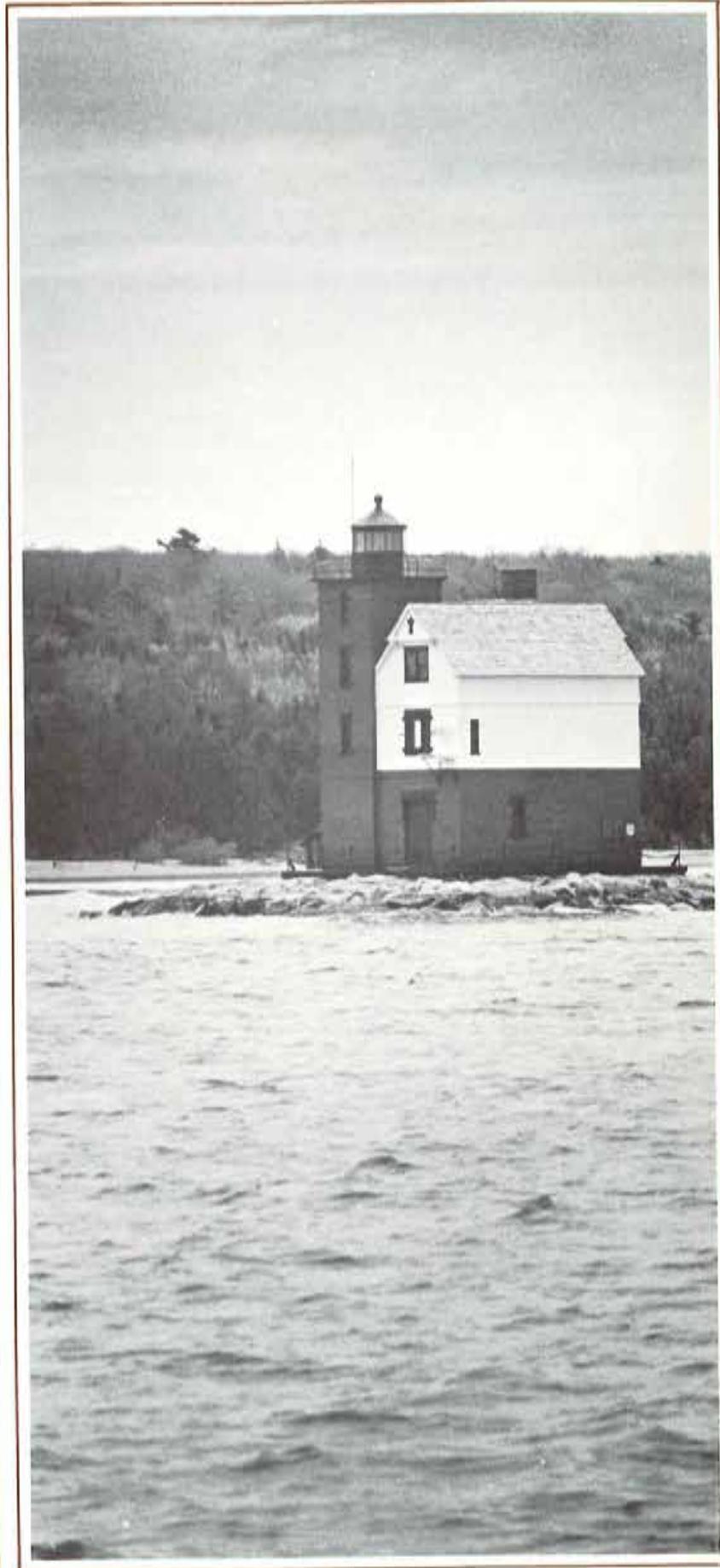

State of the Great Lakes

1987-88



State of the Great Lakes

Annual Report
for 1987-88



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.



STATE OF MICHIGAN
OFFICE OF THE GOVERNOR
LANSING

JAMES J. BLANCHARD
GOVERNOR

Two themes run through this third annual report on the State of the Great Lakes and underscore the continuing importance of this resource to the people of Michigan. First, by tracing the history of Great Lakes development and management as a part of our state's 150th birthday, this report makes it clear that Michigan's fate has been—and always will be—linked to the protection and wise use of water resources.

Second, by chronicling shortsighted exploitation of the Great Lakes in the past—and the subsequent decline in water quality, fisheries resources, and tourism—this report reminds us that our goal must be long-term, sustainable economic development based on what is best for the resource and the people who depend on it.

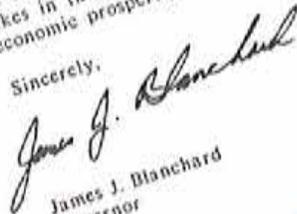
My administration is committed to this principle of Great Lakes management. In the past year, we have launched several initiatives that hold promise for achieving two objectives at once: creation and retention of Michigan jobs, and an improvement in Michigan's environmental quality.

We support both state and federal legislation, originally endorsed in the 1986 Great Lakes Governors' Toxic Substances Control Agreement, to establish a new government approach to businesses' toxic contamination. These bills would provide information and financial incentives to businesses to encourage reduction of toxics at the source—before these materials ever enter the environment. Our experience shows this is far better for public health, and far cheaper for the taxpayer, than limiting toxic emissions and ultimately paying for expensive cleanups. Toxics reduction at the source also can save businesses money and improve our economic climate. I am determined that we will achieve this goal.

We also released a report this year on the potential to expand Michigan's water and wastewater treatment industry. Prepared by the Office of the Great Lakes, this report identifies important opportunities for Michigan to stimulate the growth of businesses which create and disseminate treatment technologies. This is a natural area in which Michigan, the Great Lakes State, can concentrate economic development efforts. The benefits to our environment and economy are great.

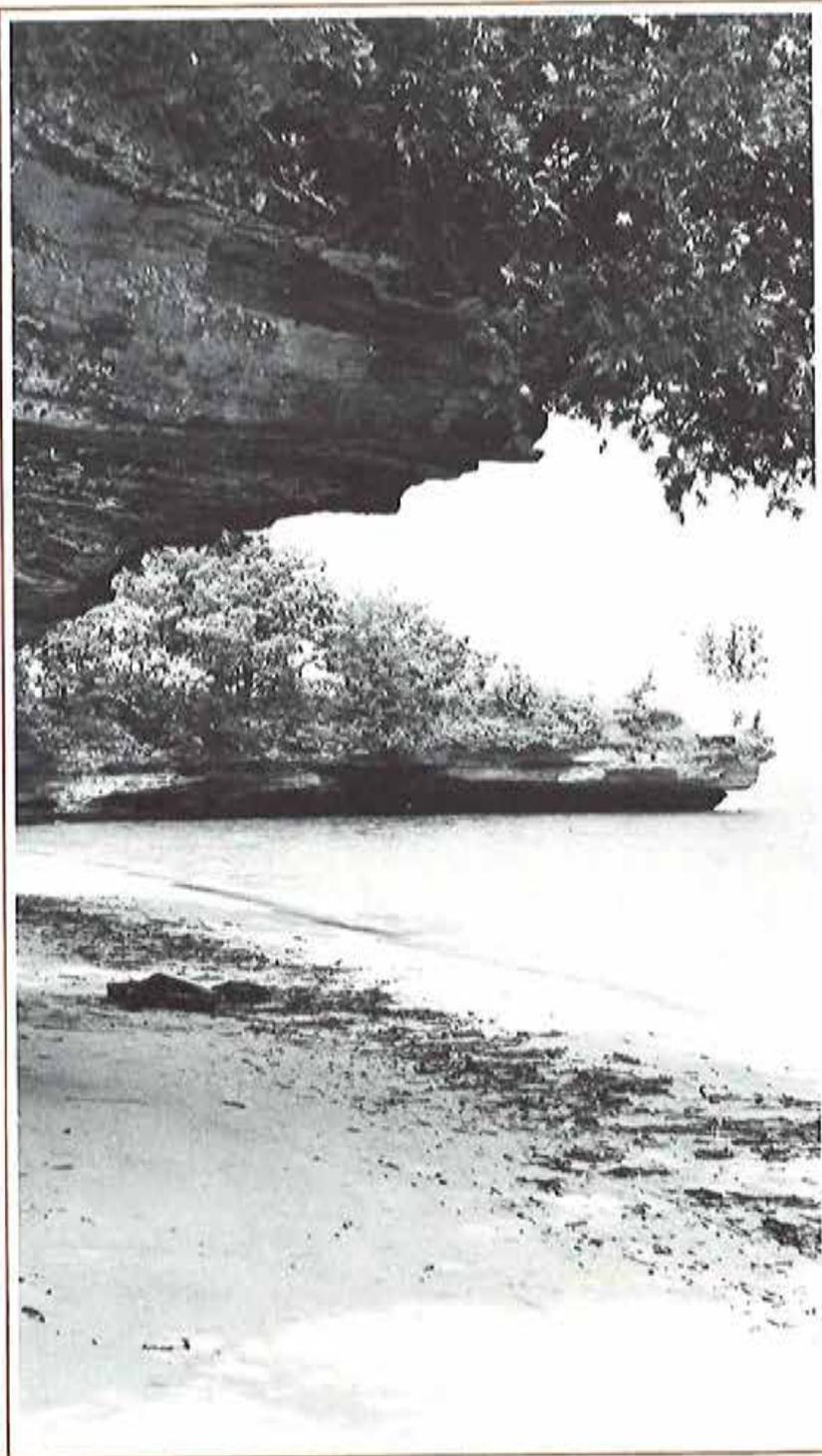
The next 150 years offer us the opportunity to demonstrate that we have learned from the mistakes of the past. I am confident we will chart a course to the future that considers foremost what serves the Great Lakes in the long run. In doing so, we will also serve ourselves, our children, and the economic prosperity we seek.

Sincerely,


James J. Blanchard
Governor



Introduction



This report relies heavily on many excellent State of Michigan documents, history books, brochures, and other materials which are listed on the reference page at the end of the report. It also relies heavily on the many people who shared written materials, personal experiences, and photographs which greatly added to this report. These individuals are also listed on the reference page.

The Great Lakes: They have changed, and they have changed us. Pristine and untouched by human hand for thousands of years, the Great Lakes have felt our influence for but a moment in time. To us in a modern, hectic world, the hundreds of years that have passed since the first European explorers roamed these shores seem like an eternity. To the Great Lakes, however, these years have been a brief, but rude, awakening; especially during the 150 years since Michigan achieved statehood.

The celebration of Michigan's sesquicentennial prompts each of us to take a moment to reflect on the past and its lessons. How have our attitudes toward the Great Lakes changed over time? How has our treatment of them changed? What can we learn from the history of the Great Lakes to aid us in our endeavors?

To the first North Americans, the Lakes and their resources were valuable sources of food and sustenance. Europeans who appeared nearly 400 years ago hoped the Lakes would serve another function: first, as a water route to the Orient, and later as an avenue for exploration of the North American interior.

The Lakes' value as a transportation lifeline to distant markets dominated thinking for the 300 years following the establishment of European commerce. First they served as a network to move valuable furs to Europe. Then they became a route for settlers into the region from Europe and for natural resources and farm products out of the region to the prosperous markets of the Eastern seaboard. Next, the Lakes' trade fed the growing

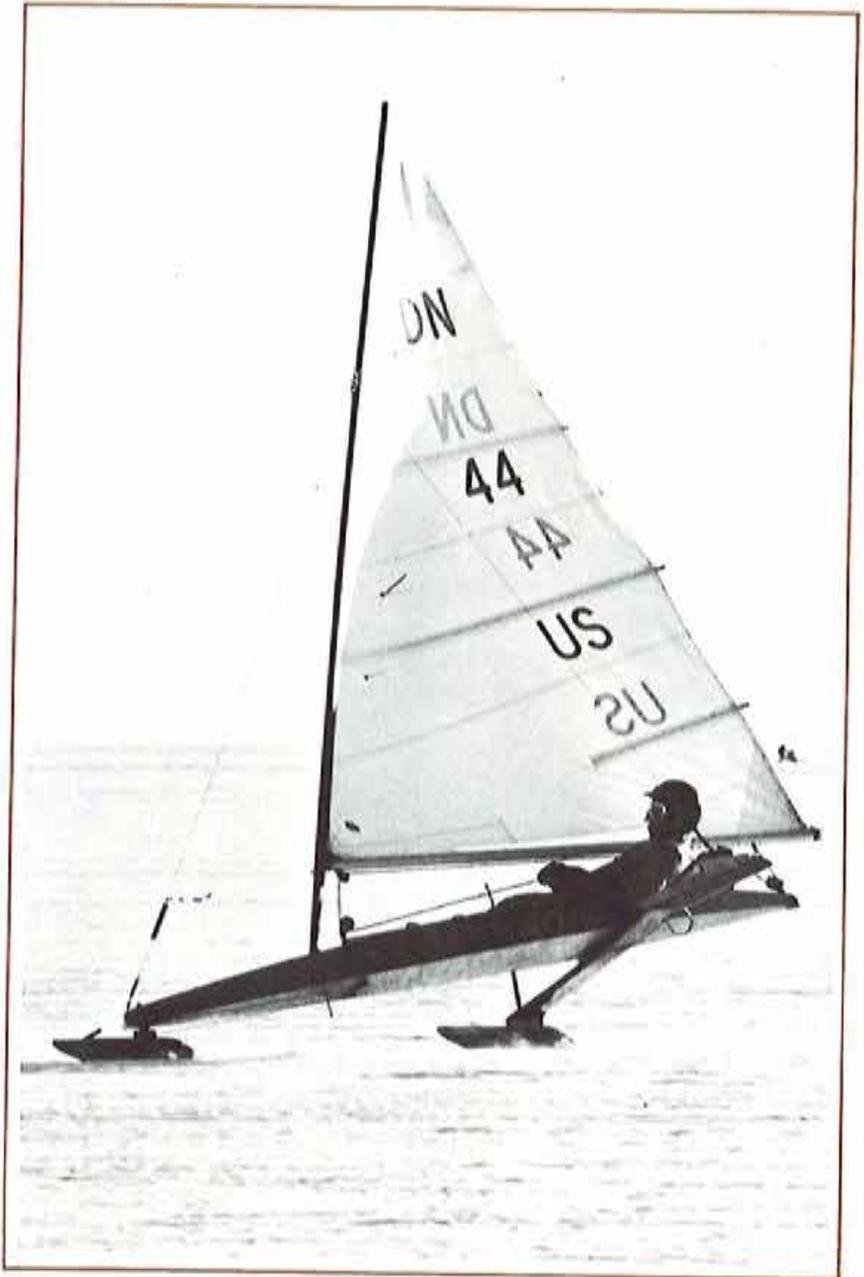
Where We've Been And Where We're Going

industrial centers built on iron ore, lumber and coal. Finally, trade with Europe blossomed again with the completion of the St. Lawrence Seaway in 1954.

But throughout this time, attitudes toward the Lakes were changing. Their fisheries provided food for growing American markets--until the fish were nearly gone. To the industrial centers of two nations, the Lakes provided an all too convenient place to dispose of waste--until the effects became disastrous. Municipalities and the growing population they served took water from the Lakes--until their use was limited by abuse.

The Great Lakes as a recreation mecca? This must have seemed equally unimaginable to the voyagers in 1700 and to homeowners along Lake Erie in 1965. Yet to the thousands who cruised the Lakes in luxury steamers at the turn of the century and the boaters of today, it was and is a pleasant reality. So, too, for the thousands who flock on a sunny summer day to a sandy Lake Michigan beach or a pebbled Lake Superior shore.

The history of the Great Lakes is full of change. Change in attitudes and perspectives, use and abuse, the Lakes themselves and us. This report offers a brief glimpse of this change: How and why it came about and what it has meant to the Great Lakes and the region they define. This report also talks about hopes and dreams. The hopes and dreams that many share for the future of the Great Lakes.



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The Early Years Of The Great Lakes :

Geologic History

In the time frame of geologic history, the Lakes are very young. The last retreat of the Wisconsin Glacier some 15,000 years ago marks the beginning of the Great Lakes. To put this into perspective, if all time since the earth was formed could be condensed into an hour, the Great Lakes would have been born in the last few seconds. Although the shape of the Lakes changed dramatically as the glaciers receded, it is the glacial advances and retreats which scoured out the modern Lake basins and defined their shapes.

Despite its recent origin, the Great Lakes basin is also a study in contrasts. As young as the Lakes are, one can also find the oldest rock in North America on the northern shores of Lake Superior: part of the Precambrian Shield.

The Beginning Of Human Habitation

Human influence on the Great Lakes began many hundreds of years ago when native American tribes discovered the Lakes on their journeys from the northwest. The Lakes not only provided abundant fish, waterfowl, and edible wetland plants but also an easy transportation route across the region. The first value attached to the Lakes must have been for their productive food resources since trade among Great Lakes tribes was slow to develop. In the spring, summer, and fall months, numerous native villages moved to the shores of the Great Lakes to take advantage of their abundant resources. Disbanded in late fall, individual family groups would move to winter hunting grounds generally in more inland areas.

The harvesting of fish, fowl, and water plants by the tribes of the Great Lakes region did little to affect the ecology of the Great Lakes. Their population numbers never reached a point where over harvesting threatened the ecosystem. Their attitudes toward resources were also very different than the Europeans. They viewed resources as gifts that could be used to sustain and shelter. The resources were not owned by individuals, and it was against cultural norms to waste them. It is these attitudes that cause people to label native Americans as the first conservationists.

European Influence

In 1615 a new chapter in the history of the Great Lakes region began when Le Caron, a Recollect friar, and Samuel de Champlain, the founder and Governor of Canada, first paddled upon the Great Lakes. In following the traditional route to the west, they travelled up the Ottawa River, passed into the Great Lakes basin by portaging to Lake Nipissing, and finally emerged from the French river on Georgian Bay of Lake Huron. The Lachine Rapids west of Montreal convinced early explorers that the Ottawa River was the main waterway to the west. Later that same year, Champlain also travelled southwest from Montreal around these rapids to discover Lake Ontario.

Six years later, searching for a water route to the Pacific, Etienne

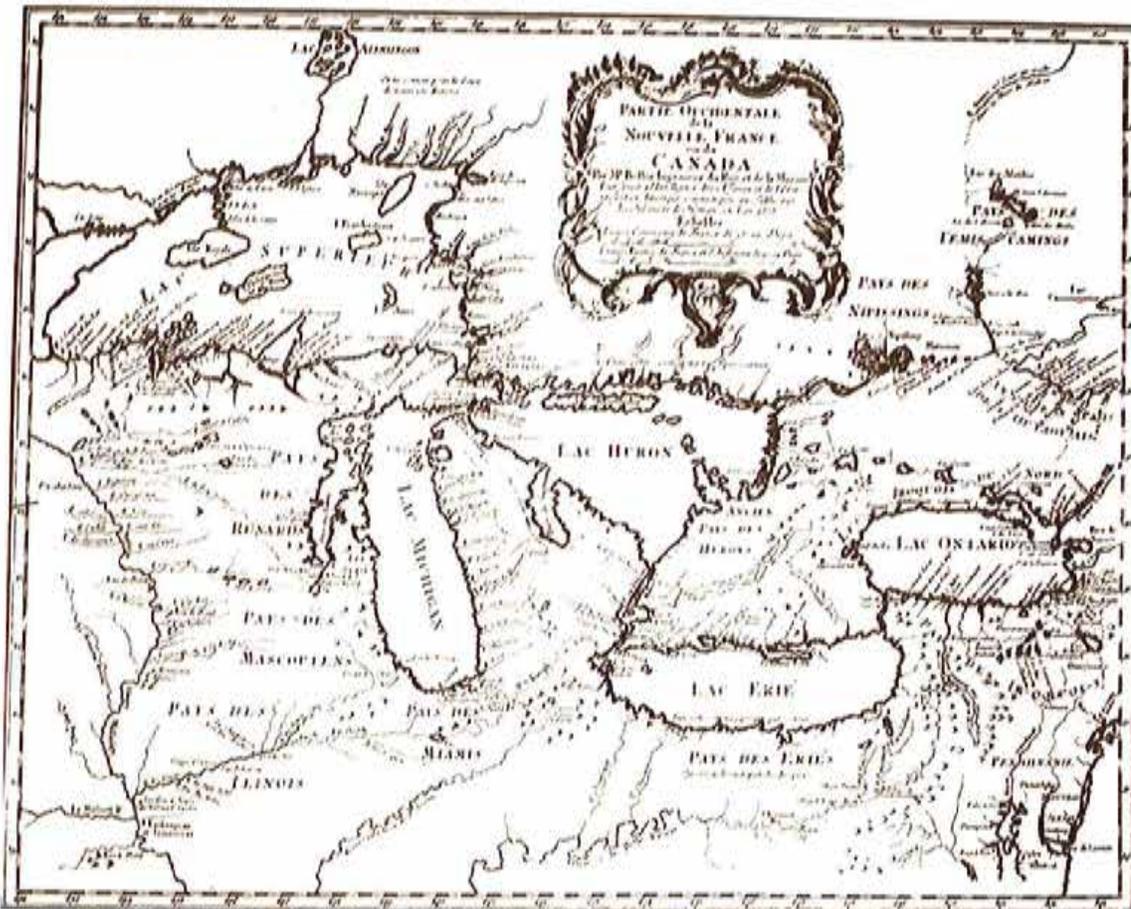
The total area of the Great Lakes drainage basin is 295,200 square miles. Michigan's 38,575 square miles of Great Lakes water area and 58,216 square miles of land and inland water area comprise almost one-third of this total. If you total up the length of Michigan's Great Lakes shoreline, it amounts to more miles than are along America's entire Atlantic seaboard. (Water Resources Commission, 1967)

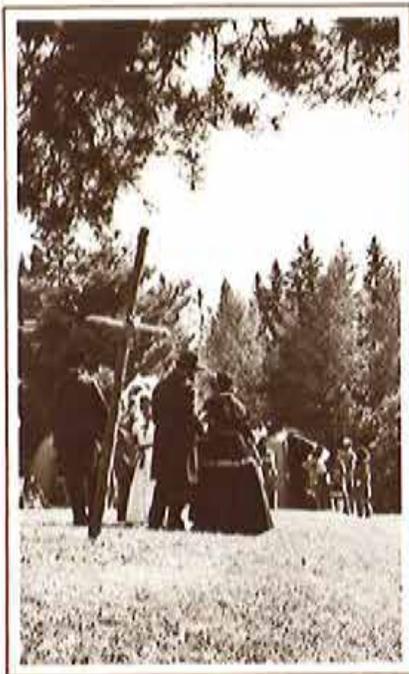
Their Importance For Food And Trade

Brule, a protege of Champlain, paddled northwest through Georgian Bay, entering the Saint Marys River and finally Lake Superior. The year was 1622 - making Lake Superior the third of the Great Lakes discovered by Europeans. Lake Michigan was not discovered until 12 years later in 1634. Lake Erie, now one of the most populous and heavily used Great Lake, was the last discovered, in 1669 - a full 47 years after Lake Huron and Ontario.

These early European explorers traveled the Great Lakes for the sole purpose of finding a water route to the rich lands of the Far East. They hoped to avoid the long and dangerous journey around the tip of Africa; the only route known to exist at the time. When it became clear that the Great Lakes did not lead to China, the focus of exploration shifted and the Lakes provided the preferred route for exploration of the North American interior. For instance, LaSalle, embarking from Lake Michigan, followed the Illinois and Mississippi rivers to the Gulf of Mexico in 1682.

During the 1650s, when traders returned to Quebec with rich cargos of furs nurtured by abundant marshes and wetlands, the Great Lakes region began to be eyed for the vast resources it contained. This marked the first real shift in European attitudes about the Great Lakes and triggered a hundred-year struggle among the European powers to claim the region as their own.





Trade became the name of the game and beaver pelts its currency.

Having been developed for the fur trade, the northern Lake ports and cities are centuries older than those on the lower Lakes (except for Detroit). Sault Ste. Marie, St. Ignace, L'Anse, and Mackinac were all ports before 1700. Mackinac, where furs from throughout the region were collected and shipped to Montreal, became the big fur center of the "West." (Water Resources Commission, 1967)

John Kern notes that the "first millionaire in the United States, John Jacob Astor, founded his American Fur Company headquarters on Mackinac Island in 1808" (1977).

Control of Great Lakes Transportation

With the fur trade, the Great Lakes became highways of regional commerce. With the founding of Detroit in 1701, the French were in control of all the strategic points in the Northern Lakes region.

From 1689 to 1760, France and Britain fought four international wars for empire. Control of the important water routes which the Great Lakes provided was the key to control of the entire North American interior. Thus the settlements of Detroit, Michillimackinac, St. Ignace and those further west, which controlled access to these routes, were considered key points.

These posts remained French until 1763 when they became British territory with the signing of the Treaty of Paris. Just 20 years later, much of the Great Lakes region changed hands again as the articles of peace were signed in 1783 -- ending the American Revolution. It was at this time that the present boundary between Canada and the United States was established.

The War of 1812 shifted control back to the British for a short time. The battle of Lake Erie which returned Detroit to U.S. control in 1813, provides evidence of the importance competing powers placed on the Great Lakes as gateways to the interior.

Naval War On The Great Lakes

The Americans realized they could not win the War of 1812 without a fleet on the Great Lakes to defeat the English ships. Oliver Hazard Perry, then 28 years old, was given the task of building ten ships to form the fleet. When the ships were ready, they blockaded Fort Malden at Amherstberg by controlling the water near Put-In-Bay. When food supplies at the Fort ran out, six English ships sailed out to do battle. In what was considered a stunning naval victory, Perry defeated the British fleet on Lake Erie thus ending the only naval battle ever fought on the Great Lakes. After the war of 1812, the Rush - Bagot Agreement forever outlawed war on the Great Lakes.

Boundaries - The Great Lakes Influence

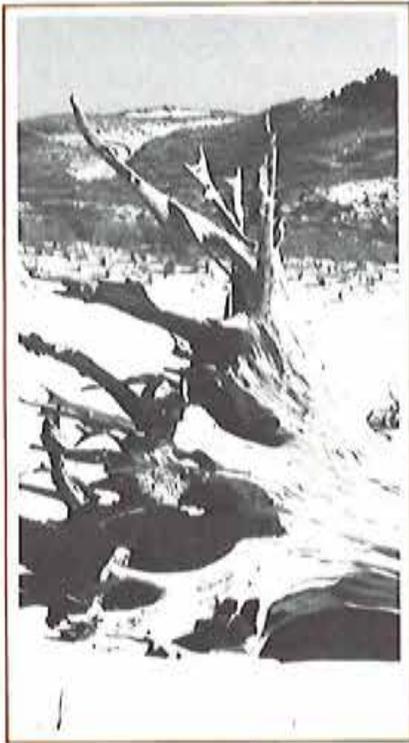
One of the most important questions to be settled at the close of the American Revolution was the boundary lines of the liberated colonies on the north and west. As John Mansfield pointed out nearly 100 years ago, "the importance, so far as it relates to the Great Lakes, was much less appreciated than it would be now. Questions like the fisheries at Newfoundland received greater consideration." (1899) The first boundary proposed by the U.S. would have given the U.S. the whole of Lakes Ontario, Erie, Huron, and Michigan and a portion of the southern shores of Lake Superior. The British representative was disposed at first to concede this boundary, but complications arose. France and Spain elected to become parties to the proceedings. Both wished to contain the expansionist-minded Americans east of the Alleghenies to aid their own future colonization plans.

Regarding the Northwest Territory, the Americans proposed two alternatives after other issues had been settled. These alternatives were offered as recompense for conceding the Mississippi as the western boundaries of the colonies. One fixed the boundary at the forty-fifth parallel, cutting across the middle of the lower peninsula of Michigan. The other set the boundary in the middle of the chain of Lakes: the current boundary. Britain chose the latter so they would have frontage on four of the five Lakes. Certain opposition from France caused this provision to be incorporated into a secret article which did not become known until after the treaties had been signed.

The importance of the Great Lakes was not lost on the new American states. The configuration of states bordering Lake Ontario and Erie is proof of the importance placed on having a foothold on the Lakes. In 1805 the boundary of the Michigan/Illinois territory was established down the middle of Lake Michigan. This line continued north to the Canadian border including what is now the eastern Upper Peninsula. When Indiana became a state in 1816, its northern boundary was set as a line 10 miles north of the southern bend of Lake Michigan. The objective of this designation was to give Indiana a piece of the growing Great Lakes trade.

In 1835, two years before Michigan statehood, the Toledo War again changed the boundaries of the Michigan territory. A strip of land 70 miles long and approximately 7 miles wide - including the town of Toledo, Ohio - was claimed by both Michigan and Ohio. War was narrowly avoided when in 1836 the U.S. Congress awarded the valuable strip of farmland to Ohio and awarded Michigan the western and central Upper Peninsula as compensation. Ohio also wished to retain the "Toledo strip" for very important water transportation reasons. It planned to build a canal from Toledo to the Ohio River to capture the increasingly valuable traffic coming up the Mississippi.





Early Vessels On The Great Lakes

The early history of the Great Lakes saw great change in the vessels that sailed upon them. Canoes were the primary method of transportation for many centuries: Indian birchbark canoes followed by the large *maitre* and smaller *canots du nord* of the French voyagers.

The *Griffin* was the first sailing ship on the Great Lakes, launched on Lake Erie by LaSalle in 1679. Other sailing ships followed, but were not common until almost 100 years later.

With the increase in commerce after the War of 1812, steamboats were introduced on the Lakes. The launching of the Canadian trader, the *Frontenac*, in 1816 made this the first steamer on the Lakes. The first American steamboat, *Walk-in-the-Water*, was launched on Lake Erie in 1818. Both were paddlewheelers.

Beginnings Of Settlement

Until the 1830s, Michigan was still a land for exploration and the fur trade. In 1805, the Michigan Territory contained 3,000 non-Indian residents, 900 of them in Detroit. A majority were French Canadians. Indians numbered 6,000 to 8,000. By 1820, the Michigan population included only 9,000 non-Indians. Few people would move into the Michigan territory before the mid-1820s, although Indiana, Illinois, and Ohio received many settlers before the mid-1820s.

With completion of the Erie Canal in 1816, a cheap, safe water route from New England and New York to Lake Erie and thence by ship to the entire Great Lakes region was established. This crucial event spurred settlement of Michigan. Because this route was preferred to overland routes, by 1850 immigration to Michigan flourished. This water route also gave a special flavor to the population with immigrants from the northeastern U.S. outnumbering those from the south 45 to 1. This compares to Indiana and Illinois, where southerners outnumbered northeasterners 7 to 5. So it was the Great Lakes that gave Michigan and later Wisconsin their distinct "Yankee" orientation. By 1830, Michigan's population was 29,000; by 1840, 212,000.

By 1836, when settlement fever peaked, travel on the Lakes was flourishing. During May of that year there were 90 steamboat arrivals at Detroit, each with passengers (mostly farm families) for Michigan and the West. Most of this travel and the commerce that went with it, took place on Lakes Erie and Ontario with an occasional trip to Chicago or Mackinac. Already the centers of settlement and commerce were shifting from the northern to the southern Lakes. The Erie Canal and later the Welland Canal, completed in 1829, can be credited with this change.

The Great Lakes value as a transportation network would continue to grow after statehood as would their value for other uses. The transformation of the Lakes as they had existed for hundreds of years had irreversibly begun.

1837-1887—Early Statehood

Early Traffic

The first fifty years of Michigan statehood produced explosive population growth and active commerce which can be directly attributed to the influence of the Great Lakes. Our 212,000 residents in 1840 increased to 2,100,000 by 1890. According to John Kern, by 1846 "sufficient numbers of [settlers] had settled across the southern portion of the Lower Peninsula to warrant moving the state capitol from Detroit to a more central location." (1977)

John Mansfield reported that in 1839, "the increase of business with Chicago and ports west of Detroit... had become so large that a regular line of eight boats was formed to run from Buffalo to Chicago making one trip every 16 days." (1899) Emigrants were settling in territories west of the new State of Michigan. By 1845, there were three daily lines of large steamboats leaving Buffalo for Toledo, Detroit, and Lake Michigan. In 1845, there were approximately one-quarter of a million Lakes passengers.

The bulk of early commerce on Lake Michigan was on the Wisconsin shore. Boats occasionally touched at St. Joseph and Michigan City, but because of a lack of harbors, there were no other stops. The principal cities on the Lakes in 1846 were Buffalo, Cleveland, Toledo, Detroit, Erie, and Chicago.

Products Begin Moving East

The first large scale use of the Great Lakes transportation network was in moving people and products into the region.

Outbound traffic developed as settlement progressed. With the rapid end of the frontier in the Midwest and the spread of agriculture, grain became the chief bulk commodity transported on the lakes. The first major movement of grain was up the Ohio canal systems to Lake Erie, eastward to Buffalo, and from there down the Erie Canal. By mid-century Chicago and Milwaukee were important western shipping terminals, as was Cleveland in the east, with Buffalo the main receiving port. By 1850 Chicago was shipping 50,000,000 bushels of wheat a year. As the grain trade slowly declined at the Lake Michigan ports, it increased from those on western Lake Superior. (Water Resources Commission, 1967)

The Great Lakes' importance for transport of people and products was not confined to the basin.

New England sent her manufactured goods to the Lakes' region and received in return the agricultural products and minerals of the west. Louisiana won, by virtue of the transportation facilities of the Great Lakes, a rapidly increasing market for her sugar and molasses. (Mansfield, 1899)

A Trip Through the Lakes of North America, published in 1857, offers a glimpse of life around Sault Ste. Marie just before this construction: Sault Ste. Marie contained 15-20 stores, some manufacturing, and a population of approximately 1,000 U.S. citizens and 300 Canadians. The U.S. side supported two hotels while the Canadian side contained only one. Many of the inhabitants and Indians in the vicinity were engaged in the fur trade and fisheries; the latter being an important and profitable operation. Indians had the exclusive right to take fish in waters contiguous to the rapids. And for those interested in recreation, the Indians "will also run the rapids when desired by citizens or strangers - this being one of the most exhilarating enjoyments for those fond of aquatic sports."

The Day Niagara Falls Stopped

A strange event marked the winter of 1847-48, one which has never occurred since. As reported by John Brandt Mansfield in his 1899 book *History of the Great Lakes*:

The winter had been exceptionally severe and ice of unusual thickness had formed on Lake Erie. The warm spring rains loosened this congealed mass, and on March 29, 1848, a brisk east wind suddenly veered round and blew a heavy gale from the west. This naturally turned the ice in its course, and, bringing it down to the mouth of the Niagara river, piled it up in a solid, impenetrable wall. So closely was it packed that in a short time the outlet to the lake was completely choked up, and little or no water could escape. Quickly, the water below this frozen barrier passed over Niagara Falls, and the next morning the people were treated to a most extraordinary spectacle. The roaring, tumbling rapids above the Falls were almost obliterated, and nothing but the cold, black rocks were visible in all directions. The news quickly spread, and crowds of spectators flocked to view the scene, and the banks on each side of the river were lined with people during the whole day. At last there was a break in the ice. It was released from restraint, the pent-up wall of water rushed downward, and Niagara was itself again.

In 1845, Missouri contributed lard oil to the Lake trade, Kentucky shipped hemp and other southern states transported a variety of products.

River traffic reached its height during the 1840s and 1850s linking Michigan's interior with her Lake trade. Detroit built sailing vessels and steamers, both paddlewheels and propellers. St. Joseph and Saginaw also became important boat building sites as keelboats and shallow-draft steamboats plied the St. Joseph, Kalamazoo, Grand and Saginaw rivers.

Vessels On The Lakes

As described in a Water Resources Commission report:

The white-winged schooner was the "common carrier" until the late 1870's. In their heyday, as many as 1,800 of them crowded the lake ports. The bigger schooners were fast, reliable vessels, remarkably long-lived (40 years or more) and about 200 feet in length. Much of the fleet was somewhat smaller -- nearly all carried three masts. (Water Resources Commission, 1967)

But the schooners' demise was imminent as steamers chugged into view. The last schooner was built in 1889, and the last schooner on the Great Lakes was taken out of service in 1910.

Although ores, grain and lumber were carried mostly by schooner, passengers and package freight were transported by steamer even before the Civil War. The first steam vessels used to carry bulk freight were wooden and carried sails to augment their engines.

Travel on these boats however, was often dangerous. Boilers blew up, sudden storms arose, there were fires and collisions -- all of which took a heavy toll...Yet... from the opening of the Erie Canal until the completion of the railroads in the 1850s, these lake boats were the chief means of transportation to the West. (Water Resources Commission, 1967)

The Opening Of A New Era In Great Lakes Transportation

In the 1850s, railroads expanded around the Great Lakes. At first this was beneficial to the Lakes' trade by linking distant sources of freight with Great Lakes ports. But over time, it diminished Great Lakes traffic. Passenger traffic went first because railroad travel was quicker. While the opening of the Sault Locks in 1855 afforded some relief by creating access to Lake Superior, there were more ships on the Great Lakes than cargo to fill them. Fortunately there was an outlet for this surplus capacity. In 1856, the first direct shipment was made from Lake Michigan for Europe. The cargo was wheat unloaded at Chicago and Milwaukee.

The Sault Canal

Even canoeists had difficulty navigating the falls of the St. Marys River. To solve this problem, as early as 1798 the Northwest Fur Company built a small lock on the Canadian side of the River to transport the large canoes carrying cargo up into Lake Superior. The second "Sault Lock", the forerunner of those we know today, was built from 1853-1855 by the Saint Marys Falls Ship Canal Co. The company was paid with a grant of land that the U.S. Congress had given to the State of Michigan. The Canal was completed in two years at a cost of one million dollars, and the company received its 750,000 acres. At the site of the Lock itself, 1,200 to 1,600 men were employed. Many others toiled at the quarries or procured wood and other materials.

The Lakes Importance To Economic Development

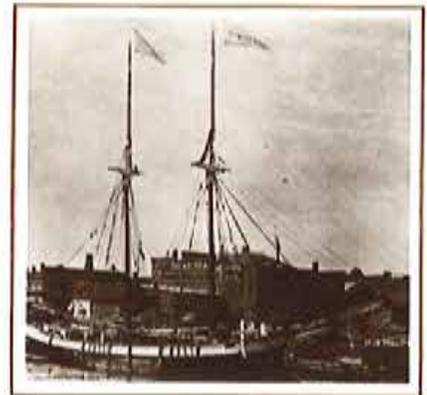
Michigan agriculture profited greatly from the State's transportation revolution which linked rail and river corridors with Great Lakes ports. Able to move Michigan farm produce to national markets and return with hardware and general merchandise cheaply, these transportation networks nurtured development. Rural population, more than 90 percent of the pre-Civil War total, almost doubled in the 1840s and again in the 1850s. The cash value of these farms tripled.

Michigan's extractive industries, lumbering and mining, also benefited from this transportation system. During the late 1830s, steam-driven sawmills opened in Flint and Saginaw and on the southwestern shores of Lake Michigan. Timbering reached its peak in the Saginaw Valley in 1880 when 60 large sawmills scented the air above the twin industry capitols of Bay City and Saginaw. (Unlike today, the Saginaw Valley and much of the southern part of Michigan was covered with high-quality hardwood and pine forests.)

All the major rivers were used to float logs to waiting mills. Schooners, steamships, and railroads carried lumber from these mills to waiting markets, primarily in Buffalo and Chicago. In addition, large barges were used to transport lumber and logs. These huge rafts of logs and lumber tied together were towed by steamers to receiving ports. Lumbering would remain a prominent part of the Michigan economy until 1900 when the forests were exhausted.

Commercial mining began in the Upper Peninsula in the 1840s. Development accelerated upon completion of the Sault Canal in 1855 and the deepening of the St. Clair and St. Marys rivers in 1857. According to John Kern:

When Easterners learned of state geologist Douglas Houghton's 1841 report on extensive copper deposits along the southern shore of Lake Superior, miners began to swarm into the region - thus Michigan's copper rush preceded the gold rush to California. After the frontier boom years, from 1843 to 1846, most prospectors moved on [and the organized mining companies moved in]. (1977)



In 1872, the greatest lumber tow on record was made from Saginaw to Buffalo. It contained six million board feet of lumber, enough to lay a ribbon of wood one foot wide from Copper Harbor to Detroit and back again.

For an exciting view of early mining life, visit the ghost town at Fayette State Park. Preserved there is one of Michigan's boom town pig iron operations.

Kern also relates that by 1860, "thirty-three companies along the Keweenaw Peninsula employed 3,700 people and produced three fourths of the nation's copper. Iron ore, discovered at Negaunee by surveyor William Burt in 1844, began to reach Great Lakes markets by 1848." (1977) Great Lakes transportation and iron ore mining soon became strongly interconnected: a pattern which continues to this day.

Saved for future generations was the famous copper rock. This solid piece of copper, weighing 2,200 pounds and measuring 3 feet 4 inches broad by 3 feet 8 inches long, was transported to the National Institute in Washington D.C. in 1844. It is the largest specimen of native copper in the world.

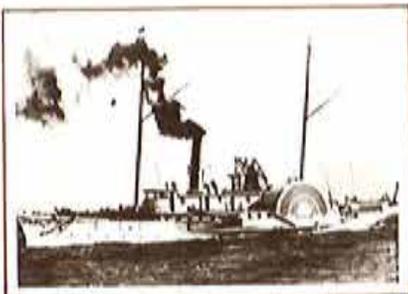
Manufacturing grew in proportion to the State's extensive rail and water transportation network, spawned also by increased output from agriculture, forestry, and mining. The number of employees in Michigan's manufacturing sector tripled between 1860 and 1870.

Great Lakes Fisheries

After the completion of the Erie Canal, tremendous population growth in the Great Lakes basin brought rapid development of a fishing industry. Many species were heavily fished by commercial fishing operations during this period. The sturgeon, which once existed in great numbers in the Great Lakes, had all but disappeared by the late 1800s. Whitefish was the catch most prized by commercial fishers. With the advent of high-efficiency gill netting, this species was also quickly depleted.

By 1879, the [commercial fishing] industry was well established. In that year, 5,000 people were employed throughout the United States portion of the Lakes. A reported 1,656 boats, 1,500 pound nets, 44,544 gill nets and 148 seines were used in harvesting some 54,450,000 pounds of fish. The commercial fishing industry continued to grow during the rest of the century.

Unlike the New England fishery, the industry of the Great Lakes was not influencing the growth and development of the region. Large-scale fishing was not a product of the frontier. It came with settlement [and became] significant in the Great Lakes only to local economies. While fishing is a natural resource industry, it differs in one major respect [from the others] which have been so important in Michigan history. By and large...it has been carried on by a collection of small, individual operators [instead of large corporate enterprises]. "Nobody got rich, but they did get by" is a description that pretty well fits the Great Lakes commercial fisher. (Water Resources Commission, 1967)

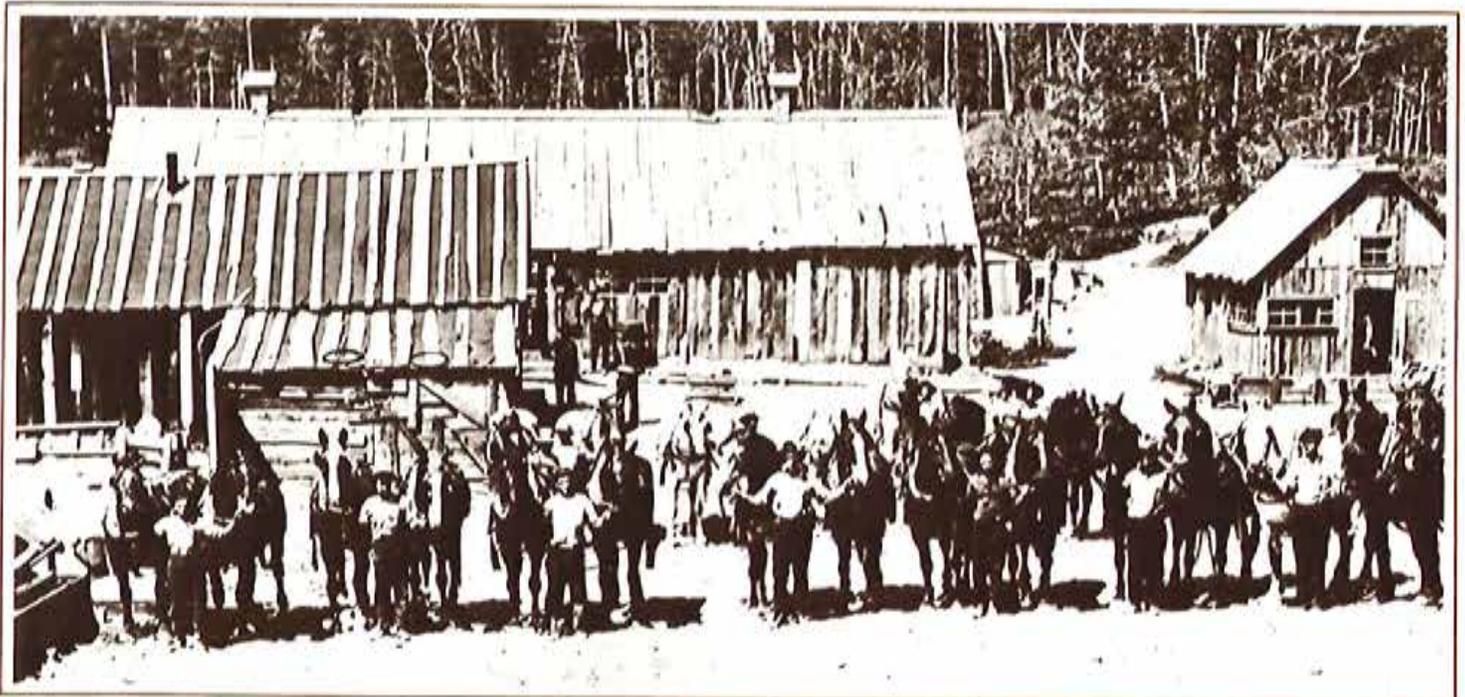


Water Quality

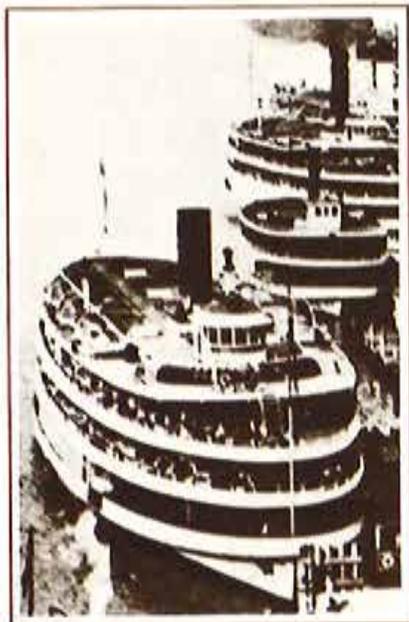
The Lakes were used from the beginning of settlement for drinking water. Later, as cities sprung up along its coasts, the Lakes were a convenient sewage disposal area. As was common throughout the world, human health concerns first prompted people to pay serious attention to water quality. In this context, many associate deterioration of the water quality of the Great Lakes with the increasing amounts of polluted materials that were dumped into the Lakes with the beginning of major manufacturing in the region. This is only partially true.

Major assaults on the biological integrity of the Great Lakes began even before Michigan became a state, although the most accelerated impact was likely during the fifty-year period following statehood. Lake Erie provides the most striking example of these early influences. Lake Erie's fragile shores historically were marshland providing rich habitat for fish and waterfowl.

When the forests were felled around these marshes, Lake Erie became the center of a great farmland. However, with the demise of a system of tree roots, nothing held the fragile and unstable land in place. A flood of silt carried topsoils, sewage and clay into Lake Erie. Every stream mouth and marsh was choked and everywhere the weak shoreline collapsed. The billions of tons of silt started a domino effect as light was cut off to aquatic plants, marshlands were reduced, and insect and fishlife declined. Outdoor World reported: "This all happened well before 1900. Industrial pollution had not even begun to take its enormous toll, yet life was already deserting Lake Erie." (1974) We first significantly affected Great Lakes water quality through our use of the land.



1887-1937 - The Dawn Of Great Lakes



Recreation - The Cruise Ship Era

After the Civil War ended in 1865, the vacation trade grew and with it the number of luxury cruise ships on the Great Lakes. Cruises taken aboard the numerous ships which plied the Lakes marked the first major use of this water for recreation. At the height of their popularity, the passenger fleet carried more than 16 million people every season. The Great Lakes were at this time a busy place with 1,500 commercial ships carrying one third of all North American tonnage. These passing ships, alluring shorelines, ports of call, and luxurious shipboard accommodations made a ship cruise on the Great Lakes a popular pastime.

A very popular destination for many lines was Mackinac Island. By the turn of the century, this resort was known throughout the basin as the ultimate in cultured vacationing. Michigan's western shore was also developing a reputation as a vacation mecca.

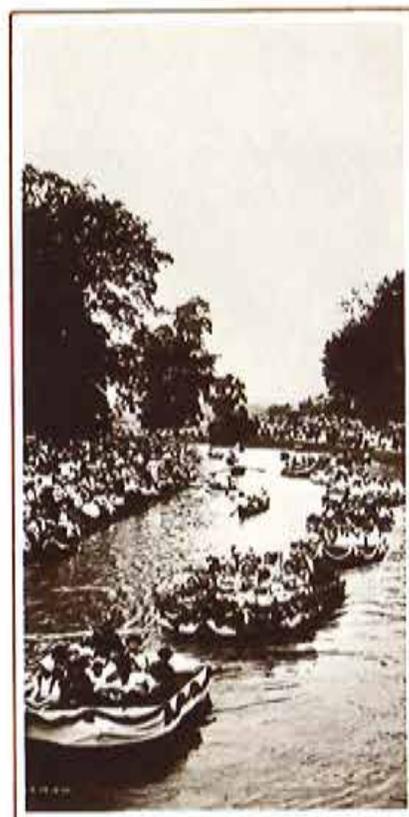
The accommodations were frequently luxurious. The top-of-the-line ship, the *City of Cleveland II*, contained 500 staterooms finished in pure white enamel with nickel-plated fixtures and parquet floors. Each also had running water and its own telephone which was hooked to a city's phone lines whenever the ship was in port. The ship had electric elevators, a wireless telegraph, white linen and silver in the dining room and even a Venetian garden.

The operation of passenger vessels for vacationers was a very big business from 1900 until the Great Depression. This economic collapse and the more popular use

of the automobile ended the era of majestic passenger ships on the Great Lakes. The last company of interest on the Great Lakes was the Chicago, Duluth and Georgian Bay Transit Company. It operated through the big years from 1910 until 1964 when the *South American* made her last run. In the early 1970s, a passenger ship, the *World Discoverer*, failed to make a successful comeback on the Great Lakes. Of the many lines that were in operation at the turn of the century, two still survive--the Arnold Line and the White Star Line--which still ferry daytrippers to the most popular tourist destination in the early 1900s, Mackinac Island.

In these words from the brochure for the 1893 season of the Goodrich Line, one can capture the feeling of what it must have been like during the most elegant era of Great Lakes recreation:

A succession of summer days and nights to the passenger in one of the palace steamers of the Goodrich Line, with luxurious facilities, gliding over the blue waters with a swift, but scarcely perceptible motion, meanwhile sheltered from the glare of the sun when too penetrating, bathing with exultant joy in silver showers of moonlight, the while listening to music or sharing the society of congenial friends, constitute an unbroken series of pleasures and surprises. To the intelligent tourist, the voyage is in no sense monotonous. Each hour is brimful of novelty and delight. The fragrance of the cool, pure air is delicious: its ozone is invigorating. By daylight or moonlight the beauty of



Recreation And Industrial Development

the scenic panorama unfolded all along the shore is entrancing. When the tired traveler seeks repose, he is soothed to rest by the music of rippling waters, and drops off at last into the perhaps unaccustomed bliss of sound, refreshing sleep. The ideal summer vacation can be realized only on the broad bosom of Lake Michigan in a steamer of the Goodrich Line. (1893)

The Great Lakes Economy

Already by 1887, the pace of development and societal change were accelerating throughout the Great Lakes basin. Just as recreation for the first time in history became an important value associated with the Great Lakes, the Lakes' contribution to industrial development within the region was also being recognized.

Beginning in 1900, heavy industry, primarily automobile and steel production, began to dominate the Great Lakes economy. It was fueled by a combination of factors including the presence of vast quantities of necessary raw materials, and availability of the cheap Great Lakes transportation network.

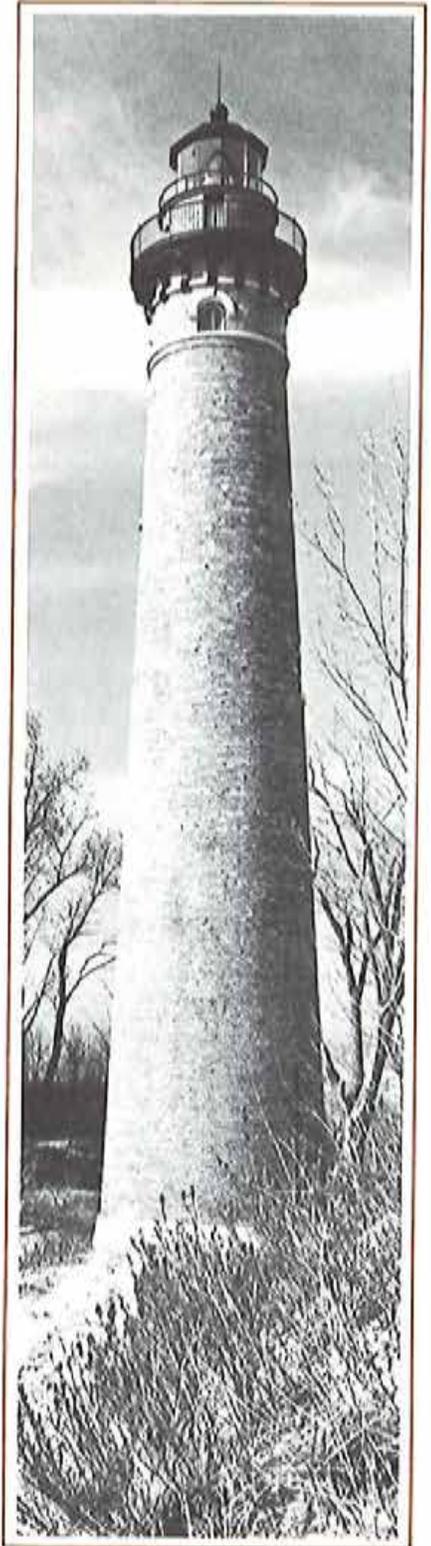
Due to the growing demands of these industries, this era spawned revolutionary change in the design of vessels and their method of operation. The R.J. Hackett, built in the late 1800s, was a radically different ship from those plying the Lakes at the time. It was square and boxy and was the first ship to have the pilothouse over the bow and the crew housing practically on the fantail with uncluttered deck between. It was the forerunner of the modern lake freighter. The only major deviation from

this design came in 1888 when the distinctive whalebacks were built. The Meteor, the last whaleback ship in operation on the Great Lakes, can still be seen in Superior, Wisconsin, its original home town, where it was saved from the scrap yard and began a second career as a museum.

The first self-unloader, crude by today's standards, began sailing the Lakes in 1904. Realizing the potential of these vessels to reduce costs, John D. Rockefeller had twelve built to supply the growing steel industry with ore. The Bessemer fleet, as it was called, was the model for the large-fleet pattern that dominates the industry today. These fleets proved much more efficient than single ship contractors for transporting bulk commodities.

Development of 1,000-foot ships would come in Michigan's next 50 years, although the pattern and purpose for their development was established long before. American Shipbuilding launched the first 1000-foot ore vessel, the M/V Roger Blough, in 1973. Another 1,000-footer, the Stewart J. Cort, was launched soon afterwards. Both ships were the first to be able to utilize effectively the newly rebuilt and lengthened Poe Lock. By 1973, the Sault Locks lifted more tonnage than the Panama and Suez canals.

The growing manufacturing sector during this 50-year period soon changed the composition of the Great Lakes region. Agriculture, mining and lumbering, which until 1900 had been Michigan's primary industries, had begun to decline or undergo fundamental change. Between 1900 and 1920, the number of farms and farmers in Michigan



actually dropped and Michigan's population became predominantly urban for the first time.

Immigrants to Michigan began once again to pour in to fill the growing number of manufacturing jobs. This second wave of immigration was decidedly different, however, than the first wave which flowed from Europe to the West via the Welland and Erie canals. World War I had nearly halted European immigration and the demand for labor attracted migrants from the American south. Most prominent was the flow of black southerners north. Though no more than 60,000 Afro-Americans were in Michigan in 1920, during that decade Michigan's black population increased by more than 100,000.



While lumbering declined rapidly after 1900, mining's decline did not occur for many more years closely following the fortunes of its primary customers, the manufacturing giants of the region. However, agriculture remained the large and relatively stable industry that it is today. While the number of farms and farmers declined, the increased use of labor-saving machinery in the fields helped produce Michigan crops valued at \$400 million in 1920 - a total Kern reports was not attained again for almost five decades (1977).

Diversion And Bridging The Lake

Lake Michigan was first linked to the Mississippi River by the Illinois waterway in 1848. However, this diversion was small at only 500 cubic feet per second. In September 1885, a tremendous flood in the Chicago area contaminated Chicago's entire water supply. This contamination gave impulse to the

movement to build a larger canal from Lake Michigan which would literally flush Chicago's sewage down the Illinois and away from its Lake Michigan drinking water source. This new canal was completed in 1900 primarily for sanitary reasons, but was also available for shipping.

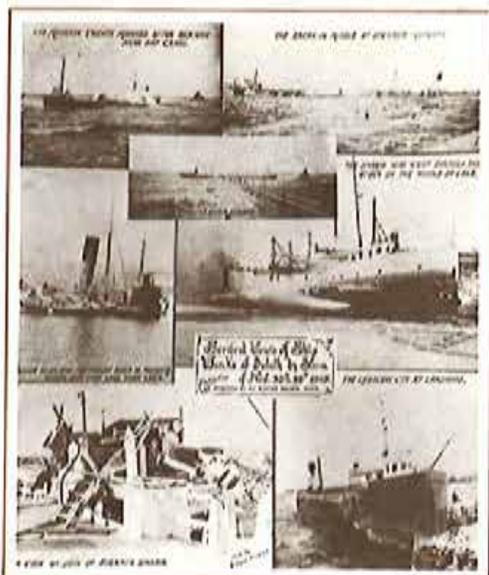
Not only were we digging into the Lakes and changing their character, we were also bridging them and eliminating them as a barrier to automobile traffic. In 1927, the Prince of Wales dedicated the Peace Bridge over the Niagara River between Buffalo and Fort Erie. Two years later, the Ambassador Bridge between Detroit and Windsor opened, and following that, the Detroit-Windsor tunnel was completed in 1930. The Blue Water Bridge, linking Port Huron and Sarnia, was dedicated in 1939.

Fisheries

Throughout this period, Great Lakes fisheries resources were still largely used for commercial purposes. Their value for sport fishing had begun to be recognized but was still not well developed. Fishing in American waters was unrestricted until 1865. In 1887, the first real effort to protect fish and game in the United States began with the creation of State Game and Fish Wardens: the forerunners of our modern day conservation officers. During this period, a number of Michigan agencies were created to develop and protect state resources. The Board of Fish Commissioners was created in 1873, the Mackinac Island State Park Commission in 1895 and the State Park Commission in 1919. These and other separate agencies were joined together in 1921 and

became the Michigan Department of Conservation.

By 1880, officials in charge of the fisheries resources began a practice that would become widespread in subsequent years and virtually indispensable to modern sport fishing: artificial propagation and introduction of fish species in the Great Lakes ecosystem. There was little concern about the appropriateness of species, and both native and non-native species were bred and planted with little regard as to the suitability of receiving waters. Smelt eggs from Maine were planted in Crystal Lake, Michigan in 1912. By 1935, they were all over Lake Michigan, and just five years later, smelt existed in virtually all the Great Lakes. German carp, which spread rapidly throughout the Great Lakes, was another species planted in the Lakes by the enthusiastic fish commissioners. Various species of salmon, trout, whitefish and walleye followed and served as the foundation of future sport fishing in the Lakes.



STORMS

The Great Lakes are not famous just for their serene shores--they also are infamous for their spectacular storms. In some ways, Great Lakes' storms are more dangerous than those of the oceans. Not only do they give far less warning of their approach, but waves, rapidly rising to thirty or forty feet high, follow each other in quick succession. These choppy waves batter the Lake boats more severely than do the ocean's long, rolling swells. A ship has no time to regain its balance from one water wall before another is upon it.

Storms severe enough to destroy ships occur in most years. However:

Violent storms causing great destruction occur perhaps once in a generation. There have been two such storms in this century -- November 9, 1913 and November 12, 1940.

The 1913 storm was described as the worst storm that ever lashed the Great Lakes. There was great damage to breakwaters, and the shores on the windward side of the Lakes were severely eroded. (Water Resources Commission, 1967)

Eighty mile-per-hour winds were recorded on Lake Superior and in Buffalo, New York.

Nineteen vessels were... destroyed and 20... stranded with... 248 lives lost. Lake Huron received the brunt of [the] storm.... Thirty-five foot waves were reported [and] the south end of the lake rose four to five feet resulting in much destruction at Port Huron.

The 1940 storm, although near the intensity of the 1913 storm, did not result in the magnitude of destruction to lake shipping as did the early storm. [However,] it was reported that the depth of water in the Saginaw River was reduced eight feet and the water line receded as much as a mile in Saginaw Bay.

One of the greatest storms ever to strike Lake Superior occurred on November 8, 1905.... This one storm wrecked 30 vessels with its hurricane force winds and 12 degree below zero temperatures. (Water Resources Commission, 1967)

Ellis reveals that in just two decades, 1878 to 1898, 5,999 vessels of all types wrecked in the Great Lakes; one-sixth of these went to the bottom. (1974)

1937-1987 - Economic Vitality Depends

Tourism - Beneficiary of Improved Management And Protection

According to Kern, "tourism has played an increasingly important role in the post-World War II economy of Michigan. By 1950, it was estimated that tourists spent \$50 million annually in the Upper Peninsula." (1977) The completion in 1957 of the Mackinac Bridge across the Straits of Mackinac and in 1962 of the International Bridge across the St. Marys River increased tourism in Michigan.

State Parks

Extensive development of state parks and recreation areas also contributed to the growth of recreational activity. While widespread use of the automobile helped spell the end of the cruise ship era of Great Lakes recreation, it was the beginning of state park development. Mackinac Island was Michigan's first state park in 1895. However, it was twenty years later, 1915, before the Michigan legislature first generally authorized the transfer of public and private lands to be managed and preserved as public parks.

By the end of World War I, demands for more recreational opportunities grew. The Michigan State Park Commission was created in 1919 to serve this growing need and was later incorporated into the Department of Conservation in 1921. From 1921 until 1956, the state park system grew from 23 units with 1,360 acres to 73 units totaling 176,991 acres. Use also grew from 244,000 visitors in 1922 to 17,865,346 in 1955. By 1970, the Michigan Department of Natural Resources recorded the annual total of public visitor days at 20 million. This year, a new record of 24.2 million was set.

Despite profound changes that have marked this period - in population, economy, and social conditions - the fundamental "purposes of providing for public recreation or the preservation of natural beauty or historic association," as defined in the state park law have endured. (Michigan Department of Conservation, 1957)

The magnetism of the Great Lakes has played an important part in the development of the state park



On Protection And Management

system as we know it today. The value placed on access to Great Lakes beaches, dunes and rugged shorelines is reflected in today's system of 94 state parks. These heavily used parks contain 115 miles of Great Lakes shoreline. National lakeshores and other public parks add to the available shoreline offering unparalleled recreational opportunities for all Great Lakes enthusiasts.

Recreational Boating

Recreational boating on the Great Lakes also blossomed over the last 150 years although most of the growth has occurred in the last 40. It wasn't until 1947 that Michigan had a formal program to promote recreational boating on the Great Lakes. In that year, the Michigan legislature established the Michigan Waterways Commission.

The Waterways Commission was established to construct 15 harbors-of-refuge on a cooperative basis with the federal government. The Commission has now developed a string of 68 protective harbors and public marinas for the safety and convenience of Great Lakes boaters. These harbors have been located with the goal that no boater will be more than about 15 miles from safety on the shoreline.

Prior to 1967, there were very few launching ramps on the Great Lakes. As the coho salmon fishery developed, many anglers began using trailered boats. Demand continued to expand in concert with the expansion of the salmon and trout fishery in the Great Lakes. In response, the DNR Recreation Division adopted an incentive program to construct protected boat launching facilities



ties on the Great Lakes, by offering communities 90 percent construction grants. To date, the Recreation Division has participated in the development of 158 launching facilities to serve Great Lakes boaters.

The Fisheries Resource

In the beginning of this 50-year period, commercial fishing was still a prominent Great Lakes industry. Whitefish, lake trout, and walleye, which delivered a record commercial catch of nearly 8 million pounds in 1955, were the most important commercial species. Their decline in the 1950s, and 1960s spelled the beginning of the decline of U.S. commercial fishing and the unique way of life it supported. Fish planting programs forestalled its total collapse.

With commercial fishery operations unable to recover from their decline, sport fishing expanded exponentially with the encouragement of the DNR. The success of this effort has caused the sport fishing industry to grow into a major component of the tourism sector of today's Michigan economy. Presently, it is worth at least \$500 million to our state's economy. DNR efforts now focus clearly on the sport angler.

The proliferation of the sea lamprey and intense over-utilization are the most prominent events in fisheries management in the last 50 years. By the 1950s, lake trout and whitefish populations were seriously depleted. A targeted chemical was developed in the 1950s that would kill the young lamprey where they spawned in tributary streams. By 1962, the Lake Superior lamprey population dropped by 85 percent. By 1965, this control program was expanded into the other Lakes. Because the big fish had almost died out, the Lakes produced an overabundance of the forage fish that the lampreys had once consumed. Large die-offs of alewives were common until planting programs reestablished predator fish populations.

The Emergence Of Great Lakes Environmental Protection

In 1968, the Department of Conservation was renamed the Department of Natural Resources. It was strictly a resource management organization until 1966 when it was assigned some environmental protection functions. The responsibilities for water quality, air quality, drain and storm water management, and other environmental protection activities were transferred from the Departments of Public Health and Agriculture.



As Governor James J. Blanchard said in last year's State of the Great Lakes report, "We have called on the Great Lakes to provide us with many things, many more than we have given in return." This statement epitomizes our treatment of the Great Lakes during this era of Great Lakes history. Use of the Great Lakes for waste disposal was virtually unregulated in the 1930s. Like the forests four decades earlier, we thought the Lakes' ability to accommodate our demands was limitless: we soon found out otherwise!

Jerome Nriagu reports that "the first comprehensive report on the pollution of the Great Lakes, issued in 1918, observed that industrial pollutants were not discharged in sufficient quantities to seriously affect use of the water." (1984) In the next three decades, industrial, population and agricultural expansion resulted in major increases in the generation of waste products. Finally in the 1960s, studies showed that the pressure exerted on the lower Lakes had become critical. And so the cry that "Lake Erie was dead" became one of many rallying points for the growing environmental movement.

In Lake Erie, from the recession of the continental glaciers until 1942, a period of several thousand years, the level of phosphorus in the western waters increased from near zero to 14 micrograms per liter. From 1942 to 1967, a span of 25 years, that concentration nearly tripled rising to 40 micrograms per liter. Seventy percent of this phosphorus entered the water through municipal and industrial wastewater outfalls, the majority from the former. In one of the most studied and documented

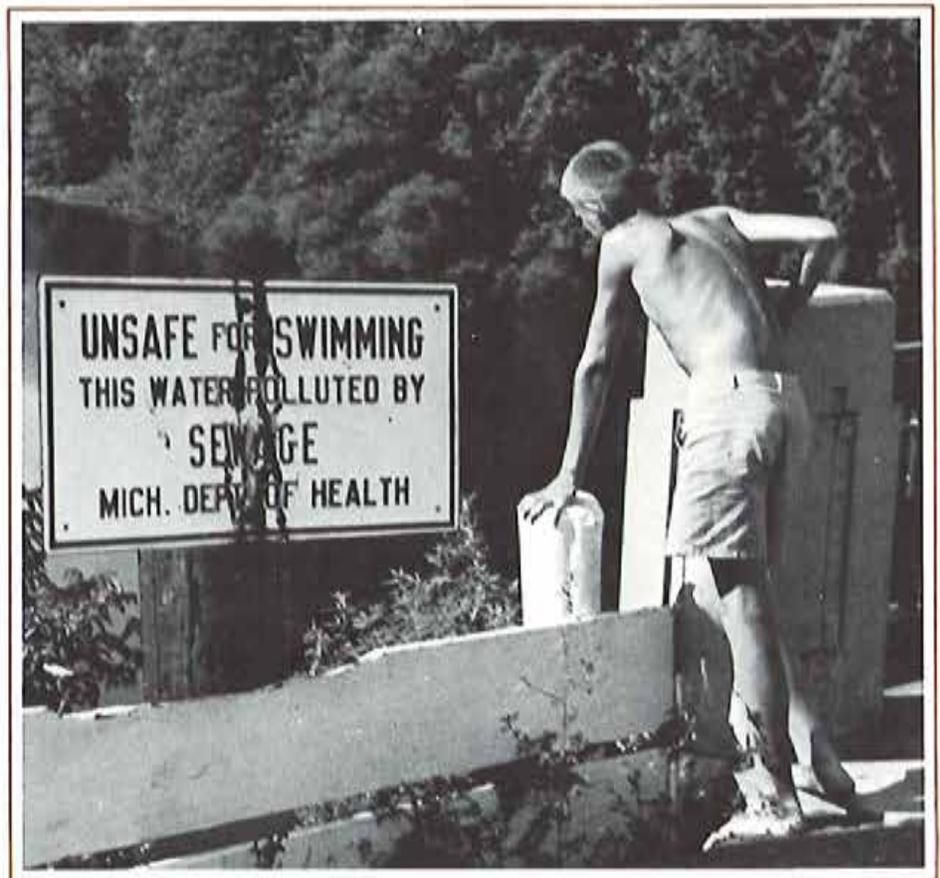
success stories of Great Lakes management, phosphorus loadings to Lake Erie were substantially reduced, and the Lake has dramatically recovered. Stronger controls on industrial dischargers, a multi-billion dollar investment in municipal wastewater treatment plants, and a ban on or reduction of phosphorus in detergents in most of the Great Lakes states and provinces contributed to this reduction. Walleye fishing has exploded and Lake Erie is once again crowded with swimmers and boaters.

Toxic Contamination

Contamination of the Great Lakes with toxic chemicals came to the forefront of concern in 1970 when the commercial fishery of Lake St. Clair had to be closed due to mercury contamination. Before this time, concern was limited to a few visionary activists.

Toxic contamination remains a vexing problem. It comes from many sources including discharge pipes, city streets, farmers' fields and even through the air. Compounding the problem is the plethora of chemicals used in the basin. The U.S. Environmental Protection Agency has identified well over 200 chemical families of concern in the Lakes yet we know the ecological and human health effects of only a few of them. In addition, many of these chemicals can last for years once released into the environment. Despite this uncertainty, demonstrable progress has been made in reducing the levels of some toxic compounds in the Lakes.

PCBs were first synthesized in the late 1800s, but were not used for industrial purposes in the United States until 1929. Sales of PCBs were voluntarily reduced



in 1970 by the sole North American manufacturer and production ceased in 1978. PCBs were first detected in Great Lakes fish in 1969. Monitoring conducted since 1971 indicates a substantial drop in concentrations in most Great Lakes fish since 1972. In one Wisconsin study, concentrations in Lake Trout from Lake Michigan, a species that has shown a high propensity to accumulate toxics, have dropped from a high of 22.4 parts per million in 1972 to 2.6 ppm in 1980. Likewise, levels in Chinook Salmon have dropped from 11.7 ppm in 1974 to 3.8 ppm in 1981. Walleye samples showed a slight increase. The U.S. Food and Drug Administration tolerance level for PCB is 2.0 ppm. While data from other studies may yield different levels, most studies indicate an overall decrease in PCBs in the Lake Michigan basin.

Some 23.5 million people rely on the Great Lakes for their drinking water.

Other compounds with downward trends of concentrations in Great Lakes fish include DDT, which was banned in 1970, and mirex, a pesticide which escaped into the Lake Ontario ecosystem via an industrial accident in 1974. However, even this good news must be tempered with concern. It appears that mirex levels, after a substantial decline in the late 1970s, have stabilized. Further, even though DDT has been banned since 1970, it still is present in the Lakes and remains firmly entrenched in the Great Lakes food chain. Other compounds such as dieldrin persist stubbornly in the Great Lakes ecosystem.

The fact that levels of contaminants such as PCB and DDT are decreasing is cause for guarded optimism. It would appear that banning these compounds has been effective. It is also clear that the discovery of other contaminants in the Great Lakes food chain does not necessarily mean that they did not previously exist in the Lakes. Throughout the last decade, scientific advances have allowed us to measure more chemical compounds and at smaller concentrations than was previously possible.

Despite many scientific advances, the effect on the Great Lakes ecosystem and human health of prolonged low-level exposure to the hundreds of chemicals present today is largely unknown. This uncertainty clouds efforts to control release of these substances to the Great Lakes. We must continue to closely monitor sensitive aquatic fish and wildlife. In the late 1960s and early 1970s, it was eagles and gulls that warned us of the DDT dangers. Now, problems in these bird and fish populations may signal other toxic problems.

The Great Lakes Growing Importance For Drinking Water

The Great Lakes are becoming increasingly important to this region as a source of water for industrial and municipal purposes. Inland Michigan cities once using river or groundwater resources have turned increasingly to Great Lakes waters. Today, over half of Michigan's residents rely on the Great Lakes as their source of drinking water. This abundant source of high quality water has allowed continued development throughout the state. Despite concerns about toxic substances in Great Lakes waters, their purity as drinking water is surpassed by few other water bodies in the United States.

Great Lakes Bottomlands

Historically, not only were the waters of the Great Lakes degraded by human activities, so were its bottomlands. These lands have only recently been recognized for their value to fish, waterfowl and wildlife along with other public benefits.

The ownership of Great Lakes bottomlands was not definitively determined until the early 1900s. When Michigan was admitted to the union in 1837, title to the submerged lands of the Great Lakes within the boundaries of this State passed into full State ownership to be held in trust for the public. The beds of three connecting waters, the Detroit, St. Clair and St. Marys rivers were subsequently declared to be in private ownership with the Michigan Supreme Court's ruling in Lorman vs. Benson in 1860. In that suit, the court stated that the riparian owner held title to the soil of the

It is estimated that one billion gallons per day are withdrawn from the Great Lakes for community water supplies. This figure nearly doubles in the summer months. Approximately one to two percent of that amount is actually for human consumption, with the remainder for household, commercial and industrial use. (Kalinowski, 1987)



Detroit River to the international boundary line, subject to the paramount rights of the public in the overlying water. A series of lawsuits just before the turn of the century negated this ruling and made clear that title to Great Lakes submerged lands could not be acquired by adverse possession. Consequently, the legislature adopted Act 171, P.A. 1899 which stated in part: "That all of the swamp or submerged lands lying along the borders of Lakes Erie, Huron, Michigan, Superior and St. Clair ... Shall be and hereby is set apart and dedicated for a public shooting and hunting ground, for the benefit and enjoyment of the people of the State of Michigan."

Despite this clear authority, the State did little to protect the Great Lakes against dredge and fill operations, especially in Lake St. Clair, during the next 50 years. The problem of indiscriminate filling and development became so acute that the legislature finally adopted the Great Lakes Submerged Lands Act (1955, P.A. 247, as amended). The Act initially stopped all filling into the waters of the Great Lakes and set up procedures for occupants of filled, unpatented bottomlands to clear title to

their real estate. Since 1955, the law has been amended to authorize filling for shore straightening and to control erosion, flood, sewage and drainage problems. In addition, development of industrial dockage and the leasing of bottomland for commercial and municipal marina development has been allowed. These uses are now regulated by the Land and Water Management Division of the DNR under a permit system.

The Final Transportation Link

The St. Lawrence Seaway was completed in 1959 linking the Great Lakes with the Atlantic for deep draft vessels. Prior to construction of the new St. Lawrence and stairstep locks from the Thousand Islands down to Montreal, deep-keeled Lake ships had to be unloaded into smaller vessels to bypass rapids and then reloaded into ocean vessels. The United States opposed this project for fear that it would hurt established U.S. trading interests. However, when it became obvious that Canada would build it alone and thus reap all the hydroelectric benefits of the Seaway, the United States endorsed the plan.

The building of the Seaway was an engineering marvel. The five-year construction project moved over 350 million tons of rock along its 112-mile site. Seven new locks were built to lower and lift vessels 326 feet. For the hydroelectric project, 18,000 U.S. acres between Waddington and Massena and 20,000 Canadian acres between Iroquois and Cornwall had to be flooded. This included 18 cemeteries, ten villages and the homes of 8,000 people. All were carefully moved.

The Seaway opened the Lakes' ports directly to the world. By 1983, the Seaway had carried over a billion tons of cargo on almost

150,000 vessels. The Great Lakes region had a direct route to export our grain, iron ore and manufactured metal products.

Throughout these last 50 years, great change has come to the basin. The St. Lawrence Seaway, begun early in the previous century, was completed. Resource management and protection replaced exploitation as the dominant ethic for Great Lakes policy. This change has had very positive effects as sport fishing, tourism and use of Great Lakes water for drinking purposes attest. It is clear that this change is here to stay and will continue to shape future Great Lakes initiatives.



1987 And Beyond - A Sampler For The Future

Recreation

Since the turn of the century, the Great Lakes have been increasingly valued for the recreational opportunities they offer. From cruise ships to individual recreational boats, people have used the Lakes for a variety of pursuits. Nineteen eighty-seven saw no lack of imagination in seizing these opportunities.

Island Explorer Water Trail

From the moment islands appear on the horizon, they seem to beckon us to pause and explore their secrets. Great Lakes islands, hundreds of them, are home to myriad wildlife and plant species, records of the past, and playgrounds of the future. Natural Resource Commission Chair Marlene Fluharty and Natural Resources Director Gordon Guyer have recently championed the importance of islands -- their diversity and ecological significance. The Forest Management Division of the Department of Natural Resources will be managing these islands to provide both recreational access and environmental protection.

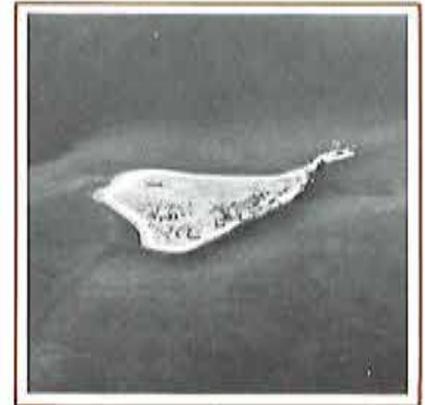
Acquisition of Lime Island, a 937-acre forested giant, served to focus attention on the unique value of islands and marked a new concept in Michigan recreation. Located in the lower St. Marys River, this island was given to the State of Michigan by Consolidated Coal Company in late 1982.

Before the ink dried on the deed for Lime Island, the DNR became involved in another "island adventure". In late 1982, the federal government, through the Bureau of Land Management (BLM), informed the DNR that nearly 800 islands as well as other parcels were about to be declared "surplus" to the needs of the federal government. Divestiture of these lands by BLM offered an unparalleled opportunity for Michigan to take permanent title to them at no cost to the State.

The initial transfer of 40 islands, most in the waters off Chippewa County, took place in June and coincided with the Sesquicentennial Celebration. Recently, the Council of Great Lakes Governors endorsed a resolution supporting the efforts of Michigan to acquire the rest of these islands.

Much work remains to be done. The transfer of these 469 islands (150 in Great Lakes waters) from the BLM to the DNR must be completed through Congressional action. Then the creation of an "Island Explorer Water Trail" linking a network of islands along the Chippewa and Mackinac County coastlines should complete this adventurous vision.

The Island Explorer Water Trail will enable boaters to follow a circle route through the islands. Support facilities will include campgrounds, picnic areas, and supply stores. Initial plans for the anchor island, Lime Island, include construction of two rustic campgrounds with adjacent picnic sites and restroom facilities. An



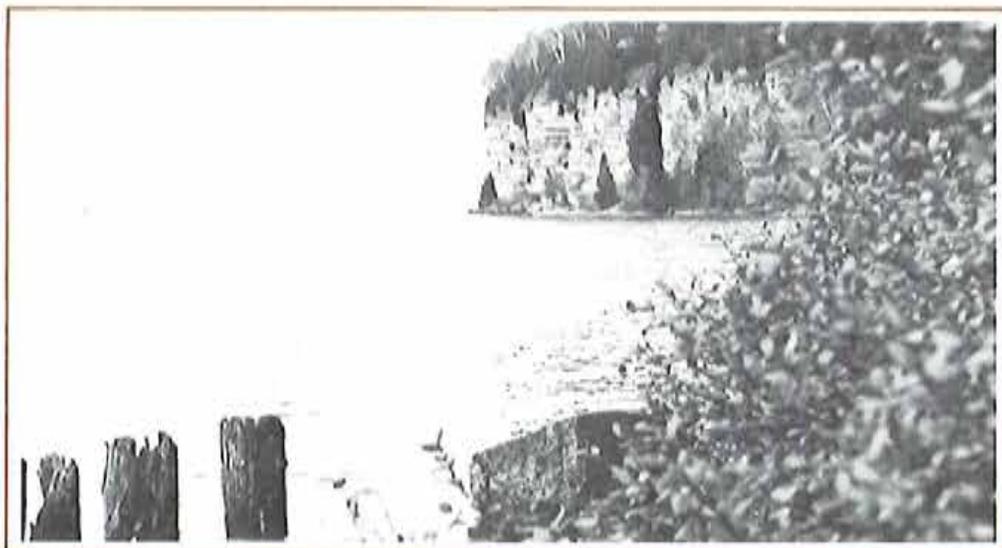
archaeological survey will be done to protect the historical and cultural values of the area and provide for potential reconstruction of former Indian encampments, explorer settlements and a 1790s lime kiln on the island. This new "trail" concept puts Michigan once again at the forefront of Great Lakes recreational innovation.

Another Underwater Preserve Designated

Underwater preserves are the latest concept in Great Lakes protected areas. Preserves are intended to protect artifacts and shipwrecks for the enjoyment of scuba divers. In addition, protection of the artifacts provides opportunities for important ongoing studies by archaeologists of the lifestyles and transportation methods of generations past. The cold, fresh water of the Great Lakes is a natural embalming fluid for the sunken ships, especially the wooden vessels which often decay in ocean salt water. Michigan was the first state in the Great Lakes basin to designate areas of significant historical value as underwater preserves. Before 1987, Michigan had designated four Great Lakes bottomland preserves -- Alger County, Straits of Mackinac, Thunder Bay and Thumb Area -- averaging 206 square miles in area.

The Whitefish Point Great Lakes State Bottomland Preserve, designated this year, is the largest of its kind in Michigan. The 376 square mile preserve contains 20 recorded shipwrecks within its boundaries and others waiting to be discovered. The Edmund Fitzgerald, immortalized in song, is located just north of the area in Canadian waters.

A "mini" preserve was established by emergency rule, authorized by Governor Blanchard this past May, to protect the recently discovered Regina shipwreck located a few miles offshore of Port Sanilac. This merchant vessel sank during a violent storm in 1913 with a loss of all seaman. Its location in Lake Huron was not known until the spring of 1986.





A Future Rooted In The Past - The Reintroduction Of The Grayling

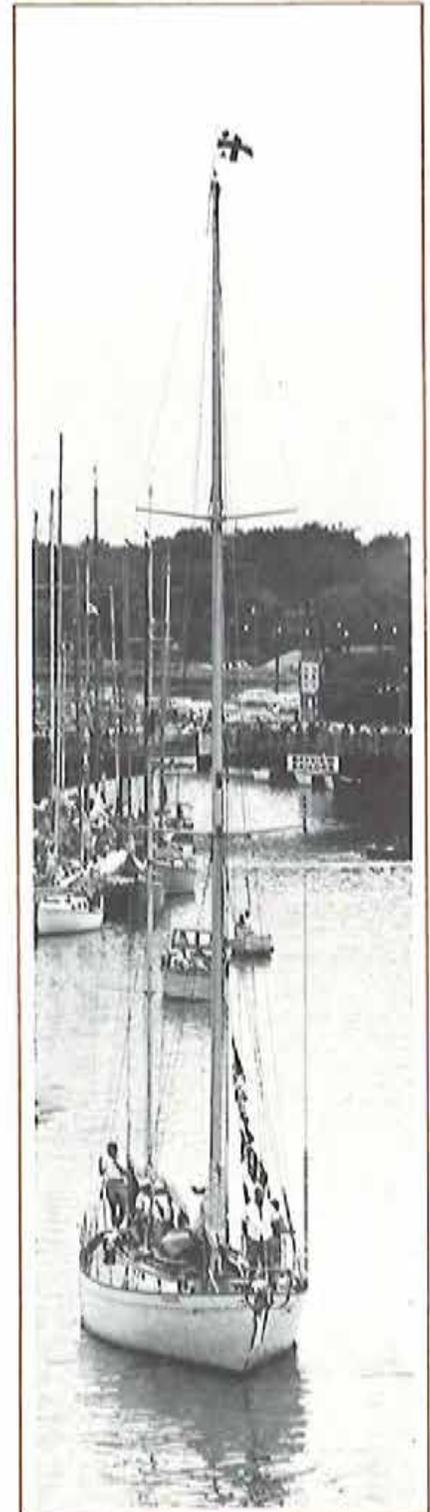
Before the turn of the century the grayling was an important fish species in Michigan. Habitat destruction and overfishing soon made the grayling only a Michigan memory - until this year. Continuing its tradition of extensive fish planting activities in Great Lakes tributaries, the Fisheries Division of the DNR reared and planted grayling into Michigan waters this last spring. The AuSable River and several Upper Peninsula sites were chosen as homes for this reintroduction.

Boating Facilities

Already, Michigan has the most registered boats in the nation--750,000, with California and Florida close behind. Michigan's dock space and slips will now accommodate only 41,500 boats. These numbers dramatize the need for creative approaches to providing support for our pleasure boaters.

An innovative concept has been developed to make available more marina space through a development fund. This fund would encourage marina development without placing new burdens on taxpayers. It's a recent development, but one that may revolutionize the boating industry in Michigan and on the Great Lakes. Faced with a severe shortage of docking space, especially in southern Michigan, some people are buying their slips rather than renting them. These "dockominiums," like condominiums, are owned by the boater but maintained by the marina owner for a maintenance fee.

To most observers it seems clear that the Great Lakes will continue to accommodate growing recreational use. Funded by passage of a new license package two years ago, improved fisheries stock will be available to Great Lakes anglers. New opportunities will be available for recreationists of all types: divers, canoeists, sailors, and others for whom the Great Lakes hold special appeal. However, recreation on the Great Lakes seldom involves only one activity. Boating facilities, good fishing, camping sites in picturesque locations, hiking trails, and shopping are the recipe for an unforgettable vacation, but especially if they are all easily accessible. Harmoniously combining all the elements that make a Great Lakes experience truly unique will continue to be a great challenge.



Education

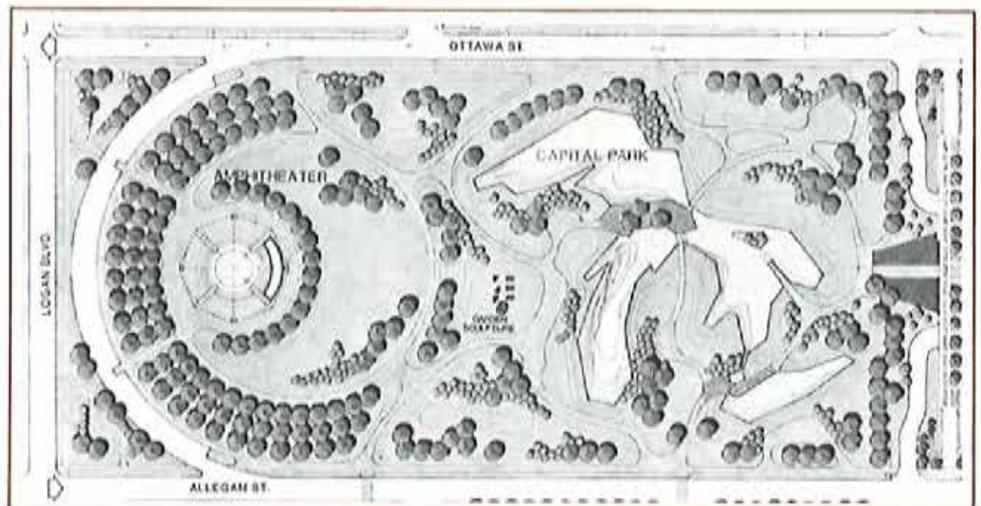
Capitol City visionaries have conceived a park in the Capitol complex with a series of Great Lakes-shaped ponds and an environmental center. The center would depict our natural heritage and promote understanding and awareness of environmental issues, including Great Lakes challenges.

Others have suggested a series of aquariums to promote our Great Lakes fishery. And still others have moved to preserve our unique maritime history through amusement and interpretive displays. In addition, the Great Lakes Commission is devising ways to move Great Lakes curricula into our schools.

Transportation And Economic Development

Historically, the Great Lakes were first and foremost a transportation network. Before the Lakes and the St. Lawrence Seaway could carry a record 57.4 million metric tons in 1977, they had to be dredged, locked, dammed, and docked. The amount of this investment is staggering, and yet with all the advantages this system has for moving goods from the nation's heartland anywhere in the world, some are concerned that the system is in decline. In 1986 only 37.5 million metric tons were moved on the Seaway; a system with the capacity to carry 80 to 110 million metric tons.

The changing economic climate which has resulted in a decrease in shipments of the Seaway's traditional foundation commodities -- iron ore, grain, and coal -- is causing ports to focus on new products to fuel their revival. Often accustomed to business coming to them, individual ports are now undertaking aggressive marketing, both individually and cooperatively. Unique arrangements, such as the cooperative DeWin effort linking the ports of Detroit and Windsor, are also challenging the old ways of doing business on North America's inland seas. None can predict what the future holds for the Seaway system, but these cooperative efforts offer hope for the revitalization of this important Great Lakes industry.



Creating Jobs And Cleaning The Environment

In July 1987, Governor James J. Blanchard released a report on the water and wastewater treatment industry. The report builds on the truism that a clean environment and job creation go hand in hand. It shows that the pollution control and water treatment industries are sources of jobs themselves as they engineer, manufacture, install and service plants and equipment used to keep our environment clean. Further, it outlines how Michigan can capture an increasing share of these growing numbers of jobs.

In short, the report focuses on some of the ways economic development and environmental protection can complement each other. It breaks new ground by advocating a variety of unique methods to move us toward a cleaner environment. It offers realistic alternatives through fostering new technology, increasing understanding between regulators and the business community, and risk-sharing for solutions to emerging problems.

Water Levels

Nineteen eighty-seven brought welcome relief to shoreline homeowners and communities. As of this fall, Lakes Superior and Ontario were at or below their average levels, Lakes Michigan and Huron were one foot above average and Lake Erie was about one and one-half feet above average. These levels are as much as two feet lower than levels only one year ago. However, with history as our guide, we must not be lulled into thinking our problems are now over. Just as high-water periods have occurred periodically in the past, we can expect them in the future. The time to prepare for this eventuality is now, before water is again lapping at our doorstep.

The Michigan legislature recognized this and appropriated \$2.2 million in 1987 to continue programs to assist people in moving homes back from eroding bluffs and elevating homes in flood-prone areas. The program also assists communities with anti-flood and anti-erosion projects and by allowing completion of diking projects in a number of needy communities. In addition, legislation is being sought to ensure that new structures are built a safe distance from the water and that potential buyers of homes at risk are informed of dangers. Additionally, efforts must continue at the federal level to obtain better water quantity management tools for the Lakes.

Environmental Protection

In no other area of Great Lakes policy have attitudes changed so rapidly and decisively as in the area of environmental protection. The public's desire for environmental protection of the Great Lakes remains strong. The fanfare of the signing of the Great Lakes Charter, Great Lakes Toxic Substances Control Agreement, and Ontario-Michigan environmental accords as well as the passage of strong new discharge standards throughout the basin has given way to step-by-difficult-step implementation.

Indirectly, it requires 40,000 gallons of water to build a car and 180 gallons to manufacture one copy of a Sunday paper. (Ellis, 1974)

The most extreme thermal transfers take place from September through December when the lakes release most of the heat from above the thermocline into the atmosphere. One-hundred quintillion calories are released. According to Ellis:

This equates on such fall days to that of 30,000 atomic bomb explosions - per day. If we could capture it, the heat released from the Great Lakes on one fall day could furnish the total U.S. power requirements for a year. (1974)

The first vital step toward development of the comprehensive basin water resources management program as outlined in the Great Lakes Charter was taken this year. A Water Resources Management Committee provided the foundation for better managing and conserving Great Lakes water resources. They set up a system for charging water use information and consultation if a diversion or consumptive use should be proposed.

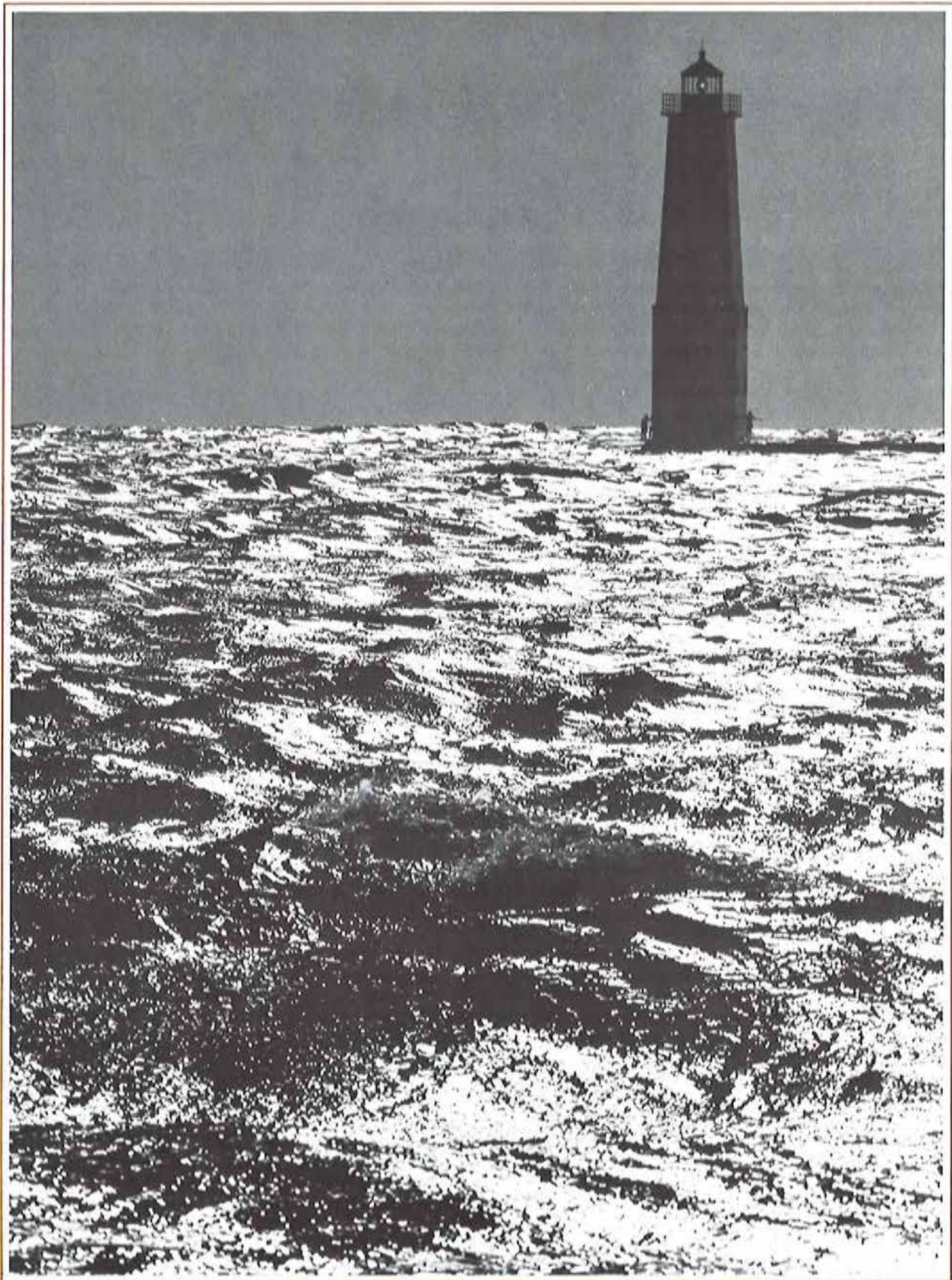
Action on the Great Lakes Toxic Substances Control Agreement also moved ahead this year with the completion of implementation and management plans by all the Great Lakes states. The plans address the 53 separate action items called for in the Toxics Agreement and outline specifically how each state will implement them. Much of the implementation called for in the plans has already begun.



One example is an Ann Arbor conference, held in July 1987, which brought together 150 scientists and policy leaders from across the basin to exchange information about impacts of airborne pollutants on the Great Lakes ecosystem. Workshops during this conference began development of the system that will be needed to identify and control toxic air pollutants that are currently entering the Great Lakes system. The work of these and other professionals will serve as the foundation for future efforts to address this recently recognized contributor of toxics to the Great Lakes.

Anxious to begin work on this problem, the Michigan and Wisconsin Departments of Natural Resources entered into a joint venture this year to quantify long-range transport over Lake Michigan of the pollutants leading to ozone depletion. This and future studies, as well as an expansion of in-place monitoring networks such as the Great Lakes Atmospheric Deposition Sampling Network, will further our understanding of aerial transport of contaminants.

Great Lakes research needs were also highlighted in a report completed by the Office of the Great Lakes for the Michigan legislature in August 1987. The result of a survey of Michigan universities, colleges, foundations, private non-profit organizations and state agencies, the report detailed nearly 300 research priorities and project ideas. The report not only discusses these ideas, but also identifies current barriers to ensuring adequate Great Lakes research: lack of stable, continuous funding; infrequent formal collaboration and multidisciplinary studies among researchers; and no effective public system to determine priorities for Great Lakes research. The stakes are high. It is advanced, high quality research that provides us with the tools by which management and control programs are designed, operated and evaluated for their effectiveness.



In last year's State of the Great Lakes report, twenty-two proposals were outlined for our 1987 agenda. They involved working on the national and international scene as well as within Michigan. These were tough proposals that tested the resolve of their proponents as well as those charged with acting on them. Eighteen were totally or partially completed for a "score" of 86 percent. A good score considering the complexity of some of the proposals, but leaving room for improvement during 1988.

Water Levels

All our objectives were achieved concerning water levels this year. A \$2.2 million supplemental appropriation continued to assist threatened communities and homeowners. Michigan officials continue to take an active role in the International Joint Commission study on the causes and effects of high water levels. We continued to press for the reduction of the Ogoki and Long Lac diversions into the Lakes. Finally, an ad hoc committee formed to review state statutes and regulations guiding shoreline development submitted its findings to the Natural Resources Commission in September 1987. Work has already begun to implement those recommendations.

Water Planning And Economic Development

Of the four water planning and economic development initiatives offered last year, progress has been made on all fronts. The Great Lakes and Water Resources Planning Commission completed its work and released the final action plan for water management in Michigan in September 1987. A White Paper on the Water and

Wastewater Treatment Industry was completed by the Office of the Great Lakes in July outlining 14 policy options for achieving the report's multiple objectives. A draft agreement with the Province of Ontario for mutual port development has been submitted to the Ontario Cabinet for approval. At our request, the Great Lakes Commission has appointed an eight-state task force to work on ensuring a continuing federal role in the building and maintenance of recreational harbors.

Environmental Protection

Efforts to maintain strong federal funding and support for Great Lakes programs were extremely successful this year. The Clean Water Act (CWA), passed over a presidential veto, contained strong Great Lakes protection programs and retained the historic Wastewater Construction Grants Program formula (giving Michigan a full share of these much needed funds). Michigan's congressional delegation also fought for and won full funding for Michigan's Great Lakes research institutions, in addition to new funds to implement the CWA's Great Lakes Program.

At the state level, lack of funding left some of last year's initiatives undone. The budget requests of Governor Blanchard and Director Guyer for Great Lakes Initiatives, a part of the Governor's Great Lakes 2001 strategy, were left largely unfunded by the Michigan legislature. However, a bright spot was the Nonpoint Source Pollution Program which was funded at a level of \$118,000.

Last year's call for development of a multi-year formal contract with the U.S. EPA to fulfill the Great Lakes Water Quality Agree-

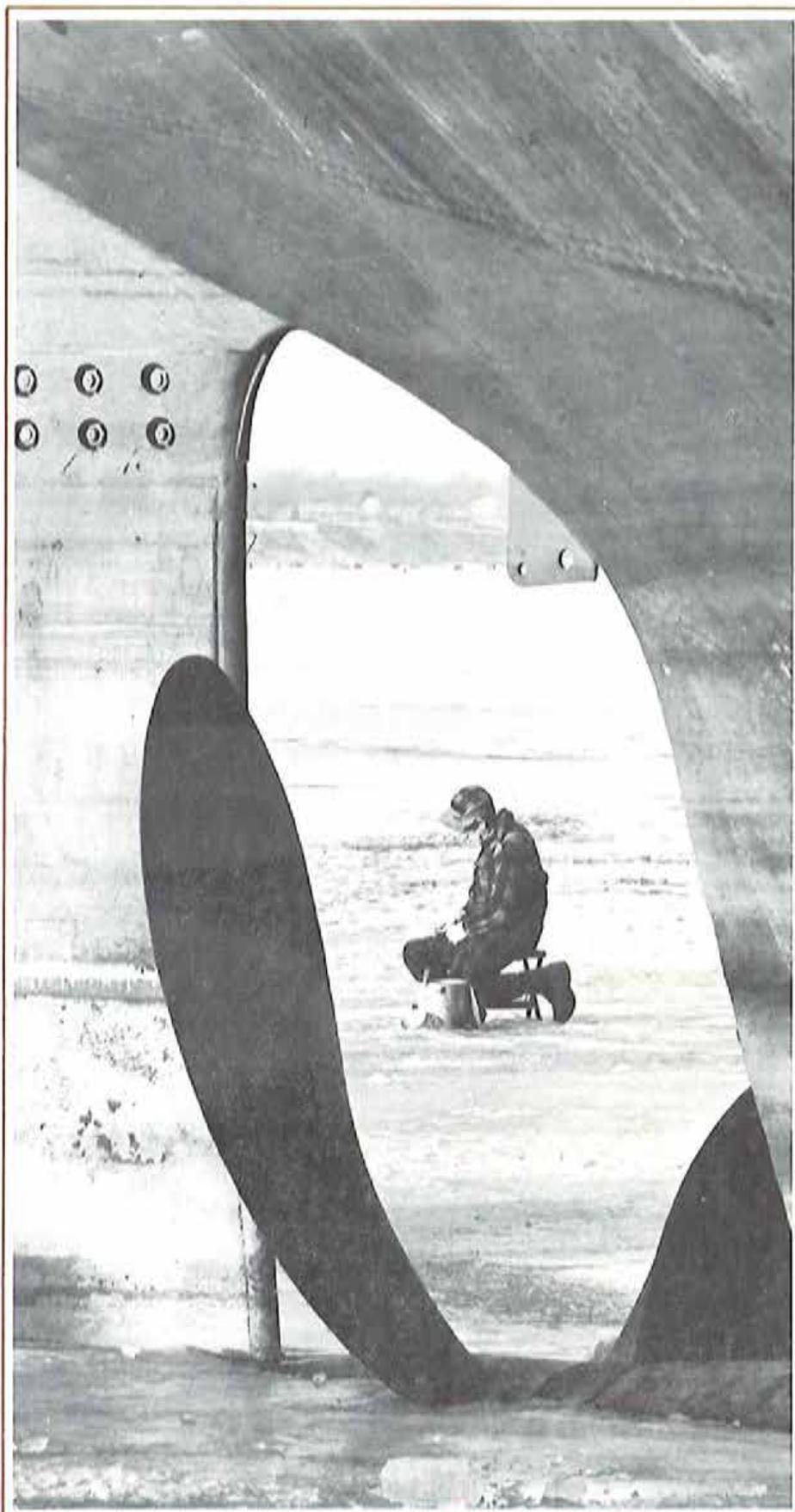
How We Did

ment's mandate has only been partially completed -- Michigan has begun discussing this approach with EPA.

However, there were many accomplishments on other 1986 proposals in the environmental protection arena. A strategy has been developed for a state-run loan pool to finance construction of municipal wastewater treatment facilities. To date, Michigan has submitted six of the eleven Remedial Action Plans for which we are responsible. No other jurisdiction has submitted more than one. A management plan to guide implementation of the Toxic Substances Control Agreement has been completed not only by Michigan, but by all of the Great Lakes states.

We gathered over 800 fish for use in monitoring our water quality, and a study of aquatic birds is undergoing peer review. In addition, the Air Quality Division of the DNR will begin monitoring air toxics with an EPA grant. A new public process to draft fish consumption advisories and set chemical limits was developed. Finally, Michigan has prevailed in our opposition to full renegotiation of the Great Lakes Water Quality Agreement. The Office of the Great Lakes was an official party to the limited negotiations representing state interests. The proposed new annexes of the Agreement significantly strengthen it.

Michigan has aggressively pursued the reduction of toxic discharges to the environment by stopping them at their source. We are pursuing legislation at both the state and federal levels to accomplish this end. We are developing source reduction impact statements as part of the DNR permitting process.



New initiatives, and renewed vigor on those unfinished in 1987, shape our agenda for 1988. Many mark the beginning of a fundamental change in program funding and operations to respond to the need for comprehensive, continuous protection and management of the Great Lakes. This trend has and will continue to define future directions in Great Lakes management and will, in future years, become an important chapter in the Great Lakes' continuing history.

1. A Michigan Environmental Enforcement and Research Trust Fund should be created using judgments and settlements assessed against Great Lakes polluters, to ensure enforcement of our environmental laws and provide Great Lakes research to guide our programs.

2. Funding should be obtained for all the initiatives included in Michigan's Great Lakes 2001 strategy. These will assist us in protecting the biological integrity of the Great Lakes with monitoring, surveillance and enhanced protection provisions.

3. A State Wastewater Treatment Revolving Loan Program should be created to enable the construction and upgrading of wastewater treatment facilities.

4. A thorough examination should be conducted to gauge the impact of shoreline development on the physical integrity of the Great Lakes and our ability to enjoy them.

5. All of our Remedial Action Plans for Areas of Concern that touch Michigan should be completed and implementation begun so we can continue to reduce Great Lakes pollution.

6. Progress in implementing the Great Lakes Charter, Toxic Substances Control Agreement and Ontario/Michigan environmental accords should continue so the full benefits of these historic documents can be realized.

7. The proposed Great Lakes Clean-up Incentive Grants Program should be established to encourage local efforts to care for the Lakes and its major tributaries.

Proposals

8. A Great Lakes Congress should be established to ensure that the informed involvement of Michigan citizens is used to help shape state Great Lakes policies.

9. Michigan should sign the waterborne transportation cooperation agreement with Ontario.

10. Michigan should obtain title to the Great Lakes islands, presently owned by the U.S. Bureau of Land Management, to make them fully available to Michigan citizens.

11. Innovative mechanisms to encourage the development of facilities for recreational boaters should be pursued.

12. Strong legislation should be enacted to prevent building in fragile or vulnerable Great Lakes shorelines and to inform buyers of high-risk erosion property of the inherent dangers.

13. An environmental bonding proposal should be explored to assess its potential for addressing solid waste disposal problems, toxic clean-ups and the cleaning of Great Lakes pollution hotspots.

14. S.B. 403-405 and 413 should be enacted to create a coordinated state program to reduce the production of hazardous waste in our State. In addition, we should support Congressman Howard Wolpe's similar federal legislation. A source reduction impact statement should be fully developed as a part of the DNR permitting process.

15. H.B. 4256 should be enacted to provide full protection for one of Michigan's greatest treasures -- our sand dunes.

16. A system of mandatory reporting of significant water uses in Michigan should be established to give us the information we need for watershed management decisions and allow us to participate in the Great Lakes Charter process.

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