



LAKE MICHIGAN LAKEWIDE ACTION AND MANAGEMENT PLAN

Annual Report 2016

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What is the Lake Michigan LAMP?

Under the Great Lakes Water Quality Agreement, the governments of Canada and the United States have committed to restore and maintain the physical, biological, and chemical integrity of the waters of the Great Lakes.

The Lake Michigan Lakewide Action and Management Plan (LAMP) is an action plan for restoring and protecting the Lake Michigan ecosystem. The LAMP is coordinated by the Lake Michigan Partnership, which is led by the U.S. Environmental Protection Agency (EPA) with participation from federal, state, tribal and local governments or agencies, and with input from non-governmental stakeholders and the public. The next LAMP will be issued in 2019 and in the coming years, the Lake Michigan Partnership will be working to assess the state of the lake, measure progress against LAMP goals and objectives, and promote management actions to address identified problems.

This 2016 annual report highlights accomplishments and progress in achieving LAMP goals and objectives.

Overview

Lake Michigan is the second largest Great Lake by volume and the only one located totally within the United States. The northern portion of the basin's 45,000 square miles is covered with second-growth forest and, except for the highly industrial Fox River Valley, has not been subjected to extensive development. Conversely, the more temperate southern portion of the basin has been extensively developed -- from Milwaukee through Chicago to northwest Indiana, resulting in environmental stressors such as loss of native habitat, urban runoff and discharges of improperly treated sewage.

The Lake Michigan basin contains the world's largest collection of freshwater sand dunes, along with many wetlands, prairies and savannas that provide essential habitat to a great diversity of plant and animal species. The lake's aquatic food web supports fish for food, sport and culture. The fertile soils in the southern part of the basin support extensive agricultural activities, and the coastline is home to 25 harbors and hundreds of marinas. The Lake Michigan coastlines also serve as a key North American migratory bird flyway.

Accomplishments

Fish and Wildlife

2015 was "Banner" Year for Piping Plovers

Twenty years ago, there were only 20 breeding pairs of Great Lakes piping plovers in Michigan. But plovers were observed in record numbers in the Great Lakes in 2015, with 75 pairs producing 128 chicks, bringing the Great Lakes total to nearly 300. Of the 58 Michigan breeding pairs recorded last year, 43 were in the northern Lower Peninsula and 15 were in the Upper Peninsula. Sleeping Bear Dunes National Lakeshore had the most nests in the region. Another notable Lake Michigan site was along Greene's Bay on the west side of Beaver Island, which in 2015 was home to its first breeding pair in over 20 years. Early 2016 reports for plover in Lake Michigan basin include breeding pairs at GLRI-restored habitat in Wilderness State Park, Michigan and Cat Island in Green Bay, Wisconsin.



Piping Plover. Credit: USFWS - Vincent Cavalieri.



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Lake Whitefish

After a 100-year absence, Lake Whitefish have re-established a spawning population in the Menominee River. Researchers from University of Wisconsin-Green Bay, as part of a project funded by the Wisconsin Department of Natural Resources (WDNR) Office of Great Lakes and the Great Lakes Protection Fund, estimate that between 241,000 and 805,000 larval Lake Whitefish were produced in the Menominee River in 2015. This is the first documentation of larval stage Lake Whitefish production in the Menominee and confirms that Lake Whitefish are successfully spawning there. It is likely that Lake Whitefish are spawning in other large Wisconsin tributaries along the west shore of Green Bay as well.

Northern Lake Michigan Cisco Expansion

In 2015, researchers from tribal, federal and state agencies documented juvenile Cisco (Lake Herring) as far south as Grand Haven, MI and north to Manistique, MI. Adult fish were captured throughout the entire northern half of the lake. Researchers from the Michigan Department of Natural Resources (MI DNR) and Little Traverse Bay Bands of Odawa Indians documented spawning Cisco in Little Traverse Bay, the first documented occurrence of Cisco spawning outside of Grand Traverse Bay in 50 years.

Yellow Perch

The Great Lakes Fishery Commission (GLFC)'s Lake Michigan Technical Committee reported high catches of young-of-year (fish in the first year of life) Yellow Perch in 2015 summer and fall Lake Michigan surveys. These high catches suggest that an above-average year class was produced in 2015, the first relatively strong Yellow Perch year class observed in the lake since 2010 (excluding Green Bay, where Yellow Perch continues to support a commercial fishery). Researchers have identified low recruitment (i.e., replacement of those fish removed from the population by fishing harvest or natural causes) as a problem affecting perch populations and fishing since the mid-1990s. Survival bottlenecks occur at multiple stages in the life of young Yellow Perch and are thought to be caused by limited food resources related to non-native species invasions (e.g., zebra and quagga mussels, spiny water flea and Round Goby). Fishery managers continue to monitor the Yellow Perch population to see if fish from the 2015 year class continue to survive and grow at satisfactory rates so that they will contribute to the Lake Michigan angler harvest in 3-4 years.

Habitat Restoration

Shoreline Protection and Restoration

Sheboygan County, WI, partnered with the Glacial Lakes Conservancy to acquire [Amsterdam Dunes](#) in 2014, with

Sheboygan County officially assuming ownership in July 2015. The 328-acre purchase establishes a Wetland Mitigation Bank and Preservation Area. The property is located on over 1,500 feet of frontage along Lake Michigan and is one of the few remaining undeveloped beach shorelines between Sheboygan and Chicago. The property is comprised of rare sand dunes, forest and wetlands of various types, bluffs, farmland, streams and diverse plants and wildlife.



Amsterdam Dunes. Credit: Wisconsin Department of Natural Resources.

Reef restoration for Cisco in Grand Traverse Bay

Rocky reefs in Lake Michigan provide secure spawning habitat for many fish species, keeping eggs sheltered from predators and the harsh winter. In 2015, The Nature Conservancy, MI DNR and Central Michigan University placed 450 tons of limestone into Lake Michigan to improve a Grand Traverse Bay reef and boost native fish populations. The limestone was put in a reef complex near Elk Rapids where Lake Trout, Whitefish, and Cisco are known to spawn. The fishes' populations are threatened by overfishing, degraded habitat, and invasive species.

Chiwaukee Illinois Beach Lake Plain RAMSAR Designation

[Chiwaukee Illinois Beach Lake Plain](#) has been designated one of only 38 Wetlands of International Importance in the United States under the RAMSAR Convention, an international treaty for protection of exemplary wetland systems around the world. The 3,914-acre site covering 15 miles of coastline is located along the southwestern shore of Lake Michigan and features the highest quality coastal dune and swale ecosystem in southeast Wisconsin and northeast Illinois. It includes six globally rare and representative wetland types and supports two federally listed threatened and endangered species which are associated with wetland communities: the eastern prairie fringed orchid and the piping plover. It also has the largest known population of Blanding's turtle, categorized as "endangered" on the *International Union for Conservation of*



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Nature Red List and as “threatened” in Illinois. In addition, the Lake Plain provides the largest near-contiguous block of stopover habitat for migratory birds along the entire Illinois coast and south western Lake Michigan coast in Wisconsin.



Chiwaukee Illinois Beach Lake Plain's Spring Bluff. Credit: Chip Williams.

Data and Monitoring

USGS Updates Lake Michigan Mass Balance Study (LMMBS)

As part of the 2015 Lake Michigan Coordinated Science and Monitoring Initiative (CSMI), U.S. Geological Survey (USGS) and Indiana University sampled contaminant loads in five tributaries to Lake Michigan: the Grand, St. Joseph, and Kalamazoo Rivers in Michigan, the Indiana Harbor Ship Canal, and the Lower Fox River in Wisconsin. Contaminants analyzed include polychlorinated biphenyls (PCBs), mercury, polybrominated diphenyl ethers (PBDEs), and organophosphate (OPE) flame retardants. Results will allow for the estimation of mass contaminant loading for the five sampled tributaries and comparison of present-day concentrations and load estimates with those collected in 1994-1995 (LMMBS) and in 2005-2006 (first LMMBS update).

No New Aquatic Invasive Species Detected

During 2015, the U.S. Fish and Wildlife Service Green Bay Fish and Wildlife Conservation Office Aquatic Invasive Species (AIS) early detection and monitoring program sampled 19 locations in Lake Michigan and its tributaries and did not find any new AIS in the basin. Six large tributaries were sampled for environmental DNA (eDNA) to detect potential Asian carp. Eight nearshore locations were sampled for larvae, juvenile, and adult fishes and benthic macroinvertebrates as part of the 2015 CSMI. Five additional locations considered high risk for new invasions (Green Bay; Milwaukee Harbor; Calumet Harbor; Chicago Harbor; and Burns Harbor) were sampled as part of a routine annual monitoring program. In total, 37,810 fish representing 77 species were collected. Thirteen fish species

were known non-natives, including Alewife, Round Goby, Grass Carp, and White Perch. A single Grass Carp was found in two locations (Milwaukee Harbor and Burns Harbor) while White Perch were found mostly in Lower Green Bay. No eDNA from Silver or Bighead Carp was detected.

Areas of Concern (AOCs)

Milwaukee Estuary

The [Great Lakes Legacy Act \(GLLA\)](#) Lincoln Park Phase II sediment cleanup and habitat restoration project was completed in 2015. Approximately 52,000 cubic yards of PCB-, PAH (polycyclic aromatic hydrocarbon)- and NAPL (non-aqueous phase liquid)-contaminated sediment were removed. Shoreline restoration will extend through 2017. These projects, paired with the 2009 Kinnickinnic River GLLA project, are major steps towards addressing beneficial use impairments in this AOC.

Muskegon Lake

In April 2016, through the GLLA, U.S. EPA and Michigan Department of Environmental Quality (MDEQ) signed an agreement to remediate approximately 44,000 cubic yards of contaminated sediments at the former Zephyr refinery and restore approximately 15 acres of riverine wetlands. MDEQ is currently working with the U.S. Army Corps of Engineers on pilot studies to clean up contamination in upland groundwater at the Zephyr site. GLRI funded restoration work through National Oceanic and Atmospheric Administration and Great Lakes Commission is underway or in design for mill debris removal, shoreline restoration and riverine wetland restoration projects at a variety of locations in the AOC.

Grand Calumet River

In 2016, through the GLLA, U.S. EPA, Northern Indiana Public Service Company, and the Indiana State Trustees agreed to remediate approximately 36,000 cubic yards of contaminated sediment in in Reach 6 & 7 of the West Branch of the Grand Calumet River (Stateline). GLRI funding to the Indiana Department of Environmental Management (IDEM) and partners has initiated restoration of approximately 800 acres of Dune and Swale and Oak Savanna habitats. The GLRI is funding IDEM and partners to continue restoration of Lake George wetlands. Additional projects underway include development of an AOC-wide prescribed burn management plan and avian management (gull harassment) and beach restoration at Jeorse Park Beach.



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Addressing Challenges

Assessing Food Web Status

Annual assessments by the USGS Great Lakes Science Center show continued lakewide declines in most Lake Michigan prey fish species in 2015. Biomass estimates were at record low levels for total prey fish in bottom trawl surveys and for several individual species including the once dominant, non-native Alewife. Scientists believe that this decline in total prey fish biomass is due to predation by piscivorous (fish eating) fishes, disruption of the lower trophic level food web by invasive species (e.g., zebra and quagga mussels and spiny water flea), and reductions in lake productivity. In nearshore and offshore waters, zooplankton community composition has changed dramatically during the past 30 years. Further, zooplankton biomass in nearshore waters is believed to have substantially declined during a similar time period and the once abundant benthic amphipod *Diporeia* has undergone a drastic decrease in abundance.

The reduced abundance of prey fish, combined with high reproduction levels for salmon, prompted the GLFC to reduce Chinook Salmon stocking by 50% lakewide in 2013. Three years after this stocking reduction, scientists still have not observed the anticipated increase in lakewide prey fish biomass. In fact, results from a recently developed fish biomass model showed an imbalanced predator and prey fish relationship in 2015, where estimates of prey fish (Alewife) biomass was insufficient to support the existing biomass of predator fish (Chinook Salmon). These results are prompting the GLFC to consider additional management actions to re-establish predator-prey balance and prevent further declines in prey fish abundance.

New Cooperative Invasive Species Management Area

A new [Cooperative Invasive Species Management Area](#) (CISMA) has been established for Charlevoix, Antrim, Kalkaska, and Emmet counties on the northern lower peninsula of Michigan. CISMAs are locally-led, grassroots-organized, public/private, long-term partnerships that increase the effectiveness of invasive species management efforts by bringing together diverse organizations to collaborate strategically across a common local geography. CISMA activities include: outreach and education; prevention; early detection and response; and treatment of established infestations. Regional CISMAs are being formed throughout Michigan, and the state's Lake Michigan shoreline is now fully covered by eight CISMAs.

Lake Michigan Clean Marina Program

To address environmental impacts from marina and recreational boating activities on Lake Michigan water quality, the [Clean Marina Program](#) implemented by each Lake Michigan state has designated a total of 52 Clean Marinas in the basin. Marinas are designated for implementing environmental best management practices that control and address issues such as waste disposal, boat cleaning, and fueling.



A boater uses a pump out station at the Washington Park Marina, Michigan City, IN. Credit: Indiana Clean Marina Program

2016 Asian Carp Action Plan Released

The [Asian Carp Regional Coordinating Committee \(ACRCC\)](#) released the 2016 Asian Carp Control Action Plan in April 2016, which outlines the strategic and coordinated actions federal, provincial, state and local partners are taking to stop the introduction, spread and establishment of Asian carp into the Great Lakes. ACRCC initiatives for 2016 include increased efforts for the detection of Asian carp at various life stages, continued development of control technologies and identification of opportunities for their field implementation. In addition, the ACRCC is continuing to focus on the development of control alternatives at Brandon Road Lock and Dam area in Illinois. Since the ACRCC's establishment in 2009, the actions of the partnership have successfully defended the Great Lakes from self-sustaining populations of Asian carp with more than \$386 million invested in research, control and monitoring efforts.

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