

# Lake Michigan Report Card

Senator Mark Kirk



Summer 2011

## ***Executive Summary***

*We need to protect Lake Michigan, the Crown Jewel of our environment and the source of drinking water for millions. To keep you informed on the health of the lake, I am publishing our first Lake Michigan Report Card. This Report Card assesses beach water quality, sewage pollution, mercury contamination, water levels and invasive species of the lake. It identifies how we can take action to protect Lake Michigan. The overall grade of Lake Michigan is a C.*

- 1) On beach water quality our grade is a D.
  - There are 52 public beaches in Illinois. According to the Illinois Department of Public Health, we had 579 beach closures or contamination advisories last year.
  - Persistent beach closures are a threat to public health and cost millions in lost revenue.
  - In response, Congress should enact the Beach Act to improve contamination warnings and assessment to lower the number of beach closings.
  
- 2) For sewage pollution our grade is a C.
  - More than 24 billion gallons of raw sewage are dumped into the Great Lakes each year.
  - In 2010 alone, 6.5 billion gallons were discharged into Lake Michigan from Chicagoland.
  - We need to set a federal date certain to ban sewage dumping in the Great Lakes, backed by steps to disinfect the Chicago River.
  - Senator Durbin and I introduced S. 147, The Great Lakes Water Protection Act, to set a date to ban all sewage dumping in the Great Lakes.
  
- 3) Mercury contamination receives an Incomplete.
  - Mercury can transform into a more toxic form, methylmercury, which bio accumulates in fish. When eaten, contaminated fish can cause nervous disorders, particularly in children.
  - Great Lakes states and Canadian provinces post mercury advisories for fish for inland water bodies but more data is needed to measure this threat in the Great Lakes.
  - The EPA should update its mercury tests annually, to report on the trend of mercury contamination in the lakes.
  
- 4) Our grade for water levels is a D.
  - Water levels have enormous effects on the lake's ecosystem, boating, navigation and fishing. Lake Michigan water levels declined since the 1990s.
  - Current water levels are about three feet below the level of 582 feet 25 years ago.
  - For every foot decline from the high, this section was downgraded a full letter grade.
  - Dredging to support boating and shipping is more expensive at lower water levels. Congress should respond by resolving any disputes holding up the Harbor Maintenance Act.
  
- 5) Our grade for cleaning up Superfund polluted sites is a B.
  - Polluted "Areas of Concern" surround the Great Lakes. For example, the US and Canada recognized Waukegan Harbor as such an area after Outboard Marine Corporation dumped PCBs in the harbor.
  - There are a total of 43 such polluted areas in the Great Lakes.
  - Cleanups began in 1990 and it seems now that the full restoration of Waukegan harbor is within reach.
  
- 6) Our last grade for invasive species is a C.
  - Keeping out invasive species, especially Asian carp, is imperative.

- Asian carp have not been found in the Great Lakes, but verified spawning populations are present about 150 miles away and eDNA results positive for Asian carp have been found above the barrier.
- Just last month three consecutive eDNA samples for carp were found in Lake Calumet, above the barrier, which was designed to keep the carp out.
- The Army Corps of Engineers should take every effort to up the voltage at the three electric dispersal barriers as a further deterrent for carp.

Based on all these considerations, our overall grade for the health of Lake Michigan is a C. There have been great strides in the last few years to enhance the restoration of natural habitat, reduce pollution and combat invasive species, but it is clear that we still have a long ways to go.

I will be working to advance the solutions above and I appreciate your help in protecting this Crown Jewel of the Midwest.

**SENATOR MARK KIRK'S LAKE MICHIGAN REPORT CARD**  
**Summer 2011**

**GOALS:** 1) Assess the health and status of Lake Michigan within the following categories: beach closures, sewage pollution, water levels, invasive species, and contamination remediation around the lakeshore. 2) Identify how local, state and federal leaders can restore and preserve Lake Michigan.

**BEACH WATER QUALITY**

➤ **Grade: D**

*Explanation:* The grade is based on number of beach closings; A = 0-100, B= 100-300, C= 300-500, D=500-700, F= 700+

	2006	2007	2008	2009	2010
<b>Beach Closures/ Contamination Advisories for Lake Michigan Beaches in Lake and Cook Counties</b>	577	807	537	628	579

Every year, thousands of beach closings are issued along the 815 freshwater beaches in the Great Lakes region. According to the Natural Resources Defense Council (NRDC), *Testing the Water 2011*, Illinois ranked 26<sup>th</sup> of 30 in state beach water quality based on percentages of samples exceeding the Environmental Protection Agency's (EPA) single-sample maximum. The single-sample standard for beach closures and advisory decisions in Illinois is 235 cfu/100 ml of *E. coli*. The NRDC report noted that 14 percent of the samples taken exceeded national water standards in 2010. In the report, the NRDC noted that Great Lakes beaches experienced 3,766 days of closings and advisories region-wide, a 14-percent increase from the 3,300 in 2009. This is a clear indicator that water pollution is on the rise.

There are 52 public beaches along Lake Michigan in Illinois. Over the last five years, annual totals for beach closings in Illinois continue above 500. According to the Illinois Department of Public Health, Illinois faced 628 beach closures or contamination advisories in 2009, up 17 percent from 2008. In 2010, 579 beach closures and advisories for beaches along Lake Michigan continue to be a health concern and impact cash-strapped budgets. A University of Chicago study showed swim bans at Chicago's beaches due to *E. coli* levels cost the local economy \$2.4 million in lost revenue every year. According to the Illinois Department of Public Health, the number of beach advisories and closings on the Lake Michigan shoreline in Illinois has remained above 500 a year over the last five years.

➤ **Action Item: Enact Beach Act**

This legislation would reauthorize the *Beaches Environmental Assessment and Coastal Health ("BEACH") Act*. The bill requires rapid testing methods to detect water contamination in four hours or less, faster notification and decision about closures and advisories within two hours and requires the EPA administrator to review grantees compliance with the BEACH act requirements.

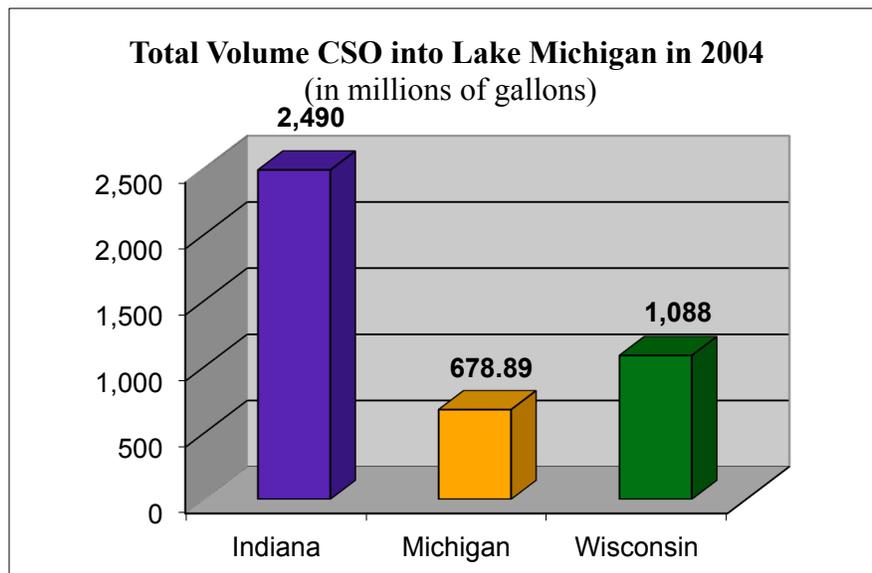
## **SEWAGE POLLUTION**

### ➤ **Grade: C**

*Explanation:* While sewage pollution has declined, millions of gallons of runoff and sewage overflow are dumped into Lake Michigan each year, devastating to the environment and causing beach closures.

The Great Lakes are the source of drinking water for 30 million Americans. Lake Michigan, the Crown Jewel of the Midwest, provides miles of beaches, habitat and water recreation to millions of Illinoisans.

Many cities along the Great Lakes do not have the necessary infrastructure to divert sewage overflows during times of heavy rainfall. More than 24 billion gallons of sewage are dumped in the lakes each year; Detroit alone dumps an estimated 13 billion gallons of sewage into the Great Lakes annually. Research conducted by the U.S. Environmental Protection Agency showed 30 communities contain a total of 347-combined sewer outflow (CSO) outfalls that discharge into the Lake Michigan basin. Eighteen of those communities are in Indiana, 11 are in Michigan, and one is in Wisconsin. According to data from the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC), 6.5 billion gallons were discharged into Lake Michigan in 2010, and 107 million gallons were discharged into the lake from the Chicagoland area this year. Improving Chicago's storm water storage and treatment infrastructure is necessary to improve water quality in the area and mitigate direct public health implications of sewage pollution.



### ➤ **Action Item: Deadline to End Sewage Dumping in the Great Lakes, Disinfect the Chicago River**

Sewage dumping contributes to hundreds of beach closures along the Great Lakes each year. To fight back, Senator Richard Durbin (D-IL) and Senator Kirk introduced S. 147, *The Great Lakes Water Protection Act*, to give cities until 2031 to build the full infrastructure necessary to prevent sewage dumping into the Great Lakes. Violators of EPA sewage dumping regulations after 2031 will be subject to fines up to \$100,000 for each day a violation occurs. These fines will be directed to a newly established Great Lakes Clean-Up Fund within the Clean Water State Revolving Fund. Fines collected

would go into this fund and be reallocated to the states surrounding the Great Lakes for wastewater treatment, habitat protection, and wetland restoration.

As part of a local effort to improve water quality in the Chicago Area Waterway System (CAWS), it is time to clean up the Chicago River to ensure that it is safe for recreational activities such as boating and swimming. Chicago is the only major city that does not disinfect its wastewater. The EPA has called for an aggressive cleanup of the Chicago River and in June 2011, MWRDGC voted to disinfect the wastewater dumped into the Chicago River. Seventy percent of the water in the Chicago River is made up of sewage or “effluent” material. In the near-term, it is important to work with local and state officials to see that this is completed to reduce the threat to public health and the environment. The Chicago River supports over six million residents in the city and it is time to disinfect sewage effluent that is dumped into river that runs through the nation’s third largest city.

## **MERCURY CONTAMINATION**

### **➤ Grade: Incomplete**

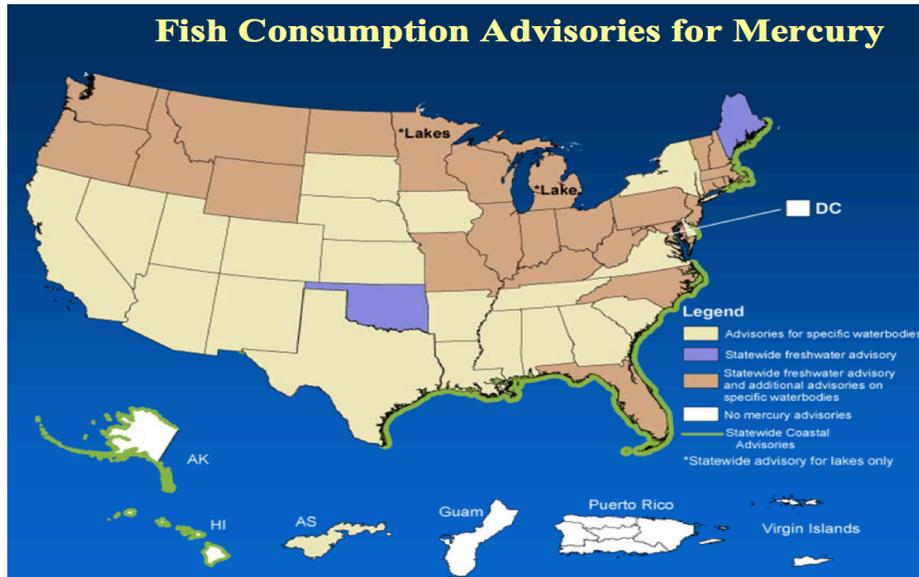
*Explanation:* Gaps in our knowledge of mercury levels in the Great Lakes make it very difficult to accurately grade the status of mercury in Lake Michigan. There is currently not enough data collected on Lake Michigan to understand the levels of harmful mercury or methyl mercury within the water column.

Mercury (Hg) is an element that is found naturally in minerals, rocks, plants soil, water, and the air. As it enters the environment through soil and lakes, mercury can be converted to a more toxic form, called methyl mercury, by bacteria. Methylmercury (MeHg) is particularly concerning since large amounts of methyl mercury can accumulate in fish tissue.

Human exposure to methylmercury most directly occurs through consumptions of contaminated fish. Mercury is a neurotoxin that can cause permanent developmental effects in young children. Mercury can adversely affect the human nervous system, brain function, and cause birth defects. EPA estimates that more than 300,000 newborns in the U.S. are born with unsafe levels of mercury in their system every year.

Although mercury levels in Lake Michigan are poorly understood, direct effluent discharge from industrial facilities, runoff from urban areas and atmospheric deposition to surface water and the surrounding watershed are all likely pathways for mercury into the Great Lakes. Mercury and Polychlorinated Biphenyls (PCB's) are two of the most common contaminants in aquatic ecosystems.

Total mercury levels in sediment and fish will vary depending on the ecology of the areas and the ability of various organisms to sequester mercury from the environment. Inland lakes tend to have higher concentration for mercury than the Great Lakes. Lacking a consistent monitoring program, fish advisories of our inland lakes are a clear indicator that mercury levels are indeed a problem in the Great Lakes region. Currently all of the states and provinces on the Great Lakes Region have fish consumption advisories due to methylmercury contamination for inland lakes and their connecting waters. The Illinois Department of Public Health has issued a statewide methylmercury advisory for predator fish, including a variety of bass, walleye, pike, and catfish. Although, current fish advisories for mercury for the Great Lakes region are for inland water bodies, this should not discount the serious threat mercury poses to the environment and Lake Michigan.



Source: EPA National Fish and Wildlife Contamination Program, 2008

Data from a 2007 NOAA Report to Congress on Mercury Contamination in the Great Lakes illustrated that sediment mercury concentrations have declined since 1970s—a trend that was reconfirmed by the findings of Paul E. Drevnick, published in *Environmental Pollution* in May 2011. This study focuses on the historic and recent changes in mercury deposition in sediment core samples from the Great Lakes (Ontario, Michigan, and superior) and inland lakes and confirms that mercury levels in core sediments in Lake Michigan have declined in the last 30 years. Unfortunately, at the time of the NOAA report trends in mercury levels in biota for Lake Michigan were unidentifiable due to lack of data.

Analysis of mercury in core sediments and other aspects, such as surface water and fish tissue, are only pieces of greater understanding of the mercury fluxes in Lake Michigan water and the implications for human health. Currently, the Great Lakes Restoration Initiative is supporting mercury related projects throughout the Great Lakes Basin, including research that specifically targets mercury cycling and bioaccumulation in the Great Lakes. More data is greatly needed for a more comprehensive understanding of the cycling of mercury in the environment and the resulting accumulation in organisms.

➤ **Action Items:**

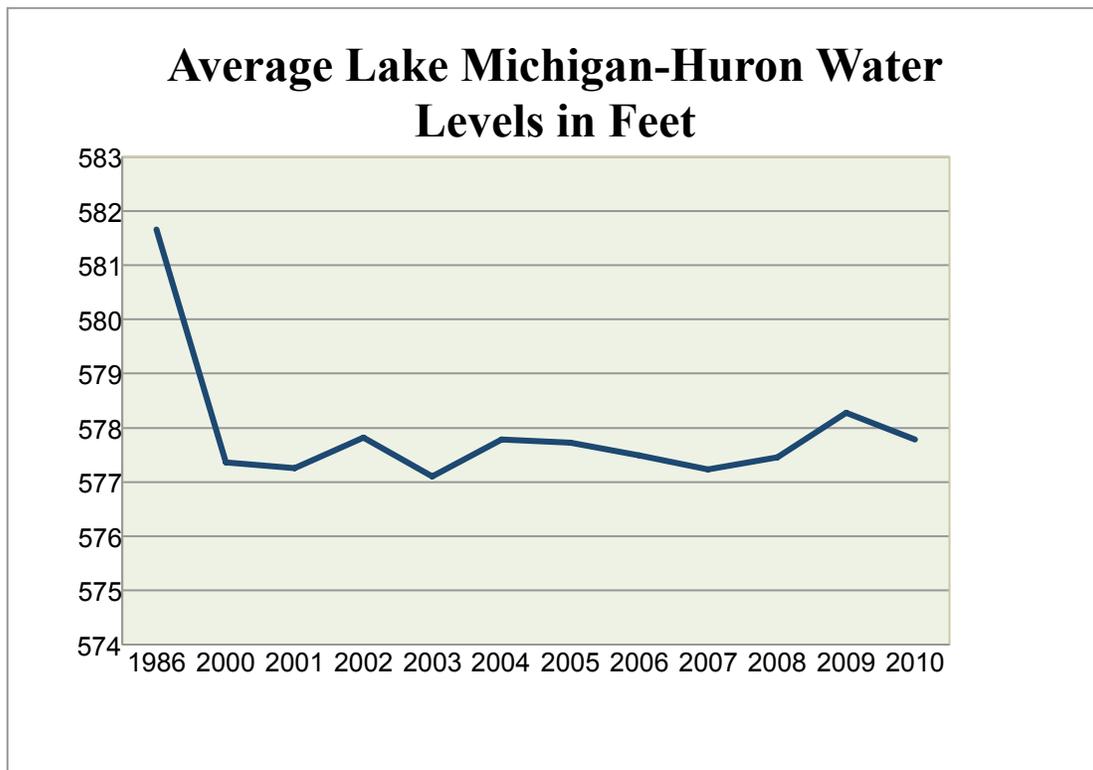
1) **EPA should review/update mercury monitors and tests**

The correlation between mercury cycling and the bioaccumulation in Lake Michigan organisms is poorly understood. The EPA must review and update its existing mercury monitoring protocols to achieve a better understanding of mercury levels in our water and should report to Congress the trend of mercury contamination in the lakes.

## LAKE MICHIGAN WATER LEVELS

➤ **Grade: D**

*Explanation:* This section uses the maximum historic water level recorded for Lake Michigan-Huron as the benchmark. For every foot water levels decrease from the maximum water level of 582 feet, a letter grade is deducted; A = 0-1ft, B= 1-2, C= 2-3, D= 3-4, F= 4+



Lake levels are an important factor in shoreline erosion and can affect the ability for shippers to navigate along the waterways smoothly and have negative implications on drinking-water intakes. Lake levels are naturally affected by precipitation, evaporation and runoff sources. Since the 1990s, water levels of Lake Michigan are on the decline.

According to the historic water level data from the Army Corps of Engineers, Lake Michigan-Huron water levels are below the long-term average by approximately  $\frac{1}{2}$  foot. Record high levels of 1986 were over three feet higher than the current average. Lake Michigan experienced the record maximums for water levels in 1986 at 582 ft. From data collected by the Army Corps, NOAA and the Canadian Hydrographic Service the daily water level average for Lake Michigan-Huron was 578.31ft as of August 1, 2011 - approximately a three-foot drop in lake levels in the last 25 years.

Low water levels affect recreational boating, commercial navigation, fishing, and aquatic ecosystems. While high water levels can cause severe erosions, low levels often effect commerce and require shippers to “light-load” their cargoes. According to NOAA’S Great Lakes Environmental Research Lab, carriers often carry five-to-eight percent less cargo and raw materials. The economic impacts of light loading are enormous. Some shippers estimate that every foot reduction in draft equates to a loss of \$250,000 to \$800,000 in cargo. Fluctuating water levels is only one natural physical process that affect the Great Lakes, but they have severe implications for our shorelines, ecosystems, and long-term decisions on water withdrawals for drinking water and agriculture.

➤ **Action Item:**

**1) Support the Great Lakes Compact**

The Great Lakes are a shared, international resource and it is important that all stakeholders are committed to their protection and will be stewards for future generations. In 2008, the Great Lakes –

St. Lawrence River Basin Water Resources Compact was formed to join the Great Lakes states and the federal government in a common pledge to protect the Great Lakes.

Withdrawals that occur in Ohio's Lake Erie basin not only impact Ohio, but also Indiana, Michigan, New York, Ontario, and Pennsylvania's waters. In this spirit the compact is an important commitment from the states with the common mission to regulate the water use of the Great lakes and reduce annual water diversions. While all the Great Lakes states have ratified the compact and a deadline of December 2013 was set to require all states to implement and register their water withdrawal and diversion plan. Moving forward, these plans of action will preserve the Great Lakes, which provide drinking water to over 30 million Americans.

## 2) Action Item: Enact *Harbor Maintenance Act of 2011*

While we cannot control the level of water in the Great Lakes directly, lake levels are vital information that greatly alters the environment and the shipping economy in the United States. The Senate is currently considering proposals that target specific concerns, such as dredging, which are exacerbated by sustained low water levels. Senator Carl Levin (D-MI) and Senator Kay Bailey Hutchison (R-TX) introduced, S. 412, the *Harbor Maintenance Act of 2011* to ensure funds in the harbor maintenance trust fund are used for intended purposes to address the maintenance dredging of our harbors. There is currently a balance of more than \$6 billion in the Harbor Maintenance Trust Fund (HMTF) that is not being used to address the backlog of maintenance dredging. This proposal would ensure that moving forward the annual funds deposited into the trust fund will be used for intended purposes and would help to address the current a dredging backlog of 18 million cubic yards in the Great Lakes.

## Cleanup of Superfund Polluted Sites

### Grade: B

*Explanation:* For over 25 years Waukegan Harbor has been recognized as an international area of concern along Lake Michigan. While the full remediation process has been arduous, plans for removing the contaminated sediment from the Harbor are in place. The full restoration of beneficial use of Waukegan Harbor and the ultimate delisting as an Area of Concern (AOC) is within reach.



Sediment contamination of toxic substances poses a serious threat to the water quality of the Great Lakes and its ecological habitat. There are a total of 43 AOCs along the Great Lakes both in the United States and Canada. There is one AOC identified and located along Lake Michigan at Waukegan Harbor in Lake County, Illinois. Remediation is the necessary next step to ensure that toxic substances are removed and the sediment is healthily restored for beneficial use.

The United States and Canada recognized Waukegan Harbor as an AOC within the Great Lakes region in 1981 after polychlorinated biphenyls (PCBs) were found in the harbor sediment in 1975. After further investigation of the area it was discovered that the PCBs were likely the result of the fluid used by the Outboard Marine Corporation (OMC) during its operation.

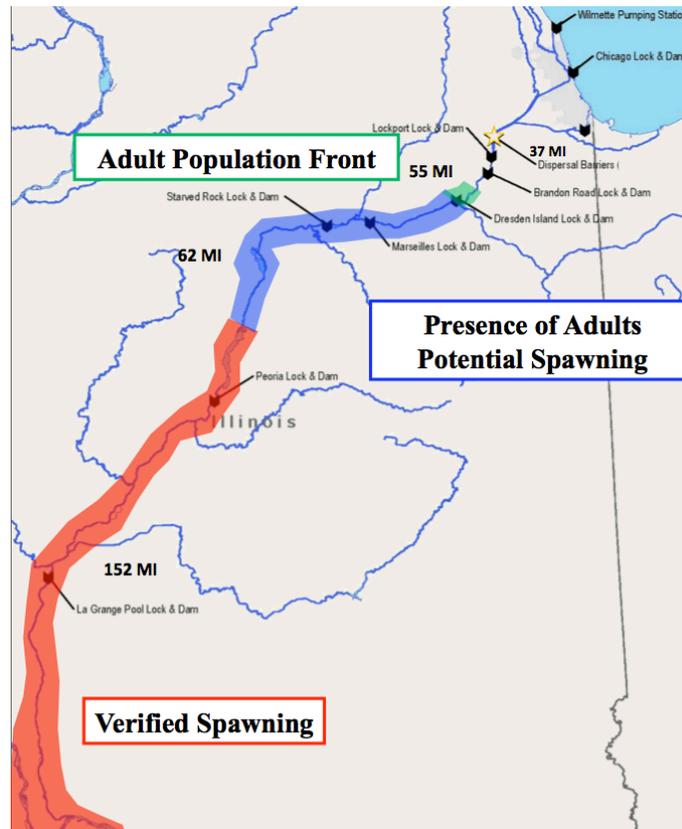
Remediation plans for Waukegan Harbor began in 1990. According to the EPA, approximately one million pounds of sediment with PCB was removed and placed in a confined disposal facility on site. Only sediment with 50 ppm PCB or greater was removed and residual contamination remained after the dredging. Over 30 years have passed since PCBs were discovered at Waukegan Harbor and the site is yet to be fully restored and delisted as an AOC in the Great Lakes. Through the coordination of the U.S. EPA, Illinois EPA, the Army Corps of Engineers, and the Waukegan Harbor Citizens Advisory Group (CAG) the final stages of the remediation plan are in place through the Superfund process. EPA is ready to move forward in the last phases of the cleanup of the harbor and store the waste close to the site in a fully contained and protected area.

- **Action Item: Work with local, state, and federal stakeholders to ensure the timely cleanup of Waukegan Harbor and the delisting of Waukegan Harbor as an Area of Concern on the Great Lakes**

## **INVASIVE SPECIES**

### **Grade for Lake Michigan: C**

*Explanation:* One of the greatest threats of invasive species to the Great Lakes is Asian carp. To date, Asian carp have not been found in Lake Michigan; however, populations of adult carp with potential for spawning are approximately 62 miles away from the Lake. The threat of invasive species has a long history in the Great Lakes. Sea lamprey and Zebra and Quagga mussels are examples of the havoc aquatic invasive species can have on an entire ecosystem. According to the Great Lakes Commission, sea lamprey caused the sharp decline in the harvest for lake trout from 5.5 million pounds to 402 pounds in Lake Michigan between 1946 and 1953. History shows us that we need to be more aggressive in protecting our Great Lakes fisheries from invasive species.



The Great Lakes region supports a \$7 billion fishing industry and hundreds of thousands of jobs. Keeping invasive species, including the destructive Asian carp, out of the Great Lakes is imperative to the health of the lakes and the jobs they support. According to the U.S. Fish and Wildlife Service (USFWS), more than 180 aquatic invasive species (AIS) are established in the Great Lakes. AIS have severe impacts on native aquatic ecosystems, as many degrade the livable environment of native species by consuming the native food supply. According to available information from the U.S. Geological Survey's (USGS) Nonindigenous Aquatic Species Database, 17 new aquatic species, including plants, viruses, crustaceans and algae have been collected and established in Lake Michigan since 2000.

Two of the greatest invasive species threat to the Great Lakes are several species of Asian carp - the silver and bighead carp - which are both swimming northward. Asian carp pose a serious threat to native populations of species because of their tremendous capability to consume plankton that other small species rely on as a major source of food.

According to the Great Lakes Fishery Commission, Asian carp can grow to be as much as 100 pounds and up to four feet long. Over the last two years, through the work of the Asian Carp Regional Coordinating Committee (ACRCC) and the Great Lakes Restoration Initiative (GLRI), we have seen great strides to address the threat of Asian carp and invasive species; however, we need to continue to evaluate our progress in mitigating the spread of invasive species.

To date, Asian carp have not been found in Lake Michigan; however, strong regional cooperation is necessary to halt the proliferation of Asian carp into the Great Lakes. Known populations of carp are growing below the Army Corp electric dispersal barriers, as demonstrated in the previous Figure. Three isolated discoveries of a single carp have occurred above the dispersal barriers, which are located 37 miles away from the Lake Michigan; however, it is unclear how these carp came to be above the barrier. The ACRCC developed the Asian Carp Control Strategy as a framework to halt the spread of Asian carp in the

Great Lakes, including the surveillance of environmental DNA (eDNA) to detect the indicators of DNA specific to Asian carp in the CAWS. eDNA sampling is a relatively new technology, beginning in 2009. While it may be a potential indicator for the presence of Asian carp, positive eDNA samples cannot conclude whether or not live Asian carp populations are present or even how Asian carp DNA came to be at the location.

As it is a relatively new methodology, further development of eDNA will provide greater context for eDNA results. The Figure below shows the annual results to date of positive eDNA sample for Asian carp along the CAWS. Already, as of July 2011, the Army Corps of Engineers has confirmed 13 eDNA samples tested positive for Asian carp. Without fully understanding what eDNA clearly exposes, it is clear that the dispersal barriers are withholding large spawning populations of Asian carp from traveling up the CAWS towards the Great Lakes.

	Total eDNA Samples Collected	Samples Positive for Asian Carp Above the Barriers
<b>2010</b>	1482	17
<b>2011</b> <i>To date</i>	898	13

➤ **Action Item: Increase voltage of electric barriers**

Keeping out invasive species, especially Asian carp, is imperative. Asian carp have not been found in the Great Lakes, but verified spawning populations are present about 150 miles away and eDNA results positive for Asian carp have been found above the barrier. Just last month three consecutive eDNA samples for carp were found in Lake Calumet, above the barrier, which was designed to keep the carp out.

The Army Corps of Engineers should take every effort to up the voltage at the three electric dispersal barriers as a further deterrent for carp.

## **OVERALL HEALTH OF LAKE MICHIGAN**

➤ **Grade: C**