deep blue water extending as far as the eye can see. People also imagine a place so remote and rustic that only the ardent explorer would willingly venture there. Visions of impenetrable forests, enormous boulders left by the last receding glacier, and unpredictable, frigid waters also form readily in the mind's eye. It is a picture quite different from that of the other Great Lakes, where more moderate temperatures and easy acces-



sibility have prompted extensive commercial development.

In addition, people may think of great waves pounding endlessly against sheer cliffs of unyielding Laurentian rock. And in the pit of their stomachs they may feel the fear of captains navigating these waters in the midst of violent storms.

### *Shipwrecks to Explore*

Lake Superior's treacherous waves deserve to be treated with the utmost respect, for more ships have gone down in the icy waters of Lake Superior than in any of the other Great Lakes. This grim history of shipwrecks has been captured in Gordon Lightfoot's haunting song, "The Edmund Fitzgerald," and can be experienced keenly today at one of Superior's most extraordinary sites--Whitefish Point--better known to sailors as the "graveyard of the Great Lakes." Here, it is said, more than 300 ships have been lost in raging Superior storms, and countless sailors have surrendered their lives to the powerful inland sea.

These wrecks have been preserved by the state for divers and historians to investigate. At both Whitefish Point State Bottomland Preserve and Alger State Bottomland Preserve at Munising, people can

### **Lake Superior Facts**

|                     |  |
|---------------------|--|
| Length              | 350 mi/563 km                                  |
| Breadth             | 160 mi/259 km                                  |
| Depth               | 489 ft/149 m average<br>1,335 ft/407 m maximum |
| Volume              | 2,934 cu mi/12,230 cu km                       |
| Water Surface Area  | 31,699 sq mi/<br>82,100 sq km                  |
| Drainage Basin Area | 49,305 sq mi/<br>127,700 sq km                 |
| Shoreline Length    | 2,980 mi/4,795 km<br>(includes islands)        |
| Elevation           | 600 ft/183 m                                   |
| Outlet              | St. Mary's River to Lake Huron                 |
| Detention Time      | 191 years                                      |
| Population          | 147,000 (Canada)<br>538,000 (U.S.)             |

## Coastal Lakes Great Lakes Connections

*Most of us think of two kinds of lakes in Michigan. First there are inland lakes scattered all around the "mitten." Then there are the Great Lakes. But there is a third kind of lake--coastal lakes. Coastal lakes are connected to the Great Lakes. Because of this they share a lot with the Great Lakes-- good fishing, pretty beaches and unique vistas.*

*One of the more interesting coastal lakes, Portage Lake in the Keweenaw Peninsula, is in Lake Superior. Portage Lake owes its Great Lakes connection to the human-made Keweenaw ship canal. The 22 mile long canal was dredged to give safe passage to Great Lakes freighters. By passing through the canal, ships could avoid going around the Keweenaw Peninsula, one of the most treacherous spots in the Great Lakes during a storm.*

*Although not used much these days as a commercial waterway, the canal and Portage Lake are a prime Great Lakes recreation spot. There are two public harbors, at the cities of Houghton and Hancock. In fact, many public harbors are located in coastal lakes because they are protected from the rough wave action of the Great Lakes, providing recreational boaters a calm, safe place to stay the night. For more timid boaters, coastal lakes offer the chance to "wet their bows" before venturing out into the big lake. While others may opt to stay within the safety of the coastal lake, with the added satisfaction of knowing that a Great Lake is right next door.*



penetrate the frosty waters of Lake Superior and examine many sunken vessels as well as the geologic formations. For those who are not divers, the shipwrecks can be studied at any one of the popular maritime museums scattered plentifully around the shores of Lake Superior.

### *Rugged Shoreline to Enjoy from National and State Parks*

Seven state parks sit along the Lake Superior shore. The Porcupine Mountains Wilderness State Park borrowed its name from the highest mountain range in the Middle Western United States--nicknamed the "Porkies." This park offers a system of foot trails that can be enjoyed in a day's outing or for several days by settling into rustic trailside cabins for a night's rest. In addition to hiking, the "Porkies" state park has excellent hunting and fishing, downhill skiing and scenic locations for camping and picnicking, including several miles of rugged Lake Superior shoreline.

At the tip of the Keweenaw Peninsula is Fort Wilkins State Park, situated in the famous "Copper Country" of Michigan. History is alive here, with well-preserved remains of an old Army outpost, and living history programs given through the summer months.

Home to one of the nation's most beautiful waterfalls, the Tahquamenon Falls State Park covers 35,870 acres including the upper and lower falls and the Tahquamenon River down to its mouth, where it feeds into Whitefish Bay. If the scenic wonder of the Falls is not enough, this park also provides for fishing, hunting, rustic and modern camping, swimming and boating.

Other Lake Superior state parks include F. J. McLain State Park in Houghton County, which includes frontage on both the Great

Lakes and Bear Lake; Muskallonge State Park, a scenic and natural area along the shores of Lake Superior and Muskallonge Lake; Baraga State Park, a pleasant place to enjoy camping and fishing; and Brimley State Park along Whitefish Bay.

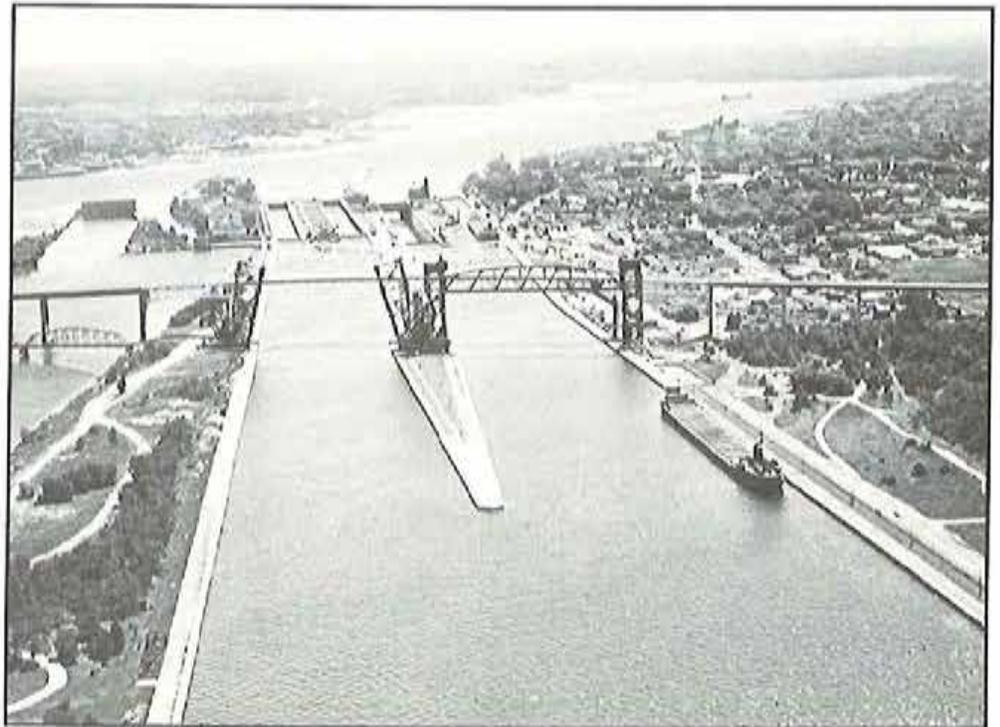
The Lake Superior region also hosts two of the three national parks located in Michigan--Pictured Rocks National Lakeshore and Isle Royale National Park. The former offers a series of sand and gravel beaches, towering dunes, stunning waterfalls, and dense forests, but it is best known for the 200-foot cliffs painted by nature with a variety of blazing colors. These cliffs have been sculpted by the wind and water into caves, arches, and unusual offshore formations that, with some imagination, resemble castles and fortresses. In the midst of these enchanting natural creations, Pictured Rocks provides endless opportunities in the summer for camping, hiking, boating, sightseeing, swimming, and picnicking; in the winter there is cross-country skiing, snowshoeing, and ice fishing.

Isle Royale, which is Michigan's oldest national park, can be reached only by floatplane or boat. This secluded island on the icy waters just off the shore of Canada is home to a resident population of the endangered eastern timber wolf as well as a herd of moose. This is an ideal place for backpackers and boaters or those who simply wish to be alone. More than 175 miles of foot trails meander over rocky terrain and through towering forests, and there are numerous launching sites from which to set sail on the open waters of the great inland sea. It is a rare treat to visit this out-of-the-way island.

### *A Gateway to the World--The Soo Locks*

Lake Superior funnels down through Whitefish Bay and into the St. Marys River, toward the one location where humans control its unpredictable activity--the Soo Locks. Here, a complicated series of gates and chutes divide the waters of the St. Marys rapids and shuttle portions through five locks, a midriver control dam, and three power plants.

The importance of the Soo Locks to the surrounding area and the shipping industry is undisputable. The ships that carry precious cargo to and from ports throughout the country cannot traverse the St. Marys rapids, so the locks control the level and flow of the water to allow safe passage through the area. The complex system also allows Superior's furious waters to be harnessed and turned into electricity. Furthermore, the site is of great historical significance to the state. Sault Ste. Marie was Michigan's first permanent settlement, and at nearby Fort Brady, General Lewis Cass took down the last British flag to fly over U.S. soil.

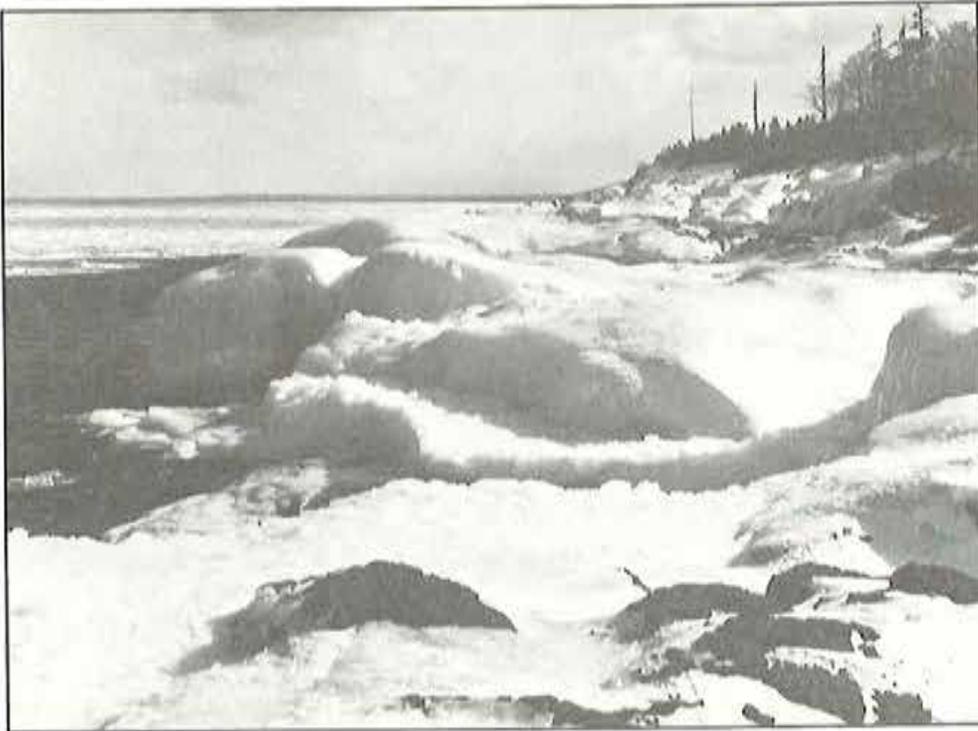


## *A Fishing Smorgasbord*

In addition to its rich history, Sault Ste. Marie offers an ideal place for anglers to test their wit against feisty freshwater fish. A diversity of sport fish is available to them, including smallmouth bass, lake and brown trout, chinook and coho salmon, steelhead, splake, and menominee. Anglers also will want to test the waters in the northwestern portion of Lake Superior, where they will find salmon as well as brook, rainbow, and lake trout. It is interesting to note that Superior is home to the only remnant population of native lake trout left in the Great Lakes. The "fats," as they often are called, are found off Stannard Rock and comprise a unique reminder of Lake Superior's heritage.

## *Lake Superior in the Future*

Because of its remoteness it is difficult to think of this lake having a pollution problem. Yet, pollution has reached Lake Superior from a source we are just recently beginning to understand--the atmosphere. A majority of toxic pollutants in Lake Superior come from airborne sources. As toxics enter the ecosystem, they pose a threat to the health and productivity of fish and wildlife. Fish consumption advisories have been in place for Lake Superior for several years. Restoring this prime recreation and environmental resource--and keeping it clean--will require additional research and monitoring so that the transport of airborne pollutants can be controlled.



## *Lake Superior Review Day*

In August 1988, the Office of the Great Lakes sponsored Lake Superior Review Day, one of four informal conferences that provided a festive atmosphere for people around the state to learn about and discuss the many positive Great Lakes projects and programs underway, as well as the challenges yet to be faced. Lake Superior Review Day was held in Sault Ste. Marie so that people and programs from both Canada and the United States could be involved. Michigan Natural Resources Commissioner David Olson started the day with a moving, personal account of what Lake Superior meant to him. People learned about the outstanding recreational and tourism opportunities on Lake Superior through presentations on the many beautiful state and national parks along Lake Superior's shore, the diverse fishery, the Island Water Trail, the mystery and excitement of shipwrecks and underwater preserves, and the Lake Superior Circle Tour. Management issues such as helping the endangered piping plover, controlling sea lamprey, and drafting cleanup plans were also presented.

Many challenges and opportunities were identified during public discussion that followed the presentations. People stated their concern over pollution in Lake Superior and the St. Marys River and voiced support for efforts to improve water quality and prevent future pollution. Support for work on air toxics and acid rain was highlighted. Local residents from Whitefish Bay discussed the problems they encountered during the 1986 high water levels, and spoke out against any efforts to "store" water in Lake Superior, as a means to control fluctuating water levels as some groups have proposed in the past. Water quality problems in Lake George--part of the St. Marys River system--were described in detail. Some of the people attending noted the problems with lack of funding and suggested a special tax on all uses of the Great Lakes to support the International Joint Commission in its efforts to protect the Lakes. Finally, the day ended with a discussion on the importance of environmental quality to the Upper Peninsula's tourism industry. Keeping Lake Superior healthy and beautiful was a priority for all who attended.

# Lake Michigan



*Nearly the entire eastern coast of the lake consists of sand which forms dunes, banks, ridges, and beaches. The beaches border water that, while not quite as clear as that of Georgian Bay, has the turquoise iridescence usually associated with the Caribbean, a brilliance of hue not found elsewhere on the Lakes. At some places the sands roll back from the water's edge, while in others the dunes perch on top of high banks composed of glacial till.*

Jonathon Ela,  
*Faces of the Great Lakes*

Lake Michigan, the only Great Lake to fall completely within the borders of the United States, is commonly referred to as Huron's twin, and for good reason. Joined by the Straits of Mackinac, the two lakes are exactly level, almost identical in size (although Michigan is slightly smaller in surface area), and share many similar characteristics.

For example, both lakes Michigan and Huron have miles of beautiful sandy beaches; quiet little resort towns rich with history; splendid, well-kept parks; scores of forests thick with trees that shield the forest floor from the blistering sun; and cool water sweet enough to drink and clear enough to view the underwater world.

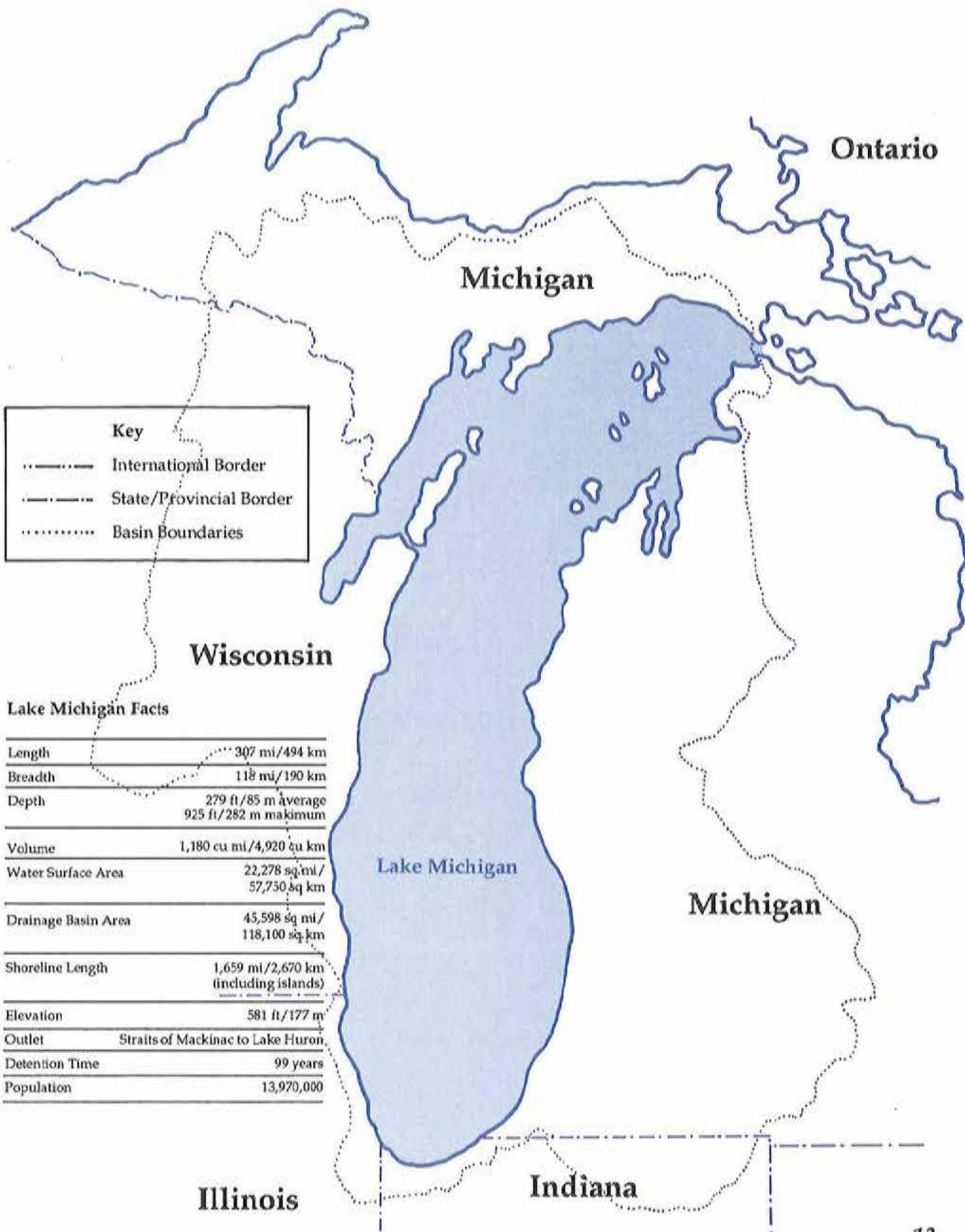
The two lakes even share a similar history; both were discovered accidentally in the early 1600s by French explorers in search of the great waterway that would lead them to eastern Asia. Once these adventurers (Samuel de Champlain on Huron and Jean Nicolet on Michigan) learned that the freshwater seas were not the passageways of which they had once dreamed, the exploration of both lakes was immediately discontinued. Not until many years later did people begin to learn about and appreciate the tremendous resources the Frenchmen had discovered.

But that is where the similarities between the two lakes end; Michigan is more intensively used than Huron or any of the other Great Lakes. It is bordered by four states--Wisconsin, Illinois, Indiana, and Michigan--all of which depend on it for drinking water, industry transportation, recreation, and a host of other uses.

In the north the Lake Michigan drainage basin is heavily forested and sparsely settled; in the south it is heavily populated, highly industrialized, and rich in agricultural land. The Lake Michigan basin produces 38 percent of the country's steel and 17 percent of its paper. A major shipping route for iron ore, coal, steel, and grain, Lake Michigan hosts many ports and industrial centers, such as Milwaukee, Wisconsin; Chicago, Illinois; and Gary, Indiana.

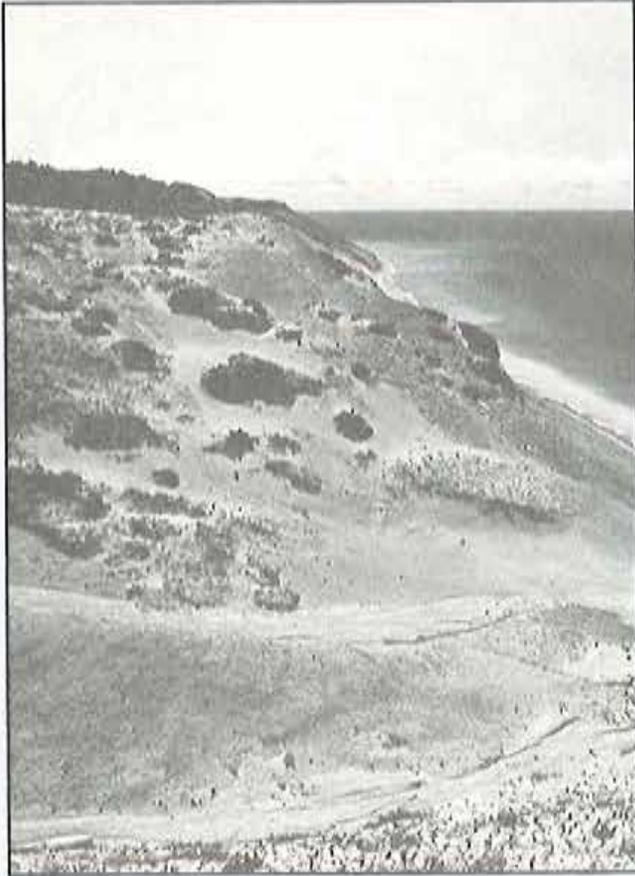
## *Michigan's "Fruitbasket"*

Several factors have combined to make the Lake Michigan Area the third largest producer of wine in the United States-- after California and New York--and one of the country's leading growers of fruit. One factor is the lake's location on the western side of the state, where it is powerful enough to buffer the land from the fierce winter storms that sweep across the Great Plains. Conversely, the lake is a cooling agent in summer, keeping temperatures at moderate levels. These features, plus the rich light soil in the Lake Michigan basin, create excellent conditions for orchards and vineyards along the western side of the Lower Peninsula. This fact is not lost on tourists, who travel each summer to



## Great Lakes Islands

*Sprinkled throughout the Great Lakes are thousands of islands. Each island is a miniature ecosystem. Some islands are weathered boulders barely breaking the surface of the water. Others are tree-studded homes to hundreds of herons, shorebirds, ducks, geese, animals, wild flowers, shrubs, and trees. Each is unique, a world of its own, in need of wise management and use.*



*Very little is known about Great Lakes islands. Nobody knows how many there are. We do know there are more than 30,000 in Lake Huron alone. Only a small percentage have been surveyed. People live on some of them. Most are uninhabited. Some are home to endangered species. Some hold archaeological treasures. Some are fertile ground for scientific investigations into*

*the origin, evolution, and extinction of plant and animal species. Some-- such as Lake Michigan's North and South Manitou Islands--are recreational delights.*

*For most of us, Great Lakes islands are mysterious, magical places we visit only in our thoughts. And yet just knowing they exist makes the Great Lakes even more special.*

enjoy the savory fruit produced here and tour the numerous vineyards to sample award-winning Michigan wines.

## *Sandy Beaches and Dunes*

Vacationers come, and continue to come, to Lake Michigan for many reasons. First and foremost, the lake that stretches lazily along the western shore of Michigan is home to the world's largest assemblage of sand dunes on any body of fresh water. The towering mountains of sand start at Warren Dunes State Park just north of the Indiana border and line the lake all the way up to the Straits of Mackinac.

Within that chain, there are dunes to suit even the most discriminating vacationer. Those on South Manitou Island are extremely remote and will appeal to the tourist seeking solitude amid some of nature's awe-inspiring creations. (The island also is home to the spectacular Valley of the Giants, Michigan's oldest forest of northern white cedar.)

The naturalist will be drawn to the Nordhouse Dunes,



within the Manistee National Forest, where the dunes have been left in their natural state. This is the only wilderness area on federal land in the lower peninsula. The adventurous undoubtedly will want to visit the dunes between Lake Michigan and Silver Lake, which is the only place dirt bikes, trail jeeps, and other off-road vehicles are permitted to climb the great walls of open sand. But those in search of the extraordinary should travel to Sleeping Bear Dunes National Lakeshore, to scale the most famous freshwater dunes in the United States.

Although the Lake Michigan dunes are vitally important to the tourism industry, they also must be respected as a very fragile component of a unique ecosystem that extends inland through grassy plains and groves of oak, maple, and white pine. Increased development in and around fragile dune areas is threatening this unique and valuable resource. Without improved programs to protect critical sand dune areas, we could damage one of Michigan's most impressive features. It is hoped that much needed sand dune legislation will be passed in 1989.

### *An Angler's Paradise*

Another noted feature of Lake Michigan is its great sport fishery, the largest of any Great Lake. Lake Michigan is stocked plentifully with chinook and coho salmon, brown, rainbow, and lake trout, and a thriving population of northern pike, walleye, bass, whitefish, and perch. In the spring anglers bring their nets to engage in the annual nighttime ritual of dipping smelt; the ceremony is conducted by moonlight (or, in its absence, kerosene lanterns and roaring beach fires) in the shallower waters along the shore wherever a stream or river enters the lake. It is interesting to note that sportfishing on Lake Michigan generated about \$326 million in revenue in 1985.



### *Enjoying the Lake from Harbors and Parks*

A picture of Lake Michigan will usually include brilliantly colored boats bobbing on the waves or resting quietly in a harbor. Michigan has more registered watercraft than any other state in the nation. In 1985 recreational boating generated more than \$4 billion in revenue for Michigan.

Federal, state and local governments have joined to develop 28 protective harbors along the shores of Lake Michigan. A total of 68 harbors have been built along the Great Lakes to provide refuge for boats of all sizes--from small fishing boats to luxurious cabin cruisers and sailboats. These harbors are not only the summer vacation spots for many Michigan boaters, they are magnets for visitors to Lake Michigan harbor communities. Residents and visitors to Petoskey, Suttons Bay, Ludington, Saugatuck, South Haven, and the other Lake Michigan

harbor communities, might spend a lazy summer afternoon walking the docks, talking with visitors from across the country, and possibly imagining what it would be like to live on the water and "get away from it all."

Lake Michigan also boasts an outstanding assortment of state parks, 20 in all. Most visitors to Lake Michigan state parks spend their days sunning, swimming and beachcombing. But one of Lake Michigan's lesser known parks offers some more unusual recreational opportunities. In the Upper Peninsula, along Lake Michigan's northern shore, Fayette State Park is the home to the state's premier ghost town featuring an old hotel, iron smelter and visitor center.

Several Lake Michigan state parks also contain designated "natural areas," where special natural communities are protected for generations to come. Adjacent to the natural area at P. J. Hoffmaster State Park is a sand dune interpretive center. Exhibits at the center and signed trails and boardwalks through the natural area allow the visitor to learn more about dunes as special plant and wildlife habitat.

A different type of state park can be found offshore of the Sleeping Bear Dunes National Lakeshore. The Manitou Passage State Bottomland Preserve was established to protect the many shipwrecks in this area. The Manitou Passage is the permanent home to vessels that sank or ran aground while taking a "shortcut" between the Manitou Islands and the mainland. Maritime history can also be enjoyed by the landlubber at museums and interpretive programs at several shoreline communities.

### *Pollution Problems that Need Special Attention*

Unfortunately, being synonymous with tourism, being highly industrialized, and having rich agricultural lands is not always a blessing. Because of its heavy use and extensive development, Lake Michigan is prone to serious environmental damage. Of the 42 Areas of Concern (or hot spots) on the Great Lakes, identified by the International Joint Commission, 10 of these are in the Lake Michigan region, more than in any of the other basins. The problems, which range from conventional pollutants to the presence of heavy metals, toxic organics, and contaminated sediments, have led to sport fish advisories and occasional beach closings. Studies and remedial action plans are under way to rectify these conditions. Restoring these areas so they can be more fully used and enjoyed will require a continued federal, state and local commitment.

For many years Lake Michigan has provided us with recreational opportunities, products, and places of which we can be proud, and it offers a multitude of beautiful settings in which to escape the rigors of day-to-day living. Along the shoreline of Lake Michigan, nature's generosity and expert hand can be witnessed at every turn. If only in appreciation for such a magnificent place, we should do everything in our power to preserve spectacular Lake Michigan for future generations.



## *Lake Michigan Review Day*

In September 1988, Office of the Great Lakes staff joined with staff from other state agencies, environmental groups, citizens and students to talk about the exceptional recreational opportunities along Lake Michigan as well as the many challenges we face in managing this vital resource. This gathering--Lake Michigan Review Day--was held in Traverse City, on the shores of Grand Traverse Bay. As a result there was considerable discussion about the Bay. Local officials and area residents were concerned that a water quality problem appears to be developing and stressed the need for local and state coordination in managing and protecting this significant recreational and environmental resource from degradation.

There was also discussion about water quality issues for Lake Michigan as a whole. Pollution sources such as fertilizers, air toxics, stormwater, municipal wastewater, and medical waste were identified as needing additional attention. The potential for over-development of the shoreline was also noted; people wondered if public ownership of the shoreline should be increased. People also wanted to know more about the summer's controversy over an unsuccessful proposal to divert Lake Michigan water to the Mississippi River.

Through brief presentations people learned about Lake Michigan's outstanding sports fishery, its bountiful state parks, and programs to protect endangered species that nest along the shoreline. The values and beauty of Lake Michigan sand dunes, and the state programs designed to manage unique coastal areas were also highlighted.



# Lake Huron



*On a day in late July of 1615 his canoe emerged from the mouth of the French River and to the south and west he saw a body of water beautifully blue, extending to the horizon. Because of its great size and sparkling water he named it La Mer Douce--the sweet or freshwater sea.*

Historian Frederick Landon,  
*Lake Huron*

Lake Huron was the first of the Great Lakes to be discovered. History accords the honor to Samuel de Champlain, not because he was the first human to lay eyes on Huron's spectacular beauty (the Indians had lived there for centuries), but because he was the first to record his experience in a European language.

Ironically, Champlain was not at all interested in learning about the vast expanse of water onto which he and a small fleet of Indians had canoed. The explorer had come to this part of the country solely to expand French influence in the New World and to engage in trade with the Indians. Not until many years later did the early settlers begin to understand the magnitude of his discovery.

After years of exploration it was learned that Champlain's La Mer Douce was but one of five great inland seas and, surprisingly, only the second largest. Together these immense lakes constituted what humans later came to know as the largest system of fresh surface water on earth.

In earlier days thick forests of white and red pine enticed lumber companies in search of handsome profits to this scenic eastern region of the state. Cities such as Saginaw, Bay City, and Alpena--because of their proximity to the lake and inland rivers--made ideal mill towns; as they flourished and grew, so did young Michigan's reputation as the greatest lumber-producing state in the country.

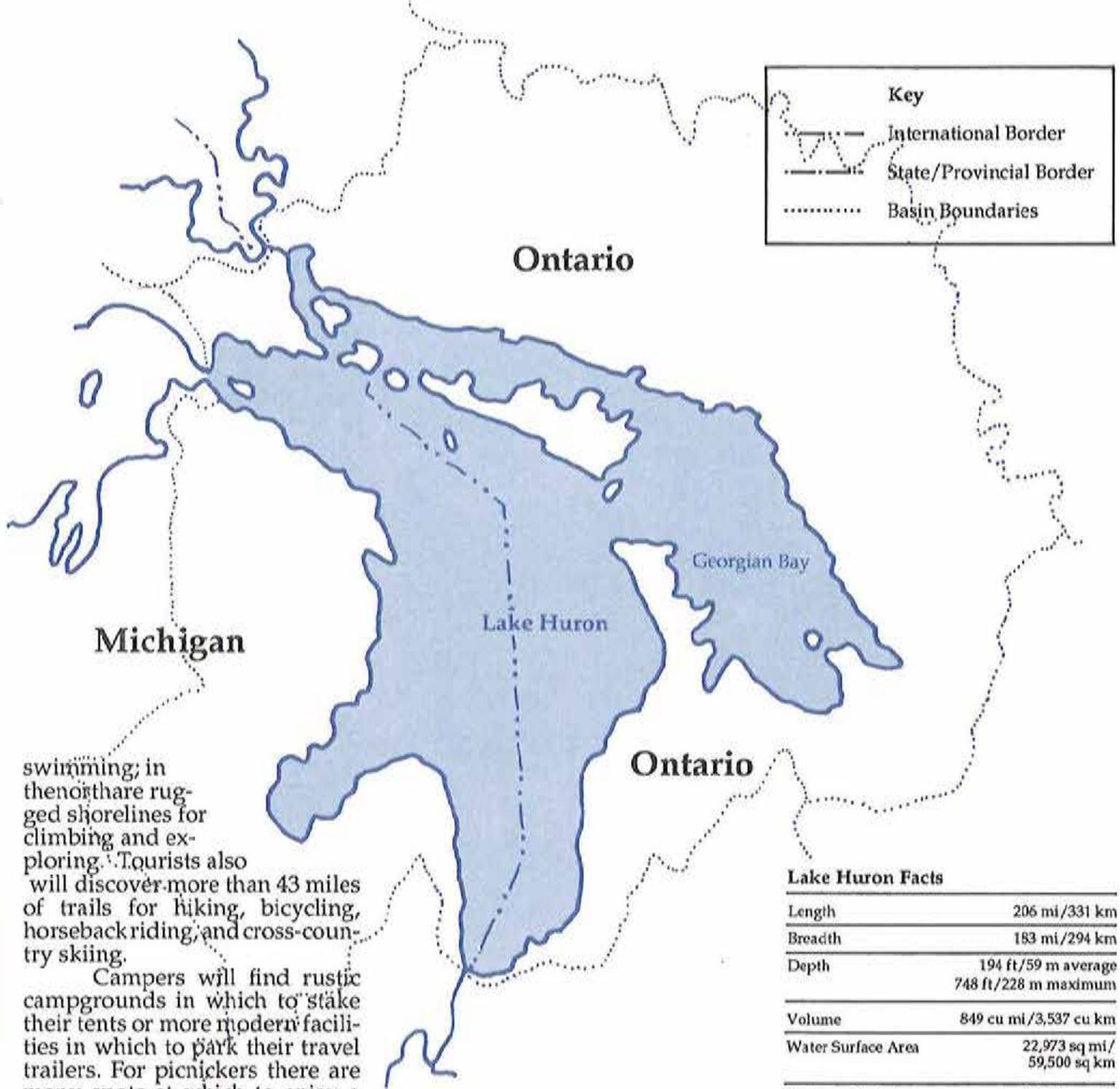
Today, the Lake Huron basin is host to one of the largest chemical producers in the United States and the largest petrochemical center in Canada. Its basin contains 17 percent of the world's uranium and 43 percent of the world's nickel reserves; copper, platinum, silver, and gold also are among its many riches. It is a major forest industry area as well.

## *A Treasure Chest Waiting to be Discovered*

Compared to the other Great Lakes, Huron is relatively unknown; in fact, it is quite likely Michigan's best kept secret. Tourists and natives who traditionally travel to lakes Erie and Michigan for rest and relaxation have yet to discover Huron's sleepy resort towns, explore its beautiful islands, and vacation in its splendid parks. It is this mysterious aura and the many natural resources hidden along the scenic shoreline, waiting quietly to be discovered, that set Lake Huron apart from the other four. Once unearthed, these little-known treasures will capture the imaginations and hearts of historians, campers, boaters, anglers, and naturalists alike.

The 12 state parks that border Lake Huron are truly the jewels in Lake Huron's "treasure chest." They have been overshadowed by the more publicized parks situated on the other Great Lakes, despite the fact that the Lake Huron's parks offer equal recreational opportunities. From Lakeport State Park in St. Clair County to Cheboygan State Park in Cheboygan County, and up to Mackinac Island State Park on the Huron side of the Straits of Mackinac, Lake Huron State parks offer 22 miles of shoreline. Newly acquired shoreline is waiting to be opened.

What will the traveler find in Huron's state parks? In the south there are long sandy beaches for sunbathing and warm, clear water for



swimming; in the north there are rugged shorelines for climbing and exploring. Tourists also will discover more than 43 miles of trails for hiking, bicycling, horseback riding, and cross-country skiing.

Campers will find rustic campgrounds in which to stake their tents or more modern facilities in which to park their travel trailers. For picnickers there are many spots at which to enjoy a lakeside meal. Boating enthusiasts can set out from numerous public launching sites. For anglers there are abundant whitefish, yellow perch, bass, catfish, chub, walleye, and northern pike in the shallow waters of Saginaw Bay and other harbors, as well as salmon and lake, brown, and rainbow trout in the lake's deeper waters.

### *Underwater "Graveyards" to Explore*

Lake Huron's treasures are not only its shores but can also be found offshore, resting in waters shallow and deep. State bottomland preserves have been specially created to protect Great Lakes ship-

#### **Lake Huron Facts**

|                     |   |
|---------------------|---|
| Length              | 206 mi/331 km                               |
| Breadth             | 183 mi/294 km                               |
| Depth               | 194 ft/59 m average<br>748 ft/228 m maximum |
| Volume              | 849 cu mi/3,537 cu km                       |
| Water Surface Area  | 22,973 sq mi/<br>59,500 sq km               |
| Drainage Basin Area | 51,699 sq mi/<br>133,900 sq km              |
| Shoreline Length    | 3,181/5,120 km<br>(includes islands)        |
| Elevation           | 581 ft/177m                                 |
| Outlet              | St. Clair River to Lake Erie                |
| Detention Time      | 22 years                                    |
| Population          | 937,000 (Canada)<br>1,321,000 (U.S.)        |

## Bays--Large And Small

*Saginaw Bay is the largest bay in Michigan--the size of Rhode Island--but is only one of many bays along the Lakes. Bays are popular recreation spots, because the closed-in areas can provide calmer waters for boating and fishing, where the safety of the shore can be found in several directions. On the other hand, a shallow bay can be just as treacherous as the deep, open waters--especially during storms and high winds--as many Saginaw Bay sailors can attest to. Fishing in bays may be a totally different experience than fishing in the open lakes. For example, the warm, inner waters of Saginaw Bay are famous for perch and walleye; but as you move further out into the colder Lake Huron waters, whitefish and trout can be found.*



*Bays can also present special problems. Several of the Great Lakes bays have suffered from serious water quality problems: Saginaw Bay and River, Wisconsin's Thunder Bay in Lake Superior and Green Bay in Lake Michigan are listed as Great Lakes pollution hotspots. Clean up efforts are underway. At the same time, water quality managers in areas where bay waters are still relatively clean--such as Grand Traverse Bay in Lake Michigan--are monitoring conditions there to identify any potential water pollution problems early and prevent them from becoming serious.*

wrecks and other aquatic resources, provide a safe environment for divers to pursue their interest, and expand local economies by increasing the number of tourist attractions. In these Great Lakes preserves the fresh and icy water keeps sunken ships and their cargo from deteriorating rapidly.

Lake Huron now hosts four state bottomland preserves, the most prominent of which is at Thunder Bay. According to the Alpena Area Chamber of Commerce, the bay was an ideal choice for an underwater park because its rocky shoals and islands make it very treacherous for ships, particularly during raging gales. The area has a rich history of shipwrecks. Although no one knows the exact number, it is said that more than 80 vessels have gone down in Thunder Bay, one of the highest densities of shipwrecks per square mile of any spot on the Great Lakes.

The Thumb Area State Bottomland Preserve, the Sanilac Shores State Bottomland Preserve and the Straits of Mackinac State Bottomland Preserve are home to substantially fewer wrecks than is Thunder Bay, but they also are a testament to the severe dangers sailors face on Lake Huron. Vessels that have found their watery graves in these three areas include the *Chickamunga*, *Bertschey*, *Philadelphia*, *Albany*, *Dunderburg*, *Iron Chief*, *Glenorchy*, *Emma L. Neilson*, *E.P. Dory*, *Governor Smith*, *Daniel Morrell*, *Cedarville*, *Regina* and *Sandusky*.

### *Special Places for Wildlife (and People)*

Other little-known assets of Lake Huron likely to pique the curiosity of tourists are its many natural and wilderness areas. These offer a rare opportunity to observe birds, animals, and plant-life in their natural habitats and learn about the distinctive features of the ecosystem that allow them to thrive. Department of Natural

Resources managed areas along Lake Huron, such as Fish Point and Nayannquing Point Wildlife Areas, are popular spots to view the spring waterfowl migrations. The first birds to arrive are Canada Geese in March, followed by tundra swans and pintail, mallard and black ducks. Other ducks follow, but by mid-April, most have departed for nesting areas in Canada.

The most interesting facet of Lake Huron is its more than 30,000 islands. The DNR is currently developing an "Island Explorer Water Trail" in northern Lake Huron and the St. Marys River to take advantage of newly acquired islands in this area. Acquisition of these islands from the federal government highlights the importance of public ownership of areas along the Great Lakes. Public ownership of special areas like islands and parks as well as efforts to promote sound development of private lands--for example through local land use planning--help keep the Great Lakes a place we can all enjoy.

### *A Touch of History*

Lake Huron is rich with history. The many small towns that flourished during the lumber era have gone to great lengths to preserve artifacts from times gone by. Visitors can browse the streets of Lexington, Port Sanilac, Port Austin, and Bay City, enjoying the beauty of ornate mansions built by lumber barons and shipbuilding magnates during the late 1800s. History buffs will particularly enjoy the four historical state parks found along the Straits of Mackinac, including Michigan's very first state park, located on Mackinac Island. Others can venture out along Huron's shoreline to observe its picturesque lighthouses, preserved to remind us of a time when one small beam of light guided hundreds of hulking vessels safely into harbor. Having visited the museums and numerous historical sites once, travelers will return again and again to Lake Huron to remember a fascinating, romantic time in our not so distant past--a past that is largely responsible for shaping the Michigan we know today.

Lake Huron is a wonderful combination of the very best features of all the other Great Lakes. Huron has the remote beauty of Lake Superior, the recreational opportunities of Lake Michigan, the fishery of Lake Erie, and the rich history of Lake Ontario. Its quiet parks and uncrowded beaches are ideal vacation spots in which to escape the trappings of modern society, and its spectacular beauty is a constant reminder of the miracles that only nature is capable of creating.

### *Lake Huron Review Day*

While scheduling conflicts forced the Lake Huron Review day to be postponed, nearly 100 questionnaires were received from people across the state, outlining their concerns and hopes for Lake Huron.

The many facets of Lake Huron--a recreation and tourism hotspot, an environmental resource in need of proper management, and a valuable economic resource for local communities--can be seen in their comments. People expressed interest in state acquisition of the Charity Islands for public use and protection, as well as increased public acquisition of Lake Huron shoreline. The plentiful Lake Huron fishery and its contribution to a growing tourism industry was noted; and to make use of the fishery a need for more small boat docking space was identified. People expressed a commitment to planned, quality shoreline development that protects delicate areas such as wetlands. Several called for setback requirements to protect buildings and roads from fluctuating water levels. Strong support was expressed for water quality improvements, especially from nonpoint pollution and dredging activities. The importance of research on the impacts of air and nonpoint source pollution was also stressed.

With problems and needs, people also identified solutions. They called for coordination among public and private groups for environmental protection and economic development. The enthusiasm of local citizens and sports groups was identified as a valuable resource that should be called into action. Education and funding were mentioned as critical tools in getting the job done. As the questionnaires indicated, many people are concerned about Lake Huron and working hard to improve and enhance this vital resource. Lake Huron's future seems a bright one.

# The St. Clair River, Lake St. Clair, and the Detroit River

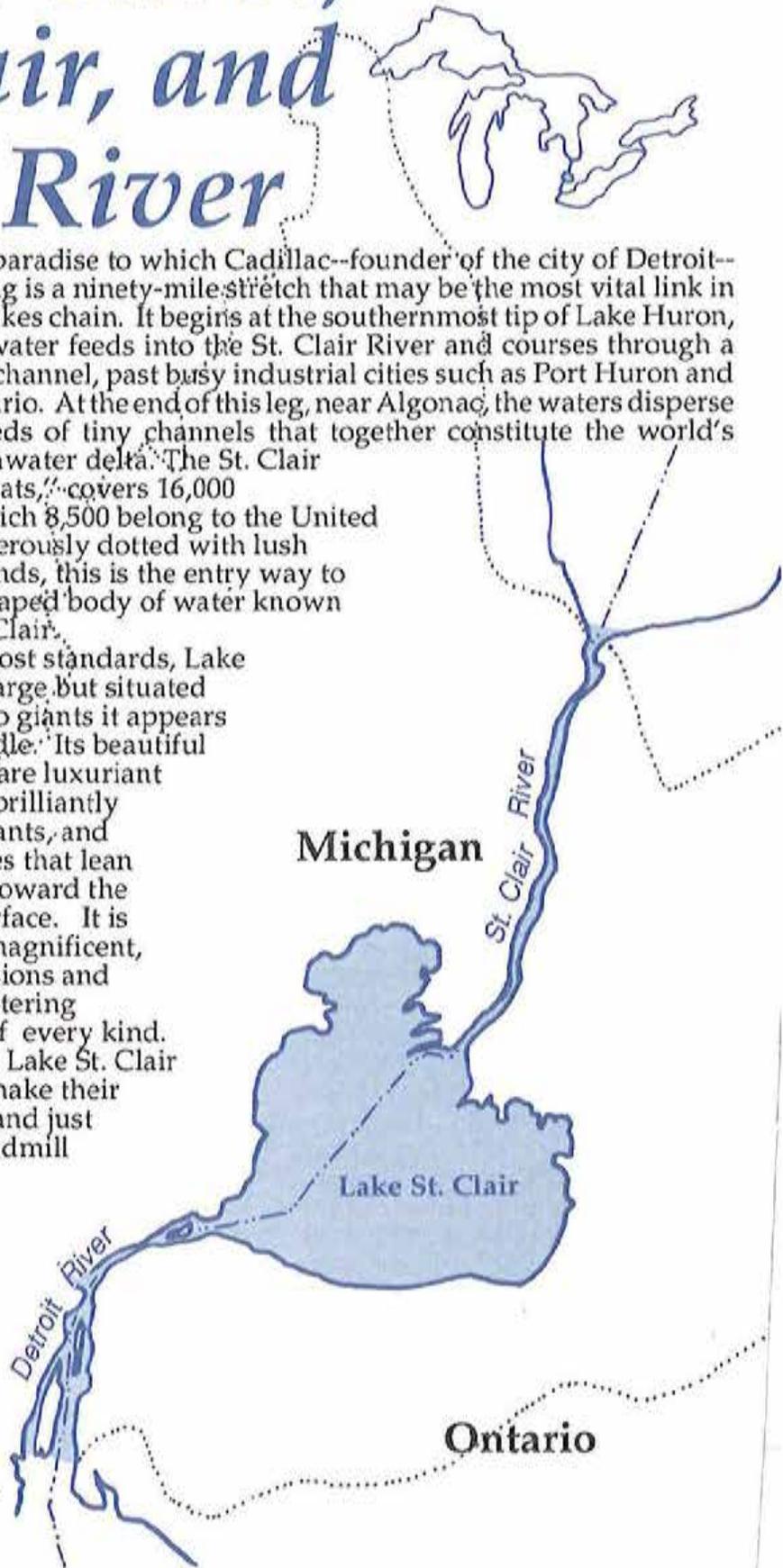
*"This country is so temperate, so fertile, and so beautiful that it may justly be called the earthly paradise of North America."*

Antoine de la Mothe Cadillac, 1702

The paradise to which Cadillac--founder of the city of Detroit--was referring is a ninety-mile stretch that may be the most vital link in the Great Lakes chain. It begins at the southernmost tip of Lake Huron, where the water feeds into the St. Clair River and courses through a seven-mile channel, past busy industrial cities such as Port Huron and Sarnia, Ontario. At the end of this leg, near Algonac, the waters disperse into hundreds of tiny channels that together constitute the world's largest freshwater delta. The St. Clair delta, or "Flats," covers 16,000 acres, of which 8,500 belong to the United States. Generously dotted with lush marshy islands, this is the entry way to the heart-shaped body of water known as Lake St. Clair.

By most standards, Lake St. Clair is large, but situated between two giants it appears a mere puddle. Its beautiful level banks are luxuriant with grass, brilliantly flowered plants, and majestic trees that lean gracefully toward the mirrored surface. It is lined with magnificent, ornate mansions and harbors sheltering watercraft of every kind.

From Lake St. Clair the waters make their way south, and just beyond Windmill Point they flow into the Detroit River.



## A Message From The Michigan Travel Bureau

# Celebrate The Great Lakes!

You will hear that many times in the coming months. And there is no better way to celebrate the lakes than to visit them. You might choose to relax at a cabin on Lake Huron, explore a sleepy resort town on Lake Michigan, visit rustic Lake Superior, or enjoy wildlife areas on Lake Erie. This year's State of the Great Lakes report will give you a flavor for each of the lakes so you can pick one (or two, or three) to tour and have an adventure this year.

If you cannot decide which Great Lake--or which part of which Great Lake--to visit you might want to spend some time "circling" the Great Lakes to find those very special places you want to come back to, again and again. You can tour lakes Superior and Michigan just by following the road signs where "Circle the Great Lakes" tours have been mapped out. Although the trails tracing the outline of Lake Huron have not been marked yet, the natural "roadsigns" are unmistakable, just follow the lighthouses. And a series of roads and freeways will take along lakes Erie and Ontario.

Take this center section with you as you travel this year so you can be sure to enjoy the wonderful recreation spots the Great Lakes have to offer. Remember, you are never more than a few hours drive from one of the Great Lakes, so every Michigan vacation can be a Great Lakes vacation.

Lake Superior is a massive lake but you will have plenty of time to ponder its dimensions as you follow the 456-mile well-marked "Lake Superior Circle Tour." You can start out at one of the world's busiest waterways--the Soo Locks--where the Great Lakes waters drop 21 feet to begin their 1,500-mile journey to the Atlantic. You will pass Whitefish Point (appropriately the home of the Great Lakes Shipwreck Museum) and can visit Tahquamenon Falls.

"Tunnel of Trees" to the Straits of Mackinac, you will be heading to the Upper Peninsula. From St. Ignace, the drive along Lake Michigan's northern shoreline to Menominee is a year-round delight. Crossing over into Wisconsin, the drive south will take you back to Chicago, where you started.

The mapping and marking of the Lake Huron Circle Tour is to be completed in 1990. But even without the signs it is possible to tour the Michigan side just by following the fifteen lighthouses from the Blue Water Bridge at Port Huron to the International Bridge at Sault Ste. Marie. Heading north from Port Huron takes you along the bluffs lining Lake Huron, where it seems as though every other town has "port" in its name. The well-preserved 18th-century village of Huron City, the remains of Grindstone City, and the dramatic rock formations of Pt. Aux Barques bring you to the mouth of Saginaw Bay with its islands, marshes and great fishing, and Bay City with its 19th-century lumber barons' homes lining Center Street.

Continuing north and east around the bay leads to the marinas and beaches at the Tawas; the fishing, canoeing and river boat excursions on the Au Sable River; the world's largest limestone quarry at Rogers City, the restored opera house and the charm of Cheboygan; and Fort Michillimackinac. The graceful Mackinac Bridge soaring hundreds of feet above the Straits of Mackinac will take you into the Upper Peninsula. An eastbound detour to, of all places, DeTour Village leads through breathtaking landscape of islands, coves, rocky and sandy beaches in the Les Cheneaux Islands. From here, there's only one way to go--north to Sault Ste. Marie, where the St. Marys River connects lakes Huron and Superior. Then it's east through the rugged mining country of northern

THE ROAD SKIRTS PICTURED ROCKS NATIONAL LAKESHORE, through the city of Munising and past the six waterfalls within the city limits (nine more surround the town), through Marquette with its towering ore docks, then up the rugged, rocky spine of the Keweenaw Peninsula with its abandoned copper mines, ghost towns, panoramic views along Brockway Mountain Drive. At the end of the peninsula is one of the oldest fully-restored operating lighthouses on the Great Lakes and one of the few spots to catch a ferry to Isle Royale, the only island national park in America.

From here the road is south again past more waterfalls, Porcupine Mountains State Park and the exotic Lake of the Clouds, before it swings west toward Wisconsin's Apostle Islands National Lakeshore, Duluth and Minnesota's north shore resorts. From Minnesota, it's east through Ontario where you might enjoy resort communities, historic forts, and provincial and national parks, before reaching the starting point at the Soo Locks.

Lake Michigan has on its shores two of America's most famous cities--Chicago and Milwaukee--and, in Michigan, some of America's best orchards and vineyards, the highest freshwater dunes in the world, and one of the world's three longest suspension bridges. Traveling counterclockwise around the lake from Chicago takes you through the Indiana Dunes National Lakeshore. Once in Michigan, you have 300 miles of coast dotted with orchards and vineyards, towering sand dunes and wide beaches, deep bays, coves, and coastal lakes. From Warren Dunes State Park your trip north takes you through artist and resort communities and quaint fishing villages such as South Haven, Saugatuck, Holland, Grand Haven, Pentwater, Manistee, Frankfort, Leland, Northport, Suttons Bay, Traverse City, Charlevoix, Petoskey and Harbor Springs. You will also pass by the famous Pt. Betsie Lighthouse and Sleeping Bear Dunes National Lakeshore and enjoy the "California" atmosphere of the Leelanau Peninsula. Some of the region's best golfing can be found around Grand Traverse Bay and up the coast to Charlevoix. Through the

Ontario and on down past Canadian beaches and resort towns toward Sarnia and back to the Blue Water Bridge.

To complete the tour of Michigan's coastline, turn south at the Blue Water Bridge. It is possible to follow the St. Clair River toward Lake St. Clair, past resorts and around Anchor Bay, a prized fishing and sailing spot, past parks and through the suburbs lining the lake. Then it is on to the Detroit River, where you will find Belle Isle, the largest urban island park in America, and travel through the heart of Detroit and its new riverside parks. It takes some maneuvering, but it is possible to follow Jefferson Avenue through the industrial belt south of the city and through such "downriver" suburbs as Wyandotte, Trenton and Gibraltar before reaching the northernmost point of the Lake Erie shoreline. From there, it is straight on past historic Monroe, beaches, parks, marshes and some of the most productive fish and wildlife habitat in the Midwest, before reaching the mouth of the Maumee Bay. If you choose to continue on along Lake Erie to Lake Ontario, your trip will take you through Ohio, Pennsylvania, New York, Ontario and Quebec, before you come back to home base--Michigan.



Celebrate The Great Lakes  
**YES MICHIGAN**

Again they pass large industrial centers--such as Windsor, Detroit, and River Rouge--and then pour into Lake Erie, the next in the line of sweet-water seas.

Historically, this passageway is significant because its discovery and settlement marked the permanent presence of the British in this part of the world; previously, their influence had been confined almost entirely to the eastern seaboard. Under the leadership and vision of Antoine de la Mothe Cadillac, the British navigated a route that started in Albany, New York, descended the St. Lawrence River, crossed Lake Ontario and Lake Erie, and terminated at Detroit.

As did all the Great Lakes regions, this territory suffered from excessive trapping and lumbering, but after the Civil War, industry emerged as the driving force. Year after year, people moved into the area, and with the invention of the automobile Detroit jumped to the fifth largest city in the nation. Windsor, Ontario, grew at a similar rate and emerged as Canada's largest city on the international border.

### *A Transportation Route to Use and View*

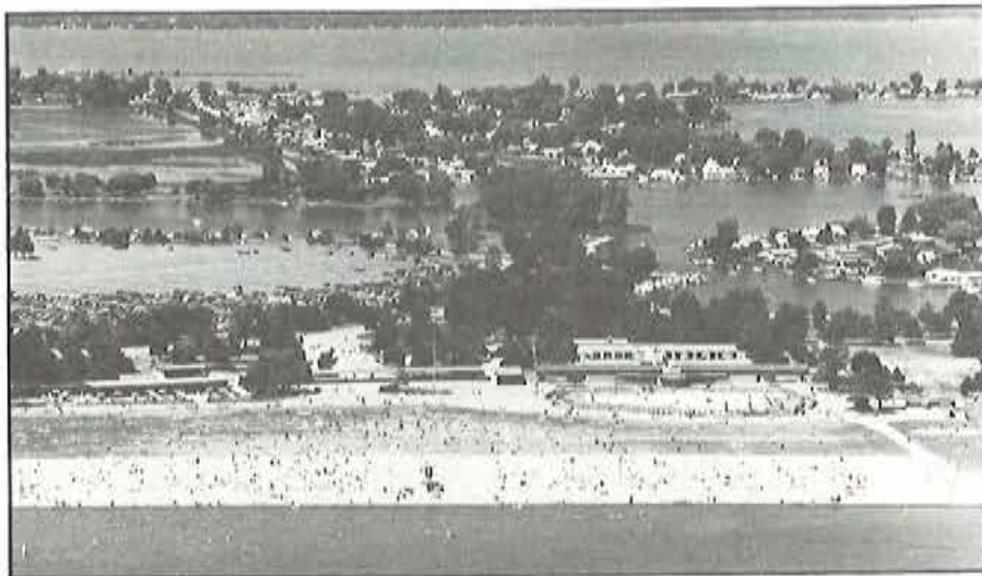
Throughout history, this stretch of water has been seen primarily as a transportation route--first for birchbark canoes and now for large ferry-boats, tankers, and passenger liners. In fact, a favorite pastime of tourists is to sit along the shores of Algonac State Park and watch the huge Great Lakes freighters pass. But the passageway has many other uses as well.

The ease of transportation was a key factor in the industrialization of the region. Detroit grew into the world's leading producer of motor vehicles and on the Canadian side, Windsor became a major producer of automobiles and coal. It was beside these waters that Henry Ford built blast furnaces and coke ovens, cement, soybean, and glass plants, as well as a tire factory. Railroads traced the shoreline, more than 50,000 factories were erected, and skyscrapers began to crowd the horizon. This region still is used extensively for industrial purposes, but the rate of growth has slowed substantially.

Today, the area is used for pleasure as much as it is for industry. For example, one of the state's greatest concentrations of recreational watercraft is found on this waterway. About 200,000 Michigan boats are registered in this southeastern area and many are moored in one of 42

public and private marinas along this connecting waterway. It is a rare summer day when people cannot see crisp white sails billowing in the offshore wind, or speedboats, and windsurfers cruising on the sparkling waves. These watercraft are so impressive that tourists often spend summer days wandering through the multitude of marinas, enjoying the beauty of these vessels.

These waters also offer great sport to anglers. More than 65 species of fish thrive here, including walleye, yellow perch, and white and smallmouth bass. The fish are extremely plentiful because of the lush marshlands surrounding the numerous islands,



which act as breeding grounds. The Department of Natural Resources also has experimentally planted additional species, including coho salmon and brown and rainbow trout.

Several of the abundant islands have been turned into southeastern Michigan's summer playlands. Belle Isle, for example, hosts a nature center, fishing piers, athletic fields, a zoo, a museum, playgrounds, and flower gardens. On other islands, spectacular homes and summer cottages grace the shore, beckoning vacationers to tour the picturesque streets.

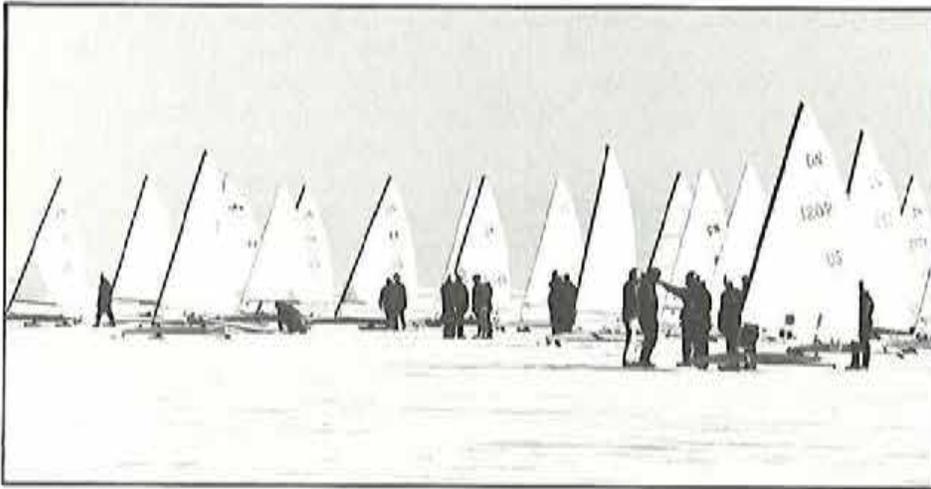
### *A Chance to View Wildlife Close to Home*

Although southeastern Michigan is usually thought of as a highly urbanized area, these connecting waters of the Great Lakes provide important habitat to many plants and animals. The marshy bays surrounding the islands--such as Harsen's and Dickinson--the river channels rich with vegetation, and the weedy-bottomed calm waters support a multitude of plants and animals. Lake St. Clair, for example, is nationally recognized as a migratory stop for canvasback and redhead ducks; about 50 percent of North American whistling swans also use its wetlands during migration. These wetlands are a valuable part of the Great Lakes ecosystem. Although we have already lost many of our coastal wetlands, programs are now in place to ensure that these productive and useful areas are protected.

The Detroit River has open water areas in some reaches throughout the winter that provide habitat for waterfowl and where birds can be viewed at relatively close range. The National Wildlife refuge on the Grassy Island area north of Grosse Ile provides protected feeding and nest-

ing areas for migrating waterfowl in the fall.

This connecting stretch of water is truly unique. It is surrounded by beautiful scenery, host to thousands of plants and animals, the center of intense industrialization, bordered by cities rich in history that continue to make Michigan one of the foremost states in the nation, and full of recreational opportunities for people from all walks of life.



## *Lake Erie and Lake St. Clair Review Day*

The city of Monroe was the spot for Lake Erie and Lake St. Clair Review Day. This was the last of the half-day sessions giving local residents the opportunity to learn about the riches of "their" particular Great Lake and let local and state officials know about people's concerns for managing the lakes. Natural Resources Commissioner Thomas Anderson opened the meeting. He was joined by state Representative Jerry Bartnik, who talked about the importance of Lake Erie for fishing, hunting and recreation. United States Congressman John Dingell talked about efforts in Washington to improve these two lakes and their tributaries by securing funds for research and clean-up activities. He expressed his strong personal commitment to protecting the Great Lakes.

The variety of activities that visitors to lakes Erie and St. Clair can enjoy--fishing and hunting; viewing spring migrations of geese, ducks and hawks; swimming and boating--were described in presentations on Pointe Mouillee State Game Area, Sterling State Park, and Point Pelee National Park in Ontario. Michigan residents learned about Ohio's commitment to this shared resource from staff from the new Ohio Lake Erie Office.

Public discussion was lively and lengthy. The enormous confined disposal facility (a diked area in which dredged material from the lake bottom is stored) surrounding Pointe Mouillee was of concern to many people. Local residents worry about leaking around the facility and possible negative impacts on wetlands, fish, and wildlife. Water quality was mentioned, with a call for further phosphorous and sewage reductions. The benefits of proposals to regulate Great Lakes water levels--artificially controlling natural fluctuations in water levels to possibly reduce impacts on shoreline property--were debated. Some felt state government should look into the possibility of regulating water levels; others did not.

The discussion also turned to two of the most pressing challenges in natural resources and environmental protection: education and funding. Funding for research and expensive remedial actions-- such as correction of the combined sewer overflow problems on the Rouge River--were called for. In the face of these tough problems, people came together at Lake Erie and Lake St. Clair Review Day to re-commit themselves to protection and management of these jewels in the Great Lakes system.

# Lake Erie and Lake Ontario

*Lake Erie...has the most productive commercial fishery in the system, and its shores provide the most supportive wildlife habitat.....it is probably the most used, most enjoyed, and, even with its flaws, the most loved lake of the five.*

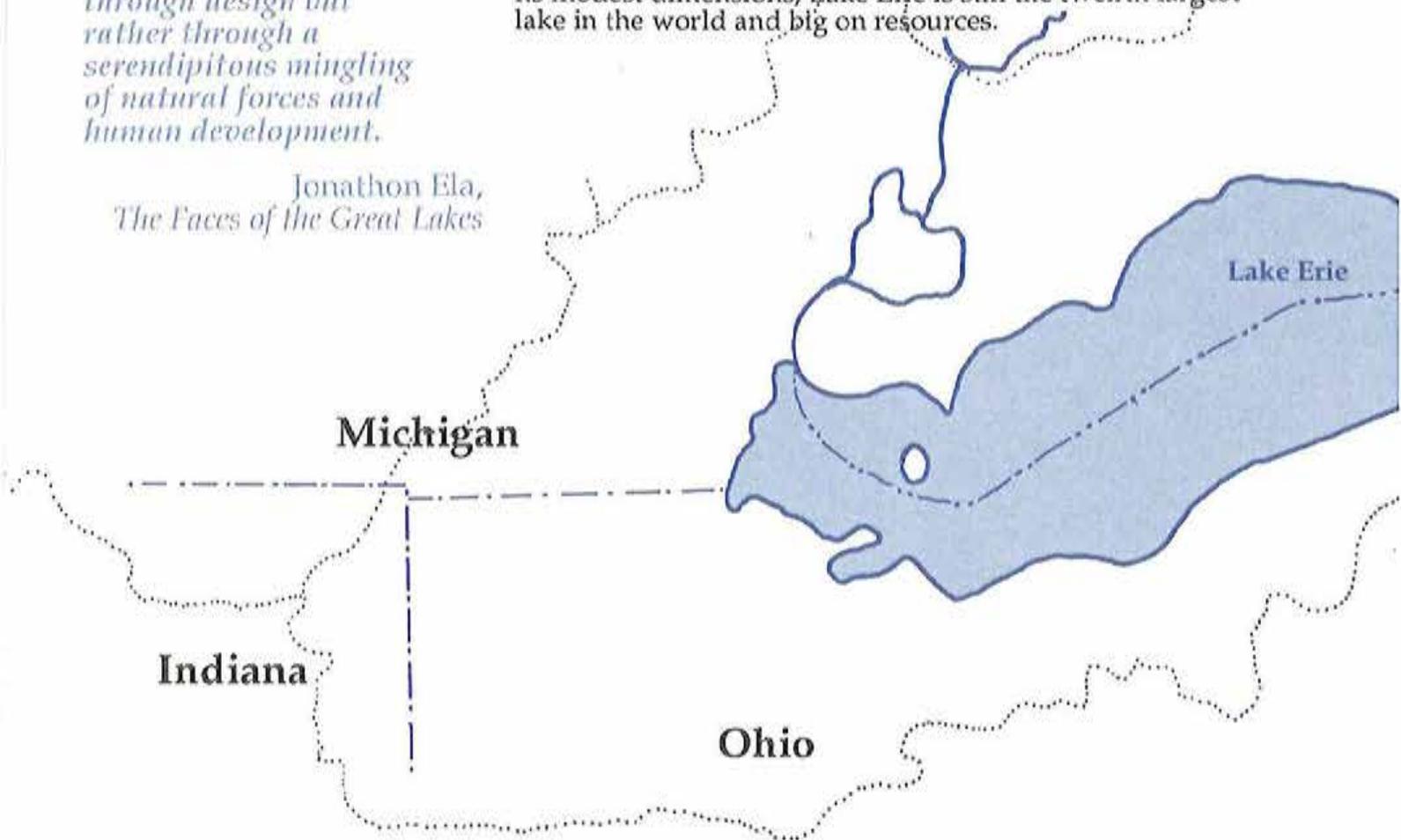
*Lake Ontario is the least wild of the five lakes, and its shorelines give the strongest impression of landscaping; this effect is not achieved through design but rather through a serendipitous mingling of natural forces and human development.*

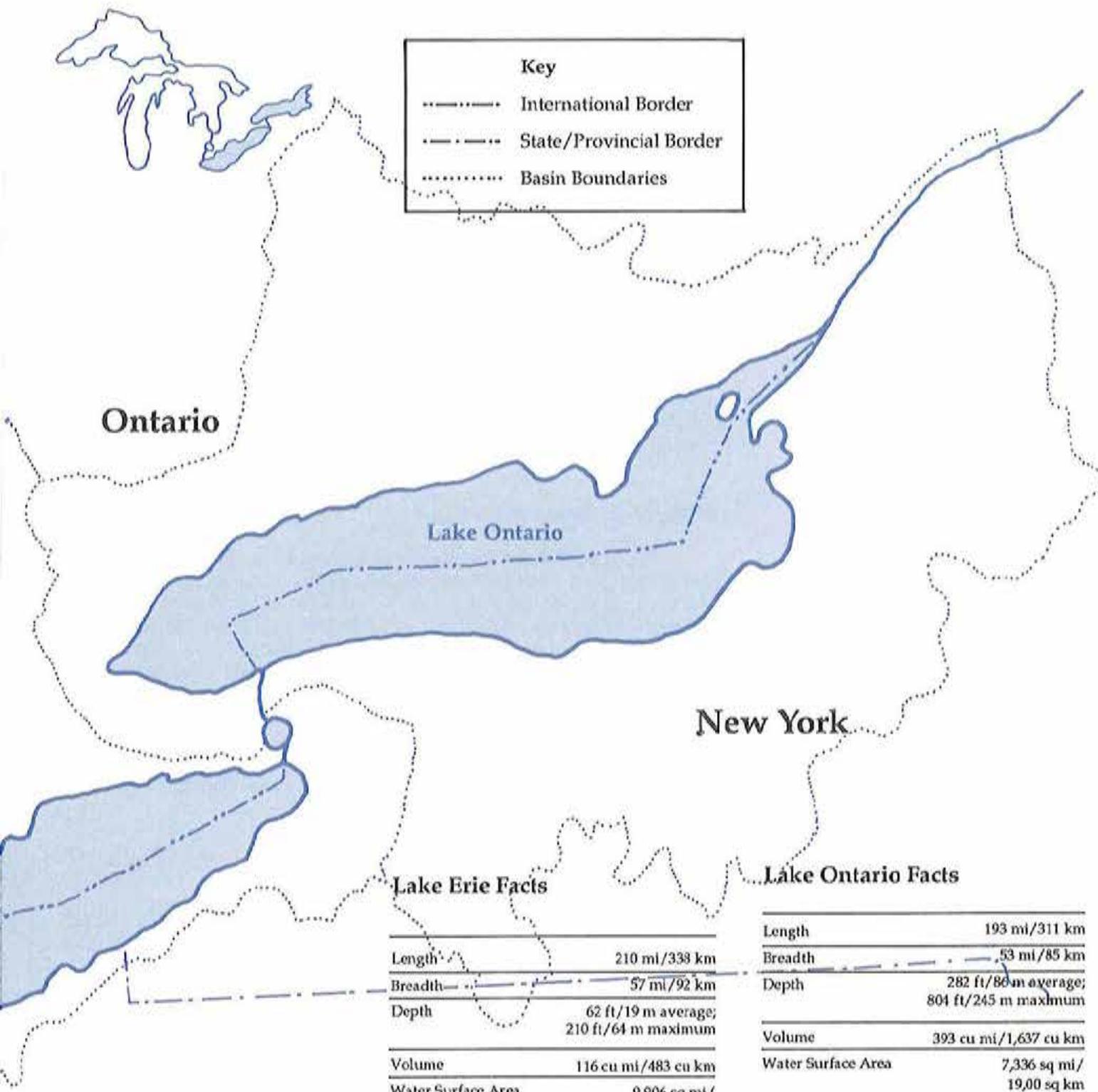
Jonathon Ela,  
*The Faces of the Great Lakes*

Because of their geographic locations, lakes Erie and Ontario are less well known to the people of Michigan than are the other three Great Lakes; very few of our homes and summer cottages overlook their waters, and our summers rarely include plans to spend vacations relaxing on their sandy beaches. Yet, their respective roles in the largest system of fresh surface water on earth are very important; without these lakes the union of inland seas would be far less interesting and certainly less impressive.

## Lake Erie

Lake Erie, the last of the Great Lakes to be discovered by Europeans, is also the shallowest of the five. Surprisingly, this shallowness has made it even more feared by sailors than Lake Superior, because Lake Erie is given to sudden squalls that dig up the lake floor and hurl it furiously into the air, blinding navigators. Even those who set sail on a calm, sunny morning must be prepared to head home in violent, gusting winds. According to veteran sailors, Lake Erie is difficult to navigate even in mild weather because of its small size (only Lake Ontario is smaller). Despite its modest dimensions, Lake Erie is still the twelfth largest lake in the world and big on resources.





| Key     |                         |
|---------|-------------------------|
| ---·--- | International Border    |
| - - - - | State/Provincial Border |
| .....   | Basin Boundaries        |

### Lake Erie Facts

|                     |  |
|---------------------|--|
| Length              | 210 mi/338 km                              |
| Breadth             | 57 mi/92 km                                |
| Depth               | 62 ft/19 m average;<br>210 ft/64 m maximum |
| Volume              | 116 cu mi/483 cu km                        |
| Water Surface Area  | 9,906 sq mi/<br>25,657 sq km               |
| Drainage Basin Area | 22,703 sq mi/<br>58,800 sq km              |
| Shoreline Length    | 856 mi/1,377 km<br>(includes islands)      |
| Elevation           | 571 ft/174 m                               |
| Outlet              | Niagara River and Falls                    |
| Detention Time      | 2.6 yrs. (shortest of the lakes)           |
| Population          | 1,515,000 (Canada)<br>11,347,000 (U.S.)    |

### Lake Ontario Facts

|                     |  |
|---------------------|--|
| Length              | 193 mi/311 km                                |
| Breadth             | 53 mi/85 km                                  |
| Depth               | 282 ft/86 m average;<br>804 ft/245 m maximum |
| Volume              | 393 cu mi/1,637 cu km                        |
| Water Surface Area  | 7,336 sq mi/<br>19,00 sq km                  |
| Drainage Basin Area | 27,297 sq mi/<br>70,700 sq km                |
| Shoreline Length    | 726 mi/1,168 km<br>(includes islands)        |
| Elevation           | 264 ft/75 m                                  |
| Outlet              | St. Lawrence River to<br>the Atlantic Ocean  |
| Detention Time      | 6 years                                      |
| Population          | 4,035,000 (Canada)<br>2,090,000 (U.S.)       |

Pennsylvania

Lake Erie is home to the largest commercial fishery on the Great Lakes and hosts the second largest sports fishery, after Lake Michigan. Anglers will delight in matching wits with the lake's major species, which include catfish, white bass, yellow perch, carp and the best stock of walleye in the world.

The Lake Erie basin also is big on industry. It manufactures the majority of Canadian and U.S. automobiles; it is a major producer of steel, glass, and ships; its earth is rich in sand, gravel, limestone, and gypsum, all of which are heavily mined. Lake Erie's 13 ports, which serve as major distribution centers for iron ore, grain, and manufactured goods, also supply a river of coal. All these industrial activities have helped Erie earn the reputation of the busiest and hardest working of any of the five Great Lakes.

The Lake Erie region is home to more than 12.8 million individuals (second only to Lake Michigan). Major concentrations of people live in the U.S. ports and industrial centers along the southern shoreline, including Toledo, Sandusky, Lorain, Cleveland, Ashtabula, Conneaut, Erie, Dunkirk, and Buffalo. There is comparatively little population on the Canadian side of the lake, which is largely undeveloped.

### *A Sterling Recreation Spot*

Because it is the southernmost Great Lake, Erie's climate is more genial than that of the others, which makes it a popular vacation spot. Every summer its beautiful sandy beaches are crowded with tourists looking for fun and relaxation. Lake Erie's fans are loyal, and their opportunities for recreation are plentiful. Although only a small portion of Lake Erie's shoreline is within Michigan's borders, there is room enough for a state park. Sterling State Park offers modern campsites, picnic areas, hiking trails, and beaches for swimming and sunbathing. It has one of Michigan's largest boat launches, from which hundreds of fishermen and women set out in search of the great Erie walleye. This Michigan state park is frequented by about one million visitors each year.

### *Wildlife's Wonderland*

The Lake Erie region also provides habitat for thousands of plants and animals. It is particularly noted for its many wetlands--swamps, marshes, bogs, and fens where the water table is above the land for at least a portion of the year. Wetlands are a vital part of the Great Lakes ecosystem because they store water, replenish groundwater supplies, filter sediments and contaminants from the water, and help slow the rate of erosion by acting as a buffer between the lake and the shoreline. Wetlands also provide habitats for plants and breeding grounds and migratory stopovers for birds, some of which cannot be found anywhere else in the world.

The habitat along Lake Erie's shore is well known to the many sportsmen and women who enjoy the fishing and hunting this area provides. But the shores of Lake Erie are also a very special place to simply watch and enjoy wildlife. A hike through one of several public and privately owned game areas and nature preserves might reveal a variety of animals and birds. The Erie Marsh Preserve (owned by The Nature Conservancy but open to the public) and the Point Mouillee State Game Area are prime spots to watch the annual spring migration of hawks and other raptors. These spectacular birds rest in Erie's coastal

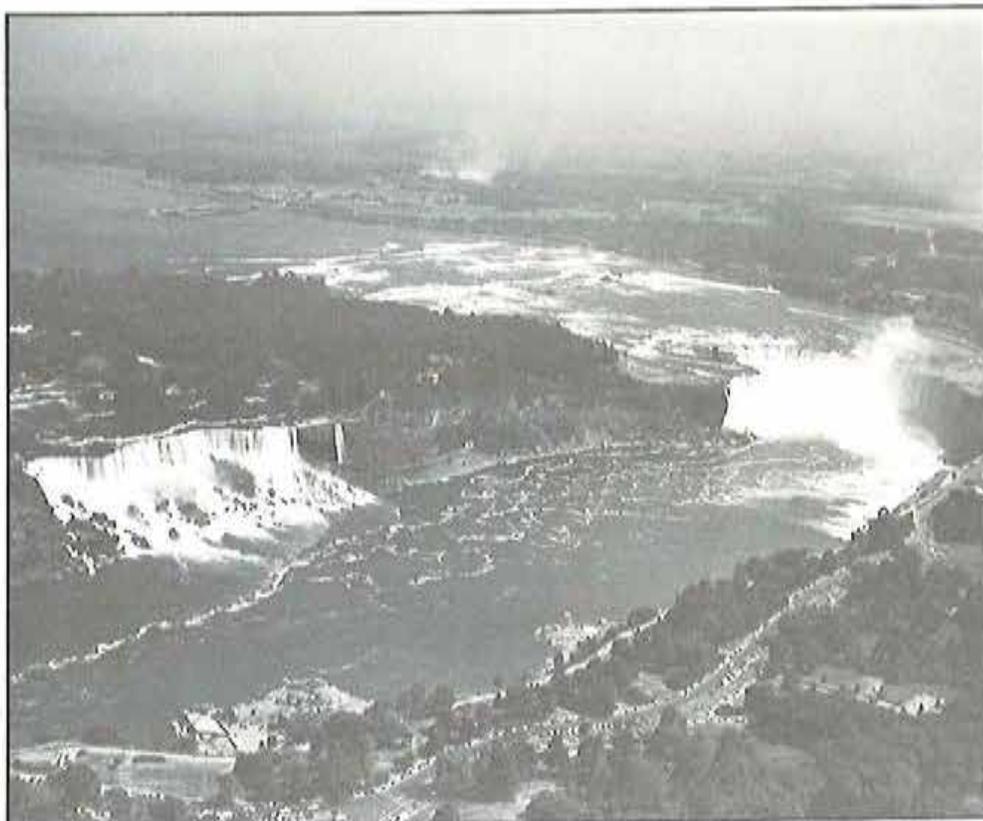
marshes while traveling from their "winter place" in Florida and other southern locales to their "summer homes" in Michigan and Canada. Both the preserve and the game area are home to such mammals as muskrat and raccoon and provide temporary migration, feeding and resting habitat for the black-crowned night heron, the double-crested cormorant, the endangered piping plover, and others. Point Mouille counts among its several plant species the threatened wild hyacinth and cup-plant, as well as wild rice, wild celery and a host of other marsh and aquatic plants.

While the story that Lake Erie was "dying" is old news, we still tell it because it shows how human acts can result in serious environmental degradation. And then through new policies, improved technology and a resilient lake we were able to reverse the damage and revitalize the environment. While the story spoke of a "dead lake," ironically scientists discovered that Lake Erie was not dying but had become far too productive for its own good. The scientific term for the ailment is eutrophication, and studies revealed that phosphorous was the major culprit. The resultant productivity led to the overpopulation of nuisance algae which literally sucked the oxygen out of large parts of the lake. With Michigan leading the way--the state banned the sale of high-phosphate detergents and invested considerable sums in municipal wastewater treatment plants--controls were instituted that have made Lake Erie much healthier. While the fight for cleaner water in Lake Erie is not over, pollution no longer conceals this lake's rich natural resources and scenic beauty.

### *Erie's Great "Fall" into Ontario*

The most famous feature of Lake Erie lies at its eastern end. Just north of Buffalo, New York, the lake's waters are funnelled into the Niagara River, which picks up powerful momentum along its 34-mile channel until it reaches Niagara Falls, believed by many to be the world's most spectacular natural creation. What is particularly interesting about Niagara is that the riverbed consists of extremely hard rock resting on a much softer sedimentary layer; as the water plunges over the crest with tremendous force, the sedimentary wall below is scooped away, and eventually the unsupported lip breaks off. Through this action the falls gradually move upriver, sculpting a deep gorge that is now nearly 7.5 miles long.

Named the "Thunderer of Waters" by the Indians, Niagara is separated by Goat Island into a Canadian and a U.S. side and probably here, more than anywhere else on the Great Lakes, we are reminded that this wonderful resource is shared by two great nations. The Canadian falls, in the shape of a



horseshoe, measure 2,500 feet across and have a vertical drop of roughly 170 feet. The falls on the American side are a fairly straight curtain about 1,300 feet long and 182 feet high. Approximately 80 million gallons of water per second roar into the basin beneath and then surge into Lake Ontario.

### *Lake Ontario*

To Michigan residents, Lake Ontario is the least known of the Great Lakes. No Michigan shore is lapped by its gentle waves or offers safe harbor to the vessels plying its waters. In fact, the most eastern lake in the system is often forgotten when talking about the great inland seas. Perhaps our attention is not caught by Ontario's quiet beauty, gracefully contoured shores, or sleepy resort towns. But there is a great deal to be learned about this calm body of water.

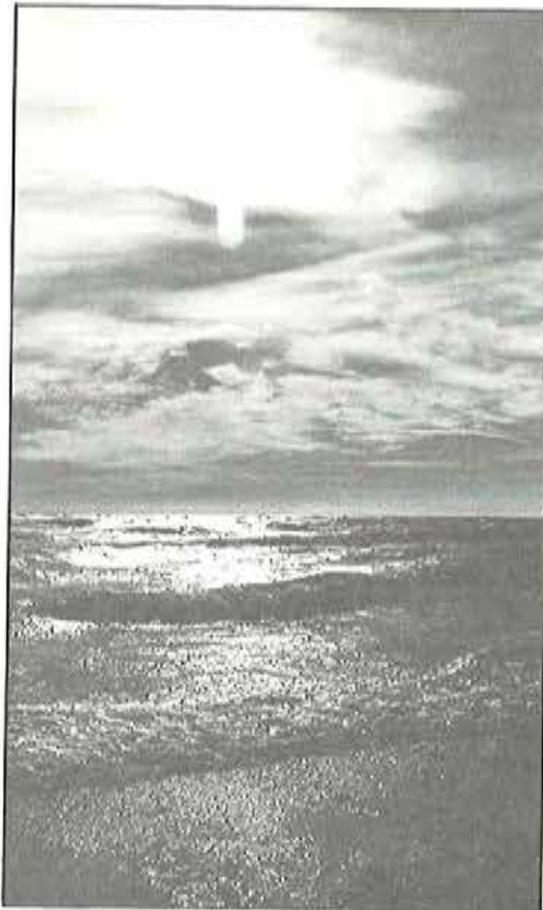
In surface the smallest of the Great Lakes, Ontario is nearly four times as long as it is wide (193 miles by 53 miles), but it is very deep--804 feet at its maximum (only Superior and Michigan are deeper). The shoreline extends 726 miles and is virtually free from hills, bays, rocks, and islands.

### *A Lake of Urban Sights and Sounds*

In many ways, Ontario is a mirror image of Lake Erie. Whereas the U.S. side of Erie is highly industrialized, the U.S. shore of Ontario is virtually undeveloped, marked only by a few resort towns. Conversely, the Canadian side of Lake Erie is sparsely settled, but the Lake Ontario basin is considered our northeastern neighbor's industrial heartland. Ontario's shores host numerous manufacturers of machinery, electrical goods, and transportation equipment. This region also is reputed for its prestigious printing and publishing houses, its electronics industry, and its steel plants (two-thirds of Canada's output is produced here).

Along Lake Ontario stretches the vibrant city of Toronto the focal point of trade between the United States and Canada, the country's major tourist and convention center, and a cultural hub. Also noteworthy is Oshawa, the seat of General Motors, dubbed by many as Canada's Detroit. It is said that one in eight Canadians live in the Lake Ontario basin, which has the greatest concentration of people outside the Montreal area.

Similar to Lake Erie, fertile soil and a genial climate make the Lake Ontario region an ideal place to grow grapes and other fruits; from its rich earth sprout many vegetables as well. The area also provides feed for livestock and is home to numerous herds of cattle, making it one of Canada's leading dairy producers.



## *A Thousand Natural Wonders*

Lake Ontario's shores, which almost seem carefully landscaped, have abundant greenery and gently sloping beaches that blend in gracefully with the calm waters of the lake. Amid this peaceful scene is the Thousand Islands. Located at the eastern end of the lake, where it narrows into the St. Lawrence River, are these picturesque dots of land. This marks the point where the waters of the Great Lakes have traveled more than 1,000 miles (from Duluth, Minnesota) and are about to begin their journey seaward.

As the Great Lakes waters make their exit, perhaps it is appropriate that they flow beside the quiet shores of Lake Ontario. After their passage from the rugged surroundings of Superior through the intensive use of Michigan, the rigors of Huron and its islands, and the industry of Erie, Lake Ontario offers a splendid respite. In this deep, bowl-like lake the waters find momentary rest before gathering force for the 1,000-mile trek through the grand St. Lawrence Seaway and on into the mighty North Atlantic.



# A Few of Nature's Small

As we celebrate the splendor of the Great Lakes and the many recreational opportunities they provide, we also celebrate the wide variety of plants and animals that they support and work to preserve the precious few areas in which the rare species thrive. A Great Lakes vacation can be made even more special by the sight of a delicate flower or the quick glimpse of a soaring eagle. It is an image that can last for years and serves as a symbol of the enormous, yet fragile riches of the Great Lakes.



## Plants

More than 2,100 plant species grace Michigan's forests, prairies, shorelines, meadows, and wetlands; more than 200 are threatened with or in danger of extinction. Highlighted below are four threatened and one endangered plant species.

*The Dwarf Lake Iris* is one of the most stunning of the four threatened Great Lakes plant species. The iris grows to about three or four inches and has brilliant purple/blue flowers, slender green leaves, and striking yellow crests on its three outer floral segments. This flower is found only along the northern shoreline of Lake Michigan and Lake Huron and blooms in late May and early June.

*The Pitcher's Thistle*, a handsome plant which has been known to grow as tall as three feet, can be identified easily by its cream-colored flowers, white and wooly leaves and stems and the tiny prickles at the tip of its leaves. It flowers throughout the summer months and from a distance appears silvery. The thistle grows on open dunes along the shore of Lake Superior near Grand Marais; the northern shore of Lake Huron, around the Thumb and along Lake Michigan.

*The Lake Huron Tansy* reaches 12 to 18 inches and sports a fiery yellow flower. Botanists explain that because of its abundant seed production and its ability to sprout from rhizomes, the Lake Huron tansy is perfectly suited to grow in sand. To enjoy its flower during the summer months, look around the sandy northern shores of lakes Huron and Michigan and at the Grand Sable Dunes along Lake Superior.

*The Houghton's Goldenrod*, a member of the aster family, is rather flamboyant with its flat-topped flowers of bright yellow, its reddish stems, and its scattered, alternate leaves of brilliant green. This variety grows best along sandy or rocky beaches and in interdunal (between sand dunes) wetlands. It is found only on the northern shores of lakes Michigan and Huron.

*The Prairie White-fringed Orchid* is one of the loveliest plants that grows in the Great Lakes region. It grows up to three feet tall with a showy bloom of 10 to 40 creamy-white flowers that are almost fairy-like in appearance. The species grows in wet prairie areas, most of which have been developed for other uses. The habitat of this endangered species is now restricted to a rather narrow band of wet meadow and wet prairie along the Great Lakes shoreline in Saginaw Bay, Lake St. Clair and western Lake Erie. The Michigan prairie white-fringed orchids form one of the most significant remaining population for this species in North America.

Plants are a necessary part of shoreline ecology; they help slow erosion by holding in place sand that otherwise would be blown or washed away. They are also a significant part of the natural beauty of the Great Lakes shoreline. And because they are found in few, if any other places in the entire world; if they disappear here, humankind will never be able to bring them back.

# Wonders

## Wildlife

Several wildlife species that can be found along the shorelines of the Great Lakes are threatened with or in danger of extinction. Two special birds which might be seen resting or feeding along the Great Lakes are the bald eagle, which is perhaps the best known, and the piping plover.

**Bald Eagles** are found in northern Michigan, and while more of these majestic birds can be seen in inland areas, the sight of a bald eagle flying high above the Great Lakes is becoming more prevalent. Thirteen years ago the bald eagle was in grave danger of extinction, largely due to water pollution and the resulting contamination of the fish upon which the eagles fed. Eagles feeding upon contaminated Great Lakes fish were particularly susceptible. According to studies conducted by the Nongame Wildlife Fund, in 1975 only six pair of eagles were nesting along the Great Lakes. Due to environmental clean-up efforts, that number increased to 84 pair in 1980 and to 161 pair in 1988. As water quality continues to improve, perhaps more and more the fleeting glimpse of a bald eagle will be a part of a visit to the Great Lakes.

**The Piping Plover** is a shore bird that looks like a small killdeer, with a light brown back, white breast and a single black breast stripe. According to the DNR, the plover—which nests only on beaches of sand and small stones—breeds in just three regions of North America: the Atlantic Coast, the salt flats and alkaline lakes of the Great Plains, and the coastline of the Great Lakes.

The bird's population has diminished significantly in the last three decades, particularly in the Great Lakes region. The decline is attributed almost entirely to human interference. Increased recreational use of the Great Lakes shoreline causes parent birds to be frightened away from the nest during crucial incubation periods, and because the eggs and young blend so well into their environment, they often are trampled.

This year only 14 pair of piping plover nested on Great Lakes beaches—seven on Lake Superior and seven on Lake Michigan; the populations on lakes Huron, Erie, and Ontario have been wiped out. This bird is included on the state's endangered species list, and the DNR has begun establishing plover refuges, (restricting the use of certain beaches during the bird's nesting period).

The Great Lakes coastal zones also provide habitat for a great many other birds and mammals, a number of which are also threatened or endangered. The many islands dotting the Great Lakes provide valuable nesting cover for the Caspian and common terns, both threatened species. Islands also provide much needed habitat for herring and ring-billed gulls, double-crested cormorants, great blue herons, and osprey, another threatened species. The islands in northern Lake Huron and Saginaw Bay are particularly noteworthy as summer homes to large nesting colonies of gulls and terns. Lake Superior's Huron Islands host large colonies of gulls and double-crested cormorants.

The animal and plant communities scattered along the shores of the Great Lakes are distinct from all others on earth. We will celebrate their existence as part of the Great Lakes and continue to work to maintain a healthy Great Lakes ecosystem in which all life can thrive.



# Meeting Our Objectives in

1988 marks my last year as Director of the Office of the Great Lakes. For the past four years I have had the unequalled satisfaction of working with the many outstanding people in government, environmental organizations, and business who are committed to Great Lakes protection. As I move on, I will take with me what I have learned--that the health of the lakes is key to a productive and vital Michigan. We made considerable progress in 1988, but, of course, there are still important challenges to face. The coming year is a time to *Celebrate the Great Lakes!*, reflect on them and recommit ourselves to their--and our--future.

## *Funding for Environmental Protection*

One of our most critical objectives for 1988--securing new funding for environmental protection--was achieved when Michigan voters voiced overwhelming support for the "Quality of Life Bond" issue which provides \$660 million for toxic clean-ups, solid waste problems, wastewater treatment and Great Lakes protection and \$140 million for state and local parks and recreation. Of the bond revenues, \$25 million will be put toward the Great Lakes Protection Fund, a permanent, regional endowment fund for Great Lakes protection and clean up.

The Quality of Life Bond revenue will also finance the State Wastewater Treatment Revolving Loan Fund (SRF). Established through legislation passed this year, the SRF will be eligible to receive \$365 million in federal dollars which, when combined with the state bond revenues, should make over \$1.1 billion in low interest loans available for Michigan communities to build and upgrade sewage treatment plants and address other water quality problems. Significant funding will be available to communities to resolve combined sewer overflow problems which contribute to degraded water quality in several of the Great Lakes pollution hotspots.

We were also successful in getting over \$600,000 in funding for Great Lakes programs included in the DNR's 1988-89 budget. Support for toxics testing of sportfish, nonpoint source pollution control in urban areas and local shoreland clean up projects was approved by the Legislature. We are still looking at the possibility of creating a new Michigan environmental protection fund by setting aside some judgments and settlements assessed against polluters to use for environmental enforcement and research that directly benefits the lakes.

## *Increasing Recreational Opportunities*

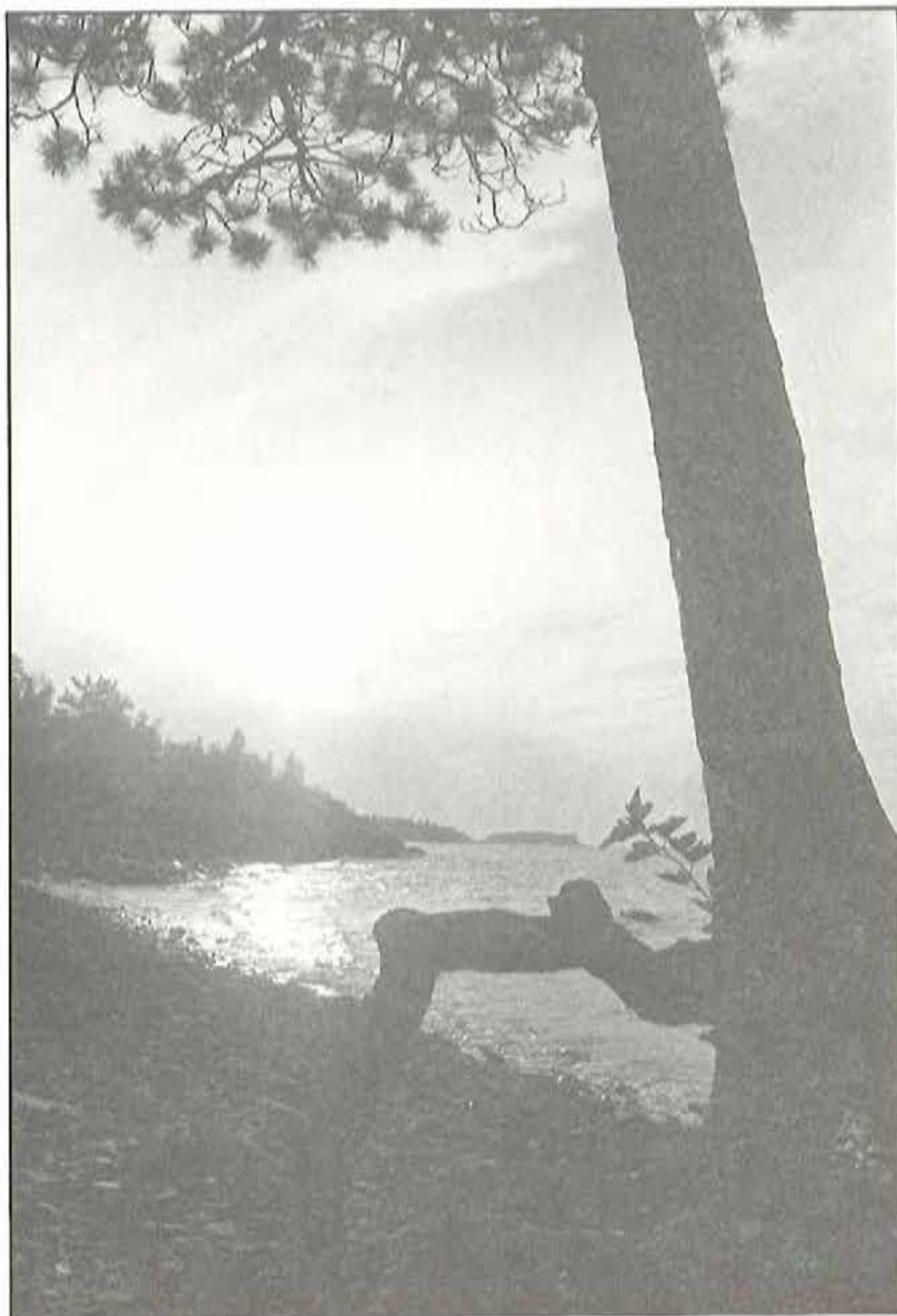
Our objective for island ownership was realized in October 1988 when Congress passed legislation transferring 537 small islands in the Great Lakes and inland waters from federal ownership to state ownership. Since many of the small islands surround state-owned property on Drummond Island and the recently acquired Lyme Island in upper Lake Huron and the St. Marys River, the DNR is developing an "Island Explorer Water Trail." The water trail will guide recreational boaters on a scenic and historic tour of these unique island resources.

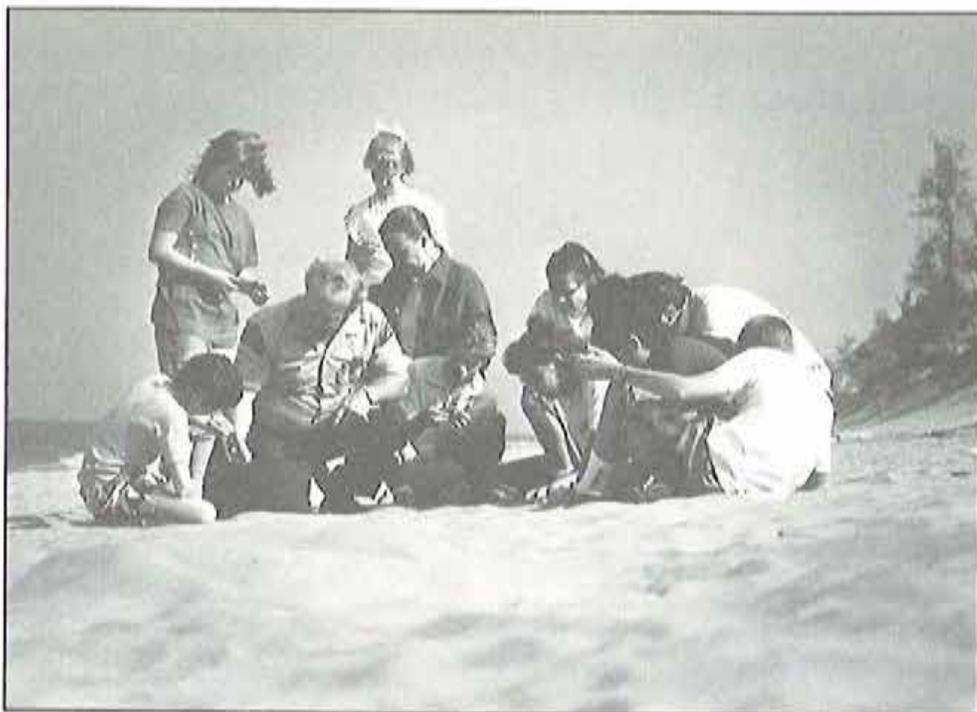
Recreational boating opportunities also will be given a boost by the new Harbor Development Fund. This newly created program is aimed at bringing together government and private enterprise in a joint effort to develop docking and related facilities.

## *Integrity of the Great Lakes Shoreland*

While we set forth to improve our shoreland management and development programs in several ways this past year, progress has been slow. DNR's Land and Water Management Division worked closely with the Governor's office and others to get several important pieces of legislation moving. The Sand Dune Protection bill, H.B. 4251, made it through several hurdles but fell short of becoming law. Two other bills that were introduced in 1988 were: a bill that would provide additional protection to new development along the Great Lakes by adding a 45 foot setback for all permanent structures and a bill ensuring that people buying shoreland property that has been designated a "high risk erosion" area would be notified of this condition prior to finalizing the sale.

In addition, the Office of the Great Lakes took a close look at shoreland development to determine its impacts on the long-term vitality of the shoreland resource. In a report that will be completed in early 1989, the Office concluded that shoreland development has significant benefits for the local communities along the Great Lakes as well as the state as a whole. The Office also determined that only about half of the communities along the shoreland use shoreland plans or other land





use programs to guide this development and ensure that the shoreland remains the vital economic and natural resource it is today.

### *Great Lakes Clean Up*

Significant progress was made in objectives for Great Lakes cleanup. Governor Blanchard and the Legislature committed \$100,000 in the DNR's 1988-89 budget for a Great Lakes shoreline clean up program. Grants of up to \$25,000 will be awarded for clean up and improvement projects such as the removal of litter and downed trees; stabilizing erosion areas; constructing benches, pathways or picnic benches along the shore; or erecting interpretive signs once the program is operational. These small projects should go a long way in expanding organized local support for the Great Lakes and major tributaries.

Efforts to clean up Michigan's 14 pollution hotspots continued in 1988. Three more Remedial Action Plans (RAPs) were publicly reviewed and completed: the Clinton River, Rouge River, and Saginaw River/Bay. Nine out of fourteen RAPs have now been completed--more RAPs than all the other states and provinces. RAPs completed in 1987 are in various stages of implementation. Some recommendations have already been completed. For example, water chemistry work and additional fish sampling have been done in Deer Lake/Carp River, fish have been sampled in Torch Lake, and Act 307 funds have been used for River Raisin sediment quality analysis.

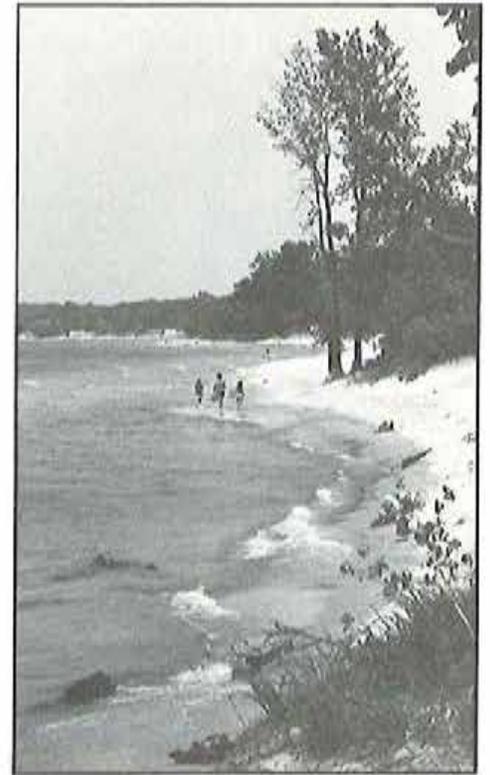
Completion dates for four of the five have been set: September 1989 for the Menominee River RAP, December 1989 for the Detroit River, November 1990 for the St. Clair River, and January 1991 for the St. Marys River. RAPs for the Detroit, St. Marys and St. Clair Rivers are being written by

officials in both Michigan and Ontario and are being developed with extensive binational public involvement. Wisconsin has the lead for the Menominee River RAP. The final RAP--for the Kalamazoo River--is being delayed as a result of on-going litigation.

### *Public Education and Involvement*

The number of people we communicate with about Great Lakes issues and problems grows each year. There is a strong commitment to and love for the Lakes across the state, and in recognition of this Governor Blanchard requested that the Office of the Great Lakes sponsor the "Great Lakes Review Days" discussed earlier in this report.

Also in 1988, we helped coordinate "Great Lakes Research Days." One of the least understood components of Great Lakes protection and management is the role of research, and yet every action we take to protect the Great Lakes ecosystem must be based on sound research. Great Lakes research includes studies which identify the affects of contaminants in the ecosystem on animals and humans; development and testing of new environmental clean up and treatment processes and new methods of environmental monitoring; investigations of the lake bottom; studies of the causes and impacts of fluctuating water levels and more. On September 30 and October 1, 1988, eight research institutions across the state had tours of research vessels and open houses, displayed exhibits and gave talks on research projects.



### *Implementing Regional Agreements*

Michigan has played a leadership role in establishing and implementing several regional agreements which enhance our ability to effectively manage and protect the Great Lakes. The integrity of one of these agreements--the Great Lakes Charter--was tested in 1988 when a proposal was made to triple the existing diversion of Lake Michigan water through the Illinois waterway to the Mississippi River in an attempt to free a few stuck barges. As Governor Blanchard explained earlier in this report, with the help of the Charter's requirement that all Great Lakes Governors and premiers be consulted when a new diversion is proposed, we were able to prevent this ill-advised diversion from taking place.

One of the requirements of the Great Lakes Charter that we made limited progress on, is a state system for reporting significant water uses. Presently, Michigan can only estimate what the cumulative water needs are for industry, agriculture and domestic supply. Industries and crop irrigators do not report the large amounts of water they withdraw from the Great Lakes and inland waters therefore, we cannot calculate the total water need for the state or any given watershed. Without this data, it is difficult to determine and plan for the impacts of a drought or a diversion of water out of the basin. Although we made significant progress in drafting a water use reporting system in the past year, needed legislation must still be introduced.

Michigan successfully implemented many portions of the Great Lakes Toxic Substances Control Agreement this year. The 1986 Toxic Agreement established a "framework for coordinated regional action in controlling toxic pollutants entering the Great Lakes system." Michigan has the lead in several areas including air toxics, biomonitoring, and uniform fish consumption advisories.



In response to the Toxic Agreement, DNR's Air Quality Division has hired a full-time staff person to work on state and regional air toxics issues. Tasks completed include a series of regional air toxics workshops. Air Quality Division staff also drafted legislation for the protection of the Great Lakes ecosystem which would require both new and existing sources of specific air pollutants to utilize Best Available Control Technology. This proposed legislation is being reviewed by the other Great Lakes states.

Surface Water Quality Division took the lead on biomonitoring by hosting a workshop to review individual state strategies. The Michigan Department of Public Health (MDPH) took the lead on uniform fish consumption advisories. New fish monitoring data was shared and discussed in February 1988 and the states agreed to use the 1987 advisories for 1988. MDPH is also working with the EPA, Ontario and other states to develop a common approach for developing fish advisories agreeable to all.

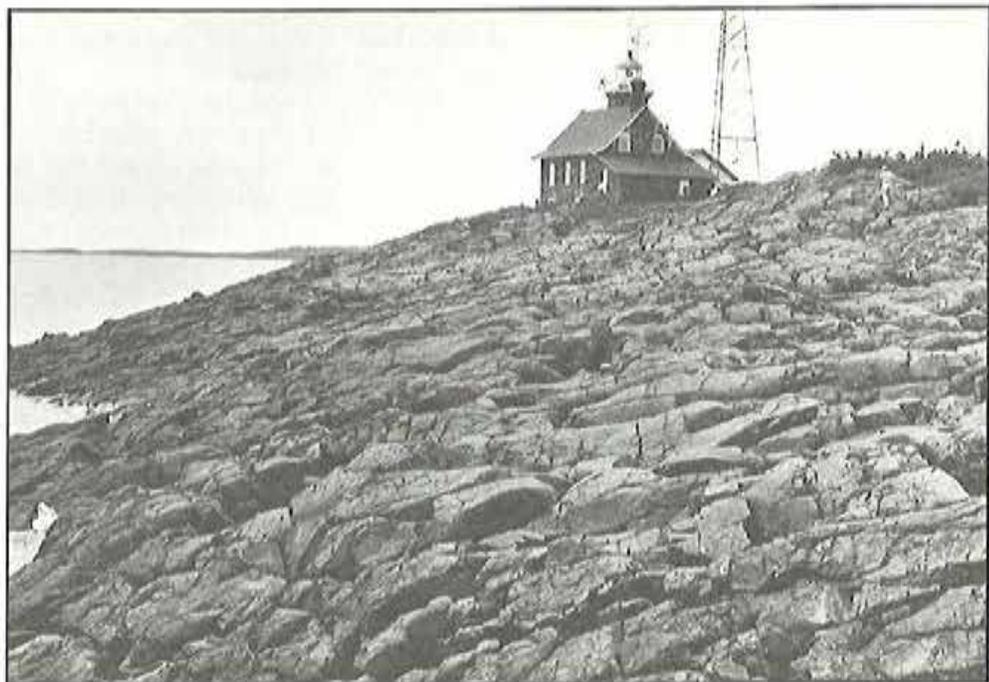
Progress was also made in implementing the Ontario-Michigan environmental accords. Renegotiation of the 1985 Ontario-Michigan Letter of Intent on emergency spills notification has strengthened our early warning process. The renegotiated agreement was signed by Governor Blanchard and Premier Peterson on April 1988 in Ottawa. Major changes in the procedure added in 1988 are immediate notification through the Michigan State Police system to the local area emergency management coordinator and notification of air releases in addition to water spills.

A new, broad cooperative agreement between Ontario and Michigan was signed in 1988. The Memorandum of Understanding on Maritime Commerce was established to coordinate efforts in maintaining an efficient, cost-competitive waterborne transportation industry and port system on the Great Lakes and St. Lawrence Seaway.

### *Waste Reduction*

It is becoming more and more clear that a key to controlling pollution is to reduce the amount of waste generated and therefore disposed of within the basin. In recognition of this, several new laws were passed to promote waste reduction. Informational, regulatory and technological barriers to waste reduction are being identified. In addition, Governor Blanchard has selected members for the Environmental Technology Board who will determine if additional state involvement in waste reduction research is needed.

Congressmen Howard Wolpe sponsored new federal waste reduction research as well. Although not passed into law, in 1988 the bill made significant progress and will be reintroduced in early 1989. This bill requires companies to report progress in waste reduction under the Community-Right-to-Know program. It also directs the EPA to establish a waste reduction office and information clearinghouse and to start a grant program for waste reduction projects.



# *Celebrate the Great Lakes*

Celebrating the Great Lakes means more than highlighting their environmental beauty--it also means rededicating ourselves to protecting them. During the last six years we have had important victories in our battle to keep them clean. But if we are to reap the bounty the Lakes offer us for tourism, agriculture, industry, transportation, recreation or drinking water we must continue to invest in the wise management of the lakes.

To ensure we do our part to protect the lakes in the coming years we will pursue the following initiatives:

## *The Great Lakes Protection Fund*

We must complete our implementation of the Protection Fund by passing enabling legislation.

## *Final Implementation of the Great Lakes Charter*

We will seek Water Use Registration legislation - another important step in our implementation of the Great Lakes Charter. This statute simply requires that significant sources of water use are identified across the state. The drought last summer reminded us what a precious commodity water can be. To properly manage it, all users must have basic information about how water is used in our state. We need this information in order to be consulted under the Charter in the event that a new or increased diversion or consumptive use is proposed.

## *Great Lakes Cleanup Grants*

We will make the first grants to spur citizen cleanup efforts of the Great Lakes and other waterways across the state. This program, sponsored by Representative Charlie Harrison, will allow individuals to become personally involved in cleaning up our Great Lakes shores and rivers at the community level. We hope that this program and the efforts of the citizens along the Rouge and Clinton Rivers act as an inspiration for all of us to Celebrate the Great Lakes by actively protecting our resources.

## *Lake Huron Fisheries Management Plan*

During the coming year, the DNR will work with the Ontario Ministry of the Environment to assemble a Lake Huron fisheries management plan. Lake Huron is a growing recreation resource. To properly manage this beautiful lake and the fishery it supports, we must build on the strong partnership with our neighbors in Ontario.

## *Michigan Ontario Agreement on Toxic Research*

This year, we will conclude a working agreement with Ontario to share the fruits of our research on toxic substances through a shared computerized information system. This state-of-the-art system allows our scientists to access the most up-to-date scientific information about toxic chemicals. In doing so we should both improve our management of the lakes.

# Agenda for 1989

## *Great Lakes Impact Statements*

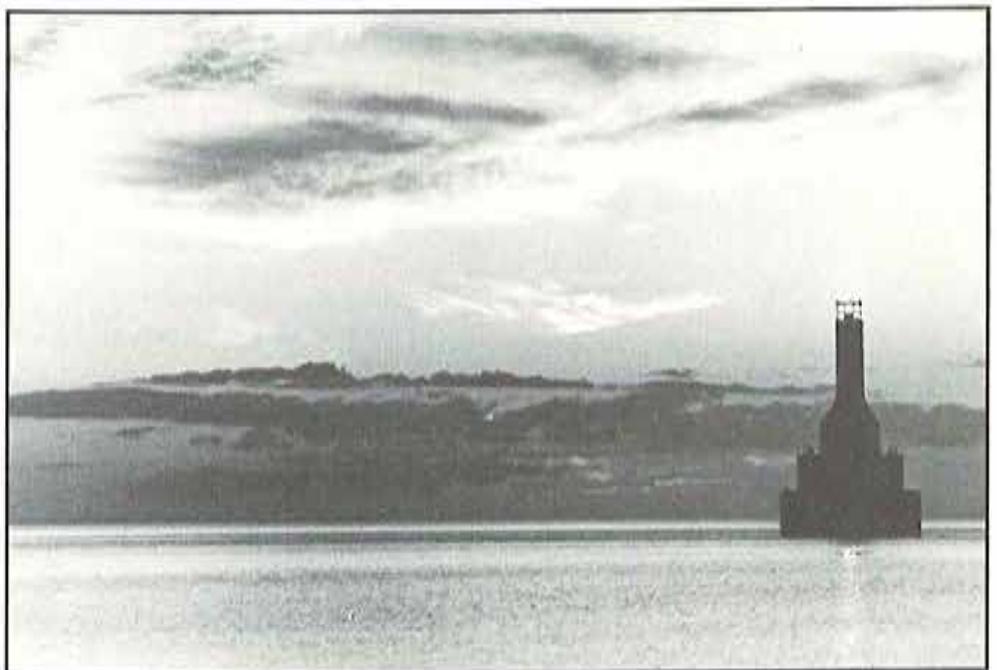
Governor Blanchard will sign an order requiring DNR to analyze new or revised surface water, groundwater, or air quality environmental protection rules in light of their effect on the Great Lakes. In particular, the assessment examines how well these rules measure up to the goals and objectives of the Great Lakes Toxic Substances Control Agreement and the Great Lakes Water Quality Agreement. This mechanism should ensure that we constantly strive to protect the Great Lakes to the greatest extent possible. In addition it will give the public a chance to hold the DNR accountable for its actions to protect the lakes.

## *The Battelle Great Lakes Laboratory*

The internationally renowned Battelle Memorial Institute has agreed to locate its Great Lakes research facility in Traverse City. This laboratory will be able to provide our companies with state-of-the-art scientific support, particularly in the area of assessing toxic chemicals. In addition they will be developing a full research agenda over the coming years.

## *Reduction of Air Toxics*

State and regional efforts to control air toxics pollution will include development of a regional, computerized air toxics database and a regional agreement among the eight Great Lakes states on air toxics permitting. The Michigan Air Toxics Policy Committee will proceed with development of a long-range air toxics strategy. These efforts will help us tackle this serious Great Lakes pollution problem.



# For Further Reading

Several of the following books were used to develop this report. For further information about Great Lakes travel, recreation and issues, you may want to refer to one or more of the following:

*Around the Shores of Lake Michigan: A Guide to Historic Sites.*

**Margaret Beattie Bogue.** University of Wisconsin Press, 1985.

*Cruising Guide to the Great Lakes and their Connecting Waterways.*

**Marjorie Cahn Brazer.** Contemporary Books. 1985.

*The Enduring Great Lakes.* **John Rousmaiere.** W. W. Norton. 1979.

*Erie: The Lake that Survived.* **Noelm Burns.** Rowman and Allanheld Publishers. 1985.

*The Faces of the Great Lakes.* **Jonathon Ela,** photographs by B. A. King. Sierra Club Books. 1977.

*Fish Michigan Great Lakes (where to, how to, when to).* **Tom Huggler.** Friede Publications. 1986.

*The Great Lakes.* **Harlan Hatcher.** Oxford University Press. 1944.

*The Great Lakes.* **Walter Massey Tovell.** Royal Ontario Museum. 1979.

*The Great Lakes: An Environmental Atlas and Resource Book.* Jointly produced by Environment Canada, United States Environmental Protection Agency, Brock University, and Northwestern University. 1987.

*Great Lakes Cruise Handbook: A Guide to Passenger Cruises, Excursions and Ferry Services on the Great Lakes and St. Lawrence River.* Harbor House Publications, Inc. 1988.

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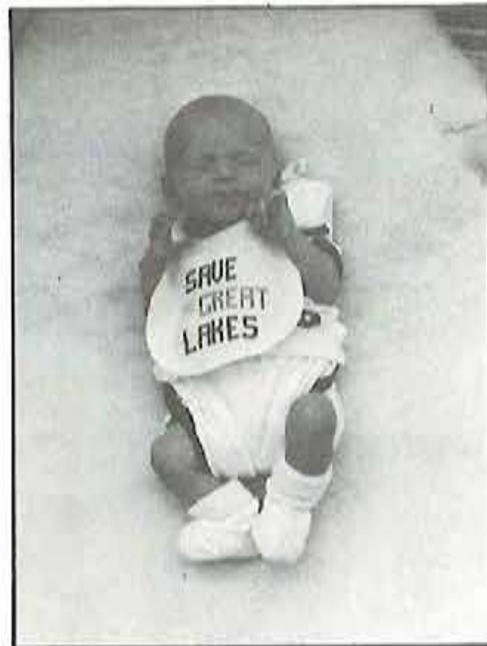
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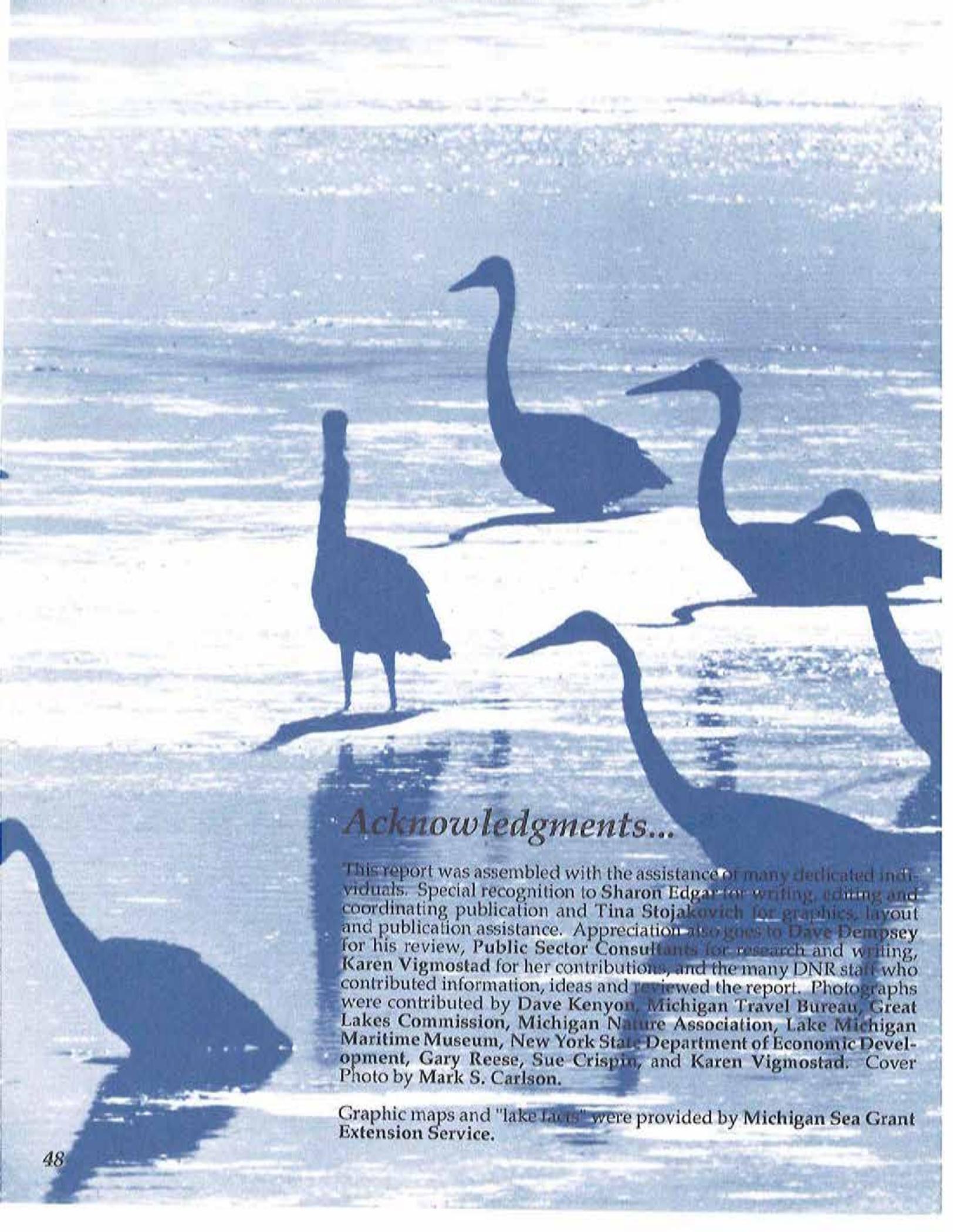
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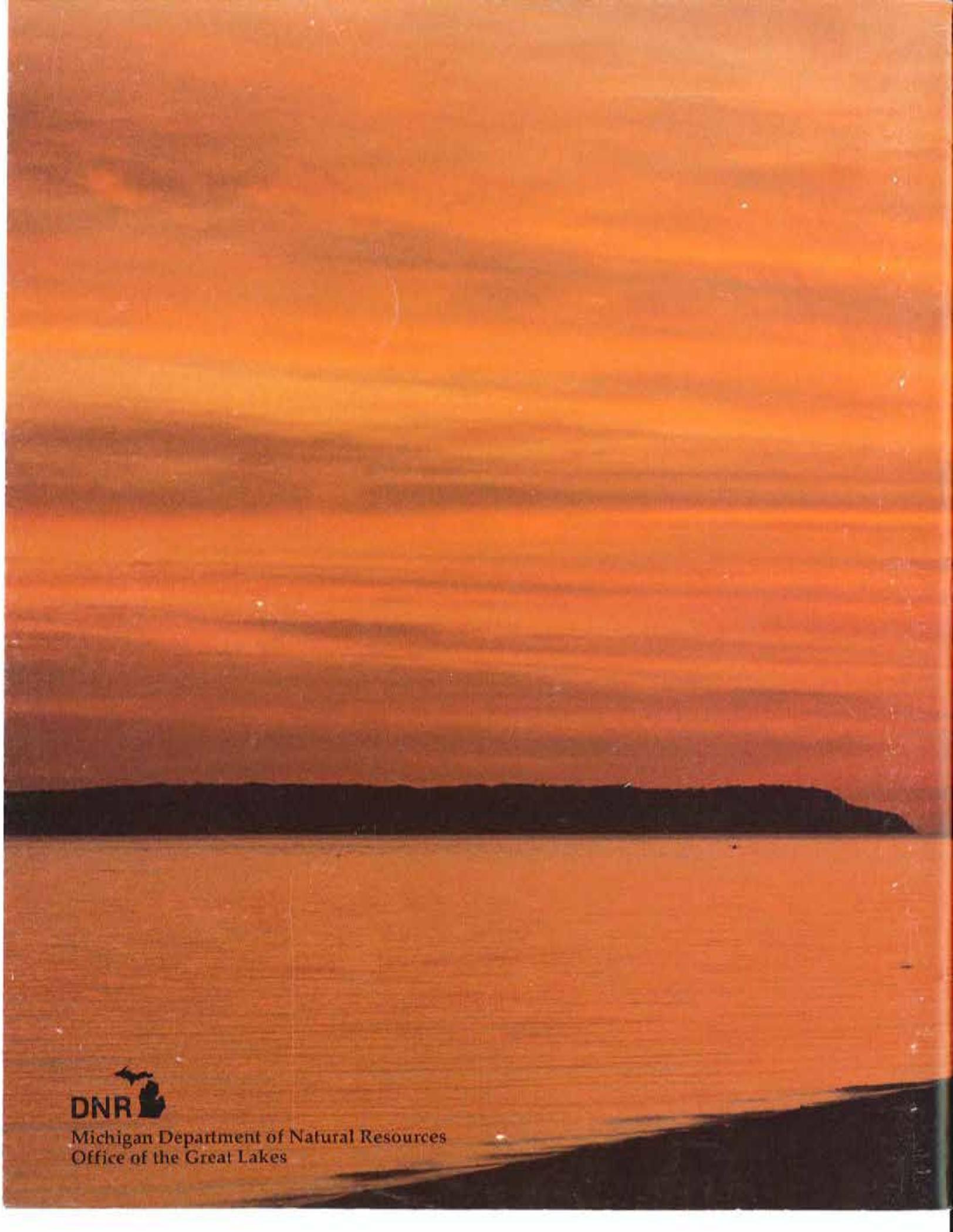
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