



WHAT ARE THE CURRENT PRESSURES IMPACTING LAKE MICHIGAN?

Current pressures on the Lake Michigan ecosystem include increasing use of groundwater by a growing basin population, disruption of the aquatic food web, and habitat alteration.

Pressures

Increasing use of groundwater

For more than ten million people, Lake Michigan is the source of water for drinking, industry, and many recreational opportunities. Of all the Great Lakes, Lake Michigan has the largest amount of groundwater discharge (79 percent) as its water source due to sand and gravel aquifers near the shore. Because of increased use by Lake Michigan basin communities, groundwater levels are now low enough in the western basin that Lake Michigan water can migrate into the groundwater, a reversal of normal flow.

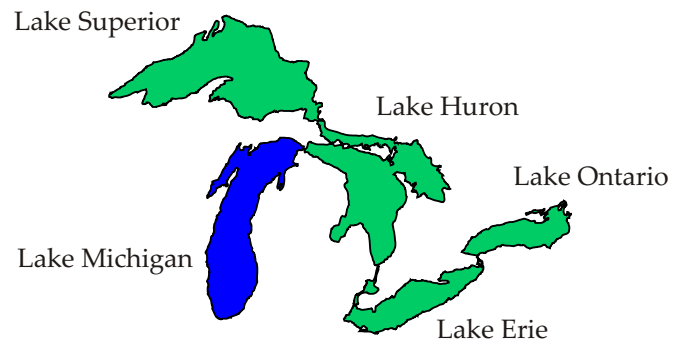
Fluctuating lake levels

Lake Michigan's water level fluctuates as part of what is thought to be a 30-year cycle. In 2001, Lake Michigan was measured at its lowest level since 1966, two feet below the long-term average. The drop was more than 40 inches from record high levels in 1997. In 2004, lake level was close to average due to high rainfall.

Low lake levels increase the pressure on available water resources, further complicating the groundwater-surface water exchange problem. Low lake levels can also impact the shipping and boating industry. Cargo loads must be lightened, leading to losses of up to \$28,000 per trip, and many recreational boat ramps become inaccessible. High lake levels can cause shoreline erosion.

Disruption of the aquatic food web

Populations of the native bottom-dwelling invertebrate *Diporeia*, a major food source for Lake Michigan fish, are decreasing rapidly. The reason for the decline is unknown but the impact on the aquatic food web is expected to be severe. A multi-agency research team is working to determine the cause of the decline.



Populations of native fish species are also in decline. The yellow perch population remains low. Lake trout populations have not recovered to the point of natural reproduction and thus continue to be restocked. Remnant populations of lake sturgeon survive in the Great Lakes only in scattered areas, including eight Lake Michigan tributaries. A lake sturgeon restocking program has begun in Lake Michigan.

A major potential threat to the food web is the invasion of Asian carp species, voracious non-native fish that threaten to enter Lake Michigan through the Illinois River system from the Mississippi River. These large carp species feed on plankton and would compete directly for food with native organisms including mussels, all larval fish, and some adult fish. An experimental electrical barrier to prevent Asian carp from entering Lake Michigan is in place across the Chicago Sanitary and Ship Canal. The barrier is located approximately 25 miles from Lake Michigan.

Habitat alteration

The increase in development pressure to alter remaining Lake Michigan aquatic and terrestrial natural habitats impacts the plant and animal species that depend on these habitats. The largest collection of freshwater sand dunes and beaches in the world

LAKE MICHIGAN PRESSURES

are threatened by residential development, mining, and episodic resurgences of *E. coli* and the macroalgae *Cladophora* that reduce water quality and restrict beach use.

Over the last two centuries, more than 60 percent of Lake Michigan coastal and inland wetlands have been destroyed, yet the pace of shoreline modification and urban, industrial, and agricultural development is increasing, threatening the remaining 12.9 million wetland acres. Although the basin's forest resources are healthy overall, and reviews of national forest plans are addressing management issues, development pressures on forest resources remain high. In urban areas, impervious surfaces such as roads and rooftops are degrading lakes and streams by increasing water temperature, runoff volume, altering watershed hydrology, raising ambient air temperatures, and reducing open space.

Current Actions

The Lake Michigan Watershed Academy provides a combination of land-use planning tools, data, and approaches to local planners to promote an ecosystem approach and dialogue among decision-makers. The ten Lake Michigan Areas of Concern (AOC) are undergoing sediment remediation and combined sewer flow/stormwater management remediation, as well as habitat restoration. It is expected that AOC remediation and restoration will enhance opportunities for public interaction with the Lake Michigan ecosystem.

Recovery plans are in place for Lake Michigan basin rare species including the piping plover, Hine's



emerald butterfly, and Kirtland's warbler. Chicago is also one of five United States signatory cities to

the Urban Conservation Migratory Bird Treaty, a long-term partnership to protect migratory birds. An aggressive program to train whooping cranes to migrate and return to nest in Wisconsin's Lake Michigan wetlands is successfully underway. A series of dam removals on the Milwaukee River has increased habitats for diverse fish and insect populations. For the first time in 100 years, a nesting pair of bald eagles was documented on Indiana's Lake Michigan shoreline in 2004.

Actions Needed

The following actions are needed to counter the current pressures on the Lake Michigan ecosystem:

- Research to determine groundwater status and groundwater-Lake Michigan interactions
- Research to determine the cause of *Diporeia* population declines
- Research to determine the causes of *Cladophora* blooms and *E. coli* outbreaks
- Research to determine the impact of invasive species on the food web and natural habitats
- Construction of an additional barrier and improvements to the existing barrier in the Illinois River system to prevent Asian carp from entering Lake Michigan
- Protection and restoration of natural areas, migratory bird flyways, and unique biological and geological features, especially wetlands
- GIS training for local officials who make land-use decisions

Further Information

For further information related to the state of Lake Michigan, refer to the *State of the Great Lakes 2005* report which, along with other Great Lakes references, can be accessed at www.epa.gov/glnpo/solec. The Lake Michigan Lakewide Management Plan 2004 can be accessed at www.epa.gov/greatlakes/michigan.html.

Piping plover at Indiana Dunes National Lakeshore.
Photo: U.S. EPA Great Lakes National Program Office.

