



## Summary of the 2014 Great Lakes eDNA Monitoring Program

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*U.S. Fish and Wildlife Service*

## **Introduction**

The U.S. Fish and Wildlife Service (Service) is the lead federal agency for the use of environmental DNA (eDNA), an early detection genetic surveillance method, in the Midwest Region. In 2014 the Service will implement a comprehensive, basin-wide Great Lakes eDNA Monitoring Program targeted to detect the genetic presence of two species of Asian carp: bighead carp and silver carp. The goal of the program is to use eDNA as an early detection monitoring tool for the genetic presence of bighead and silver carp DNA, and to use this information to help inform the efforts of other monitoring efforts, such as state directed netting and traditional methods or rapid assessment tools.

## **eDNA**

eDNA has been used as an early detection surveillance tool since 2009 and is specified for use by the Asian Carp Regional Coordinating Committee in the Asian Carp Control Strategy Framework. eDNA sampling is a process in which genetic material, such as cells containing DNA from tissue, mucus, feces and/or urine, is extracted from water samples to help determine the potential presence of an invasive species, such as Asian carp. At present, eDNA evidence cannot verify whether the DNA may have come from a live or dead fish, or from other sources such as bilge water, storm sewers or fish-eating birds. The Service, U.S. Army Corps of Engineers and the U.S. Geological Survey are leading an Asian Carp Environmental DNA Calibration Study (ECALS), funded through the Great Lakes Restoration Initiative to improve the understanding and interpretation of Asian carp environmental DNA results.

For more information on the ECALS study, please visit <http://www.asiancarp.us/ecals.htm>.

Since the initial application of eDNA as a monitoring tool in the Chicago Area Waterway System (CAWS), and through the developments and improvements to the method through ECALS, eDNA is being used as a regional sampling method for waters of the Midwest Region. Through continued coordination with our state and federal partners, the Service has designed a 2014 sampling program to test for the genetic presence of Asian carp DNA in these waters.

## **eDNA Monitoring Overview**

The Service coordinated with states, as well as Canada, to determine sampling sites and the number of samples collected for 2014. Water samples collected as part of the Great Lakes eDNA Monitoring Plan will be tested for the presence or absence of genetic material from silver or bighead carps. Samples will be processed by the Service's Whitney Genetics Lab in Onalaska, Wis. Following a five business day notification period to the states, the results of all sampling efforts will be posted online at <http://www.fws.gov/midwest/fisheries/eDNA.html>.

Sampling sites will include the CAWS, Great Lakes, Ohio River and the Upper Mississippi River. Sampling sites in the CAWS will focus on the entryways to Lake Michigan, including the

North Shore Channel, Chicago Lock, Lake Calumet and the Little Calumet River. CAWS sites will be sampled twice in 2014, each time immediately prior to the Seasonal Intensive Monitoring events scheduled for June and September as outlined in the 2014 ACRCC Monitoring and Response Plan. The sites and their respective priority levels in the Great Lakes, Ohio River, and Upper Mississippi River were chosen based on evaluation from the U.S. Army Corps of Engineers' Great Lakes and Mississippi River Interbasin Study assessment work and extensive input from the state natural resource agencies. In general, high priority sites will be sampled twice in 2014, and medium priority sites will be sampled once. The Service will also maintain a reserve of samples to repeat specific sampling areas or sample in other areas as requested by the states

A schedule is planned (Table 1) for the collection and processing of 6,480 samples, with 2,695 samples allocated for repeated sampling as needed or requested (noted as "Reserve" in Table 2). The Whitney Genetics Lab expects to process more than 9,000 samples in 2014, which is over four times the amount of samples processed in 2013.

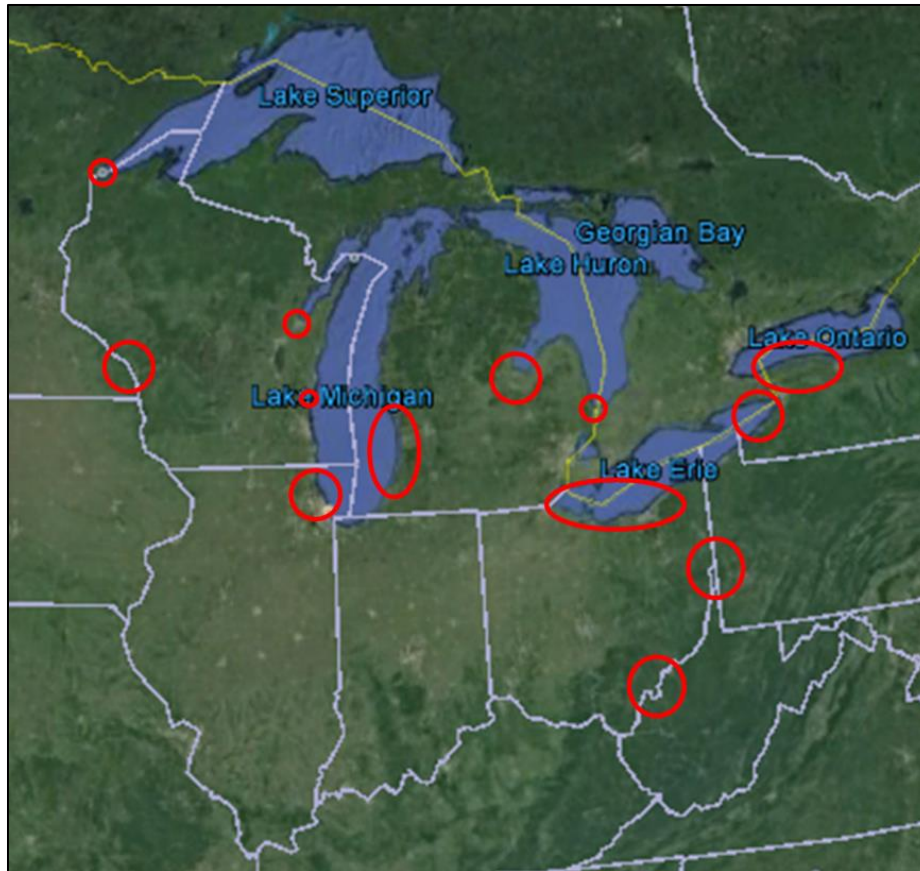
### **Quality Assurance Project Protocol (QAPP)**

The QAPP ensures continuity among all agencies involved in eDNA sampling activities by setting the same protocols for the collection and processing of eDNA samples. 2014 updates to the *Quality Assurance Project Protocol: eDNA Monitoring of Bighead and Silver Carps* includes modifications and efficiencies documented through ECALS efforts, as well as broadening it for use outside the CAWS.

Later in 2014, the Service will update the QAPP once research on new markers for bighead and silver carps are complete. Water samples will be collected up until the marker trials are complete. The Service will hold a workshop for state and federal partners in late June to review the new markers, then processing of 2014 samples will commence. It is anticipated that eDNA results will be available beginning in mid-July.

The updated *Quality Assurance Project Protocol: eDNA Monitoring of Bighead and Silver Carps* can be found at <http://www.fws.gov/midwest/fisheries/eDNA.html>.

## 2014 Sampling Locations and Schedule



*Figure 1.* A map showing where the 2014 eDNA sampling activities will be distributed across the Midwest Region, to include all five Great Lakes as well as the Ohio River and Upper Mississippi River basins.

**Table 1. Schedule for 2014 eDNA sampling**

<b>Samples Planned</b>	<b>Water Basin</b>	<b>River/Site</b>	<b>Week Scheduled*</b>
175	Erie	Cuyahoga River	4/21/2014
75	Erie	Grand River	4/21/2014
300	Erie	Maumee River	4/21/2014
125	Erie	Sandusky River	4/21/2014
125	Erie	Tonawanda Creek	4/27/2014
25	Erie	Cattaraugus Creek	4/27/2014
50	Erie	Buffalo River	4/27/2014
100	Ontario	Upper Niagara	4/27/2014
100	Ontario	Lower Niagara	4/27/2014
75	Ontario	Genesee	4/27/2014
125	Ontario	Oswego	4/27/2014
75	Erie	Grand River	5/19/2014
300	Erie	Maumee River	5/19/2014
125	Erie	Sandusky River	5/19/2014
200	Michigan	St. Joe	6/1/2014
200	Michigan	Kalamazoo	6/1/2014
100	Michigan	Grand	6/1/2014
150	Michigan	Muskegon	6/1/2014
25	Michigan	Galien	6/1/2014
25	Michigan	Paw Paw	6/1/2014
240	IWW	CAWS	6/2/2014
50	Erie	Ottawa River	6/8/2014
75	Erie	Huron River	6/8/2014
50	Erie	Vermillion River	6/8/2014
75	Erie	Black River	6/8/2014
50	Erie	Conneaut River	6/8/2014
150	Erie	Cuyahoga River	6/8/2014
75	Erie	Portage River	6/8/2014
25	Huron/Erie	Belle River	6/9/2014
50	Huron/Erie	Black River	6/9/2014
75	Huron	Tittabawasee River	6/9/2014
50	Huron	Shiawassee	6/9/2014
25	Huron	Cass River	6/9/2014
25	Huron	Flint River	6/9/2014
50	Huron	Saginaw River	6/9/2014
100	Ohio River	Pike Island Pool	6/9/2014
100	Ohio River	New Cumberland Pool	6/9/2014

100	Ohio River	Montgomery Island Pool	6/9/2014
100	Ohio River	Dashields Pool	6/9/2014
100	Ohio River	Allegheny River	6/9/2014
50	Ohio River	Monongahela River	6/9/2014
25	Ohio River	Little Beaver Creek	6/9/2014
25	Ohio River	Raccoon Creek	6/9/2014
25	Ohio River	Big Sewickley Creek	6/9/2014
25	Ohio River	Beaver Creek	6/9/2014
125	Ohio River	Muskingum River	6/16/2014
100	Ohio River	Kanawha River	6/16/2014
50	Ohio River	Little Kanawha	6/16/2014
100	Michigan	Fox River	6/23/2014
100	Michigan	Milwaukee	6/23/2014
100	Michigan	Fox River	6/30/2014
100	Michigan	Milwaukee	6/30/2014
200	Michigan	St. Joe	7/7/2014
200	Michigan	Kalamazoo	7/7/2014
100	Michigan	Grand	7/7/2014
150	Michigan	Muskegon	7/7/2014
600	UMR	Pool 5A, 8, and 9	7/14/2014
100	Superior	St. Louis Estuary	7/21/2014
240	IWW	CAWS	9/9/2014

\*Dates contingent on weather and sampling conditions

**Table 2. Summary of 2014 eDNA Sampling by Basin**

2014 Sampling Sites	# of Samples
Lake Michigan Tributaries	1750
Lake Huron Tributaries	225
Lake Erie Tributaries	1800
Lake Ontario Tributaries	600
Lake Superior Tributaries	100
Ohio River	925
CAWS	480
Upper Mississippi	600
RESERVE	2695
<b>TOTAL</b>	<b>9175</b>

### **Communication of Findings**

As outlined in *Standard Operating Procedure: Notification of U.S. Fish and Wildlife Service eDNA Results*, all eDNA results will be posted online after a five business day notification period to the states.

The SOP can be accessed at <http://www.fws.gov/midwest/fisheries/eDNA/SOP-eDNA-Results.pdf/>

eDNA results can be viewed at <http://www.fws.gov/midwest/fisheries/eDNA.html>.

For more information on the actions of the Asian Carp Regional Coordinating Committee, please visit [www.AsianCarp.us](http://www.AsianCarp.us).