

Lake Michigan contains almost 1.3 quadrillion gallons of water. That's enough to fill 3 billion bathtubs.

development encroaches upon their habitats. In response to this problem, coastal planners and natural resource managers are encouraging sustainable development to create a balance between urban growth and ecological protection.

Water Quality: Lake Michigan's water quality problems are difficult to tackle because of the lake's long retention time and cul-de-sac formation. Toxins

and pollutants remain in the water where they damage the physical environment and adversely affect wildlife. Poor water quality is found mostly near urban areas where water from storm sewers is discharged into the lake, bringing with it pesticides, herbicides, oils and heavy metals. Another pathway of pollution into Lake Michigan is the atmosphere, carrying emissions from distant factories. One leading atmospheric pollutant is mercury; others include lead and PCBs. These toxins can harm fish and wildlife. Consumption advisories have been placed on some Lake Michigan sport-caught fish because of concern that mercury, PCBs and the pesticide chlordane might harm humans who eat fish in large amounts. The U.S. government has designated 10 places on the Lake Michigan shoreline as areas of concern where beneficial uses have been impaired and environmental standards are not being met.

Aquatic Nuisance Species: Lake Michigan is threatened by the arrival of new aquatic nuisance species and also plays a key role in the spread of such species because its drainage system is connected to the Mississippi River via a diversion of the Chicago River into the Chicago Sanitary and Ship Canal.

One species that has begun its spread is the zebra mussel. These small, striped molluscs are causing widespread ecological and economic problems. They destroy native mussels and compete with other species for food. They cluster inside water intake pipes, disrupting normal inflow. They can also affect recreation if large numbers of dead ones wash ashore, produce a foul odor and leave behind their sharp shells.

Another Lake Michigan nuisance species is the round goby, a fish first found there in 1993. Gobies are suspected of competing for food with native species such as darters and sculpins, and driving native species from their preferred habitat. They prey on the eggs of important sport species such as lake trout, whose reproductive capacities are already limited, and on zebra mussels.



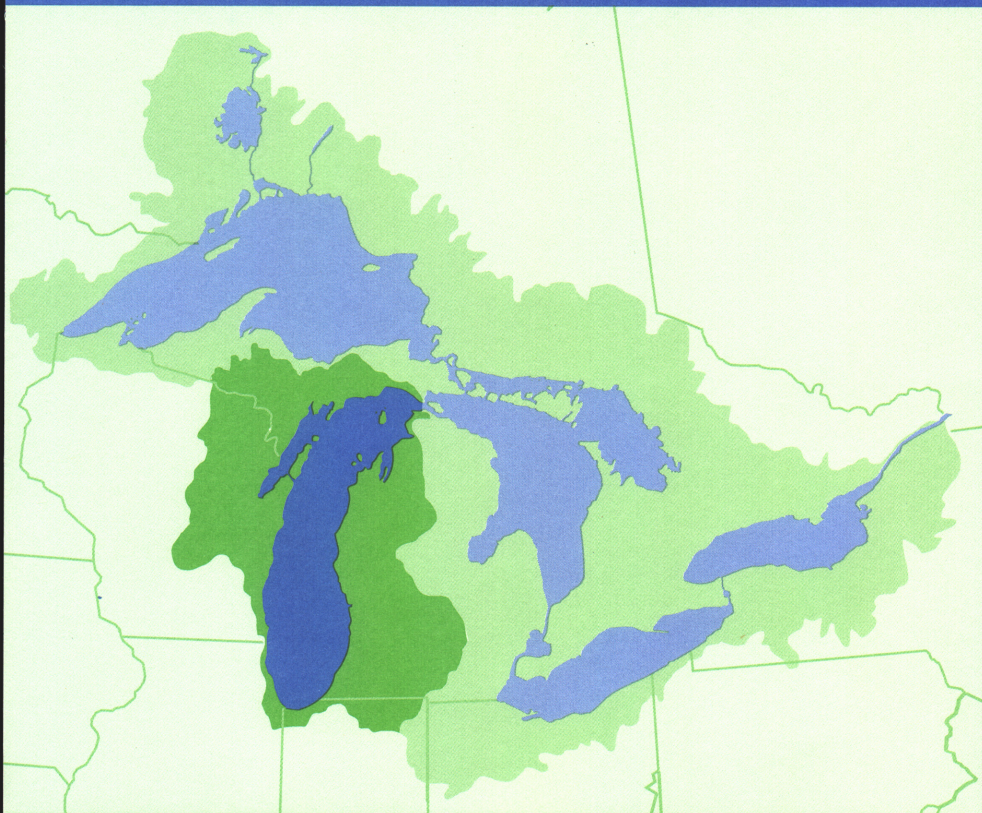
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Lake Michigan Basin



Lake Michigan Basin Statistics

Length 307 mi/494 km
Breadth 118 mi/190 km
Elevation 577.5 ft/176.0 m
Depth 279 ft/85 m average
 923 ft/281 m maximum
Volume 1,180 mi³/4,918 km³
Water Surface Area 22,300 mi²/57,753 km²
Drainage Basin Area 45,600 mi²/118,095 km²

Shoreline Length,
Including Islands 1,640 mi/2,639 km
Outlet Straits of Mackinac to Lake Huron
Retention/Replacement Time 62 years
Population 12,052,743*

* Includes metropolitan Chicago, which is not part of the **drainage** basin now but which uses Lake Michigan for drinking water.

Lake Mich





Illinois

Wisconsin

Great Lakes Basin Boundary	
Lake Basin Boundary	
International Boundary	
State Boundary	
Diversion	
National Forest	
National Park/Lakeshore	
Underwater Preserve	
Area of Concern	
City	

Chicago River
Chicago Sanitary and Ship Canal
Grand Calumet
Gary
Chicago

Des Plaines River

Waukegan Harbor
Waukegan

Milwaukee Estuary
Milwaukee

Sheboygan River
Sheboygan

Lake Winnebago
Oshkosh

La
Mic

Lake Michigan is the sixth largest freshwater lake in the world and the third largest Great Lake. Its northern edge joins Lake Huron at the Straits of Mackinac, making the two lakes hydrologically inseparable. Lake Michigan is a long, narrow cul-de-sac, with almost all of its water flowing out through the straits after circulating in the lake for almost 100 years. A small amount is diverted to the Mississippi River basin through the Chicago Sanitary and Ship Canal.

Four states — Michigan, Illinois, Indiana and Wisconsin — border the lake. The northern part of the Lake Michigan basin is covered with forests and is sparsely populated, whereas the southern portion is rich in agriculture and also heavily industrialized with large metropolitan centers such as Chicago and Milwaukee.

Lake Michigan is the only Great Lake completely within the United States.

Shoreline Use

Residential	27.7%
Commercial/Industrial	5.6%
Agricultural	1.2%
*Other	65.5%

*"Other" classification includes public, beaches, forests, barren lands.

Economy

The geographic diversity of the Lake Michigan basin makes it suitable for a wide range of economic sectors.

Industry: The largest concentration of steel production in North America is in the metropolitan areas surrounding southern Lake Michigan, including Chicago, Illinois, and Gary, Indiana.

Agriculture: Six of the top 10 agricultural counties in Michigan are in the Lake Michigan basin. Traverse City, on the shores of northern Lake Michigan, has been named the "Cherry Capital of the World." Seventy-five percent of the national tart cherry crop is produced in the area. Michigan also produces the fourth largest grape harvest in the nation. Cool winds off the lake help prevent premature budding. The grapes are used primarily for juice, but 21 Michigan wineries also use them. Christmas tree production is another facet of agriculture in the Lake Michigan basin, with Michigan producing 4 million trees in 1998.

Shipping: More than 90 million tons of cargo were shipped in and out of Lake Michigan by boat in 1996, including iron ore, coal, steel, limestone, grain and other farm products.

Forestry: A significant pulp and paper industry has developed in Michigan's Upper Peninsula and Wisconsin's Fox River valley. At the southern tip of Lake Michigan, Chicago is a major publishing center.

Fisheries: The Lake Michigan fishery has been valued at nearly \$100 million. In 1996, more than 14 million pounds of fish were caught commercially in Lake Michigan waters. The main species were lake whitefish, chubs and smelt. Lake Michigan's recreational fishery is also strong. In 1996, 715,000 anglers fished in Lake Michigan waters and spent \$490 million on fishing trips and related items. Among the most popular sport species are yellow perch, chinook and coho salmon, lake trout and steelhead.

Tourism: Lake Michigan supports a multimillion dollar outdoor recreation industry, including fishing, diving and boating. Some of the basin's greatest attractions are the magnificent freshwater dunes that line the Michigan, Illinois and Indiana lakeshores. More than 20 million people each year visit national lakeshores, state parks and underwater preserves in the basin. Underwater preserves are special areas in the lakes designated by states to protect shipwrecks and other cultural and geologic resources.

Ecology

Perhaps Lake Michigan's most striking natural feature is the freshwater dunes along its shoreline, the largest coastal sand dunes in the world. The basin also has three types of forests — northern hardwood, oak-hickory and pine. In addition to its outstanding land forms and flora, the Lake Michigan basin is also home to a diversity of animal species, including black bear, bobcat, coyote, beaver, white-tailed deer, porcupine, 12 species of frogs, the bald eagle and snowy owl, and more than 68 species of fish.

Natural Resource and Environmental Issues

Loss of Wetlands: Lake Michigan coasts support close to 40 percent of Great Lakes coastal wetlands, nearly double that of any of the other lakes. Wetlands help to replenish and purify groundwater, prevent flooding and erosion, and support a great diversity of plant and animal life, but they continue to be drained and filled in for agriculture and development. This practice promotes erosion and may endanger the plants and wildlife living in these areas.

Urban Sprawl: Populations in the Lake Michigan basin are shifting outward and the suburbs of large cities such as Chicago and Milwaukee are expanding. Vast amounts of agricultural land and open space have been converted into residential and urban areas. Longer work commutes increase pollution, and native wildlife are threatened as



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