



US Army Corps
of Engineers
Chicago District

Asian Carp Monitoring Fact Sheet

eDNA Surveillance and Calibration

Chicago Sanitary and Ship Canal – Aquatic Nuisance Species Dispersal Barrier

Overview:

One of the tools implemented by the Asian Carp Regional Coordinating Committee's (ACRCC) Monitoring and Rapid Response Work Group (MRRWG) to conduct monitoring of Asian carp in the Chicago Area Waterways System (CAWS) is Environmental DNA (eDNA) surveillance. eDNA is a genetic tool that indicates the presence or absence of species-specific DNA in the aquatic environment. Fishes, including Asian carp, release cells containing DNA into the environment from mucus, feces and urine. DNA degrades in the environment, but this process is not instantaneous, and DNA can be held in suspension and transported. Species can be detected by filtering water samples and then extracting and amplifying short fragments of the shed DNA. The MRRWG has used eDNA as an early detection monitoring tool in the Chicago Area Waterway System (CAWS) since 2010, led by USACE. In 2013, eDNA monitoring will be led by the U.S. Fish and Wildlife Service.

A positive eDNA detection indicates the presence of Asian carp DNA. At present, eDNA evidence cannot verify whether the DNA is from a live fish, nor does it provide information about Asian carp quantity, age, size, how they got there or how long they may have been there.

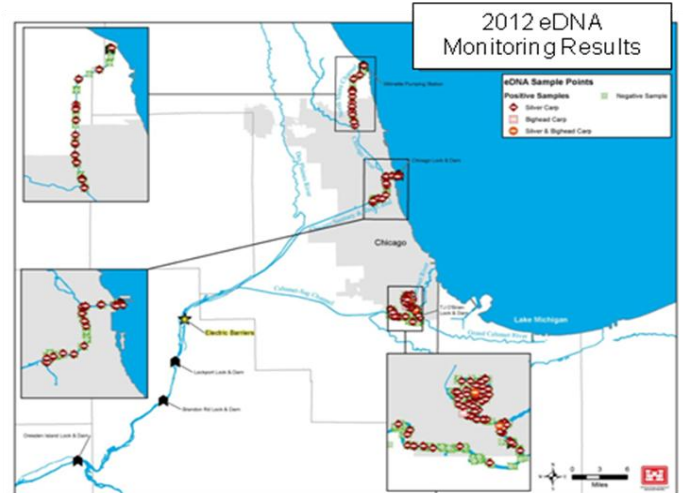
Methods:

The *Quality Assurance Project Plan (QAPP) for the eDNA Monitoring of Invasive Asian Carp in the CAWS* outlines the detailed procedures for the planning, collection, collection, filtering, processing and reporting of eDNA samples and is available online: www.asiancarp.us/documents/USACE-eDNA-QAPP.pdf

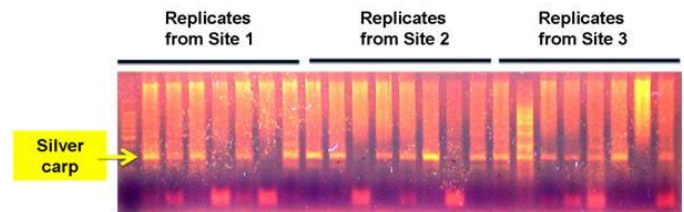
eDNA sampling teams (USACE-USFWS-ILDNR-USEPA) are responsible for the collection and filtration of water samples from sites each month (from May - October). Each filtered sample is sent to the USACE Engineer Research and Development Center (ERDC) in Vicksburg, Miss. where a team of geneticists analyze the samples for bighead and silver carp eDNA. The results (positives or negative detections) are reported back in about 10 days.

2012 eDNA results:

- Lake Calumet: 77 positive for silver carp; 4 positive for bighead carp
- Little Calumet River: 13 positive for silver carp
- North Shore Channel: 33 positive for silver carp
- Chicago River: 30 positive for silver carp



Map of 2012 eDNA results



Silver carp DNA bands in gel electrophoresis (UND photo)

What's Next?

USACE is leading an interagency eDNA Calibration Study (ECALS) with USGS and USFWS to reduce the uncertainty surrounding eDNA results and refine the eDNA method.

ECALS will:

- investigate potential alternative viable sources and pathways for DNA (other than a live fish),
- develop more efficient markers, decreasing the processing time for eDNA samples,
- determine the relationship between the number and distribution of positive eDNA samples with the number of Asian carp in the system,
- determine the effect of environmental variables (light, temperature, water velocity) on the persistence and degradation of DNA in water and
- model eDNA transport in the CAWS.

For up-to-date information on ECALS, including reports, results, and milestones, please visit:

<http://www.asiancarp.us/ecals.htm>;
e-mail the eDNA program manager at
Kelly.L.Baerwaldt@usace.army.mil;

For additional Project information please visit our website:

<http://www.lrc.usace.army.mil/Missions/CivilWorksProjects/ANSPortal/eDNA.aspx>