BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
WATER QUALITY STANDARDS AND	)	R08-9
EFFLUENT LIMITATIONS FOR THE	)	(Rulemaking - Water)
CHICAGO AREA WATERWAY SYSTEM	)	
AND THE LOWER DES PLAINES RIVER:	)	Subdocket C
PROPOSED AMENDMENTS TO 35 Ill.	)	
Adm. Code Parts 301, 302, 303 and 304	)	

NOTICE OF FILING

To: ALL COUNSEL OF RECORD
(Service List Attached)

PLEASE TAKE NOTICE that on the 8th day of October, 2010, I electronically filed with the Office of the Clerk of the Illinois Pollution Control Board, the **Pre-Filed Testimony of Jennifer Wasik regarding Asian Carp Informational Hearing.**

Dated: October 8, 2010.

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

By: */s/ Fredric P. Andes*
One of Its Attorneys

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PROOF OF SERVICE

The undersigned attorney certifies, under penalties of perjury pursuant to 735 ILCS 5/1-109, that I caused a copy of the foregoing, **Notice of Filing** and **Metropolitan Water Reclamation District of Greater Chicago's Pre-Filed Testimony of Jennifer Wasik regarding Asian Carp Informational Hearing**, to be served via First Class Mail, postage prepaid, from One North Wacker Drive, Chicago, Illinois, on the 8th day of October, 2010, upon the attorneys of record on the attached Service List.

/s/ David T. Ballard
David T. Ballard

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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
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WATER QUALITY STANDARDS AND	)	R08-9
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CHICAGO AREA WATERWAY SYSTEM	)	
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Adm. Code Parts 301, 302, 303 and 304	)	

PRE-FILED TESTIMONY OF JENNIFER WASIK REGARDING ASIAN CARP INFORMATIONAL HEARING

My name is Jennifer Wasik, and I have been a biologist in the Aquatic Ecology and Water Quality Section at the District for over 9 years. Since May 2010, I have served as Head of the Aquatic Ecology and Water Quality Section within the Environmental Monitoring and Research Division, where I supervise a staff of 11 persons. My primary responsibilities from 2001 to the present have been to design and oversee research projects in the Chicago area waterways regarding fish, benthic invertebrates, and water quality, supervise long-term biological and physical habitat monitoring, and participate in water quality advisory committees pertaining to Chicago area waterways. As part of my work for the District, I am very familiar with the science relevant to fish monitoring, collection, and analysis in the Chicago Area Waterway System (CAWS).

I have a Bachelor of Science degree in Biology from the University of Michigan and a Master of Science degree in Environmental Management from the Illinois Institute of Technology. I have also been a member of the North American Benthological Society (NABS) since 2003.

In my position at the District, I have been involved in various aspects of Asian carp management over the past several years. I was on the Aquatic Nuisance Species Dispersal

Barrier Advisory Panel during 2002-2003, following which I have reviewed meeting summaries provided to me by another member of my staff. My section has also participated in the annual U.S. Fish and Wildlife Service (USFWS) "Carp Corral" since 2002, which was established to determine the "leading edge" of the Asian carp invasion. Between 2003-2006, my section at the District performed monthly Asian carp monitoring on a rotational basis with three other governmental agencies in the Lockport and Brandon Road Pools, as recommended by the Dispersal Barrier Advisory Panel. Either myself or a member of my staff has participated in recent Asian Carp Regional Coordinating Committee (ACRCC) and Monitoring and Rapid Response Work Group (MRRWG) conference calls. I also submitted an affidavit regarding Asian carp to the United States District Court for the Northern District of Illinois for the hearings that took place in early September, which I will describe later in my testimony.

Brief Chronology of Major Asian Carp Related Events

Bighead and silver carp, collectively referred to as "Asian carp," are invasive species that have been expanding their territory in the Illinois River since the late 1990's (Kolar, *et al*). The advance of Asian carp up the Illinois River towards the Great Lakes System via the Chicago Area Waterway System (CAWS) has been a major concern of water resource managers throughout the past decade. The first electric dispersal barrier (Barrier I), located in the Chicago Sanitary and Ship Canal (CSSC) in Romeoville, IL, became operational in April of 2002. This barrier was designed to deter all fish from moving either upstream or downstream, thus attempting to separate fish populations from the Great Lakes and Mississippi River basins. Barrier I was to be a demonstration of the use of this technology to effectively halt fish movement through the electric field that it generated. Since then, two more electric barriers have been constructed (Barriers IIA and IIB) in this general area of the CAWS. Barrier IIA has been

operational since April, 2009 and Barrier IIB is undergoing safety tests but is scheduled to be online in late 2010 or early 2011.

The Asian carp issue has experienced increased media and political attention since late 2009 when the United States Army Corp of Engineers (USACE) employed a new monitoring tool called environmental DNA (eDNA), which indicated through water samples that Asian carp could be present upstream of the dispersal barriers in various areas of the CAWS. The eDNA sampling results led to implementation of certain "rapid response" measures to try to confirm the presence of Asian carp in the CAWS where no live Asian carp had ever been captured. These efforts included extensive multi-agency fish monitoring by electroshocking and various netting techniques as well as a rotenone application to poison all of the fish in the 5.7 mile stretch of the CSSC between Barrier I and the Lockport Lock and Dam. This portion of the CSSC was closed to navigation for 5 days. One bighead carp was discovered about 0.5 mile upstream of Lockport Lock, and approximately 55,000 pounds of other dead fish were collected as a result of this rotenone operation (from Wooley declaration, USFWS, Attachment 1).

Positive eDNA results from Little Calumet River water samples triggered another rotenone application on May 20, 2010 in the 2.75 mile reach downstream of the O'Brien Lock and Dam. During this operation, the waterway was closed to navigation for 5 days and the O'Brien Lock was closed to eliminate flow. The piscicide killed over 130,000 pounds of fish (mostly common carp and gizzard shad), but no Asian carp were recovered.

On June 22, 2010 a commercial fishing operation contracted by the Illinois Department of Natural Resources (IDNR) to assist in Asian carp monitoring collected one bighead carp in Lake Calumet.

Summary of Recent Asian Carp Monitoring in the CAWS

An extraordinary amount of fish monitoring has been ongoing in the CAWS since eDNA results indicated Asian carp may be present in these waterways. At first, enhanced electrofishing and netting efforts were undertaken by the IDNR, U.S. ACE, Illinois Natural History Survey, and U.S. FWS in targeted areas where positive eDNA results were reported. Commercial fisherman from southern Illinois were also hired on by IDNR to use trammel net and trawling techniques in targeted areas. A more structured approach to monitoring for Asian carp was then developed to establish routine monitoring in the CAWS.

The ACRCC is an interagency committee with representatives from the IDNR, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, U.S. Geological Survey, U.S. Coast Guard, U.S. Department of Transportation, Metropolitan Water Reclamation District of Greater Chicago, Illinois Environmental Protection Agency, Great Lakes Fishery Commission, Indiana Department of Natural Resources, Ohio Department of Natural Resources, and City of Chicago. The MRRWG, a subgroup of the ACRCC drafted a "Monitoring and Rapid Response Plan for Asian Carp in the Upper Illinois River and Chicago Area Waterway System" (Plan) (Attachment 2) in spring of 2010. As a result of the Plan, fixed site sampling has occurred biweekly since June at 5 stations throughout the CAWS that were identified as more favorable Asian carp habitat. Electrofishing and commercial netting have been employed for the fixed site sampling. In addition, cooperating agencies have conducted reach sampling which entails repeatedly electrofishing the entirety of over 70 miles of waterways upstream of the barrier. As of September, 2010, approximately 3,200 hours of Asian carp monitoring had occurred in the CAWS (USFWS, Wooley testimony September 10, page 470, line 17). This level of fishing effort is likely to continue into the future so that water

resource managers can identify the leading edge of the bighead and silver carp invasion and assess the risk of these species achieving a sustainable population in the CAWS.

Summary of Asian Carp Control Strategy Framework

In May, 2010, the USACE, USFWS, IDNR, US Coast Guard, and US Environmental Protection Agency (USEPA) released the *Asian Carp Control Strategy Framework* (Framework) (Attachment 3) which presents many possible short and long-term options to prevent Asian carp migration to the Great Lakes. I will describe the options outlined in the Framework that would be likely to have the most impact on aquatic life use potential in the CAWS.

Short-term Controls. Based on results from eDNA samples and other monitoring, the involved parties will attempt to "concentrate and confine" Asian carp in areas that would be conducive to targeted removal by use of fish toxicants and netting techniques. In addition, they will identify "high-risk" areas in the CAWS where enhanced eDNA, commercial fishing, and conventional fish monitoring techniques will be performed, as described previously.

The Framework states that electrical Barriers I and IIA will continue to operate and Barrier IIB construction has been expedited. In recent meetings, USACE indicated it would likely be operational beginning this winter. The framework also reports that rotenone will be used following routine maintenance of the barriers.

Long-term Controls. There are many ongoing studies exploring future options to slow or stop Asian carp expansion upstream towards Lake Michigan. Other types of fish deterrent barriers using lights, sound, and bubbles are being evaluated (report scheduled for end of 2010). The *Great Lakes and Mississippi River Inter-basin Study* will determine the feasibility of options such as physical or ecological separation of the basins and lock closures. The ACRCC continues to investigate the feasibility and efficacy of implementing modified structural operations on the

CAWS. Various lock modifications are being considered, including: Closing both sets of lock gates between lockages, reducing the frequency of lock openings by consolidating barge and recreation traffic, closing locks for temporary periods as needed by agencies that apply technologies to "herd" and reduce Asian carp populations that may be present, and closing locks for temporary periods as needed by agencies that conduct intensified and synchronized monitoring.

As another long-term option, the District has been asked to complete an efficacy study on using plant effluent to produce toxic zones in the CAWS. This would focus mainly on the use of ammonia at District discharges to deter fish passage.

Finally, technologies such as seismic waves are being investigated by the ACRCC to "divert or eradicate invasive Asian carp as a means to inhibit passage and reduce recruitment," and physical methods are being explored to disrupt Asian carp spawning and egg viability.

More information regarding both short and long term controls for Asian carp, including eDNA monitoring, dispersal barriers, and lock operation can be found in the Declarations of General John Peabody and Colonel Vincent Quarles , USACE, submitted to the Northern District Court of Illinois for *Michigan et al. vs USACE and District* (Attachments 4 and 5, respectively).

Summary of Lawsuits Concerning Asian Carp and the CAWS

On December 21, 2009, the State of Michigan (Michigan) filed a Motion for Preliminary Injunction with the United States Supreme Court (Supreme Court) seeking injunctive relief against the USACE, the State of Illinois and the District. The States of Indiana, Minnesota, New York, Ohio, Wisconsin and the Commonwealth of Pennsylvania also filed briefs in support of Michigan. The relief originally requested by Michigan would have adversely affected the District and millions of residents in the Chicago area by preventing the District from alleviating

flooding. In addition, the relief sought by Michigan would have eliminated the District's ability to take water from Lake Michigan for navigational and water quality purposes. Michigan alleged that the relief sought was necessary to ensure that the Asian carp did not make its way into the Lake. In response, the District opposed the Motion based upon public health and safety concerns that could arise if the Supreme Court granted the relief sought by Michigan. On January 19, 2010, the Supreme Court denied Michigan's Motion.

On February 4, 2010, Michigan filed a Renewed Motion for Preliminary Injunction based on positive eDNA samples lakeward of the O'Brien Lock and Dam and in Calumet Harbor. Recognizing the public health and safety concerns raised by the parties, Michigan's Renewed Motion scaled back the relief sought from the District. On March 22, 2010, the Supreme Court denied Michigan's Renewed Motion.

On July 19, 2010, the States of Michigan, Wisconsin, Minnesota, Ohio, and the Commonwealth of Pennsylvania filed a complaint against the USACE and the District in the United States District Court for the Northern District of Illinois, case no. 1:10-cv-04457. Their motion for entry of a preliminary injunction is attached (Attachment 6). The Reply in Support of Motion for Preliminary Injunction (Attachment 7) from Michigan contains the most current description of the relief sought from the defendants, as follows:

> 1. Enter a Preliminary injunction enjoining the Defendants to immediately take all available measures within their respective control, consistent with the protection of public health and safety, to prevent the migration of bighead and silver carp through the CAWS into Lake Michigan, including, but not necessarily limited to, the following:
>
> > (a) Using the best available methods to block the passage of, capture or kill bighead and silver carp that may be present in the CAWS, especially in those areas north of the O'Brien Lock and Dam.
> >
> > (b) Installing block nets or other suitable interim physical barriers to fish passage at strategic locations in the Calumet River between Lake Calumet and Calumet Harbor.

(c) Temporarily closing and ceasing operation of the locks at the O'Brien Lock and Dam and the Chicago River Controlling Works except as needed to protect public health and safety.

(d) Installing and continuously maintaining permanent grates or screens, along with any debris removal equipment necessary to prevent blockage or clogging of such grates or screens, on or over the openings to all the sluice gates at the O'Brien Lock and Dam, the Chicago River Controlling Works, and the Wilmette Pumping Station in a manner that conforms to the specifications detailed in Appendix A to the Corps' Interim III Report (Darcy Dec, Att 2) or otherwise will be as effective at preventing Asian carp from passing through these structures as the grates or screens specified in that Report.

(e) Installing and maintaining block nets or other suitable interim physical barriers to fish passage as needed in the Little Calumet River to prevent the migration of bighead and silver carp into Lake Michigan, in a manner that protects public health and safety.

(f) As a supplement to physical barriers, applying rotenone at strategic locations in the CAWS, especially those areas north of the O'Brien Lock and Dam where bighead and silver carp are most likely to be present, using methods and techniques best suited to eradicate them and minimize the risk of their movement into Lake Michigan.

(g) Continue comprehensive monitoring for bighead and silver carp in the CAWS, including resumed use of environmental DNA testing.

2. Enter a preliminary injunction requiring the Corps to expedite the preparation of a feasibility study, pursuant to its authority under Section 3601 of the Water Resources Development Act of 2007, developing and evaluating options for the permanent physical separation of the CAWS from Lake Michigan at strategic locations so as to prevent the transfer of Asian carp or other invasive species between the Mississippi River Basin and the Great Lakes Basin. Specifically, the Corps should be required to:

(a) Complete, and make available for public comment, within six months, an initial report detailing the progress made toward completion of the evaluation.

(b) Complete, and make available for public comment, within twelve months, a second, interim report detailing the progress made toward completion of the evaluation.

(c) Complete, and make available for public comment, within eighteen months a final report detailing the results of the evaluation and recommendations for specific measures to permanently physically separate the CAWS from Lake Michigan at strategic locations to

> prevent the migration of bighead carp, silver carp or other harmful invasive species between the CAWS and the Great Lakes.

To date, there have been 4 days of hearings. Oral arguments are to be heard on October 18, following which a decision will likely be made later this year. If the preliminary injunction is granted, an immediate appeal to the Seventh Circuit is likely. If denied, the case will still go to trial on the complaint and request for injunction.

Impact of Current and Future Asian Carp Management Activities on Aquatic Life Use Potential in the CAWS

Asian Carp Monitoring. The unprecedented amount of monitoring activities currently taking place in the CAWS are likely to take a toll on the resident fish population. In addition to fish poisonings that may be triggered at any time by positive eDNA results, the USACE plans to use rotenone as a fish deterrent following electric barrier maintenance, which is supposed to occur every 6 months. Following rotenone events in the CAWS, the resident fish populations are not expected to recover quickly since the electric barrier prevents fish from migrating upstream of Romeoville in the Chicago Sanitary and Ship Canal, and there is very little habitat in the CAWS that would be considered suitable for potential fish spawning. A biologist from a USACE fishing crew that was attempting to catch fish to tag for their telemetry study in July, 2010 reported, “It was nearly impossible to catch any fish out of Lockport pool to tag, this area has not recovered since the December rotenone” (personal communication). The District performs annual fish surveys at Lockport, upstream of the Lock and Dam near the 16th Street bridge remnants. We collected fish on July 23, 2010 in the Lockport Pool where rotenone had been applied in December, 2009. Only three fish species were collected compared to ten and eight fish species collected in 2007 and 2008, respectively (Attachment 8).

Besides the obvious fish mortality caused by rotenone poisoning, fish are undoubtedly stressed by exposure to repeated electrofishing and netting operations. Repeated electrofishing

that is currently being exercised in the CAWS increases stress to fish and can lead to behavioral changes, excess predation, lactic acid build-up, hemorrhaging, spinal injury, and vulnerability to infection (USGS, 2003). Netting, on the other hand, has the potential to physically injure the trapped fish and also impedes fish movement and feeding behaviors while they are in the net. I have personally removed both dead and injured fish from trammel nets that were set for only 24 hours in the CAWS.

Fish Deterrent Barriers. The current electrical barriers in the CAWS and proposed acoustic bubble barrier are in no way specific to invasive species like Asian carp. They are designed to repel all fish, which effectively cuts off the CAWS from recruiting native fish species that are found in the Illinois River. These barriers limit the source of fish into the CAWS, which limits the ability of the CAWS to support a growing fish community.

Lock and Sluice Gate Operations. The injunctive relief sought by Michigan and other Great Lakes States includes closure of O'Brien Lock and Dam and Chicago River Controlling Works, as well as installation of grates and screens on sluice gates at O'Brien Lock and Dam, Chicago River Controlling Works, and Wilmette Pumping Station. These actions may affect District diversion of Lake Michigan water into the CAWS. The problematic nature of installing grates or screens on the sluice gates is described in the Affidavit of Edward Staudacher, District Supervising Civil Engineer, for the ongoing Asian carp proceedings before the United States District Court for the Northern District of Illinois (Attachment 9). The portions of the CAWS that do not receive water reclamation plant flow would be most dramatically impacted if we could no longer divert water high in dissolved oxygen from the lake. Without diversion at the Wilmette Pumping Station, the 4.5 mile stretch between Wilmette and the North Side WRP would be completely stagnant except for flow from stormwater and combined sewer overflows.

The waterway would be subject to low dissolved oxygen levels, be a breeding ground for mosquitoes and a visible public nuisance.

Stagnant septic conditions would also dominate in the 1.5 mile stretch of the Chicago River main stem without flow from the lake through the Chicago River Controlling Works. If diversion ceased from the O'Brien Lock and Dam, it is possible that under some conditions the flow from the Calumet WRP could combine with the flow in the Grand Calumet River and discharge into Lake Michigan at the Indiana Harbor.

The increased residence times that would result from stopping diversion, would nearly stagnate large portions of the CAWS, causing lower dissolved oxygen concentrations, further limiting aquatic life potential. These long residence times would make it even more challenging and costly to disperse dissolved oxygen generated from artificially engineered aeration stations on the CAWS. In addition, wet weather effects, which already can last for several days on the CAWS, would linger even longer with increased residence times from lack of diversion.

Impact of Current and Future Asian Carp Management Activities on Recreational Use Potential in the CAWS

There are also several factors affecting recreation in the CAWS due to Asian carp management. Episodic waterway closures occur for barrier maintenance and for rotenone or other sampling events if triggered by positive eDNA samples. Rotenone is considered safe for piscicide applications but it is a toxic chemical which should be avoided by recreators. Obviously between the presence of dead fish and toxic chemicals, recreation has been and will continue to be affected by these events. Stopping diversion from Lake Michigan into the CAWS would result in a loss of recreation in areas upstream of WRPs due to unsightly algal growth and odors. With increased residence times, it would also likely affect recreation throughout the entire CAWS since the waterways would be more heavily impacted by wet weather events for a

longer duration. Additional fish deterrent barriers may also limit recreation in the CAWS depending on their nature and location.

Conclusion

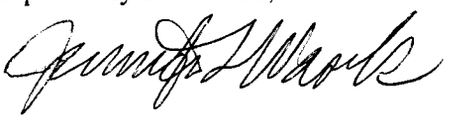
With frequent new developments and pending federal lawsuits, the Asian carp issue must be considered in any evaluation of beneficial uses in the CAWS. It appears that nearly every precaution taken to prevent Asian carp from moving through the CAWS into Lake Michigan has potential negative consequences to resident fish populations. In an aquatic environment subject to planned fish kills and intensive electrofishing and netting, even the current resident fish population of tolerant and moderately tolerant species in the CAWS may be vulnerable. The Asian Carp Control Strategy Framework lists “negative effects on resident aquatic life” as one of the consequences to several options being considered for in the CAWS, including seismic technology, physical disruption of spawning and egg viability, and toxic waterway zones.

Add to these options the forced operational changes being litigated that may affect lake diversion, and there will be serious consequences for the aquatic life in the CAWS. In these proceedings, we are attempting to craft long term aquatic life uses for the CAWS. Due to the perceived gravity of Asian carp entering the Great Lakes System, there is extreme pressure to implement many of the strategies being considered for Asian carp control as soon as possible, over the next few years. Those control strategies could be put into effect at anytime (even immediately). The expedited implementation schedule means that these measures will have a direct impact on the aquatic life use potential in the CAWS in the time frame this UAA is supposed to be considering. In this quickly evolving new landscape, it hardly makes sense to expect improved fish communities will result from artificial aeration technologies that would have to be constructed in the CAWS to meet proposed dissolved oxygen water quality standards.

Even if implementation of certain Asian carp strategies is a few years off, choosing inappropriate aquatic life uses and standards for the CAWS that do not reflect the Asian carp issues will require the District to begin on a path of further engineering the waterways with expensive artificial aeration. Then, by the time these technologies are ready to go on-line, we may be simultaneously designing toxic zones in the same waterways to deter fish! This is a complicated reality that must be addressed in these proceedings by the IPCB.

Dated: October 8, 2010

Respectfully submitted,



By: Jennifer Wasik
Metropolitan Water Reclamation District of
Greater Chicago

Attachments

1. Declaration of Charles Wooley, U.S. Fish and Wildlife Service, to the United States District Court for the Northern District of Illinois, case no. 1:10-cv-04457
2. Monitoring and Rapid Response Plan for Asian Carp in the Upper Illinois River and Chicago Area Waterway System
3. Asian Carp Control Strategy Framework
4. Declaration of General John Peabody, U.S. Army Corp of Engineers, to the United States District Court for the Northern District of Illinois, case no. 1:10-cv-04457
5. Declaration of Colonel Vincent Quarles, U.S. Army Corp of Engineers, to the United States District Court for the Northern District of Illinois, case no. 1:10-cv-04457
6. Motion for Preliminary Injunction filed in the United States District Court for the Northern District of Illinois, case no. 1:10-cv-04457
7. Reply in Support of Motion for Preliminary Injunction filed in the United States District Court for the Northern District of Illinois, case no. 1:10-cv-04457
8. District fish data from Lockport during 2008-2010
9. Affidavit of Edward Staudacher, Metropolitan Water Reclamation District of Greater Chicago, to the Northern District Court of Illinois, case no. 1:10-cv-04457

Literature Cited

Kolar, C.S., D.C. Chapman, W.R. Courtenay, Jr., C.M. Housel, J.D. Williams, and D.P. Jennings. 2007. Bigheaded Carps: A Biological Synopsis and Environmental Risk Assessment. American Fisheries Society, Special Publication 33, Bethesda, Maryland.

United States Geological Survey. 2003. *Electrofishing and Its Harmful Effects on Fish.* Information and Technology Report USGS/BRD/ITR—2003-0002.

Attachment 1

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS

STATE OF MICHIGAN, STATE OF WISCONSIN, STATE OF MINNESOTA, STATE OF OHIO, and COMMONWEALTH OF PENNSYLVANIA,	)	
Plaintiffs,	)	Case No. 1:10-cv-04457
v.	)	Hon. Robert M. Dow, Jr.
UNITED STATES ARMY CORPS OF ENGINEERS and METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO	)	
Defendants.	)	

DECLARATION OF CHARLES M. WOOLEY

1. My name is Charles M. Wooley. I am employed by the United States Fish and Wildlife Service (FWS or Service) as the Deputy Regional Director of the Midwest Region (Region 3). The Midwest Region includes the states of Minnesota, Iowa, Missouri, Michigan, Wisconsin, Illinois, and Ohio. I have been an employee of the Fish and Wildlife Service for 32 years and have served as Deputy Regional Director for the Midwest Region for 6 years. In my capacity as Deputy Regional Director for the Midwest Region, I am the line supervisor for all of the Region's biological programs, including the Region's Fisheries and Aquatic Resources Program. I report directly to the Regional Director. My responsibilities include the supervision of initiatives within the Midwest Region to manage and control aquatic invasive species.
2. The Fish and Wildlife Service, working through the Fisheries and Aquatic Resources program, provides leadership in collaborative efforts to prevent and reduce the risk of introduction, establishment, and spread of aquatic invasive species. The Fish and Wildlife

Service partners with other federal, state, tribal, and local agencies to develop methods and conduct programs designed to prevent the introduction and spread of aquatic invasive species to new locations and to limit the growth of established populations.

Planning and Coordination Efforts

3. In response to the increasing threat of the Asian carp expansion toward the Great Lakes and concerns with these fish placing greater pressure on barriers already in place to restrict their movement, the Fish and Wildlife Service has partnered with the U.S. Army Corps of Engineers (COE or Corps), the U.S. Environmental Protection Agency (EPA), the U.S. Coast Guard (USCG), the Illinois Department of Natural Resources (IL DNR), and the Metropolitan Water Reclamation District of Greater Chicago to create the Asian Carp Monitoring and Rapid Response Workgroup (MRRWG or Workgroup) established in support of the Asian Carp Regional Coordination Committee (ACRCC). The Workgroup is co-chaired by the IL DNR and the Great Lakes Fishery Commission. The Workgroup convened in the fall of 2009 to develop rapid response actions to address the discovery of data indicating that Asian carp may have been closer to Lake Michigan than previously thought.

4. Service has participated with its partner Federal, State, Tribal and non-governmental entities in developing a Draft Asian Carp Control Framework. The Framework provides actions (encompassing actions that are or will occur and potential action options) through which agencies can collaborate. This Framework is designed to be inclusive, allowing new agencies to engage in the process of implementing, developing and consulting on other possible control actions. The Framework includes a matrix of action items that are currently underway or will be implemented. While several of the actions will be conducted by a single agency or governmental unit, most actions will be cooperative

efforts. The proposed Framework action items include short-term actions and long-term actions.

5. As set forth in the Draft Asian Carp Control Strategy Framework, the Service is coordinating with Federal, State, Tribal, and non-governmental partners on actions to prevent the introduction and establishment of aquatic invasive species, or to mitigate resource impacts from introduce species. Under the Draft Framework, along with the other participating agencies, the Fish and Wildlife Service is proposing to engage in short term and long term activities to address the threat of Asian Carp migration into the Great Lakes. Actions in which the Fish and Wildlife proposes to participate include:
    a. Unified Action 2.1.1, Targeted Removal within the Chicago Area Waterways System;
    b. Unified Action 2.1.2, Enhanced environmental DNA (eDNA) Testing, Contract Commercial Fishing, and Conventional Monitoring in "High Risk" Locations;
    c. Unified Action 2.2.13, Increased Lacey Act Enforcement of Illegal Transport of Injurious Wildlife;
    d. Unified Action 2.2.15, Integrated Pest Management;
    e. Unified Action 2.2.16, State and Interstate Aquatic Nuisance Species (ANS) Management Plans;
    f. Unified Action 2.2.17, Activities to support Aquatic Invasive Species priorities under the Great Lakes Fish and Wildlife Restoration Act; and
    g. Unified Action 2.2.18, Competitive Funding Opportunities.

Each of these actions is described in detail in the Draft Framework.

6. In addition to the actions proposed within this framework, the Service's Midwest Region is currently coordinating implementation (along with other MRRWG partners) of the Management and Control Plan for Bighead, Black, Grass, and Silver Carp in the United States later renamed the Rapid Response Plan for Asian Carp in the Upper Illinois River and Chicago Area Waterways System (Plan or Management and Control Plan), which was approved by the Aquatic Nuisance Species Task Force in 2007. The Aquatic Nuisance Species (ANS) Task Force is an intergovernmental organization dedicated to preventing and controlling aquatic nuisance species, and implementing the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) of 1990. The various NANPCA mandates were expanded later with the passage of the National Invasive Species Act (NISA) in 1996. The Task Force consists of 13 Federal agency representatives and 12 Ex-officio members, and is co-chaired by the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration. The Task force coordinates governmental efforts dealing with ANS in the U.S. with those of the private sector and other North American interests via regional panels and issue specific committees and work groups. The Plan for Asian carps is available at http://www.anstaskforce.gov/Documents/Carps_Management_Plan.pdf.
7. The Management and Control Plan addresses the threat of Asian carps throughout the United States. The four species addressed by the Plan present a serious threat to North American ecosystems, including the Great Lakes, if self-sustaining populations become established in the wild. A subset of the 133 priority management actions contained within the Plan specifically addresses the challenge of protecting the Great Lakes basin from the establishment and impacts of Asian carp. As lessons are learned through implementation

of this plan elsewhere in the region and throughout the nation, applicable solutions will be adopted for the Great Lakes. The Plan contains specific actions to prevent Asian carp from entering the Great Lakes; or to contain, control, and mitigate impacts in the event of their access into the basin. The Plan uses a multi-tiered, "integrated management" approach based on timely data and current or emerging tactics and tools. Actions include the following:

a. Develop and refine effective methods for sampling populations of Asian carp, and for predicting abundance and distribution (as a risk assessment and risk management decision support tool);

b. Constrain Asian carp range expansion/population growth via development and deployment of physical and behavioral barriers to fish movement at critical geographic locations (including sonic, bubble, light, velocity, and chemical barriers);

c. Control (remove Asian carp) through:

    1) Strategic and intensive "recruitment overfishing"

    2) Development and application of chemical control tools and piscicide delivery systems to control bighead and silver carp in an effective, efficient manner, and work with partners to develop and implement a coordinated Asian carp public outreach and education campaign focused on preventing movement of fish.

8. On February 8, 2010, the Service participated in a conference call/meeting hosted by the Council of Environmental Quality on the topic of the environmental assessment needs and requirements related to short-term actions included in the recently-released Asian

Carp Control Strategy Framework. Additional participants in the meeting/teleconference included the COE, USCG, EPA, Department of the Interior Office of the Solicitor, and others. FWS agreed to provide expertise and support on consultations and environmental reviews required on specific near-term actions included in the Plan when contacted by lead agencies.

9. In support of the implementation of the Plan, as approved by Aquatic Nuisance Species Task Force in October 2007, the Service Region 3 Fisheries Program maintains a Plan Coordinator, located at its Carterville (Illinois) Fish and Wildlife Conservation Office, and serves as Co-Chair (along with IL DNR) of the Plan's Steering Committee, charged with guiding nationwide implementation of the highest priority prevention and control management actions contained in the strategy. An initial scoping and strategy meeting of State partners was recently convened at the Midwest Association of Fish and Wildlife Agencies in Springfield, Illinois, for the purpose of expediting formation of ommittees in support of the Plan's implementation.

10. The Service continues to provide senior-level representation on the multi-agency ACRCC, currently chaired by IL DNR. This includes participation on regularly-scheduled teleconferences to discuss specific key topics and decision-points on preventing Asian carps from becoming established in the Great Lakes (as identified under the Asian Carp Strategy Framework) and *ad hoc* discussions as needed to discuss other prevention and control needs.

11. The Service continues to provide staff-level representation on the MRRWG (co-chaired by IL DNR and the Great Lakes Fishery Commission, and established in support of the ACRCC). Service staff provides biological expertise for developing and informing

12. The Service continues to provide staff-level representation on the Dispersal Barrier Advisory Panel (last meeting June 15, 2010 at EPA headquarters in Chicago) to address issues relative to the efficacy of the Aquatic Invasive Dispersal Barriers (i.e. electrical barriers) in the CAWS.
13. At the request of the Army Corps of Engineers, the Service also recently began to develop a risk assessment of various lock operations scenarios. The scenarios that the Service evaluated were developed primarily by the Army Corps of Engineers with some input from the Service. The assessment was performed by a team of twelve specialists from various state and local entities and will evaluate the risks of Asian carps establishing and impacting the Great Lakes under various lock operation scenarios provided by USACE. The Service began its work on the assessment on February 19, 2010. A summary of the results is below.
14. In addition, funding has been provided by the Service through the Great Lakes Restoration Initiative to support Asian carp prevention and control activities by partners. This includes a total of $8.3 million provide to the IL DNR ($8.0 M for implementation

of approved activities under State ANS Plan; and $0.3 M to support a grant, awarded after request for proposal (RFP) competition, to implement recruitment overfishing).

15. Service staff is participating on a steering committee for an Asian Carp Marketing Summit. This summit is sponsored by the Illinois and Indiana Sea Grant and is designed to create markets to encourage commercial harvest of Asian carp to reduce their numbers basin wide.

16. The Service developed a timeline and began the process for re-initiating development of a preliminary rule and supporting documentation necessary for listing bighead carp as "Injurious" under the Lacey Act.

Response Efforts

17. In 2009, as part of its expanded Asian carp monitoring program, the U.S. Army Corps of Engineers began investigating a new technique to aid in identifying the presence of Asian Carp. The technique (environmental DNA, or "eDNA" analysis) was developed by researchers from the University of Notre Dame.

18. During routine monitoring and surveillance for Asian carp, Service staff observed what was believed to be a silver carp jumping from the water during surveys conducted near the confluence of the Des Plaines River and the CSSC, approximately 1 mile downstream from the Lockport Lock and Dam. The monitoring effort was part of the annual Carp Corral, conducted June 16-19, 2009.

19. Results from eDNA analysis in late July 2009 provided new information that Asian carp may have moved farther upstream in the Chicago Sanitary and Ship Canal than had been previously known. These preliminary eDNA results indicated the possible presence of silver carp in the Brandon Road Pool near the Lockport Lock and Powerhouse, just 5-6

miles downstream of the Corps of Engineers' electric fish dispersal barriers (near river mile 296). In response to this new preliminary information, the Service worked with the Corps and other partner agencies to develop response actions to address the potential threat of Asian carp migrating toward Lake Michigan.

20. Commencing in August 2009, the Service, the Corps, the IL DNR, and the Illinois Natural History Survey conducted increased and focused monitoring for Asian carp, with the goal of capturing or retrieving Asian carp specimens in the locations where positive eDNA genetic findings had been recorded. Responsibility for conducting surveillance rotated monthly between the partner agencies. These surveys used electrofishing, a technique in which two electrodes are placed into the water to deliver a current to stun fish in the vicinity. Fish are affected by the electricity and experience an uncontrolled muscular convulsion known as galvanotaxis. Fish suffering galvanotaxis swim towards one of the electrodes, where they are easily netted. No Asian carp were visually detected during these electrofishing and monitoring efforts.

21. Additional eDNA testing results, released on September 16, 2009, indicated the possible presence of silver carp within the Lockport Pool, less than 1 mile from electric barrier IIA, as well as in the Des Plaines River several miles from its confluence with the Canal and about 5 miles upstream of where the electric barriers are located along the Canal. The partner agencies conducted further electrofishing and monitoring in these areas. No Asian carp were visually detected during these monitoring efforts.

Initial Rotenone Response Action

22. In preparation for necessary maintenance on the Army Corps of Engineers' electric fish barrier IIA in the Chicago Sanitary and Ship Canal, the Rapid Response Workgroup planned an action to prevent Asian carp from migrating upstream of the location of the

23. During the week of November 29, 2009, a multi-agency team of biologists and managers (300+) assembled in Romeoville, Illinois to conduct the rapid response containment operation. Rotenone was applied to the 5.7 miles of the Canal between Lockport Dam and Romeoville, Illinois (the location of the Corps' electric barrier array). FWS provided a total of 53 staff to assist in the containment operation, including representatives of the Region 3 Fisheries, Ecological Services, and Refuge programs and two staff members from the Service Northeast Region Office of Fisheries. In addition, the Service provided 15 survey boats.

24. The application of rotenone by IL DNR began at 8:00 pm on December 2, 2009 and ended at approximately 1:00 am on December 3, 2009. The effects of the rotenone were contained to a 5.7 mile treated stretch of the Canal by neutralizing agents introduced at the end of the treated stretch. Upon the start of the rotenone application, boat crews were deployed to collect dead or distressed fish with nets. As fish encountered the rotenone, to escape the suffocating effect of the poison, fish surfaced in an attempt to find air. As the distressed fish surfaced, they were easily spotted and netted.

25. The composition of species collected was dominated by common carp, gizzard shad, freshwater drum, buffalo, and ictalurids (catfish and bullheads); round goby also were collected. Additionally, "sentinel fish" (caged carp and other species) were deployed at various depths within the water column by biologists to verify efficacy of rotenone

(mortality of fish) throughout the Canal's water column. All caged sentinel fish were found dead following rotenone application.

26. On December 3, a Service survey boat collected one bighead carp, *Hypophthalmichthys nobilis* (length of 22") approximately 0.5 mile above the Lockport Lock and Dam, approximately 5 miles downstream of the electric barriers. When located, this bighead carp was swimming in circles at the surface gasping for air. Service biologists positively identified the fish as a bighead carp at the collection site, and immediately transferred the specimen to IL DNR staff on site for custody and additional analysis. Genetic samples of the fish were taken by a Corps of Engineers biologist, and the fish was archived. Scheduled maintenance on electric fish barrier IIA was successfully completed during the operation.

27. Approximately one week after completion of the Rapid Response operation, fish carcasses were reported floating into and accumulating at the pool at the Lockport Lock and Dam, below the electric barrier. The Service is aware of research conducted by the United States Geological Survey (USGS) indicating that Asian carp killed by rotenone in laboratory conditions will float within 24 hours of being killed. One grass carp was collected and identified (other carcasses were primarily common carp, gizzard shad, and other species). Grass carp is a species of Asian carp that is not viewed as posing the same potential threat to Lake Michigan as silver and bighead carp at this time. Most grass carp in this area are sterile and do not pose the risk of reproduction and population expansion. No other Asian carp carcasses have been collected.

28. The Fish and Wildlife Service estimates the total weight fish collected as a result of the rotenone rapid response action to be approximately 55,000 lbs.

Commercial Netting Response Action

29. Soon after the rotenone rapid response action was completed, the Service participated in an additional rapid response action on the Calumet River at the O'Brien Lock and Dam. This action was conducted based on positive eDNA findings in the immediate vicinity of the O'Brien Lock on the Calumet River (approximately 8 miles from the confluence with Lake Michigan).

30. Analysis of eDNA samples in mid-November 2009 by University of Notre Dame scientists indicated the possible presence of Asian carp near the O'Brien Lock on the Calumet River approximately 8 miles from the Confluence of the Calumet and Lake Michigan. The Workgroup met to evaluate appropriate response actions for the Calumet River, including application of rotenone and intensive monitoring. After considering its options, the Workgroup decided against conducting a rotenone action on the Calumet River for a number of reasons. The Workgroup had information indicating that rotenone would not be as effective near the O'Brien Lock because of the colder water temperatures in the Calumet River. The effects of rotenone decrease with a decrease in water temperatures, and Workgroup concluded that the cooler water temperatures in the Calumet would result in a less effective operation than that on the Canal. Based on doubts as to the efficacy of rotenone application in this location and concerns about the high cost and intensive staffing required for another rotenone action, the Workgroup decided to conduct intensive monitoring and sampling near O'Brien Lock and Dam using commercial fishing gear set for multiple days by experienced commercial fishermen.

31. The IL DNR led the overall rapid response operation on the Calumet River. The Fish and Wildlife Service assisted in the efforts. From December 1-6, 2009, commercial fishermen

– all with experience fishing for Asian carp in the lower Illinois and the Mississippi Rivers – deployed commercial trammel netting (2-3 layers of netting with a slack small mesh inner-netting between two layers of large mesh netting) in areas near the T.J. O'Brien Lock. In the first four days of the operation, fishing was restricted to near shore areas, adjacent to the lock wall, and the marina basin. On December 5 and 6, after the navigation safety zone was enforced and ship traffic was prohibited in the area, the Service and IL DNR identified additional in-channel locations for fish sampling based on depth and bottom profile. The netting operation resulted in the catch of 1,026 fish representing 12 species, with common carp making up 87% of the total catch by number of individual fish. No Asian carp were captured during this netting operation.

Continuing Monitoring and Sampling

32. On January 13, 2010, Service personnel participated with representatives of the IL DNR, COE, Wisconsin Sea Grant, USGS, USCG, University of Notre Dame, and other partner organizations at a meeting of the Aquatic Nuisance Species Barrier Panel Task Force in Chicago, Illinois. Discussion included dialogue on recent eDNA findings in the Chicago Sanitary and Ship Canal (CSSC) and adjoining waters in the metropolitan Chicago area, and development of additional future control measures to stop the spread of Asian carp into the Great Lakes. In discussion of the control measures, the Service and other members of the Task Force discussed the need to conduct surveillance and sampling at the locations where Asian carp eDNA had recently been reported.

33. The Service then proceeded to develop a plan for sampling in locations in the Canal where Notre Dame researchers identified positive eDNA samples. Sampling pre-planning included the preparation of maps and data to guide near-term monitoring

activities; selection of sampling sites was based on boat access, results of recent eDNA analysis, and status and placement of ice cover. These fishing and netting operations have a dual purpose -- both to determine whether silver or bighead carp are present above the dispersal barrier and to suppress or eradicate any existing individuals or populations. This latter purpose is important because even if silver or bighead carp are present, we do not want to see any Asian carp above the barrier. Keeping the numbers of any Asian Carp low will prevent the potential for an increased risk that a viable population could establish even if some individuals are present in the CAWS. The Service is working actively with its federal and state partners to ensure that any numbers of Asian carp are eliminated or remain quite low.

34. From February 1-4, 2010, Service staff sampled three sites for Asian carp in the North Shore Channel, CSSC, and Cal-Sag Channel using floating trammel nets, sinking trammel nets, and electrofishing. To conduct sampling throughout the water column, FWS used a combination of floating and sinking trammel nets to be able to sample both the upper and lower portions of the water column. Trammel nets are set vertically in the water and have mesh of various sizes in order to trap and pre-sort different fish. Trammel nets also are sturdy and useful in capturing large and strong fish, such as Asian carps. The Service also used electrofishing throughout the sampling areas.

35. All sites sampled were adjacent to warm-water discharges as fish are more likely to congregate near these locations during winter months due to colder water temperatures.

36. As a result of these sampling events, between 100 and 200 fish were recovered. Common carp and gizzard shad were among the species captured. During the entire exercise, no Asian carp were seen or collected.

37. To complement this exercise, on February 3, 2010, Service staff flew over a portion of the Illinois Waterway (North Channel, CSSC, and Cal-Sag Channel) in a USCG helicopter to conduct reconnaissance regarding ice cover and location of sampling sites for future near-term sampling efforts.

38. On February 5, 2010, Service and IL DNR staff met via teleconference to plan joint agency sampling efforts on the CSSC, Cal-Sag Channel, I and M Canal, and adjoining waters. The sampling began on February 16, 2010 and continued through February 19, 2010. Sampling locations were identified, in part, through the over flights discussed in paragraph 37

39. To conduct the sampling efforts, the Service used three boats, each with a crew of two to three. IL DNR used four boats, each with a crew of three. As with our prior sampling operations, the sampling was conducted with sinking and floating trammel nets and with electrofishing. In addition to IL DNR employees, I have been informed that IL DNR is working with a professional Asian carp fisherman to conduct sampling. To serve as a control, I have been informed that IL DNR deployed one of its four sampling boats to an area of the Illinois River where Asian carp are known to exist. Using the same electrofishing technique that sampling crews are using in the other areas of the Canal, the crew was able to capture between thirty and forty Asian carps during the control operation.

40. During the weeks of February 22 and March 22, 2010, Service crews sampled fixed sites prescribed in the Plan. These sites were determined as likely spots to find Asian carp by having multiple eDNA positive samples and by experts determining that the sites were likely habitat for Asian Carp. Fixed site sampling involves of one crew consisting of two

to three biologists conducting electrofishing operations. During these sampling operations predominate species collected were common carp and gizzard shad. Except for a few grass carp, no Asian carp (bighead or silver) were collected during the sampling events.

41. Intensive sampling efforts were also conducted beginning the week on May 12, 2010 in the North Shore Channel in response to positive eDNA results. The intensive sampling consisted of three Service crews, two IL DNR crews, and one Corps of Engineers crew conducting netting and electrofishing operations. Additionally, commercial fishers were contracted to assist in netting operations. No Asian carp were captured during this effort. The predominant species collected were gizzard shad and common carp.

Additional Rotenone Application

42. The Workgroup Plan indicated that positive e DNA detections within a portion of the Little Calumet River in the Chicago Area Waterway System during 2009 and 2010 warranted a response action to capture and remove Asian carp. The Service participated on the interagency Incident Management Team (IMT) assembled to plan and manage rapid response actions that involved applying rotenone (i.e., fish toxicant) in accordance with label directions in a 2.75-mile reach of river immediately below the O'Brien Lock and Dam in order to determine if live Asian carp were present, and if so, the density of their population. Three Service employees served on the IMT. Their roles were the Planning Section Chief, Situation Unit Leader, and the Deputy Resources Unit Leader for the incident. The Service, as a member of the MRRWG, had a lead role in planning response actions over the 3 weeks leading up to the operation on May 20, 2010. The trigger for the May rotenone action was set in the winter of 2010. There had been 3

positive eDNA samples by the fall of 2009, thus, the Workgroup decided that if a fourth positive eDNA sample was found, the rotenone action would be recommended.

43. On May 20, 2010, IL DNR applied rotenone in the area at the direction of the MRRWG. From May 20-25, 2010, the United States Coast Guard established a safety zone prohibiting navigation through the area, and the COE closed the O'Brien Lock to achieve a no-flow condition. Over 130,000 pounds of fish were recovered (gizzard shad and common carp were the most common species). Except for grass carp, no other Asian carps were collected during this operation.

44. The Service was on site from May 18, 2010 to May 27, 2010 implementing the response actions. The Service worked closely with federal, state, and non-government partners to successfully plan and implement the response actions. In addition to the members of the IMT that were on site for the duration of the operation, 23 Region 3 employees and 7 boats were active in the implementation of response actions.

Recent Developments and Response Actions

45. On June 22, 2010, a single big head carp was captured alive in Lake Calumet by a commercial fisher contracted by IL DNR as part of the monitoring plan created by the MWRRG. The captured fish was approximately six years old, male and not in reproductive condition. Analysis (stable isotope analysis) is currently underway by Southern Illinois University Carbondale to determine where the fish spent most of its life. This was the first Asian carp captured above the electrical barriers in the CAWS. This prompted another intensive sampling response during the week of June 28, 2010. Three Service crews and one crew from the Great Lakes Indian Fish and Wildlife Commission joined IL DNR crews and contracted commercial fishers in electrofishing and netting in

the Calumet River from the O'Brien Lock and Dam to Lake Michigan. No Asian carps were captured and again the predominant species caught were common carp and gizzard shad. During this intensive sampling operation, a Service crew conducted fixed site sampling in the CAWS.

46. During the week of July 19, 2010, a Service crew assisted the COE with installing a telemetry array and surgically implanting radio tags in surrogate fish species to test barrier efficacy. Surrogate species include common carp, buffalo, drum, and grass carp. Telemetry is identified in the monitoring plan and is being further refined. During this time, the Service crew assisted the COE in collecting water samples for eDNA analysis. Fixed site sampling continued during the week of July 22, 2010.

Risk Assessments

47. The Service has also conducted risk assessment study on the behalf of the Corps to determine the level of risk involved in operation of the Chicago and O'Brien locks in the CAWS. The Service is also in the planning process for two additional risk assessments commissioned by the Illinois Department of Natural Resources.

Completed on Behalf of the Corps of Engineers - March 4, 2010

48. On February 19, 2010, the Service) received a formal request from the U.S. Army Corps of Engineers-Chicago District, to lead a risk analysis. That analysis was executed, and submitted to the Corps on March 4, 2010, to evaluate a suite of proposed alternatives for modifying operations of the Chicago and O'Brien Locks to address threats from Asian carps to the Great Lakes. Alternative scenarios for lock operation were considered as a means of lowering risk of bighead and silver carps establishment in Lake Michigan by way of the CAWS.

49. The COE, which operates and maintains the navigation structures at the Chicago Lock and the O'Brien Lock, was considering modifications to lock operations and structures to reduce the risk of Asian carps passing through those locks in the CAWS into Lake Michigan. Possible modifications considered included minimizing impacts to the navigation industry, and minimizing impacts from flooding. In the short term, the Corps was considering a range of alternative lock operations that would increase the time the locks would be closed. The alternatives included:

    a. Continue current operations (no action, as required by NEPA)
    b. Lock closure of 3 to 4 days a week and normal operations for the remaining days of the week
    c. Lock closure of 1 week/month and normal operation for the remaining days of the month
    d. Lock closure every other week and normal operations for the alternative weeks
    e. Lock closure of 2 months with extensive monitoring to determine if Asian carps are in the CAWS. If no Asian carps are collected during the closed period, then lock operations will be resumed at the end of the closure period. Locks would remain open, unless there was a significant flow event (flow rate trigger TBD) that could trigger fish movement. Locks would be closed on an emergency basis while monitoring activities were executed.
    f. Two-week lock closure, in mid-late April, during which extensive surveillance and monitoring is conducted. If no Asian carps are recovered, then the locks will operate normally. However, if there is a significant rainfall event that results in elevated flows (and a possible stimulus for Asian carps to move upstream) after

the two weeks of surveillance/monitoring, then the locks would be closed as soon as possible. During the lock closure, resources could be mobilized to complete surveillance/monitoring for a week. If no Asian carps are captured during the week, then the locks would be reopened.

50. To complete the risk analyses, a panel of ten experts (from the COE, IL DNR, Illinois Environmental Protection Agency, Illinois Natural History Survey, USGS, and the Service) was convened. Individuals were selected: 1) based on their expertise and knowledge related to the technical questions that formed the basis of the review, and 2) in a manner to ensure broad representation of the various entities engaged in Asian carp containment in the CAWS.

51. Nine experts completed various components of the risk analysis form, which was composed of sections focusing on: 1) risk assessment of possible lock operation alternatives, and 2) biological, ecological, and risk management questions posed by the COE. The tenth expert chose to not to participate, because one of his agency colleagues conducted the risk assessment for both representatives of that agency. Some experts completed only limited sections of the form, because their expertise was specific to discrete topics considered in the risk analysis.

52. In all cases, expert assessments of risk of projected Asian carp establishment and impact in Lake Michigan, as the result of the pathway of the Chicago and O'Brien Locks, were categorized as either Medium or High (i.e., unacceptable). Although experts differed in their assignments of risk to the six alternatives, individual expert assessment of risk tended to not change across the suite of alternatives (which included a no-action alternative) for modifying lock operations at the Chicago and O'Brien Locks.

53. The level of uncertainty described by experts relative their ability to assess risk of projected of Asian carp establishment and impact in Lake Michigan ranged from "Very Uncertain" to "Very Certain." Although experts differed, in the level of uncertainty assigned to risk of the six alternatives, individual expert level of uncertainty tended to not change across the suite of alternatives proposed for modifying lock operations at the Chicago and O'Brien Locks.

54. Of the six alternatives presented by the COE, there was no individual or combination of lock operation scenarios that experts believe will lower risk of Asian carps located in the CAWS establishing self-sustaining populations in Lake Michigan to an acceptable level, experts provided limited options (control/prevention techniques, etc) that may, if implemented, potentially lower the risk of Asian carp establishment in Lake Michigan related to any lock operation alternative. None of the options provided, by the experts, to lower risk of lock operation alternatives were recommended by more than one expert, so no clear consensus about risk management existed.

Initiated on Behalf of Illinois Department of Natural Resources

55. At the request of the IL DNR, the Service is planning to conduct two further risk assessments.

56. Draft objectives of the first risk assessment are to assess risk of:

    a. Significant under-representation of Asian carp abundance in the CAWS fish community samples collected in the past using traditional sampling gears (i.e., electrofishing, netting, rotenone)

b. Significant under-representation of Asian carp abundance in CAWS fish community samples planned to be collected in the future, using the interagency monitoring protocol

57. The draft objective of the other risk assessment is to assess risk of:

a. Substantive under-representation of Asian carp distribution, in the CAWS above the electrical barriers, in the past using environmental DNA

58. No schedule has been developed to formally initiate the two risk assessments, because data from past sampling, by all partners, are being collated and entered into a database. At this time, the provisional plan is to analyze those data, and develop a synthesis and summary report, which will be used by risk assessment panel experts. The expert panel memberships for the two risk assessments have not been finalized.

Outreach Actions

59. As an active member of the Asian Carp Regional Coordinating Committee (ACRCC), the Service is dedicated to engaging in responsive, proactive, and transparent external communication with appropriate elected officials, state, tribal, and provincial governments, industry, media and other key stakeholders. Additionally, the Service co-chairs the ACRCC's Communications Workgroup (CWG). The CWG is responsible for congressional/legislative outreach, media relations, and public/stakeholder outreach.

60. The Service currently serves as the manager and a core contributor to AsianCarp.org, the ACRCC's official website. FWS takes an active role in generating content for AsianCarp.org in collaboration with other members of the ACRCC. The website is a significant tool for public outreach as demonstrated by that fact that between June 20 and July 20 of 2010 AsianCarp.org was visited by over 7,600 unique users.

61. The Service currently fields all inquiries made by the public through email, mail, telephone, or in-person at public meetings. On February 12, 2010 in Chicago, IL and February 17, 2010 in Ypsilanti, MI the Service was an active member of the ACRCC's presentation group that updated Members of Congress and the public on the Asian Carp Control Strategy Framework and discussed the life history of Asian carp and potential threats. On June 23, 2010, the Service was also a core speaker in an informational telephonic stakeholder meeting with over 200 stakeholders regarding the bighead carp found in Lake Calumet. Beyond overarching stakeholder outreach, the Service participated in more targeted outreach activities, such as the June 21, 2010 informational conference call hosted by the ACRCC for specifically the Maritime community. The Service responds to all national and local media inquiries and to date has completed nearly 30 interviews either telephonically or in-person since the spring of this year. The Service was an active participant in the telephonic media advisory meeting that occurred on June 23, 2010 to inform the press about the Bighead carp found in Lake Calumet.
62. With respect to congressional outreach, the Service has regularly distributed electronic news releases, fact sheets, briefing books, FAQs, and other written outreach materials to interested Members of Congress and congressional staff (both proactively and by request). The Service regularly takes part in in-person informational briefings with both Capitol Hill and state/district staffers on the Asian carp issue. Along with other members of the ACRCC, The Service also participates in telephonic informational briefings organized by the Council on Environmental Quality (CEQ) that target congressional staff representing Members of Congress from the Great Lakes states. The Service has testified in all congressional oversight hearings related to Asian carp that we have been invited to

take part in, and we provide technical support to agencies testifying at hearings in which we are not providing testimony. On February 8, 2010 FWS participated in an Asian carp summit with Great Lakes leaders organized by CEQ at the White House. The summit was held at the request of Governor Jennifer Granholm (D-MI), after the US Supreme Court ruled in January 2010 that it would not force Illinois to close the CAWS locks that permit vessels to access to Lake Michigan. In addition to Governor Granholm, the summit was attended by Governor Doyle (D-WI) and Governor Quinn (D-IL), as well as agency principals from the ACRCC.

63. On February 4, 2010 the Service, with the ACRCC, hosted a phone briefing for Tribes in the Great Lakes to share the latest information on the status of Asian carp in the Illinois River and results from eDNA testing, which indicated the possible presence of Asian carp in the nearshore areas of southern Lake Michigan (Calumet Harbor, Illinois). At the request of the Little Traverse Bay Bands of Odawa Indians, on February 19, 2010 the Service held a conference call briefing with individuals from the Little Traverse Bay Bands of Odawa Indians to provide more information on the Asian carp issue. In late spring the Service participated in a multiagency consultation meeting with the Little Traverse Bay Bands of Odawa Indians in Traverse City, Michigan. Many other tribes attended as well. In addition to targeted outreach through phone-calls and in-person meetings, the Service's key Great Lakes Tribal contacts from both Regions 3 and 5 are on the ACRCC's list of individuals receiving regular email updates on the ACRCC's activities to control Asian carp. On June 10, 2010 FWS participated in a conference call with the Bureau of Indian Affairs (BIA) where it was discussed how to further promote the involvement of Tribes in the Great Lakes, specifically the Chippewa Ottawa Resource

Authority (CORA) and the Great Lakes Indian Fish and Wildlife Commission (GLIFWC).

I declare in accordance with 28 U.S.C. § 1746, under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief, and is based on my personal knowledge and on information provided to me by employees of the United States Fish and Wildlife Service.

Executed on August 2 2010 at Fort Snelling, Minnesota.

Houma, Louisiana

Charles M. Wooley
Deputy Regional Director, Region 3
United States Fish and Wildlife Service

Attachment 2

Monitoring and Rapid Response Plan for Asian Carp in the Upper Illinois River and Chicago Area Waterway System

Introduction and Background

Bighead and silver carp (hereafter, Asian carp) invaded the Illinois River in the 1990s and the invasion has since progressed upstream. Monitoring of the invasion has been occurring through standard routine sampling via the US Fish and Wildlife Service's (USFWS) annual Carp Corral & Goby Roundup, and more recently through a monitoring plan put forth from the US Army Corps of Engineers (Corps) to monitor Asian carp downstream of the Dispersal Barrier (the Dispersal Barrier is designed to repel fish using an electric field to prevent fish movement between the Great Lakes and Mississippi River basins). Through such monitoring efforts, and a rotenone action that took place below the Dispersal Barrier in Lockport Pool, bighead carp have been collected in Lockport Pool directly below the Dispersal Barrier, silver carp have been sighted in Brandon Road Pool, and bighead carp have been collected in Dresden Island Pool. 'Environmental' DNA (eDNA) is a new and emerging technique that is used to test for the genetic presence of bighead and silver carp in water. Positive confirmation of Asian carp DNA has been made in areas above the Dispersal Barrier prompting action, including further monitoring and additional rapid response actions above the Dispersal Barrier.

A Regional Coordinating Committee (RCC) was established to provide coordinated communication and response to accomplish the goal of preventing Asian carp from becoming established in Lake Michigan. To facilitate the accomplishment of the goal, the RCC formed multiple work groups, including the Monitoring and Rapid Response Work Group (MRRWG). The MRRWG is co-led by the Illinois Department of Natural Resources and the Great Lakes Fishery Commission and is comprised of liaisons from key state and federal agencies as well as independent technical specialists (see Appendix A for membership). The MRRWG was assigned the task of developing a Monitoring and Rapid Response Plan (MRRP) for Asian Carp that are either in or could gain access to the Chicago Area Waterway System (CAWS). The purpose of this MRRP is to determine how best to identify the location and abundance of Asian carp in the CAWS, and to identify appropriate response actions to address such findings.

Initial Monitoring and Plan Development Process

There is a need to balance the needs of taking immediate action(s) in order to gather data and make better up front decisions, and taking time to fully explore all actions that identify the best long term strategy. That balance was struck in the MRRP by initially considering a multitude of actions and then more fully developing the two approaches that were considered to be the most promising to determine distribution and abundance of Asian carp. The two basic approaches that

are being or were more fully developed were: 1) use of eDNA to identify areas where Asian carp DNA is present (and presumably live Asian carp) and then sample those areas with rotenone, and 2) intensive use of standard fishery sampling gears (i.e., netting and electrofishing) at fixed locations where Asian carp are most likely to be present with additional electrofishing throughout the CAWS.

Initial sampling with traditional electrofishing and netting gear and with the use of commercial fishermen was completed in the CAWS above the Electric Dispersal Barrier during February and March 2010. Sampling targeted warm water discharges and backwater habitats to maximize chances of encountering Asian carp and included reach-wide electrofishing runs along the entire waterway above the barrier. No Asian carp were collected or seen during this sampling effort.

With these results in mind, our first full MRRWG meeting (i.e., including independent technical specialists; Appendix A) occurred in April, where both options were presented and discussed. The outcome was a decision to proceed initially with eDNA sampling and rotenone treatments at locations where sufficient evidence of the presence of Asian carp existed (see Objective 2, Rotenone section for additional information on what is considered sufficient evidence). Sampling using netting and electrofishing will be reconsidered, along with any other potential techniques, once information on abundance is gathered from rotenone treatments.

The exploration of the most obvious and promising monitoring and rapid response actions, and the decision to initially pursue the use of eDNA and rotenone, is considered only the first of many steps in monitoring and rapid response. This plan will be a very adaptive and iterative process, particularly given the limited information available on Asian carp distribution and abundance in the CAWS, the pace at which our understanding of Asian carp in these waters changes and improves, and the continual improvement and understanding of what our sampling tells us and does not tell us about Asian carp populations.

Location of Primary Target Areas Covered by the Monitoring and Rapid Response Plan

The area covered by this plan encompasses over 200 miles of waterways stretching from Starved Rock Lock and Dam to Lake Michigan and includes two target areas: 1) all waterways upstream of the Dispersal Barrier and 2) waterways downstream of the Dispersal Barrier the Starved Rock Lock and Dam. The area upstream of the Dispersal Barrier includes approximately 76 miles of the Chicago Area Waterways System, also known as CAWS (Fig. 1; downstream limit of the CAWS is the confluence of the Chicago Sanitary and Ship Canal and the Des Plaines River within the Brandon Road Pool). Waterways included in the area upstream of the Dispersal Barrier are: the Chicago Sanitary and Ship Canal (CSSC, 18.3 miles), South Branch of the Chicago River (3.9 miles), Chicago River (1.6 miles), North Branch of the Chicago River (7.7 miles), North Shore Channel (7.6 miles), Cal Sag Channel (16.0 miles), the Little Calumet River (including the South Leg, 40 miles), Grand Calumet River (to sheet pile obstruction, 3 miles), the Calumet River (7.5 miles), and Lake Calumet. Waterways downstream of the Dispersal Barrier include: the CSSC (6.0 miles), Des Plaines River (43 miles, including upstream of the CSSC), and the Illinois River (43 miles).

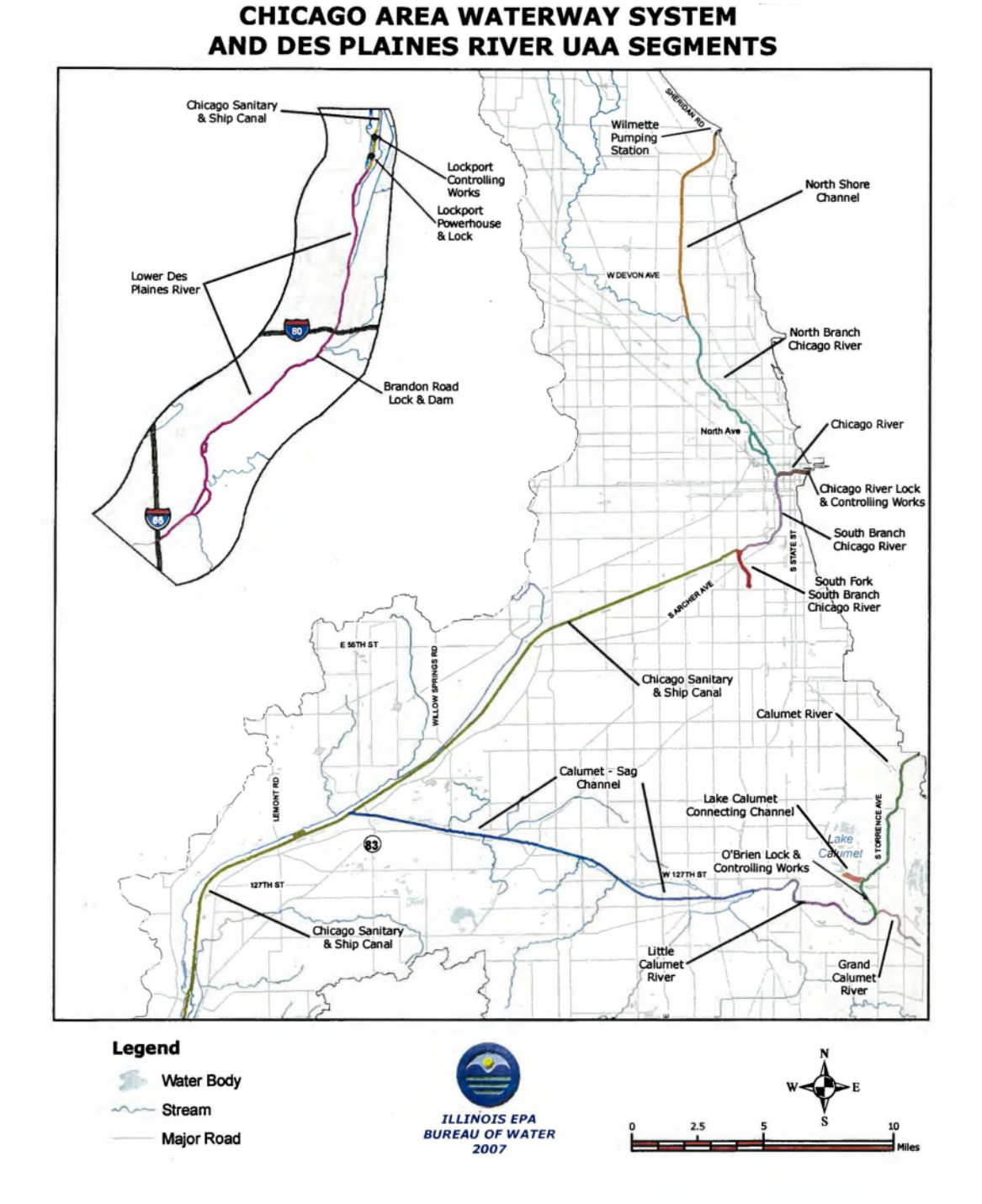


Figure 1. Map of Chicago Area Waterways System (CAWS).

Overall Goal: Prevent Asian Carp from establishing self-sustaining populations in the Great Lakes.

Under this overall goal, 6 objectives were identified:
Objective 1: Determine the distribution of Asian carp in the CAWS.
Objective 2: Determine the abundance of Asian carp in the CAWS.
Objective 3: Identify, assess and react to vulnerabilities in the current system of barriers to exclude Asian carp from moving into the CAWS
Objective 4: Establish parameters of acceptable risk that Asian carp will become established in the Great Lakes and determine our current risk level.
Objective 5: Remove Asian carp in the CAWS to a level below what is considered an acceptable risk.
Objective 6: Determine the leading edge of major Asian carp populations and reproduction in those populations.

Objective 1: Determine the distribution of Asian carp in the CAWS. Knowledge of the distribution of Asian carp in CAWS will inform decision makers on where and what actions are most needed and appropriate to keep Asian carp from moving into Lake Michigan. Possible patterns may be identified that would facilitate removal actions (e.g., rotenone), placement of additional barriers (e.g., sound and bubble barriers), and/or other appropriate actions. The following prioritized sampling efforts are intended to address this objective. Near shore areas of Lake Michigan will be addressed in a future version of this plan.

1) **Environmental DNA.** This technique allows for widespread coverage with a tool that is highly sensitive to the presence of Asian carp, particularly when compared to traditional fishery techniques. Currently, the capacity to process samples for eDNA is limited to ~60 per week. However, capacity to process samples is expected to double by July to 120 samples per week as the processing is transferred from Notre Dame to the USACE-ERDC facility in Vicksburg, MS. Specific site selection will be determined based on most recent sample results; however, early sampling will generally be prioritized as follows:

    1. Areas that have tested positive for eDNA in recent days/weeks or where a bighead or silver carp has been sighted or captured to provide evidence of fish remaining in a particular location so that additional appropriate action (e.g., application of rotenone) could be taken.

    2. Areas that tested positive for eDNA in 2009 as they would generally be considered likely places where fish would be found again.

    3. Areas where no sampling has occurred to date.

    4. Areas where the fewest number of samples have been collected.

2) Netting and electrofishing. While netting and electrofishing has some capability of determining more exact locations of Asian carp, Asian carp are extremely difficult to capture using either netting or electrofishing in areas where they are not present in large numbers, especially in water deeper than 3 meters. The use of netting and electrofishing to determine distribution is considered incidental to its primary utility as a potential tool to determine abundance, and any information gathered through their use would be used to augment distribution information gained via eDNA.

To maximize the potential usefulness of netting and electrofishing, particularly given the apparent low densities of Asian carp in the generally deep-water CAWS, effort will be concentrated in areas where the likelihood of capture is greatest (e.g., where eDNA has been detected, below migration barriers, or both). In addition, a less intense sampling effort will be done throughout the system so that we have some level of effort in all potential habitats/areas. Such an approach will also be used to address questions related to Asian carp abundance (Objective 2).

The sampling design for electrofishing and netting was developed with input from Illinois Natural History Survey (INHS) scientists and includes 5 intensively sampled fixed sites that will be sampled with both electrofishing and netting weekly, and 4 reaches that will be sampled monthly with electrofishing only to provide less intensive, but geographically comprehensive coverage of the CAWS (Fig. 2). The 5 fixed sites primarily are located at the upstream-most areas of the CAWS near Lake Michigan. These fixed-site areas were identified for intensive sampling under the assumption that Asian carp upstream of the Dispersal Barrier would swim upstream and congregate below the next existing barriers, namely the T.J. O'Brien and Chicago Locks and the Wilmette Pumping Station. This assumption is supported in part by eDNA evidence which has been found below the Wilmette Pumping Station and O'Brien Lock. Habitat conditions were also considered in the selection of the fixed sites. For example, we included Lake Calumet (Site 1), which has backwater-like conditions Asian carp favor; bigmouth buffalo, a species thought to associate with Asian carp was recently collected in Lake Calumet. Site 2 was extended downstream to include a favorable habitat area near the Acme Bend. Also, Site 3 was moved downstream of the Chicago Lock to included more favorable habitat and collection conditions. Additional details on sampling locations, protocols, and schedules are provided in Appendix B.

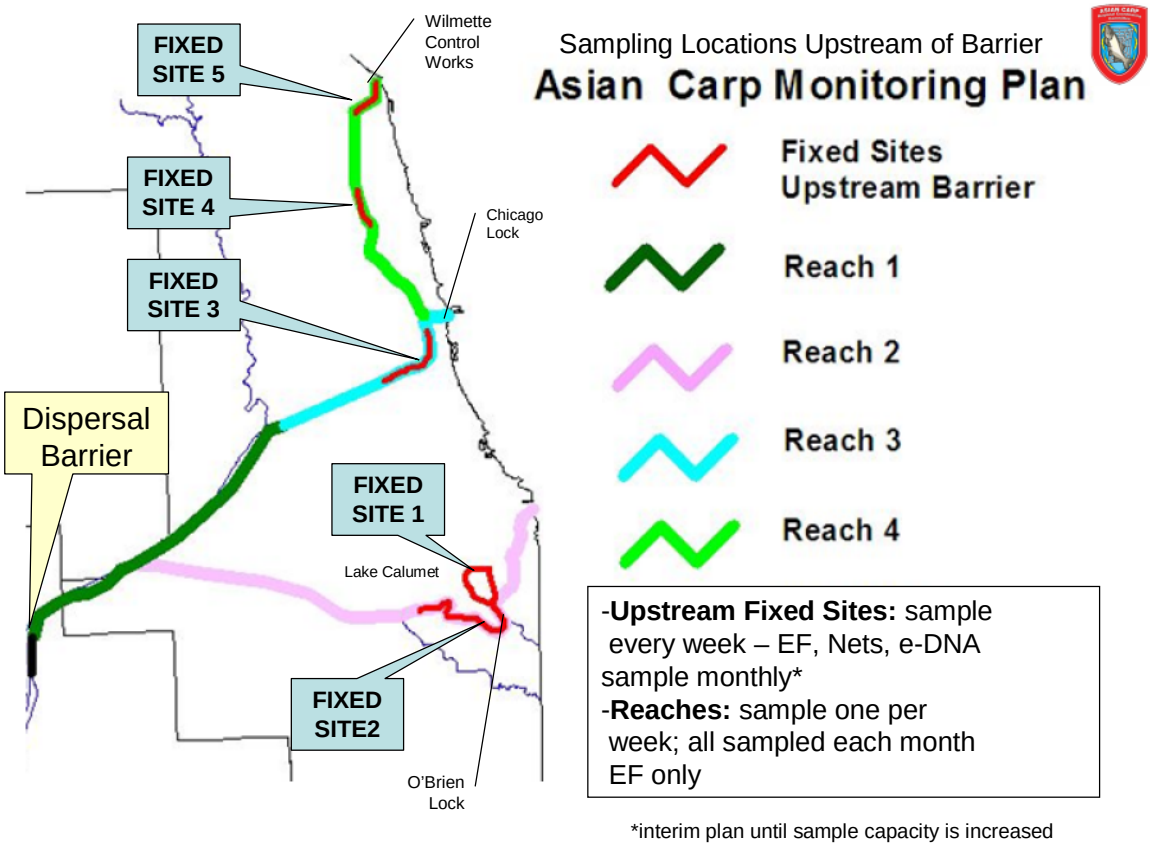


Figure 2. Fixed sites for netting, electrofishing, and eDNA sampling for Asian carp in areas above the Dispersal Barrier.

Objective 2: Determine the abundance of Asian carp in the CAWS. Knowledge of the abundance of Asian carp in the CAWS is a key piece of information to aid in determining the risk of Asian carp populations becoming established in Lake Michigan. However important, abundance will be quite challenging to determine, particularly in the short term. Prioritized actions for this objective include:

1) Rotenone Sampling. Rotenone is the only immediately available tool that will allow us to begin to determine abundance of Asian carp. When applied in confined areas with appropriate water temperatures, the majority of fish should float to the water's surface where they can be counted (evidence suggests that Asian carp will sink initially but float sooner than several other species; USGS, unpublished data). Unfortunately, rotenone can only be applied to limited areas within the CAWS at any given time due to cost, logistics, and other concerns. However, where there is evidence that Asian carp are present, rotenone can be applied to determine how many fish are in a given location and can provide the first real quantification of Asian carp abundance above the Dispersal Barrier.

Given the extensive waters that could be sampled with rotenone, it is not considered feasible to treat the entire system. Therefore, some evidence is needed to determine where rotenone samples should be collected. Various circumstances could trigger abundance sampling or

depletion monitoring with rotenone, including professional judgment regarding preferred habitats, multiple fish collected in a particular location, and multiple positive eDNA records. In some cases, rotenone could be applied as soon as logistics can be addressed. In other cases, rotenone might be precluded because of physical and logistical constraints or other considerations. Certain circumstances could make it impractical to use quickly in a rapid response context, and therefore an unsuitable response for certain triggers. The decision to use rotenone will be based on a balancing of all of these factors and therefore cannot be guaranteed as a response or sampling tool under all circumstances

It is also difficult to identify firm trigger points (e.g., once there are 2 indications of the presence of Asian carp in a location), because there are many factors that will need to be considered that are site and situation specific. Decisions should take into account indications of the presence of Asian carp along with several other factors such as 1) past eDNA information from the area, 2) habitat where the eDNA is collected (including the water velocity), 3) the relationship between the eDNA/capture site and any impediments to upstream migration. It is anticipated that regular meetings of managers, biologists, and eDNA experts and others will take place to discuss the evidence and likelihood of a successful rotenone sampling effort. There is biological rationale for both the liberal and conservative application of rotenone; ultimately, this is a management decision that will need to be made by the action agency with jurisdiction over applying rotenone (i.e., Illinois DNR; Indiana DNR).

Specifics of rotenone applications will be dependent on evidence of fish presence. A quick implementation time is essential to increase the likelihood that fish that were detected are still present in the target location. Therefore, rapid response action agencies will need to have adequate chemical, application equipment, staff, and permitting lined up to allow for a rotenone application within a few days of a decision to proceed. Rotenone would only be used when water temperatures would cause the majority of fish to float within a few days, or if other technologies are developed to allow for collection of nearly all fish killed (e.g., lift nets, possibly visual observation in shallow areas). It is possible that side scan sonar could be used to help determine the location of source fish releasing eDNA, to make better determinations on where to apply rotenone or take other actions.

Rotenone sampling does not usually constitute the type of an emergency for which the Captain of the Port could invoke authorities to close the waterway without proper notice and comment period. However, if an outright closure is not possible or practical, the U.S. Coast Guard (USCG) has indicated that it will work with the affected industry to see what combination of regulatory and voluntary measures can be put in place to facilitate an effective rotenone application. Alternatively, an exemption to notification must be secured prior to rotenone application. Locations also exist where navigation need not be shut down.

With our objectives in mind, the expert review group preliminarily considered factors that will influence decisions on a rotenone action. These include:

1) Type of evidence (e.g., eDNA, fish in hand, visual observation).
2) How many lines of evidence for Asian carp presence are there and over what timeframe were the lines of evidence gathered.

3) Type of location where evidence collected (e.g., channel border v. below structure v. off-channel).
4) Results of past rotenone and other sampling efforts at a particular location.
5) Water temp, flow, chemistry, etc.
6) Size of the area.
7) Disturbance to the public.
8) Presence of one or both species

While general trigger points for rotenone applications were not developed, specific triggers for select locations were:

O'Brien Lock and Dam-
Trigger: If another positive eDNA sample (one water sample that contains silver or bighead carp DNA) comes in, then rotenone will be used.
Reason: The consideration here is that several positive hits have come in over time and more positives may indicate Asian carp that are residing in the area. This reach is particularly difficult to sample with conventional gear and would be best sampled with rotenone. It is also a high risk area since it is adjacent to the final barrier between the CAWS and Lake Michigan
Logistical Concerns: This action will take several weeks to orchestrate. The operation must be comply with the law and be mindful of navigation and marinas downstream (staining boats with permanganate). Recovery of dead fish may occur via divers, lift nets, etc.

Wilmette Pumping Station-
Trigger: If a positive eDNA sample comes in, then rotenone or conventional gear will be used.
Reason: The consideration here is that this is the best spot logistically and has had a previous positive hit on only one sampling occasion. The site has a presumed impassable upstream barrier in that Wilmette Pumping Station does not have a lock and is not operational until May 1st. The channel typically has low volume and flow, requiring less rotenone, and no commercial navigation and little recreational navigation will be impacted. It is also relatively shallow and narrow, and potentially suitable for sampling using nets and electrofishing particularly if these are used in combination.
Logistical Concerns: Block nets will be set up downstream of the pumping station prior to taking additional eDNA samples and will be left in place during the rotenone operation. The action should be done prior to May 1st when pumping resumes.

Little Calumet South Leg-
Trigger: If a positive eDNA sample comes in, then we will electrofish to verify presence. If a visual sighting occurs or a specimen is recovered, then rotenone will be used.
Reason: This is a shallow narrow area where fish could be trapped or otherwise sampled easily. There are no lines of evidence here at this point.
Logistical Concerns: Legal approval of rotenone usage in Indiana is necessary.

Chicago River Lock to Bubbly Creek-
Trigger: None is currently developed
Reason: No positive eDNA samples exist from this area. Multiple lines of evidence must be evident before action takes place.

Additional Triggers and Rapid Response Actions

Potential Asian carp population reduction or eradication actions triggered by results of rotenone sampling are currently under consideration by the work group and will be presented in future versions of the MRRP.

2) Netting and electrofishing. Netting and electrofishing can be used to estimate relative abundance if collection effort is standardized and catch per unit effort is compared among locations. The protocols for such monitoring will generally follow the guidelines established for the Long Term Resource Monitoring Program (LTRMP) detailed in a subsequent section of this plan. Such monitoring will allow comparisons of relative abundance among areas with varied densities of the Asian carps. Ideally, catch rates could be used to estimate actual abundance or population size, but only if the relationship between catch rate and true abundance (as determined by rotenone) is known. Some preliminary work in this area has been completed by the INHS in backwater areas with higher abundance of Asian carp. The INHS work has yielded some useful information; for example, populations below 20-30 Asian carp per acre were difficult to detect using standard collection techniques. However, additional data points, particularly in locations with low abundances of Asian carp must be established. The additional data collection will require both catch rate information from netting and electrofishing as well as abundance estimates of abundance from mark-recapture, rotenone, or other abundance measuring methods. Until such work is completed, the initial 3 months of netting and electrofishing in the CAWS can only be used to determine relative abundances. Provided sufficient funding and other resources are available to complete sampling in low abundance areas, a crude abundance estimation tool might be available within a year. A more refined estimation tool will likely require multiple years to generate enough data points to establish a sufficient relationship between electrofishing and netting and abundance.

3) Environmental DNA. USACE and Notre Dame researchers are currently working to develop methodologies that could relate eDNA sample results to abundance. If successful, eDNA likely could become another very effective method of determining abundance.

4) Combination of Techniques. As previously discussed, a combination of eDNA, netting or electrofishing monitoring could be used to help identify where to sample with rotenone. Other combinations of techniques are not currently recommended as they do not lend themselves to better accomplishing our objective of determining abundance. One exception might be to use eDNA to drive our netting and electrofishing. In fact, many of our current fixed sites were selected based on past eDNA evidence. We don't anticipate enough additional benefit to overcome the additional logistical challenges that would ensue. Also, as previously discussed, using netting and electrofishing to determine abundance is predicated on the ability to make comparisons to other areas below the Dispersal Barrier where the same gears are deployed and related to abundance estimates. If eDNA were used to drive sampling to establish the 'baseline' in the CAWS, then for a fair comparison, eDNA would also need to drive sampling below the Dispersal Barrier, which seems highly unlikely at present given the foreseeable limitations in eDNA processing. Of course, if eDNA clearly indicates the need to select a new or additional

fixed site, one will certainly be considered. There is just no current plan to use netting and electrofishing to 'chase' eDNA results.

Objective 3: Identify, assess and react to vulnerabilities in the current system of barriers to exclude Asian carp from moving into the CAWS. Many measures have been undertaken or are being considered to prevent Asian carp from entering the CAWS and ultimately Lake Michigan. The USACE has been and continues to be the lead agency for most completed and proposed actions. The recently created ICWG under the RCC will undoubtedly become more active in this arena of ANS control. The MRRWG will provide necessary monitoring data and coordinate with partners to assist control efforts relative to the Electric Dispersal Barriers and other Asian carp exclusion measures. Some methods currently available to assess control measures include:

1) Telemetry. A carefully placed network of stationary receivers could be used to help determine if any fish are crossing the Dispersal Barrier or navigating their way around the barrier via other routes such as the Des Plaines River, the I&M Canal and other water body pathways.

2) Side-looking acoustics. Acoustic sonar placed at the Dispersal Barrier may be useful in determining whether any fish are able to pass through the Dispersal Barrier

3) DIDSON. DIDSON sonar could also be placed at the Dispersal Barrier to examine fish behavior and determine the degree to which different sizes of fish test the barrier.

4) Larval/small fish sampling. Given the existence of overland flow from the Des Plaines River into the CSSC above the dispersal barrier, and the potential for larvae and small fish to challenge the physical barrier currently being erected between the two mentioned waterways, it is important to determine if larval or small fish are indeed present. An initial task would be to determine the range of Asian carp in the Des Plaines River. If adult fish are present, it would be important to evaluate whether eggs/larvae will enter the CSSC from the Des Plaines River, and if so, whether they would drift or flow downstream past and below the Dispersal Barrier before becoming capable of swimming. eDNA would be useful in making the initial determination of adult fish presence in the Des Plaines River upstream of the barrier. If adult Asian carp are present in the Des Plaines River, then monitoring for larval/small fish could occur during the spawning and rearing seasons. Larval and small fish sampling should also be conducted in the CSSC during and following Des Plaines River overflow events, up and downstream of the overflow(s).

Objective 4: Establish parameters of acceptable risk that Asian carp will become established in the Great Lakes and determine our current risk level. Determining the level of tolerable risk that exists that Asian carp will invade the Great Lakes, as well as our current level of risk, is critical to determining appropriate responses to Asian carp in the CAWS. Current numbers of Asian carp in the CAWS (or Lake Michigan) could range from a handful of fish to many thousands. Responses could range from no removal actions to a very extensive rotenoning of the entire CAWS. Embedded in the question of risk are two other questions, both challenging to address: 1) how many Asian carp would it likely take to establish a reproducing

population in Lake Michigan and 2) how many fish are currently in the CAWS and Lake Michigan? The following actions are necessary to begin to address such questions. It should be noted that the actions identified below are not designed to provide direct answers to decision makers, but are intended to provide the most current information on both the risk of establishment and the current abundance of Asian carp, as well as the level of certainty associated with such information.

1) Risk of establishing. Experts must attempt to determine how many Asian carp it would take to establish a reproducing population in Lake Michigan. The determination of how many could be accomplished through a risk assessment process, modeling, or both. Probabilities of establishment could be generated for various numbers of fish reaching Lake Michigan.

2) Current numbers of Asian carp. To determine our current risk, we must understand the current abundance of Asian carp in the CAWS and Lake Michigan. A similar risk assessment process or modeling effort would need to be completed using sampling to date. Additional sampling schedule for the coming months could help to inform this process; however, sampling in the immediate future likely will not provide conclusive evidence as to the overall abundance of Asian carp in the CAWS. Additionally, the abundance of Asian carp currently in Lake Michigan would be an even more challenging metric to determine.

Objective 5: Remove and maintain Asian carp in the CAWS to a level below what is considered an acceptable risk. This objective is predicated upon sufficient progress in Objective 4: Establish parameters of acceptable risk and determine current risk level. Given sufficient progress, managers can take appropriate actions, if needed, to reduce the abundance of Asian carp in the CAWS to an acceptable level. Again, appropriate actions will be a matter for decision makers to determine, therefore the list below is neither exhaustive nor in any particular order of priority. The appropriate action will depend on information not currently known and will be a matter for decision makers to address once the needed information is available.

1) Rotenone. Rotenone is currently the best tool available for eradication of Asian carp. However, successful application of rotenone depends on knowledge of the location of Asian carp, appropriate water temperatures, as well as appropriate application methods. Physical, chemical, and hydrological conditions within CAWS would also be factors to be considered.

2) Accelerate Research to develop control using pheromones and other biological devices.

3) Commercial netting. One method of reducing the risk of carp entering the CAWS and Lake Michigan is to reduce the propagule pressure by lowering the population numbers downstream in the Upper Illinois River. Commercial harvest is one of the most effective tools to reduce Asian carp numbers in higher carp density areas in a cost effective manner. The plans for such a removal effort are being developed in the form of a controlled harvest program using commercial fishers to remove Asian carp during the winter (to reduce the potential for conflicts with anglers and boaters). Proposed removal locations are provided in the Detailed Protocol section below. The development of a marketing strategy for captured fish must go hand in hand with the removal.

4) Mechanical removal via netting and electrofishing sampling. While not as effective as rotenone, removal of fish would be a by-product of sampling efforts.

5) Develop an approach for evaluating effectiveness of response actions. This was identified as a need in the Charter for the MRRWG.

Objective 6: Determine the leading edge of major Asian carp populations and reproduction in those populations. In order to effectively assess the risks of Asian carp passing the Dispersal Barrier, to develop Rapid Response actions, as well as to implement downstream population/propagule control measures, it is critical to gather information on carp densities in the area downstream of the barrier. For example, presence of fish between the Barrier and the Lockport Lock would necessitate the use rotenone to remove Asian carp when barriers are shut down for maintenance. In addition, reducing the number of Asian carp downstream of Lockport Lock by commercial harvest will reduce the number of fish attempting to bypass that barrier. Fewer fish testing the system should lead to fewer fish bypassing the system and reaching Lake Michigan. It is also important to know where reproduction is occurring because the greatest overall reduction in numbers of Asian carp can most effectively be accomplished by removing individuals that are contributing to reproduction. Actions for accomplishing Objective 6 overlap with other objectives and are prioritized as follows:

1) Commercial Fishing and electrofishing. These tools can be used effectively to capture fish in areas where Asian carp abundance is high. Sites downstream of the Dispersal Barrier will be sampled monthly using a combination of DC electrofishing and commercial fishing (Fig. 3). Specific fishing protocols for each technique are the same as described above. Rational for locating downstream fixed sites is similar to that used to address areas above the Dispersal Barrier and focuses on areas just downstream of the major migration barriers: Dispersal Barrier, Lockport Lock, Brandon Road Lock, and Dresden Island Lock. Although electrofishing efforts will be concentrated in the 2 mile area below each barrier, placement of commercial nets could extend further downstream in order to cover areas more conducive to netting. Specific locations and effort are provided in the Detailed Protocol section below.

2) Larval/Small Fish Sampling. Small fish sampling will occur through the electrofishing efforts above, although such efforts may not necessarily target locations most likely to hold young Asian carp. A sampling strategy to capture larval fish and perhaps eggs still needs to be developed. [**Note:** This action requires additional development.]

3) Side Scan Sonar. It appears that there is potential to distinguish Asian carp from other fish that are detected by side scan sonar. Studies need to be completed to determine the degree to which accurate determinations can be made between Asian carp and other fish of similar size that could be present in the CAWS. Until such time, this technique is considered experimental. If studies prove the technique effective at identifying Asian carp with a high degree of accuracy AND with a high detection rate in low abundance situations, it would likely become one of our higher priority methods of determining the leading edge of the major Asian carp populations.

4) Environmental DNA. Researchers are currently working to develop methodologies that could relate eDNA collections to abundance. If successful, this could then be used to estimate

abundance and would also likely become one of our highest priority methods of determining the leading edge of the major Asian carp population.

5) Rotenone. While this tool would be a good indicator of abundance, it was considered an overly aggressive tool in itself for accomplishing Objective 6. However, any rotenone action taken to accomplish other objectives may yield information relevant to the location of the leading edge of major Asian carp populations.

Appendix A. Individuals and their associated roles and affiliations participating in the Monitoring and Rapid Response Group

Co Chairs

John Rogner, Assistant Director, Illinois Department of Natural Resources

John Dettmers, Senior Fishery Biologist, Great Lakes Fishery Commission

Independent Technical Experts

Becky Cudmore, Department of Fisheries and Oceans, Canada
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Jim Mick, ILDNR
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Rob Sulski, ILEPA
Sam Finney, USFWS
Rob Simmonds, USFWS
Mike Weimer, USFWS
Aaron Woldt, USFWS

Appendix B. Detailed Protocol for Netting and Electrofishing

Fixed Sites Upstream of the Dispersal Barrier.

Fixed sites will be sampled weekly. As previously stated, these sites were selected based on a combination of information including locations where bighead or silver carp eDNA have been collected (Sites 1, 3, and 5), where past sampling has indicated relatively high quality fish assemblages (Site 5), where Asian carp might potentially congregate either below barriers or in off channel areas (Sites 2-5). Fixed site will employ all available techniques including electrofishing, netting and e-DNA as described below. Electrofishing protocols generally follow those outlined by LTRMP

Electrofishing. All electrofishing will use DC current and include 1-2 netters. At each site there we there will be 3-15 minute electrofishing runs per mile of waterways. Exact sampling areas within the sites will be left to the discretion of the field crews, however, in trial runs this level of effort covers a high percentage of the area. Electrofishing will be completed in a downstream direction (in the direction of flow), generally parallel to shore (including following shoreline into off channel areas), with the operator on and off the pedal to decrease likelihood of pushing Asian carp along with our electrical field. Stunned fish will be examined closely and netted if any resemblance to Asian carp is discerned. Any Asian carp that are observed but not netted will be recorded. It is very likely that we will observe many more Asian carp than we net because of the difficulty in electrofishing for Asian carp. It is critical that these fish be counted as part of our CPUE and that this also is done in downstream areas where the relationship between CPUE and abundance is being established. This will greatly increase the number of "captures," leading to a more accurate relationship between CPUE and abundance.

Fish capture/observation information will be recorded for all Asian carp. Otherwise, notes/comments will be made only for other noteworthy occurrences (e.g., no fish observed in a run) or noteworthy species observed (e.g., rare or uncommon species). The exception will be in Indiana portions of the Grand Calumet and Little Calumet rivers where general species observation information will be recorded to obtain some level of baseline information to inform permit reviewers in the event that a rotenone application is needed.

Commercial netting. Details of the commercial netting efforts are provided in the attached figures. Length of net employed will be generally related to the length of the Fixed sampling sites and will range from 400 to 2000 yards. Location of the net sets will be left largely to the discretion of the commercial fishermen, relying on their experience. Some guidance will provided and an attempt will be made to use a limited number of qualified fishermen to establish consistent effort.

Upstream Fixed Site Descriptions and Effort (see Figs. 4-8 in Appendix C).

1. Fixed Site 1. Lake Calumet – sampling area limited to shallower area north of the Connecting Channel (this avoids deep draft areas with steep walls but includes channel drop off areas that exist north of the Connecting Channel).
    a. 6 - 15 minute electrofishing runs total
    b. 2000 yards of commercial nets
    c. 14 eDNA samples (~monthly until sample processing capacity is increased)
2. Fixed Site 2. RM 319 on the Calumet - Sag Channel to O'Brien Lock on the Calumet River (includes Grand Calumet River and South Leg of the Little Calumet River as far upstream as electrofishing boats can navigate). Covers ~7.5 river miles.
    a. 3 - 15 minute electrofishing runs per mile
    b. 2000 yards of commercial nets
    c. 60 eDNA samples (~monthly until sample processing capacity is increased)
3. Fixed Site 3. CSSC from Western Ave to South Branch of Chicago River at Jackson Blvd. Covers ~4.5 miles (~RM 320.5 – 325).
    a. 3 - 15 minute electrofishing runs per mile
    b. 1000 yards of commercial nets
    c. 60 eDNA samples (~monthly until sample processing capacity is increased)
4. Fixed Site 4. West River Park Dam Area - West Montrose Ave. on North Branch Chicago River to West Peterson Ave. on North Shore Channel. Covers ~2 river miles.
    a. 3 - 15 minute electrofishing runs per mile
    b. 400 yards of commercial nets
    c. 60 eDNA samples (~monthly until sample processing capacity is increased)
5. Fixed Site 5. North Shore Channel from Golf Rd. to Wilmette Pumping Station. Covers ~2 river miles.
    a. 3 - 15 minute electrofishing runs per mile
    b. 400 yards of commercial nets
    c. 60 eDNA samples (~monthly until sample processing capacity is increased)

Sampling Reaches Upstream of Dispersal Barrier. Reaches will be sampled on a weekly rotation such that each reach is sampled once every 4 weeks (Fig. 2). Crews will complete 3, 15 minute electrofishing runs per mile. Selection of sites will be at the discretion of the sampling crew. Electrofishing technique is the same as for fixed sites. No commercial netting will be completed. Mile markers will need to be collected to allow for use of a GPS to facilitate sampling.

Upstream Sampling Reach Descriptions.

1. Reach 1. CSSC from Dispersal Barrier (~RM 296) to RM 316 (near Stickney Water Reclamation Plant).
2. Reach 2. CSSC and Calumet – Sag Channel junction to Calumet Harbor (~RM 303.5-333).
3. Reach 3. RM 316 on CSSC to Chicago Lock
4. Reach 4. ~RM 326.5 on North Branch Chicago River to Wilmette Pumping Station.

Fixed Sites Downstream of the Dispersal Barrier. Sites downstream of the Dispersal Barrier will be sampled monthly using a combination of DC electrofishing and commercial fishing (Fig. 3). Specific fishing protocols for each technique are the same as described above. Rational for

locating downstream fixed sties was similar to that used for above the Dispersal Barrier, focusing on the areas downstream of the major migration barriers: Dispersal Barrier, Lockport Lock, Brandon Road Lock, and Dresden Island Lock. Although electrofishing efforts will be concentrated in the 2 mile area below each barrier, placement of commercial nets could extend further downstream in order to find favorable areas to apply this technique.

Downstream Fixed Site Descriptions and Effort (see Figs. 9-12 in Appendix C).

1. Fixed Site A. The 2 miles of river below Dresden Island Lock.
    a. 3 – 15 minute electrofishing runs per mile
    b. 400 yards of commercial net
2. Fixed Site B. The 2 miles of river below Brandon Road Lock.
    a. 3 – 15 minute electrofishing runs per mile
    b. 400 yards of commercial net
3. Fixed Site C. The 2 miles of river below Lockport Lock.
    a. 3 – 15 minute electrofishing runs per mile
    b. 400 yards of commercial net
4. Fixed Site D. The 2 miles of river below the Dispersal Barrier.
    a. 3 – 15 minute electrofishing runs per mile
    b. 400 yards of commercial net
    c. 60 eDNA samples

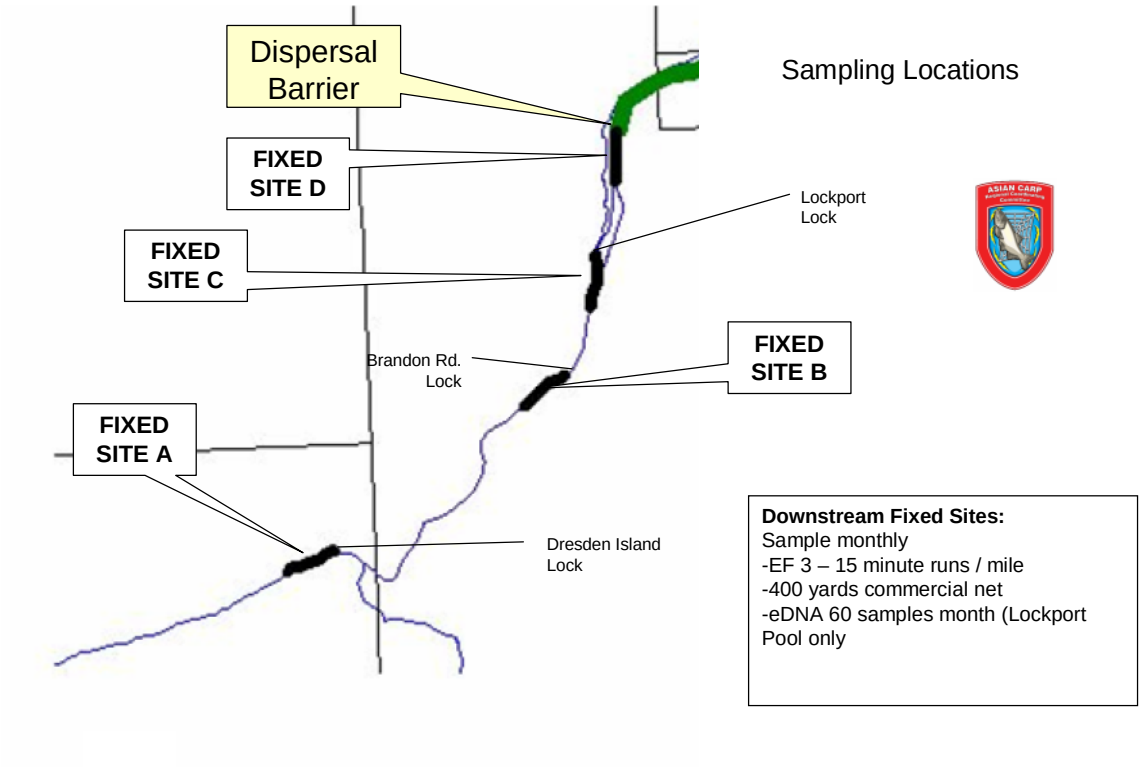


Figure 3. Netting and electrofishing sampling locations for Asian carp downstream of the Dispersal Barrier.

Population Control-Reduction Areas Downstream of the Dispersal Barrier. Details of this removal effort are being developed, but the following locations have been proposed for a controlled harvest program using commercial fishers to remove Asian carp (harvest would occur during the winter to reduce the potential for conflicts with anglers and boaters). [**Note:** Further development of this action is needed.]

1. Starved Rock L&D RM 231 to Marseilles L&D RM 245 (14 miles)
    a. Starved Rock Pool
    b. Shehan Island Complex
    c. Mayo Island
    d. Hitt Island
    e. Four Star Marina
    f. Ottawa Boat Club
    g. Bulls Island
2. Marseilles L&D RM 245 to Sugar Island RM 260 (15 miles)
    a. Ballard Island
    b. Bays near Seneca
    c. Barry Is., Moody Bayou, Grist Is.
3. Sugar Island RM 260 to Dresden L&D RM 271.5 (11.5 miles)
    a. Gravel and Strip Mine lakes between Sugar Is. and Rt 47
    b. Not much between Rt 47 and Dresden L&D
4. Dresden L&D RM 271.5 and I-55 Bridge RM 278 (6 miles)
    a. a lot of wide areas in the river
5. I-55 Bridge RM 278 to Brandon L&D (7 miles)
    a. Mobil Oil Corp Bay
    b. Treats Island - good depth
    c. wide areas in river
    d. side channels
    e. Brandon L&D Bay - too shallow

Other Considerations/Requirements:

1. **Sampling notification.** To avoid friction with facilities required to maintain high levels of waterside security, USCG requests advance notification of the exact location of fishing ops, name/registration number and description of vessel(s), and names of crew. USCG will provide this information to facility security officers. It will of course also be critical to have lines of communication primed and ready in the event that sampling activities (e.g., rotenone) would require any sort of closure to navigation or interfere recreational with recreational use of the waterways. Since small craft recreational users generally are not in direct, frequent communication with the Coast Guard, it may be necessary to develop website and ListServe group messaging communication programs to more effectively reach the public. The stationing of personnel at public access points may also be necessary for certain monitoring and rapid response activities.
2. **South Leg Little Calumet River (upstream of Cal Sag confluence).** There are about 50 miles of the South Leg of the Little Calumet River that are not likely to be accessible

by electrofishing boat, but that form a connection between the CAWS and Lake Michigan through an inlet at the Midwest Steel Plant in Portage, IN. Reconnaissance and a unique sampling strategy are required to determine how best to implement all appropriate sampling techniques. For ease in collecting, fixed sites could be set up where access to the river from the bank is relatively easy. Currently, Indiana DNR staff members are investigating possible boat access locations for both the Little Calumet River and the Grand Calumet River. It would be ideal to link eDNA sample locations with areas where electrofishing gear can be launched. Indiana DNR is preparing for sampling with netting or electrofishing in areas where eDNA is located.

3. **Collection of data on fish monitored or salvaged in the CAWS.** Monitoring and rapid response activities will be accompanied by the documentation of species and numbers of each species, in as much detail as feasible, of fish that are live-salvaged or are collected through depletion monitoring (i.e. rotenone) methods or other rapid response actions. Illinois DNR, Illinois EPA, ACOE and USEPA Region 5 Water Division will assist the workgroup in planning, coordinating and accomplishing such fish data collection activities
4. **Disposition of any bighead or silver carp collected.** Upon capture, place the fish in a secure location on the boat (preferably in a garbage bag to protect). Contact John Rogner (Illinois DNR), Charlie Wooley (USFWS), and Colonel Quarles (USACE) directly. Photograph, measure, and weigh the fish. Also, record specific information on the location of the capture (any habitat info, depth, flow, etc.) and the circumstances of the capture. State DNR will send a Conservation Police Officer to the site to transport the fish to a secure location. Arrangements can be made for any needed data collection from the fish. Fish should be securely stored on wet ice until it is picked up. Sampling should continue as scheduled.
5. **Need for modified structure operations to accomplish monitoring and rapid response activities**

   Consensus from the group was that there was not an immediate need to modify structural operations to accomplish monitoring and rapid response objectives.

Appendix C. Figures 4-12. Detailed maps of sampling locations for Asian carp above and below the Dispersal Barrier.

PICTURES REMOVED FROM THIS DRAFT FOR SIZE REASONS. CONTACT sam_finney@fws.gov for maps if necessary.

REFERENCES

U. S. Environmental Protection Agency. 2010. Audit Report, Lodge Laboratory, Center for Aquatic Diversity, University of Notre Dame.

Attachment 3

May 2010

ASIAN CARP
Control Strategy Framework

United States Coast Guard
U.S. Department of Homeland Security

ASIAN CARP
CONTROL STRATEGY FRAMEWORK

May 5, 2010

CONTENTS

EXHIBITS

APPENDICES

EXECUTIVE SUMMARY

The Great Lakes food web has been significantly degraded in recent decades by aquatic invasive species (AIS). The migration of Asian carp through the Illinois River, Des Plaines River, and Chicago Area Waterway System (CAWS) is the most acute AIS threat facing the Great Lakes today.

Federal, state, and local agencies, working together as the Asian Carp Regional Coordinating Committee (RCC), are responding to this threat to prevent Asian carp from establishing populations in the Great Lakes. The main objectives of this Framework are to:

- Outline the urgent actions agencies are taking.
- Integrate and unify the future actions of responding agencies.
- Transition from a single point of defense at the electric barriers to a multi-tiered approach.
- Provide general direction while recognizing that agencies require flexibility to best respond.
- Recognize potential hurdles that might complicate Framework implementation.
- Suggest an approach for stakeholders and other agencies to actively collaborate in future efforts.

The Framework is designed to be updated periodically as needed to reflect an ever-increasing body of knowledge gathered from ongoing research and monitoring. This version differs from the first draft released in February 2010 in that it contains new actions either now underway or whose efficacy will be assessed in 2010. It also includes updated milestones based on activities conducted to date, and a Responsiveness Summary addressing public comments received over the last several months.

Since the release of the draft Framework in early February, responding agencies have used conventional and commercial fishing techniques, including gill and trammel netting and electro shocking, to physically confirm the presence of Asian carp upstream of the electric barrier. To date, no Asian carp have been found. In addition, eDNA (environmental deoxyribonucleic acid) sampling has continued. Out of 221 samples collected and processed in 2010, two have tested positive. Taken together, the fishing and sampling results further the belief that there are not enough Asian carp upstream of the barrier to create self-sustaining populations. Agencies continue to plan and execute intense operations to locate and better characterize any and all populations of Asian carp. In addition, work has progressed on additional physical and electrical barriers, enhanced eDNA sampling, downstream fish suppression, research efforts including biological and technological controls, and modified structural operations.

The best science available underscores this Framework. Widespread agreement exists among scientists and stakeholders that minimizing the escape of Asian carp into Lake Michigan is critical to reducing the probability of Asian carp establishment in the Great Lakes.

This document describes actions, including actions now occurring, actions that are scheduled to occur, and potential actions that agencies could collaborate upon. This Framework is designed to be inclusive, allowing additional government agencies and outside stakeholders to engage in developing and implementing all potential control actions.

While several of the actions will be conducted by a single agency or governmental unit, most require cooperation among two or more agencies. The proposed action items are grouped into two categories: (1) Short-term Actions and (2) Long-term Actions. Environmental considerations, including minimizing impacts on resident aquatic life, will be integrated into the decision-making process and appropriate environmental review will occur as necessary for all proposed actions.

Put briefly, the federal, state, and local action strategy to address the clear threat Asian carp pose to the Great Lakes will be to move quickly on proven solutions, and to consider, develop, and test potential solutions — employing those that are most sound.

Short-term Actions

There is an urgent need to identify and reduce the Asian carp populations and pathways threatening Lake Michigan so that they cannot establish a self-sustaining population in the Great Lakes. To address this need, the following actions are either underway or are expected to commence by May 15, 2010:

1. Operations to confirm and reduce Asian carp populations upstream of the electric barriers:
    - Intense monitoring, fishing, and netting based on eDNA sampling results in priority zones (currently Cal-Sag Channel, O'Brien Lock and Dam, Wilmette pumping station, Calumet Harbor, Grand Calumet River, and Little Calumet River).
    - Rapid response preparations and operations including equipment procurement, training and exercises, and establishment of stand-by capability for rapid deployment.
    - Rotenone (fish toxicant) procurement and use where monitoring suggests Asian carp are present, if necessary.
2. eDNA capacity and indicator refinement:
    - Increase capacity for processing from 60 samples to 120 samples per week so that eDNA results are able to guide more intensive efforts.
3. Contract for the construction of emergency engineering measures to block passage of water and fish between (1) Des Plaines River and CSSC and (2) Illinois and Michigan (I&M) Canal and CSSC.
4. Barrier operations:
    - Begin construction of the additional planned electric barrier (Barrier IIB), and sustain operations of the current electric barriers.

Long-term Actions

Long-term actions encompass actions that address the root causes of the Asian carp threat or require further study. Actions are briefly outlined below, and listed more comprehensively later in this document.

1. Structural:
    - Efficacy studies to investigate construction and implementation of additional flood control measures for the Des Plaines River.
    - Efficacy study to evaluate the implementation of fish deterrent systems incorporating bubble, strobe, and acoustic technologies.
2. Chemical:
    - Additional possible rotenone applications where testing suggests Asian carp presence, as necessary.
3. Biological:
    - Suppression of Asian carp populations in CAWS and in downstream areas utilizing a variety of methods, including conventional fishing and recruitment overfishing.
    - Expedite research on targeted control, including Asian carp specific toxicants, pheromone attractants, disruption of spawning behavior, and sonic disruption to stun or eradicate Asian carp.
    - Re-stocking of indigenous aquatic species after rotenone applications or other reduction strategies.
4. Operational:
    - Sustained operations and parameter refinements of electric barriers.

5. Modified structural operations:
    - Consider changing the manner in which existing CAWS structures, such as locks and dams, sluice gates, and pumping stations are operated in combination with other management actions, to impede migration of Asian carp into the Great Lakes. Also consider whether modification of lock operations would be needed to support certain fish suppression activities. Such actions would likely be executed incrementally as capabilities become available and are needed.
6. Inter-basin Transfer Study and Ecological Separation:
    - The Great Lakes and Mississippi River Inter-basin Study is the long-term United States Army Corps of Engineers (USACE) effort, in collaboration with federal, state, regional, and local agencies and with input from non-governmental organizations (NGO), to explore all options and technologies that could be applied to reduce the risk of AIS transfer between the Great Lakes and Mississippi River basins. The study will provide a thorough identification of potential hydraulic connections between the two basins, exploration of potential invasive species, and comprehensive analysis of AIS control technologies, including but not limited to physical or ecological separation. Initial phases of the study will focus on the CAWS. USACE has expedited the anticipated completion of the CAWS portion of this study to 2012.
7. Other:
    - Integration of the Great Lake states, provincial, and Tribal capabilities and expertise into the proposed Framework actions.

Funding sources, detailed later in this document, have been secured for these proposed actions, underscoring the seriousness of the inter-agency response to the threat of Asian carp movement towards the Great Lakes. This collection of action items represents the collaborative efforts of participating agencies to prevent establishment of Asian carp in Lake Michigan.

In addition to the above actions, the U.S. Fish and Wildlife Service's (USFWS) Midwest Region is currently coordinating implementation of the nationwide *Management and Control Plan for Bighead, Black, Grass, and Silver Carps in the United States* (Plan), which was approved by the Aquatic Nuisance Species (ANS) Task Force in 2007. The four species addressed by the Plan present a serious threat to North American ecosystems, including the Great Lakes, if self-sustaining populations become established elsewhere. A subset of the 133 priority management actions within the Plan specifically addresses the challenge of protecting the Great Lakes basin from establishment and impacts of Asian carp. This document is available online at http://www.asiancarp.org/Documents/Carps Management Plan.pdf.

This Framework recognizes potential hurdles to accomplishing many of the actions. Nevertheless, this Framework establishes a baseline condition for collaboration among agencies and the interested communities through which a compelling plan of action can be initiated. While preventing establishment of a self-sustaining Asian carp population requires an understanding of ecological, economic, and hydrological complexities, one conclusion is clear: a comprehensive approach is needed to reduce the risk of Asian carp invasion, without relying on any one strategy.

Asian carp are the most recent, but certainly not the last aggressive invasive species to threaten both the Great Lakes and Mississippi River Basins through the Chicago Sanitary and Ship Canal. While agencies are focused on this immediate threat, it is clear a more robust long term solution is needed.

1.0 INTRODUCTION

The Great Lakes food web has been significantly degraded in recent decades because of aquatic invasive species (AIS). The migration of three species of carp not native to the United States (bighead, black, and silver), also known as Asian carp, into and through the Illinois and Des Plaines Rivers and the Chicago Area Waterway System (CAWS), is the most recent and most acute AIS threat facing the Great Lakes today.

The Asian Carp Control Strategy Framework (Framework) has been prepared by the Regional Coordinating Committee's (RCC) participating agencies to outline the actions that will be implemented to control Asian carp migration.

This section briefly presents the problem of the Asian carp migration toward the Great Lakes ecosystem, reviews the purposes of the Framework, identifies the agencies and stakeholders that play a role in the Framework, and presents additional work proceeding outside of this Framework. Section 2.0 introduces the unified actions for prevention Asian carp migration and the Control Strategy Matrix (Matrix) (Appendix A), which presents a list of the proposed actions and gives brief narrative summaries of the actions and action items. The actions are divided into two categories: (1) Short-term Actions and (2) Long-term Actions. Section 3.0 discusses the Great Lakes states' involvement in protecting the Great Lakes against Asian carp. Section 4.0 describes the communications and outreach actions likely to supplement the Framework by involving the public and additional stakeholders outside the immediate circle of participating agencies. The coordination structure of the Framework Work Group is presented in Section 5.0.

1.1 PURPOSE

The Framework is a dynamic document, reflecting an ever-increasing body of knowledge gathered from ongoing research and monitoring, and builds on the December 2009 deployment of federal, state, local, and Canadian resources to conduct an eradication effort in the Chicago Sanitary and Ship Canal (CSSC). Many actions described in this Framework, such as research and feasibility studies, are expected to provide additional data that may be included in future Framework updates. However, the main objectives of this initial Framework are:

- Outline the urgent actions participating agencies are taking to apply full authorities, capabilities, and resources in order to prevent establishment of Asian carp in the Great Lakes. While scientific opinion is not unanimous that Asian carp would devastate the ecology of the Great Lakes, the participating agencies agree that we cannot wait until the outcome can be predicted with absolute certainty. We must act preemptively with comprehensive measures to prevent establishment of carp in the Great Lakes or their tributaries. Experience has shown that controlling populations of AIS, once established in a new environment, is far more expensive and difficult than preventing their entry to the Great Lakes in the first place.
- Integrate and unify the future actions of participating agencies. While agencies have coordinated significantly in the past, this Framework is a comprehensive, integrated approach to address the Asian carp threat to the Great Lakes, and helps to further unify the participating agencies by:
  - Describing actions to prevent establishment of carp.
  - Identifying lead agencies.
  - Establishing funding for actions.
  - Determining the most effective approach for implementing actions.
- Transition from a single-point defense to a multi-tiered approach. Electric barriers remain the most important defense mechanism against Asian carp expansion through the CAWS. However, success in preventing

Asian carp from establishing a self-sustaining population in the Great Lakes depends on the ability to build upon this technology, located at a specific geographic point, to a multi-tiered defense encompassing structural solutions, biological controls, eradication response options, and other approaches.

- Provide direction while recognizing that the history of Asian carp migration demands flexibility by participating agencies. This Framework allows participating agencies to adjust plans to better serve the goal of preventing carp migration to the Great Lakes. This is meant to be a living document subject to change as the situation dictates.
- Identify technical and regulatory hurdles that might complicate Framework implementation. This analysis will also improve future efforts to prevent AIS from migrating through other artificially connecting waterways of the Great Lakes watershed. In addition, several artificially-connecting waterways throughout the Great Lakes basin may include conduits through which AIS may threaten the Great Lakes and Exhibit 1 below highlights these connections and Exhibit 2 shows the annual Great Lakes diversions. Indeed, another purpose of this Framework is to provide what could be analogous measures for controlling potential AIS at these locations.
- Identify opportunities for existing stakeholder agencies to actively engage additional stakeholders' cooperation. The Great Lakes region has a proud and vibrant history of cooperation, as evidenced by the *Great Lakes Regional Collaboration Strategy*, *Great Lakes Restoration Initiative Action Plan*, and the multi-jurisdictional contributions to the December 2009 effort to prevent Asian carp from penetrating the United States Army Corps of Engineers (USACE) electric barriers. Cooperation is crucial to keep Asian carp out of the Great Lakes. Aggressive outreach at key milestones in this Framework's development process will result in (1) innovative and effective ideas, (2) more solid stakeholder commitments, and (3) a better chance at lowering the risk of invasion.

Additionally, the intent of this Framework and the actions presented herein is to facilitate cooperation by other agencies, not yet participating, to achieve the common goal of preventing establishment of Asian carp in the Great Lakes.

Exhibit 1. Artificial Connections to the Great Lakes

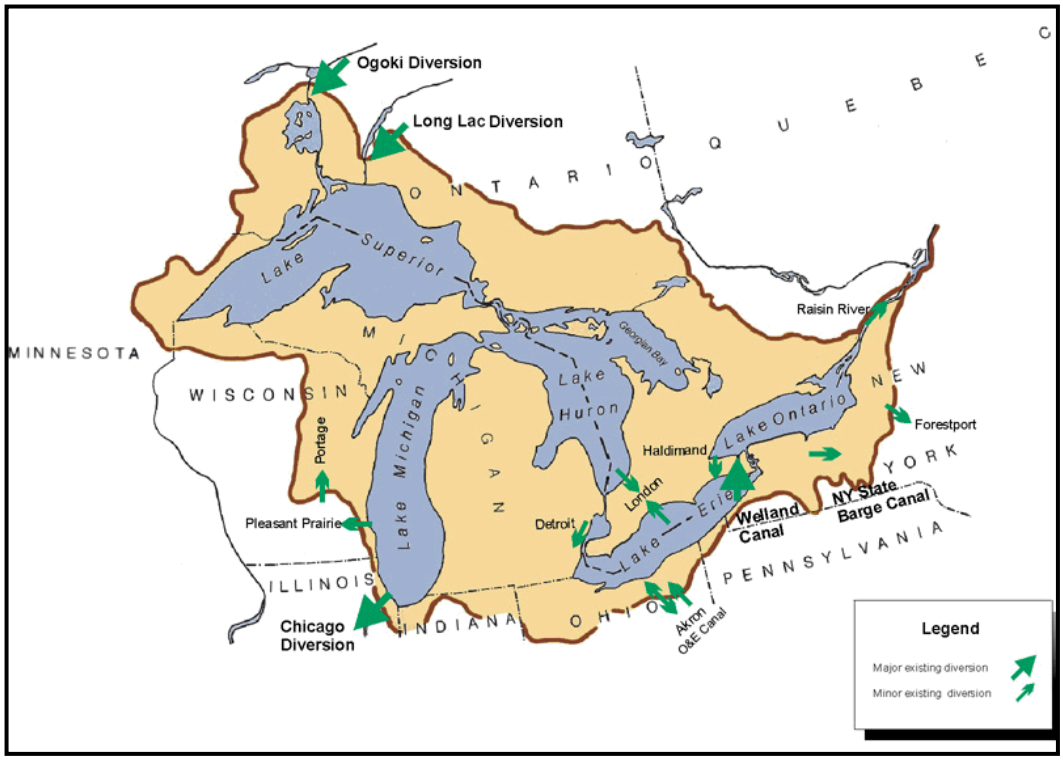


Exhibit 2. Annual Flow through Existing Great Lakes Diversions

Existing Diversions in the Great Lakes Basin	Operational Date (original project)	Average Annual Flow (cms)	Average Annual Flow (cfs)
1. Interbasin			
Long Lake (into Lake Superior basin)	1939	45	1,590
Ogoki (into Lake Superior basin)	1943	113	3,990
Chicago (out of Lake Michigan basin)	(1848)1900	91	3,200
Forestport (out of Lake Ontario basin)	1825	1.4	50
Portage Canal (into Lake Michigan basin)	1860	1	40
Ohio & Erie Canal (into Lake Erie basin)	1847	0.3	12
Pleasant Prairie (out of Lake Michigan basin)	1990	0.1	5
Akron (out of and into Lake Erie basin)	1998	0.01	0.5
2. Intrabasin			
Welland Canal	(1829)1932	260	9,200
NY State Barge Canal (Erie Canal)	(1825)1918	20	700
Detroit	1975	4	145
London	1967	3	110
Raisin River	1968	0.7	25
Haldimand	1997	0.1	2

1.2 PROBLEM STATEMENT

The potential invasion of Asian carp into the CAWS and the Great Lakes poses numerous ecological and economic impacts that have been extensively studied.

Background

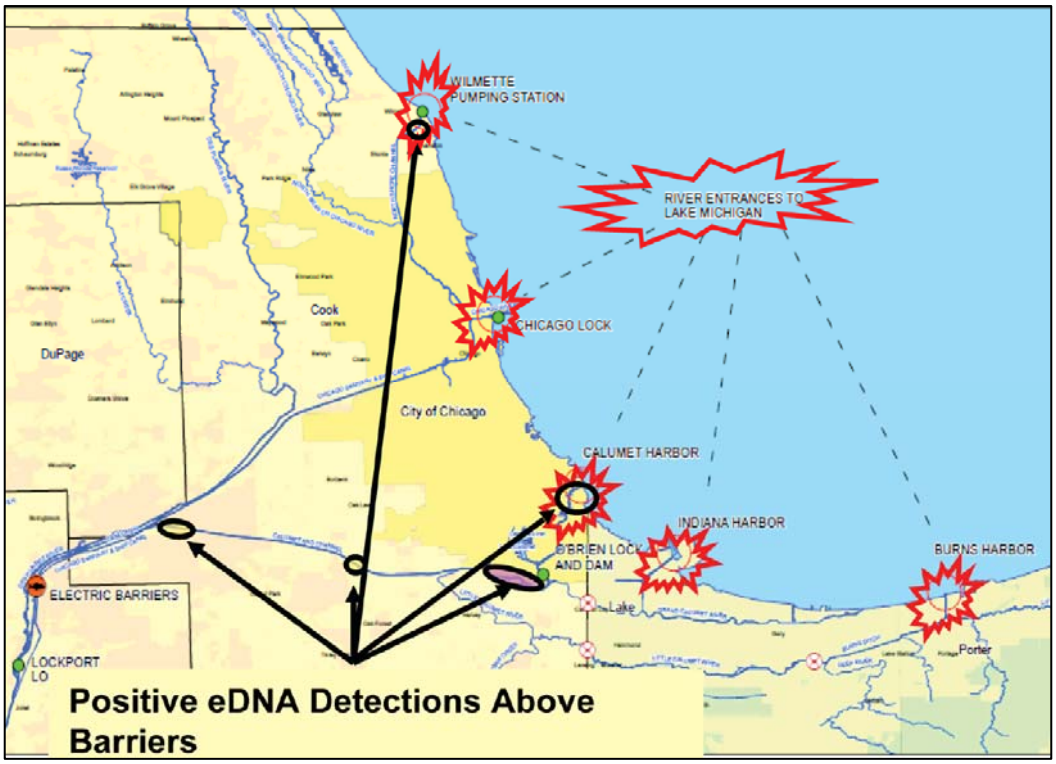
The introduction of AIS into the Great Lakes and inland waterways throughout the United States is occurring at an alarming rate. Since the beginning of the 19th century, more than 180 species of AIS have made their way into the Great Lakes region. These fish, invertebrates, viruses, bacteria, and parasites can devastate native populations, as well as cause great economic damage to the Great Lakes commercial, sport, and tribal fisheries. Of critical concern currently are Asian carp, a term used to describe a group of exotic fish originating in eastern Asia, that are expanding their range north through the Mississippi River basin towards the Great Lakes. Historically, successful control of AIS has resulted from focusing on small water bodies or critical control points in a system. The CSSC, which links the Great Lakes with the Mississippi River basin, is one such critical control point.

Historically, poor water quality in Chicago's urban waterways had controlled the transfer of invasive species between the Great Lakes and Mississippi River watersheds. Over the last three decades, newly created legislation and regulations aimed at improving water quality, combined with government projects focused on habitat restoration, have considerably improved water quality, resulting in an increased abundance of aquatic life in Chicago's waterways.[1] The artificially connecting waterways in Chicago now form pathways for AIS to expand their distribution between the Great Lakes and the Mississippi River System.

In North America, Asian carp usually refers to bighead, silver, black and grass carp. They all are members of the family *Cyprinidae*. The three species identified for action under this plan for rapid response are the silver carp, bighead carp, and black carp. These fish were originally imported, along with grass carp, to southern United States aquaculture and wastewater treatment facilities to keep retention ponds clean and to serve the food fish industry. There are many potential ways by which Asian carp may have escaped, including inadvertent releases, overland flooding events, or intentional releases. During 2002 monitoring efforts, Asian carp were detected in the upper Illinois River just 60 miles from Lake Michigan,[2] and in 2009, a bighead carp was retrieved considerably closer, within the

Lockport Pool of the CSSC, 43 miles from Lake Michigan. Exhibit 3 below highlights the area of focus, the electric barriers in relationship to Lake Michigan, specific entry points into Lake Michigan, and recent locations where Asian carp eDNA (environmental deoxyribonucleic acid) was present in the water.

Exhibit 3. Area Map, Electric Barrier Location, Waterway Entry Points into Lake Michigan, and Asian Carp Positive eDNA Locations



Bighead carp can grow to very large sizes of over 5 feet in length and 100 pounds or more. These filter-feeding fishes have "gill rakers," which are specially adapted for filter feeding plankton, one of the bases of the food chain, and are capable of consuming up to 20 percent of their own body weight in food each day. In the wild, their eating habits allow them to quickly out-compete both small and large native fish such as the gizzard shad and bigmouth buffalo fish. Sexual maturity is reached between 2-7 years, depending on the climate of the region.[3] Upon reaching sexual maturity, they begin spawning anytime between April and September, and can spawn multiple times during each season for the remainder of their lives. These fish live up to 20 years.

Silver carp are generally smaller than bighead carp. These highly prolific fish are similar to bighead carp in their feeding and spawning habits. Silver carp are often referred to as "flying fish" and pose a danger to boaters, anglers, and other recreational users—of great concern on the Great Lakes. These fish are disturbed by boat motors and will jump from the water when startled. A motor boat traveling at high speeds causes these fish to jump from the water, potentially causing damage to boats and serious injuries to humans onboard.

Black carp differ from bighead and silver carp in both diet and appearance. They have large distinctive scales that are darker in color than those of the grass carp. Their pharyngeal teeth are large, resemble human molars, and are specially adapted for crushing mollusk shells. The largest black carp on record in its native China is more than 7 feet long and weighed 150 pounds. Black carp were originally introduced in the United States accidentally in shipments of

grass carp. The diet of the black carp, though different from the bighead and silver carp, makes them an equally deadly threat to the waters of the Great Lakes. Black carp consume mollusks and snails; adults can consume an average of 3 to 4 pounds of mussels per day. A single black carp could eat more than 10 tons of mollusks during its life. Black carp could aid in the reduction of invasive zebra and quagga mussel populations throughout the Great Lakes; however, native mussel populations (some of which are already known to be threatened or endangered) would also be negatively impacted. The United States Geological Survey (USGS) has two documented reports of black carp in Illinois. The first specimen was caught in Horseshoe Lake, the second along the Mississippi River at Lock and Dam 24 in Calhoun County in 2004. Though not as widely distributed as the silver and bighead species, black carp remain a threat because juveniles are not readily distinguished from grass carp, which are sold and distributed throughout the United States and may be released into open waters.[4]

Ecological and Economic Impacts to the Great Lakes

The Great Lakes cover more than 94,000 square miles and, while estimates may vary, host an invaluable sport fishing industry. Following introduction of Asian carp into the Great Lakes basin, controlling their spread throughout these areas would be nearly impossible. Establishment of Asian carp in the Great Lakes could have lasting and potentially negative effects. Under conditions in the Great Lakes (especially their tributaries and estuaries), such as water temperature, food abundance, slow moving wetland regions, expansive area for migration, and lack of natural predators, Asian carp populations could expand quickly. These species could significantly impact local ecosystems.

The Great Lakes are home to many important species of food and sport fish such as whitefish, bloater chubs, yellow perch, and rainbow smelt, as well as sport fish including trout, salmon, and walleye. The potential impact of Asian carp on the Great Lakes' sport and commercial fishing industry can be seen now along the Mississippi River basin where in just a few short years following introduction of Asian carp into an area, many commercial fishing locations have been abandoned, as native fish have been largely replaced by Asian carp. The presence of Asian carp is a concern because they are prolific, grow and mature quickly, and feed on plant and animal plankton. They may alter energy flow in the Great Lakes, which in turn could lead to undesirable consequences for sport and commercial fisheries. A 2002 workshop convened by the Great Lakes Protection Fund, as well as the 2003 Aquatic Invasive Species Summit convened by the City of Chicago and the United States Fish and Wildlife Service (USFWS), determined that introduction of Asian carp into the Great Lakes ecosystem would threaten the sport and commercial fisheries, and could result in ecological and economic damages exceeding those caused by the sea lamprey and zebra mussel invasion.[5]

The Great Lakes are home to nearly 80 federally-listed threatened or endangered fish, mollusks, plants, mammals, insects, and reptiles, and many more species listed as threatened or endangered at the state level. The current invaders of the Great Lakes have been implicated in adverse effects on up to 46 percent of the local federally-listed endangered plant and animal species. Introduction of Asian carp to the region could further harm these organisms and perhaps lead to their extirpation. One such fish of concern is the lake sturgeon, which is protected by the State of Michigan because its remaining populations are less than 1 percent of the original population due to overfishing and habitat loss. These fish often age to nearly 25 years for females and 12 years for males before reaching sexual maturity, and are bottom feeders with a diet including snails, mussels, and crustaceans.[6] They would be especially vulnerable to the introduction of black carp, with which they would directly compete for food. Because Asian carp populations reach self-sustaining levels at or near the confluence of the Lake Michigan tributaries and canals in the Chicago vicinity; it is highly likely that range expansion within the lake's watershed would occur over time as a result of density-dependant dispersal. As higher concentrations of fish are realized within an established area, fish will move to new areas seeking suitable habitat and resources. Through this natural dispersal process, populations of Asian carp may become established in embayments, estuaries, lagoons, and river mouths of medium to large rivers and streams proximate to the home range of an established population. These types of water bodies are found within Lake Michigan and throughout the entire Great Lakes basin.

Some studies suggest that Asian carp would have difficulty becoming established in the Great Lakes. The Illinois-Indiana Sea Grant referenced a report titled, "Evaluating Asian Carp Colonization Potential and Impact in the Great Lakes":

> *It is not clear that Asian carp could grow feeding on the relatively sparse plankton typical of most of the Great Lakes. Filter-feeding carp are usually found in more productive waters with higher plankton abundances. Using a combination of laboratory experiments and modeling, we conclude*

> *that filter-feeding Asian carp will be unable to colonize most open water regions within the Great Lakes because of limited amount of food (plankton) available there. Productive embayments and wetlands are more likely to support Asian carp growth, and we suggest that resource managers focus monitoring and preventative efforts in these more limited areas of the Great Lakes.*

While the results of various scientific studies suggest a varied range of impacts from Asian carp infestation, the potential threat compels immediate precautionary actions. State, local, and federal agencies are taking pre-emptive actions to prevent carp from establishing a population in the Great Lakes or their tributaries.

Isolated Instances of Bighead Carp Found in Ohio River and Western Lake Erie

In addition to the established populations throughout the Mississippi River and other basin waterways, bighead carp have been found in portions of the Ohio River and Lake Erie. The single instance of a bighead carp found in the Ohio River is believed to have involved traversal through the Mississippi River basin and into the Upper Ohio River. Five bighead carp have been individually collected between 1995 and 2003 in western Lake Erie. Since 2004, USFWS has monitored western Lake Erie in Sandusky and Toledo, Ohio, using trammel nets in response to these discoveries. This surveillance sampling has not resulted in any additional collections of bighead or silver carp. These sampling efforts suggest a reproducing population does not exist in Lake Erie. Additional information on collection points can be found in the USGS Nonindigenous Aquatic Species Database at http://nas.er.usgs.gov/.

Robust Monitoring and Assessment Activities Underway

With the overall goal of preventing an Asian carp self-sustaining population from establishing in the Great Lakes, a subgroup to the RCC, the MRR workgroup, identified the following six objectives essential to the overall goal:

1. Determine the distribution of Asian carp in the CAWS.
2. Determine the abundance of Asian carp in the CAWS.
3. Identify and assess vulnerabilities in the current system of barriers to exclude Asian carp from moving into the CAWS.
4. Establish parameters of acceptable risk and determine the current risk level.
5. Remove Asian carp in the CAWS if located upstream of the electric barriers so that they do not have the ability to establish a self-sustaining population in the Great Lakes.
6. Determine the leading edge of major Asian carp populations and reproduction.

To fulfill these six objectives, the MRR work group is identifying the location and population abundance of any potential Asian carp in the CAWS, and then implementing appropriate response actions to address those findings. Extensive monitoring efforts covering over 200 miles of waterways from the Illinois River to Lake Michigan began in late February of this year as a collaborative effort by the Illinois Department of Natural Resources (IDNR), USFWS, and USACE. Monitoring efforts employ the use of eDNA analysis, commercial fishing contractors, side-scan sonar, electrofishing, and netting crews. Efforts on the waterways downstream of the electric barrier to Starved Rock Lock and Dam, including sections of the CSSC and Des Plaines and Illinois Rivers, focus on areas of known high Asian carp density for biological suppression. The areas upstream of the electric barrier include the CSSC, south Branch of the Chicago River, Chicago River, North Branch of the Chicago River, North Shore Channel, Calumet-Sag Channel, the Little Calumet River, Grand Calumet River, the Calumet River, and Lake Calumet.

The data obtained from each area indicate that triggers for response operations are being developed. Based on currently available technology, rotenone will be used as the initial, rapid data gathering tool, in response to eDNA evidence of Asian carp found upstream of the electric barrier. If needed, modified structural operations will support the efforts of the MRR work group with both monitoring and fish suppression efforts.

Methodologies for Fish Testing and Sampling

- eDNA genetic testing: In the spring of 2009, genetic testing was conducted using a new technique called the eDNA method to detect for the presence of Asian carp in the Chicago Area Waterway System. All fish, including Asian carp, release DNA into the environment naturally in the form of slime, feces, and urine. These substances and the DNA within them slowly degrade in the environment, but can be collected in water samples if caught soon enough. These water samples are filtered and the DNA is collected and processed to signal the presence or absence of Asian carp. Positive detection means that Asian carp eDNA was detected in a water sample. Negative detection means that no Asian carp eDNA was detected; negative results can occur when no carp are present and when fish abundance is too low to detect.
- Application of rotenone: Rotenone is an odorless chemical that is used as a broad-spectrum poison. Rotenone readily disperses in water both laterally and vertically and penetrates below the thermocline in thermally stratified bodies of water. Rotenone enters the bloodstream of the fish through the gills and causes death. In humans, rotenone is poorly absorbed in the digestive track and is readily excreted from the body, therefore rotenone is not considered highly toxic to humans if ingested orally. However, toxicity is greatly increased through inhalation due to the direct pathway to the bloodstream. In this type of exposure, rotenone is considered to be highly toxic to humans.
- Electrofishing: Electrofishing uses electricity to stun fish before they are caught and is a common scientific survey method used to sample fish populations to determine abundance, density, and species composition. When performed correctly, electrofishing results in no permanent harm to the fish, because they float to the water's surface and are retrieved.
- Netting: Block nets or other netting devices are installed in the waterway and prevent the fish from moving further upstream or downstream. Fish can be collected from the netting.
- Side-scan sonar: Side scan sonar is a tool that can be used to distinguish Asian carp from other fish that are in the water. It is a type of sonar system that provides an image of objects in the water. This technique could be used to periodically identify potential or suspected Asian carp. It could also be used to help determine the location of source fish releasing eDNA, to make better determinations on where to apply rotenone or take other actions.

Evaluating the Role of Locks

Some have suggested that a solution to preventing Asian carp from entering the Great Lakes is closure of locks and sluice gates in the CAWS. The locks and structures in the CAWS connect the nation's two largest freshwater basins, and the CAWS serves as the sole or primary water connection and route by which many goods travel downstream for dissemination to the central United States.

Description of Locks and their Function

The O'Brien Lock has a single chamber of 110 feet x 1,000 feet with a six-barge capacity. This lock, on the Calumet River, currently operates in a "show and go" pattern, with vessels passing through when they arrive.

Much of the Chicago region's petroleum, coal, road salt, cement, and iron travel through this lock; approximately 14.6 million tons of these and other commodities transit through the Calumet River System and Harbor (including the Cal-Sag Channel and reach above Lockport Lock) each year. In addition, over 15,000 recreational vessels traverse this lock. The lock is also used to control the water flow between the lake and river, and is both a piece of the overall flood control plan and the local water treatment process to comply with regulatory requirements. Finally, the lock is used by the United States Coast Guard (USCG), as well as the City of Chicago for emergency uses.

Chicago Lock, the nation's second busiest lock, has a single chamber of 80 feet x 600 feet with a 22.4-foot depth. Constructed in 1938 in order to regulate the diversion of water from Lake Michigan, this lock has a 1- to 4-foot lift connecting Lake Michigan to the Chicago River. The Metropolitan Water Reclamation District of Greater Chicago (MWRD) constructed the lock and transferred it to USACE in 1984. The lock is operated by gravity through partially opened lock sector gates and operates 24 hours a day, 7 days a week, year round. The lock has more than 11,500

annual lockages composed of more than 50,000 commercial and recreational boats and 900,000 passengers. The area of the CAWS is a safe refuge on southern Lake Michigan for barges and vessels traveling north from or south to the Port of Chicago. The lock itself provides flood protection on the Chicago River for the downtown area.

Various agencies have authorities over the involved waterways and projects. USACE has direct authority over O'Brien Lock and the navigation channel through various Congressional acts for navigation (commercial and recreational) and flood control. The Chicago Lock is authorized under the Rivers and Harbors Acts of 1870, 1880, 1912, 1919, and 1962. The federal channel is authorized to be maintained at a depth of 21 feet between the Chicago Lock, into the Chicago River and north to the North Avenue Turning Basin.

Under the authority of the Port and Waterways Safety Act of 1972, the USCG ensures the safety, security, and environmental protection of the Great Lakes and the Western Rivers. The USCG manages waterways through Regulated Navigation Areas, safety and security zones. Additionally, the USCG regulates the marine industry and supports the marine transportation system. MWRD is charged with meeting certain regulatory discharges from the City of Chicago and, through pollution discharge permits, using the water released from the lock to meet its discharge criteria. MWRD has flood control, water quality, social, and commercial authorities tied to these waterways.

Effect of Lock Operations on Carp Mitigation

Locks may impede some carp migration through the Chicago and Calumet Rivers into Lake Michigan, but by themselves they are not effective for preventing carp establishment in the Great Lakes. When the O'Brien and Chicago Locks are closed, they do not completely stop water flow. As with most locks, leakage occurs around and through the gates. Because Lake Michigan and the Chicago River are very close in elevation, Chicago Lock is designed to control water flow, not accommodate a change in water elevation. That means it may be possible for small fish to swim through the lock into the lake even when the locks are "closed."

If USACE were to close the locks and take measures to make the lock more water tight, there are other ways that fish could get into the lake, such as the unregulated access point through the Grand Calumet and Little Calumet Rivers in Indiana. Other access could include leaking sluice gates at both federal and non-federal facilities, release of live adult fish into the Great Lakes, or transfer of juveniles in bait buckets.

In major flood events in central Chicago, the Chicago and O'Brien Locks and their associated controlling works serve to prevent or minimize flood damage by allowing water to flow in reverse into Lake Michigan. In the event of future flooding, USACE is considering installing grates in the sluice gates to block the potential migration of any Asian carp that may be present, while allowing water levels to subside. If the structures were permanently closed, in flooding situations, lock and sluice gates would likely not contain Asian carp, as floodwaters carrying fish in the overflow could overtop the structures and flow unrestricted to Lake Michigan. USACE is studying whether modified structural operations discussed in this Framework may be able to limit the migration of Asian carp during flooding or operation of locks, dams, and pumping stations.

Risks and Cost Associated with Closure

Estimates vary as to economic impacts of lock closure, whether intermittent or permanent, on navigation, commerce, tourism, and other activities. For example, one study estimated that marine shipping saved shippers nearly $55 million in 2002 over alternative modes of transportation, though it is also estimated that invasive species entering the Great Lakes as a result of shipping and other modes costs the United States economy nearly $200 million annually.[7] A second study[8] estimated a $4.7 billion impact over a 20-year period to Chicago's tourism industry. Much of the Chicago region's oil, cement, iron, and coal transits through the O'Brien Lock. Without an alternate route that can accommodate the high level of traffic, key industrial building blocks of the regional economy could be damaged, and exports could be delayed or undergo significant increases in shipping costs; in a worst-case scenario, flow of critical commerce would cease. This does not account for secondary and tertiary effects that consumers would likely face in the form of higher costs, shortages, loss of services, and loss of jobs. Indefinitely closing the Chicago Lock would also greatly affect companies that rely on the waterway for tourism.

Closing O'Brien Lock would lead to several serious difficulties in delivering products. First, diverting vessel traffic from the Calumet River would deprive barges of much of the barge staging areas available in the Chicago Region, thereby increasing congestion in the waterways. Currently, staging areas are very limited for barges in the vicinity of Chicago Lock, the main alternative to O'Brien Lock. This would result in as many as several hundred barges in stationary positions for indefinite periods of time while waiting to be loaded or unloaded— a major safety concern.

Accessing Calumet Harbor via the Chicago Lock is not a matter of choosing a different route. Arriving at Calumet Harbor without going through O'Brien Lock would require transit through Lake Michigan. Existing regulations preclude carrying liquids such as petroleum products. In addition, the use of Calumet Harbor would require the barges to clear low railroad bridges, which would require ballasting and de-ballasting, thus increasing the cost per barge transit.

According to the MWRD, which serves as the wastewater and stormwater management agency for Chicago and 124 municipalities across the region, permanent closure of lock and sluice gates along the CAWS would likely result in devastating flooding throughout the region without additional deep tunnel or reservoir capacity.

Full consideration of the impacts to the economy such as jobs and businesses, the environment, and other modes of transportation will be evaluated in the environmental review process as part of the USACE Inter-Basin Feasibility Study, expedited for completion to 2012 for the CAWS.

Decision-Making Process and Timeline for Modified Structural Operations

A USACE-led study is underway to assess the concept of "modified structural operations." Alternatives are under consideration to modify lock operations from constant availability for vessel passage to scheduled intermittent periods of operation for transit. Periods of non-operation would be synchronized with efforts by other agencies to take steps to suppress, eliminate, or reduce Asian carp populations that may be present in a target area of action. This concept envisions controlling the periods during which navigation traffic could pass through the locks, so that effective measures to attack Asian carp populations that may be present in the waterway could occur. Modified structural operations would not impact emergency operation of O'Brien or Chicago Locks for flooding or public health and safety. It is anticipated that an interim report (Efficacy Study, Interim III) will be released this spring to address modified structural operations. This concept, if found feasible, would continue to evolve and be improved in combination with fish suppression activities.

1.3 PARTICIPATING AGENCIES – ROLES/AUTHORITIES/JURISDICTIONS

This section generally describes the jurisdictions, authorities, and roles of the agencies and governmental units participating in this Framework. This is meant to be an informal description of these agencies with respect to the actions discussed in this Framework, and is not meant to restrict or assign responsibilities and authorities belonging to the agencies under their implementing statutes and regulations.

- City of Chicago

  Jurisdiction: Exercises home rule authority within municipal limits.

  Authority: Municipal.

  Role: Supports the work of other agencies, particularly those actions within the City of Chicago, and performs law enforcement, patrol, and emergency response duties along the lakefront and inland waterways within the City's jurisdiction.

- Great Lakes Fishery Commission (GLFC)

  Jurisdiction: Great Lakes Fishery Convention Act allowing implementation of a convention of Great Lakes Fisheries between Canada and the United States.

Authority: Bilateral treaty.

Role: Coordinate, communicate, and conduct fishery resource management actions on the Great Lakes.

- Illinois Department of Natural Resources (IDNR)

  Jurisdiction: Investigations pertaining to the natural history, entomology, zoology, and botany of the State; the geology and natural resources of the State; the water and atmospheric resources of the State; and the archeological and cultural history of the State of Illinois.

  Authority: State.

  Role: Lead agency for work relating to monitoring, sampling, fish removal actions, and rapid response activities within the State.

- Metropolitan Water Reclamation District of Greater Chicago (MWRD)

  Jurisdiction: Surface water, municipal wastewater treatment for the metropolitan Chicago area (including almost all of Cook County), control of combined sewer overflows, dry and wet weather operation of the CAWS.

  Authority: Regional.

  Role: Supports the work of other agencies and implements designated action items to the extent allowed by its statutory wastewater and stormwater authority.

- United States Army Corps of Engineers (USACE)

  Jurisdiction: Planning, construction, and operation of navigation and flood damage reduction projects; hydropower operations; environmental protection and restoration; water conservation, recreation, and disaster assistance.

  Authority: Federal.

  Role: Operation of the CAWS Lock and Dam System and the Electric Barrier.

- United States Coast Guard (USCG)

  Jurisdiction: Navigable waterways.

  Authority: Federal Authority; Port and Waterways Safety Act of 1972 and other legislation.[9]

  Role: Ensure the safety, security, and environmental protection of the Great Lakes and the Western Rivers. The Coast Guard manages waterways through Regulated Navigation Areas, and safety and security zones. Regulates the marine industry and supports the marine transportation system.

- United States Environmental Protection Agency (USEPA)

  Jurisdiction: Coordination of federal Great Lakes policy and activities.

  Authority: Federal Great Lakes protection and restoration policy and efforts under the Clean Water Act (CWA) 118 and Executive Order 13340 and other legislation.

  Role: Coordination and funding.

- United States Fish and Wildlife Service (USFWS)

  Jurisdiction: Implementation of activities in support and enforcement of the Lacey Act, Endangered Species Act, Fish and Wildlife Coordination Act, Great Lakes Fish and Wildlife Restoration Act, and the Non-indigenous Aquatic Nuisance Prevention and Control Act as amended; and supporting activities to include fish and AIS monitoring, risk assessment, and law enforcement.

Authority: Federal.

Role: Coordination with federal, state, tribal, and non-governmental partners on actions to prevent the introduction and establishment of AIS, or to mitigate resource impacts from introduced species.

- United States Geological Survey (USGS)

  Authority: Federal.

  Role: Provide leadership, technical expertise, and information needed to develop management tools to better predict ranges and effects of AIS; and to contain, reduce, or eradicate their populations.

- White House Council on Environmental Quality (CEQ)

  Authority: Federal – CEQ coordinates federal environmental efforts and works closely with agencies and other White House offices in the development of environmental policies and initiatives.

  Role: CEQ is closely monitoring the development and execution of the Asian Carp Control Strategy Framework.

1.4 ADDITIONAL ASIAN CARP WORK

In addition to the actions proposed within this framework, the USFWS Midwest Region is currently coordinating implementation of the national "*Management and Control Plan for Bighead, Black, Grass, and Silver Carp in the United States*" (Plan), which was approved by the ANS Task Force in 2007. The four species addressed by the Plan present a serious threat to North American ecosystems, including the Great Lakes, if self-sustaining populations become established. A subset of the 133 priority management actions within the Plan specifically addresses the challenge of protecting the Great Lakes basin from establishment by Asian carp; or to contain, control, and mitigate impacts in the event of their entry into the basin. The approach uses a muti-tiered, "integrated pest management" approach that utilizes timely and accurate data to strategically implement current or emerging tactics and tools in a strategic manner. Actions include the following:

- Develop and deploy physical and behavioral barriers to fish movement at critical geographic locations (including sonic, bubble, light, velocity, and chemical barriers).
- Develop and apply chemical control tools and piscicide delivery systems to control bighead and silver carp effectively and efficiently, and work with partners to develop and implement a coordinated Asian carp public outreach and education campaign focused on preventing movement of fish.
- Work with partners to implement effective outreach and education programs focused on preventing the introduction and establishment of Asian carp and other aquatic nuisance species (ANS) in the Great Lakes basin; and to ensure effective enforcement of applicable authorities and statutes aimed at preventing the introduction of ANS in the basin.
- Work with partners to control (remove Asian carp) through strategic and intensive "recruitment overfishing" in areas with known established populations of carp. This process will utilize contracted commercial fishers deploying a variety of gear types to ensure robust capture rates of Asian carp of varying life stages; the goal is to depress local populations of Asian carp to low numbers by reducing numbers of fish reaching sexual maturity and recruiting to reproducing age.

2.0 UNIFIED ACTIONS FOR PREVENTING ASIAN CARP MIGRATION

The actions below have been divided into short- and long-term implementation goals. Short-term is defined by actions that have been or will begin implementation between February 2010 and May 15, 2010; the remaining actions are considered long-term goals. Each action has been further divided into three subcategories that, either alone or in combination, roughly correspond to the efforts by each work group: (1) Invasion Control (IC), (2) Monitoring and Rapid Response (MRR), or (3) Communication and Outreach (CO). Appendix A, the Matrix, contains the information detailed below in the Action Items in a more condensed manner.

The narratives were developed by the lead agencies for each action and were reviewed by the participating agencies. The "Agency" column in the Matrix identifies in bold the agency or agencies responsible for the actions below and for acting as the lead in implementing the action. In some cases, more than one lead agency has been designated. Agencies not identified in bold will support the lead agencies in implementing the action.

The Funding, Funding Source, Start Date, and Planned Completion columns generally represent estimates by the lead agency and may change as the actions are undertaken and funding is secured. The "Comments" column may provide qualifiers or other pertinent information about each action option.

2.1 SHORT-TERM ACTIONS / ACTION OPTIONS

While a number of actions are needed to control carp in the long-run, there is urgent need to limit the possibility of carp infiltrating Lake Michigan. Therefore, the following actions have either been implemented or will be implemented:

- Operations to reduce the number of Asian carp below the electric barriers.
- eDNA indicator refinement.
- Emergency measures to create ecological separation between (1) Des Plaines River and CSSC and (2) Illinois and Michigan (I&M) Canal and CSSC.
- Barrier operations

Specific proposed actions in support of these short-term actions are provided below.

2.1.1 Targeted Removal within Chicago Area Waterway System (CAWS)

Work group: MRR

Lead Agency: Rapid Response Team (IDNR, USFWS, USACE, USCG, etc.)

Estimated Funding: $2,000,000

Funding Source: GLRI monies to USFWS

Problem: Asian carp eDNA has been detected upstream of the barriers in several locations. Although no fish have been collected or seen on the lakeside of the barrier, the presence of eDNA suggests that fish may be present (eDNA results are posted on the asiancarp.org website). In addition to random and systematic sampling throughout the CAWS to detect Asian carp, future sampling will be designed to seek and destroy or capture Asian carp upstream of the barrier.

Additional eDNA background information can be found at www.lrc.usace.army.mil/pao/eDNA_FactSheet_08-11-09.doc, current eDNA results are posted at asiancarp.org.

Action: This action will include eDNA sampling in likely locations with rapid analysis of samples. Depending on the season, likely locations will include areas adjacent to warm water discharges, wastewater treatment plant (WWTP) outfalls, tailwaters of locks and dams, marina basins, barge slips, and other slackwater areas. If positive "hits" are encountered, efforts would be designed to concentrate and confine individuals in areas where they would be susceptible to removal through toxicants or nets. Fish might be driven with electrofishing gear and/or light/sound systems against structures or into basins and inlets where they could be confined with block nets and removed with rotenone. Commercial fishermen would also be deployed to set block nets and trap fish within short segments of the waterway where they could then be driven into gill and trammel nets or removed with rotenone. This effort was initiated in February 2010 and will continue through November 2010 or until no further evidence of Asian carp is seen. Although not yet necessary, this project could deploy up to 15 conventional electrofishing boats and state/federal fisheries crews, as well as multiple commercial fishing companies. Costs also include rotenone and the detoxifying agent sodium permanganate, substantial fishing gear of multiple types, and additional electrofishing rigs and crews beyond those already available to state and federal agencies. Field work, including characterization of Asian carp and resident fish populations to the extent practicable, would be conducted by IDNR, USFWS, USACE, and other state agencies that agree to participate.

Milestones:

- 2nd quarter 2010 – initiation of field work.
- Purchased three boats, motors, trailers, and associated gear to support electrofishing and monitoring operations.
- Purchased rotenone and potassium permanganate as a detoxifying agent.
- Purchased a variety of commercial grade nets including: block nets, lift nets, and seines.
- Identified needs and in the process of procuring additional equipment to support May 2010 rapid response effort.
- Coordinating with USGS to conduct advanced Incident Command Structure Training for IDNR staff.

Potential Hurdles:

- Weather conditions.
- Field crew availability.
- Possible negative impacts to commercial vessel traffic movement, recreational uses, and resident aquatic life (other than Asian carp) by activities associated with this action.
- Limited lab analysis capacity.

2.1.2 Enhanced eDNA Testing, Contract Commercial Fishing, and Conventional Monitoring in "High Risk" Locations

Work group: MRR

Lead Agency: IDNR, USFWS, USACE

Estimated Funding: $2,600,000

Funding Source: $1,700,000 USACE and USFWS base funding/$900,000 GLRI monies to USFWS

Problem: Capture and/or direct observation of Asian carp by trained experts provides the most solid confirmation of the presence of Asian carp. Enhanced monitoring via traditional and new approaches must be ramped up in an effort to detect Asian carp and to verify eDNA results.

Action: Increased eDNA capacity, commercial fishing, and conventional monitoring will be combined to target selected locations adjacent to and upstream of the electrical barriers, including the Cal-Sag Channel near O'Brien Lock and Dam, the North Shore Channel near the Wilmette Pumping Station, the Chicago Lock, and Lake Michigan. Multiple agencies will continue to participate in and fund the monitoring efforts. USFWS, IDNR, and the Illinois Natural History Survey will deploy dedicated field crews to conduct Asian carp monitoring in specified locations within the CSSC, Cal-Sag Channel, Chicago River, North-Shore Channel, portions of the Des Plaines River, Grand Calumet and Little Calumet Rivers, and selected near-shore areas of southern Lake Michigan in the vicinity of metropolitan Chicago (areas adjacent to industrial/municipal water and other warm water discharges, tributaries, and near-shore embayments). Additional support will be sought from the Departments of Natural Resources of other Great Lakes States. Multiple boats and crews will be allocated to each target area (up to eight 6-person teams of two boats each) in order to sample monthly over a 1- to 2-week period each month. During each of these sampling periods, one or more commercial fishing crews will be deployed to work in concert with state and federal crews or to sample locations unsuitable for standard fisheries sampling gear. Monitoring will include gill and trammel netting and electrofishing at all locations, side-scan sonar, or dual-frequency identification sonar (DIDSON), towed or fixed cameras, underwater video, and/or trained observation divers, where possible. Early monitoring efforts will focus on areas that previously yielded positive eDNA results, locations sampled with sonar that demonstrate multiple large fish targets (possible Asian carp), areas with visual sightings of suspected Asian carp, or other locations determined to be "high-risk." Enhanced sampling will be used to document the extent of Asian carp population dynamics within the canal system and connecting waterways, to provide data for modeling potential population movements (range expansion), and to determine life stages of Asian carp potentially present. To the extent practicable, population information on resident fish populations will also be obtained. Monitoring activities will be conducted in cooperation with IDNR, USACE, and other partners.

Milestones:

- Early 2010 – Enhanced monitoring began in February 2010.

Potential Hurdles:

- Weather conditions.
- Staffing concerns which include hiring additional employees for both field and lab work.
- Need to increase lab analysis capacity to 120 samples per week (current capacity is 60).
- Possible impacts to commercial and recreational vessel traffic movement and resident aquatic life (other than Asian carp) by the sampling activities described above.

2.1.3 eDNA Calibration Methodology and Increased Capacity

Work group: MRR

Lead Agency: USACE, IDNR, USFWS

Estimated Funding: $940,000

Funding Source: $600,000 USACE base funding/$340,000 GLRI monies to USACE

Problem: eDNA analysis is an emerging and cutting edge science for predicting the presence and tracking the movement of Asian carp through a waterway. To further validate its use as an effective tool, its methodology must be further refined and its analysis capacity increased. eDNA analysis will also be used as part of a diversified detection portfolio.

Action: eDNA sampling and processing will be a joint effort of the University of Notre Dame and the research laboratory of USACE, as directed by USACE, in collaboration with the USFWS and IDNR. eDNA capacity is being increased with the addition of sampling and processing capability at USACE research laboratory in cooperation with the University of Notre Dame. eDNA validation efforts are underway to verify the use of eDNA in predicting population sizes, to investigate the impact of cold water on eDNA, to determine how long eDNA lingers when live fish are not present, and to explore other possible pathways of eDNA into the CAWS such as dead carp discarded into the waterway, bilge-water, sewage outfalls, etc Future eDNA sampling will be synchronized with conventional monitoring and possible response actions in specific geographic areas, in a collaborative effort among the primary agencies engaged in monitoring and response activities.

Milestones:

- December 2009-February 2010 – USEPA completed a laboratory quality control analysis and submits final report.
- April-May 2010 – University of Notre Dame expands capacity for sampling and processing eDNA to USACE through field and laboratory training
- April 2010 – Initiation of new synchronized sampling program was completed.
- Summer 2010 – Comprehensive field experiments to consider effectiveness of eDNA analysis in determining impacts of environmental factors on eDNA and estimated population abundance.

Potential Hurdles:

- Commercial and recreational vessel traffic movement may be impacted by the sampling efforts described above.

2.1.4 Construction of Des Plaines River and I&M Canal Barriers

Work group: IC

Lead Agency: USACE

Estimated Funding: $13,200,000

Funding Source: GLRI monies to USACE

Problem: Physically block known bypasses around the fish barriers from the Des Plaines River and the I&M Canal caused by flooding.

Action: In December 2009, USEPA announced it would authorize the use of $13,200,000 in GLRI funding to allow for construction of barriers on the Des Plaines River and I&M Canal to preclude transfer of Asian carp during flood events from these bodies of water into the CSSC. On January 12, 2010, the Assistant Secretary of the Army for Civil Works approved the interim efficacy study report recommendations that would allow design and construction of these barriers to proceed. The structural solutions include 13.5 miles of concrete barriers; ¼-inch, chain-link, heavy-duty fence between the Des Plaines River and the CSSC; and blockage of the I&M Canal at a natural flow divide.

Milestones:

- April 2010 – Scheduled contract award.
- October 2010 – Construction completion.

Potential Hurdles:

- None.

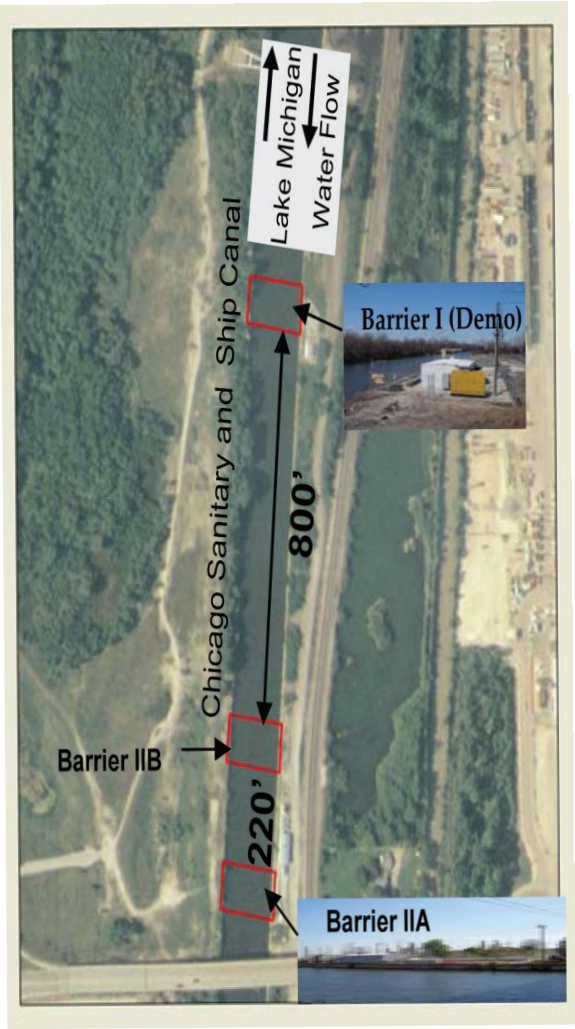
2.1.5 Continued Operation of Demonstration Barrier I and Barrier IIA

Work group: IC

Lead Agency: USACE

Estimated Funding: $4,750,000

Funding Source: USACE base funding



Problem: The electrical barrier is the best tool to stop large-scale movement of Asian carp from the Illinois River into the Great Lakes. Catastrophic failure of these barriers could allow unimpeded migration of Asian carp.

Action: Barrier I (Demonstration Barrier) operates at 1 volt/inch. Barrier IIA operates at 2 volts/inch, at the pulse rate and width supported by optimal operating parameters research to prevent passage of adult and juvenile Asian carp. The maintenance cycle scheduled for October 2010 should coincide with operation of Barrier IIB so that additional rotenone treatment of the waterway will not be necessary during Barrier IIA shutdown. Operations and necessary maintenance are funded by USACE.

Milestones:

- October 2010 – required maintenance shutdown for Barrier IIA.

Potential Hurdles:

- Catastrophic failure may mandate emergency response such as rotenone application, modified structural operations, and other fish suppression/prevention measures.

2.1.6 Expedited Construction of Barrier IIB

Work Group: IC

Lead Agency: USACE

Estimated Funding: $17,000,000

Funding Source: USACE base funding (including American Recovery and Reinvestment Act funding)

Problem: A second barrier capable of running at voltage levels high enough to repel all fish is necessary to further fortify the existing electric barrier. A second barrier will ensure sustained operation during scheduled maintenance and in the event of catastrophic failure.

Action:

- Design of Barrier IIB electronics is ongoing, with award for supply and installation pending

Milestones:

- October 2009 – Contract for construction of Barrier IIB awarded through Recovery Act funds.
- May 2010 – Award of electronics and contract (achieved on April 16, 2010).
- September 2010 – Barrier IIB completed.
- October 2010 – Barrier IIB fully operational.

Potential Hurdles:

- None.

2.1.7 Contingency Plan for Rotenone Treatment for Maintenance Shutdowns

Work Group: IC

Lead Agency: Rapid Response Team (IDNR, USFWS, USCG, etc.)

Estimated Funding: $5,000,000

Potential Funding Source: Base program funding and GLRI as necessary

Problem: The barrier system requires periodic maintenance during which the system must be shut down for a period of days. This occurred in December 2009 and was accompanied by a rotenone application of the CSSC from the Barrier 6 miles downstream to the Lockport Lock and Dam. If existing barriers fail or if Barrier IIB is not operational by October 2010, this action would be necessary. Note that this is a contingency scenario and that federal funding may be needed if failure of existing barriers occurs.

Action: Barrier IIB is scheduled for completion by October 2010. If USACE determines that Barrier IIA must undergo maintenance before IIB is completed, another rotenone treatment may be necessary. This action item is calculated to include all costs of this operation (rotenone application, detoxification, monitoring and collection of Asian carp and native fish species, and logistics support), including both material and labor costs similar to those donated by many partner organizations in 2009. Additionally, a smaller application of rotenone is anticipated when Barrier IIB is completed and Barrier IIA undergoes maintenance.

Milestones:

- October 2010 – Barrier IIA maintenance.

Potential Hurdles:

- None.

2.2 LONG-TERM ACTIONS / ACTION OPTIONS

The following action items while no less critical then the above actions, will take longer to implement and/or carry out. These efforts will be important to the long-term control of Asian carp and the conservation of the Great Lakes ecosystem. The proposed long-term actions include the following:

- Research and development of AIS suppression technologies.
- Studies on the effects of inter-basin connectivity.
- Increased enforcement against the transfer of Asian carp.
- Development of AIS management plans.

2.2.1 Final Efficacy Study Report

Work Group: IC

Lead Agency: USACE

Estimated Funding: $1,100,000

Funding Source: USACE base funding

Problem: The continued transfer of AIS between the Great Lakes and the Mississippi River basins in spite of the electric barrier could occur if the hydraulic connections between the two basins are not addressed. This includes connections throughout the CAWS, as well as the Grand Calumet and Little Calumet Rivers.

Action: Evaluation of other potential measures to deter the migration of the Asian carp is proceeding via the Final Efficacy Study report. Other electrical barriers, other types of behavioral barriers, and review of the use of existing structures and monitoring technologies are being considered. In addition, this report will discuss other assisted transits/vectors (bait buckets, ballast water, navigation transiting through the CAWS), considering measures to control access to Lake Michigan through the Little Calumet and Grand Calumet Rivers and to control Asian carp populations; the report also will provide a preliminary assessment of economic impacts from lock closures.

Milestones:

- October 2010 - Alternatives formulation complete.
- December 2010 – Draft study complete.
- January 2011 – Draft study Independent Technical Review.

Potential Hurdles:

- Extension of Section 126 emergency authority for recommended actions/measures.
- Authorization for implementation of longer term recommendation and funding.
- Requirement for waterway vessel impacts of rulemaking and public notice.
- Requirement of additional resources for enforcement of waterway restrictions (manpower and vessels).

2.2.2 Great Lakes and Mississippi River Inter-Basin Study

Work Group: IC

Lead Agency: USACE

Estimated Funding: $1,000,000

Funding Source: $500,000 USACE base funding/$500,000 GLRI monies to USACE

Problem: The continued transfer of AIS between the Great Lakes and the Mississippi River basins has not yet been addressed and continues to allow for passage. Additional hydraulic connections between the two basins could provide transfer and needs to be addressed.

Action: The Inter-Basin Transfer Study is the long-term effort of USACE, in collaboration with federal, state, regional, and local agencies and non-governmental organizations (NGO), to explore all options and technologies that could be applied to reduce the risk of AIS transfer between the Great Lakes and Mississippi River basins. The study will provide a thorough identification of potential hydraulic connections between the two basins, identification and

exploration of existing and potential AIS, and comprehensive analysis of AIS control technologies. These control technologies could include but are not limited to physical or ecological separation.

The study will also evaluate the potential for extended (temporary or permanent) closure of locks and other physical structures to impede continued migration of AIS.

This feasibility study will analyze the environmental impacts and the impacts that each alternative plan would have on the current uses of the CAWS and other identified hydraulic connections. Such waterway uses include flood damage reduction, stormwater management, effluent conveyance, commercial and recreational navigation, and others to be identified. The initial steps will involve identification of problems and opportunities, and acquisition of data to inventory existing conditions. An interim report will focus on Asian carp and the CAWS. Authority and funding for implementation will be addressed upon completion of the study.

Milestones:

- 2012 – Expected completion of interim CAWS focused study.

Potential Hurdles:

- Implementation authority.

2.2.3 Modified Structural Operations

Work Group: IC

Lead Agency: USACE, USCG, MWRD, USFWS, IDNR, City of Chicago

Estimated Funding: Costs currently under consideration

Potential Funding Source: Base program funding and GLRI as necessary

Problem: To determine whether modified lock and attendant works (sluice gates and pumping stations) operations could impede entry of Asian carp to Lake Michigan, either alone or in combination with control and eradication activities. All potential impacts must be considered to ensure public health and safety, and the purposes of these structures must be maintained as authorized by law.

Action: As part of the effort to address the threat that Asian carp pose to the Great Lakes, USACE, in collaboration with other agencies, is assessing the potential use of modified structural operations on the CAWS. The phrase "modified structural operations" is defined as operating the locks and attendant works of the CAWS such as sluice gates and pumping stations to impede Asian carp migration into the Great Lakes consistent with public health and safety and maintenance of navigation. As part of this analysis, USACE is working with IDNR and USFWS to assess whether modified structural operations might be necessary to support Asian carp control or eradication activities of those agencies. The potential impacts of modified structural operations, as well as the specific parameters of such operations, would be assessed and understood as required under any applicable laws such as the National Environmental Policy Act (NEPA). Modified structural operations, if recommended as effective, would be executed through a comprehensive plan, broad collaborative participation and use of resources, integrated continuous management and decision-making, and documented procedures agreed to by relevant agencies and effectively communicated to CAWS users.

General goals for modified structural operations are:

- To ensure, to the fullest extent possible, that Asian carp do not become established in Lake Michigan.
- To preserve emergency use of the CAWS, locks and structures, as well as other uses essential to public health and safety.

- To maintain navigation through the locks.
- To modify operations and cooperate with vessel users as CAWS structures are changed.
- To support control and/or eradication activities performed by fisheries management agencies.

Three-phased approach includes:

- Phase 1: Concept Development – Integrate agencies' efforts to develop methods to suppress Asian carp population growth with USACE evaluation of whether reducing the number of lock openings would be effective and, if so, how. MWRD considers how to operate the Wilmette Pumping Station and modify sluice gates to impede Asian carp movement. This will occur after engaging relevant stakeholders. The goal for this phase is to complete concept development and recommended actions as appropriate by June 2010.
- Phase 2: Initial Implementation – Execute recommendations for any modified structural operations identified for implementation as quickly as possible once methodologies are specified. Some methodologies currently under consideration include:
    - Closing both sets of lock gates between lockages.
    - Reducing the frequency of lock openings by consolidating barge and recreation traffic. Various scenarios are being assessed including:
        - Alternative 1 – No action; Chicago and O'Brien Locks operate as normal.
        - Alternative 2 – Modified Structural Operations – Close each week; Chicago and O'Brien Locks open 3 to 4 days every week, a significant reduction from current "show and go" operations. Check potential to place screens on the sluice gates and the lock gates during periods of closure.
        - Alternative 3 – Modified Structural Operations – Close one week per month; Chicago and O'Brien Locks closed to navigation one week per month starting in June 2010.
        - Alternative 4 – Modified Structural Operations – Close every other week; Chicago and O'Brien Locks closed to navigation two weeks per month starting in June 2010.
    - Closing locks for temporary periods as needed by agencies that apply technologies to "herd" and reduce Asian carp populations that may be present, to include rotenone.
    - Closing locks for temporary periods as needed by agencies that conduct intensified and synchronized monitoring (eDNA, electrofishing, and netting).
    - While USACE is evaluating potential modified lock operations in the Interim Efficacy Study III in order to determine the need for a planned approach, USACE currently has ability and authority to make certain operational changes at the navigation locks as necessary in support of resource agency efforts to control or eradicate Asian carp in the CAWS.
- Phase 3: Additional Implementation – Adjust initial methodologies based on field results for longer sustainable operations. Continue to field new workable and appropriate methodologies as these become available.

Milestones:

- June 2010 – Submit recommendations for Modified Structural Operations to the ASA/CW.
- End of 2010 – Full implementation.

Potential Hurdles:

- Development and implementation of controlled operations plan under a compressed timeline to execute by onset of warmer weather.

- Public health and safety impacts.
- Potential for negative impacts on recreation use and native aquatic life.
- Establishment of a Vessel Traffic Management System.
- Requirement of additional resources (manpower and vessels) for enforcement of waterway restrictions.
- Possible negative impacts on commercial vessel traffic movement by activities associated with this action.

2.2.4 Commercial Fishing for Removal Below Lockport

Work Group: MRR/IC

Lead Agency: IDNR

Estimated Funding: $300,000

Funding Source: GLRI monies to USFWS

Problem: In some areas downstream of Lockport Pool, the population density of Asian carp is very high; these fish may be seeking to expand their areas. By decreasing the numbers downstream, thereby decreasing the propagule pressure, the pressure to expand may also decrease. However, these fish do seek to expand their areas by increasing population densities and continue to migrate upstream. Therefore, by decreasing the numbers downstream, this reduces the propagule pressure.

Action: An accepted principle of invasive species control is to remove propagule pressure that would otherwise hasten dispersal of fish into new areas and increase likelihood of invasion. This action will employ commercial fishermen in the pools below the barrier in a sustained program of catch and removal of Asian carp from the system, while minimizing detrimental effects on native fish species. In both the Lockport and Brandon Road Pools, densities of Asian carp are relatively low therefore at this time no commercial fishing efforts are planned.

Milestones:

- Contract specifications for commercial fishing are completed. Final approval of the monitoring plan is anticipated by April 30, 2010. Once this is completed we anticipate commercial fishing operations will begin in May 2010.

Potential Hurdles:

- Negative impacts on commercial vessel traffic movement by fishing operations.

2.2.5 Commercial Market Enhancement/Recruitment Overfishing

Work Group: IC

Lead Agency: IDNR

Estimated Funding: $3,000,000

Funding Source: GLRI monies to USFWS

Problem: The accepted principle of invasion control is to dramatically suppress Asian carp populations in the Illinois River watershed, including CAWS. Yet with governmental budgets limited, a sustainable mechanism for suppressing carp populations has been difficult to initiate.

Action: Expand the commercial market for Asian carp in Illinois and beyond, with a portion of proceeds from carp sales or other similar revenue stream going to fund ecosystem restoration and invasive species prevention. This

market expansion may be focused on providing fillets for consumption in both domestic and overseas markets, utilizing Omega 3 oils, or using the carcasses as fertilizer. This provides several benefits and could provide a "win-win-win": (1) suppression of carp populations, (2) job creation, and (3) an enhanced revenue source for programs designed to restore ecosystems, such as the Great Lakes. These monies would be utilized to provide funding opportunities to enhance marketing within the United States and export opportunities overseas. It is important to note that live Asian carp would not be transported.

Milestones:

- IDNR has received and is evaluating detailed research proposals necessary to support the development of a commercial market for Asian carp. These proposals include:
- Conducting Asian carp contaminant analysis.
- Conducting Asian carp component/content analysis.
- Commercial harvesting program administrative support and data evaluation.
- Asian Carp marketing summit.

IDNR is also partnering with the Illinois Department of Commerce and Economic Development (DCEO) to assess commercial processing capacity at Illinois facilities, and make strategic investments necessary to increase capacity. To evaluate the impact of increased commercial harvesting on Asian Carp populations, IDNR in cooperation with leading scientific experts will be monitoring ecosystem responses to Asian Carp Removal in the Illinois River.

Potential Hurdles:

- Ensuring that market enhancement does not lead to fishery sustenance or substantial detrimental effects to native fishes, but instead meets the desired biological suppression results.

2.2.6 Investigation of Certification Requirements for Asian Carp Usage

Work Group: IC

Lead Agency: IDNR, United States Department of Agriculture (USDA), United States Agency for International Development (USAID)

Estimated Funding: NA

Funding Source: IDNR base funding

Problem: There is a potential that Asian carp could be used as a human food source, but certification procedures that document the suitability of Asian carp that are removed from the CAWS, Illinois River, and Mississippi River and used for human consumption has not yet been assessed.

Action: IDNR will work with the Illinois Congressional delegation to identify certification procedures necessary for Asian carp to be declared suitable for use in US-sponsored Humanitarian relief efforts.

Milestones:

- IDNR is working with the Illinois Congressional delegation to certify Asian carp appropriate for use in the (P.L.) 480 TITLE II Food For Peace Program (USAID). IDNR will consult with DCEO and Illinois commercial processors to complete application process.

Potential Hurdles:

- Ensuring that market enhancement does not lead to fishery sustenance, but instead meets the desired biological suppression results, using legal and penal mechanisms.

2.2.7 Feasibility Assessment of Inter-Basin Transfer of AIS

Work Group: MRR

Lead Agency: USGS

Estimated Funding: $500,000

Funding Source: GLRI monies to USGS

Problem: Continued transfer of AIS between the Great Lakes and the Mississippi River basins in spite of the electric barrier. Additional hydraulic connections between the two basins could provide transfer and should be addressed.

Action: First, determine the frequency via the surface-water pathway of potential for migration of AIS from the Des Plaines River to the CSSC during flooding conditions observed previously. Second, determine the potential for migration of AIS from the Des Plaines River and/or the I&M Canal to the CSSC via groundwater flow through the fractured bedrock present between these surface water bodies. The area of investigation is where the Des Plaines River, CSSC, and I&M Canal are proximate in the vicinity of Lockport, Illinois, which includes the area surrounding the electric barrier. The investigation will involve a review of the life cycle of the Asian carp; surface topographic mapping; characterization of the bathymetry and water levels in the Des Plaines River, CSSC, and I&M Canal; assessment of the fracture network in the karstic bedrock system between these surface-water bodies; characterization of groundwater flow through the fracture network; and assessment of select water-quality parameters in the bedrock. Coordination efforts with USACE to avoid duplication are underway.

Milestones:

- Compilation and analysis of available information and write-up on area geology and hydrology has begun.
- Compilation of hydraulic, water-quality, and sediment-quality data from USGS databases has begun.
- Side scan sonar and bathymetric survey of the Ship and Sanitary Canal has been completed. Data analysis is ongoing.
- Field surveys of temperature and specific conductance on the Ship and Sanitary Canal have been completed. Data analysis is ongoing.
- Field surveys of areas where bedrock is exposed at the Des Plaines River have been completed. Data write up has begun.
- Bathymetric survey of Des Plaines River in areas where bedrock is exposed at or near the land surface has been performed.
- Measurement of fracture orientations in the dolomite has been performed. Data analysis is ongoing.
- Field visit with USGS Branch of Surface Geophysics personnel has been performed to provide preliminary evaluation of candidate locations for surface geophysical surveys as well as to provide an indication of the feasibility of the various surface geophysical techniques for fracture identification in this area.

Potential Hurdles:

- Access issues for field operations.

2.2.8 Tagged Fish Research to Test Barrier Effectiveness

Work Group: MRR

Lead Agency: IDNR, USFWS, USACE

Estimated Funding: $400,000

Funding Source: GLRI monies to USFWS

Problem: Asian carp eDNA has been detected upstream of the barrier in several locations. Although no Asian carp have been collected or seen, the presence of eDNA suggests that Asian carp may be present. Potential pathways must be identified and evaluated, including the possibility that some fish may be moving through the barrier.

Action: Preliminary work using tagged common carp was conducted by the Illinois Natural History Survey to determine if the demonstration barrier was able to prevent fish from moving across. That project used a very small number of carp and did not have ideal field conditions to allow for strong conclusions to be reached. Additional work should be directed at Barrier IIA using a much larger sample size, more controlled field conditions, and potentially using sterile Asian carp as test fish. A complementary approach would include use of DIDSON sonar equipment at the barrier site to observe fish behavior and to look for any fish penetrating or crossing the barrier.

Milestones:

- IDNR has received approval for tagged fish research project protocols from USFWS. We are now finalizing our 2010 monitoring plan which is targeted for release April 30, 2010, and once that is final we can begin operations.

Potential Hurdles:

- None.

2.2.9 Investigate Tow Boats and Barges as Potential Vectors

Work Group: MRR

Lead Agency: USCG, USEPA, IDNR, USFWS, USACE

Estimated Funding: $500,000

Funding Source: GLRI monies to USCG

Problem: The presence of eDNA above the AIS barrier as a result of transport of Asian carp, carp eggs, or its eDNA, has moved across the AIS barrier by means of ballast water or bilge water transport Is a potential vector. In September of 2009, the industry voluntarily stopped the practice of temporarily taking on ballast water to navigate under bridges along the CSSC. USCG issued a rulemaking to prohibit the practice in December 2009. However, there remains a possibility that eDNA or eggs could enter the voids of the towboats or barges through cracked welds or damaged hull plating. Because the majority of the towboats and barges are currently uninspected, their material condition could permit accidental introduction of water and eggs that could be transported and discharged above the barriers.

Action: Establish a Cooperative Working Group with towing industry reps, fishery biologists, scientists, and agency officials to investigate and study the potential vector of towboats and barges for transporting Asian carp across the AIS barrier. The work group will determine whether vessel ballast/bilge water is a vector in the CSSC. The primary focus of the work group will be to investigate and study the potential vector of towboats and barges for transporting Asian carp (including eggs, larvae, and juveniles) across the USACE electric barrier.

Milestones:

- February 2010 – Initial convening of work group was initiated.

- March 2010 – Develop objectives, methodology and sampling protocols. Identify towing industry participants and locations.
- April 2010 – Complete Statement of Work.
- May 2010 – Secure funding and award contract.
- September 2010 – Complete sampling and testing for evidence of Asian carp.
- October 2010 – Report findings and determine risk.
- November 2010 – Implement additional risk mitigation measures if necessary.

Potential Hurdles:

- Finding necessary evidence of species bypass—not just Asian carp eDNA.
- Establishing methodology acceptable to all parties.
- Control of vector pathways during effort to prevent cross-contamination.
- Authority to exceed the IDNR allocation for discretionary diversion.

2.2.10 Assessment Study of Potential Impacts of Steel-hulled Barges on Fish Movement Across Electric Barrier II

Work Group: IC

Lead Agency: USACE, USCG, IDNR, USFWS

Estimated Funding: Costs currently under consideration

Potential Funding Source: GLRI monies and base program monies as necessary

Problem: Studies of Electric Barrier I indicate that fish swimming alongside barges took about three times as long to become immobilized by the electric barrier than if they were swimming through the electric field without any substantial steel hull present. As the steel hull approaches the barrier the steel warps the electric field toward the hull, thus providing a shielded area for fish where the effects of the barrier would be reduced or completely eliminated. Steel-hulled barges may increase the probability that fish are not affected by the electric barrier. Technical data for the Barrier I study were used to model parameters for Barriers IIA and IIB; however, no actual testing was done on those electric barriers.

Action: Design and conduct experiments to test the effectiveness of the Electric Barriers IIA and IIB in the presence of steel-hulled barges and other vessels.

Milestones:

- June 2010 – Experimental design.
- August 2010 – Solicitation and award of contract for study.
- June 2011 – Completion of study with final report.

Potential Hurdles:

- Interruption of river traffic.

2.2.11 Research of Potential Asian Carp Access Vectors on Barge Decks and Between Lashed Barges

Work Group: MRR

Lead Agency: USFWS, IDNR, USCG

Estimated Funding: Costs currently under consideration

Potential Funding Source: Base program funding and GLRI as necessary

Problem: Anecdotal evidence exists for potential vectors for AC access to the CAWS. Barge personnel have been observed kicking dead silver carp off decks of barges in the O'Brien Lock. Additionally, live and dead animals, as well as debris, have been observed trapped in the cavities formed between barges lashed together bow to bow or bow to aft. It is unknown if these access routes are viable vectors for developing self-sustaining populations of Asian carp in the CAWS.

Action: Form interagency/industry task force to validate or disprove the access paths of fish on decks and fish trapped between lashed barges. The task force must establish factual evidence that supports or refutes the viability and effectiveness of these access pathways.

Milestones:

- June 2010 – Task force formation.
- August 2010 – Preliminary results briefing.
- October 2010 – Final report.

Potential Hurdles:

- None.

2.2.12 Investigation of Northeast Illinois' Bait Shops

Work Group: CO

Lead Agency: IDNR

Estimated Funding: NA

Funding Source: IDNR base funding

Problem: In working to prevent Asian carp establishment in the Great Lakes, every possible avenue for entrance needs to be addressed while reaching out to the public for assistance and educating them on the dangers.

Action: IDNR will conduct an investigation of bait shops in Northeast Illinois to identify whether Asian carp are collected and sold as bait in the Chicago area in order to further reduce the risk of distribution of Asian carp minnows.

Milestones:

- IDNR has identified 52 wholesale and retail establishments with valid permits to sell live minnows in Region 2 (Lake, McHenry, Kane, Cook, Du Page, Kendall, Kankakee, Will, Grundy counties).
- Of these permitted, 51 inspections were conducted and found eight of these locations were closed, out of business or not selling minnows at that time of year and an additional five bait shops had not complied with permit requirements. These individuals were inspected and were advised to complete a permit application. All inspections were completed by February 26, 2010. No Asian carp were found, and all bait shop owners and employees were very cooperative. IDNR will repeat this inspection process in June and July at the height of the fishing season to re-inspect these shops and those that we were unable to access.

Potential Hurdles:

- Bait shop and public compliance.

2.2.13 Efficacy Study for Toxic Zones Using Plant Effluent

Work Group: MRR/IC

Lead Agency: MWRD

Estimated Funding: NA

Funding Source: MWRD base funding

Problem: Dependence on a single engineering control should not be expected to halt migration of Asian carp in the CAWS. A multi-tiered defense is the preferred approach, considering utilization of all available technologies to prevent the Asian carp from establishing a self-sustaining population.

Action: Use of MWRD plant effluent to create an anoxic zone has been determined unworkable because Asian carp are known to gasp air when in water with low dissolved oxygen (DO), and possibly could survive and transit through an anoxic zone. Wet weather operations would also disrupt an anoxic zone. Another possible approach is to create a toxic zone through the bypass of ammonia-laden primary effluent to the CSSC at the Stickney plant and the Little Calumet River at the Calumet plant. This would create toxic zones to kill fish migrating upstream. These two zones would block passage to the lakefront control structures and serve to assist in the plan for controlled lock operations. The length of the toxic zone, as well as other operating parameters, would have to be determined through study, including the method to remove the ammonia toxicity at the downstream end of the toxic zone. Full-scale testing would be included in the study and would be necessary to verify that the toxicity would be present across the entire channel cross-section throughout the zone. Instream mixing may be necessary to accomplish complete dispersal. MWRD envisions collaboration with other institutions on this applied research.

Milestones:

- 2011 – Complete literature research.
- 2012 – Complete modeling of toxic zones and method of ammonia removal.
- 2013 – Full-scale testing in channel.

Potential Hurdles:

- Prohibited by the CWA and MWRD's National Pollution Discharge Elimination System (NPDES) permits.
- Proposal would discharge not only toxic concentrations of ammonia, but also total suspended solids (TSS), toxic metals, and organics, and impact biological oxygen demand (BOD), which could have adverse aquatic life and human health consequences in the vicinity of the discharges and in downstream waters.
- Sanctioning the discharge of untreated sewage could undermine the utility of secondary treatment throughout the watershed by other sanitary districts and have profound negative implications nationwide.
- Efficacy for Asian carp control is doubtful based on ammonia toxicity data for common carp and the volume, pH, and ammonia concentrations expected in the effluent.

2.2.14 Increased Lacey Act Enforcement of Illegal Transport of Injurious Wildlife

Work Group: MRR/IC

Lead Agency: USFWS

Estimated Funding: $400,000

Funding Source: GLRI monies to USFWS

Problem: Although transfer of AIS is currently illegal, stricter enforcement is necessary to mitigate the risk of transfer.

Action: The USFWS will support law enforcement activities related to implementation of the Lacey Act,[10] as applicable. USFWS will support implementation of the injurious wildlife provisions[11] through regulations specified in the *U.S. Code of Federal Regulations* (CFR).[12] USFWS law enforcement personnel will work cooperatively and in coordination with state officials and agencies within the Great Lakes and surrounding region to enforce federal and state statutes and regulations to support prevention and control of AIS, including Asian carp. Additionally, the USFWS will work toward completion of actions needed in advance of rulemaking for listing of bighead carp as injurious under the Lacey Act (black and silver and large-scale silver carp are currently listed). The agency completed some of the steps required in the rulemaking processes for bighead carp, including a risk assessment, the Initial Regulatory Flexibility Analysis, and an economic analysis, although not all have gone through public review.

Milestones:

- Completion of supporting documents, studies, and data acquisition and draft proposed rule to pursue injurious species listing for bighead carp under the Lacey Act (actions to begin FY2010 – 3rd Quarter)
- Coordination between USFWS and State law enforcement personnel to support implementation of authorities to preclude illegal activities related to aquatic nuisance species, with an emphasis on Asian carp prevention in the Great Lakes (actions ongoing through FY2010; includes cross-agency training and priority-setting, and field operations).

Potential Hurdles:

- Enforcement personnel.
- Timeframe requirements for finalization and approval of injurious wildlife listing for bighead carp.

2.2.15 State and Interstate AIS Management Plans

Work Group: IC/MRR/CO

Lead Agency: USFWS and eight Great Lakes states

Estimated Funding: $11,000,000

Funding Source: GLRI monies to USFWS

Problem: Lack of development of state programs specific to AIS Management Plans.

Action USFWS will provide funds allocated through the GLRI in 2010 to states, Tribes, and others to enhance activities that prevent introduction of AIS into the Great Lakes. Additional funding has been made available to implement State AIS Management Plans and related to AIS control within the Great Lakes watershed. This would include development of state-led rapid response actions conducted under new rapid response plans developed by the Great Lakes states and approved by the AIS Task Force.

Milestones:

- Allocation of $8 million to State of Illinois to support actions to control Asian carp as identified in approved State AIS management plan (completed April 2010)
- Allocation of balance of funds to seven other Great Lakes States to support activities identified in approved State AIS management plans (currently soliciting proposals for approved activities from States, to be followed by review and obligation of funds).

Potential Hurdles:

- States may have difficulty providing the 25 percent cost-share requirement (non-federal funds) as a requirement for receiving annual funding allocation for support of activities identified in approved State AIS Management Plans.

2.2.16 Competitive Funding Opportunities

Work Group: MRR/IC/CO

Lead Agency: USEPA, USFWS

Estimated Funding: $8,800,000

Funding Source: GLRI monies to USFWS

Problem: Invasive species disrupt fragile ecosystems causing economic and ecological damage..

Action: Under the Invasive Species Prevention and Control Grant Program, USEPA and USFWS expect to provide $8.8 million (approximately $4.5 million through USFWS and $4.3 million through USEPA) for projects that will prevent new introductions of invasive species into the Great Lakes basin, as well as projects that will eradicate and control invasive species already present. Invasive species will be addressed through one or more of the following activities: implementing on-the-ground control projects, developing new control technologies, reducing spread via canals and waterways, addressing live organisms in commerce, and/or promoting safe recreation and resource use. The Invasive Species Prevention and Control Grant Program will support the development. Through this existing funding mechanism, states, Tribes, and academia may submit proposals for funding consideration through a competitive proposal review process. Projects targeting prevention and control of Asian carp in Great Lakes waters can be submitted for consideration.

Milestones:

- 2nd quarter 2010 – Review of proposals. Announcements expected in late April.
- 3rd quarter 2010 – USFWS/USEPA grants awarded and initial implementation of work.

Potential Hurdles:

- Agencies have little control over what is submitted; Asian carp proposals may be lacking.

2.2.17 Understanding Asian Carp and Bluegreen Algae Dynamics

Work Group: MRR/IC

Lead Agency: USGS

Estimated Funding: $225,000

Funding Source: GLRI monies to USGS

Problem: Bluegreen algae (primarily *Microcystis sp.*) blooms resulting from the mussel invasion may provide an excellent food source for bighead carp, enhancing their invasion. Noxious bluegreen algal blooms, under some circumstances, can be enhanced by interaction with silver and bighead carp, and presence of these carp may enhance toxin production by noxious algae.

Action: The risk of enhanced noxious algal blooms, and the possibility that bluegreen algae (cyanobacteria) blooms might enhance Asian carp invasiveness, could be assessed by modeling; verification of the modeling via field experiments also could increase our understanding of this relationship.

Milestones:

- Focus on bighead carp for 2010.
- Map of the spatial and temporal extent and cell density of bluegreen algae blooms in the Great Lakes.
- Determination of bioenergetics of bighead and silver carp feeding on *Microcystis sp.* blooms.
- Determination of densities and conditions of Asian carp feeding on *Microcystis sp.* that enhance or ameliorate blooms and toxin production by *Microcystis sp.*
- Scientists and technicians have been selected to perform project-related tasks.
- Green algae have been chosen to culture with blue-green algae. Culture methods for both have been researched.
- Supplies and equipment inventoried and purchased.

Potential Hurdles:

- Raising *Microcystis sp.* in adequate concentrations in the laboratory environment.
- Hydroclimatic variability of bluegreen algae blooms.

2.2.18 Use of Seismic Technology to Divert or Eradicate Invasive Asian Carp

Work Group: MRR/IC

Lead Agency: USGS

Requested Funding: $200,000

Funding Source: GLRI monies to USGS

Problem: Methods now available to control nuisance and non-native, invasive fishes are inadequate. Some methods are expensive, labor-intensive, and non-selective (e.g., most chemical applications); others remove fish only in a particular length range (netting, electrofishing, commercial/recreational fishing, electrical barriers), or are in early stages of development and not developed for a variety of species (e.g., use of pheromones with other control methods, sterile male release). Proximity of Asian carp (bighead carp and silver carp) to the Great Lakes basin highlights the need to quickly make available additional control methods to affect their behavior, thereby impeding their spread into the Great Lakes, or to remove Asian carp through direct mortality. Seismic technology has the potential to affect the behavior or eradicate nuisance and non-native invasive fishes through a range of age classes, making it a viable candidate for integrated suppression efforts.

Action: This study will focus on lethal and sub-lethal effects of seismic technology to divert or eradicate invasive Asian carp as a means to inhibit passage and reduce recruitment. Initial dose response studies will determine the effects of different sound wave frequencies on various age classes of Asian carp at a range of distances from the sound source. The magnitude of the sound wave and particle velocity will be measured in order to quantify fish response to sound impacts. Initial and delayed lethality will be assessed, as well as sub-lethal evading behaviors.

Milestones:

- An experimental site has been selected and all necessary supplies and inventory are being compiled.
- Lease agreements on equipment have been received.
- Equipment has been refurbished and tested to ensure Quality Assurance/Quality Control upon delivery of the technology.
- Additional collaboration has been initiated with USFWS and the Bureau of Reclamation.
- Determination of the lethal effects of sound waves on Asian carp is expected to begin in spring 2010. When dose response data are acquired, studies will evaluate the effects of an array of seismic sound sources and continuous exposure in a controlled setting and in the field.

Potential Hurdles:

- Delay in manufacturing of equipment to meet project needs for scale up applications.
- Possible negative effects on resident aquatic life.

2.2.19 Expand Research on the Identification of Asian Carp Attraction Pheromones

Work group: MRR/IC

Lead Agency: USGS

Estimated Funding: $300,000

Funding Source: GLRI monies to USGS

Problem: Technologies presently do not exist to specifically target Asian carp for control within aquatic ecosystems. Current applications of non-selective toxicants (e.g., rotenone) harm native fish species and must be applied to broad expanses of aquatic habitat if they are to have effect. The lack of a species-specific method of attraction (e.g., pheromones) limits the ability to achieve maximal control while minimizing risk to native fishes. Developing attractants with high specificity for Asian carp is necessary to control or eradicate them without further harm to native species and habitat.

Action: USGS will conduct research to better define the active pheromone components and the response of Asian carp to pheromone products. Conceptual models will be developed in which pheromones could be integrated into management programs to control or limit Asian carp. Methods will be developed to synthesize active pheromone components.

Milestones:

- Utilize electrophysiology of Asian carp olfactory systems to identify the most effective chemical substances identified in pheromones and feeding lures in silver and bighead carp.
- Conduct behavioral tests to determine attraction to compounds found highly effective in physiology studies.
- Initiate proof-of-concept field observations for substances found highly attractive to Asian carp.
- Research work orders are being established and a scientist has been identified to conduct studies.
- Competitive bids have been received for digital video analysis of carp behavior.

Potential Hurdles:

- Chemical tool research and development recently initiated; long lead time for field testing, possibly extending into 2013.
- Chemical composition of pheromone highly complex and variable over reproductive cycle.
- Potential competition with natural hormones to prevent 100 percent efficacy.

2.2.20 Identify Potential Compounds for Inclusion in a Toxicant Screening Program to Identify Potential Selective Toxicants for Control of Asian Carp

Work group: MRR/IC

Lead Agency: USGS

Estimated Funding: $300,000

Funding Source: GLRI monies to USGS

Problem: Current toxicants used to control AIS are general toxicants with limited to no selectivity (e.g., antimycin, rotenone). Agrichemical and pesticide laboratories create thousands of new chemical compounds yearly. Although toxicity information is generally not available for these new compounds in aquatic organisms, structure activity relationship analysis could identify likely candidates for inclusion in a toxicant screening program.

Action: USGS will develop cooperative research and development agreements to access pharmaceutical or agrochemical company chemical libraries to identify potential candidate toxicants. Identification of potential toxicants will either be through structure activity relationships or through known activity models. Studies will be required to assess selective toxicity of candidate toxicants between Asian carp versus native fishes. Additional data sets would be required to support registration. Efforts would be made to target those compounds/formulations with present agrichemical/pesticide use to reduce costs and time required to obtain full registration while minimizing potential impacts to native aquatic life.

Milestones:

- Literature review completed and a database of chemical correlations with mode of toxic action developed.
- Initiated collaboration with a university chemist to assist in the identification of potential toxicants.

Potential Hurdles:

- Development of cooperative research and development agreements.
- Required development for new compounds of full registration dossier before widespread use.
- Long lead time for completion, possibly extending into 2015.

2.2.21 Evaluate Physical Methods to Disrupt Asian Carp Spawning Behavior and Decrease Egg Viability

Work group: MRR/IC

Lead Agency: USGS

Estimated Funding: $200,000

Funding Source: GLRI monies to USGS

Problem: Technologies presently do not exist to specifically target Asian carp for control within aquatic ecosystems. Current physical controls (e.g., electrofishing or netting) are of limited success in altering populations. The development of physical methods to disrupt Asian carp spawning activities in identified tributaries coupled with attractant pheromones has the potential to limit Asian carp reproduction success.

Action: Research will focus on identification of sound wave amplitude and frequency which elicit silver carp avoidance behavior to disrupt spawning aggregations and limit recruitment. Research will also be conducted to evaluate the response of Asian carp eggs to electrical fields, sonication, etc., in order to develop methods to reduce egg viability while the eggs drift downstream of Asian carp spawning areas. The research will enable integrated approaches to prioritize locations of potential physical controls in identified spawning habitat coupled with application of attractant/dispersal pheromones.

Milestones:

- Earliest field application would be in 2011. However, if additional funding becomes available, this project can be accelerated to 2010. Currently, remaining 2010 GLRI monies might be able to be redirected to fund this effort.

Potential Hurdles:

- Scaling equipment from laboratory application to field trials.
- Negative effects of techniques on native aquatic life, such as impeding the spawning of important commercial or sport fishes.

2.2.22 Characterization of Organism-Level Target Delivery Sites in Native Aquatic Animals

Work group: MRR/IC

Lead Agency: USGS

Estimated Funding: $200,000

Funding Source: GLRI monies to USGS

Problem: Current toxicants used to control AIS are non-selective and applied as immersion exposures, resulting in equal exposures of native and invasive species to the toxicant. Development of a delivery system that is selectively consumed by or active in an invasive species could reduce non-target species exposure to the toxicant and may enhance selectivity and reduce effects to non-target species. Development of such delivery methodologies will require full understanding of native and invasive species gill and gut enzyme activity and physiology, because a targeted delivery system will likely use an oral or gill adhesion delivery route.

Action: Research will be conducted to identify and characterize potential bioactive agent delivery sites within native fishes, especially those with potential dietary or other life history overlap with Asian carp, including the gill, skin, and gastrointestinal tract (fore- and hind gut). Research will focus on acquisition of data on important characteristics of native species (e.g., enzyme, protein, lipid, carbohydrate components, pH, and enteric microbial community). These data are key to our understanding of factors that might affect delivery of a bioactive agent. While some basic research is available in this area, additional basic and applied research will lead to development of optimized delivery components to enhance selectivity and sensitivity of integrated pest management programs for Asian carp. This research will directly support and integrate with research planned to characterize Asian carp gastrointestinal pH, and digestive enzyme profiles will be expanded to include identification and characterization of native fish gastrointestinal tracts to develop novel methods to deliver current and potential new bioactive agents.

Sea Lamprey Control throughout the Great Lakes Basin

The GLFC works with Fisheries and Oceans Canada, the USFWS, and the USACE to undertake sea lamprey control. Recent efforts rely on barriers that are constructed to block the upstream migration of spawning sea lampreys while allowing non-target species to pass through without being affected. Additional research has yielded specific lampricides, chemicals applied to waterways which will not harm other fish species; Sea lamprey traps strategically placed to collected spawning lampreys; and the sterile-male-release technology which releases sterile males into areas of spawning females to significantly decrease the quantity of viable offspring.

With further research and development is necessary, these techniques have the opportunity to be applied to other invasive species, potentially Asian carp.

The sea lamprey, a species native to the Atlantic Ocean, swam into the upper Great Lakes through the Well and Canal and, by 1939, had infested the entire basin. By the 1940s, the Great Lakes fishery was devastated, with fish harvest falling from nearly 18 million pounds annually to only a few hundred thousand pounds.

Understanding the urgency of the problem, and greatly alarmed by the real economic and ecological damages sea lampreys were causing, the governments of Canada and the United States agreed to the *Convention on Great Lakes Fisheries of 1954*, a treaty that created the GLFC and vested sea lamprey control in that organization.

Today, sea lampreys have been reduced by 90% from their historical high of the 1940s, but only through the GLFC's expensive, ongoing effort—to date, the GLFC has spent more than $350 million combating the sea lamprey. Sea lamprey control is possible because the species is vulnerable during several life stages and because the governments made control a priority. They put the GLFC clearly in charge of the effort, thus creating accountability, and they provided the GLFC with the resources it needed to discover sea lamprey control techniques and to implement the program.

Milestones:

- Identification and characterization of important characteristics of native plankton-eating fishes to reduce exposure to Asian carp toxicants being developed.
- Initiated equipment and supply acquisitions.
- Initiated literature review and development of a consolidated database of native and non-native fish life history characteristics.

Potential Hurdles:

- Potential seasonal enzyme profiles (e.g., enzymes adjusted to match food resources) may require delivery platforms to be seasonally adjusted to match enzyme activity.

2.2.23 Great Lakes' Tributary Assessment for Asian Carp Habitat Suitability

Work group: MRR/IC

Lead Agency: USGS

Estimated Funding: $275,000

Funding Source: GLRI monies to USGS

Problem: Tributaries that would be suitable for Asian carp spawning need to be identified to focus management efforts for evaluating invasion success, as well as sites to launch control actions.

Action: Although Asian carp prefer lakes and slow moving waters, they are thought to require a long river for spawning and to be able to establish a self-sustaining population. An often-cited value in the literature is a minimum

length of 100 kilometers (km). Twenty-two rivers on the U.S. boundaries of the Great Lakes have been identified with a minimum undammed river length of 100 km[13]. However, estimates of river length required are based on locations where populations of Asian carp are known to be found, and thus do not describe a true minimum. Recent research has determined the developmental stage at which Asian carp larvae are capable of swimming and migrating laterally from flowing water into nursery habitats. This knowledge can be used in a model of river velocity and temperature to describe an actual river length required. This more accurate minimum river length, taken together with the temperature and velocity regimes of individual rivers, can be used to more accurately determine which rivers are suitable for spawning and successful reproduction of Asian carp.

Milestones:

- Determine more exact timeline for Asian carp to achieve required key developmental stages.
- Determine the minimum velocities needed to keep Asian carp early, non-swimming life stages, adrift.
- Determine the mean velocities and temperature of rivers most likely to be used as spawning habitats by Asian carp.
- Model the transport of Asian carp eggs and larvae to assess spawning habitat suitability.
- A USGS project coordination meeting was held on March 16, 2010, in Chicago to present the project, receive feedback, and coordinate science and resources.
- The Saint Joseph River in Michigan and Indiana and the Milwaukee River in Wisconsin have been selected for assessment.
- Field sampling guidelines for hydraulic and water-quality data have been developed to aid in planning the field work.
- Culturist and technicians are assigned; equipment is purchased to maintain fish for breeding; location for maintenance system has been determined, and ponds are reserved. Source and backup sources for breeding stock have been determined; culture system selected and supplies are purchased.
- Study design is finalized.

Potential Hurdles:

- Temperature and hydrograph variability will require wide variety in models.
- The exact source of mortality in eggs and larvae that precipitate to the bottom of a river are not known.
- Development testing parameters are needed for tributaries. At least two spawns are needed to determine variability between fish.

2.2.24 Risk Assessment of Asian Carp Establishment in the Great Lakes, Based on Available Food Sources

Work group: MRR/IC

Lead Agency: USGS

Estimated Funding: $250,000

Funding Source: GLRI monies to USGS

Problem: Asian carp have been observed to diversify their diets beyond preferred pelagic plankton sources and feed on organic matter (“detritus”) during certain conditions and on the basis of availability of food resources. It is unknown if Asian carp can sustain themselves in the Great Lakes.

Action: USGS researchers have observed bighead carp feeding on sediment detritus in ponds and silver carp feeding on attached algae in aquaria. Also, silver carp are thought to derive substantial nutrition from bacteria, both consumed and cultured in the gut. However, it is not known whether these food sources are adequate for growth and survival of Asian carp. It is unknown whether they could feed adequately on plankton currently found in the Great Lakes, or if they could exploit detritus or attached algae (like *Cladophora*, now a substantial problem in parts of the Great Lakes because of the mussel invasion) to a degree that would allow them to maintain large populations. USGS will investigate these questions using laboratory (juvenile fish) and pond (adult or sub-adult fish) studies to assess the risk of bighead carp establishment in the Great Lakes. Research focus will be on bighead carp in FY2010 and silver carp in FY2011.

Milestones:

- Evaluate existing physiological model for juvenile bighead carp.
- Offer non-planktonic resources such as attached and unattached *Cladophora* and attached inorganic substrate on zebra mussel shells as found in the Great Lakes; determine behavior of fish and energetic content of food consumed.
- Predict if the conditions found in the Great Lakes will prove adequate for growth and survival when planktonic resources are unavailable.
- Conduct focused studies on role of bacterial consumption as potential nutrition for Asian carp.
- Scientist, culturist and technicians selected for project.
- Culture techniques for specific algae have been researched; equipment and supplies being inventoried and purchased.
- Material to which zebra mussels will attach has been identified
- A plan for handling samples to avoid introduction of invasive species or viruses into the lab have been developed.

Potential Hurdles:

- Timeline required for behavioral and physiological adaptations to new foods assessment may extended into 2014.

2.2.25 Technologies Using Oral Delivery Platforms for Species-Specific Control

Work group: MRR/IC

Lead Agency: USGS

Estimated Funding: $1,553,000

Funding Source: GLRI monies to USGS

Problem: The technology does not currently exist to specifically target Asian carp for control within aquatic ecosystems. Methods with high specificity for Asian carp are necessary to control or eradicate them without harm to native species and habitat.

Action: Development of a targeted oral delivery platform using novel incorporation technologies that have the capacity to deliver biocides to specific target sites in AIS may increase the selectivity and specificity of both current and potential new management chemicals. This large integrated project will focus on developing these approaches for application throughout the Great Lakes. In 2010, work will focus on initiating development of new integrated pest management approaches for Asian carp and other invasive aquatic species of concern to Great Lakes managers,

including researching candidate bioactive agents, pathogens, and specific targeted delivery platforms that will allow for control of Asian carp while minimizing negative impacts to native aquatic life to the extent practicable.

Research will initiate in 2010 and finish in 2011 to characterize Asian carp gastrointestinal pH and digestive enzyme profiles. Research will also initiate in 2010 and finish in 2011 to compare and contrast the gill of Asian carp relative to native fish with a focus on identifying optimal particle size and geometry that may enhance selective filtration by Asian carp. The characterization of the gill, gastric pH, and enzyme profile may allow for the creation of an Asian carp specific poison.

Milestones:

- USGS hired new fishery biologist as principal investigator and developed recruitment actions for research personnel.
- Completed responses to project peer-review and revised project as appropriate.
- Initiated literature review and development of a consolidated database of native and non-native fish life history characteristics.

Potential Hurdles:

- Long lead time from development to field testing, possibly extending into 2015.

2.2.26 Study Efficacy of Reducing Asian Carp Food Source Through Nutrient Removal

Work Group: IC

Lead Agency: USEPA, IEPA, MWRD, USGS

Requested Funding: $1,000,000

Potential Funding Source: GLRI monies

Problem: Most if not all biologists agree on the dramatic need to suppress the population of Asian carp in the Illinois River watershed, including CAWS. Asian carp are filter feeders (bighead and silver carp). As such, they grow fastest and reproduce the most in systems with ample food supplies supported by nutrient-rich conditions. In the CAWS, including the CSSC, WWTP effluent makes up most of the flow, and thus the nutrients fuel phytoplankton growth, which (along with suspended organic matter present in effluent) serves as the primary food source of the carp.

Action: One potentially effective tool to control Asian carp in the CAWS/Des Plaines River/Illinois River system is to reduce the food source of the carp by addressing the base of its food chain - nutrients. A viable long-term strategy to reduce the nutrients, fine particulate matter, and phytoplankton concentrations (i.e., the food of carp) would likely reduce the abundance of carp. Nutrient reductions could be accomplished by removing phosphorus and nitrogen (using advanced biological nutrient removal technologies) from the WWTPs effluent that discharge into the CAWS/Upper Illinois Watershed. In this critical area, point source discharges are a primary source of nutrients and particulate matter. Over time, nutrient reductions by point sources could reduce Asian carp populations, could enhance native fish communities, and would support the goal to reduce nutrient discharges to the Mississippi River and Gulf of Mexico.

Combined sewer overflows (CSO) and stormwater discharges are also sources of nutrient loadings. In order to achieve and maintain lower levels of nutrient loadings, MWRD will need to continue to implement a strong CSO control program and the cities with separate storm sewer systems in the drainage area will need to implement robust stormwater control measures. It is recommended that stormwater control measures in suburban communities include requirement for use of low phosphorus fertilizers. It is also recommended that green infrastructure measures be

implemented in the cities with separate storm sewer systems and CSO areas to reduce wet weather loadings and trap nutrients.

Milestones:

- 2010 – Review existing and new information on carp food, energenics, growth, and reproduction as related to nutrient and phytoplankton abundance.
- 2010 – Determine expected nutrient reductions and costs associated with widespread and/or targeted implementation of both short-term (i.e., optimization of existing WWTP infrastructure for nutrient removal) and long-term (construction of new treatment technologies) actions by publicly owned treatment works (POTW).
- 2011 – Complete modeling of the effects associated with implementation of a range of nutrient reduction strategies on Asian carp populations and native fish communities in the Illinois River.
- 2012 – Work with IEPA to introduce actions determined most effective into NPDES permits.

Potential Hurdles:

- Cost of implementing nutrient controls at WWTPs, depending on which treatment technologies are selected.

3.0 GREAT LAKES STATES' INVOLVEMENT

This Framework and its proposed actions should unite the Great Lakes states and allow them to achieve the common goal of protecting the Great Lakes against Asian carp. As a result of these proposed actions, the Great Lakes states are in a unique position to enhance the unified front throughout each state's individual jurisdiction.

Several proposed actions in the Framework specifically aim at increasing Great Lakes states programmatic capacity against AIS by providing funding. This would allow the states an opportunity to leverage their resources and expertise for implementing short-term and long-term actions to prevent Asian carp from establishing a self sustaining population in the basin. These measures include:

- Funding opportunities for AIS and prevention program development. Through existing funds such as the Wildlife and Sport Fish Restoration Grants Program, states can apply for grants for AIS, specifically Asian carp program development within the respective states or through multi-state collaborations and grants.
- Competitive funding for state response operations and response plan implementation. Additional competitive funding opportunities for 2010 are available for implementation of AIS- and Asian carp-specific control activities.
- Increased pest management program implementation using a combination of physical, chemical, and biological methods. Importantly, this program addresses one of the nine priorities of the Council of Great Lakes Governors and directly supports state and interstate management of AIS plans approved by the AIS Task Force.
- Preparation of AIS Management Plans. Additional funds have been allocated for 2010 through GLRI due to the significance of Asian carp control. States are strongly encouraged to utilize these funds to prepare and implement AIS-specific plans and other supporting activities.

USFWS and the RCC work groups will work closely with Great Lakes states to provide assistance where applicable in program development and plan preparation through the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPACA). As amended, it has authorized federal support, via USFWS, for state and interstate AIS management plans. Draft plans are approved by the AIS Task Force. All Great Lakes states are implementing, with USFWS grants, either or both state and interstate AIS management plans. Great Lakes states are the primary recipients of the grants, but others can be invited by states to share in grant allocations.

Additional examples of measures states could adopt to protect their waters from Asian carp establishment include:

- Holding consensus-building forums with other state and federal agencies. For example, a series of Governor's Policy Summits could be held across the basin to provide solid scientific information to decision makers and the general public on the nature and scope of the issue, and accomplishments and plans to deal with problems, including alternative approaches and impacts. The objective is to begin dialogue that may lead to collaborative regional approaches.
- Considering multi-state coordinated actions to prevent establishment of Asian carp in the Great Lakes. This would allow actions on a larger scale, with potentially pooled resources to increase the effects and reach of these potential actions.
- Along with provinces, tribes, and local municipalities, investigating the passage of ordinances/laws prohibiting sale and import/export of live Asian carp (similar to the law already in place in Chicago).

4.0 COMMUNICATION AND OUTREACH

The efficacy of the actions described above and summarized in the Matrix can be significantly enhanced through increased outreach to and participation by other agencies and stakeholders. For example, recreational water sports groups can play a direct role in educating their members and the general public about how they can participate in ways to prevent transport of invasive species through the Great Lakes watershed. Additionally, NGO volunteers can report any potential sightings of Asian carp to appropriate resource agencies. Many precedents for effective natural resource education programs in the United States could be adopted by agencies participating in this Framework.

Outreach actions currently being implemented concurrently with the programs in the Framework include:

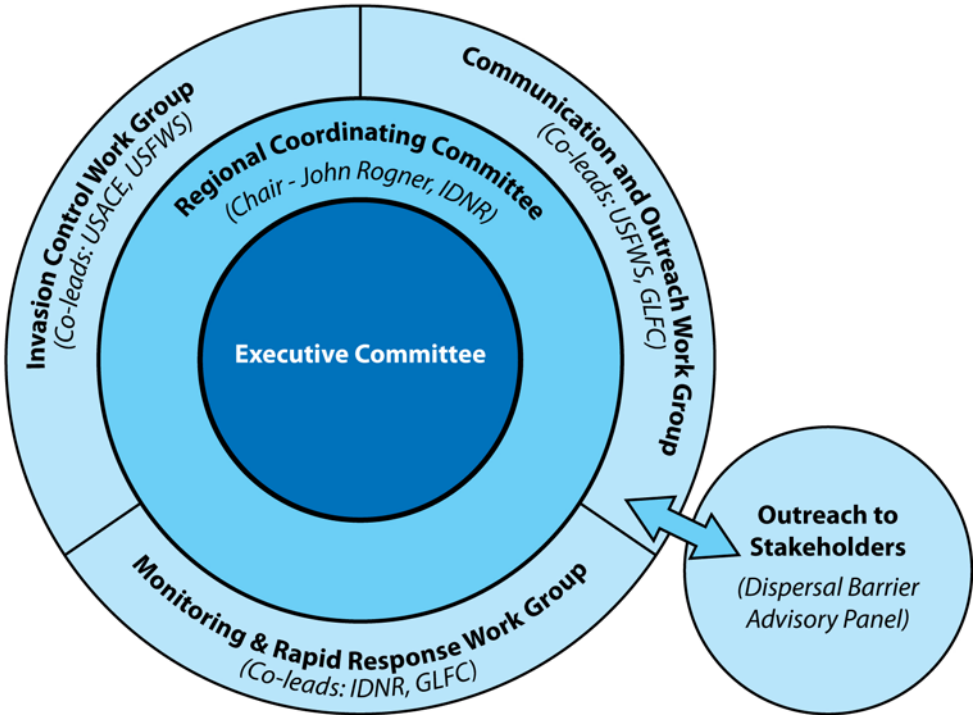
- Implementation of a Strategic Communication Plan as part of this Framework. The plan outlines communication tools, methods, and protocols that will provide timely and transparent information to multiple target audience groups including elected officials, states, tribes, key constituents, and the media.
- Maintenance of the primary online communication tool www.asiancarp.org to disseminate announcements and provide information on RCC activities.
- Coordination of on-site or telephonic media events, including press announcements regarding new Asian carp control efforts, such as release of sampling and eDNA results.
- Outreach to state resource agency heads, municipal leaders, and tribal leaders.
- Development of public engagement opportunities/ "How to Help" section of www.asiancarp.org. The Communication work group will continue to use www.asiancarp.org and media advisories to disseminate validated information.

The RCC invited stakeholders and user groups will provide input and comments on the Strategy Framework via public meetings and via a centralized e-mail account. Ongoing stakeholder participation is necessary in both individual actions within this Framework and in further development of the Framework itself.

5.0 COORDINATION STRUCTURE

Exhibit 4 depicts the relationship of the seven primary agency or governmental groups involved in the implementation of the Framework. The relationship is non-linear because of the need for harmonized input from each group in all facets of the Framework. The Executive Committee consists of senior managers from key federal and state agencies. The RCC is made up of agencies with operational and coordinating authority for work relevant to the CAWS. The three work groups surrounding the RCC are tasked with the specific responsibilities laid out in the Framework. Each of the three work groups will be led by representatives from the agencies identified, although the work groups themselves are comprised of several staff members from each agency. Outreach will be the sole responsibility of the Communication and Outreach Work group.

Exhibit 4. Coordination Structure



6.0 ACRONYMS

AIS	Aquatic Invasive Species
ANS	Aquatic Nuisance Species
ASA CW	Assistant Secretary of the Army for Civil Works
BOD	Biological oxygen demand
CAWS	Chicago Area Waterway System
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CO	Communication and Outreach
CSO	Combined sewer overflow
CSSC	Chicago Sanitary and Ship Canal
CWA	Clean Water Act
DIDSON	Dual-frequency identification sonar
DO	Dissolved oxygen
eDNA	Environmental deoxyribonucleic acid
GLFC	Great Lakes Fishery Commission
GLRI	Great Lakes Restoration Initiative
IC	Invasion Control
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
I&M	Illinois and Michigan
km	Kilometer
MWRD	Metropolitan Water Reclamation District of Greater Chicago
MRR	Monitoring and Rapid Response
MS4	Municipal separate storm sewer system
NA	Not Applicable
NANPACA	Nonindigenous Aquatic Nuisance Prevention and Control Act
NEPA	National Environmental Policy Act
NGO	Non-governmental organization
NPDES	National Pollution Discharge Elimination System
POTW	Publicly owned treatment works
RCC	Regional Coordinating Committee

SO	Sewer overflow
TBD	To be determined
TSS	Total suspended solids
USACE	United States Army Corps of Engineers
USAID	United States Agency for International Development
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WWTP	Wastewater treatment plant

7.0 BIBLIOGRAPHY

Barnhart, G. 2005. *The Threat Posed to the Great Lakes Basin by Asian Carp.* On-line address: http://www.glfc.org/fishmgmt/testimony_AsianCarp.pdf. Accessed: November 3, 2009.

Brammeier, J., I. Polls, and S. Mackey. 2008. Preliminary Feasibility of Ecological Separation of the Mississippi River and the Great Lakes to Prevent the Transfer of Aquatic Invasive Species. November.

Chick, J. H. 2002. Establishment of Asian Carp in the Upper Mississippi River and Potential Threats to the Great Lakes. Illinois Waterway Barrier Workshop hosted by the Great Lakes Protection Fund, in Chicago. June.

Conlin, M. 2002, Summer/Fall. "Asian carp poised to invade the Great Lakes." *News from the Great Lakes Panel on Aquatic Nuisance Species: ANS Update*, 8(3).

Friends of the Chicago River. 2006. *Clean Water and Healthy Fish.* On-line address: http://www.chicagoriver.org/projects/clean_water_and_healthy_fish/. Accessed: September 15, 2009.

Kolar, C.S., D.C. Chapman, W.R. Courtenay, Jr., C.M. Housel, J.D. Williams, and D.P. Jennings. 2007. "Bigheaded carp: a biological synopsis and environmental risk assessment." *American Fisheries Society Special Publication 33*. Bethesda, Maryland.

Michigan Sea Grant. 2009. *Lake Sturgeon*. On-line address: http://www.miseagrant.umich.edu/downloads/sturgeon/fs_Sturgeon.pdf. Accessed: September 2, 2009.

Nico, L.G. 2007. *Mylopharyngodon piceus*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. On-line address: http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=573. July 20.

Schwieterman, Joseph P. 2010. An Analysis of the Economic Effects of Terminating Operations at the Chicago River Controlling Works and O'Brien Locks on the Chicago Area Waterway System. DePaul University, Chicago, IL. April 7.

Tetra Tech, Inc. (Tetra Tech). 2009. *Illinois Department of Natural Resources – Rapid Response Plan.* December.

END NOTES

[1] Friends of the Chicago River. 2006. *Clean Water and Healthy Fish.* On-line address: http://www.chicagoriver.org/projects/clean_water_and_healthy_fish/. Accessed: September 15, 2009.

[2] Conlin, M. 2002, Summer/Fall. "Asian carp poised to invade the Great Lakes." *News from the Great Lakes Panel on Aquatic Nuisance Species: ANS Update*, 8(3).

[3] Kolar, C.S., D.C. Chapman, W.R. Courtenay, Jr., C.M. Housel, J.D. Williams, and D.P. Jennings. 2007. "Bigheaded carp: a biological synopsis and environmental risk assessment." *American Fisheries Society Special Publication 33*. Bethesda, Maryland.

[4] Nico, L.G. 2007. *Mylopharyngodon piceus*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. On-line address: http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=573.

[5] Chick, J. H. 2002. Establishment of Asian Carp in the Upper Mississippi River and Potential Threats to the Great Lakes. Illinois Waterway Barrier Workshop hosted by the Great Lakes Protection Fund, in Chicago.

[6] Michigan Sea Grant. 2009. *Lake Sturgeon*. On-line address: http://www.miseagrant.umich.edu/downloads/sturgeon/fs_Sturgeon.pdf. Accessed: September 2, 2009.

[7] Taylor, John C and James L. Roach. 2009. "Ocean Shipping in the Great Lakes: An Analysis of Industry Transportation Cost Savings."

[8] Schwieterman, Joseph P. 2010. An Analysis of the Economic Effects of Terminating Operations at the Chicago River Controlling Works and O'Brien Locks on the Chicago Area Waterway System. DePaul University, Chicago, IL. April 7.

[9] United States Code (U.S.C) Title 14, Part I, Chapter 5, Section 89.

[10] U.S.C. Title 16, Chapter 53, Sections 3371-3378.

[11] U.S.C. Title 18, Section 42.

[12] Code of Federal Regulations, Title 50, Chapter I, Subchapter B, Part 16.

[13] Kolar et al, 2007.

Appendix A

Asian Carp Control Strategy Matrix

May 2010

Appendix A

Asian Carp Control Strategy Matrix

May 2010

Action Item	Workgroup	Action	Agency	Point of Contact	Funding	Funding Source	Implementation Goal†	Start Date	Planned Completion	Comments
2.1.1	MRR	Targeted Removal Within Chicago Area Waterways System (CAWS)	Rapid Response Team	John Rogner, IDNR	$2,000,000	Funded GLRI Monies	Short-term	FY 2010 2nd Quarter	NA	Costs include rotenone, electrofishing, seining, netting, mobile BAFF, light-sound system, etc. Note: Costs may change depending on the number and geographic extent of areas to be treated.
2.1.2	MRR	Enhanced eDNA Testing, Contract Commercial Fishing, and Conventional Monitoring in "High Risk" Locations	IDNR, USFWS, USACE	John Rogner, IDNR	$2,600,000	Funded USACE, USFWS, IDNR ($900,000 for IDNR action will be GLRI monies)	Short-term	FY 2010 2nd Quarter	NA	Note from IDNR: This is entire length of Cal Sag below O'Brien all the way to barrier because eDNA was detected throughout. ($0.5M USFWS for conventional monitoring and $0.9M commercial fishing / electrofishing from IDNR). This action will continue into the next several fiscal years. Estimate by IDNR for O'Brien work: Based on 3 days/week from March through October, 33 weeks total, 99 days total, @ $3,000/day (2 crews for entire length) - $300,000.
2.1.3	MRR	eDNA Calibration Methodology and Increased Capacity	USACE, IDNR, USFWS	Col. Vincent Quarles, USACE John Rogner, IDNR Charles Wooley and Mike Weimer, USFWS	$940,000	Funded USEPA/USACE $340,000 GLRI $600,000 USACE	Short-term	Ongoing	NA	Evaluate suite of validation technology for type and size of populations. $3.5 million enhanced eDNA from USACE. This action may continue into the next several fiscal years.
2.1.4	IC	Construction of Des Plaines River and I&M Canal Barriers	USACE	Col. Vincent Quarles, USACE	$13,200,000	Funded USACE 2010 GLRI monies	Short-term	April 2010	October 2010	Construction complete first quarter of FY 2011 (October to December 2011).
2.1.5	IC	Continued Operation of Demonstration Barrier I and Barrier IIA	USACE	Col. Vincent Quarles, USACE	$4,750,000	Funded USACE appropriation	Ongoing	FY 2010	TBD	Barrier IIA maintenance is scheduled for October 2010.
2.1.6	IC	Expedited Construction of Barrier IIB	USACE	Col. Vincent Quarles, USACE	$17,000,000	Funded USACE appropriation	Ongoing	October 2009	September/ October 2010	Scheduled completion in September 2010 and fully operational in October 2010. The goal is to place into operation before Barrier IIA requires maintenance shutdown in the fall of 2010.
2.1.7	IC	Contingency Plan for Rotenone Treatment for Maintenance Shutdowns	IDNR, USFWS, USCG, (RRT)	John Rogner, IDNR	$5,000,000	Not Funded Federal funding may be needed if catastrophic failure of existing barriers occurs	Ongoing	FY 2010 4th Quarter	TBD	Low probability of occurrence as Barrier IIB is expected to be constructed and fully functional before next maintenance shutdown cycle.
2.2.1	IC	Final Efficacy Study Report	USACE	Col. Vincent Quarles, USACE	$1,100,000	Funded USACE appropriation	Long-term	2009	TBD	USACE will complete Final Efficacy Study using Section 3061 WRDA 07 in September 2010 that will assess USACE structures and operational changes, assess preliminary impacts of any Federal actions for economic and environmental impacts, and study the feasibility of additional barriers and impediments in the CAWS including the Little Calumet River, Grand Calumet River, and Authority for implementation is Section 126 (if extended) or specific Congressional authorization. It is intended that NEPA requirements will be met.
2.2.2	IC	Great Lakes and Mississippi River Inter-Basin Study	USACE	Col. Vincent Quarles, USACE	$1,000,000 ($500,000 USACE $500,000 GLRI)	Funded USACE base funding. $0.5M - FY2010 GLRI allocation. $200K is immediately available, $300K remainder may be re-prioritized based on further discussions	Long-term	FY 2010	TBD	USACE will focus expedited first phase of Inter-Basin EIS on CAWS and migration of Asian carp and other AIS. Lock closure impacts will be evaluated as an alternative under this study. All information obtained through the efficacy studies will inform actions to be considered under this study. It is intended that NEPA requirements will be met. USACE expected to complete interim CAWS focused study in 2012.

Appendix A

Asian Carp Control Strategy Matrix

May 2010

Action Item	Workgroup	Action	Agency	Point of Contact	Funding	Funding Source	Implementation Goal†	Start Date	Planned Completion	Comments
2.2.3	IC	Modified Structural Operations	USACE	MG John Peabody, USACE	TBD	Funded USACE appropriation	Long-term	FY 2010 2nd Quarter	September 2010	A three phased approach to change the manner in which existing CAWS structures such as locks and dams, sluice gates and pumping stations are operated, in combination with other management actions, to assist in impeding the migration of Asian Carp into the Great Lakes.
2.2.4	MRR/IC	Commercial Fishing for Removal Below Lockport	IDNR, USCG	John Rogner, IDNR	$300,000	Funded GLRI monies	Long-term	FY 2010 3rd Quarter	TBD	An accepted principle of invasive species control is to remove propagule pressure that would otherwise hasten dispersal of fish into new areas and increase likelihood of invasion. This action will employ commercial fishermen in the pools below the barrier in a sustained program of catch and removal of Asian carp from the system, while minimizing detrimental effects on native fish species.
2.2.5	IC	Commercial Market Enhancement/Recruitment Overfishing	IDNR	John Rogner, IDNR	$3,000,000	Funded GLRI monies	Long-term	FY 2010	TBD	Expand the commercial market for Asian carp in Illinois and beyond, with a portion of proceeds from carp fillets or other similar revenue stream going to fund ecosystem restoration and invasive species prevention. This market expansion may be focused on providing fillets for consumption in both domestic and overseas markets, utilizing Omega 3 oils, or using the carcasses as fertilizer. These monies would be utilized to provide funding opportunities to enhance marketing within the United States and export opportunities overseas. It is important to note that live Asian carp would not be transported.
2.2.6	IC	Investigation of Certification Requirements for Asian Carp Usage	IDNR, USDA, USAID	John Rogner, IDNR	NA	No funding necessary	Long-term	FY 2010 2nd Quarter	TBD	IDNR will work with Illinois Congressional delegation to identify certification procedures necessary for Asian carp to be declared suitable for use in US sponsored humanitarian relief efforts.
2.2.7	MRR	Feasibility Assessment of Inter-Basin Transfer of AIS	USGS	Leon Carl, USGS	$500,000	Funded GLRI monies (GLRI template no. 69)	Long-term	FY 2010 2nd Quarter	TBD	Coordination of efforts with USACE to avoid duplication underway; possible hurdles of access issues
2.2.8	MRR	Tagged Fish Research to Test Barrier Effectiveness	IDNR, USFWS, USACE	John Rogner, IDNR	$400,000	Funded GLRI monies	Long-term	TBD	TBD	DIDSON - 1 mobile unit and 1 recess mounted unit into canal at barrier.
2.2.9	MRR	Investigate Tow Boats and Barges as Potential Vectors	USCG, USEPA, IDNR, USFWS, USACE	Captain Lorne Thomas, USCG	$500,000	Funded GLRI monies	Long-term	FY 2010 2nd Quarter	FY 2010 3rd Quarter	Funding source not identified. Since this workgroup will include towing industry representatives and the outputs of this study could result in regulatory action, due to FACA limitations, the USCG (or other federal agencies) cannot lead the workgroup.
2.2.10	IC	Assessment Study of Potential Impacts of Steel-hulled Barges on Fish Movement Across Electric Barrier II	USACE, USCG, INDR, USFWS	Col. Vincent Quarles, USACE, Capt. Lorne Thomas, USCG, Todd Main, IDNR, Mike Weimer, USFWS	TBD	Funded GLRI and base program monies	Long-term	June 2010	June 2011	Design and conduct experiments to test the effectiveness of the Electric Barriers IIA and IIB in the presence of steel-hulled barges and other vessels. The final report is expected to be completed in June 2011.
2.2.11	MRR	Research of Potential Asian Carp Access to Vectors on Barge Decks and Between Lashed Barges	USFWS, IDNR, USCG	Mike Weimer, USFWS, Todd Main, IDNR, Capt. Lorne Thomas, USCG	TBD	Funded GLRI and base program monies	Long-term	June 2010	October 2010	Form interagency/industry task force to validate or disprove the access paths of fish on decks and fish trapped between lashed barges. The task force must establish factual evidence that supports or refutes the viability and effectiveness of these access pathways.

Appendix A

Asian Carp Control Strategy Matrix

May 2010

Action Item	Workgroup	Action	Agency	Point of Contact	Funding	Funding Source	Implementation Goal†	Start Date	Planned Completion	Comments
2.2.12	CO	Investigation of Northeast Illinois' Bait Shops	IDNR	John Rogner, IDNR	NA	No funding necessary	Long-term	TBD	TBD	IDNR will conduct a friendly investigation of bait shops in Northeast Illinois to identify whether Asian carp are collected and sold as bait in the Chicago area.
2.2.13	MRR/IC	Efficacy Study for Toxic Zones Using Plant Effluent	MWRD		NA	No funding necessary	Long-term	FY 2010	FY 2013	Create a toxic zone through the bypass of ammonia-laden primary effluent to the CSSC at the Stickney plant and the Little Calument River at the Calumet plant to creat a toxic zone to kill fish migrating upstream. The two zones would block passage to the lakefront control structures. Full-scale testing would be included in the study.
2.2.14	MRR/IC	Increased Lacey Act Enforcement of Illegal Transport of Injurious Wildlife	USFWS	Charles Wooley and Mike Weimer, USFWS	$400,000	Funded USFWS Allocation of GLRI monies (GLRI template no. 24)	Long-term	FY 2010	TBD	Support Federal law enforcement activities to enforce the Lacey Act, and to work in coordination with State LE partners to enforce State statutes and regulations related to AIS prevention and control. Support efforts to finalize all requirements in advance of proposed rulemaking to list Bighead carp as "injurious species" under the Lacey Act.
2.2.15	IC/MRR/CO	State and Interstate AIS Management Plans	USFWS, 8 states	Charles Wooley and Mike Weimer, USFWS	$11,000,000	Funded USFWS Allocation of GLRI monies (GLRI template no. 189)	Long-term	FY 2010	TBD	$11 million for enhanced support of State and Interstate AIS Management Plans and for support of State-led rapid response actions under new rapid response plans developed by states and approved by the AIS Task Force. Impediments: 25% non-federal match required. IDNR portion to include $200,000 for Illinois to advance public outreach. IDNR adds 2 employees and will continue to update plan.
2.2.16	IC/MRR/CO	Competitive Funding Opportunities	USEPA, USFWS	Bill Bolen, USEPA Charles Wooley and Mike Weimer, USFWS	$8,800,000	Funded USFWS Allocation of GLRI monies	Long-term	FY 2010	FY 2010	State to assist in ecological separation – complement to USACE Inter-Basin Study, specifically assessing State interests/needs for ecological separation.
2.2.17	MRR/IC	Understanding Asian Carp and Bluegreen Algae Dynamics	USGS	Leon Carl, USGS	$225,000	Funded GLRI monies	Long-term	FY 2010	June 2012	Blue green algae (primarily Microcystis) blooms resulting from the dreissenid invasion may provide an excellent food source for bighead carp, enhancing their invasion. Noxious blue green algae blooms can under some circumstances be enhanced by interaction with bighead carp. The risk of enhanced noxious algal blooms, and the possibility that use of blue green algae blooms might enhance bighead carp invasiveness, could be assessed by modeling, parameterized with mesocosm experiments that fill in some of the holes in our understanding of this relationship.
2.2.18	MRR/IC	Use of Seismic Technology to Divert or Eradicate Invasive Asian Carp	USGS	Leon Carl, USGS	$200,000	Funded GLRI monies	Long-term	Spring 2010	TBD	This study will focus on lethal and sub-lethal effects of seismic technology to divert or eradicate invasive Asian carp as a means to inhibit passage and reduce recruitment. Initial dose response studies will determine the effects of different sound wave frequencies on various age classes of Asian carp at a range of distances from the sound source. The magnitude of the sound wave and particle velocity will be measured in order to quantify fish response to sound impacts. Initial and delayed lethality will be assessed, as well as sub-lethal evading behaviors.

Appendix A

Asian Carp Control Strategy Matrix

May 2010

Action Item	Workgroup	Action	Agency	Point of Contact	Funding	Funding Source	Implementation Goal†	Start Date	Planned Completion	Comments
2.2.19	MRR/IC	Expand Research on the Identification of Asian Carp Attraction Pheromones	USGS	Leon Carl, USGS	$300,000	Funded GLRI monies	Short-term	FY 2010 3rd Quarter	TBD	Better define the active pheromone components; additional research to define the response of Asian carp to pheromone products; develop conceptual models in which pheromones could be integrated into management programs to control or limit Asian carp; develop methods to synthesize active pheromone components. Timely funding will allow work to begin in current field season.
2.2.20	MRR/IC	Identify Potential Compounds for Inclusion in a Toxican Screening Program to Identify Potential Selective Toxicants for Control of Asian Carp	USGS	Leon Carl, USGS	$300,000	Funded GLRI monies	Short-term	FY 2010 3rd Quarter	TBD	USGS will develop cooperative research and development agreements to access pharmaceutical or agrochemical company chemical libraries to identify potential candidate toxicants. Potential toxicants will be identified either through structure activity relationships or through known activity models. Studies will be required to assess selective toxicity of candidate toxicants between Asian carp versus native fishes. Additional data sets would be required to support registration. Efforts would be made to target those compounds/formulations with present agrichemical/pesticide use.
2.2.21	MRR/IC	Evaluate Physical Methods to Disrupt Asian Carp Spawning Behavior and Decrease Egg Viability	USGS	Leon Carl, USGS	TBD	Funded GLRI monies	Short-term	FY 2010 3rd Quarter	TBD	Research will be conducted to evaluate potential methods to disrupt Asian carp spawning aggregations and to alter Asian carp egg viability. Identification of sound wave amplitude and frequency which elicit silver carp avoidance behavior may disrupt spawning aggregations and limit recruitment; Evaluation of Asian carp egg response to electrical fields, sonication, etc. to develop methods to reduce egg viability while the eggs drift downstream of Asian carp spawning areas. Timely funding will allow work to begin in current field season.
2.2.22	MRR/IC	Characterization of Organism-Level Target Delivery Sites in Native Aquatic Animals	USGS	Leon Carl, USGS	$200,000	Funded GLRI monies	Short-term	FY 2010 3rd Quarter	TBD	Research will be conducted to identify and characterize potential bioactive agent delivery sites within Asian carp including the gill, skin, and gastrointestinal tract. Research will focus on collection of data on the physiological characteristics of both Asian carp and native species (e.g., enzyme, protein, lipid, carbohydrate components, pH) to provide an understanding of factors that might affect delivery of a bioactive agent. While some basic research is available, additional basic and applied research will lead to development of optimized delivery components to enhance selectivity and sensitivity. Research planned to characterize Asian carp gastrointestinal pH and digestive enzyme profiles will be expanded to include identification and characterization of native fish gastrointestinal tracts.
2.2.23	MRR/IC	Great Lakes' Tributary Assessment for Asian Carp Habitat Suitability	USGS	Leon Carl, USGS	$275,000	Funded GLRI monies	Short-term	FY 2010 3rd Quarter	September 2013	Tributaries that would be suitable for bighead carp spawning need to be identified to focus management efforts for evaluating invasion success, as well as sites to launch control actions. Recent USGS research has determined the developmental stage at which bigheaded carp larvae are capable of swimming and migrating laterally from flowing water into nursery habitats. This knowledge can be used in a model of river velocity and temperature to describe an actual river length required and, taken together with the temperature and velocity regimes of individual rivers, can be used to more accurately determine which rivers are suitable for spawning and recruitment of bigheaded carp.

Appendix A
Asian Carp Control Strategy Matrix
May 2010

Action Item	Workgroup	Action	Agency	Point of Contact	Funding	Funding Source	Implementation Goal†	Start Date	Planned Completion	Comments
2.2.24	MRR/IC	Risk Assessment of Asian Carp Establishment in the Great Lakes, Based on Available Food Sources	USGS	Leon Carl, USGS	$250,000	Funded GLRI monies	Short-term	FY 2010 3rd Quarter	June 2014	Bighead carp have yet to become established in waters as oligotrophic as the open waters of the Great Lakes. However, under varying conditions bighead carp have been observed to diversify their diet beyond their preferred pelagic plankton sources and feed on detritus. Feeding studies are needed under controlled conditions where the flexibility in the carp diet can be defined thus establishing their ability to maintain large populations in the Great Lakes.
2.2.25	MRR/IC	Technologies Using Oral Delivery Platforms for Species-Specific Control	USGS	Leon Carl, USGS	$1,553,000	Funded USEPA FY 2010 GLRI monies (GLRI template no. 66)	Short-term	FY 2010 2nd Quarter	TBD	Development of a targeted oral delivery platform using novel incorporation technologies that have the capacity to deliver biocides to specific target sites in AIS may increase the selectivity and specificity of both current and potential new management chemicals. This large integrated project will focus on developing these approaches for application throughout the Great Lakes. In 2010, work will focus on initiating development of new integrated pest management approaches for Asian carp and other invasive aquatic species of concern to Great Lakes managers.
2.2.26	IC	Study Efficacy of Reducing Asian Carp Food Source Through Nutrient Removal	USEPA, IEPA, USGS	Janet Pellegrini, USEPA	$1,000,000	Funded GLRI monies	Long-term	FY 2010	FY 2012	Nutrient reductions could be accomplished by removing phosphorus and nitrogen (using advanced biological nutrient removal processes) from WWTPs that discharge into the CAWS/Upper Illinois Watershed.

NOTES:

†	To highlight immediate actions to be taken - Short-term: Feb. - May 2010, Long-term: beyond May 2010, Ongoing
AIS	Aquatic Invasive Species
BAFF	Bio-acoustic Fish Fence
CAWS	Chicago Area Waterway System
CO	Communication and Outreach
CSSC	Chicago Sanitary and Ship Canal
DIDSON	Dual-frequency identification sonar
eDNA	Environmental DNA (Deoxyribose Nucleic Acid)
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FY	Fiscal Year
GL	Great Lakes
GLRI	Great Lakes Regional Initiative
IC	Invasion Control
IDNR	Illinois Department of Natural Resources
MRR	Monitoring and Rapid Response
MWRD	Metropolitan Water Reclamation District of Greater Chicago
NA	Not Applicable
NEPA	National Environmental Policy Act
NGO	Non-governmental Organization
NOAA	National Oceanic and Atmospheric Administration
OE	Outreach and Education
RRT	Rapid Response Team
SPA	Sound Projector Array
TBD	To Be Determined
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USGS	United States Geological Service
USFWS	United States Fish and Wildlife Service
WRDA	Water Resources Development Act

Appendix B

ASIAN CARP CONTROL STRATEGY FRAMEWORK
COMMENTS
RESPONSIVENESS SUMMARY

May 2010

CONTENTS

Attachment

1.0 INTRODUCTION

The Great Lakes food web has been significantly degraded in recent decades by Aquatic Invasive Species (AIS). The migration of four species of carp (bighead, black, grass, and silver or Asian carp) not native to the United States (U.S.), into and through the Illinois River, Des Plaines River, and the Chicago Area Waterway System (CAWS) is possibly the most acute AIS threat facing the Great Lakes today. Asian carp have expanded their territory greatly over the past decade. Visual sightings have placed silver and bighead carp in the upper Illinois River and the Chicago Sanitary and Shipping Canal (CSSC), approximately 20 miles from Lake Michigan. In response to the continued progression, the Asian Carp Control Strategy Framework (Framework) was created to halt Asian carp movement and preserve the Great Lakes ecosystem.

This section briefly reviews the multi-faceted purpose of the Framework and ongoing efforts to ensure prevention of the establishment of Asian carp in Lake Michigan. In recognition that Asian carp control will only be successful with the full support of industry and non-governmental organizations, the Framework was introduced to Congress, Governors of the Great Lakes States, and the general public in February 2010. Questions, comments, and additional recommended actions have since been accepted through open forums at public meetings, letters sent directly to lead agencies, and via the internet at carpcomments@gmail.com.

Since February 2010, 1,748 comments have been received from these outlets. Comments were submitted by a wide variety of groups including concerned citizens, environmental advocacy groups, affected industry stakeholders, other local, state, or Tribal groups, and elected officials. The comments received were helpful in updating the Framework. Each of these comments has been read and sorted into categories of response according to the actions in the Framework.

Section 2.0 discusses each of the categories of comments received, as well as provides responses to each category. Congressional, state, and local agency letters and/or comments were received on the Responsiveness Summary and are included as Attachment 1.

1.1 BACKGROUND

The Framework was created in response to the recent events surrounding Asian carp and their potential expansion throughout the CAWS and potential introduction into Lake Michigan and the Great Lakes basins. This was a collaborative effort between federal and state agencies to show their dedication to control the movement of these potentially destructive AIS.

The Framework is intended to be a dynamic document, reflecting an ever-increasing body of knowledge gathered from ongoing research and monitoring efforts. Many actions described in this Framework, such as research and feasibility studies, are expected to provide additional data that may impact future management decisions. However, the main objectives of this Framework are to:

- Outline the urgent actions agencies are taking.
- Integrate and unify the future actions of responding agencies.
- Transition from a single point of defense at the electric barriers to a multi-tiered approach.
- Provide general direction while recognizing that agencies require flexibility to best respond.
- Recognize potential hurdles that might complicate Framework implementation.
- Suggest an approach for stakeholders and other agencies to actively collaborate in future efforts.

The Framework presents a collection of action items that are currently underway or will be implemented in the near future. The proposed action items are grouped into two categories: (1) short-term actions and (2) long-term actions. These actions will be in full compliance with all federal, state, and local laws and regulations. Environmental

considerations will be integrated into the decision-making process and appropriate environmental reviews will be prepared as necessary for all proposed actions.

1.2 COMMENT CATEGORIES

The comments received were sorted into categories based on the actions defined in the Framework. The categories include the following:

- Ballast/Bilge Water
- Biological Controls
- Intentional Releases
- Commercial Harvesting
- Communication and Outreach
- Electric Barriers
- Impacts to Native Species
- Spawning and Habitat Suitability for Asian Carp
- Ability for Asian Carp to Invade the Great Lakes
- Hypoxic Zone Creation
- Inter-Basin Feasibility Study
- Modified Structural Operations
- Rotenone
- Secondary Barriers

2.0 RESPONSE TO COMMENTS

The responses provided in this document address each of the categories defined above and responses to individual comments are not provided. A summary of comments received for each category is provided as a focal point to the response.

2.1 BALLAST/BILGE WATER

Summary of Comments Received

Comments discussed the possibility that barge traffic, particularly the ballast water and bilge water, could be a mechanism by which Asian carp or their DNA could be transported upstream of the electric barriers.

It is possible that this may be a vector by which the transport of Asian carp eggs, gametes, or juvenile fish in ballast/bilge/rake/void water may be occurring. When tows/barges take on water in ballast operations or through other means south of the barrier, eggs, gametes, larvae, or juvenile fish might be inadvertently carried across the barrier and discharged through de-ballasting or de-watering operations. (It is important to note that effective November 2009 the U.S. Coast Guard has prohibited any ballast/bilge water from being discharged on the opposite side of the barrier from which it was obtained.)

A cooperative workgroup including towing industry representatives, fishery biologists, scientists, and federal and state agency officials has been chartered to investigate and study the potential vector of towboats and barges for transporting Asian carp (including eggs, gametes, larvae, and juveniles) across the U.S. Army Corp of Engineers (USACE) electric dispersal barrier in the Chicago Sanitary and Ship Canal (CSSC). The study of any additional AIS transport across the barrier will be incidental to the primary study. The workgroup will review vessel operational practices that could facilitate Asian carp transport. A sampling protocol will be determined to identify whether there is evidence of Asian carp e-DNA, eggs, and/or fish in the bilge or ballast water in any tank or void space onboard a vessel and if it is a viable vector. The results of the study will be forwarded to the Regional Coordinating Committee (RCC) for incorporation in future drafts of the Framework.

2.2 BIOLOGICAL CONTROLS

Summary of Comments Received

Many comments were received asking if other biologic controls could be considered other than the use of rotenone, closure of the lock and dam system, or if other less disruptive methods could be relied upon.

All agencies involved in Asian carp control are looking at short- and long-term strategies to keep Asian carp from establishing a self-sustaining population in the Great Lakes.

Asian carp are thought to have very exacting spawning requirements, requiring long rivers for the development of the eggs and larvae, making the ability to eradicate them dependent on certain types of invaded areas. For example, if the invaded water is a reservoir or lake with no such river tributary, then Asian carp would most likely die out. If such rivers exist, it might be possible to deny those rivers to the carp by erecting barriers prohibiting the necessary upstream movement to spawn. Erecting barriers in the extremely large rivers of the central U.S. where Asian carp are already very abundant is infeasible.

One strategy that could eventually allow eradication of Asian carp is the use of genetically modified carp that can produce only male offspring. This strategy, called Daughterless carp technology is under development for control of common carp in Australia. This technology involves introducing genetic modifications that cause offspring of genetically modified and released fish to be all male. This “daughterless” trait is then genetically carried forward through following generations until reproduction lessens due to the absence of females. Models indicate that this strategy could eventually result in eradication of common carp from the large rivers of Australia, but that success would take decades of effort at a high level of funding. Asian carp take longer to mature than common carp and our

invaded rivers are larger, thus it seems likely that an even larger and longer effort of this kind would be required to address Asian carp in the rivers of the U.S. This strategy might be more viable in addressing a smaller population that has recently invaded an area. In any case, eradication of any established population of Asian carp would be difficult and expensive. The progress in developing this genetic tool in Australia will be monitored for potential application in the U.S. and may prove to be implementable at some point in time.

While the daughterless technology is a single method of eradicating Asian carp, it is generally more effective to employ Integrated Pest Management (IPM). IPM involves implementing as many feasible methods of control available for a given species into one management and control plan. Each IPM would be focused at the appropriate life stage and applied appropriately in time and space to achieve the desired level of control while minimizing economic costs and environmental risk.

2.3 INTENTIONAL RELEASES

Summary of Comments Received

Inquiries were received on how fishery management agencies could address the potential illegal transportation or intentional release of Asian carp into the Great Lakes.

Aquaculture, transportation, stocking, importation and/or possession of aquatic life is controlled under the Illinois Fish and Aquatic Life code. Any species that does not appear on the Aquatic Life Approved Species List is illegal to raise, transport, stock, import or possess without permission of the Illinois Department of Natural Resources (IDNR) director. The IDNR has officers who enforce this existing code.

At the federal level, the U.S. Fish and Wildlife Service (USFWS) also have the authority to utilize enforcement authorities granted to them by Congress. USFWS law enforcement personnel are working cooperatively and in coordination with state officials and agencies within the Great Lakes and surrounding regions to enforce all federal and state statutes and regulations to support prevention and control of AIS, including Asian carp. Additionally, the USFWS is working toward completion of actions needed in advance of rulemaking for listing of bighead carp as injurious under the Lacey Act (black and silver and large-scale silver carp are currently listed).

2.4 COMMERCIAL HARVESTING

Summary of Comments Received

A large number of inquiries were made regarding whether a domestic or international commercial market could be created that would allow for the overfishing of Asian carp to occur which could lead to a reduction to nearly unsustainable population numbers might occur. Failing to overfish Asian carp to depletion, several comment were also received recommending overfishing them starting at the leading edge and working back down the Illinois River to keep them away from the CAWS.

One of the long-term solutions to the Asian carp problem is the development of commercial markets. According to IDNR, Silver carp are the largest aquaculture-produced fish in the world while bighead carp are the fourth. Illinois has an overabundance of both species of Asian carp and underdeveloped processing and distribution facilities.

The Framework included $3,000,000 for assistance to develop a commercial market. This funding would be dedicated to establishing commercial harvesting and processing on Asian carp in both the Illinois and Mississippi Rivers. Activities would be initiated in areas were Asian carp are located closest to the electric barriers and plentiful enough for overfishing The Framework also includes efforts to identify certification procedures necessary for Asian carp to be declared suitable for use in U.S.-sponsored humanitarian relief efforts. IDNR in partnership with the Illinois Department of Commerce and Economic Opportunity (IDCEO) are leading an effort to promote Asian carp in a variety of products such as a protein source for consumption, animal feed, and feed additives; biofuels; organic fertilizers; and Omega 3 oils. This project will include research to identify barriers and opportunities for greater utilization of Asian carp and has the following objectives:

- Objective I. Research and identify foreign and domestic markets for Asian carp protein, encourage Illinois manufacturers of fish oil, Omega 3, biofuels, animal feed, food protein enhancement fertilizer, and surimi to utilize carp in their products;
- Objective II. Research barriers to utilizing Asian carp as a food resource in institutional settings as well as for various humanitarian relief efforts, including food banks, food pantries, and homeless shelters;
- Objective III. Research barriers to utilizing Asian carp protein and protein extracts in animal feed and feed enhancement products. This would include further analysis of Asian carp for expected processing yield, nutritional content, potential contaminants, and other microchemistry to evaluate the potential for increased utility in feed mills and rendering for biofuels;
- Objective IV. Research the influence and effects of Asian carp on the tourism industry, with a particular focus on fishing tournaments, such as Carpathon, and new opportunities, possibly on an international scale.

For more information on these commercial endeavors visit, www.onearth.org/article/eating-asian-carp.

2.5 COMMUNICATION AND OUTREACH

Summary of Comments Received

Regarding communication and outreach, comments were received asking for increased participation by industry, states, provinces, and NGOs in standing workgroups and/or that these workgroups convene more reoccurring meetings with stakeholders. A large number of comments also asked how various stakeholders and the public could keep more informed as to what was occurring with Asian carp, the Framework, and individual Agency's efforts. Finally, the RCC was recommended to be more transparent and provide information as quickly as possible to affected stakeholders.

The RCC aims to facilitate transparent and timely communication on Asian carp control efforts to elected officials, key stakeholders, industry members, waterway users, state resource agencies, municipal leaders, Tribal leaders, and the general public throughout the Great Lakes Basin, as well as local, regional and national media.

Communication efforts are channeled through the RCC's website: www.asiancarp.org. Communication with all stakeholders will remain a priority as the RCC develops and executes short- and long-term strategies for preventing Asian carp movement above the electric barrier system in the CAWS.

The www.asiancarp.org website provides access to multimedia including videos, images, and audio clips, which are available for media and public use. These images cover rapid response activities conducted in December 2009, historical surveying efforts, and press events in the Chicago area, in addition to a variety of images of different species of Asian carp. As additional surveying, sampling and on-the-ground activities continue, additional photographs will be posted to the image library, which is available for public use. Unless otherwise noted, all multimedia should be credited to www.asiancarp.org or the appropriate agency. All press releases and event announcements issued by the RCC are also available to the public in the online pressroom, and are organized by date of distribution. Press announcements will be issued by the RCC to announce implementation of the Framework, and events related to the Framework, including but not limited to, sampling and monitoring results, eDNA (environmental deoxyribo nucleic acid) analysis and results, and public or congressional meetings.

Telephonic briefings with key stakeholders including waterway industry members, tribal leaders, non-governmental organizations, and the media, were held in January and February 2010 by principle members of the RCC to provide updates on rapid response activities, eDNA sampling results, and planned future actions by respective agencies.

Public meetings concerning the Framework were held in Chicago, Illinois and Ypsilanti, Michigan on February 12 and February 17, 2010, respectively. Representatives from all participating RCC agencies and organizations were present at both meetings. The public meetings were coordinated to encourage comments, concerns, and questions regarding the Framework by interested stakeholders, media, and elected officials for consideration by the RCC's

principle members. Transcripts from these meetings are available at www.asiancarp.org, and videos from these meetings are available for viewing at www.epa.gov/greatlakes/live/. Announcements for future public hearings, meetings and events will be posted on www.asiancarp.org and distributed to media and stakeholder contact lists. Media outlets, organizations, and companies who would like to be included in correspondence related to public hearings and events, can send their contact information to carpcomments@gmail.com. Hundreds of comments and/or questions were received via the RCC's email address carpcomments@gmail.com between December 2009 and March 2010. This comment box will remain open; however, comments that were received after March 26, 2010 have not been addressed in the revised Framework.

A Frequently Asked Questions (FAQ) section for the www.asiancarp.org website was developed to address public comments and concerns regarding rapid response efforts that were conducted in December 2009, and has expanded to include additional FAQs on the RCC's activities in 2010.

A PowerPoint© presentation of the RCC Framework is available for viewing at www.asiancarp.org. If an individual or an organization is interested in having an RCC member speak or present to a group or at a public event regarding ongoing Asian carp control activities, they may email their request to carpcomments@gmail.com with "Presentation Request" in the subject line. The following information needs to be included in the email request: date; time; location of the event, hearing or meeting; the name of the requesting group; a primary contact; and expected attendance.

Elected Officials and Other Decision-makers

The RCC will continue to promote effective and timely external communication with elected officials, as well state, Tribal, and provincial governments. The RCC will distribute news releases and other outreach materials to appropriate elected officials and other decision-makers prior to providing this same material to members of the media. For especially important or time-sensitive announcements, the RCC will make every effort to telephonically notify key elected officials and decision-makers as soon as 24 hours prior to the distribution of a news release to media.

In addition to electronic and telephonic updates, members of the RCC will continue to initiate in-person meetings with key officials and their staffers to provide timely briefings on the issue. In addition to one-on-one meetings, the RCC will look for opportunities to participate in group briefings for assemblages such as the Congressional Great Lakes Task Force, Council of Great Lakes Governors, Great Lakes Commission, Great Lakes and St. Lawrence Cities Initiative, and the Great Lakes Indian Fish and Wildlife Commission. Furthermore, members of the RCC will continue to accept offers from Congress and state and provincial legislatures to provide testimony on the issue to appropriate legislative committees. Finally, the RCC will continue to inform key officials and their staffers of important events related to Asian carp they might be interested in attending.

Public Engagement: How You Can Help

Reporting Asian carp sightings - To report a sighting, note the exact location, and immediately call your local DNR office. If you catch the fish, put it in a secure location and limit contact. If possible, freeze the specimen in a sealed plastic bag as this will help ensure accuracy in laboratory testing. Phones numbers to call to report an Asian carp sighting are provided below:

- Illinois DNR: call the Illinois Department of Natural Resources, Division of Fisheries at 217-782-6424.
- Indiana DNR: call Indiana Division of Fish and Wildlife at 317-234-3883 or the Illinois-Indiana Sea Grant at 847-872-8677.

Outreach Materials

The Illinois-Indiana Sea Grant in partnership with the Illinois Natural History Survey, IDNR and USFWS developed Asian Carp Watch Cards (http://www.in.gov/dnr/fishwild/files/fw-Asian_Carp_Watchcard.pdf) to provide a free, easy to use identification tool for commercial fishermen, sport anglers, and other waterway users to identify Asian carp. The identification card provides characteristics of Asian carp, including both photographs and drawings, and recommendations on how to prevent the spread of these and other AIS.

2.6 ELECTRIC BARRIERS

Summary of Comments Received

Many questions were asked regarding the USACE electric barrier system currently in place to keep aquatic invasive species from migrating both from and to the Mississippi River and the Great Lakes basins. Inquiries and comments focused on its function, methods for improvements, and placement of additional barriers.

Operations

USACE and others have been working for many years to find ways to keep Asian carp from reaching the Great Lakes. USACE's main role has been to construct and operate an electric barrier system.

The electric barrier system is located in the CSSC, a man-made waterway that creates the only direct connection between Lake Michigan and the Mississippi River basins. The electric barrier system was developed to prevent the spread of AIS species between these watersheds.

USACE began operating the first barrier (Barrier I) in April 2002 as a demonstration and research project to see if electrical barriers would be an effective technology for preventing the spread of AIS. This barrier, located near Romeoville, IL, is formed of steel cables that are secured to the bottom of the canal. A low-voltage, pulsing DC current is sent through the cables creating an electric field in the water. The electric field is uncomfortable for fish and it is intended to prevent fish from swimming across it. Since Barrier I was originally built as a demonstration, it was not intended to be operated for more than a few years.

In 2004, the USACE initiated construction of a permanent barrier (Barrier II) to prevent the migration of fish, including Asian carp, between the watersheds. Barrier II, which is located 800 to 1,300 feet downstream of Barrier I, also uses a pulsed electric field, but includes several design improvements identified during monitoring and testing of Barrier I.

Barrier I was taken off-line for approximately a month in September-October 2008 for significant repairs. Barrier IIA was in operation while the repairs at Barrier I were successfully completed. These repairs will allow Barrier I to remain in service for several more years.

Barrier I and Barrier IIA are operating continuously. Barrier I operates at a maximum in-water field strength of one volt per inch with five pulses per second and each pulse four milliseconds long. In August 2009 the operational parameters of Barrier IIA were raised from the same as Barrier I to a setting of two volts per inch, 15 pulses per second and 6.5 milliseconds pulse duration. This change was made after new genetic testing indicated that Asian carp were significantly closer to the barrier than had been detected by previous, more traditional monitoring methods and initial results from a research program on optimal barrier operating parameters became available. The operating parameters at Barrier I were not changed because the equipment at Barrier I cannot operate at the higher levels. The increased operating parameters make Barrier IIA more effective at repelling smaller fish. The operating parameters used at Barrier I are effective for larger fish.

Barrier IIB is under construction and is scheduled to be completed in October 2010. After completion of construction, safety testing will be completed before the barrier goes into full time operation. Funding from the American Recovery and Reinvestment Act ("stimulus funding") is being used to shorten the completion time of Barrier IIB by approximately one year. Once Barrier IIB is fully operational, Barrier I will be taken off line and upgraded to a more permanent facility. The schedule for completion of the upgraded Barrier I is dependent on future Congressional appropriations.

USACE regularly updates the RCC on the status of the barrier system and also provides updates to stakeholders via a Barrier Advisory Panel.

A research program to identify optimal barrier operating parameters is being completed at the USACE's Engineering Research and Development Center (ERDC) in Vicksburg, MS. USACE is trying to verify the optimal combination of operating parameters to deter all sizes of fish while being as safe and cost-effective as possible.

Available results from this research were used to adjust the operating parameters of Barrier IIA in August 2009. A second phase of research will be completed in 2010, if funding is available, and a third phase will be completed in 2011. If the ongoing research shows that further adjustments to the operating parameters would be beneficial, the barrier operating parameters will be adjusted consistent with safety concerns.

Barrier Efficacy Studies

USACE is also studying threats to the effectiveness of the barrier system and identifying actions necessary to reduce the risks from such threats. This study, called the Efficacy Study, is being completed in stages and interim reports will be released as stages are completed. The reports will identify proposed actions that will be implemented as quickly as possible once authorized and funded. The major areas of study are potential bypasses via neighboring waterways, identification of optimal barrier operating parameters to maximize barrier effectiveness, reducing the risk of assisted transit of live fish through or around the barriers (via ballast water, bait buckets, etc.), reducing existing carp populations, evaluating use of other types of barriers or deterrents, and the potential for modified lock and waterway operations.

The Des Plaines River is one such known potential bypass to the electric barrier. In the event of flooding, it is possible for water from the Des Plaines to overflow into the CSSC upstream (lake ward) of the barrier location. This can potentially transfer AIS into the canal. Another identified potential bypass pathway is the Illinois and Michigan canal, which is also close to the CSSC in places. An initial report, the Efficacy Study Interim I report, has been completed that recommended construction of physical barriers to prevent the potential bypassing of the barriers during high-water conditions in these neighboring waterways. These recommendations have been authorized and the physical barriers will be constructed in 2010.

The other major areas of study are completing the research on the optimal operating parameters to maximize barrier effectiveness, reducing the risk of assisted transit of live fish through or around the barriers (via ballast water, bait buckets, etc.), reducing existing carp populations, evaluating use of other types of barriers or deterrents, and modified lock and waterway operations.

Additional interim reports will be completed in Spring and Summer of 2010. A final efficacy study report will be completed Fall 2010.

2.7 IMPACTS TO NATIVE SPECIES

Summary of Comments Received

Comments were received if the fisheries management agencies had considered the use of native species as predators for Asian carp.

The fisheries management agencies agree that rebuilding native fish populations that can provide predation on young carp can be an important tool. It is known that native species, if present in sufficient numbers, can prey on juvenile Asian carp and could lead to a decline in their population numbers. However, it is well documented that Asian carp do outcompete native species. This is the case in both the Mississippi River and Illinois River where the majority of the species present are now Asian carp. Through overfishing activities that can result in a large decline in Asian carp population numbers, native species would have the ability to re-establish themselves and once again become the dominant species. There would also be a benefit realized in that by removing Asian carp from areas proximate to the electric barriers, this would lower the likelihood that Asian carp could find a way to migrate upstream of the electric barriers. Lastly, the fisheries management agencies are committed to restock native species when those opportunities become available.

2.8 SPAWNING AND HABITAT SUITABILITY FOR ASIAN CARP

Summary of Comments Received

Several inquiries were made regarding the habitat and spawning behavior of Asian carp. Additional comments questioned current work on assessments to the Lake Michigan ecosystem and how to assess for the presence of sustainable populations of Asian carp within the Great Lakes ecosystem.

U.S. Geological Service (USGS) studies on the lower Missouri River indicate that Asian carp (except when spawning) preferred lake-like habitats that were at least 6 feet deep with still or slow-moving water. Asian carp selected clearer waters with more phytoplankton. In the Missouri River basin, which has few connected floodplain lakes or wetlands, these habitats are found behind navigation structures called wing dikes and in tributaries of the Missouri River. Asian carp used the fast-moving portions of the Missouri River only during spawning. In the Lamine River in Missouri, there was a slight preference for areas with large woody debris, but generally these are open water fishes that are not highly affected by bottom type and move somewhat randomly through deeper water areas. In the Mississippi and Illinois Rivers, Asian carp also seem to occupy off-channel habitats with no or slow current. In their native China, when not spawning, Asian carp primarily live in lakes on river floodplains and migrate to the rivers to spawn.

Asian carp usually spawn in very turbulent areas of large, muddy, rivers. Most spawning occurs while the river is rising after a heavy rain. In a USGS study on the Missouri River, Asian carp spawned only in the Missouri River itself, not in the smaller tributaries. A similar study in the Yangtze River of China, considered the natal stream of Asian carp, found few sites in which they spawned (36 sites in about 1,000 river miles), but in the USGS study Asian carp spawned in many areas, perhaps a result of the many turbulent spots in the Missouri River from man-made navigational structures. In the Illinois River, Asian carp have been observed spawning at tributary mouths and below navigation dams. The eggs and very young larvae of Asian carp drift in the current until the larvae become old enough to swim. They are slightly heavier than water and will sink to the bottom, where they are thought to die, if the current is not fast enough to keep them in the drift. Depending on temperature, the eggs hatch in about 30 hours, and USGS data indicate that the larvae drift for an additional 70 hours before they begin swimming. When they can swim, the larvae quickly leave the river and move toward low velocity off-channel nursery habitats.

USGS research in the Missouri River has shown that Asian carp can be incremental spawners, spawning a portion of a year's egg production multiple times over a year, and can spawn at any time between May and September, with most occurring in June through early July.

Lake Michigan Ecosystem Impacts

There is no definitive way to determine the length of time for an invasive species to have a significant impact on an ecosystem. There is a considerable amount of information that is necessary to make an assessment that a species has established a self-sustaining population. These factors include predator-prey interactions and other environmental variables that influence a species' ability to increase their population numbers. Sustainable populations are also influenced by the density of fish within suitable habitat, and the genetic variability within that population. Repeated capture of both juvenile and adult Asian carp would be a good indication of a sustainable population, including young-of-the-year Asian carp to provide evidence of a successful spawn, juvenile fish to provide evidence the young-of-the-year fish are surviving, and adult fish of varying ages. Because eDNA sampling cannot give an indication of fish age or abundance, and because there have been no captures of Asian carp in Lake Michigan (juvenile or adult), currently there is no evidence of a sustainable population in Lake Michigan. USFWS in coordination with IDNR have had field crews monitoring the CAWS, including the Des Plaines River, Cal-Sag Channel, Calumet Harbor, South Branch Chicago River, and other tributaries of Lake Michigan since February 2010 looking for signs of Asian carp. Since sampling began on February 16, 2010 no Asian carp have been found.

Overfishing of a species is based on the assumption that controlling the abundance of adult Asian carp provides the opportunity to control a species' population growth rate. If fishery managers can control the abundance of adult Asian

carp (i.e., through overfishing), they can control the amount of fish added to the stock each year. This is one of many approaches the RCC is considering in the fight against Asian carp.

2.9 ABILITY FOR ASIAN CARP TO INVADE THE GREAT LAKES

Summary of Comments Received

Several individuals and organizations questioned whether or not Asian carp could establish a self-sustaining population in the Great Lakes; specifically, if the Great Lakes had the available food sources so that Asian carp could migrate in open waters. Questions were also raised that if the Great Lakes were of such a different environment than that of a river system would that halt their advancement; that such vast shorelines that would have to be transited by Asian carp prior to them being able to reach another suitable riverine system would halt their migration, and other habitat related questions.

The threat of Asian carp is to all rivers, lakes, wetlands and tributaries feeding into the Great Lakes, the real base of the Great Lakes ecosystem.

Many studies show that Asian carp substantially change ecosystems to which they have been introduced. Many studies around the world, including a USGS study in the Missouri River, have found that zooplankton (animal plankton) populations are dramatically reduced when Asian carp are abundant. In the presence of high densities of Asian carp, large phytoplankton (plant plankton) species decline, but very small phytoplankton species, too small to be fed on by Asian carp, usually become more abundant. The end result is usually water that appears very green but has little zooplankton. Logically, this does not work to the advantage of native fishes that eat zooplankton – and nearly all fishes feed on zooplankton when they are very young. In a pond study in Missouri, Asian carp out-competed native paddlefish, which also feed on zooplankton. In a study in Germany, in a lake heavily stocked with Asian carp, fishes with tiny young that live in the open water where Asian carp live (especially zander, the European walleye) declined dramatically. In the Illinois River, a study has shown that the native gizzard shad and bigmouth buffalo (both filter feeders) are skinnier than they were prior to the dramatic population increases of Asian carp. It is important to remember that some fishes are likely to be more affected than others.

Asian carp have yet to become established in the open waters of the Great Lakes. However, under varying conditions Asian carp have been observed to diversify their diet beyond their preferred plankton sources and feed on detritus (non-living organic matter). They have been feeding on sediment detritus in ponds and feeding on attached algae in aquaria. Also, Asian carp are thought to derive substantial nutrition from bacteria, both consumed and cultured in the digestive track. Feeding studies will be conducted under controlled conditions where the flexibility in the carp diet can be defined thus establishing their ability to maintain large populations in the Great Lakes.

Framework projects have been initiated to identify which tributaries would be suitable for Asian carp spawning in order to focus management efforts for evaluating invasion success, as well as sites to launch control actions. Although Asian carp favor lakes and slow moving waters, they are thought to require a long river for spawning and subsequently establish a self-sustaining population. An often-cited value in the literature is a minimum length of 100 km. The report identifies 22 rivers on the USA boundaries of the Great Lakes that have a minimum undammed river length of 100 km, and an Asian carp risk assessment performed by the Canadian Department of Fisheries and Oceans includes an inventory of the Canadian Rivers with a minimum length of 50 km. However, the estimates of river length required are based on locations where populations of Asian carp are known to be found, and thus do not describe a true minimum. Recent research has determined the developmental stage at which Asian carp larvae are capable of swimming and migrating laterally from flowing water into nursery habitats. This knowledge can be used in a model of river velocity and temperature to describe an actual river length required. This more accurate minimum river length, taken together with the temperature and velocity regimes of individual rivers, can be used to more accurately determine which rivers are suitable for invasion by Asian carp.

The issue was raised that Asian carp would be undernourished if they got into Lake Michigan and that they could not travel through open lake waters to reach rivers to begin spawning once again. Although much remains to be learned

about the potential impacts of Asian carp in the Great Lakes, these assertions cannot be supported by published science. Asian carp exhibit a wide range of feeding strategies and consume a wide variety of food items. It remains unknown, how much plankton would be necessary to sustain populations of Asian carp in the Great Lakes if consuming other food resources, in addition to plankton, is a feeding strategy that they may utilize. One current USGS research project funded through the Great Lakes Restoration Initiative and described in the Framework is examining the importance of different food types (beyond plankton) in the diets of Asian carp and the ability of alternative food sources to sustain these fishes. This study will provide better information for making predictions on the Asian carp behaviors. Therefore, to state that Asian carp in the Great Lakes would be undernourished may prove to be true, but is presumptive at this point.

2.10 HYPOXIC ZONE CREATION

Summary of Comments Received

Comments received suggested that a hypoxic zone be created that would not support life so that Asian carp could not pass through this area into Lake Michigan. Responses from several agencies on this subject were received and are provided below.

Proposals were received that suggested using toxic levels of chlorine to create a toxic zone for Asian carp in the CAWS. There are, however, several hurdles to the use of chlorine as a chemical barrier, including (but not limited to) the time and cost to upgrade facilities and safety concerns. Additional hurdles include the technical feasibility of in-stream dechlorination, the serious health and safety issues for both the nearby residents and the staff conducting dechlorination, and any homeland security issues with the transportation and use of these chemicals outside of a secured treatment plant facility. It is uncertain how effective this option would be at preventing a consistent barrier to Asian carp migration through the system, and may not allow for the maintenance of resident aquatic life in the vicinity and downstream of the effluent. As with all options, negative effects on established uses, such as recreation and aquatic life, should be minimized.

The creation of a “thermal exclusion zone,” created by power plant or other discharges, has been discussed as well for the CAWS. In response to a draft proposal by Midwest Generation to IEPA for creating an AIS barrier zone in much of the lower CAWS, USEPA’s contractor completed a peer-reviewed report entitled, “Report on Non-Indigenous Species Migration through the Chicago Area” (August 2008). The report concluded that current thermal conditions in the CAWS do not serve as a barrier to non-indigenous species throughout the year due to the inability to keep water levels at a hot enough temperature to stop Asian carp. There are also serious human health and environmental concerns with implementing this proposal.

The feasibility of low or no dissolved oxygen levels were among many of the methods reviewed by the involved agencies that were originally tasked to develop aquatic nuisance species barrier technologies. Low or lack of dissolved oxygen was determined to be an ineffective method of dispersal prevention. It was found to be very difficult if not impossible to maintain a low or no dissolved oxygen zone fro a stretch of waterway long enough in distance to create a barrier to the Asian carp The use of “eco-barrier” zones for the purpose of impeding Asian carp migration has several hurdles including that this approach may be ineffective in producing a consistent barrier to Asian carp migration and would be likely to result in detrimental impacts to resident aquatic life. As stated earlier, with all options, negative effects on established uses, including recreation and aquatic life, should be minimized.

2.11 INTER-BASIN FEASIBILITY STUDY

Summary of Comments Received

Many comments received focused on a more permanent separation of the Mississippi River from the Great Lakes basin to ensure no AIS transfer between these two basins.

In collaboration with federal, state, local, and other interested entities, USACE is conducting a feasibility study of the options and technologies, or controls that could be applied in preventing or reducing the risk of AIS transfer between the Great Lakes and Mississippi River basins, through aquatic pathways. AIS shall be defined as all non-indigenous species that threaten fisheries, recreational or commercial economies; native species richness and abundance; and/or the ecological stability of infested aquatic areas. The footprint of the Great Lakes and Mississippi River Interbasin Study (GLMRIS) includes the intersection of the Great Lakes and Mississippi River basins, specifically covering the eight Great Lakes states.

The study team will develop a draft Feasibility Study and Environmental Impact Statement, whose goals would ensure the prevention or reduction of the risk of AIS transfer between the Mississippi and the Great Lakes basins:

- Identify all stakeholders in the plan formulation of GLMRIS;
- Inventory all potential AIS aquatic pathways between the Great Lakes and Mississippi River basins;
- Identify current and potential future AIS;
- Analyze appropriate control alternatives in order to protect aquatic ecosystems, fisheries and associated economies, and recreational and commercial economies;
- Recommend controls, additional studies, or legislation based on the analysis of the control alternatives and their respective regulations or impacts to users of the aquatic pathways; and
- Initially focus on the prevention of transfer of Asian carp and other potential AIS via the CAWS, in line with the above goals.

A portion of the study focusing on the CAWS will be considered separately and on an expedited schedule. This study will address the long-term prevention of the spread of Asian carp, as well as other potential AIS, between the Great Lakes and Mississippi River Basins. This study is expected to be completed by 2012.

2.12 MODIFIED STRUCTURAL OPERATIONS

Summary of Comments Received

Many comments were received regarding the use and operation of the CAWS Lock and Dam system. These comments ranged from demanding that the system be permanently closed immediately to allowing the current operational regime to remain the same.

USACE shares the sense of urgency and concern for the health of the Great Lakes ecosystem and the fishery, tourism and industries it supports. USACE is working diligently with multiple agencies to determine what tools can be used to address the threat of Asian carp migration.

USACE is currently evaluating the potential use of modified structural operations in conjunction with control and eradication measures to address the threat of Asian carp are ongoing at this time. Modified structural operations involves the potential to change the manner in which existing structures in the CAWS, such as locks and dams, sluice gates and pumping stations are operated in order to impede Asian carp migration into Lake Michigan and suppress any Asian carp populations that may be present.

There are a number of impacts that need to be considered, including economic, environmental, and the potential health and safety risks due to increased flooding.

A comprehensive, planned approach to Asian carp is essential. USACE will continue to work with the RCC and all interested stakeholders to develop measures to prevent Asian carp migration into Lake Michigan.

Efficacy Study 3 will examine whether short-term and/or intermittent lock and sluice gate closures are appropriate and whether additional barriers should be constructed within the CAWS. These studies will include evaluations of the effectiveness of potential actions. Recommendations will be included in the interim reports completed in 2010. A

detailed evaluation of long-term or permanent ecologic or hydraulic separation of the basins will take significantly more time to complete and will be considered in GLMRIS.

2.13 ROTENONE

Summary of Comments Received

A number of individuals made inquiries regarding the suitability of using rotenone to control Asian carp, whether it has adverse human health impacts, whether other methodologies existed that could be used to eradicate Asian carp without harming other species, and if the use of rotenone was used indiscriminately.

The use of rotenone to control Asian carp in the Chicago River was and is taken very seriously. During the December 2009 rapid response on the CSSC, many options were considered including control strategies like heating the water, capturing the fish with nets, herding the fish with noise or lights and trapping them, removing oxygen from the water, increasing the flow at the lock, and sonic disruption.

However the scientific literature is clear that rotenone is the best option to control Asian carp populations. Rotenone affects all species of fish, although susceptibility to the chemical varies between species. The chemical inhibits a biochemical process at the cellular level making it impossible for fish to use oxygen in the release of energy needed for body processes. For more information on this study you can visit the following website: www.cerc.usgs.gov/pubs/center/pdfDocs/carp_rotenone.pdf.

Rotenone is non-persistent, so there is no accumulation in the water, soil, plants or surviving animals. The breakdown process is very rapid. Ultimately, rotenone breaks down into carbon dioxide and water. This natural detoxification process is accelerated through the addition of potassium permanganate into the water upon treatment completion.

In an effort to mitigate possible effects on other fish and wildlife, IDNR conducted electro-fishing operations in the treatment area prior to the rotenone application to remove any sport fish that were present before application. Desirable fish caught were relocated outside the treatment area, and the area will be restocked with more desirable fish in the future, improving the overall quality of fish in the area.

In 2007 USEPA completed a thorough evaluation of the human health and ecological risks associated with rotenone. For more information on the USEPA evaluation, you can visit the following website: www.epa.gov/oppsrrd1/REDs/rotenone_red.pdf.

In the event that an effort similar to the December 2009 rapid response is required, the Chicago River would be closed to recreational and commercial uses.

The technology does not currently exist to specifically target Asian carp for control within aquatic ecosystems. Methods with high specificity for Asian carp are necessary to control or eradicate them without further harm to native species and habitat. Development of a targeted oral delivery platform using novel incorporation technologies that have the capacity to deliver biocides to specific target sites in Asian carp may increase the selectivity and specificity of both current and potential new management chemicals. This large integrated project will focus on developing these approaches for application throughout the Great Lakes. In FY 2010, work will focus on initiating development of new integrated pest management approaches for Asian carp and other invasive aquatic species of concern to Great Lakes managers, including researching candidate bioactive agents, pathogens, and specific targeted delivery platforms. Research will also be conducted to identify and characterize potential bioactive agent delivery sites within AIS including the gill, skin, and gastrointestinal tract (gastric or post-gastric). Research will focus on collection of data on the physiological characteristics of both Asian carp and native fish species (e.g., enzyme, protein, lipid, carbohydrate components, pH) to provide an understanding of factors that might affect delivery of a bioactive agent.

2.14 SECONDARY BARRIERS

Summary of Comments Received

Comments and suggestions were received regarding additional barrier placement to be used as additional impediments to stopping the movement of Asian carp toward the Great Lakes so that the current electric barrier was not the only line of defense.

A project has been added to the Framework that will focus on lethal and sub-lethal effects of seismic technology to divert or eradicate invasive Asian carp as a means to inhibit passage and reduce recruitment. Initial dose response studies will determine the effects of different sound wave frequencies on various age classes of Asian carp at a range of distances from the sound source. The magnitude of the sound wave and particle velocity will be measured in order to quantify fish response to sound impacts. Initial and delayed lethality will be assessed as well as sub-lethal evading behaviors.

Possible implementation of other barriers in addition to the existing electrical barriers is being considered in the Efficacy Study conducted by USACE. Locations both upstream and downstream of the existing barriers are being considered.

Attachment 1

Letters from Congressional, State and Local Agencies

News From
Carl Levin
U.S. Senator, Michigan
http://levin.senate.gov

February 17, 2010

Sen. Carl Levin Statement for the Asian Carp Regional Coordinating Committee Meeting in Ypsilanti, MI

WASHINGTON — *U.S. Sen. Carl Levin, D-Mich., submitted the following statement to today's meeting of the International Joint Commission on Asian Carp. The Ypsilanti, Mich., meeting includes representatives from the International Joint Commission, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the U.S. Coast Guard, Great Lakes states, provinces, municipalities and tribes, and the White House Council on Environmental Quality.*

The Great Lakes are one of our nation's greatest natural resources, and ensuring the protection and restoration of this treasure must continue to be a top priority. Our fisheries are valued at $7 billion per year. Asian carp, which consume 40 percent of their body weight every day and can grow up to 100 pounds, are a significant threat to the Great Lakes fisheries, and we must do all that we can to prevent them from being introduced into the Great Lakes.

I have long supported the construction of the electric dispersal barrier in the Chicago Sanitary and Ship Canal, through legislation and appropriations. We have secured authority for the Corps to implement emergency measures to prevent the Asian carp from bypassing the barrier. We introduced the Asian Carp Prevention and Control Act which would list Asian carp as "injurious" under the Lacey Act so that no one could import or sell in interstate commerce, live Asian carp. In various meetings with federal officials, they have assured our delegation that they have the necessary funding to address the situation and that they have authority to close the locks.

While I am pleased that federal agencies are engaged in preventing the Asian carp from entering and establishing a population in the Great Lakes, I am discouraged that the actions identified in the Asian Carp Control Strategy Framework are not more aggressive. First, agencies should be acting faster. Fish are not active in the winter months; however, if we wait until warmer weather to take action, it may be too late. Second, the Framework does not have clear factors for triggering specific action such as lock closure. Third, the agencies with authority continue to fail to budget adequately. The Administration is relying on funding from the Environmental Protection Agency's Great Lakes Restoration Initiative (GLRI) to supplement Asian carp control efforts. That was not the purpose of that long fought-for initiative.

Invasive species are a very big problem in the Great Lakes. They cause significant environmental and economic harm. Prevention is the best solution. So I hope that the federal agencies understand the threat of Asian carp and will act with urgency to prevent Asian carp from entering the Great Lakes.

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MICHIGAN HOUSE OF REPRESENTATIVES

FRED MILLER

STATE REPRESENTATIVE

APPROPRIATIONS
SUBCOMMITTEES:
COMMUNITY COLLEGES (C)
COMMUNITY HEALTH
HUMAN SERVICES
INVESTIGATIONS, INTERGOVERNMENTAL AFFAIRS AND OVERSIGHT

February 17, 2010

Dear Members of the Asian Carp Regional Coordinating Committee:

I am writing today in support of strong action to prevent Asian carp from entering the Great Lakes.

As you are well aware, the Great Lakes are Michigan's most important treasure and the heart of billion dollar industries, such as tourism, fishing and boating. The threat to these industries by Asian carp is real, and half measures are not sufficient in protecting the Great Lakes from this invasive species.

I strongly urge the locks in Chicago to be closed before Asian carp invade the Great Lakes. Closing the locks will allow federal, state and local governments time to determine the best course of action to stop this devastating species once and for all. Failing to take action will cause economic and ecologic damage that will be irreparable for generations.

I appreciate you taking the time to hold this meeting today in Ypsilanti, and am confident that the overwhelming majority of residents of our state support strong action to prevent the spread of this invasive species. Thank you for taking my thoughts into consideration.

Sincerely,

Fred Miller

Fred Miller
State Representative

March 8, 2010

Regional Coordinating Committee

RE: Asian Carp Control Strategy Framework

Dear Committee Members:

Thank you for the opportunity to comment on the draft Asian Carp Control Strategy Framework, February 2010. The Illinois Environmental Protection Agency (IEPA) has authority to implement the federal Clean Water Act and the Illinois Environmental Protection Act provisions related to water pollution control. These authorities include assuring that water quality in Illinois waterways is protected, restored and maintained to support healthy communities of aquatic life, through the use of National Pollutant Discharge Elimination System (NPDES) permits and other tools.

From this perspective, a review of the draft Asian Carp Control Strategy Framework has revealed some proposed actions that may conflict with Clean Water Act goals. Section 2.1.1 Targeted Removal Within the Chicago Area Waterways (CAWS) proposes regular use of rotenone or other piscicides to eradicate existing individual carp from targeted areas within the CAWS. IEPA is concerned that, since rotenone and other fish toxicants are non-specific, frequent use of this control technique could adversely impact populations of other indigenous fish species. We therefore encourage an emphasis on removal actions that can target Asian carp, and minimize lethality to non-target species, and recommend that the use of fish poisoning be very infrequent.

There are similar conflicts posed by Section 2.2.12 Toxic Zones Using Plant Effluent, which proposes to use wastewater treatment plant effluent to create "toxic zones" that non-specifically kill fish and other aquatic life. The thought is that effluent could be a conduit to deliver high levels of ammonia or create anoxic conditions, either of which would be at least inhospitable and at most lethal. Even if such conditions could be consistently maintained enough to be effective (which is doubtful), the wastewater treatment plant effluent would not be compliant with Illinois water quality standards or the NPDES permit limits which the Metropolitan Water Reclamation District must meet. IEPA cannot grant variances from meeting water quality standards. We recommend that this Section be eliminated from the Strategy.

We certainly appreciate the concern and the risk to the Great Lakes aquatic life ecosystem if Asian carp become established in Lake Michigan. We simply urge that control strategies are implemented that do not adversely impact other indigenous aquatic life in the CAWS and which are legal under the current water pollution control regulatory framework.

If you have questions or need further information, please contact me at (217) 782-1654 or Marcia.Willhite@Illinois.gov.

Sincerely,

Marcia T. Willhite

Chief, Bureau of Water

Ohio Department of Natural Resources

TED STRICKLAND, GOVERNOR SEAN D. LOGAN, DIRECTOR

March 3, 2010

Asian Carp Regional Coordinating Committee
c/o U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Dear Members of the Asian Carp Regional Coordinating Committee:

Thank you for the opportunity to formally comment on the Asian Carp Control Strategy Framework. I was encouraged by the discussions on Asian carp that I participated in recently at the Great Lakes Commission's Great Lakes Days in Washington, DC. I shared with officials of the other Great Lakes states and Canadian Provinces our belief that a collaborative approach between the federal and state governments, provinces and tribes and our private and public sector partners is the only way to accomplish the universal goal of keeping Asian carp and other invasive species out of our waters.

However, there are a few observations on the Asian Carp Control Strategy Framework put forward by the Asian Carp Regional Coordinating Committee that I would like to present to you in the attached document. Please understand that our comments, complied from state fish biologists, wildlife managers and representatives from the Ohio Attorney General's office as well as our internal our legal counsel, are intended to be constructive. Concurrently, we hope Ohio's comments on the Framework compel the Coordinating Committee to continually evaluate and revise the set of solutions detailed in the Framework so that the health and vitality of the Great Lakes is adequately protected from Asian carp.

As you are aware, Ohio's stake in this latest invasive species threat is our motivation to continue to be involved with the work of the Asian Carp Regional Coordinating Committee and to continually advance our perspective. Lake Erie is the 13th largest lake in the world, and the source of tremendous recreational opportunities as well as an important economic driver for Ohio. Recreational fishing on Lake Erie is responsible for an $1.1 billion dollar economic impact for the state and generates $480 million in retail sales, supports 10,000 jobs, and provides $52 million in state and local tax revenues annually.

Thank you for your leadership on this issue. We remain hopeful that the committee can accommodate Ohio's recommendations on the Framework and we look forward to working with you collaboratively.

Sincerely,

Sean D. Logan

Sean D. Logan
Director, Ohio Department of Natural Resources

Encl.
SDL/tl

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STATE OF MICHIGAN
OFFICE OF THE GREAT LAKES
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

KEN DEBEAUSSAERT
DIRECTOR

International Joint Commission Hearing on Carp
Statement of Director Ken DeBeaussaert, Michigan Office of the Great Lakes
Representing Governor Jennifer Granholm
Ypsilanti, Michigan
February 17, 2010

I appreciate the opportunity to talk with you today about the looming catastrophe that we face if Asian carp become established in the Great Lakes.

Allowing Asian carp to populate our Great Lakes will destroy our Great Lakes ecosystem, our Great Lakes fishery as well as other recreational opportunities. We must act swiftly, collaboratively, and wisely to address this crisis.

Invasive species have already created havoc in the Great Lakes. Reports indicate that the cost of biological pollution from invasive species is both massive and rising. In the Great Lakes, total costs for treatment and control of zebra mussels alone reach $100 million per year. The Great Lakes Fishery Commission reports that for sea lamprey, the program requirements are on the order of $30 million per year.

Invasive species have profoundly changed the ecosystem of the Great Lakes, significantly impacted the Great Lakes sport and commercial fisheries and have hampered recreation, all of which have had a negative effect on Michigan's economy.

For example: Lake Huron once had a vibrant salmon sport fishery, with hundreds of charter boats attracting thousands of anglers each year to ports up and down its long coastline. Fishing derbies attracted additional anglers who launched their boats or kept their boats at local marinas. But invasive zebra and quagga mussels (Eurasian invaders) have caused the collapse of the salmon population, and thus the sport fishery. Gone are the fishing derbies, charter boaters have left the ports, and anglers have moved elsewhere. This was a several hundred million dollar industry, and it is gone.

Michigan has taken aggressive steps to stop the further spread of these foreign invaders, including:

- Requiring that Great Lakes ships report on use of ballast water management practices established by the shipping industry,
- Enacting legislation requiring all ocean-going ships to obtain a permit for ballast water discharges. The permit specifies the use of an approved treatment system to prevent release of invasive species via ballast water,
- Taking legal action to address ballast water issues, including successfully defending our state laws in federal court and challenging federal agencies for their failure to appropriately use existing regulatory authority to act, and
- Administering state regulatory programs to control aquatic nuisance species in our lakes and rivers. These programs include restrictions on transport of invasive species of fish, establishment of a list of invasive species prohibited in Michigan, and participation in actions to control sea lamprey in Great Lakes tributaries.

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- Michigan has contributed to actions to prevent Asian carp from entering the Great Lakes. We contributed financially to construction of the electrical barrier in the Chicago Sanitary and Ship Canal. We prohibited possession of live Asian carp in the state, and we participated in the response actions in December 2009 that treated the Canal to remove Asian carp prior to maintenance of the electrical barrier.

Despite our best efforts, Asian carp are now at our doorstep. And here is the bottom-line. Once Asian carp gets established in the lakes, we cannot eradicate it, control its spread, or the damage they will cause.

But the story of Asian carp does not need to be a legacy of destruction for our children. The Great Lakes community, including Governors, congressional delegations, local government officials, and citizens has proven that they can work together on difficult challenges. Yes, this is a formidable challenge, but together we can and must solve it.

The threat of Asian carp must be treated as a crisis and steps must be implemented immediately to address it. As early as 2003, scientists, governmental officials, and stakeholders were calling for ecological separation of the Great Lakes and the Mississippi River watershed, but we did not act quickly enough. Short-term fixes have become long-term projects. For example, the installation of the second electrical barrier took over six years, and it is still not fully operational. It took several years to ban the importation of Black Carp and Silver Carp under the Lacey Act. Bighead Carp are still not covered under that Act.

Because of our history of insufficient action or painfully slow progress, any action plan must call for work or research to be completed in months and not years. Any action plan for the stopping the spread of Asian Carp into the Great Lakes must contain permanent solution. It must reflect the realities of limited funding and the lessons learned from past experience with fighting invasive species.

The following are Michigan's recommendations for actions that must begin immediately to address the threat of Asian carp becoming established in the Great Lakes.

- Closing and ceasing operation of the O'Brien Lock and the Chicago Lock until a permanent ecological barrier is constructed between the Great Lakes and the Mississippi River watershed. The Army Corp of Engineers must have the authority to close the locks on emergency and permanent bases if necessary,
- Initiating studies to be completed by the end of this year to examine the feasibility of transferring cargo via other transportation systems,
- Physically modifying or operating other water control structures near Lake Michigan – at the O'Brien Lock, the Chicago Controlling Works, and the Wilmette Pumping Station in a manner that will not allow fish to pass into the Lake,
- Installing interim barriers at other locations this year, including barriers between the Des Plaines River and the Canal and in Indiana Harbor and Burns Ditch from the Grand Calumet and Little Calumet Rivers to eliminate the potential for flooding between the two watersheds,
- Completing additional studies related to the biology/ecology of the carp and predictive models to determine the areas at highest risk for colonization in the Great Lakes, including estuaries and bays, drowned river mouths, and river systems,
- Providing additional dollars for continuous monitoring of carp based on risk analyses, with funding on reserve for chemical treatment used as a rapid response mechanism as warranted,
- Communicating with the states on actions and data in a timely manner,
- Completing electrical barrier 2b this year
- Developing and implementing plans for a permanent solution to the problems that would ecologically and physically separate the carp-infested waters of the Mississippi River watershed from the Great Lakes.
- Implementing a proactive campaign to educate the public about the risks and dangers of Asian carp so that they do not get hurt or unknowingly (or knowingly) spread these dangerous fish into inland waters.

These are proactive steps that will create a permanent solution to the threat of Asian carp entering the Great Lakes. The proposed frameworkfalls short in meeting the test of creating permanent solutions. It ignores past experience and it is built upon timeframes that make it clear the affected agencies are not viewing this threat

as a crisis warranting immediate actions. The Framework does not present a sustainable plan; it is a plan to limit damages, not solve the problem.

More specifically, Michigan has the following concerns with the Framework:

- Rather than calling for a permanent ecological separation between the Great Lakes and Mississippi watershed, the Framework calls for a long-term study with a completion date of 2012 to explore the feasibility of such a separation.
- The Framework calls for modifying days of operation of the locks and while the locks are closed suppressing the population fish utilizing poison, commercial fish nets and state and federal fish crews. This proposal is not sustainable, extremely costly and provides no permanent solution.
- The Framework does not call for a feasibility study for transferring cargo via other transportation systems. A recent Michigan led study finds the cost of alternative shipping at $70 million dollars as compared to $78 million proposed in the framework for population suppression.
- The Framework calls for more studies on changing the operation of the O'Brien Lock, the Chicago Controlling Works and the Wilmette Pumping Station to ensure that they will not allow fish to pass into Lake Michigan. The time for study is passed, it is time to prepare the engineering plans and to change the operation or modify the structure to ensure no fish passage. In the meantime, the locks should be closed.
- The Framework assigns roles and responsibilities to the states but fails to recognize the states as a partner in ensuring that the carp do not enter the lakes.

There are provisions of the plan that Michigan does support, including:

- Completion of barrier 2b by October 2010.
- The construction of interim barriers between the Des Plaines River and the Canal
- The call for research to evaluate Asian Carp spawning behavior, habitat suitability, risk assessment of carp becoming established in the Great Lakes based upon available food sources.
- The need for increased outreach to and participation by other stakeholders and agencies.

We all treasure the Great Lakes and share a commitment to their continued vitality. We must now all share a similar commitment to move aggressively forward to stop the spread of Asian carp. The Great Lakes states may have challenging discussions on specific actions, but that should not stop us from moving forward swiftly, collaboratively and wisely to address the threat posed by Asian carp. Allowing Asian carp to populate our Great Lakes will destroy the resource and the recreational opportunities they provide us.

President Obama and Congress have given the restoration and protection of the Great Lakes new hope with the infusion of $475 million through the Great Lakes Restoration Initiative. This work will all be in vain if Asian carp are allowed into the Great Lakes.

Thank you.