

## Location

The Chicago Area Waterway System (CAWS) is the only known continuous connection between the Great Lakes and Mississippi River basins and poses the greatest potential risk for the transfer of aquatic nuisance species.

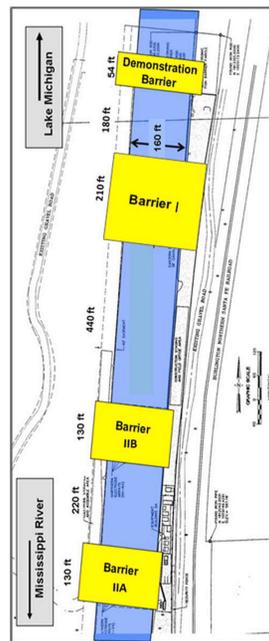


The Electric Dispersal Barriers are located near Romeoville, Ill., in the Chicago Sanitary and Ship Canal (CSSC) within the CAWS. The CSSC is a man-made hydrologic connection between the Great Lakes and Mississippi River basins that was completed in the early 20th century to address sanitation and flooding. Construction of the CSSC allowed the reversal of the flow direction in the Chicago River and accommodated increased shipping.

## About the U.S. Army Corps of Engineers

The USACE Chicago District mission is to provide valued, world class leadership, engineering services, and management capabilities to the diverse stakeholders and partners within the greater Chicagoland metropolitan area and the nation.

The Chicago District is responsible for water resources development in the Chicago metropolitan area, an area of about 5,000 square miles with a population of about nine million. The district is involved in a variety of projects stemming from flood-risk management, coastal storm damage reduction, navigation, ecosystem restoration, emergency management and interagency and international support.



\*Barrier I is in design phase. Tentative location shown above.

For more information about the Chicago District, please visit [www.lrc.usace.army.mil](http://www.lrc.usace.army.mil) or call the public affairs office at 312-846-5330.

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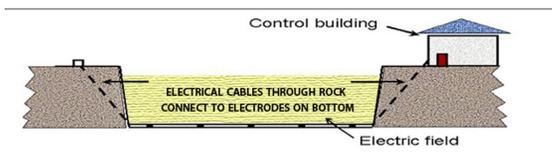
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## Overview

The Electric Dispersal Barriers deter the inter-basin establishment of Asian carp and other aquatic nuisance species via the Chicago Sanitary and Ship Canal.

The barriers, located approximately 25 miles from Lake Michigan and within a 1,500-foot section of the CSSC, are formed of steel electrodes that are secured to the bottom of the canal. The electrodes are connected to a raceway, consisting of electrical connections to a control building. Equipment in the control building generates a DC pulse through the electrodes, creating an electric field in the water that discourages fish from crossing.



The Demonstration Barrier has been operational since 2002. Barrier IIA was placed into full-time operation in 2009, and Barrier IIB was placed into full-time operation in 2011. In 2013, USACE begins construction of permanent Barrier I, authorized by Congress as an upgrade of the Demonstration Barrier. Permanent Electric Barrier I will be situated between Barrier IIB and the Demonstration Barrier.

Demonstration Barrier: Operates at 1 volt/inch, 5 hertz (cycles per second), 4 ms (pulse duration in milliseconds)

Barrier IIA: Operates at 2.3 volts/inch, 30 hertz, 2.5 ms  
-Located 1,150 feet downstream of Barrier I

Barrier IIB: Operates at 2.3 volts/inch, 30 hertz, 2.5 ms

The Demonstration Barrier consists of 12 bundled steel cables (shown at left) to generate the electric field. One of the improvements incorporated into the design of Barriers IIA and IIB was to use 32 solid steel bars (shown at right) for each barrier for a total of 64 electrodes. The solid steel bars will corrode less over time, which reduces the frequency of replacement.



## Effectiveness

To ensure the barriers' success, Congress directed USACE to study a range of factors that could potentially reduce their effectiveness. USACE is analyzing various technical, environmental and biological factors.

The first report USACE completed under this authority identified areas of potential bypass through adjacent waterways upstream of the electric barriers during flooding and recommended construction of a barricade along the Des Plaines River, which was completed in the fall of 2010, along with a stone berm in the Illinois and Michigan Canal, completed in the summer of 2010.



These project features reduce the likelihood of any Asian carp in the Des Plaines River potentially bypassing the electric barriers during a high-water event.

The Des Plaines River barricade, funded by the Great Lakes Restoration Initiative, extends approximately 13 miles from Romeoville, Ill. to Willow Springs, Ill. It consists of concrete barriers and a specially-fabricated wire mesh that allows water to flow through the fence but prevents the passage of juvenile and adult fish.

Other interim reports led to increasing the operating settings at Electric Barriers IIA and IIB that research indicated would immobilize very small fish, recommending the construction and installation of bar screens for two sluice gates at both the O'Brien and Chicago locks and studying how technologies such as bubbles, lights and sounds can inhibit Asian carp movement.

USACE also works closely with other agencies to monitor the CSSC to determine the effectiveness of the barriers, as well as the location and abundance of Asian carp in the waterway. Monitoring methods include netting, electrofishing, underwater cameras, tracking fish through implanted tags and collecting water samples for Asian carp environmental DNA.

## Quick Facts

### Authorization

In 1996, the National Invasive Species Act authorized USACE to construct a demonstration electric dispersal barrier on the CSSC. USACE received additional authorization, including Section 3061 of the Water Resources Development Act of 2007, to construct Barriers IIA and IIB.

### Uniqueness

This technology has been used in other places, but typically in smaller, shallower waterways. The CSSC barriers are in waters generally 20 to 25 feet deep and approximately 160 feet wide. To our knowledge, our barriers are the largest of their kind in the world and the only on a highly-trafficked, commercially-navigable waterway.

The barriers do not block the flow of water or the movement of vessels. Therefore, the canal can continue to serve intended purposes for treated wastewater and stormwater management and navigation.

### Operations

Upon construction completion, each barrier undergoes ongoing comprehensive safety and operational testing.

The barrier electric field can be characterized by the equipment parameters of frequency, length (duration) and amplitude (voltage) of the DC pulses. Effective operation is dependent on a proper combination of these parameters.

Multiple barriers are needed to provide redundancy. The barriers are complex electrical and mechanical systems and must periodically be powered down for maintenance. More than one barrier is needed so that at least one barrier can be active when another barrier, or barriers, is offline for maintenance.

Parasitic structures secured to the bottom of the CSSC, made of structural steel shapes and woven-wire rope, limit the extent of the electric fields generated by the dispersal barriers to the areas designed for fish deterrence.

The Fish Barrier Total Control System is an automated computer system that can run the barriers remotely in the event of power loss.

### Effectiveness

Past and ongoing field testing of the efficacy of the barriers gives high confidence in the effectiveness.

Since 2003, USACE has been participating in telemetry studies that use transmitters to track tagged fish in the vicinity of the barriers.

