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GPO

ASIAN CARP AND THE GREAT LAKES

(111–87)

HEARING

BEFORE THE

SUBCOMMITTEE ON
WATER RESOURCES AND ENVIRONMENT

OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

February 9, 2010

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U.S. House of Representatives
Committee on Transportation and Infrastructure
Washington, DC 20515

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February 5, 2010

SUMMARY OF SUBJECT MATTER

TO: Members of the Subcommittee on Water Resources and Environment

FROM: Subcommittee on Water Resources and Environment Staff

SUBJECT: Hearing on the "Asian Carp and the Great Lakes"

PURPOSE OF THE HEARING

The Subcommittee on Water Resources and Environment will meet on Tuesday, February 9, 2010, at 2:00 p.m., in room 2167 of the Rayburn House Office Building to hear testimony from representatives of the U.S. Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (Corps), the States of Illinois and Michigan, academia, and interested stakeholders on the issue of preventing the induction of the aquatic invasive species, the Asian carp, into the Great Lakes.

BACKGROUND

I. Asian Carp Introduction and Threat to Aquatic Ecosystems

Two species of carp – the bighead carp and silver carp – hereinafter referred to as Asian carp, were first introduced into the southern United States in the early 1970s to remove algae from farmed catfish ponds. Flooding in the early 1990s caused many of the catfish farm ponds to overflow, and Asian carp were released into local waterways in the Mississippi River basin. The carp have since migrated northward up the Mississippi River, becoming the most abundant species in some areas of the River.[1]

Three characteristics of Asian carp have complicated efforts to control the northward migration of the species towards the Great Lakes including its: (1) large size (up to four feet in length and 100 pounds); (2) rapid rate of reproduction (spawning carp can produce between 50,000

[1] EPA, Asian Carp and the Great Lakes (November 25, 2009), http://www.epa.gov/glnpo/invasive/asiancarp/.

to 1 million eggs); and (3) aggressive nature (Asian carp are easily agitated by loud noises, such as boat engines, and have been documented jumping out of rivers into ongoing boaters).

Asian carp are of particular concern to the Great Lakes region because of the potential harm they could cause to the native ecosystem. Asian carp currently present in the Mississippi River physically lack a stomach, so they must continually feed on aquatic vegetation. Native fish species have difficulty competing with Asian carp because of their rapid consumption of resources.

Additionally, Asian carp can readily adapt to varying environmental conditions, exacerbating the ecosystem concerns for the Great Lakes. According to the U.S. Fish and Wildlife Service, "bighead and silver carp all prefer a wide temperature range, indicating their ability to thrive from the northernmost waters of the Great Lakes to the waters of the middle Mississippi River Basin. . . . Asian carp species that have become adapted to life in the Great Lakes would also likely invade the Lakes' tributary streams and rivers where they would most likely spawn."[2]

II. The Chicago Sanitary and Ship Canal[3]

The Chicago Area Waterway System is a system of canals and natural waterways that serves as both a navigation link between Lake Michigan and the Mississippi River system and as an outlet for the stormwater and effluent from the City of Chicago. The canal system extends between Lake Michigan and the Des Plaines River, a tributary of the Illinois River and ultimately of the Mississippi River. The canal system was originally constructed to permit Chicago to dilute and dispose of its wastewater without allowing it to enter Lake Michigan. Using the canal system, Illinois redirected the Chicago River, which naturally flowed east into Lake Michigan, to flow west, carried by the canal system into the Des Plaines River. The Chicago River Controlling Works were constructed at the confluence of the Chicago River and Lake Michigan.

The permanent connection between Lake Michigan and the Mississippi River drainage basins was finalized with the completion of the Chicago Sanitary and Ship Canal (Canal) in 1900. Subsequent construction included the dredging and reversal of the Calumet River, the erection of the Thomas J. O'Brien Lock and Dam on that river, and the construction of the Cal-Sag Channel linking the Calumet with the main canal.

By statute, the Corps operates and maintains the Canal as necessary to sustain navigation from Chicago Harbor on Lake Michigan to Lockport on the Des Plaines River. Vessels enter and exit the Chicago end of the canal system through the O'Brien Lock and through the lock facilities at the Chicago River Controlling Works (the Chicago Lock). The Corps owns both locks and operates them in accordance with applicable regulations and agreements with the Metropolitan Water Reclamation District of Greater Chicago (Water District).

Most commercial boat traffic between Lake Michigan and the canal system now passes through the O'Brien Lock, including barge traffic recently rerouted from the Chicago Lock. About

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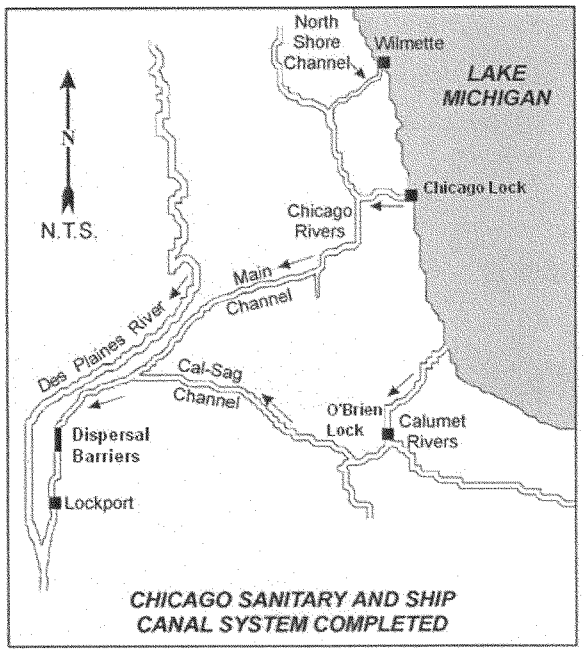
[2] *See* Declaration of Charles M. Wooley, Deputy Regional Director of the Midwest Region, United States Fish and Wildlife Service, *Wisconsin v. Illinois and Metropolitan Sanitary District of Greater Chicago* (Jan. 4, 2010).
[3] *Source:* Memorandum for the United States in Opposition, *Wisconsin v. Illinois and Metropolitan Sanitary District of Greater Chicago* (Jan. 2010).

seven million tons of cargo[4] pass through the O'Brien Lock each year, as do 18,000 recreational boats. Additional cargo, ferry, and pleasure boats use the Chicago Lock. The locks are also used by the U.S. Coast Guard stations on the Lake Michigan side of the locks in responding to safety emergencies on the canal and in patrolling critical infrastructure facilities in the river system.



Source: U.S. Army Corps of Engineers, Chicago District

In addition, both the Chicago River Controlling Works and the O'Brien Lock are used for flood control purposes. Both facilities include sluice gates connected to the locks, which are used to combat the risk of flooding during significant rainstorms by drawing water from the canal system into Lake Michigan. The Corps owns the sluice gates at the O'Brien Lock and operates them under the direction of the Water District. The Water District owns and operates the sluice gates at the Chicago River Controlling Works. In very severe rainstorms, in addition to opening the sluice gates, the Water District requests the Corps to open the Chicago and O'Brien lock gates as well, to permit additional water to be diverted into Lake Michigan. Both locks were last opened for this flood control purpose in September 2008.

[4] Predominately coal and other fossil fuels, bulk construction materials (e.g., sand and gravel), iron and steel products, and chemical products.

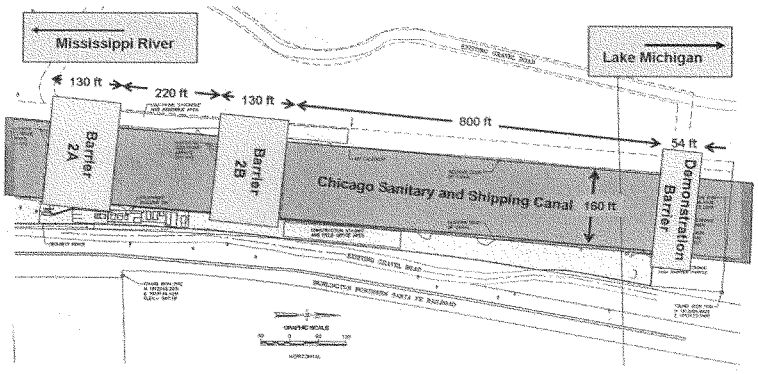
III. Federal Efforts to Combat Asian Carp

A. Electric Dispersal Barrier

Congress first recognized the potential for invasive species, including Asian carp, to enter the Great Lakes via the Canal in 1996. In that year, Congress included language in the National Invasive Species Act of 1996 (16 U.S.C. § 4713, *et seq.*), directing the Corps to study and implement a dispersal system along the Canal to prevent the introduction of Asian carp into the Great Lakes.

Pursuant to this authority, the Corps elected to construct an electric barrier system because it was, generally, non-lethal to fish and does not interfere with navigation. [5]

In April 2002, the Corps began operation of the first electric barrier in Romeoville, IL (now known as Barrier I) as a demonstration of the technology to deter invasive species. The system consists of steel cables that are secured to the bottom of the Canal. A low-voltage, pulsing direct current (DC) is sent through the cables, creating an electric field in the water. This field is uncomfortable for fish and most do not swim through it. Barrier I was intended to only operate for a few years as a demonstration project. After Barrier I was constructed, further research by the Corps suggested that smaller or juvenile fish required more voltage beyond the capacity of Barrier I.



Source: U.S. Army Corps of Engineers, Chicago District

In 2003, the Corps initially approved the construction of a permanent barrier – Barrier IIA – under its continuing authorities program (section 1135 of the Water Resources Development Act of 1135). This project, which was later specifically authorized by Congress through the District of Columbia Appropriations Act (2005), includes several design improvements identified during the study of Barrier I. Barrier II is able to generate a stronger electric field over a larger area and has

[5] Corps, Chicago Sanitary and Ship Canal Aquatic Nuisance Species Dispersal Barriers (August 27, 2009), http://www.lrc.usace.army.mil/projects/fish_barrier/index.html.

two control houses, Barrier IIA and IIB. Each control house can be operated independently, but the Corps' goal is to have both operated simultaneously. In the Water Resources Development Act of 2007, Congress authorized the Corps to complete Barrier II, upgrade Barrier I and make it permanent, and to operate the barrier system at Federal expense.

Barrier IIA was completed in 2006 and was fully operational in April 2009. Barrier IIB is currently under construction, utilizing funds from the American Recovery and Reinvestment Act (P.L. 111-5), and is expected to be complete by the end of 2010.

B. Efficacy Study

While the Canal barriers provide a level of protection against the direct migration of Asian carp through the Canal to the Great Lakes, these species potentially could bypass the barriers during a flooding event and cross over into the adjacent Des Plaines River or Illinois and Michigan Canal. To minimize this potential, Congress authorized[6] the Corps to conduct an efficacy study "to prevent aquatic nuisance species from bypassing the Canal Dispersal Barrier Project" and entering the Great Lakes.

On January 10, 2009, the Corps released its Final Report with recommendations for interim risk reduction measures resulting from the efficacy study. The recommended plan is for the placement of 34,600 feet of concrete barricades and 33,400 feet of chain link fencing (with 1/4" openings) along 68,000 feet (~13 miles) of flood prone areas of the Canal upstream of the barriers. The total cost of these interim measures is $13,174,000, which was provided through the Great Lakes Restoration Initiative.[7] The Corps expects to award a contract for these measures in March 2010, and expects to complete construction of the interim measures by October 2010.

C. Great Lakes Mississippi River Interbasin Feasibility Study

The Corps is also carrying out a feasibility study, pursuant to section 3061 of the Water Resources Development Act of 2007, to investigate long-term efforts for preventing invasive species from entering into the Great Lakes.

The initial scoping of the Interbasin Study will examine several potential pathways for movement of aquatic invasive species into the Great Lakes, including the Canal and connected waterways, the Ohio River and Lake Erie, and the Fox and Wisconsin Rivers. Although the scope of the study covers multiple pathways into Great Lakes, the Corps expects to prioritize the feasibility study for the Canal, expected to be completed within 2 1/2 years. The remainder of the study is expected to be completed within five years. The study has a multi-year timeframe, but the Corps expects individual decisions can be made as the appropriate section of the study is finalized, rather than waiting for the entire study to conclude. According to the Corps, approximately $450,000 of fiscal year 2009 and 2010 appropriations is available for the Interbasin study.

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[6] Section 126 of the Energy and Water Development and Related Agencies Appropriations Act of 2010, Pub. L. 111-85 (2009).

[7] Department of the Interior, Environment, and Related Agencies Appropriations Act, 2010, Pub. L. No. 111-88 (2009).

D. eDNA Sampling Technique

In August 2009, the Corps entered into an agreement with the University of Notre Dame to use an experimental technique called environmental DNA (eDNA) testing to identify Asian carp in the Canal. This technique involves water sampling, filtering for organic solids, and analyzing the DNA for genetic markers specific to the Asian carp.

The initial results of the eDNA technique found Asian carp eDNA south of the barrier system only. More samples were taken further upstream of the barriers. Four samples from the Calumet-Sag Channel area revealed Asian carp eDNA. Subsequent tests have been negative, although this may have been due to colder winter temperatures. Sampling is still being conducted to test for the presence of Asian carp north of the barrier system.

E. Ballast and Bilge Water Restrictions

Water taken on by vessels for stability (ballast) or water that accumulates in void spaces of vessels (bilge) can contain invasive species. In September 2009, the barge industry agreed to cease ballasting on either side of the barrier, at the Coast Guard's request.

IV. State Efforts to Combat the Asian Carp

The Illinois Department of Natural Resources (IDNR) is the lead responding agency member of the Asian Carp Rapid Response Workgroup. The Workgroup's other members are the Coast Guard, the Metropolitan Water Reclamation District of Greater Chicago, the Corps, the EPA, and the United States Fish and Wildlife Service. The Workgroup has conducted several recent efforts to identify and kill Asian carp in the Canal.

A. Rotenone Application

In December 2009, Barrier IIA was taken offline for routine maintenance. To prevent the passage of Asian carp through the barrier system during maintenance, IDNR applied the fish poison (Rotenone) to a 5.7-mile portion of the Canal south of the barrier system. Other States involved in the Rotenone application included Michigan, Indiana, Wisconsin, and Canada, which provided personnel and equipment. The Rotenone killed approximately 30,000 fish in the Canal. One Bighead carp was found south (riverward) of the barrier system.

B. Fish Netting and Tagging

In response to the eDNA findings along the Calumet-Sag Channel, Illinois contracted with commercial fisherman experienced in catching Asian carp. From December 1-7, 2009, over 1,000 fish were caught and identified, but no Asian carp were identified.

PENDING LEGISLATION

Several legislative proposals have been introduced in the House of Representatives to address the issue of the Asian carp.

H.R. 51, the "Eradicating Asian Carp in the Great Lakes Study Act," (introduced by Representative Mark Kirk of Illinois) requires the Director of the United States Fish and Wildlife Service to study and report to Congress on methods for eradicating Asian carp from the Illinois Waterway System, including harvesting them from the Illinois River, and repopulating the River with native species. H.R. 51 was referred to the Committee on Natural Resources.

H.R. 3173, the "Asian Carp Prevention and Control Act", (introduced by Representative Judy Biggert of Illinois) amends the Lacey Act to add the bighead carp to the list of injurious species that are prohibited from being shipped or imported into the United States. H.R. 3173 was referred to the Committee on the Judiciary.

H.R. 4472, the "Close All Routes and Prevent Asian Carp Today Act of 2010," (introduced by Representative Dave Camp of Michigan) directs the Secretary of the Army to immediately close and cease operation of the O'Brien and Chicago locks to prevent the migration of bighead and silver carps into Lake Michigan. H.R. 4472 was referred to the Committee on Transportation and Infrastructure.

AGENDA

PANEL I

Mr. Cameron Davis
Senior Adviser to the Administrator
United States Environmental Protection Agency

Major General John W. Peabody
Commander, the Great Lakes and Ohio River Division
United States Army Corps of Engineers

Director Marc Miller
Illinois Department of Natural Resources

Director Rebecca Humphries
Michigan Department of Natural Resources and Environment

Secretary Matt Frank
Wisconsin Department of Natural Resources

PANEL II

Professor David Lodge
Director, Center for Aquatic Conservation
Professor of Biological Sciences
University of Notre Dame

Dr. Michael Hansen
Chair, Great Lakes Fishery Commission

Mr. Del Wilkins
Vice President of Terminal Operations & Business Development
Canal Barge Company, Inc.

Testifying on behalf of The American Waterways Operators

Mr. Joel Brammeier
President and CEO
Alliance for the Great Lakes

ASIAN CARP AND THE GREAT LAKES

Tuesday, February 9, 2010

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
Washington, DC.

The Subcommittee met, pursuant to call, at 2:30 p.m., in Room 2167, Rayburn House Office Building, Hon. Donna F. Edwards presiding.

Ms. EDWARDS. Good afternoon. I would like to welcome everyone to today's hearing. Thank you for braving the snow this afternoon.

As we get started, I ask unanimous consent that the gentleman from Wisconsin, Mr. Petri, be permitted to participate in today's hearing of the Subcommittee on Water Resources and Environment. Without objection. Thank you, Mr. Petri.

I would also like to ask unanimous consent that the following testimony be made part of the record: a statement from the Ranking Member of the Subcommittee, Mr. Boozman; a letter from the Passenger Vessel Association, dated February 5, 2010; and a letter from the Conservation Coalition, dated February 5, 2010, that was to be submitted by our Committee colleague Representative Ehlers.

[The information follows:]

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January 22, 2010

The Honorable Eddie Bernice Johnson
Chairwoman
Subcommittee on Water Resources and Environment
Committee on Transportation and Infrastructure
B-376 Rayburn Building
U.S. House of Representatives
Washington, DC 20515

Dear Representative Johnson:

Because its Chicago-area vessel members depend upon use of the federally-operated lock at the Chicago River Controlling Works, the Passenger Vessel Association (PVA) respectfully asks to present testimony at your subcommittee's February 9 on the Chicago Sanitary and Ship Canal and the Asian Carp.

PVA is the national trade association for U.S.-flagged passenger vessels of all types. Its membership currently includes more than 550 vessel and associate members. PVA members own and operate dinner cruise vessels, sightseeing and excursion vessels, passenger and vehicular ferries, private charter vessels, whalewatching and eco-tour operators, windjammers, gaming vessels, amphibious vessels, water taxis, and overnight cruise ships. The diverse membership of PVA includes small family businesses with a single boat, companies with several large vessels in different locations, and governmental agencies operating ferries.

The following PVA members in the Chicago area operate vessel tours and charters that move through the Chicago River Controlling Works lock connecting Lake Michigan and the Chicago River:

Chicago Cruises (Great Lakes Development LLC) (www.chicagocruises.com)
Chicago's First Lady Cruises (www.cruisechicago.com)
Chicago from the Lake, Ltd. (www.chicagoline.com)
Entertainment Cruises (www.entertainmentcruises.com)
Mercury Sightseeing Boats (www.cruisechicago.com)
Shoreline Marine Company (www.shorelinesightseeing.com)
Wendella Sightseeing Boats (www.wendellaboats.com)

Each of these companies provides passenger excursions which enter and exit the Chicago River via the Chicago River lock. Most of these operators offer the famous boat tours to showcase Chicago's architecture. Should the lock be closed, each would be prevented from providing lake-to-river and river-to-lake excursions, upon which their businesses rely. For these Chicago vessel companies and their hundreds of employees, lock closure

703,674 passengers and made at least 7,865 transits through the lock in 2009. These PVA members employ at least 616 workers in high-quality, good-paying jobs and have an annual payroll of at least $7,033,396. Tens of millions of dollars of investment assets and resources are at risk if the passenger vessels can not be employed in their normal income-producing activity.

PVA members that operate throughout the Great Lakes derive their existence on the natural attractiveness and ecological integrity of the waters on which they sail. Therefore, PVA takes seriously any credibly-demonstrated harm that could ensue to the Great Lakes should the Asian carp establish a population there. Nevertheless, PVA believes that the federal government can prevent the migration of the Asian carp by employing a range of concerted actions other than closure of the Chicago River Controlling Works lock.

PVA urges all policymakers to take note of and protect the economic well-being of its vessel members in Chicago as strategies to combat the Asian carp are devised. This is why PVA respectfully asks for a "place at the table" at the upcoming summit meeting.

For more information, please contact PVA's Legislative Director, Mr. Ed Welch, at 703-518-5005 ext. 27 and ewelch@passengervessel.com.

Sincerely,

John R. Groundwater
Executive Director

Friday, February 5, 2010

Subcommittee on Water Resources and Environment
Committee on Transportation and Infrastructure
United States House of Representatives
111th Congress

Chairwoman Johnson, Ranking Member Boozman, and Members of the Subcommittee,

Michigan is a state defined by the Great Lakes geographically, economically, and culturally. With one-fifth of the world's fresh surface water and more freshwater coastline than any other state, the Great Lakes provide Michigan residents with unparalleled recreational and business opportunities that define our outdoor heritage and economic vitality.

Our state's second and third largest industries (agriculture and tourism) depend heavily on the health of the Great Lakes. With the scenic backdrop and recreational paradise of our Nation's "Third Coast," Michigan's $12.8 billion tourism industry is supported primarily by the Great Lakes. Each year, anglers flock to Michigan's world-class sportfishery, reeling in $4 billion annually to our state's economy. Boating on the Great Lakes is a treasured pastime that generates roughly $21 million in economic benefits while sustaining a $2 billion marina and harbor business annually.[i] Collectively, studies suggest that the Great Lakes provide for nearly 823,000 jobs in Michigan.[ii]

Michigan's hunting, fishing, and trapping traditions also depend on the diverse ecosystem and habitat of the Great Lakes, its rivers, wetlands, and uplands. With one out of six Michigan residents being a hunter, angler, or both, Michigan has a strong outdoor heritage supported by the diverse recreational opportunities in our natural resources. Sportsmen and women in Michigan spend $3.4 billion each year in our state, providing $1.7 billion in salaries and wages, which yields an additional $5.9 billion ripple effect on the state's economy annually.[iii] This provides $406 million to federal and $378 million to state and local tax rolls each year. Two billion of this spending comes from fishing alone, placing Michigan with the fifth largest expenditures on recreational fishing pursuits out of all fifty states.[iv]

After pollution and aquatic invasive species have depleted home values, water quality and water-based recreation in and around the Great Lakes, federal, state, and local officials have demonstrated a desire to restore and maintain a healthy Great Lakes in order to improve the region's economy, public health and outdoor heritage. In 2006, the Brookings Institution issued a report showing that implementation of the Great Lakes Regional Collaboration Strategy originally prompted by President George W. Bush would yield nearly a 4:1 return on investment to the Great Lakes basin's tourism and fishing industries, reduced costs to municipalities, and increased property values.[v] President Obama and this Congress last year committed an investment in this opportunity

with a $475 million down-payment on the Great Lakes Restoration Initiative. For the next fiscal year, the President has proposed to continue this investment with an additional $300 million.

While we applaud this Congress and Presidents Barack Obama and George W. Bush for supporting Great Lakes Restoration, the recent administrative gridlock on solutions to prevent Asian Carp from invading Lake Michigan through the man-made navigational canals in Chicago is counterintuitive. The $9 million electric barriers that were constructed to prevent the Asian Carp from invading and devastating the Great Lakes ecosystem has not been adequate; scientists have proven through eDNA tests that Asian Carp may have already breached these barriers. In response, federal agencies and the State of Illinois have opposed proactive solutions that would prevent the carp's migration to Lake Michigan through the Chicago Sanitary Ship Canal. Despite support from the states of Ohio, Wisconsin, Indiana, Minnesota, New York, and the Canadian Province of Ontario, Michigan's petition to the U.S. Supreme Court seeking an injunction to force such measures has also been denied. Absent a legal remedy and the apparent refusal to act by relevant administrative agencies, Congressional solutions to stop Asian Carp from invading the Great Lakes and its tributaries are necessary.

Asian Carp has the proven ability to inflict irreparable damage on the Great Lakes ecosystem and injure boaters, which would severely affect Michigan's economy and recreational pastimes if immediate solutions are not undertaken to stop the fish at Lake Michigan. Rarely do we have an opportunity to prevent the damage of an invasive species before it begins, yet in this circumstance such an opportunity exists. As such, we respectfully ask for your support in passing H.R. 4472 (CARP ACT). With its companion S.2946, this bi-partisan, bi-cameral legislation introduced by Rep. Dave Camp and Sen. Debbie Stabenow is a dynamic approach to ensure all variables are considered while providing immediate safeguards and developing long-term solutions to keep Asian Carp out of the Great Lakes.

While we fully support the spirit of the CARP ACT as introduced, we recognize that a temporary lock closure may not fully prevent fish migration into Lake Michigan. In the interim, we also encourage the following solutions as supplemental preventative measures to closing the locks:

- Operation and management of the locks leading to Lake Michigan in a way that reduces the further transfer of Asian Carp as much as possible, including rapid response and flood management plans;
- Completion of the Dispersal Barrier Efficacy Study by August with immediate implementation Study's first interim report recommendations as soon as possible;
- Operation of the Dispersal Barrier System at optimal power and frequency
- Expedition of both the completion of Barrier II and upgrade of Barrier I;
- Closure of the sluice gates at the Wilmette Pumping Station and immediate installation of interim barriers in the Grand Calumet and Little Calumet Rivers;
- Expeditious completion of the Great Lakes and Mississippi River Interbasin Transfer Study

Respectfully submitted,

Bowfishing Association of Michigan – Steve Winters, President
Delta Waterfowl – Scott Berg, Regional Director
Michigan Association of Conservation Districts – Lori Phalen, Executive Director
Michigan Bear Hunters Association – Phil Hewitt, Vice-President
Michigan Bow Hunters Association – Bruce Levey, President
Michigan Charter Boat Association – Denny Grinold, Federal and State Government Affairs
Michigan Conservation Foundation – Bob Jacobsen, President
Michigan Trappers and Predator Callers Association – John A. Caretti, President
Michigan Trout Unlimited – Bryan Burroughs, Executive Director
Michigan United Conservation Clubs – Erin McDonough, Executive Director
Upper Peninsula Sportsmen's Alliance – Dale McNamee, President

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Ms. EDWARDS. The Chair does not have an opening statement.

With that, I would like to ask Mr. Petri if you have an opening statement.

Mr. PETRI. I have a brief one.

I really want to thank you, Representative Edwards, for pinch-hitting so that we can get this moving forward. I suspect that we will be joined in a few minutes by the Chairman of the Full Committee, and we look forward to that.

I would also like to thank our witnesses, particularly those from out of town, for being here; and I hope you don't have to stay longer than you originally planned. I know you are all working on that.

I want to add that I was particularly happy that the panel includes Matt Frank, who has been our hardworking Wisconsin Department of Natural Resources secretary; and we very much appreciate your being a part of the panel as well.

It is no exaggeration to say the issue of the Asian carp entry into the Great Lakes is one that has raised great fears on the part of our States surrounding the Great Lakes. Some predict that the carp population has the potential to disrupt the fundamental ecology of the Great Lakes, resulting in tremendous economic damage to our States and particularly our fishing industry.

Yesterday, the Asian Carp Workgroup, a collection of State and Federal agencies, released their Control Strategy Framework. We all agree, and I would note that the Framework specifically states, that the goal is to prevent the introduction of carp into the lakes. Under this plan released yesterday, the opening of the locks would be minimized while a range of approaches are used to attack the carp population and prevent them from entering Lake Michigan.

Much attention has been focused on a proposal originally from the State of Michigan to close the Chicago Sanitary and Shipping Canal. I am looking forward to hearing the views of the representatives from Michigan, Illinois, and my own State of Wisconsin on this issue.

It seems to me that we do want to keep the carp from entering the Great Lakes, but there must be a way to do it that does not hurt the economy of one of our Great Lake State neighbors. If a lock is left open, however, we have to proceed with great urgency to find effective and permanent solutions to keep the carp out.

I am interested in hearing both the short- and long-term strategies to prevent the introduction of the carp. We must have a coordinated response and a strong Federal-State partnership to combat this threat. So I would hope that this hearing would examine a range of options to keep the carp out. Certainly with our human ingenuity and know-how, we should be able to outsmart this fish.

Given the interest in moving this hearing forward, I will end my statement here and express my appreciation once again to the witnesses for appearing before the Subcommittee under such trying weather circumstances. Thank you for your work to protect the Great Lakes, and I yield back the balance of my time.

Ms. EDWARDS. Thank you, Mr. Petri.

With that, I will introduce the witnesses in the order in which we will hear your testimony. Again, thank you very much for being here today, and we look forward to hearing your testimony.

We will begin with Mr. Cameron Davis, who is the Senior Adviser to the Administrator of the United States Environmental Protection Agency, based in Chicago, Illinois. Major General John W. Peabody is the Commander of the Great Lakes and Ohio River Division of the United States Army Corps of Engineers in Cincinnati, Ohio. Assistant Director John Rogner, Illinois Department of Natural Resources in Springfield, Illinois. Director Rebecca Humphries, Michigan Department of Natural Resources and the Environment from Lansing, Michigan. Secretary Matt Frank, the Wisconsin Department of Natural Resources in Madison, Wisconsin. Professor David Lodge, Director, Center for Aquatic Conservation, and Professor of Biological Sciences at the University of Notre Dame, Indiana. Dr. Michael Hansen, Chair of the Great Lakes Fishery Commission, Ann Arbor, Michigan. And Mr. Del Wilkins, Vice President of Terminal Operations and Business Development at Canal Barge Company in Channahon, Illinois—I hope that is correct—and you are testifying on behalf of the American Waterways Operators. And, finally, Mr. Joe Brammeier, President and CEO of the Alliance for the Great Lakes in Chicago, Illinois.

We will begin our testimony today with Mr. Davis.

TESTIMONY OF CAMERON DAVIS, SENIOR ADVISER TO THE ADMINISTRATOR, UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, CHICAGO, ILLINOIS; MAJOR GENERAL JOHN W. PEABODY, COMMANDER, THE GREAT LAKES AND OHIO RIVER DIVISION, UNITED STATES ARMY CORPS OF ENGINEERS, CINCINNATI, OHIO; JOHN ROGNER, ASSISTANT DIRECTOR, ILLINOIS DEPARTMENT OF NATURAL RESOURCES, SPRINGFIELD, ILLINOIS; REBECCA HUMPHRIES, DIRECTOR, MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT, LANSING, MICHIGAN; MATT FRANK, SECRETARY, WISCONSIN DEPARTMENT OF NATURAL RESOURCES, MADISON, WISCONSIN; DAVID LODGE, DIRECTOR, CENTER FOR AQUATIC CONSERVATION, PROFESSOR OF BIOLOGICAL SCIENCES, UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA; MICHAEL HANSEN, CHAIR, GREAT LAKES FISHERY COMMISSION, ANN ARBOR, MICHIGAN; DEL WILKINS, VICE PRESIDENT OF TERMINAL OPERATIONS AND BUSINESS DEVELOPMENT, CANAL BARGE COMPANY, INC., CHANNAHON, ILLINOIS, TESTIFYING ON BEHALF OF THE AMERICAN WATERWAYS OPERATORS; AND JOEL BRAMMEIER, PRESIDENT AND CEO, ALLIANCE FOR THE GREAT LAKES, CHICAGO, ILLINOIS

Mr. DAVIS. Thank you, Chairman Oberstar, Chairwoman Edwards, Representative Petri. Thank you very much, Members of the Subcommittee, for the opportunity to speak today on behalf of U.S. Environmental Protection Agency Administrator Lisa Jackson. Thank you for the opportunity to provide the agency's perspective on efforts to prevent Asian carp from becoming established in the Great Lakes.

I would also like to recognize that Bill Bolen with EPA is here with me who has put in significant work on behalf of EPA on this issue.

The administration continues to make restoration and protection of the Great Lakes a national priority, as evidenced by President Obama's significant investment in the ecosystem under his Great Lakes Restoration Initiative. EPA understands the extreme level of concern by the public and that the public feels for the Great Lakes ecosystem. We understand the concern that the public feels for their safety while recreating and concern for their jobs.

We also have an urgent need to keep Asian carp from becoming established in the Great Lakes. As we move forward, we are working to keep Asian carp from becoming established in self-sustaining populations in the ecosystem. But to do that we require a coordinated, cooperative approach.

I will address EPA's role first and the efforts in recent past and multi-stakeholder plans moving forward second in my testimony.

First, EPA is tasked with coordinating Federal Great Lakes protection and restoration policies and efforts under Clean Water Act section 118 and Presidential Executive Order 13340. EPA has been doing this and will facilitate the integration of efforts by participating agencies and stakeholders moving forward.

One of the best weapons we have against Asian carp is this coordinated, cooperative approach through which each agency remains accountable for the work under its authorities in order to ensure the most effective efforts possible. We will undercut ourselves if we inhibit such accountability and integration.

This team approach has been successful and will continue to be successful if we give it a chance. It was successful in December when you saw participating agencies come together under the leadership of the Illinois Department of Natural Resources to undertake a rapid response action. The action was needed to defend the Chicago Sanitary Ship Canal against Asian carp migration while the Corps of Engineers' electric fences were down for maintenance. During that rapid response action, we saw Federal, Canadian, municipal, State, Provincial, binational, and municipal agencies, all of whom provided people, funding, and equipment, come together in what was by all accounts a highly successful effort despite numerous obstacles.

This team approach also led to the draft Framework that was released this week, and I will talk about that in just a moment.

That was the first role of EPA, coordination. The second role of EPA is that of funding.

Nearly a year ago, President Obama proposed and, thanks to your help in Congress, passed the Great Lakes Restoration Initiative, an unprecedented investment for rehabilitating the Nation's largest fresh surface water system. EPA is stepping up its use of its funding authority, as evidenced in December when we announced that we were working with the Corps of Engineers to use $13-plus million for the Corps of Engineers to accelerate its work to help defend the Chicago Sanitary Ship Canal against carp migration. That work, as I am sure you will hear about from General Peabody, addresses bypasses and other ways in which carp can get into the Chicago Sanitary Ship Canal from adjacent waterways.

And currently we are working with the other Federal agencies in Illinois to fast-track additional investments under the initiative

that will address Asian carp populations that may be upstream of the electric barriers.

I thought it was very important to talk a little bit about the EPA's role. Let me turn now to the next steps, because using that coordinated approach that I just talked about is so incredibly important.

By using the coordinated team approach, participating agencies have come together to produce this draft Asian Carp Control Strategy Framework this week. We want to accomplish several things with this document.

First, we want to provide direction without restricting ideas and initiatives. As we have learned over and over again in this situation the carp are not staying still. The circumstances underlying the carp migration continues to evolve. Likewise, we need to evolve with the situation. So one of the great benefits of this Framework is that it provides a unified direction for the agencies while not straitjacketing them so that they can remain deft in their responses.

Second, with the Framework, we want to establish a multi-teared defense. I cannot overstate just how important this is. I believe we cannot fight biology with engineering alone. I don't believe we can fight biology with any other mechanism alone. What this Framework does is establish a multi-dimensional defense for the Great Lakes. So, rather than just use one tool in the toolbox, the Framework relies on engineering approaches, relies on chemical approaches, biological, managerial, and operational approaches so that we have a strong, vibrant effort that we are deploying to help prevent Asian carp migration.

Third, we want to create space for every player to be involved in the effort. It is so incredibly important to understand that no one agency has all the answers here. What we have tried to do is essentially create a table around which everybody can sit and offer their most constructive recommendations and ways in which they can be part of the solution. In other words, this Framework belongs to everybody. It does not just belong to the agencies at this table and beyond.

The Great Lakes region must unite in this effort. The December rapid response action illustrates just what we can achieve when we are working together. And the Framework is not intended to be final. It is intended to be continually improved upon. The first step is for everyone to have a hand in its development and its execution.

I want to thank you, Members of the congressional delegation, for your concern, your compassion for protecting and restoring the Great Lakes. Administrator Jackson, our partner agencies, the States, and delegation all share one overriding imperative and that is to keep Asian carp from becoming established in the Great Lakes.

Thank you.

Mr. OBERSTAR. [presiding.] Thank you very much, Mr. Davis. I remember you well from your many years of engagement and involvement in Great Lakes water quality issues. You have been a real leader, a practitioner, feet on the ground, and you have given an excellent presentation this morning.

I apologize to all the panels for being delayed. I had a number of other Full Committee activities that had been delayed because of the Washington snowfall, so I was attending to those.

I want to thank Ms. Edwards for standing in as Chair as we began and Mr. Petri whose long-standing engagement in and contribution to issues in water quality on the Great Lakes is very well grounded and well informed and he is very much actively engaged.

Also, on the Republican side, Mr. Ehlers, Mrs. Miller, who are long-time advocates for the quality of the Great Lakes water and protecting and enhancing that water quality out into the future.

Members on the Democratic side, Mr. Hare, Mark Schauer, our newest Member from Michigan, who was active in the State legislature on water quality issues, all of those bring very great commitments and understanding to this issue. Mr. Costello, though he is not right on Lake Michigan or the Great Lakes, his district borders on the Mississippi River. He understands these issues directly.

Before I go further, I would just like to make an observation. In 1953, 3 million pounds of lake trout were caught by sport fisherman and also commercial fishermen on the Great Lakes and 2.5 million pounds of white fish. The next year, 1954, that fishery crashed to 300,000 pounds of lake trout and 250,000 pounds of white fish in 1 year because of the lamprey eel. That was before the St. Lawrence Seaway was opened. That was due to vessels coming in the Welland Canal and discharging this creature that came from—most people suspect—from the Black Sea. And it multiplied. It found a happy home. It adapted to freshwater and migrated all by itself without being transported by vessels from the Welland Canal segment, what is now the St. Lawrence Seaway, to the upper lakes.

We said then, we have learned our lesson. My predecessor, John Blatnik, who was a Member of Congress at that time, was Chair of the Rivers and Harbors Subcommittee, a microbiologist himself by training. And as the Seaway opened he said, we need to prevent ballast water from transporting species into the lakes which are not native to the lakes or which can adapt to freshwater. We, the U.S., and the Canadians are now spending upwards of $6 to $10 million a year and will do so forever to contain the lamprey eel, spraying lampricide in their spawning beds where rivers discharge into the Great Lakes from both Canada and the U.S. side.

For a while, pollution of those rivers dampened the population growth of the lamprey eel and the numbers declined, but that is not an adequate solution. We don't want polluted rivers dumping into our freshwater lakes and spreading the damage.

So when the billions of dollars are spent on Lake Erie, $5 million to clean up discharges into the Lake, dig up the bottom sediments, stop the toxins from coming in, airborne from as far away as Central America, DDT coming into the Great Lakes, having adverse effects on bald eagles, then the lamprey came back. And then we had relaxed our vigilance on inbound cargoes coming in on the salties, and we had the zebra mussel and the round-eyed goby and spiny akinoderm, and a host of other aquatic species and aquatic plants have taken up the water column in the Great Lakes.

Now we have this huge threat that did not come into the lakes but may well find its way in. Those specimens provided by Dr.

Ehlers give you an idea of how terrifying it is to be out on a boat amongst those carp thrashing about and actually jumping into boats.

Now when I first heard about the carp, I said, well, maybe they will eat the lamprey, or maybe they will eat the zebra mussels. No, they don't. They filter all the food chain out of the water column; and one species has no stomach, so it must continuously feed. There is just a slipstream going right through the fish of all the water column. So it is taking away the food chain from the rest of the species in the water column. It is a treacherous, dangerous species that we cannot allow into the lakes.

And Mr. Petri and I were exchanging notes that maybe the cold freshwater will inhibit the species. I have seen so many species adapt to the Great Lakes that I don't want to take that chance. No one wants to take that chance.

And this has to be a Federal response. We cannot allow eight Great Lake States and the Province of Ontario to pass separate, disparate laws that may conflict with each other and work against each other. We have to have a national response. It has to be a unified response, and we have not had that in the past in reaction to other invasive species.

So, Mr. Davis, I greatly appreciate your comments. You can't fight biology with engineering alone. This is not a final action taken by EPA but will continually be improved upon. That is the mind-set that each one of our presenters today needs to keep in mind.

As for this committee, I know the lessons of the past. I know the treacherous fate that awaits the movement of those ugly critters into—they really are. I am not hurting their feelings, am I?

But, some years ago, scientists from the Great Lakes and Russian scientists who have been studying Lake Baikal for decades met in Duluth; and we had presenters from the University of Wisconsin, Mr. Petri, and scientists from throughout the United States sharing information. Lake Baikal has about the volume of Lake Superior, except that it is deeper. It is a mile deep. Lake Superior is deep, 1,735 feet at its lowest point, which is 125 feet below sea level. But each is a unique specimen in the world of freshwater.

And you think of freshwater, it is 1 percent of all the water on the face of the Earth. We have 20 percent of that freshwater in the Great Lakes. Lake Superior is half of the total Great Lakes' volume.

So we have a unique responsibility here. We have got to marshal all the resources, all the brain power, all the technology we can, not only to prevent Asian carp from—and all their varieties—from getting into that freshwater treasure but to get the others out.

General Peabody, thank you very much for being with us.

General PEABODY. Good afternoon, Mr. Chairman. Thank you very much for the opportunity to testify.

Congresswoman Edwards, Congressman Petri, I am here to testify about the Corps of Engineers' efforts to defeat the risk to the Great Lakes posed by the migration of Asian carp through the Chicago area waterway system.

The Army Corps of Engineers is committed to using all available authorities, capabilities, and resources to combat this invasive spe-

cies. Because the Corps cannot do this alone, we are working intensively as part of the Federal, State, Provincial, binational, and municipal agency team through the Asian Carp Workgroup. We are actively exploring all options to defeat the threat, working within the Asian Carp Control Framework and using a strategy that has four prongs to it for the Corps of Engineers.

The Corps' principal role has been to prevent or reduce migration of Asian carp by building, operating, maintaining, and improving the electrical dispersal barrier system in the Chicago Sanitary and Ship Canal. The fish barrier is the largest fielded operational electrical dispersal barrier in the world and constitutes a dynamic project with significant research and development components.

Any assertions that the barrier system is or has been ineffective in restricting upstream movement of bighead and silver carp are speculative. The facts are that the fish barrier system has been in continuous operation since 2002 and has performed as designed, as far as we can tell.

Monitoring Asian carp migration is an essential second part of the interagency effort. As part of a comprehensive review of the fish barrier's effectiveness in late 2008, the Corps recognized that we did not have adequate information about the location of Asian carp migration. As a result of canvassing academic and scientific communities, we learned of the environmental DNA research being conducted by the University of Notre Dame's Dr. David Lodge in association with The Nature Conservancy. We have been actively collaborating with him and his team ever since.

Environmental DNA is an important emerging technology that is providing additional information to indicate the possible presence of Asian carp, but because Asian carp eDNA has not yet undergone complete, scientific, independent peer review, the results should be considered preliminary at this time. We are coordinating with Dr. Lodge and his team to execute the needed independent external peer review, which we hope to complete by June.

This approach is consistent with the Corps' policy of ensuring that its technical, engineering, and scientific work undergoes an open, dynamic, and rigorous review process to ensure confidence in our decisions and policy recommendations. However, we are not waiting to take action even in the face of these uncertainties.

Along with our partner agencies, the Corps is working to address the potential threat in a variety of ways. Using the efficacy study authorized in WRDA 2007, we are constructing emergency measures recommended and approved through an interim report that will be initiated this spring and completed this fall. These measures are designed to prevent fish bypasses via the flanking waterways of the Des Plaines River and the Illinois and Michigan Canal.

The Corps is also working to develop additional measures to apply in the Chicago Area Waterways System this spring once warmer weather prompts increased fish activity. These measures are under study so have not been defined but may include modified operations at existing locks and controlling works, installing other types of barriers near the locks, controlling ballast water, and assessing options to block the alternate pathways of the Grand and Little Calumet Rivers. To be effective, any measures we take would have to be done in concert with the actions by other agencies on

matters within their expertise or authority to eliminate or reduce the numbers of any Asian carp that may be in the vicinity.

The fourth element of our strategy is to build on all these efforts with a long-term focus on the Interbasin Control Study. The Corps is undertaking this congressionally authorized study, formally called the Great Lakes and Mississippi River Interbasin study, to explore options and technologies that could be applied to reduce the risk of aquatic invasive species of any type that might transfer along multiple points between the Great Lakes and Mississippi River basins. This study would be developed in coordination with all interested stakeholders and will be based on science, leveraging the latest technology and the best available information.

Mr. Chairman, this concludes my remarks. I look forward to answering the committee's questions. Thank you.

Mr. OBERSTAR. I especially want to thank you, General Peabody, for coming such a great distance by car.

General PEABODY. Yes, sir.

Mr. OBERSTAR. Seventeen hours?

General PEABODY. Sir, it was only 10. The view was nice. It was covered in snow. But this is an important hearing, sir, and I felt a compelling requirement to be here.

Mr. OBERSTAR. I must say Mr. Petri and I chose a different route. Rather than going back to the safety of Minnesota and Wisconsin, where it is only below zero, we chose to stay here in Washington and risk life and limb in the snow, where they don't know how to remove it. They don't know what to do with it. They just walk on it. They count on the sun to melt it. They are counting on global climate change to melt this down.

It is not happening. I have seen this for 40 years out here. They just don't know what to do with snow. Hell, when I grew up, we had a sidewalk snowplow because people didn't have cars in my day. But we know how to handle it.

You are awfully good to make this journey. And, all of you, I thank you very much for making the effort to be here with us.

Ms. Edwards, thank you. This is not the Chesapeake Bay, the Great Lakes, but your concern for both the Bay and its good health and your efforts over many years in the State legislature and elsewhere now as a Member of this Committee have marked you as an advocate for the environment, wherever it happens to be. Thank you.

Mr. Rogner, give us the Illinois viewpoint.

Mr. ROGNER. Thank you, Mr. Chairman, Congressman Petri, Congresswoman Edwards, for this opportunity to testify on behalf of Director Marc Miller, Director of the Illinois Department of Natural Resources, on the role of the Illinois DNR in battling the Asian carp invasion. Since the early 1990s, we have been fully engaged in this effort.

I will first mention a couple of the recent actions we have taken and then outline our action plans for the immediate future as we work with our Federal, State, and local partners to prevent the spread of Asian carp into the Great Lakes.

But, first, I want to be absolutely clear on one important point. The Illinois DNR has a firm commitment to this task, and we remain unwavering in that regard. We have been working very close-

ly with our partner States, including Michigan and Wisconsin, and also the Federal agencies to develop effective control strategies.

Illinois has also contributed significant resources to controlling Asian carp. A premiere example is that we served as the local sponsor for the Corps of Engineers' electric barrier system, contributing $1.8 million to this effort.

Most recently, Illinois DNR served as the lead agency for the successful, rapid response effort last December to prevent the upstream movement of Asian carp when the electric barrier system was shut down for maintenance. The unified response of the Great Lakes States and Provinces I believe was a shining leadership moment for our region and a prime example of how a small group of committed people can really make a difference. This unparalleled effort demonstrated that Federal, Provincial, State, and local partners can work together to help ensure that this invasive species does not establish sustainable populations in the Great Lakes and threaten this globally important ecosystem.

Over 400 people worked together with contributions of supplies, equipment, and crews from partners throughout the basin. The rapid response team safely applied Rotenone to a 6-mile stretch of the Chicago Sanitary and Ship Canal. The Corps of Engineers performed critical maintenance on the electric barrier system, and then we led the cleanup and removal of 18,000 fish, including one Big Head carp. That one fish documented that Asian carp were at the barrier and could have moved past the barrier in potentially large numbers had we not conducted this action.

It is important to note that, as we consider additional operations, the cost of this single action was over $3 million and would not have been possible without the substantial donations of equipment and labor from the other States and Provinces and financial support of our Federal partners. I want to thank everyone here at this table today for that critical support.

There are several lessons that we have learned from this experience that I would lake to share with the committee:

First, meeting this challenge will require even greater collaboration and levels of partnership. We must enlist the scientific and communication resources as well as the political leadership of every State and Province in the basin to join in this effort.

Second, early and sustained outreach to key stakeholders, proactive communication strategies, and operational transparency must continue to be maintained as we move forward with our Framework strategy and operations.

Finally, the collaborative approach that has been developed with our local, State, and Federal partners is working very well and we believe represents the best model for future efforts.

I now wish to outline the actions to control Asian carp that the Illinois DNR proposes to begin immediately or as soon as funding can be secured. These actions will be conducted as part of the Asian Carp Workgroup that is already firmly in place.

First, we will conduct a targeted Asian carp removal operation throughout the entire Chicago Area Waterways System. This includes the identification, containment, and removal of carp using standard fisheries gear, including netting, electro fishing, contract commercial fishing, and the use of toxicants such as Rotenone.

These priority actions will be focused above the barrier in locations most likely to hold carp. We propose to begin these operations next week.

The Illinois DNR will contract with commercial fishermen to operate below the barrier system to reduce populations and propagule pressure on the barrier system below it.

Third, informed by Corps of Engineers' eDNA monitoring, we will conduct sampling and removal in hot spots of the Cal-Sag Channel. This includes the entire length of the Cal-Sag below the O'Brien lock and dam as well as the North Shore Channel below the Wilmette Pumping Station.

We will participate with the Corps of Engineers' efforts to refine the eDNA technology so that it is a better predictor of both location and population size of Asian carp.

In the next 90 days, the Illinois DNR will conduct a survey of all retail live bait locations to ensure that Asian carp minnows are not being sold in Chicago-area bait shops, something that is currently unlawful in Illinois. This effort is already under way.

We have also identified several longer-term actions that we are proposing.

We will prepare for rapid response contingency operations, including training, advanced procurement of supplies and necessary equipment.

We will lead the Asian Carp Management and Control Implementation Task Force along with the U.S. Fish and Wildlife Service. This plan outlines 133 different actions that will be deployed nationally in all watersheds where Asian carp are a problem.

We will participate in additional research into barrier effectiveness using tagged fish and advanced sonar technology.

And then, finally, we propose to work with our sister State agency, the Department of Commerce and Economic Opportunity, to enhance commercial markets for Asian carp and investigate requirements for the use of Asian carp products for humanitarian relief purposes. These efforts will promote commercial fishing on the Illinois and Mississippi Rivers and help reduce population pressures on the electric barrier system.

This is a problem that is not going to be solved by one State or one agency. As a region, we have a long and established history of using a proactive and collaborative approach. When we are divided, solutions to our problems can remain elusive. We believe our Great Lakes region is stronger when we work together in partnership to solve common problems, and Asian carp will not be an exception to this.

The Illinois DNR looks forward to working with the other Great Lake States and Federal agencies in preventing Asian carp from establishing sustainable populations in the Great Lakes and in the larger problem of the exchange of invasives between the Great Lakes and Mississippi River basins. Thank you again for the opportunity to share our views.

Mr. OBERSTAR. Thank you for that splendid presentation.

I will have a couple of questions and comments later, but I think it is a well-thought-out approach, and your emphasis on the multidisciplinary approach to the issue, that is what I am looking for. I think that is what people all throughout the lakes are looking for.

The Carp Management and Control Implementation Task Force plan of 133 different actions, is that available to the committee?

Mr. ROGNER. Yes, it is. We can make it available.

[The information follows:]

The "Management and Control Plan for Bighead, Black, Grass, and Silver Carps in the United States" is available online: http://asiancarp.org/documents/Carps_Management_Plan.pdf

For a hard copy, please contact the Committee on Transportation and Infrastructure at (202)-225-9960.

Mr. OBERSTAR. Thank you.

Director Humphries, thank you very much for being with us.

Ms. HUMPHRIES. Thank you very much, Mr. Chairman, Congresswoman Edwards.

Mr. OBERSTAR. Did you drive here too?

Mr. HUMPHRIES. No, I did not.

Mr. OBERSTAR. You caught the last Northwest Airlines flight out?

Ms. HUMPHRIES. I did. I arrived yesterday. However, getting home might be much more difficult than it was getting here.

Mr. OBERSTAR. Yes, leave quickly before they shut everything down.

Ms. HUMPHRIES. I think that might be the game plan.

Mr. OBERSTAR. It is much safer out there than it is here, believe me.

Ms. HUMPHRIES. I appreciate the opportunity to testify today about the looming catastrophe that we face if Asian carp become established in the Great Lakes. I also appreciate the Members in the Michigan congressional delegation for their past work on this and other Great Lakes issues. I have been a conservation professional for over 30 years, and my role with the Michigan Department of Natural Resources and Environment is to protect our resources while maximizing recreational opportunities. Allowing Asian carp to populate our Great Lakes will destroy the resource as well as recreational opportunities, and we must act swiftly, collaboratively and wisely to address the crisis. Invasive species have already created havoc, as you have so aptly described earlier. Reports indicate that the cost of biological pollution from invasive species is both massive and it is rising. In the Great Lakes, total cost for treatment and control of zebra mussels alone reaches $100 million each year. The Great Lakes Fisheries Commission reports that for sea lamprey, 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 a negative effect on Michigan's economy.

Let me give you one example, a little more recent example than we heard earlier. 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 and kept their boats at local marinas, but invasive zebra and quagga mussels, which are Eurasian invaders, have caused the collapse of the salmon population and thus the sport fishery. This was a several million dollar industry, and it is gone.

Michigan has taken aggressive steps to stop the further spread of these foreign invaders, including requiring Great Lakes ships to adhere to ballast water management practices, enacting legislation requiring all oceangoing ships to obtain a permit for ballast water discharges, 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 by administering State regulatory programs to control aquatic nuisance species in our

lakes and our rivers, including restrictions on the transport of invasive species of fish, establishment of a list of invasive species prohibited in Michigan and participation and actions to control sea lamprey in the Great Lakes and its tributaries.

Despite our best efforts, Asian carp are now at our doorstep. Michigan has its own steps and has taken those steps to prevent Asian carp from entering the Great Lakes. We have contributed financially to the construction of the electrical barrier in the Chicago Sanitary and Ship Canal, and we have prohibited the possession of live Asian carp in the State. We also participated in the actions this past December that treated the canal to remove Asian carp prior to the maintenance of the second electrical barrier. I cannot stress the following in simpler terms. Once an invasive species gets established in the lakes, we cannot eradicate it. The threat of Asian carp must be treated as a crisis and steps must be implemented immediately to address them. As early as 2003, scientists, government officials and stakeholders were calling for ecological separation to 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 6 years and is still not fully operational. It took several years to ban the importation of black carp and silver carp under the Lacey Act and bighead carp are still not covered under that Act.

I started by saying that we must act swiftly, cooperatively and wisely to address the threat posed by Asian carp.

Here are my recommendations to meet those objectives. We must immediately take all available measures, consistent with protection of public health and safety, to prevent the migration of bighead and silver carp into Lake Michigan, including 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 Watersheds. The Army Corps of Engineers must have the authority to close the locks on the emergency basis and also a permanent basis if necessary.

We must initiate studies to be completed by the end of this year to examine the feasibility of transferring cargo via other transportation systems. We must operate other water control structures near Lake Michigan, 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.

We must install inner barriers at other locations this year, including barriers between the Des Plaines River and the canal and the Indiana Harbor and Burns Ditch from the Grand Calumet and Little Calumet Rivers to eliminate the potential for flooding between these two watersheds. We need to complete additional studies related to the biology and the ecology of carp and predictive models to determine the areas at highest risk for colonization within the Great Lakes. We need to provide additional dollars for continuous monitoring of carp based on risk analysis with funding on reserve for chemical treatment as a rapid response mechanism is warranted, and we must communicate with the States any actions and data in a timely manner.

Operating electrical barrier 2a at optimum voltage and completing electrical barrier 2b this year is important. In developing and implementing plans for a permanent solution to the problems that would ecologically and physically separate the carp-infested waters of the Mississippi watershed from the Great Lakes. We also have to be very proactive with our citizens so that they don't knowingly or unknowingly move these fish into waters where they are not found now. We all treasure the Great Lakes, and we all share a commitment to its continued vitality.

Now we must share in a similar commitment to more aggressively move forward and stop the spread of Asian carp. I have additional attachments that I have included in my testimony. I would like to thank you, and I am available to take any questions you might have.

Mr. OBERSTAR. Thank you very much for the wide-ranging statement. Now we will proceed with Secretary Frank.

Mr. FRANK. Thank you, Mr. Chairman. Thank you for holding this hearing, Representative Petri and Representative Edwards. We really appreciate you bringing the attention to this issue that it truly deserves. I want to start off by thanking this Committee and acknowledging the Congress and the President's initiative on the Great Lakes Restoration Initiative. I can't tell you how excited we are by that initiative. You know, we have been talking about these issues, as you have pointed out, Mr. Chairman, for a long time. This unprecedented opportunity we have, I want to let you know that we are all working hard together to make sure that that money is put to good use. It is long overdue, and we are committed to improving the Great Lakes with the resources that Congress and the President have set aside. So that is a very positive thing. You eloquently set forth the history of how we have been dealing with invasives in the Great Lakes, from the lamprey eel to zebra and quagga mussels to the round goby to VHS.

I can tell you, all of our agencies have been struggling with these issues for some time, and there is a great deal of frustration that we all have and that the people of our States have to cut off the flow of these invasives into the Great Lakes. This is a threat not only to our Great Lakes, but it is a threat to all our inland waters. Once they are in the Great Lakes, they move inland, and this becomes a problem not just in our States, but then throughout the United States. Whether it is the vector in the Mississippi River or the Great Lakes, this truly is a national issue.

Before I talk about the specific issue at hand, I do want to follow up on Director Humphries' comments about ballast water because this is an incredible opportunity, I think, to really reemphasize how important it is to deal with that issue as well. The Congress last year, the House of Representatives passed a strong ballast water measure. It passed overwhelmingly in the House. It did not get passed through the Senate. And that was following on years of inaction by Federal agencies. A new administration is in town. The Coast Guard is taking a close look at this issue.

Wisconsin and some other States have submitted comments to the Coast Guard about regulation. We are glad to see that the Coast Guard is taking this issue more seriously, but we are concerned that we need to get strong action on ballast water. We

would welcome this committee's oversight of what is going on with the ballast water issue so that we can finally move on that issue. We know that ballast water continues to dump new invasives into our waterways, and we need to deal with it. We need to deal with it effectively.

Wisconsin passed a very strong ballast water permit recently, but we still think the best solution is a strong Federal standard that goes beyond IMO to make sure that we are treating this ballast water so we are not continuing to dump new invasives. It is a critical issue, and I appreciate having the opportunity just to raise that as another important issue we are dealing with right now.

Now as to Asian carp, there is a lot that has been said. I will try not to replow ground. A lot of important points have been made. We do think it is important that there is Federal agency coordination, and again, I applaud the White House for their leadership. We had a summit yesterday. The Governors came in to meet with Federal agencies. We are encouraged that this is being taken seriously. We are encouraged that there are resources being devoted to this serious issue.

Having said all that, we have a sense of real urgency and concern about where this is all going. We can all think that we are doing as much as we can, but the fact is, we may not have much time, and we really need to make sure that we are looking at all alternatives. I think an immediate expansion of monitoring and fish control efforts in the Chicago waterways system are absolutely critical. We need, as has been said, to get the second barrier up. We share Michigan's frustration that we have a little different perspective on that issue than some other folks do. It is long overdue.

It has taken too long, and we were pleased to hear yesterday that the Corps said that it would be up and running this year. That needs to get done. But having said all that, we need to look at the ecological separation between the Chicago waterway and the Great Lakes. There are a number of vectors. We agree it is a complex issue. There is another number of vectors that have to be closed off. We think there is good initial work that is being done. But we need to move faster, and the issue of the locks, what to do with the locks is certainly out there.

It is an easy call from Wisconsin's perspective. We are concerned about commerce and the health of the Great Lakes. We think the lock should be closed. We hope that people don't see that as some sort of simplistic answer, that even in closing the locks, you don't guarantee that fish don't get through there. They were designed for navigation, not as a fish barrier. Also there are other vectors that have to be dealt with. So in advocating for that, we do not mean to demean all of the other things that are in some of the Federal planning that we have seen so far.

We really have to work together on this, and I can't stress enough how urgent this is and that we need to move from talk to action. Thank you, Mr. Chairman.

Mr. OBERSTAR. Thank you very much, Mr. Frank, Mr. Secretary, for your splendid presentation and your broad view of the issue and the approaches.

Professor Lodge, I want to say, I read with great interest the release of your research work on DNA. I look forward with great interest to your testimony.

Mr. LODGE. Thank you very much. I will draw your attention to the PowerPoint that I will use this afternoon.

Chairman Oberstar, Ms. Edwards, Mr. Petri, thank you very much for the opportunity to talk about what my collaborative team and I have learned in the last few months about Asian carp in the Chicago waterway and for the opportunity to share our perspectives on what that means. I was last before this Subcommittee about 2 years ago to testify about the impact of ship-borne invasions, the ballast water issue that Mr. Frank was just talking about. And in that testimony, I pointed out to the Subcommittee that while ships were a major contributor of alien species to the Great Lakes, they were not the only one. And in fact, that canals, like the one that we are here to talk about today, are a major pathway by which harmful alien species gain access to the Great Lakes and, indeed, by which other species leave the Great Lakes. In my written testimony, I outlined answers to six questions, and for the sake of brevity, I am going to focus only on four questions in my verbal testimony this afternoon. The first question I want to answer, which stems directly from the work that the Army Corps has supported and that General Peabody referred to, is our work in the canal in the last few months on how close are the carp to Lake Michigan. Now before I really answer that question, I need to say a few things about the method by which we have learned where silver and bighead carp are in the canal system.

We have used some very standard technologies from molecular genetics but we have combined those protocols into an unusual combination and a new application to surveillance of Asian carps in the canal. You can think about what we have done as the environmental protection equivalent of what forensic experts do every day and what our justice system has in many ways come to rely on, for example, to determine whether a suspect was at a crime scene. We and Asian carps leave a trail of DNA behind us, and it is that trail that we have been detecting in the Chicago waterway.

We have invited an audit, a review, which is in many ways a more rigorous peer review than is typical for scientific work. That review was completed by the EPA, an independent audit team. They issued their final report on our work this past week, and I have provided that to the Committee to become part of the permanent record of this hearing. The conclusion of the EPA audit team—I have put one summary statement up here on this slide—the bottom line is that it is uncontroversial that we are detecting the DNA of only silver and bighead carp and secondly, this EPA audit team, including experts in molecular genetics, concluded that our results are actionable in a management context.

So with that as a background—and I am happy to address any questions you may have in a more detailed nature about that—what we have discovered, unfortunately, in recent months is that both silver and bighead carp are in the waterway north of the electric barrier. I have just indicated with these red blobs on that map where we have detected either silver or bighead carp, and you have received a more detailed map in my written testimony.

The most troubling result is that silver carp are not only at the doorstep of the lake up in Wilmette in northern Chicago, but, in fact, appear to be in Lake Michigan or at least in Calumet Harbor opening to Lake Michigan. Bighead carp are not yet—at least we have not yet detected, and I hope we do not detect bighead carp DNA in the lake. However, my conclusion from these data is that it is not inevitable that an invasion of these species—either species is underway, and I believe that an invasion, that is establishment of a self-sustaining, reproducing and spreading population, is still possible to prevent. That begs a question, however, about how many carp will it take to launch an invasion?

The short answer is, I don't know, and no one knows. The slightly longer and more helpful answer is that it is a numbers game. If the goal is to prevent invasions in Lake Michigan, then the proximate management goal has to be to prevent additional individual fish of either species from entering Lake Michigan. It is not inevitable that an invasion by either one of these fishes will occur, and our most recent results finding silver carp in the lake make it even more urgent that steps are taken to prevent additional fishes from entering the lake.

The third question I want to address is, Is this issue only about Asian carps? And the answer to that is no. I think that is a very important point for the Committee to consider. This canal has already been a pathway by which very harmful species which Chairman Oberstar referred to earlier on—zebra mussels and quagga mussels—this canal is how those species have gotten, for example, to California. It is how they first escaped the Great Lakes and then made their way across the country by other means. But their escape of the Great Lakes was made possible by this canal. This canal is a two-way highway for many species. So these species that I am picturing have already used it. There are many other species poised to use the canal. They either have or are poised to do so. And I will highlight just a few of those on this slide. Spiny water flea, already mentioned by Chairman Oberstar. Water chestnut, a highly damaging aquatic weed. A variety of parasites and pathogens that can be deadly to a variety of fish species. New Zealand mud snail, the bloody red shrimp. All of these species are in the Great Lakes but not yet in the Mississippi River Basin. And, of course, going the other way, I don't need to tell you about bighead and silver carp but don't forget there are other species waiting to go in the same direction. Brazilian water weed, a very expensive water weed further south could use the canal to go north. And then a final example would be the northern snakehead, present in the Mississippi River basin but not yet present in the Great Lakes.

So it is very important that you look at this canal and not just as a conduit for Asian carps, but as a conduit for many species, past and future. Therefore, any management actions will bring benefits far beyond the benefits of preventing damages by the Asian carps. I will just finish by suggesting what I believe are some of the management implications of this, and I won't go through all of this. In fact, many of the previous speakers have already addressed these and the new framework that came from the administration yesterday includes many, but not all of, these points.

I draw your attention in particular to the last one which I think Mr. Brammeier will also address, which is that especially when you consider this whole suite of species that I mentioned, it is very important to think about the benefits of the canal being far beyond management taken with respect to Asian carps. Thank you.

Mr. OBERSTAR. Thank you very, very much, Dr. Lodge, for that excellent presentation. And all your accompanying data will be concluded in the Committee record, in the hearing record.

And now Dr. Hansen. Welcome, and thank you for joining us.

Mr. HANSEN. Mr. Chair and Members of the Subcommittee, thank you for inviting me to discuss Asian carp and the threat they pose to the Great Lakes.

I am Mike Hansen, Chair of the Great Lakes Fishery Commission. I am also a professor of fisheries at the University of Wisconsin-Stevens Point.

The commission understands the destruction that invasive species cause to ecosystems. Since the 1950s, the commission has been responsible under a treaty between the U.S. and Canada to control the sea lamprey, an invasive species that destroyed fisheries after invading the upper Great Lakes in the 1920s.

The Great Lakes are tremendously valuable and worth protecting. Annually, Great Lakes fisheries are worth more than $7 billion and have enormous cultural value to the diverse peoples who live and fish in the region.

Globalization and trade have provided more species more opportunities than ever to invade waters of the United States. Currently, more than 180 non-native species have entered the Great Lakes, and harmful species have cost the region billions of dollars. Permanent impacts on the environment and benefits our children will never see are unquantifiable.

We are concerned about Asian carp because we have seen what these fish have done to the Mississippi and Illinois Rivers. Asian carp spread rapidly by reproducing in large numbers to become the predominant species in an ecosystem. Asian carp eat plankton that is the foundation of food webs. Once loose in the wild, where plankton is abundant but predators are few, Asian carp have proliferated. Strong dietary overlap between Asian carp and native fishes suggest that Asian carp could outcompete native fish for food, especially because an Asian carp can eat 40 percent of its body weight each day.

Between 1991 and 2000, bighead carp increased exponentially in the Illinois River. So, by fall 1999, Asian carp made up 97 percent of the biomass of a fish kill in a national wildlife refugee near St. Louis. Today, commercial fishers in the Illinois River regularly catch more than 25,000 pounds of bighead and silver carp each day—an amazing amount of fish.

The silver carp has a unique characteristic that makes it particularly dangerous to humans. The sound of a motorboat startles the fish into leaping up to 10 feet out of the water. These flying fish, some weighing more than 20 pounds, are projectiles that land in boats, damage property, and injure people.

To understand potential risks of Asian carp to the Great Lakes, the Department of Fisheries and Oceans-Canada and the U.S. Geological Survey assessed the risk of invasion by Asian carp. Specifi-

cally, these risk assessments tell us the following: First, Asian carp are likely to tolerate the climate of the Great Lakes because the basin's climate is within the fish's natural rage. Second, Asian carp feed on plankton, the low end of the food web, so they eat the same food that most other fish eat for their own growth and survival. Third, the Great Lakes Basin contains numerous tributaries with suitable spawning habitat and large areas of vegetative shorelines, which they need, particularly in large bays, river mouths, connecting channels, and wetlands.

Silver carp will likely be harmful because nearly 1 million boats and personal watercraft operate in the lakes, placing millions of people in potential contact with silver carp. Overall, people of the Great Lakes Basin should be deeply concerned about the possible negative effects of Asian carp.

Let me conclude with some thoughts about policy responses. Other witnesses during today's hearing described actions to prevent Asian carp from entering the Great Lakes. The Great Lakes Fishery Commission has been a supportive partner in all of these efforts. I would like to especially thank Cameron Davis for his determination to coordinate a multi-agency response.

The question remains, however, what can be done if Asian carp enter the Great Lakes? Unfortunately, the answer is not much, at least not much at the moment, because control mechanisms do not currently exist for Asian carp. While current work to prevent Asian carp migration is appropriate, the only solution to this problem is to achieve what is called ″ecological separation″ by altering the canal system to prevent species of any kind from moving between the Mississippi River and Great Lakes Basins.

We appreciate the work, which we cofunded, that Mr. Brammeier and his colleagues conducted to take a good, hard first look at ecological separation. He will describe that in more detail shortly.

But this is just the start. The Water Resources Development Act of 2007 authorized the U.S. Army Corps of Engineers to conduct a full-scale engineering analysis to identify and propose ways to achieve ecological separation. We urge Congress to clearly express that the end objective is ecological separation, not to reduce the risk or try to achieve separation while maintaining the status quo. The goal must be ecological separation.

We also urge Congress to provide the Corps with adequate resources and authority to accelerate development and implementation of solutions to achieve ecological separation. The Great Lakes cannot wait.

Mr. Chair, I again thank you for holding this important hearing. I appreciate the committee's interest in taking steps necessary to protect the Great Lakes from Asian carp and other invasive species.

Mr. OBERSTAR. Well, you are so right, Dr. Hansen; the Great Lakes can't wait. And, as I said at the outset, we thought we learned that lesson 50 years ago. We are learning it all over again with every one of these new species that come into the Great Lakes. This is not an inexhaustible resource.

Mr. Wilkins, thank you for being with us. You may proceed with your testimony.

Mr. WILKINS. Thank you, Mr. Chairman. Good afternoon to you, Mr. Chairman and Ranking Member Mr. Petri. Thank you for the opportunity to testify today on behalf of the American Waterways Operators, the national trade association for the tugboat and barge industry.

I am vice president for Canal Barge Company, a family-owned business headquartered in New Orleans that has been in business for 76 years. Canal operates throughout the inland waterway system and also owns Illinois Marine Towing Corporation, a Chicago-area towing and barge fleeting company.

I would like the Subcommittee to know, first and foremost, that the members of AWO fully support robust measures to protect the Great Lakes from the spread of Asian carp. As we put these protections into place, we must also protect human health and safety and maintain the free flow of waterborne commerce that is critical to our economy.

Our fundamental message is this: The choice whether to protect the environment or ensure the continued flow of vital maritime commerce is an unnecessary one and, quite frankly, a choice our Nation cannot afford to make. We are confident that congressional leadership, coupled with Administration and stakeholder cooperation, will lead to us a sustainable long-term solution that protects the Great Lakes ecosystem without sacrificing critical jobs and the environmental and economic benefits of barge transportation.

Mr. Chairman, finding such a solution is critical because inland waterways navigation is essential to our economy, and it is the safest, most economical mode of domestic freight transportation with the smallest carbon footprint of any mode. Barging plays a key role in the transportation system by reducing congestion on our overcrowded highways and rails. And as commercial users of the inland waterway rivers, coastal waterways, and Great Lakes, our industry has a deep commitment to environmental stewardship.

Since 2004, our industry has cooperated with Federal and State agencies concerning the safe operations of the electric fish barriers currently on the Chicago Sanitary and Ship Canal. Our industry has also promoted the recovery of threatened and endangered species and established practices to reduce emissions from tank barges.

Cooperative and balanced solutions to the problems of invasive species are, in fact, achievable. An integrated approach can arrest the advance of the Asian carp, protect the Great Lakes ecosystem, and maintain safe, efficient, and reliable navigation on vital commercial waterways.

My testimony will now address what we feel are nine specific actions as part of that integrated strategy.

First, expedite construction of the Barrier 2-B, which is on the Chicago Sanitary and Ship Canal. Secondly, design and implement bubble and acoustic fish barriers to prevent Asian carp from moving into the Great Lakes, as commonly done in Europe. Thirdly, immediately complete structures to stop carp from entering the Great Lakes during floods.

Fourth, conduct tag-fish research to validate the effectiveness of all primary and secondary barriers, including electric, bubble, and acoustic barriers. Fifth, employ consistent measures to identify the

location of this invasive species, such as electric fishing or electrofishing, netting, and commercial fishing that do not delay the movement of commerce. Sixth, fund research on Asian carp specific biological control agents, which has proven to be an effective strategy with other invasive species on the Great Lakes.

Seventh, sample barges and other vessels for juvenile carp and their eggs. We are currently serving on a public-private-sector working group to conduct such sampling and ensure our that our industry is not a vector to move this invasive species. Eighth, impose further restrictions on the importation of aquatic invasive species. And, finally, conduct more scientific studies about the ability of carp to survive within the Great Lakes ecosystem.

Mr. Chairman, proposals have been made recently in both legislation and litigation to permanently close the locks on the Chicago Waterway System. We strongly oppose lock closures. Recent proposals by Federal agencies to implement a program of scheduled lock closures are equally troubling because they will impede essential commerce without stopping the advance of the carp. Let me repeat that and underscore that: Closing the locks just will not stop carp.

Speaking personally, closing the locks would also be devastating to Illinois Marine Towing Company and may even put that company out of business, with a loss of a hundred or more jobs for our shore-side and vessel operations. Other vessel operators who work in the same Illinois waterway in the same region who provide family-wage employment to hardworking Americans would likely suffer the same fate. Together with State, Federal Government agencies, and concerned stakeholders, we feel that we can develop effective solutions to stop the Asian carp in a way that doesn't sacrifice jobs at a time when jobs are on such short supply.

Mr. Chairman, this prestigious Committee has a history of leadership and finding solutions to complex and challenging public policies without framing them as an either/or decision. The American Waterways Operators has committed to working cooperatively to ensure a balanced approach to environmental stewardship and economic sustainability for the Great Lakes and the western rivers. We are convinced that both goals can be realized.

We thank you for the opportunity to present today, and we certainly are here to answer any of your questions and concerns.

Mr. OBERSTAR. Thank you very much for testifying on behalf of the waterways users. I will come back to you with some further questions and comments after we hear all the testimony.

Mr. Brammeier, Alliance for the Great Lakes, please proceed.

Mr. BRAMMEIER. Thank you, Mr. Chairman and Congresswoman Edwards and Congressman Petri, for hosting the hearing today.

My name is Joel Brammeier, and I am the president and CEO of the Alliance for the Great Lakes. I am also a steering committee member of the Healing Our Waters Coalition.

I and dozens of dedicated citizens and experts have, for more than a decade, advised Federal agencies and the State of Illinois on how to stop Asian carp from establishing in the Great Lakes. And many of those folks are in this room today. As Dr. Lodge said, we can accomplish that task, but only if every choice we make

today is dedicated to the permanent prevention of Asian carp invasion.

Behind nearly every invasive species are the hands of human intervention. The noble intent for the artificial connection to the Mississippi River at Chicago was protection of the city's drinking water. As the 19th-century city grew, sewage-laden rivers flowed into Lake Michigan. The State of Illinois reversed the rivers, binding the ecology of the Great Lakes and the Mississippi River and ultimately leading this potentially devastating invader to the shores of Lake Michigan.

Now, 120 years on, we have added layers of complexity to that system. 2.1 billion gallons of water streams past those channel walls every day. The system allows more than 35,000 recreational boat movements and supports a slowly declining traffic of 20 to 25 million tons of bulk commodity movements every year.

The city has built itself with pride on this backbone of a 19th-century engineering marvel. This connection opened the continent to trade, and it kept the city's rivers from reverting to open sewers. But the stark reality that the system created an aquatic superhighway for Asian carp and other invaders calls the question of whether it is as critical today as it seemed 120 years ago.

On the threat itself, others have spoken to that, and I will only say that the only reasonable response to the biological pollution of invasive species is zero tolerance. There is no diluting their impacts to some unnoticed background level. And even if the electrical barriers operate as designed, they will not last forever and they will not achieve 100 percent effectiveness.

The permanent solution is not technology but what we call ″ecological separation″ or, simply, no movement of live organisms between the Great Lakes and the Mississippi River via the canals, up to and including permanent physical barriers.

Now, this simple idea seems audacious. A close look illuminates that sewerage treatment operations over 30 years have dramatically reduced the need for a direct connection between Chicago and Lake Michigan. Commodity deliveries and loading are clustered at specific parts of the waterways with comparatively little traffic moving through downtown Chicago or into Lake Michigan itself. In fact, less than 1 percent of freight movement in metro Chicago moves between the Mississippi River and Lake Michigan. Barely more than a thousand recreational boats move through Lockport Lock annually. We can simply no longer afford to assume that 71 miles of century-old canals are required to get the job done if the job creates a massive liability for the Great Lakes.

Now, a feasible separation scenario can accommodate the vast majority of commodity traffic. It can provide new methods of moving recreational boaters. And, most importantly to this committee, it can serve as a one-time payment for 100-percent effective permanent protection.

Now, this is not a new concept. A 2003 gathering of experts from around the world in Chicago set an agenda beyond the electrical barriers and agreed that stopping water was the only way to stop the stream of invaders.

Now, we are encouraged that the Corps has committed to an interbasin feasibility study, but we are concerned that few steps

have been taken besides agency coordination nearly 2 years after original authorization. The unclear analysis by the Corps of the economic impact of short-term changes to the waterway does not herald a good start to this process. A rapid, transparent process that stands up to citizen and expert scrutiny is the only way to yield meaningful results.

To that end, Federal agencies should do three things: immediately execute a short-term contingency plan with a clear and singular goal of no establishment of Asian carp; take all action necessary, including temporarily altering navigation, to prevent movement of existing carp populations; and, probably most importantly, expedite the Chicago portion of the authorized Interbasin Transfer Study to be completed by September 30, 2011, with a clear goal of 100 percent prevention.

We understand the damage that has already occurred. We can predict irreparable harm to the Great Lakes if we fail. We have the tools and the knowledge in hand to stop this problem before it starts. But a solution is being held hostage by outmoded infrastructure and assumptions that how business has been done is the way business has to be done.

The engineering feat of the Chicago waterway protected Lake Michigan, but it transferred costs to others, costs that were not apparent in 1890 but are a hole in the wallet today. This backbone of the largest Great Lake's city must either stretch and strengthen with time or it will collapse under its own weight. I look forward to working with this Subcommittee and everyone engaged on this matter to create a legacy for the waterway that outlasts both me and the original projects.

Mr. Chairman, thank you for holding this hearing, and I look forward to assisting on any actions the Committee can take to support this effort.

Mr. OBERSTAR. Thank you very much, Mr. Brammeier.

And to all of the witnesses this afternoon, I would say that, were it not for the storm of the half-century, most of the chairs here would be filled. The level of Member interest and concern about this issue of the Asian carp in the Great Lakes is very high. I had numerous requests from Members, nearly everybody in the Subcommittee. And those who are not on our committee, those who serve on other committees are very, very deeply concerned. They are hearing from their constituents. They are seeing the news reports. This carp has galvanized public concern like no other such issue except, perhaps, for the 1968 fire on the Cuyahoga River that moved the Nation and the Congress eventually to pass the Clean Water Act of 1972.

Coleridge, in ″The Rime of the Ancient Mariner,″ describes the ocean as dark, endless, heaving, and mysterious. Dark it certainly is. So is Lake Superior on its worst days. Heaving in the midst of storms, typhoons, hurricanes. We are beginning to unlock the mystery of the oceans, going deeper than ever before, going down to the bottom of the Marianas trough, finding vents in the ocean that have temperatures of 700 degrees-plus with creatures still living there.

But endless the oceans are not. It was a form of image by Coleridge. And neither are the Great Lakes endless. We haven't

unlocked all of their mysteries, but we are getting there. But faster than we can address those mysteries, the species that don't belong there, that were not there to begin with, are getting ahead of us.

And the lakes can't heal themselves. The native species can't protect themselves against these invasive predators or plants, like purple loosestrife and others. It is only us, who are the custodians, who can take these actions.

And I cited earlier the lamprey eel. So many efforts were made to find something to do with the lamprey—catch them, smoke them, export them to Sweden. The Swedes had an appetite for them for a while, and then that waned. Norwegians thought that might be a delicacy, but soon they abandoned it in favor of lefse. And there just isn't anything you can do with these species.

I mentioned the DDT. I held hearings on the U.S.-Canada Great Lakes Water Quality Agreement in 1985, and we found that the United States had banned DDT after Rachel Carson, and yet it was being exported to Central America, sprayed on banana plantations and the aerosols were caught in the upper atmosphere. And in 14 days, faster than President Reagan said the Sandinistas could reach the U.S. border, DDT was in the Great Lakes. And bald eagles were eating the fish that absorbed the DDT, and the bald eagle eggs weren't forming and the hatchlings died. And something was happening far from our shores that we had no way of controlling, except prevent the exportation of DDT.

Dr. Humphries, you said the carp are at our doorstep. It reminds me of an image in the language of my ancestors, the Slovenes: [Speaking in foreign language.] ″We just think about the wolf, and it is at our doors.″ And that is what the carp is; it is at our doors. And the Great Lakes can't wait, said Secretary Frank, which I thought was so compelling.

So what I want all of you to discuss now is we have this draft, Asian Carp Control Strategy Framework. We have the language of the Water Resources Development Act of 2007, which took a great deal of bipartisan effort, I must say. And in so expressing, I want to once again express my great appreciation for the splendid work of Mr. Mica, the Ranking Member on the Republican side, to bring a bill forward in a way that had never been done before, open this transparency and bipartisanship. And we overrode a presidential veto to get that bill passed.

But it had this particular language, the interbasin study, a long-term action to address the problem of the Asian carp. So all the authority necessary exists to bring all of you and all of the other entities together.

Now, I want your commitment and your expression of how you are going to do this, both in the short term and the long term. We have an immediate issue to be addressed; we have a longer-term issue. We have the invasive species that come in through ballast water. We have this species that is moving up-lake.

And, by the way, Mr. Wilkins, that didn't come in any ballast water. The waterway users, the barge operators, they didn't bring this in. It escaped, as we all know, from a fish farm, a catfish farm, and didn't belong there in the first place.

The Lacey Act is good law, but if it isn't enforced—just as in the late 1970s we passed legislation to outlaw scrimshaw and impose

enormous penalties to save African elephants and save whales. And yet, if you don't enforce the act, you don't impose the penalties. We have penalties on whaling in our territorial waters, but if it isn't enforced, the whaling continues. Same here, if these laws aren't enforced, if we don't have multidisciplinary strategies, we don't engage the province of Ontario, the Canadian National Government and all the States and the Federal agencies together, we are not going to be effective.

So, first of all, while you are thinking about that, about what you are going to do and how you are going to continue and how you are really going to vigorously implement the authorities available, General Peabody, tell me—and thank you again for making the long journey, for each of you, for making the extraordinary effort to be here.

We worked out the funding, the shift of authorities and the availability of funds, both under the stimulus program and under the regular programs. So describe the work under way now and your timeline to meet the completion goal of fall 2010 for this second, bigger, more robust electric barrier.

General PEABODY. Yes, sir. Thank you.

Sir, originally, Barrier 2-B, which, the way I think of it, is effectively a better-looking twin to Barrier 2-A will be executed, thanks to $7 million from the American Recovery and Reinvestment Act by September of this year.

If we can pull that to the left once the final design for all the electronic components, which is under way right now is complete and we have awarded the contract and examined the schedule, we will do that.

This barrier gives us redundancy in the Sanitary and Ship Canal, which, although there are other vectors, remains the primary avenue of approach for Asian carp up into the Chicago Area Waterway System.

Barrier 1, as a reminder, is a demonstration barrier, which has lower operating parameters than Barrier 2-A. Barrier 2-A, as a result of the information that Dr. Lodge and his team provided to us this past summer, was taken to higher operating parameters, which we know to be, based on laboratory testing of Asian carp of all sizes, juvenile and adult, in tanks, to be the optimal parameters for the barrier. So the barrier is operating today at its optimal parameters.

Barrier 2-B will give us that redundancy so we don't have to go through the intensive rotenone application that Mr. Davis talked about during his testimony ever again. We would probably have to do a minor application, but it would be in a very short, narrow stretch of the canal, just a few hundred feet, as opposed to nearly six miles.

Mr. OBERSTAR. Does that mean September of this year?

General PEABODY. Sir, the construction will be done in September. It will take about a month for us to do the operational testing that we need to do to turn it on and make it effective. We expect by the end of October that it will be operating as an effective barrier.

Again, sir, I want to emphasize, once I have a construction schedule, I can put that schedule under a microscope, and if there

is a way for us to accelerate that in any way, we will do so. But we have to get the design pieces right now.

Mr. OBERSTAR. Has the electrical current power of the stepped-up version been tested on critters that size?

General PEABODY. I don't know if they were that large, sir. But I think they were as large as a foot and a half in length. I can get you the exact dimensions.

Mr. OBERSTAR. Well, if the sound of a motorboat can stimulate those size fish that are on display here—and I realize the record can't see my finger pointing over to these models—but if it can scare them to jump out of the water, then how much electrical current is needed to do that?

General PEABODY. Yes, sir. Great question.

The original dispersal barrier, the demonstration barrier, was built based on information generally available at the time about other dispersal barriers that had been built. And the information indicated that fish responded to one volt per inch, which is the primary, but not the only parameter.

As a result of studies Dr. Mark Pegg did in 2004, he indicated that the voltage required to repel the specific species of Asian carp could be as high as four volts per inch. Subsequently, we conducted (or "ran") additional studies, and what we found was Dr. Pegg had it at least partly right. One volt per inch did not seem to be adequate, but, in fact, it was a combination of three variables: the voltage, in this case two volts per inch; the frequency, or how fast this pulse rate goes out, because it is not a constant current, it is a pulsing DC current that goes out, and 15 hertz is the frequency; and then the periodicity of the pulse, which is 6.5 milliseconds, in other words, the duration of the pulse.

Those are the parameters that we are currently applying in Barrier 2-A. I want to caution: These are parameters that have shown to be effective in laboratory tank tests, where fish cannot escape the electricity. One of two things happens. The fish either attempt to swim away, or they swim into the current at these parameters and they are rendered unconscious, they are stunned, they float to the surface, and they flow away.

We need to do additional testing using flume tests, with our Engineer Research and Development Center, that will replicate field conditions. Right now we don't have flumes that are large enough to replicate those conditions. This is being built this spring. Over the course of the summer, we will execute those additional tests, and that will further inform our optimal parameters research.

Mr. OBERSTAR. Will that include testing this volume of current against juvenile fish, as well?

General PEABODY. Yes, sir, all size fish. It is interesting, we were going to start testing in smaller flumes this week, and we were unable to do so because when our research and development lab folks went out to the laboratories that farm these fish for testing purposes, there were not enough fish available to do the tests. So we have had to go to alternative sources. But we will start that next week, the small flume test.

Mr. OBERSTAR. Thank you.

Cam Davis, what about my question? Speak for the whole group here. What is it going to take to keep this group together under

the existing legislative authorities provided? And what about funding to sustain this effort in the short term and the long term?

Mr. DAVIS. Thank you, Mr. Chairman.

What is it going to take to keep this group together? I have been so impressed by how it actually hasn't taken much. Every single agency around this table has come willingly and very helpfully, in terms of helping with the rapid response action that we saw in December, in terms of the drafting of this framework. We have seen everybody drop everything and push really hard to get this document in front of you that you see now.

So I don't see any of that commitment wavering, from where I sit. And that is something I can say for the whole group. There is not a lot I can say for all other agencies because I don't represent them, but that is one thing I can say absolutely.

Mr. OBERSTAR. Are EPA and the Corps the lead agencies here?

Mr. DAVIS. The EPA has a coordination role. We facilitate the integration of the various steps and actions that you see in this document. We, for example, at EPA do not have authority over the locks. We do not have fishery management authority with any one of these States, certainly Illinois.

And, in terms of the lead, we consider ourselves the lead for purposes of making sure that our actions are integrated, that we are taking a coordinated approach to solving this problem.

Mr. OBERSTAR. General Peabody, how is this going to work now? Do we have a two-headed leadership here, or do we have one single source of direction?

And I say, the opportunity is greater than we have ever had before. We have a President from the Great Lakes who understands the value of this great resource. We have the funding in place, we have mechanisms available to us, the scientific community alerted, the public is anxious. There has never been a better time than now. So I don't want to lose this momentum by a lack of central leadership.

General PEABODY. Mr. Chairman, I agree with Mr. Davis's remarks. I think the team is united in its intent to come to solutions that are effective. The challenges that we have going forward are, can we get adequate information upon which to make the best informed and reasoned decisions in a timely manner? That is the fundamental challenge.

I will give you an example. One of the things that we are examining is whether we can apply acoustic and bubble barriers and whether we can apply CO2 in or near the locks, to use the locks as an effective barrier to the migration of Asian carp. But this is just a concept. These are just ideas. We need to go from ideas to drawing board to execution. And so we don't know all the stumbling blocks that we may encounter to execute the engineering that will take these ideas and implement them.

But I can assure you that we intend to implement them as fast as possible and that, in coordination with EPA and our other agency partners, we will try to make these measures as effective as possible, as well.

Mr. OBERSTAR. Thank you. I can assure you that there will be vigilance from this committee, beginning with Mr. Petri, who has long been a protector of the Great Lakes.

Mr. PETRI. May I ask a question?

Mr. OBERSTAR. Such time as the gentleman may consume.

Mr. PETRI. Okay, I do have a couple of questions.

First of all, I wondered if I could provide Mr. Wilkins an opportunity to respond to Mr. Brammeier's testimony about the locks. It didn't sound like you were talking about the same world, because you were talking about the tremendous volume of commerce going through the locks and the importance to the local community, and he was saying it is only 1 percent that goes all the way through, and, really, it would not be particularly disruptive to figure out strategies to put in a physical barrier between the Great Lakes and the Mississippi River.

Mr. WILKINS. Well, sir, I cannot speak to Mr. Brammeier's data, so I will not. But I can say to you is that, when I hear the statement about the lock closure, basically what it says to me is that the U.S. Solicitor General has already stated that the locks themselves are not watertight. I can tell you that in my previous life prior to be an administrator, I was a former captain on the inland waterway system, and they leaked and they permit the escape of water.

I guess my short answer is that the locks just won't be a permanent barrier because there is no type of bulkhead in the chamber. Given what the major general was saying, how can we use other resources to come to a final means of trying to control, because I can tell you that we, as AWO, certainly are excited and want to continue working with the full team with rational outcomes.

Mr. PETRI. But could you elaborate on your testimony? I think you were talking about a physical barrier, not necessarily relying on the locks.

Mr. BRAMMEIER. Certainly, Mr. Petri. I do want to be clear that there are two questions at hand today. One is the short term, and the other is the long term. And, in my comments, I am speaking to the long-term need to separate the Mississippi River from the Great Lakes, which is going to require significant investment, new authority, and a change in the way we think about the system.

Just to clarify the data, the numbers that I cited were reflective of the volume of commodities moving through the O'Brien Lock on the south side of Chicago relative to the total volume of freight moving in the Chicago metropolitan area annually.

Mr. PETRI. And that is—well, you said it was 1 percent of the total movement or something?

Mr. BRAMMEIER. Less than 1 percent, yes. And those are the best numbers we have, reflective of how much of that cargo actually moves from the Mississippi River into the Lake Michigan Basin.

Now, to be frank, even less of that actually requires a trip into Lake Michigan. And so my point here is that the volume of traffic that needs to move from the Mississippi River to the Great Lakes on the waterway is a very small number relative to the total amount of movement on the waterways and, certainly, to the total volume moving through the Chicago metro area.

Mr. PETRI. So most of the movement is going to depots or other destinations within the Chicago area but not in Lake Michigan?

Mr. BRAMMEIER. Most but not all, certainly.

Mr. PETRI. You are saying it is only 1 percent?

Mr. BRAMMEIER. Of the total volume of cargo moving on all modes, through all mechanisms through the Chicago metro area, yes.

Mr. PETRI. Mr. Wilkins?

Mr. WILKINS. Well, first, I would say ecological separation is a huge game changer. Nationally, the policy—that would become a policy judgment which says navigation may not be important, and I don't think that is the answer. And regionally, it would eliminate a lot of jobs, not just jobs for us in the barge industry, but all the subsequent services that rely on that, which is manufacturing, terminals, docks, all of the above.

As far as the tons that move through the system, it is certainly a viable system. It is certainly a system that is continuing to grow. We look at the inland waterways system as the most economical means of transporting on a cost-per-ton basis when compared to other modes. It is very green, very environmentally friendly. So I don't look at it as a dying business or a business that is still not viable today and in the future.

Mr. PETRI. I wish I had more time to go further, but this is an area that I think will be of considerable discussion, and we will try to come up with a permanent solution, not just for this problem but for other invasive species moving both ways through the area.

And I guess I wanted to ask Mr. Lodge about that. You indicated that DNA testing indicates that these Asian carp are already in the Great Lakes. And I wanted to ask General Peabody, finally, about other vectors. Because in some of the information the Chairman has, there is an indication that people may be buying minnows or something for fishing, and they could be Asian carp minnows. And the next thing you know, the sports fisherman or others are—they don't all get eaten by another fish. Some of them might wiggle off, and the next thing you know, they are living in the Great Lakes. A lot of different ways that these creatures can get into the lakes. People might even inadvertently move them, or intentionally, thinking it is a cool thing to do, discharge them into the Great Lakes.

So I guess I wonder if there is no magic bullet, probably, in dealing with the range of possibilities for species getting from the Mississippi Basin into Lake Michigan. But I just wondered if you could comment on that a little bit.

And then, secondly, talk about the habitat in the Great Lakes. Is it really conducive to these fish? I mean, there seem to be bottom feeders and, sort of, river and pond type fish. The Great Lakes are colder and vast. How realistic is the possibility that they will, in fact—I mean, maybe a few—but really multiply and dominate the food chain, given the different natures of the habitat?

Mr. LODGE. Thank you, Mr. Petri. I think what I hear is two different questions. One is about what are the pathways and the relative importance of the pathways by which fish might get into the canal system above the electric barrier. And the second is about potential impact in the Great Lakes. So let me take those one at a time.

It seems quite clear that the largest potential source of individual Asian carps into the canal system close to Lake Michigan is via the canal. We know from lots of lines of evidence, from many

State and Federal agencies now, that the silver and bighead carps are both very abundant south of the electric barrier. So those fish are, if you will, stacked up down there, spreading and pushing, if you will, against the electric barrier.

If the electric barrier is less than 100 percent effective or fails on occasion or can be circumvented during floods that unite the Des Plaines and I&M canal with the Chicago canal, then that is a large potential source. So it is reasonable to put the greatest attention on the canal and the barrier system and the steps that have already been outlined in the framework for preventing additional fish from south of the barrier from joining those north of the barrier.

Having said that, there clearly are other potential pathways. And you have mentioned both, both of the ones that I see as being potentially important. Bait—and Mr. Rogner has already talked about a survey the Illinois DNR is going to do to try to assess that. I think that is possible. I think that is probably—I mean, we will have to see what the data say, but I think these fish, I think particularly the juveniles, are unlikely to do very well in a bait store kind of setting. So I doubt that is going to be particularly important, but it could be of some importance.

The thing that I think has, in the past at least, been clearly more important is the intentional release of adult carp. There are several, if not many, ponds in the Chicago metropolitan area that we know are inhabited by bighead and/or silver carp. Those carp didn't get there from the canal. They got there because individuals bought them and released them. There are some cultural practices that have encouraged people to do that in the past.

Now, in Chicago, in the last few years, that was outlawed, and I think Ms. Humphries suggested that is not legal in Michigan anymore. But it could be that that is still happening illegally. It could also be that some of those fish north of the barrier have been there for a long time. They live 10 years or more.

So that was perhaps a too-long answer to your first question.

The second question was about impact to the Great Lakes. I think none of us know for certain what the impact would be in the Great Lakes. There is only one way to find out, and I don't think any of us want to try that way.

I think what I would say is that it is very hard to imagine the result of an invasion by either silver or bighead carp being positive; very difficult, if not impossible, to imagine a net positive outcome. And, on the other hand, it is very easy to imagine a catastrophic outcome. So somewhere in between those two perhaps is the most likely outcome if either silver or bighead were to invade.

I would offer you a metaphor. We are playing Russian roulette with the environment and the economy of the Great Lakes systems when we allow access to those species and the other ones that I outlined. And, in fact, probably Russian roulette isn't a very good metaphor because it is not like there is only one chamber loaded. We have it loaded with two chambers full of Asian carp, silver and bighead, and then we have all those other species. So it is not even a good metaphor.

We know that these invasions will happen if additional management steps are not taken to make the canal less permeable to orga-

nisms. And, of course, while we are all sitting here talking, the fish are swimming.

Mr. OBERSTAR. Thank you for that very thoughtful response and for those very thoughtful questions.

I will come back to Mr. Petri in a bit. Now I want to recognize Ms. Edwards and thank her again for beginning the hearing and for being here today.

Ms. EDWARDS. Thank you, Mr. Chairman. And, as always, when I show up at the hearing, I learn something, and then I end up with questions. So I appreciate the opportunity.

Since I do come from the Chesapeake Bay region, I mean, one of the things that I have been, you know, trying to focus on in this hearing are areas of coordination and collaboration among the States and Federal agencies. And so, Mr. Davis and General Peabody, I appreciate your indicating the level of enthusiasm that the various partners have shown, at least at this stage, in working together and coordinating.

But some of the experience that I think we have here with the Chesapeake Bay and the restoration of the bay and the coordination of efforts within the Chesapeake Bay watershed is that it really does require both presidential leadership, an agency that is really designated to coordinate, and, of course, a Congress that commits the resources that it takes to match the enthusiasm of the participating States.

And there is a piece of that that seems lacking here, in terms of really designated coordination. And, Mr. Davis, I would appreciate your commenting on that. Because some of the things that we learn about the bay and our other regions with invasive species, you know, are transferable, and we don't always have to start from scratch. And I wonder if EPA has some thoughts about that and what we might gain in terms of its application with the Great Lakes region.

Mr. DAVIS. Sure. Thank you very much, Congresswoman.

I think you have pointed out a good trifecta. Presidential leadership: check, we have it. Agency coordination: check, we have it. Funding: check, we have it.

What we haven't had, to me, in the past is a roadmap that clearly tells the public who has to do what by when using which sources of funding. There hasn't been any one place that people can go to say, okay, if I am interested in the locks issue, here is where I go to find out about it. If I am interested in fishery carp suppression, population suppression measures, here is where I go to find out who is in charge of that, when are they going to act, how are they going to fund those efforts.

That is why the release of this yesterday is so absolutely critical. Because, for the first time ever, what we have done is we have pulled together those answers, in terms of what actions are going to be taken, by whom, when, and what the funding sources are.

So there is nothing about this situation where, as much as we all would love to see this, where any one person or any one agency can simply pull a lever and this problem goes away or mitigates itself in some way. But what we can do is clearly articulate what the authorities are, which agencies are undertaking which actions,

and what the expectations are for when those actions will be started and completed so there is some sense of accountability.

I think communicating that accountability structure has been something that we have desperately needed. And I think we have, with this framework, a very good tool for ensuring that accountability.

Ms. EDWARDS. And do you have any thoughts as to whether you have the tools that will be applicable across administrations and across Congresses?

Mr. DAVIS. Well, I wish I could predict the future with a lot more clarity than I have been able to do so far. So it is a great question, and it is a tough question to answer.

I do think that it is worth a try to see this. This framework just came out yesterday, and I think we need to give it some time to bake and for us to take action with it.

Ms. EDWARDS. But you don't have a statutory tool?

Mr. DAVIS. For coordinating?

Ms. EDWARDS. That is right.

Mr. DAVIS. Under Clean Water Act Section 118, the EPA does have authority to coordinate actions among the Federal agencies. So I think that that is clear. We have invoked that authority for purposes of this particular issue.

I think the real question on the table is, have we been able to act fast enough? And I think the clear answer is, no, we haven't. I know I have been mindful of and trying to draw attention to this issue for more than a half a decade. And now that I am in the job, now that we have invoked that authority, I think we are getting some traction here.

Ms. EDWARDS. Do any of our other witnesses have a comment about the need for that authority more directly than through the Clean Water Act?

General Peabody?

General PEABODY. Yes, ma'am. Thank you, Congresswoman.

Let me just make clear what I understand the Corps' authorities to be and their duration. The authorities that we have specifically related to this issue are derived from the authorities to build, operate, and maintain the fish barriers, first of all.

Second, the study authorities that we have, which are two-fold—one is the so-called efficacy study, again authorized in WRDA 2007, which tells us to find out whether the fish barrier is effective, one of the issues that people have articulated here. We have a variety of things that we are doing to address that, to include an interim report (approved by Secretary Darcy last month) to go ahead and work on these flood bypass potential avenues that Dr. Lodge talked about along the Des Plaines River and the Illinois-Michigan canal during flood events.

The third authority is the Great Lakes/Mississippi River Interbasin Study, which is the long-term part of the strategy that both Mr. Davis and I talked about in our testimony.

What we don't have is authority for execution in all cases. We have a stop-gap authority that was in the 2010 Energy and Water Appropriations Act, Section 126, which gives the Secretary of the Army emergency authority to take unspecified measures to prevent Asian carp from dispersing northward of the barriers and into Lake

Michigan. That is a 1-year authority that expires a year from the enactment, which I believe is October 28th of this year.

We have used that authority to execute the construction of these flanking waterway barriers that I just referred to. We will continue to use that authority going forward through the rest of the year to execute some of the ideas in our modified lock operations concept. But we lose that execution authority when it expires at the end of this fiscal year.

Ms. EDWARDS. Thank you, Mr. Chairman. I have additional questions, but if we are going to go back around, I will save them.

Mr. OBERSTAR. Before I go to Mr. Petri, I think we need a mid-course review. And I would suggest that we convene, optimally this panel again, not necessarily in a hearing, but in a roundtable discussion that would be public, and get your assessment of where matters stand, where progress is being made by the Corps, by this interagency group on the control strategy, so that, as I have discussed informally with Mr. Petri, that is sort of a point of importance for the appropriations cycle. If we need to do something further, appropriations measures are an effective means of doing so. If we need more funding or we need additional authority that we can include in an appropriations bill, that all would be agreed upon, that would be a legislative action, that would be the time to do it.

So we will share our thoughts on what might be an optimal time to do that, and we will notify you. But I want all of you to be thinking about early to mid May.

General PEABODY. When it is warm, that would be preferable, so that it is not snowing.

Mr. OBERSTAR. Ahead of the hurricane season and after the snow melts, and come together to discuss where we are, where we are going, where we need to go.

Mr. Petri?

Mr. PETRI. Well, we are going to be having other meetings, I guess, so I just had one quick question that I—do these carp have any natural predator in our system or where they come from—I guess it must be somewhere in Asia, southeast Asia or wherever—in their own habitat? Or are they at the top of their particular situation?

Yeah, Dr. Hansen?

Mr. HANSEN. I think we should assume that they have no natural predators here, but neither did the common carp. And if you give almost any of our native predators a choice, they seem to like common carp. So they do tend to select fish with soft rays.

I don't think we should persuade ourselves that the fact that other fish will eat them will actually impede them from colonizing these Great Lakes and doing great harm. We should be pleasantly surprised that they are feeding some of our native fishes, but that is not really the point, is it? Because they are likely to do their damage in the way that they interact in the food web.

And because they interact in the food web at a low level, they could well have the same sort of catastrophic effects that we have seen from zebra mussels, where they have essentially rerouted the food chain and led to wholesale changes. And our secretary from the State of Michigan pointed out that Lake Heron just recently

underwent a dramatic shift in how that whole ecosystem was structured, probably owing to how zebra mussels restructured things. So the Asian carp is a very different animal but in the same position, and almost certainly its damage will be caused through that mechanism.

And I would also like to say that I agree completely with Dr. Lodge. These animals will almost certainly be harmful, not helpful. So we probably could see some benefits because something will eat them, but it is more likely they will be very, very damaging.

And another point probably needs to be made. The deep cold portions of the Great Lakes probably aren't where these animals are going to be happiest. They are going to be happiest in the nearshore waters, where we have an abundance of streams they can swim into to spawn, where we have warmer waters that will be more suitable. But those are also some of the most productive systems in the Great Lakes. And history would already show us that, at the peak of their productive potential, Lake Erie outproduced all the Great Lakes combined. And one species, the cisco, produced more fish production than all of the rest of all the species in the rest of the lakes combined.

So Lake Erie is probably the one at greatest risk, and the nearshore waters of Saginaw Bay and Green Bay, where we have extremely valuable fisheries. Those are probably the places where this animal will do its greatest damage.

Thank you.

Mr. OBERSTAR. Thank you, Mr. Petri.

Just to supplement that, so eagles, fish hawks, osprey have no interest in the carp?

Mr. HANSEN. I certainly didn't mean to say that. Carp are probably——

Mr. OBERSTAR. No, you didn't, I know. But you say they really don't have much challenge from predators. Given the abundance in the Illinois River——

Mr. HANSEN. They are almost certainly being eaten by things.

Mr. OBERSTAR. An eagle is not going to pick up a forty-pounder.

Mr. HANSEN. Oh, right.

Mr. OBERSTAR. Yes, Dr. Lodge?

Mr. LODGE. If I can just add and build on your point, even if juvenile silver or bighead carp provide food for native fishes, the problem is the size of those specimens over there. And those are perhaps average size, not even big ones. There is no predator that is going to be able to consume an adult. So, from a biological perspective, we refer to that as a size refuge. These fish grow very quickly to a size where there will be no predator where they can be consumed.

Mr. OBERSTAR. Yes, the idea of a fish that has no stomach and must continually process water is astounding.

And, Dr. Hansen, I understand they can be smoked and some people might eat them, but they are rather bony, aren't they?

Mr. HANSEN. They do support native fisheries in their native range. And I guess you could always say, well, that would be a benefit. But, gosh, I hope we don't go there. So they are probably perfectly suitable in some forms for food. And obviously they could

support the same kind of economies here if we let them loose, but hopefully we wouldn't.

One more point about their colonization ability, it seems to me this animal is built to colonize new habitats. These fish grow very fast, and you can see how big they get. Those fish are probably—you would need to look at their ear bones to figure out how old they are, but they are probably only 7 or 8 years old. They mature at a very young age, and they produce lots of eggs. So they are built to colonize these habitats. So if you let too many out, the odds are much, much better that they will get a foothold.

So I think you can probably rest assured that Dr. Lodge detected fish upstream of that barrier. His methods are convincing and proven. The idea now is, is it enough? Are there enough up there to start this off? We should hope there are not. And we should probably try at least to get rid of the ones that have gotten above there.

Mr. OBERSTAR. I think we are all agreed on that point.

General Peabody, what is the rate of flow of the current through the ship canal? And it is from Lake Michigan into the Illinois River; therefore, fish have to swim against that current. So a large fish can do that rather readily, I suspect. What is the smallest size?

And then, Dr. Lodge, if one of these carp females can produce 50,000 to a million eggs, can those eggs make their way all by themselves against the current?

General PEABODY. Sir, with reference to the current, it is very slow in the Chicago Area Waterway System. As Mr. Davis talked about, it is very flat topography. And even though 1 billion gallons of water sounds like a lot, it is not a lot when you consider the web of canals and rivers that——

Mr. OBERSTAR. Well, in cubic feet per second, what is the rate?

General PEABODY. It is less than a foot per second, generally, sir. Now, that varies with whether or not you have rains, and it picks up during that period. But in terms of how the fish behaves, I would defer to the fish experts on the panel.

Mr. OBERSTAR. Dr. Lodge?

Mr. LODGE. I think you asked specifically if the egg could go upstream, and the answer to that is clearly no. But what is clear from the studies that many other biologists have done—I am thinking of Duane Chapman at USGS and the book produced by Cindy Kolar at the USGS which reviews work from around the globe—it is clear that adult Asian carps of both species are oriented toward swimming upstream, particularly in search of spawning areas.

And that is what you see in the canal, both from traditional work and from our work. They seem to stack up below barriers, below structures. And when they are in the spawning mood, they are swimming upstream and can readily do so against substantial currents.

Mr. OBERSTAR. Well, the experience with salmon, which have to swim against tremendous currents in the Fraser River and in the Yukon and elsewhere on the west coast, you see them going against the falls, and the drive to spawn is just so powerful. And those are

much smaller than these large-scale carps, so they have huge power.

Director Humphries, it was the State of Michigan that initiated legal action, and that action was denied by the U.S. Supreme Court, but the underlying issue of authority to act was not addressed by the Court.

What motivated the State of Michigan to initiate the lawsuit? Will the State be satisfied now that there is enough Federal-State multi-agency coordination, a concentrated program, a clear strategy to attack this issue? Will they be satisfied now to continue cooperating, coordinating?

Ms. HUMPHRIES. We will continue to cooperate and coordinate with our sister States. We have been an active participant despite the lawsuit. We worked as part of the rotenone treatments that were done last December with our sister agencies, and we will continue to do that.

Will it satisfy our legal challenges? No. I will tell you, our attorney general office refiled this case last week. The decision was made before the latest DNA information was made public, and so they have refiled.

What is at the crux of this is really where we are going with this long term. Is our goal to biologically, ecologically, and physically separate these watersheds or is it not? And that is what, in our conversations with our other agencies and with the Federal Government, we have tried to ascertain, is what is our long-term goal here. Because it does make a difference in terms of how we approach the short-term strategies.

We applaud the efforts that have been done to coordinate activities. We applaud the effort that has been done by the Federal agencies to bring funding to this and to Congress. But, quite frankly, we need to do more. And we do not feel that continuing to operate the lock structure and the opening waterways that are in place and poisoning off those waters on a regular basis in order to facilitate that is a sustainable strategy.

Mr. OBERSTAR. So, in short, the State of Michigan welcomes the efforts under way but does not consider them to be sufficient.

Ms. HUMPHRIES. That is correct, at this point in time.

Mr. OBERSTAR. General Peabody, in Louisiana, many, many years ago, it was believed to be a great benefit to shipping to dig an additional channel to New Orleans from the Gulf, the Mississippi River Gulf Outlet, commonly known as ″Mr. Go.″ On the order of six or so freighters use that waterway annually.

What was perhaps not anticipated—or if it was, it was dismissed—was that the waterway would allow saltwater to penetrate all the way up to New Orleans. In that action, the area between Lake Borgne and the Mississippi River was destroyed, the wetlands with huge reeds and plant growth that proved to be the barrier against surges in storms and in hurricanes from Lake Borgne, such that St. Bernard Parish in Hurricane Katrina was not just hit by water, it was washed away.

The force of the surge from Lake Borgne, with nothing standing in its way, swept away—I was there just 6, 7 months after Katrina and took a photograph of the first home that bore the brunt of that storm. All that was left was a commode. That porcelain piece domi-

nated the landscape. It was the only thing that was left. There were no watermarks on the homes of St. Bernard Parish because they were all overtopped. And several I saw were lifted up with their concrete base and floated as much as three blocks away from home until they ran into another object that didn't move.

And this is all, sort of, parenthetical. But the owner of the home that didn't move and was struck by a moving home sued the intruder for collision damage. And I asked him why. He said, ″Well, there is nothing else for us to do. No one is fixing our problem here.″

So we moved, in the Water Resources Development Act of 2007, to close off—give the court authority to close off ″Mr. Go″ and divert the Mississippi River, reintroduce fresh water and sediment, and to hopefully in time restore the wetland that once was the buffer for St. Bernard Parish, which is the home of the Islenos people, the Canary Islanders who came to that area in the 16th and 17th century.

So is it possible that closing off navigation, closing off the outlet from Lake Michigan would be the definitive answer to movement of carp into Lake Michigan and the rest of the Great Lakes?

General PEABODY. I think your question gets to the heart of the matter, sir.

If I could get the topography slide up, not the structural operations. Great. Thank you.

Sir, as Mr. Davis indicated in his testimony, this is relatively flat topography. If you look, it is a little bit hard to see on the slide, but there are some green dots along the edge of Lake Michigan in the Chicago area. Starting from north to south, you have the Wilmette Pumping Station. And then in the heart of Chicago, you have the Chicago locks and controlling works. And then a little bit further to the south of that, near the bottom of the dark yellow aspect of the slide, is the O'Brien Lock, a little bit inland, about eight miles inland from the lake. Those are the only potential physical obstacles, for aquatic species to move between Lake Michigan and the Chicago Area Waterway System above the fish barrier.

If you will notice, to the south and east of the O'Brien Lock and Dam, there are two waterways—and it appears there are three egress points into Lake Michigan; there are actually only two: the Grand Calumet River to the north and the Little Calumet River to the south. You are familiar with them, sir, I know. And both of those egress into Lake Michigan through the Indiana and the Burns Harbor, respectively.

So one of the challenges that we have is, in addition to the authority that the Corps has to operate those locks and dams for purposes of navigation—and there are some other associated purposes, such as water flow management and flood damage reduction—if we were to close the locks, this would need to be shown to be effective as impediments to Asian carp migration.

We are actively studying—I want to emphasize this—actively studying whether or not we should close the locks, but we need a vast amount of information to assess impacts and consequences on both sides of the equation; not just impacts and consequences to the Great Lakes but the impacts and consequences to commerce, transportation, flood damage reduction, and so forth in the Chicago

area system. This is a very complex issue. There are orders of magnitude impacts, second- and perhaps third-order impacts, that we cannot yet understand until we complete our studies, and we are going forward with our studies to do that.

In the meantime, we are actively studying this concept of modified lock operations, which would envision operating the locks differently than we do today. This concept is just an idea that we are still considering. I hope to give Secretary Darcy a recommendation early next month, about a month from now. But the concept would be, instead of just operating the locks so whenever traffic shows up we allow it through, we could do a variety of things to impede, not prevent, not stop, but impede Asian carp migration through those structures.

They could include such things as maximizing traffic through the locks so we reduce the total number of openings and closings of the lock gates. They could include taking actions in areas near the locks that would attack the Asian carp populations that might be present so that, when we do have periods where the locks are open for navigation traffic, there is a lower or reduced likelihood that the Asian carp might pass through. And they could include putting screens during flooding events in the locks, as well as the sluice gates, which need to be open for reverse flows to prevent really massive flooding in the Chicagoland area.

The bottom line is, whatever measures we take, they need to be effective. And we definitely need to take actions along the Little Cal and the Grand Calumet Rivers in association with any actions we are considering to take along the locks.

Mr. OBERSTAR. Thank you for that thorough and complex response. I appreciate it very much. The question is a hard one. It has to be asked, and I asked it in the context that I did because I think it is very instructive for us to learn from the experience of the lower Mississippi River.

And I appreciate very much, also, your attention, attentiveness to the consequences for navigation or shipping for commerce as well as the environmental importance of this. We cannot have one instead of the other or say they cancel each other out. I think we have to do this in the context of the way you presented it. I think that is well thought out.

Mr. Petri?

Mr. PETRI. No, I am fine.

Mr. OBERSTAR. Ms. Edwards?

Ms. EDWARDS. Thank you, Mr. Chairman.

Just a couple of questions for you, Professor Lodge and Dr. Hansen, about biology.

Can you tell me, Professor Lodge, what a positive test for Asian carp DNA means on the likelihood that a live carp has passed by the location where the sample is taken? And I think that there is some variation in terms of how long that sample lasts to show presence.

And, also, if you could answer for me whether there is some entity that coordinates research about the biology of the carp, its habitat, et cetera, and who pulls all that together.

Mr. LODGE. Thank you, Congresswoman Edwards.

Your first question, what does a positive DNA result mean? With a very high probability, it means that a live carp has been or is close by or close upstream within the last 6 to 48 hours. That is what I believe it means.

While it is possible that—I mean, you can imagine a number of scenarios by which DNA might be present without a live carp being present, while there are possibilities, they are not very plausible. And they are certainly insufficient to explain the overall repeated spatial pattern that I showed you in the canal. So when we have been back to places three or four times, the result is the same.

So, while there are other possibilities, they are not a plausible explanation for the overall pattern. So the short answer is, it means there is a live fish close by, and it has been there in the not-very-distant past.

Your second question is about——

Ms. EDWARDS. About coordination of research.

Mr. LODGE. I think there is no entity. There may be other panel members who can speak to that better. I think perhaps the framework document and the plans that were put out yesterday may be the closest thing that exists to a coordinated plan of study of Asian carps. But others may have a more informed answer than mine.

Ms. EDWARDS. If not, I mean, I guess my question goes to whether, for example, we know enough about the reproductive cycle to begin to interfere with that? And what research is available, for example, that might tell us whether we could perhaps pretreat vessels coming through so that it would potentially kill eggs passing through? Things like that.

Because, I mean, there must be some way that, either through your university research or other research, that the participating States are able to identify the need-to-know list and then check that off to get to some of the prevention efforts that I think, Dr. Hansen, in your testimony, you indicated a need to focus more on that prevention. And I don't know how you do that without identifying and coordinating research.

Mr. HANSEN. I agree with Dr. Lodge, I don't think any single entity coordinates all the research. But the thing to remember about these animals is that they have been fairly well studied in their native range, so the overall biological attributes that they have are fairly well understood.

And that information was essentially assembled in the two risk analyses that were done, one in the U.S. by the people that Dr. Lodge mentioned and there was a companion or similar piece done in Canada. So we know quite a bit about their biology.

And the studies that have been done on the Illinois River by researchers in Illinois basically converge on the same sort of information. Hence, we know that they have a fundamental ability to grow fast, get large, have lots of eggs. We know approximately when you would expect them to spawn, what they look for.

And those elements of their biology were used in the risk analysis to essentially say, we think we know where they will live, like these near-shore waters or shallower, cooler habitats, and they are probably not going to like the really open, colder waters. They would likely want to spawn in streams. So we would find them in those areas.

I think many of the things we would want to know from a control perspective we probably already know. The question is, what tools do we have to bring to bear on some of those control methods?

We studied the lamprey very hard to find a very specific toxicant that would target its juveniles when they were living in streams. And we got maybe lucky or not, but we have found a chemical that has worked and is the primary thing that we fire against them. We don't have that same sort of technology sitting there waiting for the Asian carp, so we would have to think about this more broadly and employ some of the things we can do, like catch them. We now apparently can detect them at fairly low numbers using Dr. Lodge's technology, but what do we do to control them?

That is what I meant about we don't have a lot that we have in the gun right now that we could shoot that specifically aims at these species. The things we do know are more general, like rotenone, like fishing, and those sorts of things.

Ms. EDWARDS. But rotenone just kills everything.

Mr. HANSEN. Oh, absolutely. It is not specific like the chemical we deploy for lampreys. And that is obviously what the best thing would be. If we had a chemical you could throw into the river and it only killed carp, that would be great.

Ms. EDWARDS. Thank you.

Mr. OBERSTAR. Yes, this idea of biological control, I remember at the height of the zebra mussel concern, some researcher said, ″Oh, we have found a diving duck in the Black Sea that eats the zebra mussels, and maybe we could bring that over here.″ My first question was, who is its control? There are so many of these control mechanisms in species that we have brought in to control a runaway creature or plant that then become runaway on their own. Whoever or whatever that creature is, let's not bring it in, because they will become a menace on its own.

Well, before I close, I want to ask unanimous consent for Members who were not able to be present today to submit questions in writing to members of the panel and for you to submit responses for the record.

And, secondly, I will ask staff to work with the stenographer team to produce the transcript as soon as possible so we can distribute it to Members who were not able to be here, for them to review and upon which to ask for their questions.

But now we have been firing at you. Do you have any questions for each other or for us? It is not like church, you know. You don't have to pray about this.

Mr. Wilkins?

Mr. WILKINS. Yes, Mr. Chairman, I would just come back to underscore one point around the sense of urgency.

And the Federal framework currently in place, I mean, it has promising measures that we all support. And I think that if it comes down to looking at modified lock schedules or something of this sort, we would highly recommend that we exhaust every other option to stop the carp or impede the carp before we look at the effectiveness of closing the locks, and certainly take time to understand that.

We work closely with the Corps of Engineers and with the Coast Guard. AWO has had a long history of that type of collaboration

and working-togetherness, and we think we can apply that to this measure, as well.

Mr. OBERSTAR. All right. No question about the AWO and their participation and their cooperation. It is a great organization, and they have a very balanced view on matters of this kind, and I appreciate it.

Mr. Brammeier?

Mr. BRAMMEIER. Thank you, Mr. Chairman.

I just wanted to draw some attention to something you noted earlier, which is that these next few years are a tremendous opportunity. You pointed out that we have a Great Lakes President who understands what the lakes means to the region. This is a great time to be thinking about thinking big and what we need to do, not just in the short term to stop these fish from getting in tomorrow, but how we can make changes for the long term so we don't have to be here 5 or 10 years from now, having this same discussion.

So now is certainly the time, and this is a tremendous opportunity to think big about solving this problem.

Mr. OBERSTAR. Thank you. And the Chair intends to seize this opportunity and pursue it, as we did in the Water Resources Development Act and in the Coast Guard authorization bill that has passed the House twice and is languishing over in the place I affectionately called the black hole, the other body. It is a galactic black hole. You know what happens in outer space? Stars become bigger and bigger, and finally they condense and collapse upon themselves, becoming enormous powers and suck everything else into it, from which not even light can escape. That is what is happening in the other body.

None of you need comment, but that is the way I feel about them. This Committee has sent them a lot of legislative authority; they just haven't acted on it. So we are hoping that maybe some light will escape from the other body and we will see something happen.

But we have put in place a framework within which EPA for ballast water will set the standard and the U.S. Coast Guard will be the implementing agency, drawing upon all other authorities and resources from the Great Lakes and the universities, the intellectual capabilities that we have. And we had in place a protocol and an agreement with one of the lake carriers on the Great Lakes and Great Lakes Environmental Research Laboratory to test various methods of treating ballast water, both for the lakers and for the salties. And something fell apart. We just couldn't get it together at the right time. Actually, we needed further authority in the Coast Guard bill that we passed; the Senate never acted on it.

Those are the kinds of missed opportunities. Let's not miss that opportunity here. So we will convene this group again in May in the understanding that this is a continuing effort. Today's hearing is not definitive.

Your work is much appreciated. I know that my colleagues on the Committee were very much looking forward to this testimony, to this day. And I know that Mr. Petri will continue to support the effort and lead, as he has done, in cooperation with Mr. Ehlers, Mrs. Miller, and others on our committee.

Mr. Petri, any final comment?

Mr. PETRI. No, just thank you, and thank all of you for the time that you have put in preparing this testimony. And we hope you make it safely back whence you came.

Mr. OBERSTAR. Yes, we wish you all a safe journey home, despite the Washington snows.

The Committee is adjourned.

[Whereupon, at 4:58 p.m., the Subcommittee was adjourned.]

Hon. John Boozman
Hearing on
"Asian Carp and the Great Lakes"
February 9, 2010

- Thank you Madam Chairwoman. I want to welcome all the witnesses to today's hearing and I look forward to their testimony. I want to commend Dr. Ehlers and Mrs. Miller for their years of work on behalf of the Great Lakes and the people who depend on this great natural resource.

- The Great Lakes are a vital resource for both the United States and Canada. The Great Lakes system provides:

    - a waterway to move goods;
    - water supply for drinking, industrial, and agricultural purposes;
    - commercial and recreational fisheries;
    - a source of hydroelectric power; and,
    - swimming and other recreational activities.

- The increased presence of invasive plant and animal species is a major environmental problem affecting the Great Lakes region, as well as other parts of our country.

- In the 1950s, the sea lamprey was introduced unintentionally into the Lakes and decimated trout

fisheries. Today, there are at least 25 major non-native species of fish in the Great Lakes.

- Zebra mussels damage natural resources, and invade and clog water intake pipes, costing water and electric generating utilities hundreds of million dollars a year in prevention and remediation efforts.

- In addition, non-native plant species are displacing native aquatic vegetation.

- There are more than 180 non-native aquatic species in the Great Lakes, many of which are invasive.

- It is said a new aquatic invasive species is discovered every 6 to 8 months on average in the Great Lakes, as they are introduced through ship hulls and ballast water discharges, canals and waterways, recreational vessels, and trade of live organisms.

- Today the Subcommittee is reviewing the issue of the Asian carp and its dangerous proximity to the Great Lakes.

- Once an exotic species establishes itself, it is almost impossible to eradicate and usually difficult to prevent from moving throughout the nation. We are finding that reducing the introduction and spread of aquatic invasive species is a difficult problem to solve.

- Invasive species in the Great Lakes are major stresses that are pushing the Great Lakes ecosystem towards potentially irreversible changes.

- Preventing and controlling invasions of nonindigenous species, like the Asian carp, in the Great Lakes and elsewhere is critical.

- I am pleased to see the Army Corps of Engineers has been called to testify. Over the last several years the Corps has carried out the only projects on the federal level that are designed to halt the Asian carp from entering the Great Lakes.

- I look forward to hearing from the other witnesses about how the various Federal, state, local, and nongovernmental entities plan to deal with the problem of the Asian carp and the Great Lakes.

Congressman Robert E. Latta
Subcommittee on Water Resources & Environment
Hearing on the "Asian Carp and the Great Lakes" – Submitted for the Record
February 9, 2010

Good afternoon. Chairwoman Johnson and Ranking Member Boozman:

There is a serious threat to the Great Lakes from two main species of carp, the bighead carp and the silver carp, commonly referred to as Asian carp. While the species has been around for several decades now, they are coming extremely close to entering Lake Erie and causing insurmountable damage. These invasive species are harmful to the health of the ecosystem of all of the Great Lakes.

Our Great Lakes contain roughly 20 percent of the world's freshwater, where the fishing industry is valued at roughly $7 billion a year. Keeping Asian Carp out of our Great Lakes is imperative to not only the fishing industry's economic value, but to the safety of our anglers and boaters. Asian Carp are not direct predators as they eat plankton, which if they are successful in gaining access into the Great Lakes and start breeding, will destroy the ecosystem and will starve native fish such as walleye and trout.

Originally farmed in rice paddies in China and other parts of Asia, Asian Carp were brought to the United States in the 1970's to help catfish farmers eat algae in their ponds. As time has progressed, Asian Carp have slowly made their

way north to the waters surrounding the Great Lakes. These fish are known as invasive species and grow very quickly, and rapidly reproduce. They have been known to grow up to 100 lbs. and 3 to 5 feet in length.

While there have been efforts by the Corps of Engineers to contain the Asian Carp, there is a real possibility that these fish will enter Lake Erie. It is my understanding that the Asian carp could enter Lake Michigan through the Chicago Sanitary Ship Canal and subsequently enter Lake Erie. Lake Erie has more fish than the other four Great Lakes combined, and because of this it is also the most biologically productive. These Asian carp will be extremely detrimental to the recreational and economic benefits that the Lake provides Ohio. In these tough economic times, we must prevent any further impediments to Ohio's economy.

As a sportsman, I know firsthand the benefits that fishing in Lake Erie brings to Ohio. Due to the devastation that Asian carp cause by dominating all other fish for food and habit, other fish will not be able to survive. Lake Erie is the Walleye capital of the world. In addition, perch is also an significant fish in the lake. In Ohio, 35% of the perch quota is given to the commercial fishing industry. In total, each year, over $300 million is spent in the Ohio Lake Erie basin on fishing. There is a total of $1 billion spent in the Lake Erie watershed as a whole. If Asian carp invade Lake Erie, it will be absolutely devastating. In addition to the fishing industry specifically, there are the elements of tourism and travel related to boating and sportsmen

activities which brings Ohio $10.75 billion in revenue annually and supports more than 250,000 jobs. Ohio simply cannot take this negative economic impact if these Asian carp are successful in penetrating into Lake Erie.

There are a few areas in which I have questions that I would like to discuss with the panelists. Specifically, many have called for the temporary closure of the locks leading to Lake Michigan. The recent U.S. Supreme Court ruling ruled in favor of Illinois officials, and the locks will remain open. I am interested in the cost benefit analysis of keeping the locks open versus temporarily closing the locks until there is a better plan for handling the Asian carp.

Secondly, the Asian carp have a capability of manifesting itself via a ballast water exchange. The issue of ballast water needs to be examined and how to prevent this exchange from occurring with this instance and with other invasive species.

Please accept for the official record the submittal of testimony by Kristy Meyer, Director of Agricultural & Clean Water Programs, Ohio Environmental Council and Rick Graham, President of the Izaak Walton League of America – Ohio Division.

I look forward to continuing to work with the Water Resources and Environment Subcommittee, as well as the full Committee on Transportation & Infrastructure, on this very important issue of containing Asian Carp, and

specifically preventing them from reaching Lake Erie. Thank you and I yield back my time.

Testimony of Joel Brammeier, President and CEO, Alliance for the Great Lakes

Permanent Prevention of Asian Carp in the Great Lakes

Subcommittee on Water Resources and Environment
Committee on Transportation and Infrastructure
Hon. Eddie Bernice Johnson, Chairwoman
Hon. John Boozman, Ranking Member

February 9, 2010

Introduction

Madam Chair, thank you for inviting me to appear before this subcommittee to discuss the urgent threat posed to the Great Lakes by Asian carp. My name is Joel Brammeier, and I am the president and CEO of the Alliance for the Great Lakes. Formed in 1970, the Alliance is the oldest independent citizens' Great Lakes protection organization in North America. I am also a member of the steering committee of the Healing Our Waters – Great Lakes Coalition.

I and dozens of other dedicated citizens and experts have worked for many years in an advisory capacity to the U.S. Army Corps of Engineers and Illinois Department of Natural Resources to support the protection of the Great Lakes from invasion by bighead and silver carp. As a member of the Dispersal Barrier Advisory Panel,[1] I have offered my voice for nearly the last decade to a team of professionals that has provided sound advice, helpful critique and robust discussion among businesses, non-governmental organizations and agencies at all levels of government with a single task at hand: to stop Asian carp from establishing in the Great Lakes.

We can accomplish that task. But only if every decision we make today, tomorrow and next week is dedicated to one purpose: the permanent prevention of new invasive species movement into the Great Lakes via the Chicago Waterway System (CWS).

Creating an Artificial Connection

Behind nearly every invasive species in the Great Lakes are the hands of human intervention, and Asian carp are no different. The Great Lakes are connected to multiple other saline and fresh water bodies via artificial canals constructed during the 19th and 20th century. The Chicago

[1] http://seagrant.wisc.edu/AIS/Default.aspx?tabid=393.

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Sanitary and Ship Canal (CSSC) and Portage Canal in Wisconsin connect Lake Michigan to the Illinois River, while multiple canals in Ohio connect Lake Erie to the Ohio River. The various canals of the New York State Canal System (NYSCS) and the Welland Canal not only link Lake Erie to the Hudson River and Atlantic Ocean, but also provide a western route from Lake Ontario to Lake Erie that is otherwise naturally blocked by Niagara Falls. Zebra mussels and round gobies have spread from the Great Lakes to the Mississippi River via the CSSC, while blueback herring, white perch and sea lamprey have all likely invaded the upper Great Lakes via the NYSCS.

In Chicago, the motivation for creating the artificial connection to the Mississippi was protection of the city's drinking water. Between 1860 and 1900, the North and South Branches of the Chicago River became a focus of industrial activity, including meat packing, slaughterhouses, distilleries and lumber mills. As the city grew rapidly, untreated sewage from homes and industries flowed to the rivers and into Lake Michigan, the primary source of drinking water for Chicago. The rivers became open sewers hosting bacteria and viruses causing typhoid, cholera, dysentery and other waterborne diseases.

In response, the Illinois General Assembly adopted the Sanitary District of Chicago Enabling Act in 1889. The legislation led to the creation of the Sanitary District of Chicago, the predecessor of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC). Soon after, its board of trustees, subscribing to the popular 19th century belief that "dilution is the solution to pollution," reversed the flows of the North and South Branches of the Chicago Rivers and the Calumet River away from Lake Michigan, and diverted clean lake and polluted river water downstream toward the Mississippi River.

By 1900, the man-made CSSC connected the South Branch of the Chicago River to the Des Plaines River. The artificial North Shore and Calumet-Sag Channels were completed in 1910 and 1922, respectively. Chicago's raw sewage, industrial wastes, and urban storm water were now directed away from the Great Lakes into the Des Plaines, Illinois, and Mississippi Rivers, with the unintended consequence of binding the ecology of the Great Lakes and Mississippi River watersheds and leading a potentially devastating fish across the threshold of Lake Michigan.

The Chicago Waterway System

The highly engineered combination of natural rivers and artificial canals continues to serve its intended 19th century purpose of disposing of wastewater, but 120 years of use have added layers of complexity. Many of the natural portions of the system have been channelized with attendant loss of natural habitats. The state of Illinois is authorized by the U.S. Supreme Court to stream up to 2.1 billion gallons of Great Lakes water per day – much of it as treated wastewater - past the channel walls of steel and limestone. The CWS is home to a recreational boating network with 35 – 70,000 recreational vessels moving between Lake Michigan and the inland waterways each year. Dozens of boat operators make their living moving tourists between downtown Chicago and Lake Michigan. The system supports a steady, although not

growing, annual traffic of 20-25 million tons of bulk commodities such as coal, petroleum products and construction materials.[2]

In short, the Chicago metropolitan area has built itself with pride on the backbone of a 19th century engineering marvel bridging two great watersheds. This connection between the waterways and Lake Michigan was once seen as critical to opening the continent to trade and to feed in cool, clean Lake Michigan water to keep the rivers from reverting to open sewers. But the stark reality that this complex system created an aquatic superhighway for the jumbo-sized Asian carp and other invasive species to travel between Lake Michigan and Mississippi watersheds calls the question of whether this connection is as critical today as it seemed 10, 50 or 120 years ago.

The Level of Threat

When deciding whether to permit water pollution, regulators consider the ability of the environment to absorb the pollution against the potential impact on the health of humans, fish and wildlife. Conventional pollution permits take a "damage control" approach; there are dozens of pollutants that the Great Lakes tolerate in small amounts. Other more pernicious contaminants, such as mercury, are targeted for reduction and even elimination.

For some pollutants, however, the rules of damage control do not hold. Zero tolerance is the only appropriate response to the biological pollution of invasive species. There is no diluting their impacts to some unnoticed background level. By definition, these organisms establish in an ecosystem by outmuscling native species for food and reproductive opportunities. Once established, the chances of successful control are minimal.

Great Lakes fishery experts before this subcommittee today can speak thoroughly to the threat posed to the Great Lakes by Asian carp. I will summarize my perspective with three simple facts:

- In the Mississippi River basin where low-value Asian carp have invaded, they have established in great numbers and outcompeted native fish (Chapman 2003).
- U.S. (Kolar et al 2005) and Canadian (Mandrak and Cudmore 2004) risk assessments indicate that the Great Lakes have multiple carp-friendly habitats, including Green Bay, west Michigan, Saginaw Bay, Lake St. Clair, and western Lake Erie. These are some of the most popular boating and fishing spots in the region.

[2] All data on navigation are published by the U.S. Army Corps of Engineers Waterborne Commerce Statistics Center. Data were extracted and organized from Corps databases via a proprietary program written by Scudder Mackey of Habitat Solutions, Inc. and are available upon request. Original databases are available for public download at http://www.iwr.usace.army.mil/ndc/wcsc/wcsc.htm.

- The industries most at risk from an Asian carp invasion – sportfishing and recreational boating – contribute $7 billion and $16 billion (Great Lakes Commission 2007) annually, respectively, to the economies of the Great Lakes states.

Compounding these risks is the critical fact that, based on expert judgment that the eDNA monitoring method indicates live fish presence (Lodge 2009), carp are very likely already in the waters of Lake Michigan. This evidence demands that federal agencies immediately set a goal of beating back carp populations to zero as far from Lake Michigan as possible before they are able to establish in the Great Lakes

Ecological Separation

The presence of Asian carp in the Great Lakes and knowledge of the impacts of past invasions creates a strong incentive to act now to permanently protect both the Great Lakes and Mississippi River. Even if existing electrical barriers in the CSSC operate as designed, they will not last forever, nor will they ever achieve guaranteed 100 percent effectiveness. With the passage of time – through human error, an accident, wear and tear, or a natural disaster – the effectiveness of the barriers will be compromised.

The permanent solution is not reliance on technology, but on what we call "ecological separation," or no movement of live organisms between the Great Lakes and the Mississippi River via the canals – up to and including permanent physical barriers in the CWS. At first blush, in face of billions of gallons of water and millions of tons of cargo, this simple idea seems audacious.

However, a close look at water flows and navigation patterns suggests otherwise. Sewage treatment upgrades have diminished the need to maintain a connection to Lake Michigan water to maintain river water quality; the volume of these "discretionary diversions" has trended down for the last 20 years and will continue to decrease. Likewise, the need to allow combined sewage to flow into Lake Michigan for flood control has dramatically declined and will continue to do so with the completion of the local "Deep Tunnel" project. Commodity deliveries and loading via barge are confined in bulk to the Chicago Sanitary and Ship Canal and lower portions of the Calumet River, with comparatively little traffic moving through downtown Chicago or into the open waters of Lake Michigan. Barely more than 1,000 recreational boats move through Lockport lock annually. We can no longer afford to assume that 71 miles of canal in a century-old layout are required to get the job done, particularly when the job creates a massive external liability for the Great Lakes.

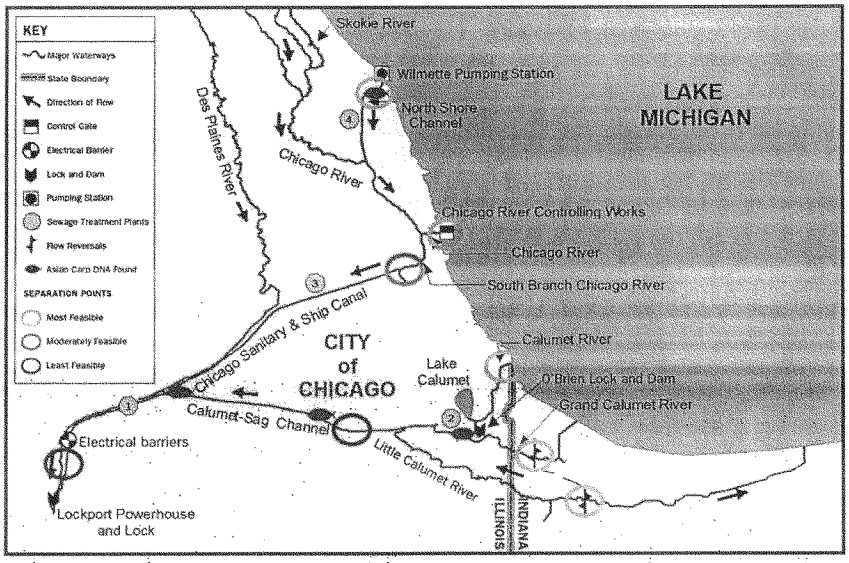

Figure 1: Potential locations of a physical separation of the Great Lakes and Mississippi River, 1/15/2010.

In light of these findings, a feasible separation scenario will:

- Stop all life stages of aquatic organisms moving between the Great Lakes and Mississippi River via the CWS;
- Accommodate the vast majority of commodity traffic within the waterways, as only a fraction of that traffic enters Lake Michigan;
- Provide new methods of moving recreational boaters between the Illinois River and Lake Michigan;
- Anticipate very occasional overflows into Lake Michigan to prevent local flooding, while improving the water quality of the lake and waterways; and
- Serve as a one-time payment for 100 percent effective, permanent protection against invasives.

Separation is not a new concept. In 2003, a local, state and federal interagency group hosted the Chicago Aquatic Invasive Species Summit for the express purpose of setting an agenda "beyond the barriers." This conference of more than 70 experts from around the region and the world agreed that stopping water movement between the Great Lakes and Mississippi River was the only way to interrupt the stream of live organisms (City of Chicago 2005).

Two key steps were taken to follow up on this recommendation. In recognition that the separation effort was at the beginning of a long road of research and evaluation, the Great

Lakes Fishery Commission and Great Lakes Fishery Trust supported an initial "prefeasibility" analysis of separation. This work, authored by a team including myself, Scudder Mackey (University of Windsor/Habitat Solutions, Inc.) and Irwin Polls (Ecological Monitoring and Assessment) identified several locations on the CWS that should be targeted for a full feasibility analysis (Figure 1). Our research reinforced the need to pursue a policy of ecosystem separation: in a series of interviews with stakeholders from around the Great Lakes in the U.S. and Canada, including decision-makers at all levels of government, it became clear that a goal of 100% effectiveness in stopping species movement was critical to the effort.

Stakeholders also recognized that the electrical barriers alone were unlikely to provide the permanent protection desired for the lakes. Knowing that any changes to the waterway would require significant federal investment and oversight, the Alliance and many others sought the necessary authorization for the U.S. Army Corps of Engineers to perform a Great Lakes and Mississippi River Interbasin Transfer Study, which became part of the *Water Resources Development Act of 2007*. While we are encouraged that the Corps has committed to developing an environmental impact statement for this work, we are concerned that few advance steps have been taken to tap the substantial expertise on the issue outside of federal agencies nearly two years after the authorization passed. We cannot afford to miss an opportunity to bring the best minds to bear on solving this problem.

Recommendations

We do not yet have a single permanent solution in hand. Each choice we make today is an opportunity to insure the Great Lakes against an Asian carp invasion. The smarter the choice, the longer the insurance policy extends and the more time we have to find and build a permanent solution. The policy and management actions below[3] are our best opportunity to keep the few carp already in Lake Michigan from becoming a permanent problem for all of the lakes:

Policy Needs

1. Federal and state agencies must immediately describe a short-term contingency plan with clear and firm triggers for action. All actions should flow from a singular goal of beating back existing populations of carp to zero as far from Lake Michigan as possible.

2. The U.S. Army Corps of Engineers must expedite the Chicago portion, including all National Environmental Policy Act (NEPA) requirements, of the Great Lakes and Mississippi River Interbasin Transfer Study so that it is completed by September 30, 2011 instead of 2014 as is currently expected. Implementation should begin in fiscal year 2012.

[3] Adapted from recommendations developed by the Healing Our Waters-Great Lakes Coalition, available from Chad Lord, Water Program Director, National Parks Conservation Association.

3. Provide clear agency authority to implement emergency actions through a public Memorandum of Understanding between agencies or some other public mechanism, with U.S. EPA in a lead role given its leadership in coordinating government action through the Great Lakes Interagency Task Force.

4. The Corps must complete the Dispersal Barrier Efficacy Study by August 2010. Immediately begin implementation of the flood control measures recommended in the Study's first interim report for completion by fall 2010.

Management Needs

1. Locks and sluice gates leading to Lake Michigan must be operated and managed in a way that reduces further transfer of Asian carp into Lake Michigan, including temporary closure if appropriate. Temporary changes in lock operations can slow movement of additional Asian carp toward Lake Michigan. Contingency plans should address needs for flood control and emergency response.

2. Operate the Dispersal Barrier System at optimal power and frequency and expedite both the completion of Barrier IIB and upgrade of Barrier I by the end of summer 2010.

3. Immediately install interim barriers in the Grand Calumet and Little Calumet Rivers, as necessary, to prevent Asian carp from migrating to Lake Michigan through Indiana.

4. Eliminate any risk of Asian carp bypassing the Dispersal Barrier System by waterway traffic, including the strict enforcement of the Coast Guard's prohibition of ballast and bilge water transfers through the dispersal barriers.

5. Expand eDNA testing and consider eDNA results as actionable indicators of live Asian carp presence.

I encourage this subcommittee to work with the administration to ensure the fulfillment of these needs as soon as possible.

Conclusion

The false choice between Great Lakes protection and a freeflowing economy has taken center stage in the public debate about the urgent need to protect the Great Lakes from Asian carp invasion. Running a close second is the contention that threat to property, life and limb by flooding and disease is a precondition of changing how we use the Chicago Waterway System. This does a disservice to the reality on the ground: that the Great Lakes and Mississippi River are being held hostage by outmoded infrastructure and dated assumptions that how business gets done is the way business has to be done.

Permanent Prevention of Asian Carp in the Great Lakes
Statement of Joel Brammeier

A rare opportunity stands before two great waters of the United States today. We understand the damage that has already occurred. We can predict the irreparable harm to the Great Lakes if we fail. We have the tools and knowledge in hand to stop the problem before it starts. We cannot accept the outdated zero-sum thinking of industry or environment, clean water or invasive species. The original engineering feat of the Chicago Waterway System protected the Great Lakes, but transferred costs to others – costs that were not entirely apparent in 1890 but are a hole in the wallet today. Those with the vision to see and will to transform understand that this backbone of the largest Great Lakes city must either stretch and strengthen with time, or collapse under its own weight. I look forward to working with this subcommittee and everyone engaged on this matter to create a sustainable legacy for the CWS that outlasts both me and the original project. Madam Chair, thank you for holding this hearing and I look forward to assisting on any actions this subcommittee can take to support this effort.

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Ohio Environmental Council

[UNLEASHING THE POWER OF GREEN]

Written Testimony of Kristy Meyer, Director of Agricultural & Clean Water Programs, Ohio Environmental Council, and Rick Graham, President of the Izaak Walton League of America - Ohio Division

Before the U.S. House of Representatives Committee on Transportation & Infrastructure, Subcommittee on Water Resources and Environment

Honorable Eddie Bernice Johnson, Chair; Honorable Donna F. Edwards, Vice Chair; and Honorable John Boozman, Ranking Member

February 9, 2010

Thank you, Madame Chairwoman, Madame Vice Chair, and Mr. Ranking Member. We appreciate the opportunity to submit testimony to this subcommittee to discuss the threat that bighead and silver carp (referred to as Asian carp from here out) pose to the Great Lakes and why we need to take immediate action to prevent Asian carp from reaching Lake Erie. I want to thank you for this Committee's work in support of our Great Lakes. You are to be commended for your continued commitment to the Great Lakes, which are not only an amazing fresh water resource for our region, but our nation and the world.

Right now, Asian carp are poised to enter Lake Michigan through the Chicago Sanitary Ship Canal and devastate the recreational and economic value the Great Lakes provide Ohio. I want to give you a clear picture of what this would look like for Ohioans.

Asian carp are voracious feeders, requiring large amounts of plankton, making Lake Erie ideal habitat for Asian carp. Lake Erie, the shallowest and warmest of all the Great Lakes, is the most biologically productive Great Lake. It produces more fish for human consumption than all of the other lakes combined.

Asian carp require a minimum of 100 km of undammed river length to reproduce and prefer turbid waters. Several scientists have noted that the timing of spawning is more related to turbidity increase than hydrology. This may be a defense mechanism because the eggs and larvae are defenseless to sight-feeding predators while in the drift. In Ohio, the Maumee, Black, Vermillion, Huron, and Portagerivers meet the required criteria for Asian carp reproduction. All of these conditions suggest that Asian carp would be able to grow, live, and reproduce in the Lake Erie watershed.

Asian carp can grow to more than 4 feet long and weigh up to 100 pounds, and they jump several feet out of the water when disturbed by a boat motor. Imagine a 100-pound fish leaping out of the water and smacking into someone. In the Mississippi River, adults have sustained broken collar bones, noses, and teeth, as well as been knocked unconscious. Think about what would happen to a child hit by one of these fish.

Asian carp can dominate aquatic ecosystems by out-competing native fish for food and habitat, like perch, bass, and walleye. As they feed near the base of the food chain, they can cause an entire system to become depauperate. This is particularly concerning because Lake Erie is the walleye capital of the world and supports one of the biggest freshwater commercial fisheries in the world. In Ohio, about 35% of our perch quota is given to the commercial fishing industry. Each year more than $300 million is spent in the Ohio Lake Erie basin - $1 billion in the whole Lake Erie watershed - on fishing. If Asian carp invade the Great Lakes, they could also devastate this $1 billion fishing industry and permanently alter how recreational boaters, anglers, wildlife watchers, and tourists use and enjoy Lake Erie and its many tributaries. As a result of tourism and travel from boaters, anglers, and wildlife watchers Ohio gains $10.75 billion in revenue annually and supports more than a quarter of a million jobs. The impact of the Asian carp would be irreversible to the people, wildlife, and economies that rely upon Lake Erie.

We know from experience the devastating impacts of invasive species on the Great Lakes. Too rarely do we have the opportunity to prevent the damage of invasion before it begins, yet such an opportunity is now on our doorstep. There are no second chances. Future actions based on good science-based information are crucial to the health of the Great Lakes ecosystem and our economy.

First, temporary lock closure would be the best solution, but until a decision to temporarily close the locks is made, the locks leading to Lake Michigan must be operated and managed in a way that reduces further transfer of Asian carp into Lake Michigan. We acknowledge that this may cause short-term disruptions in navigation in the canal system. However, a variety of temporary changes in lock operations can slow future movement of additional Asian carp toward Lake Michigan. We recognize that there is a legitimate concern about flooding and emergency response in the City of Chicago. Planning for a flood event can be anticipated and delt with using a contingency plan and lock operations for emergency responders can also be addressed in a similar fashion.

The Ohio Environmental Council and the Izaak Walton League of America – Ohio Division supports all of the recommendations made by the Healing Our Waters – Great Lakes Coalition in their January 28, 2010 letter to Cameron Davis, Senior Adviser to the Administrator at the EPA. In addition to temporary changes in lock operations, five of the eleven other recommendations are of highest priority for immediate action.

1. Complete the Dispersal Barrier Efficacy Study by August. Also, immediately begin implementation of the measures recommended in the Study's first interim report. Building barriers between the Des Plaines River and the Chicago Sanitary and Ship Canal and the Calumet-Sag Channel will help eliminate the risk that Asian carp will find their way into the Chicago Waterway System during flooding events. Construction of these barriers should be completed by fall 2010.

2. Operate the Dispersal Barrier System at optimal power and frequency and expedite both the completion of Barrier IIB by the end of this summer and the upgrade of Barrier I.

3. Until all Asian carp that have entered the Chicago Waterway System are found and eradicated, agencies must identify and take actions that interrupt their spawning behavior. These actions as outlined in the plan should be applied wherever positive eDNA tests are detected during spring and summer spawning.

4. Close the sluice gates at the Wilmette Pumping Station and immediately install interim barriers in the Grand Calumet and Little Calumet Rivers, as necessary, to prevent Asian carp from migrating to Lake Michigan.

5. Expedite the Chicago portion, including all National Environmental Policy Act (NEPA) requirements, of the Great Lakes and Mississippi River Interbasin Transfer Study so that it is completed by 2011 instead of 2014 as is currently expected. Although we support the study's basin-wide perspective, the crisis in the Chicago Waterway System shows that the Chicago area should be prioritized so long-term solutions, like ecological separation, can be identified and implementation begun expeditiously.

Thank you for the opportunity to present this testimony to the subcommittee. As you deliberate, please consider the important impacts that Asian carp, if allowed access to the Great Lakes, would have on our natural resources, economy, and quality of life.

If you would like additional information for the record, please contact me at the OEC, by phone at (614) 487-7506, mobile phone at (614) 638-8948, or email at Kristy@TheOEC.org.

Testimony of
Cameron Davis
Senior Advisor to the Administrator
U.S. Environmental Protection Agency
Before the
U.S. House Transportation & Infrastructure Committee
Water Resources & Environment Subcommittee

Tuesday, February 9, 2010

Chairwoman Johnson and members of the subcommittee, on behalf of U.S. Environmental Protection Agency Administrator Jackson, thank you for the opportunity to provide the agency's perspective on efforts to prevent the establishment of Asian carp in the Great Lakes.

The administration continues to make restoration and protection of the Great Lakes a national priority as evidenced by President Obama's, significant investment in the ecosystem under his Great Lakes Restoration Initiative (Initiative).

EPA understands the extreme level of concern that the public feels for the ecosystem, their safety while recreating, and for their jobs. We also have an urgent need to keep Asian carp from becoming established in the Great Lakes. As we move forward, we are working to keep Asian carp from becoming established in Lake Michigan. But to do that will require a coordinated, cooperative approach.

I will address EPA's role in efforts in the recent past and multi-stakeholder plans for moving forward.

EPA's Role

First, EPA is tasked with coordinating federal Great Lakes protection and restoration policies and efforts, under Clean Water Act Section 118 and Executive Order 13340. EPA has been doing this and will facilitate the integration of efforts by participating agencies and stakeholders. One of the best weapons we have against Asian carp is a coordinated, cooperative approach through which each agency remains accountable for the work under its authorities, in order to ensure the most effective efforts possible. We will fail if we inhibit such accountability and integration.

This team approach has been successful and will continue to be successful. Specifically, it worked this past December, when EPA helped coordinate an impressive multi-jurisdictional team with Illinois Department of Natural Resources to undertake a "rapid response" action. The action was needed to ensure Asian carp did not move past the U.S. Army Corps of Engineers' (Corps) electric barriers designed to prevent Asian carp migration through the Chicago Sanitary and Ship Canal. Federal, Canadian, municipal, provincial, binational and state agencies – all of whom provided people, funding or equipment – contributed to an effort that, by all accounts, was highly successful despite numerous obstacles. This team approach also led to the draft *Framework* released this week. I will talk more about that in a minute.

The second role that EPA has to play is that of funding. Nearly a year ago, President Obama proposed and, thanks to your help, Congress passed the Great Lakes Restoration Initiative, an unprecedented investment for rehabilitating the nation's largest fresh surface water ecosystem.

EPA is stepping up to use its funding authority under the Initiative to help slow the migration of Asian carp. In December, EPA announced more than $13 million in funding for emergency measures and additional monitoring to be executed by the Corps. This work will address potential bypasses between either the Des Plaines River or the Illinois and Michigan Canal and the Chicago Sanitary Ship Canal during high water events. Currently, we are working with the other federal agencies and Illinois to fast-track additional investments under the Initiative that will address Asian carp populations that may be upstream of the electric barriers.

Next Steps

Using the coordinated team approach, participating agencies have published a draft *Asian Carp Control Strategy Framework* this week. We want to accomplish several things with this *Framework.*

First, we want to provide direction, without restricting ideas and initiatives. One thing we have learned is that the Asian carp situation continues to evolve. Therefore, the *Framework* must unify everyone to generally move in the same direction, while allowing all agencies' responses to adapt as necessary.

Second, we want to establish a multi-tiered defense. This would include structural, chemical, biological, operational and management solutions. We cannot fight biology with engineering alone.

Third, we want to create space for every player – agencies, conservation interests, businesses, the navigation industry, recreational groups and even individuals – to

engage in the effort to keep Asian carp from becoming established in the Great Lakes. In short, this *Framework* belongs to everyone.

The Great Lakes region must unite in this effort. The December rapid response action illustrates just what we can achieve when we work together. The *Framework* is not intended to be final; it is intended to be continually improved. The first step is for everyone to have a hand in its development and its execution.

I want to thank you and the Great Lakes Congressional delegation for your concern and support of control efforts. Administrator Jackson, our partner agencies, the states and delegation all share one overriding imperative: to ensure we leave the Great Lakes better for the next generation than the way in which we inherited them.

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Testimony by Matt Frank, Secretary of the Wisconsin Department of Natural Resources
Before the
U.S. House Transportation and Infrastructure Subcommittee
On Water Resources and Environment
February 9, 2010

Introduction

Chairwoman Johnson and members of the Subcommittee, thank you for the opportunity to appear before you today to discuss our shared efforts aimed at protecting the Great Lakes from aquatic invasive species – in this case Asian Carp. My name is Matt Frank and I am the Secretary of the Wisconsin Department of Natural Resources. I am pleased to submit this testimony on behalf of the WDNR and my boss, Wisconsin Governor Jim Doyle.

I want to start by thanking Representative Oberstar for his leadership on many Great Lakes issues as Chair of the House Transportation and Infrastructure Committee. I also want to applaud Representative Kagen for his leadership as a member of this Subcommittee and I would also like to recognize Representative Petri who serves on the full Committee on Transportation & Infrastructure.

The Great Lakes in Perspective

The Great Lakes are a treasure of international significance. They contain approximately 20% of the world's surface freshwater, and 95% of North America's. One in three Canadians and one in 10 U.S. residents depend on the Great Lakes for their water. More than 35 million U.S. residents and 8 million Canadians live, work, and recreate in, on or by the waters of the Great Lakes Basin.

The Great Lakes regional economy and, indeed, our nation's depend on the Great Lakes. For example, the Great Lakes provide water for 70 percent of U.S. steel production. The Lakes provide transportation for almost 200 million tons of international and interlake cargo—indeed, the lake carriers can tell you how much transport tonnage they lose for each inch of water lost. One-third of all the boats registered in the United States are in the Great Lakes States and boating alone supports over 250,000 jobs. Overall, our

region generates nearly 30% of our nation's gross domestic product and about 60% of all U.S. manufacturing. Water is also used for hydro-power on both sides of the border. All of these different uses depend on the lakes in different ways as a source for clean, abundant fresh water.

Wisconsin boasts a $13 billion tourism industry, much of those dollars are generated thanks to abundant, healthy water resources and in turn a popular recreational fishery.
Wisconsin waters of Lake Michigan and Lake Superior support a popular and thriving sport fishery which includes private anglers, licensed guides and charter captains. There are approximately 235,000 anglers who fish 3.7 million days each year primarily for rainbow, brown and lake trout, chinook and coho salmon, walleye, smallmouth bass, strain muskellunge, and yellow perch. Wisconsin licensed 359 charter captains in 2009. Based on Wisconsin Department of Natural Resources (WDNR) creel surveys of major fisheries in 2008 (not all fisheries are covered), anglers harvested a minimum of 640,000 fish in Lake Michigan and 36,000 fish in Lake Superior.

Sport fishing in Wisconsin waters of Lake Michigan and Lake Superior generated $419 million in economic activity and supported 5,000 jobs in Wisconsin alone, based on a comprehensive survey conducted in 2006 by the United States Fish and Wildlife Service and the Department of the Census and an economic analysis done by the American Sportfishing Association.

Sustainable management and use of the Great Lakes can foster economic growth while protecting our environment. Conversely, we place our water resources, our environment and our economy at risk if we do not manage the Lakes sustainably and do not keep our lakes at healthy levels. Therefore, we must be forward-looking to put in place effective policies that address today's issues and anticipate tomorrow's challenges. These policies should include immediately and effectively tackling our most pressing problems; putting in place an effective long-term water management framework; and, developing a robust research and information-sharing regime to encourage adaptive management.

Restoring and protecting the Great Lakes is a persistent challenge requiring myriad and collaborative actions across all levels of government. Required actions are not easily isolated from one another, nor should they be, and we must look at all of the challenges that face our Great Lakes.

Great Lakes Regional Collaboration Strategy
Highlights the Challenge of Aquatic Invasive Species

When I testified at your field hearing in Green Bay in the spring of 2008, I noted with pride the collective achievement of Great Lakes region in producing the Great Lakes Regional Collaboration (GLRC) Strategy to achieve our shared goals. The framework for the GLRC was based on the nine priorities that the Great Lakes Governors outlined in 2003. The process started with a Presidential Executive Order and included our regional leaders—Governors, Mayors, Members of Congress and Tribal leaders—as well as non-governmental groups and hundreds of committed citizens. The process united us as never before toward our shared goals of protecting and restoring our nation's water belt--the Great Lakes. And, it provided a shared vision of near-term steps that could put us on a path toward a restored water belt--a healthy water belt to power our nation's economy and support a robust environment.

That promise is now being brought to reality thanks to the hard work of those same Great Lakes stakeholders and the welcome federal commitment of significant resources to support the strategy through the Great Lakes Restoration Initiative. As you know, this Initiative was funded by this Congress at the full $475 million requested by President Obama for Federal Fiscal Year 2010.

Aquatic Invasive Species Control Key Strategy

While we are extremely grateful to Congress and to the Administration for your support of the GLRI, it is noteworthy that over $60 million of the $475 million for the Initiative is being expended just to combat aquatic invasive species. Indeed, aquatic invasive species (AIS) continue to pose one of the most serious threats to the Great Lakes ecosystem. An average of one new species is discovered in the Great Lakes ecosystem every eight months, and once present, eradication is often impossible. Prevention is vital to stemming ecosystem impacts from new invasive species. And, because AIS easily transfer from watershed to watershed, it is absolutely critical that comprehensive national action be taken to combat the spread of AIS.

Chicago Ship Canal Just One Vector for Invasives

Yesterday's White House Asian Carp Summit was a very important step in our collective efforts to keep

Asian Carp out of the Great Lakes. Your support of additional federal revenue for this task would also be very appreciated. For several weeks now, we have been raising several issues where swift action is needed. Some of the key issues where we continue to focus our attention and urge concrete action include:

Achieving a total "ecological separation" of the Mississippi-Illinois River System from the Great Lakes drainage.

Background: Like Michigan, Wisconsin is gravely concerned about Asian Carp and other AIS movement into Lake Michigan, but unlike Michigan we also have to live with AIS movement downstream into the Mississippi River system. The current electrical barrier provides no protection against downstream movement, so "ecological separation" is the only effective option for Wisconsin. In Chicago, this means infrastructure changes in the **Chicago Waterway System (CWS)** such that there are no direct hydrologic connections between the Illinois Sanitary and Ship Canal and Lake Michigan.

To ensure that Asian Carp do not become established in Lake Michigan before "ecological separation" is completed, we also want swift action in these areas:

Operate the existing Electrical Dispersal Barrier system at maximum effective power and expedite completion of the proposed Barrier IIB.

Background Congress first directed the COE to deal with the problem of invasive species movement in the CWS in 1996 and they have slowly been developing a system of 3 electrical barriers at a bottleneck location on the Chicago Sanitary and Ship Canal (see attached diagram). The first was a low power "demonstration" barrier (Barrier I) which did not begin operation until 2002. After lengthy wrangling over funding, a second, more powerful dual barrier has been incrementally constructed. Testing began on the first barrier of the new dual system (Barrier IIA) in March 2006 and finally began full time operation in April 2009. Due to safety concerns it is still not being operated at a voltage that is sufficient to repel all sizes of Asian Carp. COE has stated that it has received funding for the second barrier of the new dual system (Barrier IIB) and that construction is underway and will be completed by September, 2010. COE states that operational and safety testing must be completed before Barrier IIB can start operation and provides no timetable for completion of the tests. In the years since Congress first instructed the COE to deal with this issue, progress has been slow. In 2004, despite the fact that this interstate waterway is the responsibility of the Federal government, the eight Great Lakes states contributed $575,000 needed to fill a gap in funding to construct the barrier (Wisconsin contributed $68,000 from WNDR).

Comprehensively monitor the Chicago Sanitary and Ship Canal and all connected waterways for the presence and location of bighead and silver carp using the best available methods and techniques.

Background The urgency of creating "ecological separation" and the severity of interim measures depends to some extent on the level of Asian Carp infestation in the CWS above the electric barrier. So it makes sense to routinely conduct comprehensive fish sampling to monitor the level of infestation. Over the years, Illinois DNR, US Fish and Wildlife Service, and several other agencies have done varying levels of Asian Carp monitoring primarily downstream, but also occasionally at or above the electric barrier. Monitoring is usually done with normal fish sampling gear such as electrofishing boats, nets or radio tracking. Starting in August, 2009, COE began looking for Asian Carp DNA in water samples using an experimental technique they call "environmental DNA" (eDNA) testing. This new testing has not been calibrated – it is not known what level of Asian Carp infestation will trigger a positive eDNA test - but this testing has found evidence of Asian Carp DNA at several locations above the barrier. Illinois DNR has recently been trying to organize a coalition of state and federal agencies – including Wisconsin DNR - to contribute resources for an actual fish sampling monitoring program for 2010.

Eradicate any bighead or silver carp discovered in these waters.

Background Again, to ensure that Asian Carp do not become established above the electric barrier and escape into Lake Michigan before "ecological separation" can be created, it will be necessary to eradicate any populations of Asian Carp discovered by the monitoring program described in #3a. Currently the only feasible way to control Asian Carp is to chemically poison all the fish in the infested location. The chemical used is called rotenone and while deadly for fish is not any threat to human health or other land or water animals. These chemical treatments however, can be logistically difficult and expensive. For example, in December 2009, Illinois DNR sponsored a chemical treatment of a 5 mile stretch of the **Chicago Sanitary and Ship Canal (CSSC)** just below the electric barrier to keep Asian Carp from passing the barrier while it was down for maintenance. Illinois DNR sought financial and staff assistance from other agencies and the final effort included 250 staff from many federal and local agencies, states around Lake Michigan and even Ontario and Quebec, at a total cost of probably $5 million. It is likely that treatments in other areas of the CWS should Asian Carp populations be discovered would be of comparable magnitude – however in the future it is unclear of any of the other participating agencies would be able to repeatedly donate resources to frequent treatments.

Expedite completion of the barriers between the CSSC and the Des Plaines River far enough upstream to ensure that Asian Carp cannot cross over during flood events.

Background The location of the electrical barrier on the CSSC is above the confluence of the Des Plaines River which means that Asian Carp coming upstream from the Illinois River would have unimpeded access to the Des Plaines River. Unfortunately, the Des Plaines River flows right next to the CSSC for a distance of approximately 13 miles separated only by a narrow strip of land. During flooding events (such as occurred in summer, 2008), water – and potentially Asian Carp - can move between the Des Plaines and the CSSC above the barrier which would give them direct access to Lake Michigan. Nothing was done about this potential barrier breach until December, 2009 when EPA announced it would provide $13 million of its Great Lakes Restoration Initiative funding to allow construction of levees and fences to help separate the Des Plaines and CSSC. While a worthy effort, it is unclear if the funding provided or the final engineering plans will be sufficient to provide an adequate fish barrier.

Quickly assess the impacts of actions such as closing the locks and modifying sluice gate operations. Discuss and evaluate those impacts and agree to immediate modifications to lock and sluice gate operations that significantly minimize the chances of Asian Carp movement but also are protective of public health, safety and significant commerce issues.

Background In various court filings, COE, State of Illinois and the Chicago Metropolitan Water Reclamation District have sincerely argued that there are significant flooding and commercial barge traffic economic implications to preliminary injunction requests for immediate lock closures and changes in water diversion operations. At the same time, the states of Michigan, Wisconsin, Minnesota and Ohio have all sincerely argued that their fishery interests worth $7 billion are also at grave risk should Asian Carp become established in the Great Lakes. Assuming that these both represent extreme positions, it would seem the parties could have a fair discussion of the impacts, and see if there are any reasonable changes in lock or water diversion operations that could be taken on an interim basis that would reduce the risk of Asian Carp movement but still reasonably address flooding and barge movement issues.

Complete construction of passive Asian Carp barriers on the Mississippi River.

Background Asian Carp are extremely abundant in the Mississippi River just south of Wisconsin, and there are no impassable barriers to keep them from spreading up into Wisconsin and Minnesota. In 2004, Minnesota, Wisconsin and US Fish and Wildlife Service paid for a joint study of barrier options for the

Mississippi River which made some specific recommendations for installation of passive barriers (http://files.dnr.state.mn.us/natural_resources/invasives/aquaticanimals/asiancarp/umrstudy.pdf). Generally passive barriers include lights, sound, bubble screens and chemical attractants installed at bottleneck points such as locks. The study also recommended these passive barriers be installed at two neighboring lock and dams, and that active control and removal programs (eg localized chemical treatments or commercial harvest) be initiated should Asian Carp penetrate the downstream barrier. At the time it was estimated such a barrier system would cost about $25 million. COE was asked to include this as part of their infrastructure redevelopment, however no action has been taken to date (it was not included among the COE ARRA projects for example).

Federal Actions Needed to Prevent Other Invasive Introductions

As Governor Doyle, myself and many other in the Great Lakes region have requested repeatedly, the federal government must move swiftly under its existing authorities to require improvement for ballast water management including practices for those ships declaring no ballast on board to forestall the introduction of new invasive species to the Great Lakes.

A system of state by state regulations will not be nearly as effective and is clearly less desirable than a consistent and clear federal solution. In Wisconsin, we have already acted to require a state ballast water permit for ships coming into our ports but this is not a substitute for meaningful federal action.

We have commented on the draft Coast Guard ballast water permit (see Attachment A) and have urged support for federal legislation in the past (see Attachment B).

Federal support is also needed to strengthen rapid response capabilities. Legislation is needed to prevent the introduction and spread of harmful species via the trade in live organisms and other vectors. Finally, Congress should provide full funding for the Great Lakes Fishery Commission's sea lamprey control program and other state and regional programs under the National Invasive Species Act.

Conclusion

More than 180 non-native species have invaded the Great Lakes, damaging water-dependent industries, threatening valuable fish and wildlife resources, and costing the region an estimated $5.7 billion annually.

The region must remain vigilant to prevent new invasive species from entering the Great Lakes and causing long-term, irreversible damage. The imminent threat of Asian carp devastating the region's $7 billion sport fishing industry underscores the urgent need for action to safeguard the Great Lakes against the threat from aquatic invasive species.

The continued health and availability of Great Lakes water in this region is critically important for our nation's environment and economy. Fortunately, we have a strong partnership and tools that we can use to ensure our future. Ms. Chairwoman and members of the Committee, our pledge to you is that we will continue to work with you to ensure that we make real progress on preventing Asian Carp and other aquatic invaders from entering and further compromising the health of our Great Lakes. This is our responsibility to our citizens, our children and our grandchildren.

Thank you, Ms. Chairwoman.

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor
Matthew J. Frank, Secretary

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November 30, 2009

Docket Management Facility M-30
US Dept. of Transportation; West Building Ground Floor; Room W-12-140
1200 New Jersey Avenue, SE
Washington, DC 20590-0001

Subject: Docket Number: USCG-2001-10486

Dear US Coast Guard:

Thank you for the opportunity to comment on the "Standards for Living Organisms in Ships' Ballast Water Discharged in U.S. Waters; Draft Programmatic Environmental Impact Statement; Proposed Rule and Notice". Susan Sylvester, of my staff, presented oral comments on October 2, 2009, at the Chicago public meeting on this rule. The Wisconsin Department of Natural Resources (DNR) is now submitting formal written comments in addition to those already presented. The State of Wisconsin's interest in this matter relates primarily to our concerns about the integrity of the Great Lakes and our belief that controlling ballast water discharges is key to preventing the spread of aquatic invasive species (AIS) into this delicate ecosystem.

Overall, we believe the proposed rule is an excellent start and we fully support it. We are pleased that the rule proposes a concentration-based numerical discharge standard. A national standard will resolve many issues due to the patchwork of discharge standards existing currently among the Great Lakes states. Our preference has always been for international standards to address this worldwide problem and failing that, a strong national standard must be adopted now. A concentration-based standard is clearly needed as a replacement for ballast water exchange and flushing because the results of exchange and flushing are so highly variable. We cannot afford to wait any longer for more research to take place. New species like viral hemorrhagic septicemia (VHS) are appearing. Quagga mussels are making the impacts of zebra mussels seem tame and we must react quickly to try to stop the spread of these and any future aquatic menaces.

Wisconsin's DNR strongly supports the need to control all ballast water discharges into the Great Lakes now. We believe that it is possible to prevent ship-mediated spread of AIS into Wisconsin's waters in a manner that supports a viable shipping industry. Aquatic habitat and native species managed by the State of Wisconsin in the Great Lakes are continually threatened and impacted by invasive species and non-native diseases transported by ships' ballast water. It is widely known that all waters of the Great Lakes watershed are threatened by rapid dispersal of non-natives through ballast water transfers. These invasive species take a steep toll on our Great Lakes, inland waterways and $13 billion dollar tourism industry.

More than 180 non-native fish, plants, insects, and organisms have entered the Great Lakes since the early 1800's, disrupting the food chain, fouling beaches, clogging infrastructure and costing citizens, industry, and businesses

more than $200 million a year. Research has shown the primary way aquatic invasive species enter the Great Lakes is when ocean-going vessels discharge the ballast water they've carried on the ship to provide balance.

Wisconsin's Governor Doyle has been a leader in fighting aquatic invasive species in Wisconsin and under his administration funding has increased to our agency to help stop AIS spread on inland waters.

Everyday there is the potential for new introductions of AIS, or their spread from one Great Lake port to another. Once the invasive establishes itself, the state and federal governments must address this problem. In the last 10 years, over $3 billion dollars have been spent in the Great Lakes to mitigate the damage by one invasive species, the zebra mussel. The burden of treating ballast water prior to discharge does not compare to the billions of dollars that are spent by taxpayers to control invasives that have been introduced to the Great Lakes by ballast waters.

Because of this, we strongly support the need to regulate all commercial vessels that discharge ballast waters into state and US waters and are very interested in working with the US Coast Guard and US EPA to advance solutions to this serious problem. Therefore, we encourage the US Coast Guard to adopt these ballast water discharge standards as soon as possible so that states are not forced to issue individual discharge standards or permits due to delays at the federal level.

On November 18, 2009, our agency issued a state ballast water discharge General Permit with the effective date of February 1, 2010. In short, the permit requires several actions. Ocean-going ships would have to meet strict standards for the number of living organisms allowed in the ballast water they discharge in Wisconsin ports. The permit requires that:

- Beginning in 2014, assuming commercially viable technology is available, existing ocean-going ships would have to meet a standard for living organisms in the ballast water they discharge that is 100 times more stringent than the standard proposed by the International Maritime Organization (IMO). New York State uses the same standard.
- Beginning in 2012, assuming commercially viable technology is available, new ocean-going ships would be required to meet a standard that is 100 times more stringent than the proposed international standards.
- Commercial vessels that move only among the Great Lakes ports, known as "Lakers", would not have to meet a ballast discharge standard in this general permit, which would be effective through January 2015, but we may require a discharge standard to be met in the next reissuance of the permit. They would be required to immediately take steps to prevent spreading AIS around the Great Lakes with best management practices.

The Department remains convinced that the IMO standard, alone, is simply not protective enough to achieve the needed safeguards against this significant vector for additional AIS. Our permit's strong performance standards, supports the national efforts put forth in the US Coast Guard rule. Wisconsin staffs have been and will continue to be working with Minnesota staff to share information to understand the shipping industry and ballast water issues and serve our common Port of Duluth/Superior.

The proposed USCG rule seeks comment on whether a more stringent standard between the proposed phase-one and the phase-two Ballast Water Discharge Standard (BWDS) is achievable. We would support the interim standard of 100 x IMO to be in place between the two phases so that the industry and the public understand that this is a progressive compliance schedule and that a stronger BWDS is needed to prevent further introductions of AIS, as the states of Wisconsin, New York, and California have demonstrated. The proposed rule notes that a number of states have already adopted BWDS using more stringent standards and we strongly encourage the US Coast Guard to adopt standards stronger than those by IMO.

The rule also seeks comment on whether one year or three years is the more appropriate time limit for further practicability review. Progress is continually being made on technology and treatment systems and we

continually get closer to developing the systems necessary to meet standards more restrictive than proposed IMO standards. We support a one year review timeframe to allow new systems to become available to the shipping industry as soon as possible to meet more restrictive standards. We are very concerned that the "grandfather" clause could potentially prevent any additional treatment upgrades to vessels beyond the initial phase-one IMO discharge standard. The final rule needs to provide greater clarity on this issue. We would support "grandfathering" a vessel that installs IMO treatment in phase-one, but they would be given a compliance date to upgrade to phase-two treatment levels.

The rule states that the phase-two implementation date for all existing vessels which have not installed a BWMS for phase-one is January 1, 2016. This has a compliance date of the first drydocking after January 1, 2016. We recognize several states have set this date for their 401 certification to the USEPA Vessel General Permit. Wisconsin strongly supports a more aggressive date as we believe the technology will be available prior to 2016 (or potentially as late as 2019 for the first drydocking date).

It is encouraging to see that the Coast Guard is interested in looking at the Great Lakes as a more sensitive ecosystem and may want to justify more stringent standards or compliance dates. The Great Lakes are unique and we believe a strong national standard is still the best way to implement this effectively. You also requested comment on whether vessels should be required to discharge into an on-shore treatment system prior to entering the Great Lakes. Wisconsin has looked at the feasibility of an off-ship treatment system at the Port of Milwaukee. It would be significantly more cost effective to install this type of off-ship treatment system at the entrance of the Great Lakes. We understand the issue with ship delays and potential back-ups due to this type of requirement. However, if the logistics could be worked out, this opportunity to remove ballast water from any vessel entering the Great Lakes system is the most cost effective way to prevent all the AIS from entering the system. This could be especially true for vessels that do not have an appropriate properly operating treatment system on-board. Requiring off-ship treatment of ballast water as ships enter the St. Lawrence Seaway is perhaps the most effective and efficient way to control ballast water discharges.

We have always felt strongly that federal regulations must be strong and numerical, such as 100 times IMO. The federal regulations should be the minimum and should not preempt even stronger state regulations. The final US Coast Guard rule should not prevent states from being more protective of their waters with stronger numerical discharge standards. Rigorous enforcement of the standards and an effective US EPA vessel general permit is the key to making this program successful to protect the integrity of the Great Lakes ecosystem. Wisconsin would like to see routine testing of the contents of the ships' ballast tanks and testing of discharges, including those discharge outlets below the water line. Monitoring for chloride/salinity for oceangoing vessels discharging into freshwater is appropriate because of acute toxicity concerns. Test parameters for living organisms are also important. A NPDES Vessel General Permit from USEPA should require the US Coast Guard discharge standards to be implemented and should give state and federal personnel the right to enter ships for inspection and compliance purposes. Random checks must be done, as well as responses to complaints and inquiries.

The final regulation should recognize the need to control ballast water discharges from all vessels, including those that operate entirely within the St. Lawrence Seaway and Great Lakes System. The final discharge standard must apply to all commercial vessels including Lakers.

We urge the Coast Guard to release an updated Environmental Technology Verification Protocol, one of the key remaining elements of the Coast Guard's ballast management program, for public comment such that an approved final protocol can be established for the verification of ballast water treatment technology.

It is also important to work closely with our Canadian neighbors to ensure that there is one common ballast water discharge standard for the Great Lakes so that the shipping industry has an even playing field regardless of country or port. Canada has not ratified the IMO standards to date and our federal government must work closely with them to ensure both countries are requiring the same standard in the Great Lakes.

While the proposed US Coast Guard regulation is a significant step forward, we are concerned that there could be delay before its final issuance. We urge final adoption of the regulations as quickly as possible. We remain committed to our position that continued discharges of AIS from ballast waters are unacceptable.

Thank you for the opportunity for the DNR to comment on the proposed ballast water discharge standards rule and on the general issue of ballast water as a vector for AIS into the most significant fresh water resource on the planet—our Great Lakes. We look forward to working with the US Coast Guard and the US EPA to advance the best possible regulatory actions to protect the waters of the state and the US. Duplicative efforts are a concern in a time when our staff and natural resources are so precious. We want to protect the Great Lakes from invasion of new AIS and are encouraged that the US Coast Guard has taken this first step to establish an effective discharge standard from all vessels.

Further comments on specific questions that were raised in the rule are attached to this letter for your consideration.

Sincerely,

Matthew Frank
Secretary

Attachment

ATTACHMENT

U.S Coast Guard (USCG) Proposed Rules for Ballast Water Discharge Standards
33 CFR Part 151 Subpart C and Subpart D

WDNR Comments on USCG questions:

Specific comment was requested on six questions. They asked to provide details on treatment system costs and installation. Wisconsin does have limited information on technology costs; however, we offer the following comments on these questions:

4. What are the technology alternatives and costs for smaller coastwise vessel types?
   - Off ship treatment could be a practical solution for smaller coastwise vessels. We have looked into the feasibility of having a hopper barge with treatment system installed to be used to contain the ballast water off-loaded from vessels.
   - This seems to be a viable alterative to installing treatment systems on every ship.

Estimated Capital Costs for Barge Off-Ship Ballast Water Treatment

Port of Milwaukee Off-Ship Ballast Water Treatment Phase 3:
Estimated Costs for Planning and Design

Original with All Costs

Item	Estimated Cost	Revised Estimated Cost 10/09
Search Great Lakes for barge to lease or purchase	$5,000	Lease $300-400/day April-Dec or purchase $200K to $2M depending on age & condition of barge
Procure Barge	$25,000	$7,000 delivery from Chicago to Milwaukee
Design Barge Retrofit for collection and treatment	$100,000	$100,000
Plan and perform waste characterization study and biological survey	$125,000	$125,000
Design Sampling Plan	$25,000	$25,000
Perform Batch testing to define treatment dosage and frequency	$60,000	$60,000
Design Treatment System	$100,000	$100,000
Characterize residuals and develop procedures for residuals management	$80,000	$80,000
Develop Treatment system operations and management plan	$30,000	$30,000
Tug operational cost		$400/hour for shifting barge to ship
TOTAL	**$550,000**	**$760,000 to $2,560,000**

For the ship, the conceptual modification would consist of adding a tee fitting into the existing ballast piping inboard of the sea valve on the shell of the vessel, closing the sea valve, and then sending the ballast water up through new piping (called the off-ship connection branch) to the deck of the ship. Depending on the size of the ship, the capital cost for the ship modification work would range from about $60,000 to $204,000.

5. What are the additional avoided environmental and social damages and economic benefits of ballast water discharge standards at more stringent standards?
   - If we are able to prevent just one new AIS from establishing itself in the Great Lakes, then we have been successful with the new discharge standards. Wisconsin is especially concerned with the introduction of new bacteria or viruses, such as VHS, which has recently been found in waters of our state. The public has demanded that we prevent the introduction of new AIS into our waters. Lake Michigan beaches fouled with zebra mussel shells prevent the public from walking on the sand. Nuisance algal blooms with filamentous *Cladophera* being swept on shore, has caused beach closures because of the noxious odors from decomposition. The crash of the yellow perch population in Lake Michigan and Green Bay has changed the popular Wisconsin tradition of the Friday night fish fry forever.
   - AIS events have cost the taxpayers of the state, millions of dollars in clean-up and prevention costs. For example, the Department first discovered viral hemorrhagic septicemia (VHS) in 2007. We responded immediately to try to understand how this virus was transferred between water bodies and between fish species. We reassigned production at our hatcheries and the Department of Agriculture, Trade, and Consumer Protection (DATCP) quarantined three hatcheries where fish were lost and as a direct result not stocked. For FY'2008 alone, costs that we can quantify for our central response totaled $675,855, at the Kettle Moraine hatchery $204,560, at Wild Rose Hatchery $477,928, and at Lake Mills Hatchery $119,580. We also incurred costs to develop a Biosecurity template for hatchery operations. Total costs incurred are approximately $1.5 million. These are actual costs the department has incurred in one year trying to respond to just one new invasive species and do not include significantly greater costs to our tourism and fishing industry.

6. In light of the potentially severe nature of such damages, does the proposed rule ensure to the maximum extent practicable that aquatic nuisance species are not discharged into waters of the United States from vessels, as required by NISA? Would an approach that bypassed phase-one and went directly to the phase-two standards be practicable and provide greater protection of the aquatic environment?
   - The Wisconsin Dept. of Natural Resources would like to see the most stringent standards required in phase-one, rather than having a phased in requirement. Owners/Operators will install treatment systems onto their vessels making a huge initial capital investment. They will not be interested in adding to this treatment system or installing a totally new system to meet a higher standard a few years later. You may hear from the shipping industry that they should be "grandfathered" once they install the initial treatment technology to meet the IMO phase-one discharge standard. The capitol expense required to upgrade these installed system will be significant. We should require the most restrictive discharge standard initially and allow for a compliance schedule if the industry is not able to meet the original target dates. If the rule established a 100 x IMO discharge standard initially, then it would not need to require a phase-two. The 1000 x IMO discharge standard could be required only for new vessels.

Other general comments:

- We agree that there are unknowns with emerging technology. We firmly believe that this rule will help move technology forward to achieve the discharge standards required. The initial imposition of the IMO standards and schedule will move the US to the international standard that will serve as the base starting point. But, Wisconsin strongly believes that is not the final acceptable discharge standard. It is important to keep the technology moving forward to 100 times more stringent or greater than IMO standards; with a regular review on the technology until phase two can be fully implemented.

- A non-existent reference is given is §151.2045(b) (1) where it states that a vessel on a voyage to the Great Lakes or Hudson River must comply with the requirements in §151.1514 of subpart C. There is no such section in subpart C. This needs to be clarified.

- In §151.2050, which identifies best management practices any vessel with ballast tanks must implement, (c) states - *"Clean the ballast tank regularly to remove sediment. Tanks should be cleaned 200 nautical miles from any shore or under controlled arrangements in port or at dry dock. Sediment should be disposed of in accordance with local, State, and Federal regulations."* There may not be a location anywhere in the entire Great Lakes where there are 200 nautical miles from shore. Does this mean that there would be no acceptable location for this discharge of sediment? The distance criteria from shore would appear to exclude discharging sediment into the Great Lakes. This exemption must be clearly stated so it specifically states ballast tank sediment from vessels may not be discharged into the Great Lakes, including both oceangoing vessels and those that only traverse the Great Lakes (Lakers). This needs some clarification and strengthening. Use the word "shall" in two places instead of "should" so it's clear this is a requirement.

  Prohibiting the discharge of sediment into the Great Lakes when ballast tanks are cleaned is critical because the sediment is potentially a concentrated source for nonindigenous species. Multiple life stages of organisms could accumulate that may not be destroyed or removed by ballast water management systems (as discussed in 4.2.1 of the DPEIS). We understand the current practice for cleaning ballast tanks is to wash down the tanks to generate sediment slurry, which is then discharged in the open water when the vessel is underway. This practice is in violation of two Wisconsin laws, §30.12(1), Wis. Stats., that prohibits the placement of material on the bed of a navigable water, and §29.601(3), Wis. Stats., that prohibits the discharge of deleterious substances.

  In the preamble on page 44634, stated in the discussion about the phase one ballast water discharge standard, that the standards would not apply to vessels that operate exclusively in one Captain of the Port zone (COTP). The justification being that a vessel operating in only one zone would be unlikely to introduce aquatic nuisance species from outside the zone. This exemption provision needs clarification in the rule. This is not mentioned in Subpart C for the Great Lakes and Hudson River, and in Subpart D there appears to be contradictions. The exemptions in §151.2015 identifies what vessels are exempt from the requirements of this subpart, which implies all of Subpart D. Why then does (c), that applies to vessels in one COTP, specifically list just the exemption for the reporting and record keeping requirements in §151.2060 and §151.2070?

- We agree with the provision for the COTP exemption, but it should only be for the ballast water management system and the discharge standards.

- The requirements in §162.060 for the ballast water management system approval process is extremely thorough and well done.

- The proposed ballast water discharge standards only regulate living organisms. Another standard may be appropriate to address potential concerns with chloride toxicity from the discharge of seawater into freshwater environments. High chloride concentrations are present in an oceangoing vessel's ballast water after a saltwater exchange or flushing. At a salinity of 35 parts per thousand the chloride concentration is 55% or 19.2 parts per thousand (19,200 mg/L). Wisconsin has restrictions on the discharge of chloride, with an acute daily maximum limit 1514 mg/L (the chloride limit expressed as salinity is 2.7 parts per thousand).

  We are unaware of how many oceangoing vessels may enter the Great Lakes ballasted with significant volumes of seawater, so the full implication of imposing a chloride limit is unknown. It's suspected there would be few ballast tanks with seawater as oceangoing vessels usually arrive loaded with cargo instead of ballast. The NOBOB vessels would take on ballast, diluting any residual seawater. A dilution ratio of 11:1 of freshwater to seawater would comply with the chloride limit.

  If a restriction on chloride is included in the rule, a chloride exemption will need to be added for the prohibition on dilution in §162.060-20(f) that contains the design and construction requirements for ballast water management systems. It's certainly correct to prohibit dilution of ballast water to meet the ballast water discharge standards or living organisms. But, after treatment to remove or destroy the organisms, dilution could be used to meet the chloride limit.

  If undiluted seawater above the limit is discharged into the Great Lakes it will create acute toxicity at the point of discharge. Ballast water management systems are not designed to remove salinity, and some may even rely on salinity for it to operate. Dilution of seawater ballast water with freshwater until it is below the chloride limit can be performed to prevent acute toxicity. This is an acceptable practice to comply with a water quality based effluent limit for a substance that is not a bioaccumulating chemical of concern. The final regulations need to be clear on this point.

  Alternatively, if the US Coast Guard has evaluated the impacts of chloride from seawater in ballast tanks discharged into freshwater, and can justify the granting of a water quality standards variance with EPA, the limit could be altered or other mitigating actions could be required. Because the US Coast Guard April 2008 DPEIS was focused on the impacts of changes in the concentration of nonindigenous species in ballast water discharges, the impact from the discharge of seawater wasn't included.

- The Great Lakes are a drinking water source, and an irreplaceable freshwater natural resource. They warrant implementation of strong environmental regulations to protect such waters from the introduction of new biological pollutants, such as invasive species, and from the establishment of new populations of existing invasive species within these including the most vulnerable. We recognize the technical challenges that freshwater environments pose to treatment technology and the difference in construction between ocean going and laker vessels, these should be viewed as challenges to be met rather than excuses for inaction.

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Governor of Wisconsin

BOB TAFT
CO-CHAIR
Governor of Ohio

ROD BLAGOJEVICH
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September 12, 2005

The Honorable Daniel Inouye
United States Senate
722 Hart Senate Office Building
Washington, D.C. 20510

The Honorable Ted Stevens
United States Senate
522 Hart Senate Office Building
Washington, D.C. 20510

Dear Senator Inouye and Senator Stevens:

Thank you for your efforts to curb the introduction of aquatic invasive species (AIS) through ballast water management legislation. The future of commerce, recreation and the environment of our nation demands action. Already, some 162 species have harmed the Great Lakes. San Francisco Bay, Chesapeake Bay and other national waters have similar problems. Invasive species introductions cost the nation billions of dollars in damages each year.

As you know, the Great Lakes Governors remain deeply committed to halting the effects of AIS. One of our nine priorities for Great Lakes restoration and protection is to stop the introduction and spread of non-native aquatic invasive species. A key action toward this goal is to eliminate ship-mediated introductions of AIS, particularly via ballast water that has proven to be a well-established pathway for invasions. We strongly believe that the time has come to take decisive action to protect the nation's coastal waters, including one of the world's most outstanding natural resources, the Great Lakes.

As proposed by S. 363, ballast water management alone cannot adequately protect the Great Lakes and the rest of our nation's waters from AIS. That is why it is our strong preference to address the AIS issue comprehensively. Several critical components must be included in any Congressional action directed toward eliminating ship-mediated AIS introductions for it to be effective and have our support. The following provisions must be included in any effective Congressional bill that addresses this issue:

- Require the interim application of: 1.) best performing ship-board ballast water treatment; 2.) best residuals management practices for vessels that declare "no ballast on board;" and, 3.) best hull management methods for all ocean-going vessels. Ships should be required to meet an environmentally protective standard on a future date certain (within 5 years), but preventive measures must be taken in the interim;
- Establish incrementally tougher protective standards and require ships to meet those standards by a future date (between 2011 and 2014). The ultimate goal must be zero discharge of viable organisms;

- Maintain the possibility of using U.S. EPA's Clean Water Act authority to address ballast water discharges so that States can assure their publics that they and their resources will receive adequate protection from this threat even if the federal program fails to be implemented;
- Maintain the possibility of State action to improve on federal protections related to ships. While a uniform federal regulatory process is necessary, it should not preclude the States from strengthening these protections as needed;
- Review and implement best-performing ballast water management practices for non-ocean going vessels to address the spread of AIS already introduced into U.S. waters;
- Immediately and significantly expand the research, testing and evaluation of all treatment policies and technologies; and,
- Support information and education outreach programs to reduce the potential for AIS introductions.

Several provisions in S. 363 could significantly impede progress to provide meaningful AIS protection. Specifically, we are concerned with the following provisions:

- A State pre-emption clause that would preclude States from taking steps to protect against damage by AIS introduced through ballast water;
- A clause that the Act would supersede any provision of the Clean Water Act with respect to ballast water;
- Limited case-by-case review of treatments demonstrated to be substantially better than ballast water exchange; and,
- Locking-in the existing regulatory exemption for ships declaring no ballast on board until S. 363 standards are implemented ten years or later from the effective date of the legislation. Because these ships can be a significant vector for AIS and account for approximately 90 percent of the ships entering the Great Lakes, immediate interim steps must be taken.

The draft report of the Great Lakes Regional Collaboration issued on July 7, 2005 indicates the broad-based support for addressing this important problem. While State and regional actions against AIS remain critical to establishing a complete protective framework, we believe that a coordinated national approach is the preferred long-term means of stopping new invasive species from penetrating the Great Lakes. While reserving judgment on other specific bills, we urge you to support comprehensive AIS legislation incorporating the suggestions outlined in this letter as an alternative to S. 363 as currently drafted.

Please do not hesitate to contact David Naftzger, Executive Director of the Council of Great Lakes Governors, at 312-407-0177 if there are questions. We look forward to continuing to partner with you on this issue of national importance.

Sincerely,

Rod Blagojevich
Governor of Illinois

Jennifer M. Granholm
Governor of Michigan

George E. Pataki
Governor of New York

Edward Rendell
Governor of Pennsylvania

Mitch Daniels
Governor of Indiana

Tim Pawlenty
Governor of Minnesota

Bob Taft
Governor of Ohio

Jim Doyle
Governor of Wisconsin

cc: Great Lakes Congressional Task Force

Great Lakes Fishery Commission

ESTABLISHED BY CONVENTION BETWEEN CANADA AND THE UNITED STATES TO IMPROVE AND PERPETUATE FISHERY RESOURCES

THE ASIAN CARP THREAT TO THE GREAT LAKES

Dr. Michael J. Hansen, Chair
Great Lakes Fishery Commission

House Committee on Transportation and Infrastructure
Subcommittee on Water Resources & Environment
Honorable Eddie Bernice Johnson, Chair
2167 Rayburn Office Building
February 9, 2010

INVASIVE SPECIES AND THE DESTRUCTION THEY BRING

Madam Chair, thank you for inviting me to appear before this subcommittee to discuss the threat of the Asian carp invasion into the Great Lakes. My name is Michael Hansen. I am the chair of the Great Lakes Fishery Commission. I am also a professor of fisheries at the University of Wisconsin at Stevens Point.

The Great Lakes are an extremely valuable resource for both the United States and Canada. The Great Lakes' commercial, recreational, and tribal fisheries are valued at more than $7 billion annually (ASA 2008). The lakes provide drinking water for 40 million people and are a rich tourist draw. They are a way of life for the people of the region and a healthy, vibrant Great Lakes ecosystem is immeasurable in economic terms alone.

The Great Lakes—and the way of life they support—are under assault from invasive species. Invasive species are defined as non-native animals and plants, both aquatic and terrestrial, that enter new environments, become established, and spread. The Great Lakes are "ground zero" for aquatic invasions. Today, the lakes harbor more than 185 non-native species (Lodge 2007; Mills et al. 1993; Ricciardi 2001; Sturtevant et al. 2010), many of which entered the lakes accidentally. The rate of introduction into the Great Lakes is not slowing, even with the welcomed institution of some invasive species control measures (e.g., ballast water exchange requirements starting as early as 1989). Some estimate that a new invader enters the system every 9-12 months. Many in the scientific community, however, believe that the Great Lakes contain many more invasive species than have been discovered, because a coordinated, basinwide program to monitor new nonindigenous species does not exist (IAGLR 2008; Sturtevant et al. 2010).

Invasive species have many pathways into new ecosystems. Ballast water is a major vector, as are canals and waterways, the trade of live organisms, recreational activities, and aquaculture. While much of the focus has been on large or prominent organisms, microorganisms and pathogens are also an increasing concern (particularly with the emergence of the VHS virus, an exotic fish disease linked to fish kills in several Great Lakes and just recently detected in Lake Superior). The Great Lakes, essentially, are a welcoming, open door for invaders.

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The world and North America are becoming more globalized. With enhanced trade and the movement of goods comes the reality that more species have more pathways than ever to invade the Great Lakes. The Saint Lawrence Seaway, for instance, is a direct pathway for foreign ships into the U.S. heartland. Those ocean going ships have been responsible for more than 1/3 of all Great Lakes invaders (Mills et al. 1993; Sturtevant et al. 2010). Also, the U.S. Fish and Wildlife Service reports that an average of more than 200 million fish, and tens of millions of reptiles and amphibians, birds, and mammals are imported into the United States annually for food and for the pet trade industry. Fish for pet trade, for example, are collected in exotic locations throughout the world or reared in aquaculture facilities (Livengood and Chapman 2007), which are prone to flooding, thereby enabling escapement.

Invasive species are not a local or even a regional problem—they are a national and a global problem. Invasive species spread readily from region to region, so species introduced into one part of the country will, in all likelihood, eventually make it to other parts of the country. Eurasian *Dreissenid* mussels (a.k.a., the "zebra mussel"), for instance, entered the Great Lakes through ballast water from oceanic ships in the mid-1980s and have now spread throughout much of the United States. Asian carp, which are discussed below, escaped from aquaculture in the Deep South and, as they made their way northward through the Mississippi and Illinois Rivers, have become a major economic and ecological nuisance. These carp are now found in Texas, the Ohio River Basin, and are threatening the Great Lakes and even the Columbia River Basin in the Pacific Northwest. Snakeheads were imported for the aquarium trade and for food and are now present in the Northeast, the East, and the Mississippi River system. Specimens have also been found in Alabama, California, Florida, Kentucky, Texas, Washington, and Lake Michigan. The point is, exotic introductions into United States' waters anywhere raise the possibility of spread to other ecosystems. Solutions must be large in scope and based on the assumption that species will multiply and extend their range.

The focus of this hearing is on Asian carp, and the primary pathway for Asian carp to enter the Great Lakes from the Mississippi River basin is through two canals in the Chicago area: the Chicago Sanitary and Ship Canal and the Cal-Sag Canal. Other witnesses during this hearing will address the policies that are being undertaken to try to stop the spread of Asian carp through those canals. I will reflect on these policies toward the end of this statement. Let me first provide a summary of the threat Asian carp pose to the Great Lakes.

THE HAVOC OF ASIAN CARP: A HARBINGER OF WHAT'S TO COME FOR THE GREAT LAKES?

Asian carp have the ability to spread rapidly, reproduce in large numbers, and become the predominant species in an ecosystem. Once established, fishery managers have little chance to control the fish. Like the sea lamprey, they could become a permanent element of the Great Lakes if they enter the system.

The term "Asian carp" is a generic term to describe several species of related fish originating from Asia. Two species of Asian carp primarily comprise the current invasion via the Illinois Waterway System—the "bighead" and "silver" carps. These species were imported into the southern United States to keep aquaculture facilities clean and to serve the food fish industry. Bighead carp were imported from China in 1972. A year later, in 1973, silver carp were brought into the United States from China and eastern Siberia (Chick and Pegg 2001; Hoff 2008; Schrank and Guy 2002; Tucker et al. 1996). By 1980, bighead and silver carps, which had escaped from aquaculture facilities, had been captured in the wild by fishers in Arkansas, Louisiana, and Kentucky (Williamson and Garvey 2005). Flooding events in the 1980s and 1990s allowed the bighead and silver carps to greatly expand their range. The floods provided extensive spawning and rearing habitat that facilitated high survival rates for offspring.

Since their escape nearly two decades ago, bighead and silver carps have overwhelmed the Mississippi and Illinois River systems. Bighead and silver carp are filter feeders. They eat plankton (e.g., algae and microscopic animals), the very foundation of the food web. Their feeding habits were the reason they were imported into the United States by the aquaculture industry: by feasting on plankton, they kept aquaculture facilities clean. Nevertheless, when loose in the wild, where plankton were abundant and predators were few, the Asian carp had a field day. Between 1991 and 2000, as the invasion was unfolding, biologists observed an exponential increase in bighead carp numbers in the Illinois River, near St. Louis (Chick and Pegg 2001). Such increases played out time and again as the carp expanded their range northward. Commercial harvest of bighead carp in the Mississippi River Basin, for instance, increased from 5.5 tons to 55 tons between 1994 and 1997 (Chick and Pegg 2001). Biologists reported dietary overlap among Asian carp and native fishes in the Mississippi and Illinois Rivers, which suggests the Asian carp would likely outcompete native fish for food. In fall 1999, an investigation of a fish kill in off-channel waters of a National Wildlife Refuge near St. Louis documented that Asian carp made up 97% of the biomass (MICRA 2002), which indicates that, at least in that area, the fish community consisted of almost nothing but Asian carp. During this period, commercial fisherman began reporting that they were abandoning their traditional fishing sites because they were unable to lift nets that were "loaded" with Asian carp. Today, commercial fishers in the Illinois River regularly catch upwards of 25,000 pounds (11,000 kg) of bighead and silver carp *per day* (Irons et al. 2007). A half of an acre can often yield thousands of pounds of Asian carp (Chapman 2003), an astonishing amount of fish and an indicator of just how much of total fish biomass Asian carp can represent. The commercial value of Asian carp is extremely low and much less valuable than the native fish they replaced.

Biologists and policy makers are particularly troubled by the fact that Asian cap can grow to extremely large size because an Asian carp is capable of eating 40% of its body weight each day (Hoff 2004). Bighead and silver carp voraciously consume plankton, stripping the food web of the key source of food for small and big fish.

The silver variety of the Asian carp has a unique characteristic that makes it particularly dangerous to humans: the sound of a boat motor startles the fish, causing it to leap as high as ten feet out of the water. These flying fish—some weighing more than twenty pounds—serve as a projectile, landing in boats, damaging property, and injuring people. Biologists on the Illinois River need to follow new safety protocols to avoid serious injuries from these fish. Waterskiing and other aquatic activities have grown extremely dangerous. The newspapers and YouTube are replete with accounts of people being injured by Asian carp, including a story about woman who nearly died in 2004 after being knocked unconscious from her Jet Ski near Peoria, Illinois (Meersman 2004). Said Duane Chapman of the U.S. Geological Survey, a biologists in the thick of these fish, "You may imagine it would be quite novel for a 20-pound fish to jump into your boat, but being hit by a large Asian carp would be similar to being hit by a bowling ball. Even if the fish don't hit you, they can break fishing rods, windshields, electronics or anything else in your boat. As if adding insult, the carp will leave slime, blood and excrement on everything it touches" (Chapman 2010). The public's safety and property are clearly at risk.

The trail of destruction—to the ecosystem, economy, property, and boaters—that these Asian carp have left in their wake has been cause for tremendous concern to the people of the Great Lakes basin. Would Asian carp have a similar impact on the Great Lakes basin as they did in the Mississippi and Illinois River systems? We will have little chance of managing these new fishes if they become established in the Great Lakes.

Risk assessments carried out by officials from the U.S. Department of Interior (Kolar et al. 2005) and the Department of Fisheries and Oceans Canada (Mandrak and Cudmore 2004), and overall experience with

biological invasions, give little reason to be optimistic. For starters, these assessments indicate that the carp are certain to tolerate the Great Lakes basin's climate, because the basin is well within the fishes' native climate range. Mean annual air temperatures range between -2°C and 22°C for bighead carp and -6°C and 24°C for silver carp, a temperature span that would support Asian carp populations in much of the United States and Canada, including the Great Lakes.

Risk assessments also indicate that the carp would likely find the Great Lakes to contain an abundant and diverse supply of food. In the Great Lakes, the bighead carp would consume zooplankton and silver carp would prey heavily on phytoplankton, thereby competing with the young of many native species and all life stages of native planktivorous fish species. To make matters worse, Asian carp do not appear to be too finicky about what they eat. For instance, bighead carp diet in the Mississippi River is more varied than in their native range, because they feed on algae, detritus, and zooplankton. This means that the carp appear to be able to feed opportunistically. Also, by feeding on plankton, the Asian carp feed on the "low end" of the food web. That is, they will compete for food with the young of many native fish species and with all life stages of planktivorous native fish. Little doubt exists that bighead and silver carp would have significant negative impacts on the food web by causing large-scale changes at the low end of the structure.

The Asian carp need certain types of habitat to feed and spawn successfully, including tributaries greater than 30 miles (50 km) of unimpeded length. The carp would also thrive in areas with vegetated shorelines that afford them suitable habitat for feeding. The Great Lakes basin contains numerous streams with suitable spawning habitat and large areas of vegetated shorelines, particularly large bays, wide river mouths, connecting channels (e.g., the Saint Marys River), wetlands, and lentic areas (areas of still waters). While the carp may not thrive in large portions of the basin—for example, in the deep, cold, open waters of the lakes—all lakes, including Lake Superior, contain ample habitat for spawning and feeding.

Should the silver carp become established in the Great Lakes basin, they will likely inflict harm directly on people. The Great Lakes Commission estimates that nearly 1 million boats and personal watercraft operate on the lakes (GLC 2003), which thereby places millions of people in potential contact with the silver carp. Knowing the hazards of boating, Jet-skiing, and waterskiing on the Illinois River system, the problem of projectile fish would be compounded on the Great Lakes by a significantly larger boating population in the region.

Overall, citizens of the Great Lakes region should be deeply concerned about the prospects of Asian carp. Mandrak and Cudmore (2004) concluded that the probability of bighead and silver carps surviving and reproducing in the Great Lakes is high. If bighead and silver carp colonize the Great Lakes, they will likely spread throughout the basin due to the natural and man-made connections and the widespread distribution of suitable habitat.

POLICY ISSUES

The history of aquatic invasions has shown that people are left with few options to control a species once the species enters an ecosystem and spreads. With sea lampreys, the region has been relatively fortunate in that the species concentrates in streams and is vulnerable to control during several portions of its life cycle. Also, the alewife, while a nuisance, serves as a food fish for predators like trout and salmon, thereby making that species controllable through stocking and rehabilitation programs. Other than those two species, meaningful control mechanisms do not exist in the Great Lakes basin for other invaders.

The short answer to the question "What can be done if Asian carp enter the Great Lakes?" is "Not much." At least, not much at the moment. Currently, control mechanisms do not exist for Asian carp, if they become established. Scientists do not know of a pesticide that would target the carp, nor weaknesses in their spawning behavior that could be exploited, nor predatory pressures that would help reduce populations. That said, the effort to find solutions has not been robust. The sea lamprey control program has been a success because of a concerted effort to apply science to discover control techniques. Sea lamprey control has worked because lines of accountability are clear—the Great Lakes Fishery Commission is responsible. Sea lamprey control has worked because the governments of Canada and the United States have committed resources to do the job. Currently, no such effort exists for other invasive species, including Asian carp. Granted, universities and government agencies are conducting solid, promising research on invasive species, but until governments redouble their efforts—both in terms of resources and in terms of vision—viable solutions for any invasive species are probably decades away. The Great Lakes Regional Collaboration's Aquatic Invasive Species Team noted as much and recommended the establishment of an "Integrated Pest Management Program" to focus attention of government. The commission strongly agrees and recommends a concerted effort to find solutions to some of the most pressing invasive species problems. Such solutions include both the development of control techniques and the establishment of accountability so that an agency remains motivated toward progress.

This paucity of control options has been a strong force motivating prevention. The Great Lakes Fishery Commission has been a partner with other primary agencies to seek preventative measures for Asian carp for more than a decade. These measures were discussed in greater detail by other panelists during today's hearing. The commission has joined its partners over the years in pressing for construction of an electrical dispersal barrier, stopping trade of live Asian carp, and supporting other steps taken by management agencies in the Chicago region. The commission strongly supports current efforts to complete the electrical barrier, to build a structure of some kind to prevent species transfer between rivers that parallel the Chicago Sanitary and Ship Canal, and to plug other holes (such as culverts and pipes) that might allow species migration. The commission is heartened by the strong interest that Cameron Davis, the Senior Advisor to the EPA Administrator, has taken in this issue, because the administration's interest in coordinating a multi-agency response is badly needed.

While current work to prevent Asian carp migration are certainly appropriate, the only solution to this problem is to achieve what is called "ecological separation," that is, altering the canal system in a way where it is *impossible* for species of any kind to move from the Mississippi basin to the Great Lakes or vice versa. This separation was included as a recommendation of the Aquatic Invasive Species Summit convened by Chicago Mayor Richard M. Daley in 2003 (Anonymous 2003).

The recommendation from 2003 was to achieve that separation "within 10 years," so much needs to be done in a short amount of time. In fact, the Great Lakes do not have any time to lose. Ecological separation must occur immediately. To kick-start the investigation into the feasibility of ecological separation, the Great Lakes Fishery Commission and the Great Lakes Fishery Trust co-commissioned a study to examine transportation patterns on the waterways, the hydrology, and options for achieving separation. That report (Brammeier et al. 2008) was completed about a year ago and its conclusions have never been more relevant. The commission appreciates Mr. Brammeier and his co-author's work on this issue and thanks the chair for including him at this hearing, because his insights are critical to understanding ultimate policy solutions.

Finally, the commission recognizes that the Brammeier project is really the start to a serious look at achieving ecological separation. The *Water Resources Development Act of 2007* authorized the U.S. Army Corps of Engineers to conduct a full-scale engineering analysis to identify and propose ways to

achieve this essential separation. The commission was gratified to see the corps begin this study during the first fiscal year after it was authorized. The corps will continue with the study in 2010. The commission urges the corps to complete this study with all haste. The Great Lakes Fishery Commission urges Congress to clearly express that the end objective is ecological separation—not "reduce the risk" or "try to achieve separation while maintaining the status quo," the goal must be "ecological separation." Further, the commission urges Congress to provide the corps with resources to accelerate development of solutions that will achieve ecological separation and for Congress, at this time, to provide the corps with the authority it needs to implement any solution it proposes, so long as the solution fully achieves the separation goal. The Great Lakes Fishery Commission is concerned that the corps' study will be protracted and that separation will be delayed as authorizations and appropriations for a recommended project wind their way through the legislative process. The Great Lakes cannot wait.

LESSONS FROM THE SEA LAMPREY

Before I conclude, I would like to emphasize why prevention is paramount and why all efforts to address Asian carp have been essential. The Great Lakes Fishery Commission, the organization I chair, knows a great deal about invasive species. The commission was established in 1955 by the Canadian and U.S. *Convention on Great Lakes Fisheries* (U.S. Department of State 1956), primarily as a response to one of the most injurious invaders to ever enter the Great Lakes system: the sea lamprey.

Sea lampreys are primitive eel-like fishes native to the Atlantic Ocean. Shipping canals were the primary vector for sea lampreys to invade the upper Great Lakes in the early 1900s through improvements to the Welland Canal, which was built to bypass Niagara Falls. Sea lampreys are parasites in their native environment, but were able to wreak staggering damage on the Great Lakes ecosystem. By the late 1940s, harvest of lake trout, a keystone species, had fallen by 99% from the average catch of the 1930s (Fetterolf and Krueger 1990). The fishery that once sustained native fishers, fueled lucrative commercial operations, and attracted millions of anglers who simply enjoyed the outdoors was devastated. In short, sea lampreys changed the human way of life in the Great Lakes basin. The problem was so great that the governments of Canada and the United States were largely motivated by the sea lamprey's devastation when they agreed to the *Convention on Great Lakes Fisheries*, and included sea lamprey control commitments in the treaty.

Since 1955 when the commission was formed, the commission has delivered a sea lamprey control program, in cooperation with the Department of Fisheries and Oceans Canada, the U.S. Fish and Wildlife Service, the U.S. Geological Survey, and the U.S. Army Corps of Engineers. The commission's control program successfully reduced sea lamprey populations by 90% in most areas of the Great Lakes. Nevertheless, eradication is impossible and the ongoing program is expensive.

The sea lamprey has taught some tough lessons, which we would be well-served to heed as we consider the Asian carp threat:

- A single invasive species can cause significant, permanent damage to the economic and ecological health of a region. We are fortunate that sea lampreys can be controlled, but sea lampreys remain a permanent, destructive element in the Great Lakes basin. Most—if not all—fishery management decisions made by federal, state, tribal, and provincial agencies must forever account for sea lampreys.

- Control of invasive species, if possible, is expensive and ongoing. The commission has spent more than $300 million since 1956 controlling sea lampreys. This amount, while large, does not account

for the billions of dollars of revenue lost to commercial, tribal, and recreational fishers of the Great Lakes basin, nor does it account for billions of dollars spent by state and federal governments over decades to rehabilitate and propagate the fishery after sea lamprey invasion. Moreover, this figure does not include the immeasurable damage to the ecology of the Great Lakes basin.

- **Prevention is key; eradication is not possible.** The Great Lakes fishery will forever contend with sea lampreys.

- Citizens shoulder the costs and consequences of invasive species, not the beneficiaries of open waterways for shipping, fish ponds for aquaculture, or the free trade of live organisms.

- Programs to manage invasive species are costly and borne by taxpayers.

Sea lampreys have taught us that prevention of new invaders is critical. Once a species enters an ecosystem and becomes established, few tools, if any, exist to manage, let alone eradicate, invasive species. In fact, of the more than 180 non-native species in the Great Lakes, sea lampreys and alewives are the only aquatic invasive species that are being managed.

What remains unclear is whether policy makers truly understand the sea lamprey's lesson. Even with all that is known about the damage of invasive species, and even though pathways are generally identified, precious little has been done to prevent new introductions. A meaningful process does not exist to assess the risk of proposed importations of live organisms or to discover ways to manage the harmful species that have become established. Myriad canals and artificial connections exist between naturally distinct watersheds, leaving the Great Lakes region vulnerable to invasions from other parts of the United States and, in turn, being a source of invaders. Ballast water regulations have been proposed but they are far from accepted or implemented.

CONCLUSION

Efforts to prevent the migration of Asian carp into the Great Lakes have been motivated by what has been observed in the Mississippi and Illinois River systems—large-scale ecosystem disruption, loss of once-viable commercial fisheries, and human harm. Risk assessments conclude that the Great Lakes would likely be suitable habitat for Asian carp. Because control techniques for Asian carp are non-existent, agencies have been working non-stop for years to create barriers on the Chicago Sanitary and Ship Canal, to stop the trade of live Asian carp, and to fill all known policy gaps. The job is far from complete. The only true solution is achieving ecological separation. With the administration's strong interest in coordinating the response, the Great Lakes Fishery Commission remains confident that such separation will occur as soon as possible. Madam Chair, thank you for holding this hearing and for any action the committee is willing to take to help us and the administration in its efforts.

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TESTIMONY BEFORE THE SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT, HOUSE TRANSPORTATION AND INFRASTRUCTURE COMMITTEE, REGARDING ASIAN CARP AND THE GREAT LAKES

by

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February 9, 2010, 2:00p.m.
Room 2167, Rayburn House Office Building

Madame Chair and Members of the Subcommittee:

My name is Rebecca Humphries, and I am the Director of the Michigan Department of Natural Resources and Environment. I appreciate the opportunity to testify today about the looming catastrophe that we face if Asian carp become established in the Great Lakes. I also appreciate the members of the Michigan Congressional delegation joining us today and for their past work on this and other Great Lakes issues.

I have been a conservation professional for over 30 years, and my role within the Michigan Department of Natural Resources and Environment is to protect our resources while maximizing recreational opportunities. Allowing Asian carp to populate our Great Lakes will destroy the resource as well as 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 a negative effect on Michigan's economy.

Let me give you an 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 adhere to 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.

Despite our best efforts, Asian carp are now at our doorstep.

Michigan has its own steps 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.

I cannot stress the following in simpler terms: Once an invasive species gets established in the lakes, we cannot eradicate it, fully control its spread, or the damage it causes.

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, I submit that any long-term actions must only be to install redundant prevention measures.

I started by saying that we must act swiftly, collaboratively, and wisely to address the threat posed by Asian carp.

Here are my recommendations to meet those objectives:

We must immediately take all available measures, consistent with protection of public health and safety, to prevent the migration of Bighead and Silver Carp into Lake Michigan, including:

- 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,

- 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,

- Operating electrical barrier 2a at optimum voltage and completing electrical barrier 2b this year, and

- 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.

We must also develop 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.

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. 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.

My submitted testimony has additional attachments.

Thank you, and I would be happy to take questions from the Committee.

January 19, 2010

The President
The White House
Washington, D.C. 20500

Dear Mr. President:

We write to request an immediate summit between Great Lakes governors and senior White House officials to identify a rapid response to the threat posed by Asian carp to the Great Lakes. Given the recent discovery of carp DNA samples above the Chicago Sanitary and Ship Canal barrier and today's Supreme Court decision, it is essential that we quickly implement emergency measures to protect the Great Lakes from carp and other invasive species.

Invasive species have already had a significant impact on the economies of our states, and the introduction of Carp into this already fragile ecosystem will be devastating. The Great Lakes are vitally important not only to the 35 million people that live within their basins, but to the world. The Great Lakes play a part in all aspects of the economy from manufacturing and transportation to trade and tourism, and thus the protection of these resources is critical to our state economies. Your pledge of $5 billion to restore and protect the Great Lakes and the recent $475 million down payment on that promise through the Great Lakes Restoration Initiative is welcome and critical, and we pledge to work with you to implement these restoration measures in a timely and effective manner.

We look forward to working with the White House to identify and implement a solution to this critical issue. Thank you for your consideration and we look forward to your response.

Sincerely,

Governor Jennifer M. Granholm
Michigan

Governor Jim Doyle
Wisconsin

STATE OF MICHIGAN
JOHN D. CHERRY, JR.
LT. GOVERNOR

November 13, 2009

Ms. Jo-Ellen Darcy
Assistant Secretary for Civil Works
108 Army Pentagon Room 3E446
Washington, DC 20310-0108

Dear Assistant Secretary Darcy:

I write to you today on a serious matter that is critical to the health of the Great Lakes. Recent information released by the U.S. Army Corps of Engineers indicates that Asian Carp are very close to the partially operational and incomplete electrical barrier in the Chicago Sanitary and Shipping Canal. To avoid the devastating effects of these invasive species in reaching the Great Lakes, specific investments and actions are essential to ensure that the barrier and other infrastructure are controlling the water pathways used by aquatic invasive species. Below I have listed specific actions that need to be continued or initiated.

First, electrical barrier 2B needs to be completed and operational as soon as possible. The design for the electrical barrier in the canal consists of two parts, 2A and 2B. Of the two parts, to date only barrier 2A is operational, leading to serious problems with turning it off for maintenance. Barrier 2B is needed both for full protection from carp dispersal and to provide for maintenance of the electrical barrier as required. As an interim measure, Michigan has supported an emergency response plan to protect the Great Lakes during a period when the existing barrier may be deactivated for maintenance, however, these emergency response efforts falls short of the long-term solution needed. Michigan was pleased to see funding to continue operation of portions of the electrical barrier in the canal and to continue construction of permanent barriers in the fiscal year 2010 Energy and Water Appropriations Act. This work must proceed expeditiously.

Second, safety studies must be quickly completed and procedures put in place to allow for full power operation of barrier 2A. To date, the barrier is operating at only half of its potential due to incomplete safety studies on its operation. Present operations may be enough power to deter adult Asian Carp from passing through the barrier but may not be enough to deter small fish.

Third, a physical barrier, even if temporary, needs to be constructed as soon as possible between the Des Plaines River and the canal to eliminate the potential for flooding between the two waterways. Flooding could allow movement of fish, including Asian Carp, into the canal and vice versa. If the one-year period of authority for this action provided in the Energy and Water Appropriations Act is insufficient, or if additional appropriations are needed to implement timely actions, I urge you to advise our Congressional delegation immediately so that they can continue to support protection of the Great Lakes from Asian Carp. I note it is important to the overall effort in the area of the canal that funding for physically separating the Des Plaines River and the canal not be re-programmed from the critical work on the electrical barrier itself.

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Invasive species, such as Zebra Mussels, Round Goby and Eurasian Ruffe, have already demonstrated devastating environmental and economic effects on both the Great Lakes and Mississippi River watersheds. Further work on a permanent solution to prevent the dispersal of aquatic invasive species needs to proceed in a timely manner. Michigan was pleased to see funding to continue a study, including consultations with key partners on the range of options and technologies to prevent the inter-basin transfer of aquatic invasive species in the fiscal year 2010 Energy and Water Appropriations bill. This is important work for protection much of the U.S. from invasive species dispersal and I would urge you to make the review of issues related to the Chicago Sanitary and Shipping Canal a top priority.

Thank you for your continued attention to this matter. Please let me know if there is anything more the state of Michigan can do to help with this critical work.

Respectfully,

John D. Cherry, Jr.
Lieutenant Governor

STATE OF MICHIGAN
OFFICE OF THE GREAT LAKES
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

KEN DEBEAUSSAERT
DIRECTOR

November 25, 2009

To Emergency Response Group:

The recent eDNA evidence indicating that Asian Carp may have made their way past the electrical barrier in the Chicago Sanitary and Shipping Canal raises an even higher level of threat to the ecological integrity of the Great Lakes and puts a $4.5 billion sport and commercial fishery at risk.

While the state of Michigan has supported the Emergency Response Plan developed earlier, in light of the new evidence, we strongly urge you to consider taking additional preventive measures including:

- Emergency closing of the locks in the Cal-Sag Channel, chemical applications in this area, and monitoring until the eDNA evidence is confirmed or ruled out
- Other alternative testing to confirm the eDNA evidence
- Expanding the chemical applications to additional areas where eDNA evidence indicates the presence of Asian Carp

Since the emergency response is planned to begin December 2, 2009, impacts on commerce from emergency closure of the locks is minimal compared to the potential economic harm that could be caused by Asian Carp's introduction. If the emergency response confirms the eDNA evidence, additional and more permanent actions will be necessary to provide protection for the Great Lakes.

Actions called for in the Great Lakes Regional Collaboration Strategy related to options for permanent separation of the Great Lakes and Mississippi River system must be expedited. Recently, Michigan's Lt. Governor John D. Cherry wrote the Undersecretary of the Army to urge additional actions to protect the Great Lakes, including the completion of the second portion of the new barrier, full utilization of the existing barrier, now operating at minimal levels, creating a physical barrier to block Asian Carp from entering via other waterways during times of flood, and using all existing authorities to explore all options to block the Asian Carp.

As you know, the state of Michigan has long-supported efforts to block Asian Carp from entering the Great Lakes, including prohibiting possession of live Asian Carp here. We have provided direct financial support for the electrical barrier in 2004, have continuously supported federal authorizations and appropriations, and as you know, we are providing manpower, materials, and equipment for the upcoming emergency response along with other states and provinces.

CONSTITUTION HALL • 525 WEST ALLEGAN STREET • P.O. BOX 30473 • LANSING, MICHIGAN 48909-7973
www.michigan.gov • (800) 662-9278

But ultimately at this critical moment, the awesome responsibility to protect the Great Lakes from the introduction of Asian Carp is yours. The actions you take must err on the side of protection of our Great Lakes.

Sincerely,

Ken DeBeaussaert
Director
517-335-4056

cc: Mr. Cameron Davis, U.S. Environmental Protection Agency
Ms. Donna Stine, Governor's Office
Mr. Steven E. Chester, Director, MDEQ

Ministry of Natural Resources

Office of the Minister

Room 6630, Whitney Block
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Toronto ON M7A 1W3
Tel: 416-314-2301
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Ministère des Richesses naturelles

Bureau du ministre

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Téléc.: 416-314-2216

MNR4046MC-2010-91

February 2, 2010

State of Michigan
Office of the Governor
PO Box 30013
Lansing, Michigan 48909
USA

Attention:
Governor Jennifer M. Granholm

Dear Governor Granholm:

I am writing to express Ontario's concerns regarding the potential spread of Asian Carp into the Great Lakes Basin. I understand that the Director of Michigan's Department of Natural Resources and Environment, Rebecca Humphries, will be testifying before the subcommittee of Water Resources and Environment of The House of Representatives on February 9, 2010.

We have been advised that this hearing presents Ontario with an opportunity to ensure that our concerns regarding the negative environmental and socio-economic impact of Asian carp entering the Great Lakes are considered by the Committee. The people of Ontario appreciate your office's assistance in submitting Ontario's letter as part of Michigan's testimony. Canada and the United States have a long history of shared stewardship of the Great Lakes and we wish to continue to build on this already strong relationship. Our concerns are described below.

The potential introduction of Asian carp into the Great Lakes poses an imminent and substantial threat to the environment and economy of Ontario. As such, it is vital to the Province that immediate action be taken to prevent the introduction of this invasive species. Preventing the introduction of Asian carp into the Great Lakes, is far preferable to, and less costly than, attempts at eradication or control. Prevention measures must be the first line of defence before eradication, which is often only partially effective following establishment of an invasive species.

There will be profound consequences for Ontario if this invasive species is introduced to the Great Lakes. The waters of the Great Lakes are so interconnected that irreparable harm to U.S. states will cause similar harm to Ontario. What happens in Illinois' waters can and will affect the sustainability of the Great Lakes' fish populations shared with Ontario. Preventing the introduction of Asian carp into the Great Lakes and protecting our shared fishery resources is therefore of great national and international importance.

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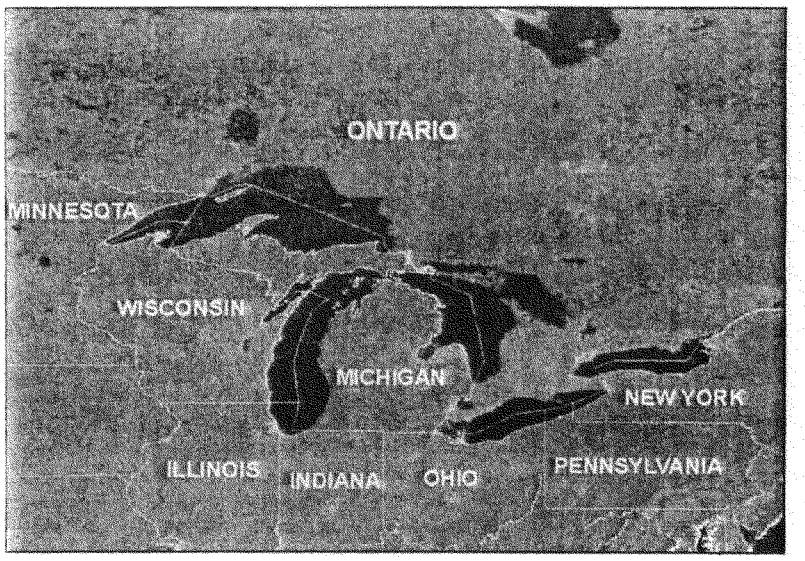
As shown in the map below, approximately 40% of the shoreline of the Great Lakes and 36% of the waters of the Great Lakes lie within the boundaries of Ontario.



The fishery resources of Ontario's Great Lakes waters have major social, environmental and economic importance to the Province, and all persons who live in the Great Lakes Basin. The economic value of the sport and commercial fisheries in Ontario's portion of the Great Lakes is substantial. Based on 2005 statistics, the combined value of the recreational and commercial Great Lakes fisheries is approximately $643 million (Canadian). These fisheries and the enormous commercial and governmental investments in these fisheries are at severe risk, should Asian carp become colonized in the Great Lakes system. Lake Erie is likely to be the Great Lake most severely affected.

The sound management of the Great Lakes aquatic resources and water dependent natural resources is vital to the Province of Ontario. Over time, the Great Lakes fishery resources have been diminished and significantly altered through exploitation, degradation of habitat and the introduction or invasion of plant and animal life.

...3

Cooperative decision-making is the best way to manage and conserve a fragile resource. As part of its efforts to manage its fishery resources, the governments of Canada and the Province of Ontario have recognized that coordination and cooperation with the United States is a critical element to ensure that fisheries are maintained in a sustainable way. It is for such reasons that state-provincial agreements, as well as bilateral treaties, have been entered into on water quality, water levels, water removals and fisheries, to ensure their coordinated and effective management and protection.

To date, the Great Lakes jurisdictions have recognized a responsibility to take action within their borders. Ontario and the Great Lakes states have acted together to address the potential threat of the introduction of live Asian carp into the Great Lakes Basin. In 2006 and 2004, respectively, Canada and Ontario amended their regulations to make it illegal to possess, buy or sell live Asian carp within the Province, and we have enforced these regulations. However, this is not enough and does not address the threat that Asian carp pose as they travel up the Mississippi River. Jurisdictions must act quickly and in a cooperative manner as has been done in other contexts.

Previous experiences have shown that the introduction of an invasive species can have devastating affects. For example, zebra mussels, another invasive species, were introduced into the Great Lakes in the mid-1980's. Zebra mussels significantly changed the nature of the Great Lakes ecosystem, increasing water clarity, disrupting the food web and affecting fish habitat by altering the structure and composition of critical spawning habitat. Overall, the impact was a reduction in the amount of food available to native species. In fact, zebra mussels have caused drastic declines in the native Great Lakes clams. An estimate of the amount that has been spent to address problems related to zebra mussels in both the United States and Canada in the Great Lakes Basin is between $3 and 7.5 billion (Canadian). Between 1989 and 2004, Ontarians alone spent $120 million (Canadian) on zebra mussel control.

The sea lamprey has had equally devastating affects on the once commercially and environmentally significant Lake trout and other fish. Decimation of Lake trout began when sea lamprey entered Lake Erie and the upper Great Lakes in the early 1920's. So significant was the negative impact that the U.S. and Canadian federal governments entered into the 1954 Convention on Great Lakes Fisheries, one of the purposes of which was to develop a united attempt by the affected U.S. and Canadian jurisdictions to battle the sea lamprey.

...4

The cost of sea lamprey control measures has been substantial; approximately $20 million (U.S.) annually, of which Canada's contribution in 2009 was $8.1 million (Canadian). This annual and continual requirement to spend money in an attempt to control sea lamprey has not resulted in their eradication.

It is vital that immediate action be taken to prevent the introduction of Asian carp into the Great Lakes system in order to prevent serious environmental and economic damage to the Province of Ontario.

The Great Lakes are a treasure shared by both Canada and the United States, I appreciate the assistance that your staff have provided to ensure that Ontario's interests and concerns are considered. By working together we can ensure our actions support the concerns expressed by Michigan and others and also ensure that the bi-national aspect of the issue is before the subcommittee.

Sincerely,

Linda Jeffrey
Minister of Natural Resources

c: Premier Dalton McGuinty
Rebecca Humphries, Director, Michigan Department of Natural Resources and Environment

Testimony by David M. Lodge
before the
U.S. House of Representatives Committee on Transportation and Infrastructure
Subcommittee on Water Resources and Environment
Oversight hearing on "Asian Carp and the Great Lakes"
Tuesday, 9 February 2010, 2:00pm
Rayburn House Office Building, Room 2167

Contact information:
Dr. David M. Lodge
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dlodge@nd.edu

Madam Chairwoman and Subcommittee members, I am honored to have the opportunity to participate in this hearing. I thank the subcommittee, especially Chairwoman Johnson, for the invitation to testify.

I am a biologist. I received a D.Phil. from the University of Oxford as a Rhodes Scholar. I come to the issue of Asian carp in the Great Lakes from the perspective of an active researcher on many kinds of invasive species in many places worldwide. I have been working on invasive species for 26 years, supported by private funding as well as funding from the National Science Foundation, the Environmental Protection Agency, the National Oceanograpic and Atmospheric Administration, and, of greatest relevance to today's hearing, the Army Corps of Engineers. I have co-edited two books and have authored or co-authored at least 150 published scientific papers. At the University of Notre Dame, I am the Director of the Center for Aquatic Conservation, Director of Notre Dame's new Environmental Change Initiative, and a professor of biology. My colleagues, collaborators, and I have many on-going research projects on various aspects of invasive species. The topics of particular relevance to this hearing include: (a) forecasting the spread and the environmental and economic impact of many aquatic nuisance species; (b) developing new species risk assessment (screening) protocols to allow private sector and agencies to prevent the importation and sale of harmful species while leaving unaffected the sale of benign species; (c) combining economic and ecological risk analyses to guide allocation of resources among management options; and (d) developing new genetically-based surveillance technologies for environmental protection.

I also bring considerable experience at the science-policy interface to my studies on Asian carps. I am a past Chairman of the national Invasive Species Advisory Committee. I was also the chairman of a committee appointed by the Ecological Society of America (the primary

scientific society for biologists who study the environment), to write an assessment of the science and policy of invasive species (Lodge et al. 2006). The current state of science, economics, management, and policy on invasive species was assessed by many scientists and economists in a recently published book my colleagues and I edited (Keller et al. 2009). Thus, I can represent a consensus of views from the scientific and social sciences on invasive species biology and economics.

I was last before this subcommittee in March 2007 to testify about the impact of ship-borne invasions in the Great Lakes. In that testimony, I pointed out that while ships were the major contributor of alien species to the Great Lakes, other pathways were also important, including canals. Today, I am here to talk about the Chicago Sanitary and Ship Canal and the threat it poses as a conduit for the dispersal of potentially harmful species into the Great Lakes. The threats urgently at hand are silver carp and bighead carp, but the canal represents a potential highway to environmental havoc for many species that pose a high risk to both the Great Lakes and the Mississippi basins.

In particular, I will address the following topics in turn: what my collaborators and I have learned in the last few months about how close to Lake Michigan are the silver and bighead carps in the Chicago canal (the Chicago Sanitary and Ship Canal and connecting waterways); how many carp would it take to launch an invasion of Lake Michigan; how important the Chicago canal is relative to other pathways by which silver or bighead carps could gain access to Lake Michigan; the likelihood of substantial damages to Great Lakes fisheries, recreation, and economies if silver and/or bighead carp invade the Great Lakes; the importance of the Chicago canal as a conduit for many species dispersing in either direction; and what management actions I believe the available evidence suggests should be more seriously considered and/or pursued for the Chicago canal.

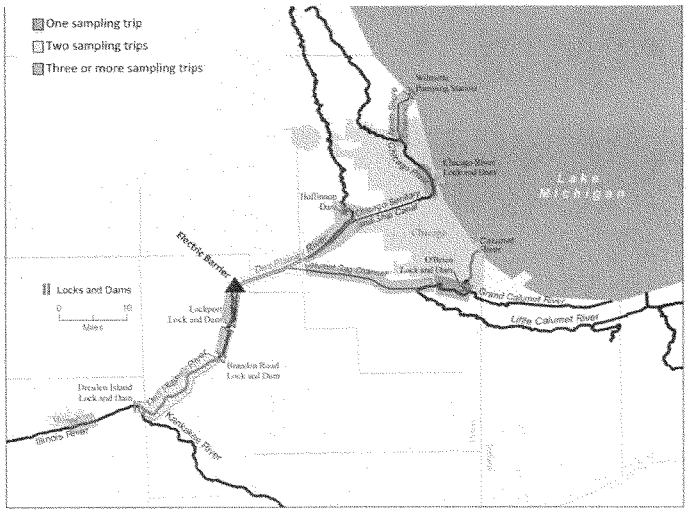
In the Chicago canal, how close are silver carp and bighead carp to Lake Michigan?

In this section, I describe recent genetically-based surveillance results on silver carp (*Hypophthalmichthys molitrix*) and bighead carp (*H. nobilis*) by a team of researchers, including Mr. Lindsay Chadderton, Dr. Andrew Mahon, and Dr. Christopher Jerde, and me. Mr. Chadderton is the Director for Aquatic Invasive Species, Great Lakes Project, The Nature Conservancy, has authored or co-authored at least 17 published scientific papers, and has over 15 years of experience in both New Zealand and the United States employing surveillance and rapid response efforts in the management of invasive species. Dr. Mahon is a Research Assistant Professor of Biological Sciences at the University of Notre Dame, has authored or co-authored at least 13 published scientific papers, and is an expert on ecological genetics. Dr. Jerde is a Research Assistant Professor of Biological Sciences at the University of Notre Dame, has authored or co-authored 14 published scientific papers, and is an expert on analyzing and interpreting ecological data, including presence-absence data of organisms like the data that we have been collecting on Asian carp. Because this section represents the collective work of the individuals listed above and additional laboratory and field technicians, I use "we" in this section to describe our results. Nevertheless the interpretations and views expressed in this section and subsequent sections are my own.

We recently provided a detailed description of our methods and results in a declaration to the Supreme Court (Lodge 2010). Here I provide a summary and results that are updated to 2 February 2010).

To overcome the well-known limitations of traditional fisheries sampling gear in situations where the target fish is rare (like the situation at an invasion front), we have used a non-traditional method. In early 2009, we adapted and improved the environmental DNA (eDNA) method of Ficetola et al. (2008) so that we could detect the eDNA of silver carp and bighead carp, collectively referred to as Asian carps, in the Chicago canal. By eDNA, we mean DNA in bits of tissue routinely left behind by all organisms. In the case of these fishes, the DNA could be contained in cells from multiple sources including slime, feces, and urine. Specifically, we identified and used species-specific molecular markers for silver carp and for bighead carp. These markers recognize sequences of DNA that occur only in silver carp or only in bighead carp and not in any other species of organism. Beginning in summer 2009, the Army Corps of Engineers began to financially support our use of the environmental DNA (eDNA) tool as potentially the best available technology to detect the presence of silver carp and bighead carp where they occur at low abundance. As of our 20th and most recent sampling trip on 8 December 2009, we have sampled a large portion of the Chicago canal (Figure 1). While we have sampled some reaches of the canal more than three times (to confirm detections of eDNA from silver and/or bighead carp), we have not yet sampled some northerly reaches of the waterway even once, nor have we sampled any Indiana portions of the Grand Calumet and Little Calumet rivers (Figure 1).

Fig. 1: Sampling effort in the Chicago canal (June-December 2009) by the University of Notre Dame and The Nature Conservancy. Additional sampling conducted in the Des Plaines River and the I&M Canal is not indicated on the map but is discussed in text.



During 15-16 December 2009, our field and laboratory protocols were examined in detail by a four member team of experts. This Quality Assurance audit team was led by the

Environmental Protection Agency, and was independent from the research team and the Army Corps of Engineers. An observer from the Army Corps of Engineers was also present. The review team scrutinized all the reports that we have provided to the Army Corps of Engineers and our laboratory notebooks, inspected our laboratory at Notre Dame, observed and discussed with us all the details of our eDNA protocols, and provided us with blind samples to process. In their Summary, released last week and appended here, the team confirmed that our genetic markers detect only the target fish species, endorsed our field and laboratory protocols, acknowledged that our methods minimized the possibility of reporting false positive results, and concluded the following: "Our team believes that the eDNA method you are using is sufficiently reliable and robust in reporting a pattern of detection that should be considered actionable in a management context. We have a high degree of confidence in the basic PCR method you are using for detecting Silver and Bighead carp environmental DNA"

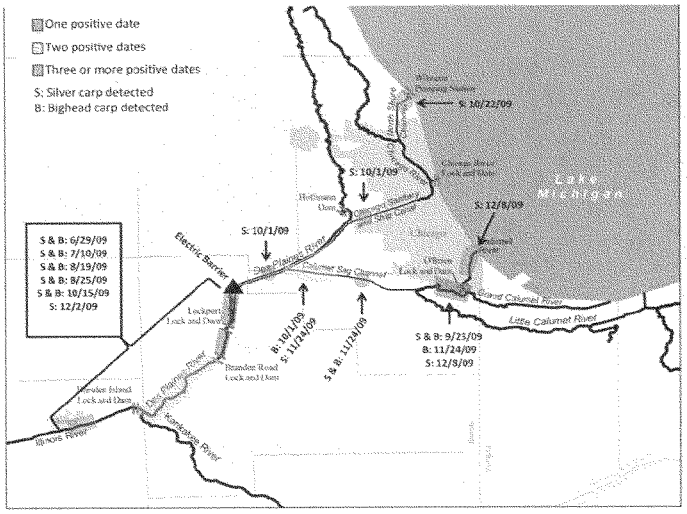
Additional confidence that the presence of eDNA indicates the presence of live Asian carps is provided by at least two additional lines of strong evidence. First, in more southerly portions of the Chicago canal, where Asian carp are known to be abundant from traditional methods, a large proportion of our water samples contain eDNA of one or both species. Of the seven collection trips below the electric barrier, silver carp DNA was detected from six trips and bighead DNA from five trips. The only trip in which DNA was not collected occurred on 3 August 2009 where most of the samples were collected just below the electric barrier and in the main channel instead of the backwaters, where we discovered DNA accumulates.

Second, when personnel from management agencies applied poison or traditional methods very intensively where we had detected eDNA, at two locations they saw or caught one silver carp and one bighead carp. At these locations prior to our eDNA studies, neither species was thought to occur. Given that sampling is being conducted at or near the invasion front (where the fishes are rare), it is not surprising that fishes have not been caught or seen at all the locations we have detected eDNA.

The most alarming of our eDNA evidence suggests that at least one silver carp has been in Lake Michigan near the mouth of the Calumet River, and at least one other silver carp has been within 100 hundred yards of the Wilmette Pumping Station (Figure 2). The closest to Lake Michigan that we have detected bighead carp is about 7.5 miles, about 1 mile south of O'Brien Lock & Dam (Figure 2). As Figure 2 indicates, we have detected additional silver carp and bighead carp in multiple locations at multiple times above the electric barrier.

The rate at which we have collected water samples, analyzed them, and reported results has met or exceeded the rates agreed under our cooperative agreement with the Army Corps of Engineers. We have collected a total of 577 two-liter water samples above the electric barrier. We have completed the processing of 84% and 82% of those samples for bighead carp and silver carp, respectively. Because the processing of water samples is much more time consuming than their collection, we continue to report results. It is important to understand, however, that the more recently reported results near Lake Michigan reflect only the order of our sampling and processing, not the movement of fish. Our sampling was not designed to detect any changes in the carps' distribution during the last few months of our sampling. Rather our results (Figure 2) should be understood as a snapshot of the carps' occurrence over the last few months.

Fig. 2: Locations and sample dates of detection of eDNA for silver (S) and bighead (B) carps by the University of Notre Dame and The Nature Conservancy. Colors indicate results for both species combined. Des Plaines River and I&M Canal results are presented only in the text.



Our protocols detect only whether some eDNA was present, not how much eDNA was present. Furthermore, even if we knew the initial concentration of eDNA in the water sample, we still would not be able to conclude anything about the absolute abundance of fish (e.g., number of fish per area) because we do not know how the abundance of eDNA relates quantitatively to the abundance of fish under even one given set of environmental conditions (e.g., temperature, current velocity). While these eDNA results cannot tell us how many individual fish of each species occurred of even exactly where or when, a positive result (i.e., the detection of eDNA) indicates that at least one fish has been present nearby our sampling location or just upstream (the water flows from Lake Michigan southward in all reaches of the Chicago canal) within the few hours before we sampled. We base this inference on laboratory experiments in which we were no longer able to detect fish eDNA in laboratory tanks 6 to 48 hours after the removal of a fish. We believe that under natural conditions in the waterway, the eDNA signal would degrade even more rapidly.

Without additional experiments, it is impossible even to conclude anything about the abundance of Asian carps in one location compared to another location with different flow conditions or other differences that might affect the presence or persistence of eDNA. For this reason, we do not compare results from the lower reaches of the canal to the upper reaches of the waterway where flow conditions are very different.

Confidence that eDNA indicates the presence of at least one individual live fish of a target species applies especially strongly to locations where we have detected eDNA on multiple sampling trips separated by multiple days (during which any eDNA not associated with a living fish would likely have degraded). Thus we have especially high confidence that at least one live

bighead carp was present just south of the O'Brien Lock and Dam (Figure 2). Furthermore, detections in the Calumet Sag Channel of bighead and silver carp eDNA at multiple locations on at least one sample date suggest strongly that multiple individual fish of both species were present in the Calumet Sag Channel. Although bighead carp (and probably silver carp) can move long distances quickly (e.g., one individual moved about 9 miles in a day), more typical movement is about 1 mile per day (Kolar et al. 2007). Thus movement of a single fish is an unlikely explanation for positive results on one day at two locations separated by about 10 miles in the Calumet Sag Channel (Figure 2). Overall our results indicate with very high confidence that at least a few live bighead and silver carp inhabited the Calumet Sag Channel and that multiple silver carp were present in the Calumet River.

We draw inferences from negative results (i.e., failure to detect eDNA) with considerably less confidence than from positive results because we know false negatives become more and more likely the lower the concentration of eDNA in the water. From sampling in the southerly pools, we know that even where target species are known to be present from traditional tools, we nevertheless did not detect eDNA in some samples. Thus, overall, negative results must be interpreted with great caution no matter. A negative result does not necessarily imply that no silver carp or bighead carp are present. It means only that the concentration of eDNA was lower than the detection limits of our current eDNA protocols.

Some have suggested that the following might provide alternative explanations for the presence of eDNA (alternative, that is, to the presence of at least one live fish): i) sewage treatment effluent from humans that had consumed silver or bighead carp or discarded fish waste, ii) deposition of excrement by seagulls or other birds that may have consumed silver or bighead carp tissue at other locations, iii) humans discarding one or more carcasses of silver or bighead carp directly into the canal, and iv) transport and release by barges of water containing eDNA. We consider each of these alternative explanations more fully below, and conclude that none of them is consistent with the overall spatial pattern of our positive results, especially those that have been shown up in repeated sampling trips (Figures 2).

Sewage treatment effluent is unlikely to contain eDNA from fish that were consumed or even from fish waste that may have been put down a kitchen sink because the DNA would degrade during passage through a sewage treatment plant even more quickly than it would degrade in the environment. In addition, the overall spatial pattern of positive results (Figure 2) is not consistent with sewage treatment outfall(s) as a source(s).

Excrement from birds (or humans) is unlikely to contain detectable quantities of DNA because the DNA would degrade substantially during passage through the digestive tract.

It is possible that humans may occasionally discard the waste from a cleaned silver or bighead carp caught or purchased elsewhere, and that DNA could thus be detected in the water in the immediate vicinity of a carcass. Live, fresh, and frozen bighead carp are commonly available for sale in Asian food markets in Chicago (and other major cities in the Great Lakes region). However, the geographic distribution of positive results and positive results in the same location on multiple dates suggest that discarded carcasses are an extremely unlikely general explanation for silver and bighead eDNA detections.

Transport of water used for ballast in barges could contain eDNA for silver and bighead carp if a barge took on water in carp-infested waters and discharged it as it traveled northward. However there is no barge traffic near the Wilmette Pumping Station, and U.S. Coast Guard guidelines to which the navigation industry agreed in September were supposed to have

precluded ballast as an explanation in the Calumet Sag Channel, at least for our last sampling date (Figure 2).

Based on our understanding of the waterway and other potential pathways, we believe that no explanation other than the presence of multiple living silver and bighead carps can plausibly explain the entire repeated spatial pattern of positive results for silver and bighead carp eDNA in the waterway.

The repeated spatial pattern of our results indicate the both silver carp and bighead carp (Figure 2) have moved upstream and accumulated below barriers and other structures, both because passage is slowed or prevented, but also perhaps because those are favored habitats for these fishes, as indicated by some evidence from the Missouri River (Kolar et al. 2007).

How many carp will it take to launch an invasion in Lake Michigan?

Although our eDNA evidence suggests that at least one silver carp has swum into Lake Michigan, an "invasion" is not necessarily underway. In the most important sense of the word, "invasion" refers to an established and spreading population in a new location—one that is not only self-sustaining, but one that is growing. For that to happen, not only do at least one male and female fish have to survive to breeding season, they have to find each other at the right time and place to reproduce, and at least two of their young have to survive the gauntlet of predators and other hazards to themselves achieve adulthood and reproduce successfully.

And because each of those things happening is unlikely in any given circumstance, most incipient invasions fail (Lockwood 2005, Drake & Lodge 2006). Until the whole sequence of survival and reproduction happens many times, an incipient invading population remains highly vulnerable to extinction, even without any management efforts to eradicate them. In fact, even when fisheries managers, wildlife managers, biocontrol experts, or citizens have tried hard to start populations of (desirable) species, they usually fail. Most populations become established only after repeated introductions of large numbers of individuals. And many of those populations that initially failed multiple times eventually grew and spread rapidly. In summary, then, there is no evidence to suggest that a population of silver carp has established in Lake Michigan, and there is no evidence at all that bighead carp have entered Lake Michigan.

Given the vagaries of the survival and growth of a potentially invading population, no one knows how many silver carp or how many bighead carp it would take to launch a self-sustaining population of either species in Lake Michigan. However scientific studies do provide some useful guidance for management.

It is a numbers game. The more individual fish that swim into the lake, and the more times that happens, the more likely an invasion is to occur. Given a management goal to decrease the probability of an invasion of Lake Michigan, our scientific understanding—as well as common sense--gives us great confidence that the best way to accomplish the management goal is to reduce the probability of additional fish swimming into Lake Michigan. Considering that invasion is *not* inevitable for either species, there is a high probability that management actions now that prevent additional silver and bighead carp from entering Lake Michigan could prevent population establishment in Lake Michigan. This is true even if some individuals of one or both species have already entered Lake Michigan. However the fact that one or more individual silver carp have apparently already entered Lake Michigan means that management efforts are more urgent than before we had that knowledge. Each time more fish enter the lake, we roll the dice to determine whether an invasion will result.

Compared to other pathways to Lake Michigan, how important is the Chicago canal?

If the management goal is to reduce the future number of individual silver and bighead carps gaining access to Lake Michigan, then it begs some questions: how did the fish get above the barrier? how might fish continue to gain access to the canal above the barrier? and which route is likely to give access to the greatest number of individual fish (and therefore should be the highest priority for management)? I tackle each of these questions in turn.

At least four possible explanations exist for how fish may have passed through or circumvented the electric barrier. First, the effectiveness of the electric barriers are unlikely to have been continuously 100% effective in the past and they are unlikely to be 100% effective in the future. Some silver and bighead carp may therefore have gone through the original barrier (or even both barriers in recent years), even while they were operational. Second, the barriers have failed occasionally. Third, in 2009, after barrier IIA was made operational, barrier I was temporarily shut down for maintenance. Although the Army Corps of Engineers did not believe that Asian carps were near the barriers at that time, it now seems more likely (given our eDNA results) that they were. Any Asian carp that had accumulated below barrier I (but above barrier IIA) would then have been free to swim upstream undetected and undeterred. Frequent observations of common carp behavior just below the barrier, and our eDNA results, suggest that such "stacking up" of fish just below the electric barriers and other upstream barriers is common.

Fourth, to keep the maps as clear as possible, we have not indicated sampling effort (Figure 1) or sampling results (Figure 2) in the Des Plaines River north of its confluence with the Chicago Sanitary and Ship Canal or in the I&M Canal. However, we have detected silver carp eDNA at a single location in the Des Plaines River about four miles north of the electric barriers (which are in the Chicago Sanitary and Ship Canal). In this area, the Des Plaines River runs parallel to the Chicago Sanitary and Ship Canal on the Canal's west side <100 meters from the Canal; the two are separated by a small elevation which is overtopped during high floods. Likewise, in the I&M Canal, which in the same region parallels the Chicago Sanitary and Ship Canal on the east side of the Canal, we detected eDNA for silver and bighead carp at multiple locations. The I&M canal connects with the CSSC above and below the electric barrier, and could possible provide a pathway to bypass the barrier. Thus, at times of high water, as in fall 2008, any Asian carps in either the Des Plaines River or the I&M Canal could have easily swum into the main canal above the electric barriers.

Given the four possibilities listed above, the presence of living silver and bighead carps in the canal north of the electric barriers is most plausibly explained by failures of the electric barrier to completely restrict the northward movement of silver and bighead carps.

However, it is also plausible that humans have released living silver or bighead carp individuals into parts of the waterway north of the electric barriers (Kolar et al. 2007). It is possible that juvenile silver and/or bighead carps have been unintentionally sold as live fish bait, most likely mixed with native fish species, some of which they resemble as juveniles. If so, some could have been released or escaped from anglers. However, because neither species of carp survives well under confinement like that in the bait industry, we do not see this vehicle as very likely.

Far more likely is the intentional release, at least in the past, of larger individuals, especially of bighead carp, purchased from Asian food markets (Shiu & Stokes 2008). The confirmed presence of silver and/or bighead carps in multiple Chicago area park ponds is strong

evidence that intentional human release of these carps is sufficiently common for multiple individual carp to survive in multiple ponds and lakes. However, since 2003, it has been illegal in Chicago for silver and bighead carp to leave a food market alive. Because individual carp can live for many years, some individuals in the canal could have been released many years ago.

These considerations suggest at least three focuses of management action are appropriate. First, efforts to further minimize all the mechanisms by which additional fish might otherwise gain future access to the canal north of the electric barriers are essential. Successful management, and ideally eradication, of Asian carp above the barrier relies upon preventing further introductions. Although escape from or release by humans may have contributed to the populations of silver and bighead carps whose eDNA we have detected above the barrier, dispersal of Asian carps through or around the electric barriers is clearly the largest single potential source of future invaders.

Second, it is well established from traditional surveillance methods that the populations of both species are very large south of the barriers, and we know from a 30 year history in the Mississippi River and tributaries that both species disperse upstream whenever the opportunity exists. Once the populations of either or both species build up to very high numbers immediately south of the barriers, even a low failure rate of the barriers could result in a sufficient number of escapes north to cause an invasion in Lake Michigan unless additional management steps are taken. Suppression or control of the Asian carp population in the pools immediately below the barrier would help reduce the impact of catastrophic failure.

Third, efforts to decrease the survival and/or prevent the egress into Lake Michigan by those fish already in the canal north of the barrier is urgent. Toward that end, it makes no difference how the fish got there.

Overall, considering the most plausible pathways, dispersal northward of Asian carps that are currently south of the electric barriers poses the numerically greatest risk to the Great Lakes. It therefore merits the greatest management attention. I offer additional considerations for management in the last section of this testimony.

If one or both species of carps invade the Great Lakes, how likely are substantial damages?

A review of the potential damages to the Great Lakes environment and the regional economy is beyond the scope of my testimony. Three things however are clear. First, in many places with environments that are similar to the Great Lakes, silver carp and/or bighead carp have achieved spectacularly large abundances and caused declines of native fishes including close European relatives of our highly prized walleye (Kolar et al. 2007).

Second, it is therefore easy to imagine catastrophic results of an invasion by either silver carp or bighead carp (Newcomb 2010). Conversely, given the wealth of experience with both these species in many parts of the world, including temperate zone lakes and reservoirs, and including our own Mississippi and Illinois rivers, it is difficult to imagine either species having only a small impact. It is virtually impossible to imagine impacts that more than a very small number of people would consider to be positive.

Third, the experience elsewhere with these specieis suggests that impacts would be spread unevenly among the five Great Lakes. Lake Superior would probably be the least hospitable for both species, while both silver and bighead carps would probably thrive most in Lake Erie. One of the most valuable commercial and recreational freshwater fisheries in the world is at high risk (Rothlisberger et al. 2009).

Thus, while no one can predict the outcome with certainty if either silver carp or bighead carp establish in the Great Lakes, I believe the outcome is likely to be high environmental and economic damage if either invades, and worse if both invade. Whether the damage would be small or large, it would be irreversible for the foreseeable future because no acceptable technology currently exists to control their abundance in the Great Lakes.

In the context of endangered species, you've probably heard it said that "extinction is forever." Unfortunately, it is also usually true that invasion is forever. Biological invasions are the least reversible form of pollution. In contrast, most other forms of pollution--like the phosphorus pollution that we've been so successful at cleaning up in the Great Lake, the nitrogen and sulfur compounds of air pollution, heavy metals, and PCBs—degrade or get buried, and the problems they cause decline eventually, if only we stop adding molecules of them to the environment. Chemical pollutants, in other words, do not reproduce; species do. Once a population is established, even if we stop adding individuals to Lake Michigan, their populations will continue to grow, they will continue to spread throughout the Great Lakes, and their damage to fisheries, recreation, and human health will grow exponentially over time.

If no additional management and policy actions are taken, we would be playing Russian roulette with the Great Lakes environment and regional economy. And the gun with which we are playing has not just one but two chambers loaded with bullets. Even if silver carp has little impact, bighead carp might, or *vice-versa*. In fact, as I'll argue below, the Chicago canal has loaded many more chambers of our invasive species gun.

Does the Chicago canal pose a threat only from Asian carps? Only to the Great Lakes?

The issues before this committee should not be seen as limited to silver and bighead carp. They should also not be seen as limited to the Great Lakes and surrounding states.

The electric barriers that are now often referred to as the Asian carp barriers were originally motivated by an invasive fish going in the other direction—the round goby going from the Great Lakes (where it was introduced in ships' ballast) into the Mississippi River basin. By the time barrier I was operational, the round goby was several miles south of the barrier site. From the beginning, however, the barrier was seen even by its proponents as a stop-gap and partial solution to the threat for invasive species. There are many potentially harmful species that have invaded one but not yet both the Mississippi River basin and the Great Lakes basin. The most recent counts show about 186 nonindigenous species in the Great Lakes, most of which have not yet colonized the Mississippi River. These include the fish Eurasian River Ruffe, a fish likely to be quite harmful to the biota and fisheries of the Mississippi River basin, and small crustaceans (e.g., bloody red shrimp) that will not be slowed much by electricity. Less study has occurred in the Mississippi River basin, but there are many more potentially harmful species following the Asian carps northward, including another Asian carp (black carp), snakehead, and some highly invasive aquatic weeds that will not be slowed by electricity.

Thus the canal is a two-way highway to environmental and economic havoc, and benefits of any management steps that reduce the species traffic will extend far beyond silver and bighead carp. They will also bring benefits to the states in the Mississippi River basin as well as to the states bordering the Great Lakes. The invasive species gun with which we are playing Russian roulette has all its barrels loaded and in fact is primed to explode in both directions. Any management actions that make the passage of fishes through the canal harder, and any improvements that also reduce the potential for transit of additional organisms—those not

affected by electricity--will bring long term additional benefits to North America, on top of the benefits derived from preventing invasion of the Great Lakes by one or more Asian carp species.

Science-based management actions for the Chicago canal

Given the goal shared by all federal agencies to prevent an invasion of the Great Lakes by either silver carp or bighead carp, any management action that reduces the likelihood of individuals of either species entering the lake should be seriously considered. First, while other options are considered, I recommend that urgent attention be given to any management action that will prevent the silver and bighead carp that are currently above the barrier from entering Lake Michigan. Second, options for eradicating or at least dramatically reducing the numbers of the individuals above the barrier should also be considered. Third, the operation and maintenance of the two existing barriers, and the plans for the third barrier, should be fine-tuned as much as possible to maximize effectiveness against fishes moving in either direction (barrier IIA was designed to be more effective against species moving northward). Fourth, a surveillance program needs to be established in the Great Lakes to locate and determine the extent of any Asian carp presence in the Great Lakes, targeted perhaps at the tributaries most likely to support spawning of the carps. This should be coupled with development of methods that would allow any fish detected to be contained, and eradicated. Fifth, other deterrents to fish movement should be considered to augment the barriers. Sixth, the Mississippi River basin and the Great Lakes basin should be permanently separated ecologically, as agreed among many agencies, stakeholders and experts at the 2003 canal summit in Chicago (Brammier et al. 2008). It is not only Asian carp we should be thinking about, but the hundreds of potentially harmful species (many of them completely unaffected by electrical current) in both basins, the damages from which would be suffered by us and our children in perpetuity.

Finally, it is important to keep in mind that while we talk, the Asian carps swim. They do not respect our timetable, our budgets, or our political boundaries. And there are many more species on each side of the canal that also will not wait for our management deliberations before they too traverse the canal.

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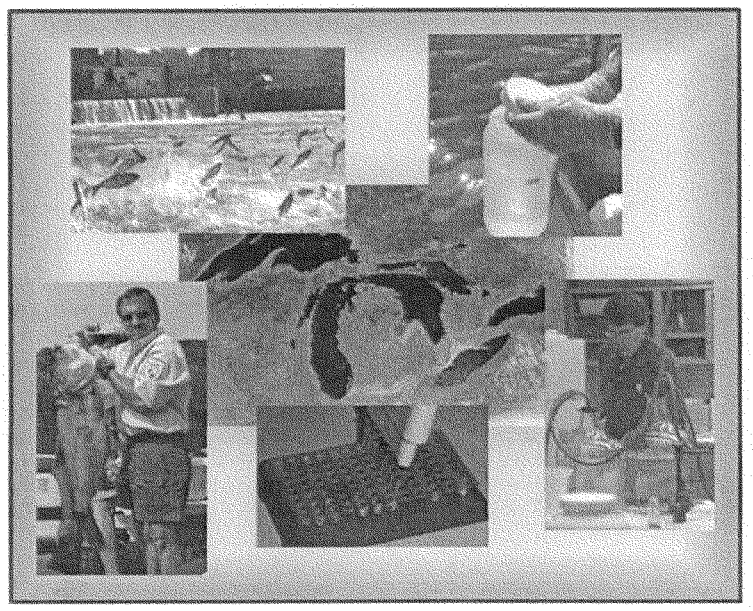
Laboratory Audit Report

Lodge Laboratory
Department of Biological Sciences
University of Notre Dame

February 5, 2010



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Laboratory Audit Report
Lodge Laboratory
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Based on the evidence collected during the audit, I certify that the report reflects an accurate representation of the Lodge Laboratory activities.

Louis J Blume 2/05/2010

Louis Blume, U.S. EPA, Great Lakes National Program Office — Date
QA Lead Auditor

2/05/10

John Darling, U.S. EPA, National Exposure Research Laboratory — Date
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ABBREVIATIONS AND ACRONYMS

BLAST	Basic Local Alignment Search Tool
CSSC	Chicago Sanitary and Ship Canal
DNA	Deoxyribonucleic Acid
eDNA	Environmental Deoxyribonucleic Acid
EPA	Environmental Protection Agency
L	Liters
NCBI	National Center for Biotechnology Information
PCR	Polymerase Chain Reaction
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SOP	Standard Operating Procedure
USACE	United States Army Corps of Engineers

EXECUTIVE SUMMARY

DESCRIPTION AND SCOPE OF AUDIT

A technical and quality systems audit of the Center for Aquatic Conservation Lodge Laboratory at the University of Notre Dame was conducted on December 15 and 16, 2009 by U.S. Environmental Protection Agency and contractor personnel:

- Louis Blume, U.S. EPA Great Lakes National Program Office Quality Manager and Audit Team Lead
- Margie Vazquez, U.S. EPA Office of Research and Development, National Exposure Research Laboratory, Ecological Exposure Research Division, Quality Assurance Manager and Audit Team Co-Lead
- Dr. John Darling, U.S. EPA National Exposure Research Laboratory, Molecular Ecology Research Branch, Audit Technical Lead
- Dr. John S. Chandler, CSC, Senior Biochemist and Audit Technical and quality assurance (QA) Support

Laboratory personnel interviewed during the audit included Dr. David Lodge (Laboratory Director), Dr. Andrew Mahon (Research Assistant Professor), Dr. Christopher Jerde (Research Assistant Professor), W. Lindsay Chadderton (Director, Aquatic Invasive Species, The Nature Conservancy), and several other laboratory staff. Kelly Baerwaldt of the U.S. Army Corps of Engineers also was in attendance at the audit as an observer. The purpose of the audit was to review the environmental DNA (eDNA) surveillance method employed by the laboratory to detect Asian carp DNA in water samples under a cooperative research agreement between the laboratory and the United States Army Corps of Engineers (USACE). The specific goals of this audit were to:

1. Provide an independent assessment of method performance and reliability by observing and evaluating sampling and analytical procedures and laboratory processes;
2. Assess if there is sufficient documentation of the sampling and analytical procedures to facilitate reproduction of the procedures by another laboratory; and
3. Provide a forum for discussion and possible recommendations pertaining to laboratory procedures and quality systems.

The audit did not address interpretation of the eDNA results in regards to the presence or absence, proximity, or abundance of silver or bighead carp, the presumed source of eDNA. Interpretation of the eDNA results requires additional research in order to understand the relationships between analytical results, abundance of fish, and conditions at sampled water bodies. Such additional research would make this approach more useful for surveillance and monitoring. The audit focused on evaluating the reliability of the eDNA surveillance method based on observation and review of the analytical procedures employed by the laboratory.

AUDIT SUMMARY

Based on the information reviewed and the observations made during the 2-day on-site audit, the auditors believe that the protocols utilized by the Lodge group to detect environmental DNA (eDNA) from silver and bighead carp in water samples are reliable. Consistent with these findings, the brief statement below was provided to the laboratory during the audit debrief:

> *"Our team believes that the eDNA method you are using is sufficiently reliable and robust in reporting a pattern of detection that should be considered actionable in a management context. We have a high degree of confidence in the basic PCR method you are using for detecting silver and bighead carp environmental DNA."*
> EPA Audit Team of Lodge Laboratory at the University of Notre Dame, December 16, 2009

Basis for Confidence in Method Reliability

The audit team made a number of positive observations regarding the field and laboratory activities conducted by the laboratory. The audit team found the laboratory to be well-managed and professional. All personnel that were interviewed during the audit were highly qualified and demonstrated expertise in pertinent procedures. The experience and interest of each project lead provided a unique group dynamic well suited to project objectives. Communication and coordination among all the laboratory personnel was frequent and effective due in part to the small size of the group and shared laboratory and office facilities.

The audit team recognizes that, given the novelty associated with application of eDNA technology, prospective risk managers and decision-makers require accurate assessments of the uncertainties associated with the method. In particular, it is critical for these stakeholders to understand the likelihood of both false positive and false negative results. The auditors consider the potential for false positive results (report of positive detection when, in fact, there is no silver and bighead carp eDNA in the sample) to be minimal, based on assessment of the eDNA protocol and observation of quality control (QC) procedures implemented by the Lodge laboratory to monitor method performance. These procedures include the following:

- Analysis and evaluation of QC samples, including negative and positive PCR controls, method blanks, and sampling (trip) blanks (these steps monitor sampling and analysis activities for field samples to identify any occurrence of sample contamination and false positives);
- Thorough cleaning and decontamination procedures for the laboratory and for sampling equipment (which minimizes cross contamination, for example, for field samples collected from different locations or at different times);

- Assignment of unique numerical identifiers to all samples resulting in blind samples throughout the analytical process (mitigating potential bias during sample processing and analysis, as well as data interpretation);
- Reanalysis of positive polymerase chain reaction (PCR) results when appropriate (which confirms that a positive PCR detection in a field sample is repeatable);
- Resampling and analysis at sites where samples produced positive results (when appropriate and feasible additional sampling is conducted to establish patterns of positive results);
- Sequence analysis of PCR amplicons from a small number of samples (confirms that positive field sample results are for the target sequence only);
- Evaluation of the species-specificity of the eDNA assays using sequence homology comparisons between PCR primers and potential non-target DNA templates, including those likely to be encountered in the sampling areas (this step ensures that positive field sample results are for the target species only, and not related species); and
- Demonstration of primer specificity using DNA templates extracted from tissue of non-target fish species likely to be encountered in the sampling areas (this step also ensures that positive field sample results are for the target species only, and not related species).

As with any PCR-based detection method, it is impossible to entirely eliminate the possibility of individual false positive detections. However, these procedures, which were reviewed during the audit, ensure that this possibility is minimized for the water samples that were analyzed by the laboratory and provide confidence that the reported spatial and temporal pattern of positive detections is a reliable indicator of the presence of silver and bighead carp eDNA in the sampled region.

The audit team was unable to assess the potential for false negative PCR results (failure to detect Asian carp eDNA when it is present in the sample), because the laboratory has not yet conducted the experiments necessary to estimate sensitivity limits of the eDNA detection protocol. Although these experiments have been proposed by the Lodge laboratory, their implementation awaits additional funding and changes to prioritization of research efforts.

Recommendations and Next Steps

The auditors did note that the Lodge laboratory, which is an academic setting, did not have in place all of the QC procedures typically employed by diagnostic laboratories using PCR methodology. The audit team recommends that future development and implementation of the eDNA method, whether in the Lodge laboratory or elsewhere, should include the following additional procedures to further enhance data reliability:

- Use disposable supplies for sampling and filtration.
- Improve isolation of critical procedures (sample extraction, PCR setup and post-PCR processes).
- Use dedicated pipettes (per process) and aerosol barrier pipette tips.

- Increase frequency of analyses of negative (DNA) controls.
- Improve photographic quality (i.e., documentation) of gels.
- Develop and document a standard approach for interpretation of PCR results (gel band visualization).
- Develop formal processes for verification of presumptive positive results including amplification of larger sample volumes, resampling and analysis, re-amplification of PCR reactions/products, and sequencing of PCR products.
- Develop reporting procedures for sample results (e.g., negative, presumptive positive, verified positive) that facilitate management decisions and actions.

Although formal quality system documentation was not required by the cooperative agreement governing the project and not in place at the laboratory, QC practices and procedures were used for field and laboratory activities. The laboratory staff understands the need for QC, as shown in the conscientious development and implementation of a variety of QC procedures and evaluations to minimize false positives. While the audit team is confident that, in principle, the results reported by the Lodge laboratory could be reproduced independently by other laboratories, it finds that the documentation of field and laboratory activities was not sufficient to serve as a sole guide for independent method reproduction. This documentation, as well as the documentation for the quality system, should be improved, especially if the method becomes a major decision-making tool for management. A documented quality system will help ensure consistent implementation of procedures over time and in the event of staff changes. To strengthen and document the laboratory quality system, the auditors recommend the following general quality system improvements:

- Document standard operating procedures (SOPs) for all routine field and laboratory procedures associated with the project.
- Document staff training for technicians/analysts.
- Document supervision of analysts/technicians (e.g., by having the supervisor or mentor co-sign laboratory notebooks).
- Improve documentation of routine laboratory activities including documentation of reagent use (e.g., by recording lot numbers of primers, polymerase, extraction kit components).
- Develop more detailed documentation of PCR setup and gel analyses with respect to mapping positions to sample ID.
- Describe the laboratory quality system and practices in a general laboratory operations manual or quality management plan.
- Develop a project-specific quality assurance project plan (QAPP).
- Use laboratory notebooks with permanently bound pages designed to withstand bench conditions and designed to be archived.

Despite recommendations in this audit report for future method development and quality system improvement, the auditors express overall confidence in the reliability of the eDNA protocol implemented by the Lodge laboratory. The audit team thus encourages the cooperative agreement program to continue its important work in developing, testing, and applying eDNA methodology for surveillance of silver and bighead carp and other

invasive aquatic species. The laboratory intends to publish these results and the audit team strongly encourages the laboratory to do so. Publication will provide an additional forum to evaluate and improve the sampling and analytical procedures.

ACKNOWLEDGEMENTS
Technical review was provided by Lora Johnson, U.S. EPA Office of Research and Development, National Exposure Research Laboratory, Director of Quality Assurance and Dr. George D. Di Giovanni, CSC, and Professor at Texas A&M University. Judith Schofield, CSC, Senior Project Manager, provided technical support and assistance in compiling the summary.

Note: This executive summary was provided to Colonel Vincent V. Quarles, U.S Army Engineer District, Chicago on January 27, 2010, by Bill Bolen, U.S. Environmental Protection Agency Great Lakes National Program Office.

1.0 INTRODUCTION

A technical and quality systems audit of the Center for Aquatic Conservation Lodge Laboratory at the University of Notre Dame was conducted on December 15 and 16, 2009 by U.S. Environmental Protection Agency (U.S. EPA) and contractor personnel. This audit was requested by Colonel Vincent V. Quarles of U.S Army Engineer District, Chicago. The purpose of the audit was to review the surveillance method employed by the laboratory to detect Asian carp DNA (silver and bighead) in water samples under a cooperative research agreement between the laboratory and the United States Army Corps of Engineers (USACE).

Auditors from the U.S. EPA who conducted the audit are:

- Louis Blume, U.S. EPA Great Lakes National Program Office Quality Manager and Audit Team Lead
- Dr. John Darling, U.S. EPA National Exposure Research Laboratory, Molecular Ecology Research Branch, Audit Technical Lead
- Margie Vazquez, U.S. EPA Office of Research and Development , National Exposure Research Laboratory, Ecological Exposure Research Division, Quality Assurance Manager and Audit Team Co-Lead
- Dr. John S. Chandler, CSC, Senior Biochemist and Audit Technical and Quality Assurance Support

Key personnel interviewed during the audit included:

- Dr. David Lodge, Laboratory Director
- Dr. Andrew Mahon, Research Assistant Professor
- Dr. Christopher Jerde, Research Assistant Professor
- W. Lindsay Chadderton, Director, Aquatic Invasive Species, The Nature Conservancy

The specific goals of this audit were to:

1. Provide an independent assessment of method performance and reliability by observing and evaluating sampling and analytical procedures and laboratory processes;
2. Assess if there is sufficient documentation of the sampling and analytical procedures to facilitate reproduction of the procedures by another laboratory; and
3. Provide a forum for discussion and possible recommendations pertaining to laboratory procedures and quality systems.

The audit did not address interpretation of the environmental deoxyribonucleic acid (eDNA) results in regards to the presence or absence, proximity, or abundance of silver or bighead carp (the presumed source of eDNA). In addition, the audit did not involve reviewing or otherwise verifying specific analytical results, but rather focused on

evaluating the reliability of the eDNA surveillance method based on observation and review of the sampling and analytical procedures employed by the laboratory.

Prior to the audit, a conference call was held on December 7, 2009, between the Lodge laboratory, U.S. EPA, and EPA's contractor staff to discuss the logistics of the audit. During the call, a schedule was discussed and formalized. A letter of confirmation regarding the audit was provided to the Lodge laboratory by U.S. EPA Great Lakes National Program Office on December 10, 2009, (Appendix A) along with the final agenda (Appendix B). The audit team prepared for the audit by reviewing various documents and information provided by the laboratory prior to the audit. A detailed list of the material provided is included in Appendix C. Based on these materials, an audit checklist (Appendix D) was developed to help guide the audit and was provided to the laboratory with the confirmation letter.

The auditors spent two days observing laboratory activities, listening to presentations, and discussing details of daily activities with the laboratory staff. Additionally, four blind samples (two samples spiked with bighead carp DNA and two known negative samples) were prepared by the auditors (i.e., spiked with purified bighead carp tissue DNA) and analyzed by the laboratory during the audit so that the auditors could observe the analytical procedures and visualization of PCR assay results. This provided an opportunity for the audit team to observe details of the overall process and discuss these procedures with staff conducting the analyses. The suggestion by the laboratory, prior to the audit, to prepare and analyze blind samples during the audit was helpful in observing a more comprehensive level of procedural detail that could not be assessed from the documentation alone.

Subsequent to the audit visit, all eDNA primers were subjected to independent *in silico* sequence analysis to determine the potential for non-target primer binding and amplification (i.e., PCR assay specificity).

The remainder of this audit report details the results of the audit of the Lodge laboratory. Section 2 provides the basis for confidence in the method reliability, including a discussion of the results of the independent *in silico* analysis of the sequence alignment file. Section 3 details recommendations and next steps. Section 4 provides a brief conclusion.

A draft of the Executive Summary of this report was provided to Dr. David Lodge of the University of Notre Dame on January 22, 2010, and a copy of the draft report was provided on February 4, 2010, with a request to review these documents for accuracy and to ensure that the summary reflects the Lodge laboratory's understanding of the discussion during the debrief at the close of the audit. At the time of this writing, the Lodge laboratory has implemented some of the auditors' recommendations discussed at the audit debrief. A memorandum from the Lodge laboratory to the EPA audit team regarding their progress in implementing quality recommendations is included in Appendix E.

2.0 BASIS FOR CONFIDENCE IN METHOD RELIABILITY

The audit team based their evaluation on the two-day visit to the laboratory, various documents and information provided prior to the audit, and post-audit activities. Activities during the audit generally followed the agenda. Observations made during the audit are detailed in Sections 2.1 through 2.6 and results of the independent *in silico* sequence analysis are detailed in Section 2.5.

2.1 STAFF QUALIFICATIONS, TRAINING, AND QUALITY ASSURANCE ROLES

All personnel, identified during the audit as supporting the eDNA surveillance project, have appropriate skills and experience to accomplish project objectives. This observation is based on the audit team's review of individual staff resumes provided by the laboratory, as well as discussion of personnel qualifications and expertise during the audit. Project leads assume supervisory responsibility for various project phases consistent with their respective areas of expertise. Sampling efforts are coordinated and overseen by Lindsay Chadderton, sample processing and analysis activities are coordinated and supervised by Dr. Andrew Mahon, and data review and management are coordinated by Dr. Christopher Jerde. General project oversight is provided by the laboratory director, Dr. David Lodge.

It is apparent that all project staff communicate effectively and frequently regarding project objectives, research planning, methods, and results. The audit team was particularly impressed with the team-oriented environment and intensive communication about project activities. This level of communication is facilitated by shared office and laboratory facilities, daily interaction, and weekly meetings. Technical training is provided to project support staff by the appropriate leads for each project phase; however, training activities are not documented. Although the project does not have a designated quality assurance (QA) officer, each project staff member has defined quality assurance/quality control (QA/QC) responsibilities. Dr. Jerde coordinates these overall QA efforts through data review, identification of issues, and implementation of corrective actions that are then discussed among project staff.

The following table summarizes the roles and experience of key project staff.

Table 1. Key Project Staff

Role*	Name	Experience
Project lead	Dr. David Lodge	Professor at the University of Notre Dame with extensive CV highlighting years of research and publications in biology, extensive research in invasive species.
Primary person responsible for field sampling, planning and coordination	W. Lindsay Chadderton	Director, Aquatic Invasive Species, The Nature Conservancy with extensive experience in the USA and in New Zealand in conservation research and policy.
Primary person responsible for designing PCR primers and implementing PCR	Dr. Andrew Mahon	Research Assistant Professor at the University of Notre Dame, PhD received in 2007, experience in genetics and aquatic biology.
Primary person for data review and statistical analysis of data, primary QA person	Dr. Christopher Jerde	Research Assistant Professor and math biologist at the University of Notre Dame, PhD received in 2008, experience in statistical analysis of population ecology data (among other research), including invasive species research.
Research technician	Amy Rohly	Lab technician, M.S. received 2009, primarily responsible for post-filtration sample processing (DNA preparation and amplification), under the guidance of Dr. Mahon.
Research technicians	Erik Elgin & Michele Budny	Lab technicians primarily responsible for sample filtration under the guidance of Lindsay Chadderton and Dr. Mahon.
Staff members listed as part of the project and present during the audit, but not directly interviewed and observed: Matthew Barnes, Cameron Turner, and Gary Clark, all of whom are graduate students at the University of Notre Dame.		

* The staff is a mix of individuals with particular talents, but all individuals work together in making research decisions.

2.2 LABORATORY FACILITIES

In general, the laboratory is maintained in a clean and organized fashion and laboratory facilities are adequate to support project-related activities at their current level. Expansion and dedication of existing resources may be required if the number of sample analyses increases. The auditors noted that the laboratory did not employ some QC procedures typically employed by diagnostic laboratories using PCR methodology, specifically the physical isolation of procedures for sample processing and analysis and

the isolation, storage, and security of reagents and samples. The audit team recommends that future development and implementation of the eDNA method should include additional procedures to further minimize the potential for laboratory contamination and enhance security (i.e., controlled access) of reagents and samples.

Optimally, there would be increased physical isolation of work spaces, especially between pre- and post-PCR amplification processes. Project personnel do decontaminate existing laboratory space through meticulous and frequent cleaning of bench surfaces. The post-amplification product detection (agarose gel electrophoresis) is conducted in a separate room (i.e., gel room). However, sample processing (filtration and extraction) is confined to three separate laboratory benches to accommodate sequential sample processing workflow. Samples (i.e., DNA extracts) and reagents are stored in a common freezer located in the laboratory. All non-disposable labware (glass and plastic) cleaning procedures are sufficient. Laboratory and storage facilities are not currently secure. Specific recommendations for improving the use of existing laboratory facilities are summarized in Section 3.1.

2.3 FIELD SAMPLING PRACTICES

The audit team recognizes the critical nature of sampling design and sampling practices to the eDNA surveillance project. The team did not observe an actual sampling event but did receive a comprehensive overview and presentation of sampling practices (by Lindsay Chadderton). It should be noted that the challenges associated with eDNA sampling are unique in that the presumed source of target DNA (i.e., silver and bighead carp DNA) is not likely to be uniformly dispersed throughout a water matrix or correlated directly with the proximity or abundance of Asian carp. These caveats have been addressed by the project team and their efforts toward sampling design (location, frequency and number of samples) and sample collection are impressive and commendable.

Sample collection procedures include the use of anti-contamination practices as well as sample controls. All equipment that is used for sampling (boats, waders, sample containers and transport coolers) is decontaminated using a bleach solution prior to each sampling episode. Additional precautions include sampling from upstream to downstream (in order to avoid introducing target DNA into upstream sites) and the use and changing of disposable gloves between sampling sites. In addition, laboratory-prepared cooler or trip blanks (2 liters of sterile water) are immersed at individual sampling sites and packaged together with field samples from that site in coolers that have been previously cleaned and wiped down with a bleach solution. These cooler blanks are processed and analyzed exactly the same as field samples. As of the audit, the laboratory has not detected target DNA in any cooler/trip blank (*Interim quality assessment and quality control report of the CSSC using eDNA Methodology*, 18 November 2009, listed in Appendix C as "eDNA update QAQC overview.pdf").

Field sampling, sample identification/tracking and sample packing is coordinated by Lindsay Chadderton. Unique numerical sample identifiers are assigned to each sample in

the field, thus allowing "blind" downstream processing and analysis by laboratory technicians. Samples are packed and transported on ice in sturdy coolers ensuring that damage to sample containers or loss of sample integrity is unlikely. Dr. Mahon has sample receipt and storage responsibilities and Dr. Jerde has custody of the sample information to ensure that samples stay "blind" through analysis. Sample custody protocols are not formally documented in a SOP but chain-of-custody procedures are not required for this project. Sample documentation is relatively simple and is maintained on a single spreadsheet. Sample documentation procedures are not currently documented in an SOP.

The auditors believe that the procedures used by the sampling teams are well designed and effective in controlling contamination from extraneous environmental sources (i.e., unrelated to the specific sample site). Also, the importance of initial sample site selection and resampling of these sites in order to establish spatial and temporal patterns of Asian carp eDNA presence (or absence) is paramount and the auditors believe that the expertise among project staff promotes optimal design and execution of sampling efforts. The audit team further recognizes the importance of resampling at sites generating positive eDNA results in order to increase confidence in delineating invasion fronts for Asian carp. In the case of positive detection of Asian carp eDNA in a sample, additional sampling activities should be considered with input from the Lodge laboratory personnel who have unique and extensive expertise with this important component of the project.

2.4 eDNA METHODOLOGY

The eDNA method encompasses sequential sample filtration, filter extraction and DNA purification, PCR amplification, and PCR product analysis. Each of these processes is conducted independently and, as practical, in dedicated areas of the laboratory. The audit team was able to observe the overall processing and analysis of four samples (two negative and two positive containing bighead carp DNA). Based on these observations the audit team believes the overall eDNA methodology is technically sound and reliable.

Sample filtration

Observed sample filtration procedures included appropriate quality control activities to ensure sample integrity and minimize opportunities for contamination. Sample filtration is initiated within 18 hours of sample collection in order to minimize target DNA degradation. Samples (2 L) and cooler/trip blanks are individually filtered using a decontaminated filtration funnel equipped with a glass fiber filter. Prior to each field sample, a method blank/equipment control is prepared by filtering 1 L of de-ionized water through each assembly and these filters are cross-referenced to each field sample and stored frozen until further processed. Each filtration assembly is decontaminated (with bleach solution), rinsed with water and dried between samples. In the event Asian carp DNA is detected in a sample, the specific filter control (method blank) is extracted separately and analyzed for the species detected (silver and/or bighead carp). At the time of the audit, filter controls had been analyzed for all positive sample results and none had tested positive for target DNA indicating that contamination deriving from the filtration

process had not been observed (*Interim quality assessment and quality control report of the CSSC using eDNA Methodology*, 18 November 2009, listed in Appendix C as, "eDNA update QAQC overview.pdf").

Filter extraction and DNA purification

The audit team observed that the analyst exercised appropriate caution during the procedure to minimize the potential for cross-contamination of samples. Filter extraction and DNA purification is accomplished using a commercial kit that employs physical and chemical disruption of cellular materials entrapped on the filters followed by purification of nucleic acids from these crude extracts using proprietary silica-based adsorption and elution spin-column technology. The laboratory uses the vendor-supplied protocol for filter processing with the exception of the final DNA elution step which is accomplished with sterile water rather than the vendor-recommended buffered solution (the latter contains a metal chelating agent that may interfere with PCR amplification). Individual samples (purified DNA) are then analyzed by PCR assay (or stored frozen until analyzed). Although the efficiency of Asian carp eDNA recovery has not been directly assessed using this extraction/DNA purification process, this is a common approach for DNA extraction and purification from cellular sources. The audit team is confident that this extraction/purification process is appropriate for recovering target DNA but process recovery determinations will ultimately be required (pending identification of an appropriate control, e.g., carp fecal material) to evaluate overall method sensitivity.

PCR analysis

Overall the audit team believes that the procedures and techniques used to conduct PCR analyses are satisfactory. Sample analyses are conducted using species-specific PCR assays. Replicate aliquots (eight, one-microliter sample replicates) of each sample are independently analyzed for silver and bighead carp DNA using laboratory-optimized PCR assays containing specific primers for either bighead or silver carp DNA. Following PCR amplification, individual reactions are subjected to agarose gel electrophoresis in order to resolve PCR products (amplicons) according to size or mass. Gels are then visually examined to determine if any sample reaction contains a PCR product or gel band consistent with the size/mass of the specific target sequence. This determination is based on comparison of sample PCR products with product amplified from positive control reactions containing purified DNA from either silver or bighead carp tissue and PCR product size as estimated relative to the electrophoretic mobility of DNA standards of known size/mass included with each agarose gel.

The audit team noted that pre- and post-PCR activities should be better isolated to further reduce the risk of contamination resulting from PCR product carry-over. The laboratory currently conducts gel electrophoresis in a separate room that could accommodate all post-amplification procedures (e.g., preparation of amplified reactions for gel analysis). Isolation of PCR set up procedures (reagent preparation, addition of reagents and samples to reaction wells) should also be improved to further minimize contamination risk. The laboratory does not currently use aerosol barrier pipette tips or dedicated pipettors for

PCR work due to budget constraints. While their use could also reduce contamination risk, it was noted that appropriate controls are in place that should prevent or detect cross-contamination of samples. For example, prevention of cross-contamination is addressed through decontamination procedures and proper analyst technique and detection of contamination is addressed through analysis of negative controls. Positive controls containing target DNA and negative controls containing no DNA are included with each PCR assay. Negative controls containing non-target DNA are not routinely included since the laboratory has previously demonstrated assay specificity using non-target DNA. The auditors did note that, in effect, negative field samples might serve this purpose if the laboratory were to quantify DNA concentrations for these samples. It was noted that the quality of the agarose gel photographs should be improved in order to better document results.

The audit team and laboratory staff discussed the rationale and procedures used to interpret and report analytical results, as well as the corrective actions that should be implemented should any PCR control fail. The laboratory currently reports a positive sample result only if: 1) an appropriate gel band is observed in one or more replicate reactions; 2) all controls associated with the sample, including cooler blanks, trip blanks, equipment blanks and method blanks, provide an appropriate response; and 3) all controls associated with the PCR assay, including positive and no-template negative controls, exhibit the appropriate response. Conversely, negative sample results are reported when a PCR product is not observed as a distinct gel band and PCR controls exhibit appropriate responses. In the event that any control sample fails to exhibit the appropriate response, all sample results associated with that failed QC sample are invalidated. Positive samples are reanalyzed to confirm initial results (i.e., target DNA detection). The audit team believes that this is a rational approach but noted that sequence analysis confirmation of PCR products from positive water samples would provide increased confidence in the results. Several approaches for PCR product confirmation and results reporting were recommended and are described in Section 3.3.

2.5 PCR METHOD EVALUATION

The audit team recognizes that, given the novelty associated with application of eDNA technology, prospective risk managers and decision-makers require accurate assessments of the uncertainties associated with the method. In particular, it is critical for these stakeholders to understand the likelihood of both false positive and false negative results. The auditors consider the potential for false positive results (report of positive detection when, in fact, there is no silver and bighead carp eDNA in the sample) to be minimal, based on assessment of the eDNA protocol and observation of QC procedures implemented by the Lodge laboratory to monitor ongoing method performance. Studies to evaluate method specificity were conducted by the laboratory during method development and were provided to the audit team during the site visit. Subsequent to the audit visit, all eDNA primers were subjected to independent *in silico* sequence analysis to determine the potential for non-target primer binding and amplification (i.e., PCR assay specificity). These results are discussed below.

Method Specificity

During the audit, Dr. Mahon presented an overview of studies conducted by the laboratory to assess method specificity. The laboratory has evaluated the species-specificity of both PCR assays (silver and bighead carp) using sequence homology comparisons between PCR primers and potential non-target DNA templates, including those likely to be encountered in the sampling areas. These *in silico* analyses predict that primer specificity for both assays is sufficient to eliminate false positive results due to mis-priming and amplification of non-target sequences. The laboratory has also empirically evaluated primer specificity for both PCR primer sets by using DNA templates extracted from tissue of non-target fish species likely to be encountered in the sampling areas and demonstrating no amplification of non-target DNA (i.e., false positive results). Additional species-specificity was demonstrated between the silver and bighead carp PCR assays indicating that the primer sets discriminate between these two related Asian carp species.

Subsequent to the audit visit, all eDNA primers were subjected to independent *in silico* analysis to determine the potential for non-target primer binding and amplification. The audit team Technical Lead, John Darling, was provided with a sequence alignment file consisting of the four eDNA primers (i.e., forward and reverse primers specific for the silver carp *Hypophthalmichthys molitrix* and the bighead carp *H. nobilis*), along with non-target DNA sequences from *Ctenopharyngodon idella* (grass carp), *Mylopharyngodon piceus* (black carp), and *Cyprinus carpio* (common carp). Primers were individually subjected to analysis using the Basic Local Alignment Search Tool (BLAST) provided by the National Center for Biotechnology Information (NCBI). Searches of the non-redundant nucleotide (nr/nt) GenBank sequence database were conducted using the "blastn" option and search parameters were automatically adjusted to search for short input sequences.

In no case was there evidence for a non-target template with high degrees of homology to both forward and reverse eDNA primers that would raise concerns regarding the potential for non-specific amplification. In a number of cases, one member of the eDNA primer pair (either forward or reverse) did show very strong homology, in some cases 100%, with non-target templates in GenBank. In many cases, these non-targets were cyprinid species not expected to occur in the areas being sampled. Moreover, none of these non-targets showed sufficient homology to both forward and reverse primers to warrant concern regarding the possibility of false positive amplifications. However, the auditors note that even in the absence of non-specific amplification, detection of the target template could be influenced by the presence of non-target templates capable of competing for one of the primers in the polymerase chain reaction. Specifically, if large excesses of non-target template were present and that template were capable of binding one member of the eDNA primer pair, the efficiency of target template amplification could be reduced with resulting reduction in detection sensitivity, even if non-target template were not amplified exponentially. The audit team recommends consideration of this issue in future method development (see Section 3 Recommendations).

As with any PCR-based detection method, it is impossible to entirely eliminate the possibility of individual false positive detections. However, the procedures which were reviewed during the audit ensure that this possibility is minimized for water samples analyzed by the laboratory and provide confidence that the reported spatial and temporal pattern of positive detections is a reliable indicator of the presence of silver and bighead carp eDNA in the sampled region.

The audit team was unable to assess method sensitivity and the potential for false negative PCR results (failure to detect Asian carp eDNA when it is present in the sample), because the laboratory has not yet conducted the experiments necessary to estimate sensitivity limits of the eDNA detection protocol for either species of Asian carp.

2.6 QUALITY SYSTEMS

The laboratory does not currently operate a formal quality system but conducts all phases of the eDNA surveillance project in accordance with the cooperative research agreement between the laboratory and the USACE. It should be noted that this agreement does not stipulate specific sampling plans or analytical procedures. The laboratory has developed and adopted project-specific quality control procedures related to sampling, sample processing, and sample analysis as detailed in an interim quality assessment report (report title in Appendix C, "eDNA update QAQC overview.pdf") and described above. The laboratory director and all project leads review project data including QC results.

Audits of laboratories supporting EPA projects typically involve review of laboratory statements of work, quality assurance project plans (QAPPs), and standardized sampling and analytical protocols. Due to the research focus of the laboratory, the funding agreements, and the nature of the project that involves recently developed and novel eDNA methodology, these formalized documents are not applicable. The audit team recommends that the laboratory prioritize formal documentation of quality systems and method procedures (see Section 3 Recommendations).

3.0 RECOMMENDATIONS

The audit team provided several recommendations to the Lodge laboratory during the audit debrief. It is important to note that these recommendations are primarily intended to address issues related to potential false positive results since method sensitivity and the potential for false negative results cannot presently be evaluated. The auditors recognize that some of the recommendations discussed below, particularly those pertaining to procurement of additional equipment, may not be feasible with available resources and may require additional funding. Recommendations regarding documentation of laboratory procedures and activities are intended to enhance method reproducibility and tracking of sample processing and analysis. Specific recommendations are presented below.

3.1 LABORATORY FACILITIES

The audit team recognizes that the laboratory is not solely dedicated to the eDNA surveillance project. The following recommendations are intended to optimize the use of existing resources while minimizing procurement of additional project-specific equipment:

- Improve isolation and unidirectional workflow of critical sample processing and analytical procedures, notably pre- and post-PCR procedures. The laboratory should consider conducting the sample preparation for gel analyses in the same room that gel sample analyses are conducted to minimize the potential for product contamination of areas where PCR set up and reaction assembly is conducted. Auditors also recommend the use of a dedicated PCR workstation or hood that can be sterilized and decontaminated and used for preparing PCR reagents and assay setup.
- Improve isolation of samples (filters and purified sample DNA) and reagents (PCR assay components including primers) either by enhancing secondary containment or storing them in separate freezers.
- Control access to common reagent and sample storage freezers and refrigerators to avoid unintentional handling of critical materials and to avoid excessive temperature fluctuations of sensitive reagents or samples.
- Equip refrigerators and freezers with thermometers, preferably external (and establish a routine temperature monitoring system), and temperature alarms to indicate a system failure that might compromise reagent or sample integrity.
- Procure an ultra-low temperature freezer for long-term storage of samples and reagents or identify an existing secure storage facility.
- Procure a high quality gel viewing (UV light box) and photographic system to improve the quality of agarose gel photographs (i.e., photographic documentation of results).
- Consider adopting a system for the densitometric analysis of photographs documenting PCR results (agarose gel bands). Both open source and commercial software for such analysis are available and would aid in standardizing interpretation of PCR products.

3.2 FIELD SAMPLING PRACTICES

As stated in Section 2.3, the team did not observe an actual sampling event but did receive a comprehensive overview and presentation of sampling practices during the audit. The audit team did not provide recommendations for sampling procedures because these activities appear to be optimal given the nature of the eDNA sampling efforts. The only notable comment regarding field sampling practices involves sampling design, specifically, the obvious importance of resampling in strategic areas to provide the spatial and temporal patterns of eDNA detection that are critical to inform and implement management actions and enhance confidence in the significance of positive eDNA results. The audit team also noted that opening and closing the cooler blanks in the field would provide additional confidence in these controls.

3.3 eDNA METHODOLOGY

The audit team recommends that future development and implementation of the eDNA method, whether in the Lodge laboratory or elsewhere, should include the following additional procedures to further enhance data reliability and method reproducibility:

- Consider procuring additional micropipettes and dedicate these to specific procedures (e.g., pre- and post-amplification procedures) to further minimize risk of laboratory contamination due to sample or PCR product carry-over.
- Consider the use of aerosol-barrier pipette tips for all sample processing and PCR (pre- and post-amplification) procedures.
- Consider the use of disposable supplies (funnels and filters) for sample filtration to eliminate the need to decontaminate filtration funnels between samples and the need to prepare equipment controls (method blanks) prior to each sample filtration.
- Increase the frequency of analyses of negative (DNA) controls using quantified field sample DNA. This would serve to confirm that no non-specific template amplification is occurring, and would thus complement no-template negative controls. Alternatively, the amount of DNA in a small percentage (perhaps 5%) of samples could be quantified; negative PCR results from samples containing DNA would serve as adequate negative (DNA) controls.
- Develop standardized definitions and reporting procedures for sample results that facilitate management decisions and actions. For instance, the laboratory should consider standardizing definitions of negative, presumptive positive, and verified positive categories for reporting sample results.
- Develop and document a standard approach for interpretation of PCR results (gel band visualization). This approach might include standardization of conditions for electrophoresis, visual examination and interpretation of gels by two or more trained analysts and/or densitometric scanning of gel photographs and comparison with established standards for gel band density and size.
- Develop formal processes for verification of presumptive positive results. These might include amplification of larger sample volumes and re-amplification of PCR reactions/products. Sequencing is a powerful confirmation tool, therefore the frequency of verification of all "presumptive" positive PCR products by DNA

sequence analysis also should be increased to ensure product authenticity. The auditors recognize the challenges associated with PCR product recovery and sequencing. Increased frequency of sequence verification could be accomplished in several ways including cloning PCR products followed by sequencing or reamplifying and sequencing PCR products. In addition, retrospective sequencing of archived positive samples would increase confidence in the specificity of the eDNA amplification protocol.

3.4 QUALITY SYSTEMS

Although formal quality system documentation was not required by the cooperative agreement governing the project and not in place at the laboratory, QC practices and procedures have been implemented for field and laboratory activities. The laboratory staff understands the need for QC, as shown in the conscientious development and implementation of a variety of QC procedures and evaluations to minimize false positives. While the audit team is confident that, in principle, the results reported by the Lodge laboratory could be reproduced independently by other laboratories, it finds that the documentation of field and laboratory activities was not sufficient to serve as a sole guide for independent method reproduction. This documentation, as well as the documentation for the quality system, should be improved, especially if the method becomes a major decision-making tool for management. A documented quality system will help ensure consistent implementation of procedures over time and in the event of staff changes. To strengthen and document the laboratory quality system, the auditors recommend the following general quality system improvements:

- Develop and maintain detailed SOPs for all routine field and laboratory procedures (including vendor-supplied protocols) associated with the project.
- Document staff training for technicians/analysts.
- Document supervision of analysts/technicians (e.g., by having the supervisor or mentor co-sign laboratory notebooks).
- Improve documentation of routine laboratory activities including documentation of reagent use (e.g., by recording lot numbers of primers, polymerase, extraction kit components).
- Provide more detailed documentation of PCR setup and gel analyses with respect to mapping positions to sample ID.
- Describe the laboratory quality system and practices in a general laboratory operations manual or quality management plan.
- Develop a project-specific quality assurance project plan (QAPP).
- Use laboratory notebooks with permanently bound pages designed to withstand bench conditions and designed to be archived.

4.0 CONCLUSIONS

Based on the information reviewed and the observations made during the 2-day on-site audit, the auditors believe that the protocols utilized by the Lodge laboratory group to detect environmental DNA (eDNA) from silver and bighead carp in water samples are reliable. Consistent with these findings, the brief statement below was provided to the laboratory during the audit debrief:

> *"Our team believes that the eDNA method you are using is sufficiently reliable and robust in reporting a pattern of detection that should be considered actionable in a management context. We have a high degree of confidence in the basic PCR method you are using for detecting silver and bighead carp environmental DNA."*
> EPA Audit Team of Lodge Laboratory at the University of Notre Dame, December 16, 2009

Despite recommendations in this audit report for future method development and quality system improvement, the auditors express overall confidence in the reliability of the eDNA protocol implemented by the Lodge laboratory. The audit team thus encourages the laboratory to continue its important work in developing, validating, and applying eDNA methodology for surveillance of silver and bighead carp and other invasive aquatic species. The laboratory intends to publish these results and the audit team strongly encourages the laboratory to do so. Publication will provide an additional forum to evaluate and improve the sampling and analytical procedures.

APPENDIX A

Letter to the Lodge Laboratory at the University Of Notre Dame
from the U.S. EPA Great Lakes National Program Office
Confirming Intent for the Audit

(2 pages)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
GREAT LAKES NATIONAL PROGRAM OFFICE
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

December 10, 2009

David Lodge
Director, Center for Aquatic Conservation
Department of Biological Sciences
University of Notre Dame
Galvin Life Sciences Center
P.O. Box 369
Notre Dame, Indiana, 46556-0369 USA

Dear Dr. Lodge:

This letter confirms the U.S. Environmental Protection Agency's (EPA) plans to conduct a laboratory audit of the Lodge Laboratory in the Department of Biological Sciences at the University of Notre Dame on December 15 and 16,2009. These visits will be conducted by the EPA Great Lakes National Program Office (GLNPO) and EPA Office of Research and Development (ORD). The purpose of the audit is to review the environmental DNA (eDNA) surveillance method employed by the laboratory to detect Asian carp DNA in water samples. Specifically, the goals of the audit include:

1. Providing an independent assessment of method performance and reliability by observing and evaluating sampling and analytical procedures and laboratory processes;
2. Assessing if there is sufficient documentation of the sampling and analytical procedures to facilitate reproduction of the procedures by another laboratory; and
3. Providing a forum for discussion and possible recommendations pertaining to laboratory procedures and quality systems.

The audit will be conducted by the following EPA staff from GLNPO and ORD assisted by GLNPO's contractor, CSC:

- Louis Blume, GLNPO Quality Manager and Audit Team Lead
- Margie Vazquez, National Exposure Research Laboratory, Ecological Exposure Research Division, Quality Assurance Manager and Audit Team Co-Lead
- John Darling, National Exposure Research Laboratory, Molecular Ecology Research Branch, Audit Technical Lead
- John S. Chandler, CSC, Senior Biochemist and Audit Technical and QA Support

Printed on Recycled Paper

Additionally, Kelly L. Baerwaldt of the ACOE will be attending the audit with us as an observer. We plan to arrive at the lab at 8:30 AM on Tuesday, December 15,2009 and depart no later than 3:00 PM on Wednesday, December 16,2009. The audit will focus on the following areas of laboratory operations:

- Technical Systems
- Laboratory Facilities
- Laboratory Documentation
- Reagents and Standards Preparation
- eDNA Sampling and Analysis

Thank you for providing the draft schedule for the visit per our discussion on December 7th. We are pleased at the laboratory's suggestion to process a few samples while we are visiting and very much appreciate the effort and willingness to support the audit. We reviewed the agenda you drafted based on our discussion and have no changes.

Attached to this letter please find a series of audit checklists that we will be using to guide the audit. Prior to the visit, we also are interested in receiving additional documentation if available: 1) the Research Plan, the Project Work Plan or quality assurance project plan (QAPP) if produced and 2) the SOP for eDNA processing and analysis.

Thank you for your cooperation. If you have any questions prior to the visit, please do not hesitate to contact me at Blume.Louis@epa.gov or 312-353-2317 or alternatively on my cell phone at 773-230-2715.

Sincerely yours,

L J Blume 12/10/09

Lonis Blume
GLNPO Quality Manager

Attachments: Technical and Quality Systems Audit Checklist
Signed Confidentiality Agreement
Draft Agenda

cc: Margie Vazquez, US EPA, National Exposure Research Laboratory
John Darling, US EPA, National Exposure Research Laboratory
John S. Chandler, Computer Sciences Corporation
Kelly Baerwaldt, US Army Corp of Engineers
Paul Horvatin, US EPA, GLNPO
Bill Bolen, US EPA, GLNPO

APPENDIX B

Schedule for the Laboratory Audit of the
Center for Aquatic Conservation Lodge Laboratory

(1 page)

Schedule for EPA visit to Center for Aquatic Conservation Lodge Lab

EPA group arrives Monday evening to hotel.

Tuesday morning:

8:30am: Meet in Galvin Life Sciences (Room 180) for introductions and coffee

9:00am: Begin presentation by Mahon, Chadderton, Lodge on overview of processes involved in the lab's work.

10:00am: Begin lab experiment demonstration (field sample collection and water filtration; Chadderton Mahon)

12:00pm: Lunch

1:00pm: Begin lab experiment demonstration (DNA extractions; Mahon)

2:30pm: Begin lab experiment demonstration (PCR reactions; Mahon)

3:30pm: Jerde presentation (data)

4:30pm: EPA private meeting time for discussion

6:00pm: Dinner

Wednesday morning:

8:30am: Meet in Lodge lab (Galvin Life Sciences 180) for lab experiment presentation on gel electrophoresis preparation and sample loading (Mahon)

9:30am: View experimental gel results (Mahon)

10:00am: Question and answer session with ND and EPA personnel

11:00am: EPA private meeting time for discussion

12:30pm: Lunch

1:30pm: Final review session and comments

3:00pm: EPA departs Notre Dame

APPENDIX C

Checklist of Documents Regarding eDNA Analysis from the Lodge Laboratory

(1 page)

Note: Document submitted by University of Notre Dame Lodge Laboratory to Louis Blume of U.S. EPA Great Lakes National Program Office on December 8, 2009.

Checklist of documents regarding eDNA analysis from the Lodge Lab

All documents except public presentations and fact sheets are Confidential Business Information. Do not distribute documents without authors' approval. All files should be in pdf format. If your files are missing any of the below documents, contact Christopher Jerde (cjerde@nd.edu).

Reports

- ☐ eDNA update 11-23-09.pdf
- ☐ eDNA update QAQC overview.pdf
- ☐ eDNA update 11-18-09.pdf
- ☐ eDNA update 11-6-09.pdf
- ☐ eDNA update 10-23-09.pdf
- ☐ eDNA update 10-8-09.pdf
- ☐ eDNA update 9-25-09.pdf
- ☐ eDNA update 9-17-09.pdf
- ☐ eDNA update 9-16-09.pdf
- ☐ eDNA update 9-11-09b.pdf
- ☐ eDNA update 9-11-09a.pdf
- ☐ eDNA update 9-4-09.pdf
- ☐ eDNA update 8-10-09.pdf
- ☐ eDNA update 8-18-09.pdf

Presentations

- ☐ eDNA-USACE Rapid Response Panel Nov 2009.pdf
- ☐ eDNA-Mississippi River ANS panel Oct 2009.pdf (will be available at December meeting, 36MB)

Proposals

- ☐ 3. CESU eDNA flume.pdf
- ☐ 2. CESU eDNA surveillance.pdf
- ☐ 1. CESU Risk Assessment.pdf

Other

- ☐ eDNA fact sheet 9-17-09.pdf
- ☐ eDNA fact sheet 8-27-09.pdf
- ☐ eDNA fact sheet 6-17-09.pdf

Note: The Audit team also received the report "eDNA update 10-05-09.pdf".

APPENDIX D

Technical and Quality Systems Audit Checklists

(11 pages)

Lab Name: University of Notre Dame, Center for Aquatic Conservation (Lodge Laboratory)

Project Title: <insert title>

Audit Cover

The audit of the above-named facility is supported by the following checklists (attached):

- Technical Systems Audit Checklist
- Laboratory Facilities Audit Checklist
- Laboratory Documentation Audit Checklist
- Reagents and Standards Preparation Audit Checklist
- eDNA Sampling and Analysis Audit Checklist

Auditor	Affiliation

Laboratory Staff Participants:

Role	Name	Years Experience
Project Manager		
Analysts/Technicians		
Reagent Preparation		
Sample Processing		
Sample Analysis		
Samplers		
Data Interpreter		
Sample Custodian		
Data Reporter		
QA Officer		
Others		

Lab Name: University of Notre Dame, Center for Aquatic Conservation (Lodge Laboratory)

Project Title: <Insert title>

Technical Systems Audit Checklist

REVIEW QUESTIONS	RESPONSE		COMMENTS
	YES	NO	
A. Personnel Qualifications			
1. Do all personnel assigned to this project (**project name**) have the appropriate level and type of experience to accomplish the project objectives?			
2. Does the laboratory document project related personnel training/mentoring?			
3. Does the project director communicate project objectives, results, and research planning with project staff?			
4. Is the laboratory adequately staffed to meet project requirements in a timely fashion?			
5. Does the project have a designated QA Officer?			
6. Does the QA Officer report to senior management?			
7. Was the QA Officer available during the audit?			
B. Quality Management Systems			
1. Is there a written and approved protocol, research plan, or work plan for this study?			
2. Is there a written and approved Quality Assurance Project Plan (QAPP) or QA narrative Statement for this study? If not, briefly describe how/where QA & QC requirements and procedures for the study are documented.			
3. Is the QA manual/Plan up to date (less than 3 years old)?			
4. Is the QA manual/Plan available to all staff and are all project staff familiar with the QA manual/Plan?			
5. Does the QA manual/Plan address critical elements of a QA/QC program, including the following? ➢ Personnel ➢ Facilities and equipment ➢ Operation/Calibration/Maintenance of equipment ➢ Operation/Calibration/Maintenance of instruments			

Lab Name: University of Notre Dame, Center for Aquatic Conservation (Lodge Laboratory)

Project Title: <Insert title>

REVIEW QUESTIONS	RESPONSE		COMMENTS
	YES	NO	
➢ Documentation of procedures ➢ Data validation ➢ Feedback and corrective actions ➢ Record keeping ➢ Internal audits			
6. Are QA/QC responsibilities and reporting relationships clearly defined?			
7. Are all laboratory standards "traceable?"			
8. Do QC records indicate corrective action when results fail to meet QC criteria?			
9. Do supervisory personnel review data and QC results?			
10. Has the laboratory performed internal audits to ensure the QA Plan is followed? If so, describe results and corrective actions taken.			
11. Have any of the following external or self-assessments been conducted or planned for the components of this study (e.g., support facilities, data management procedures)? If yes, briefly describe. ➢ Peer review ➢ Surveillance/site visit ➢ Technical systems audit ➢ Performance evaluation ➢ Data quality assessment			
C. Problem Resolution			
1. Has a person been designated to follow-up on previously identified problems?			
2. Has a time frame been stipulated for resolving problems?			
3. Does the laboratory document problem resolution and corrective actions?			

Additional Comments: _____

_____

_____

Lab Name: University of Notre Dame, Center for Aquatic Conservation (Lodge Laboratory)

Project Title: <Insert title>

Laboratory Facilities Audit Checklist

REVIEW QUESTIONS	RESPONSE		COMMENTS
	YES	NO	
1. Does the laboratory have adequate workspace to accommodate analysts and work flow?			
2. Does the laboratory provide physically separate areas for reagent preparation and storage?			
3. Does the laboratory provide physically separate areas for sample processing and sample storage?			
4. Does the laboratory provide physically separate areas for PCR amplification and post-amplification product detection? Note: Describe laboratory "work flow."			
5. Does the laboratory utilize biological safety cabinets to isolate or contain specific procedures? If so, describe below.			
6. Does the laboratory have a source of reagent-grade water?			
7. Do records exist for monitoring laboratory water systems?			
8. Are all analytical balances located away from drafts and areas subject to rapid temperature changes or vibration?			
9. Do balances have calibration stickers indicating last certified calibration and date of next scheduled calibration?			
10. Are balances routinely checked with class S weights before each use (or daily) and the results recorded in a logbook?			
11. Is the laboratory maintained in a clean and organized manner?			
12. Is there a separate area for cleaning glassware?			
13. Are adequate glassware cleaning procedures used and posted in that area?			
14. Are adequate secured facilities provided for the storage of samples, sample extracts, reagents/standards, including cold storage?			

Lab Name: University of Notre Dame, Center for Aquatic Conservation (Lodge Laboratory)

Project Title: <Insert title>

REVIEW QUESTIONS	RESPONSE		COMMENTS
	YES	NO	
15. Are the temperatures of cold storage units recorded daily in logbooks?			
16. Are appropriate chemical/biological waste disposal policies/procedures followed?			
17. Is the laboratory secure?			

Additional Comments: _____

Laboratory Documentation Checklist

REVIEW QUESTIONS	RESPONSE		COMMENTS
	YES	NO	
A. Sample Tracking			
1. Is a sample custodian designated?			
2. Are the sample custodian's procedures and responsibilities (e.g., sample receipt, storage, disposition, and disposal) documented? If yes, where are these documented (SOP # or location)?			
3. Are sample chain-of-custody procedures documented? If yes, where are these documented (SOP# or location)?			
4. Are there written procedures for compiling and maintaining sample documentation? If yes, where are these documented (SOP # or location)?			
5. Does the laboratory provide "blind" samples to the analysts? If so, how are these samples coded and tracked?			
B. Analysis Control			
1. Do all project personnel have access to SOPs for all of the required project activities? If yes, where are these SOPs located?			
2. Are all SOPs updated and indicate appropriate version control?			
3. Are staff conducting operations according to project SOPs? If not, are modifications noted in the lab notebook?			
4. Is a logbook maintained for each instrument indicating calibration data and maintenance records?			
5. Do analysts record bench data in a neat and accurate manner?			
6. Are QA/QC procedures documented and available to analysts?			
7. Are there specific formats (e.g., paper, photographs, electronic) for recording bench data? If yes, describe.			
8. Can the analyst who recorded (entered) data and the date of data entry be identified?			

Lab Name: University of Notre Dame, Center for Aquatic Conservation (Lodge Laboratory)

Project Title: <Insert title>

REVIEW QUESTIONS	RESPONSE		COMMENTS
	YES	NO	
C. Documentation/Notebooks			
1. Are permanently bound notebooks with preprinted, consecutively numbered pages used to record daily analytical procedures, details, and results?			
2. Are all entries in the notebooks signed, dated, and legible?			
3. Are changes to notebooks dated and initialed by the person who made the change?			
4. Are all notebook entries made using ink?			
5. Are any inserts (e.g., photographs, computer printouts) permanently affixed to the notebook and signed across insert edge and page?			
6. Has the supervisor of the individual maintaining the notebook personally examined and reviewed the notebook periodically, and signed with the date and appropriate comments as to whether or not the notebook is being maintained properly?			
D. Data Handling			
1. Can data be tracked from the point of generation to the final result?			
2. Are data that are manually entered into a computer checked by a second person?			
3. Do project files identify specific instrumentation/ reagents/standards used to generate results?			
4. Are data calculations checked by a second person? If yes, are these checks documented?			
5. Is there a project/run tracking/filing system in place?			
6. Are there written procedures for data receipt, storage, and retrieval?			
7. Are data archived in a retrievable fashion?			
8. Are all data and records retained for the required project-specified amount of time?			
9. Do records indicate any corrective actions that have been taken regarding project data?			

Additional Comments: _____

Reagents and Standards Audit Checklist

REVIEW QUESTIONS	RESPONSE		COMMENTS
	YES	NO	
1. Are all reagents, chemicals, and standards of reagent grade or higher purity (e.g., molecular or PCR grade)?			
2. Is the following information documented for all reagents/standards used? ➢ Manufacturer ➢ Date of receipt ➢ Date opened ➢ Lot number ➢ Expiration date			
3. Does the laboratory document the preparation of reagents/standards and uniquely identify sources, methods of preparation, preparer, and date of preparation?			
4. Are reagents/standards stored separately from samples or sample extracts?			
5. Are reagents/standards replaced at appropriate intervals?			
6. Are all reagents/standards stored properly?			

Additional Comments: _____

eDNA Sampling and Analysis Audit Checklist

REVIEW QUESTIONS	RESPONSE		COMMENTS
	YES	NO	
A. Sample Collection			
1. Are sterile sampling supplies (e.g., bottles, carboys) provided by the laboratory to the sample collection teams? If yes, indicate below how sterility/sanitization is achieved and monitored?			
2. Are sample containers properly labeled (describe)?			
3. Do sampling personnel conduct sampling according to a SOP? If yes, where are the SOPs documented (SOP # or location)?			
4. Are sampling teams adequately trained to conduct environmental sampling? If yes, describe training/experience.			
5. Are specific anti-contamination procedures used during sampling? If yes, describe these procedures.			
6. Are sampling plans (e.g., locations, number and volume of samples, etc.) developed, documented, and communicated prior to deploying sampling teams? If yes, describe.			
7. Are samples packaged and transported properly to avoid damage or loss of sample integrity? If yes, describe.			
8. Are QC samples (trip blanks, cooler blanks) provided to the sampling teams?			
9. Are sample documentation and chain of custody procedures used for each sampling episode (describe)?			
10. Are samples delivered to the laboratory sample custodian or secure sample receipt area in a timely fashion (describe)?			
B. Sample Filtration			
1. Does the laboratory have documented procedures for filtration of water samples? If yes, where are these procedures documented (SOP # or location)?			

REVIEW QUESTIONS	RESPONSE		COMMENTS
	YES	NO	
2. Does the laboratory include sample processing controls (e.g., filtration blanks) with each filtration series (describe)?			
3. Does the laboratory include a positive control with each filtration series (describe)?			
4. Is sample filtration conducted in an isolated area to reduce the risk of contamination?			
5. Are specific anti-contamination procedures used during sample filtration? If yes, describe these procedures.			
C. Filter (DNA) Extraction/DNA Purification			
1. Does the laboratory have documented procedures for filter extraction and DNA purification? If yes, where are these procedures documented (SOP # or location)?			
2. Does the laboratory include positive and negative controls (DNA) during filter extractions?			
3. Are filters stored prior to extraction (describe)?			
4. Is filter extraction conducted in an isolated area to reduce the risk of contamination?			
5. Are filter extracts stored prior to purification (describe)?			
6. Is DNA purification conducted in an isolated area to reduce the risk of contamination?			
7. Are purified DNA samples stored prior to PCR analyses (describe)?			
8. Are specific anti-contamination procedures used during filter extraction/DNA purification? If yes, describe these procedures.			
D. PCR Analysis			
1. Does the laboratory have documented procedures for PCR analyses? If yes, where are these procedures documented (SOP # or location)?			
2. Are all stages of PCR reaction setup isolated in order to reduce the risk of contamination (describe)?			

Lab Name: University of Notre Dame, Center for Aquatic Conservation (Lodge Laboratory)

Project Title: <insert title>

REVIEW QUESTIONS	RESPONSE		COMMENTS
	YES	NO	
3. Are specific anti-contamination procedures used during PCR setup? If yes, describe these procedures.			
4. Does the laboratory include appropriate positive and negative DNA controls as well as no template controls (NTC) with each PCR run (describe)?			
5. Does the laboratory conduct all post-amplification procedures in an isolated area with dedicated equipment (e.g., micropipettors) and consumables to minimize the risk of intra-lab contamination with PCR product?			
6. Does the laboratory have standard procedures and specific criteria for interpreting results from agarose gels (describe)?			
7. Does the laboratory have specific protocols to address potential false positive results (describe)?			
8. Does the laboratory verify all presumptive positive results (describe)?			
E. PCR Method Issues – Discussion and Recommendations			
as needed			

Additional Comments: _____

APPENDIX E

Memorandum from the Lodge Laboratory to the EPA Audit Team
Regarding Progress in Implementing Quality Recommendations

(4 pages)

CENTER FOR AQUATIC CONSERVATION

4 February 2010

TO: Louis Blume and members of the EPA audit team

FROM: David M. Lodge
Andrew R. Mahon
Christopher L. Jerde
W. Lindsay Chadderton

RE: Progress in implementing quality recommendations

We wanted to thank you for such a constructive and helpful audit, and to update you on our progress in implementing changes to our environmental DNA quality assurance and quality control protocols since your visit on December 15-16, 2009.

Since your visit and evaluation of our protocols, the following changes have been implemented:

1) Laboratory notebook inspections are conducted each week by supervisor and notebooks are initialed and dated.
2) Laboratory notebooks are all permanently bound.
3) Laboratory notebook records include chemical lot numbers from all supplies utilized in our protocols.
4) Laboratory notebooks are photocopied monthly and copies are stored by supervisor.
5) A gel documentation binder is kept by the UV-light box. Each sample's test result (positive/negative) and where the sample was located on the PCR plate are recorded. This binder is also copied monthly and the copies are stored by Mahon.
6) We have formalized our QA/QC protocols depicted in the flowchart amended to the end of this memorandum (Figure 1a,b). These procedures include the recommended "Presumptive positive" and "Confirmed positive" designations.
7) We have drafted our Standard Operating Procedures and they are currently being edited. A lab manual of procedures and training is forthcoming.
8) We have initiated a policy that 5-10% of all positive samples positive for Asian carp and any sample that tests positive from a new location or a location that is of importance to management agencies is gel extracted and sequenced. We are pursuing funding to sequence additional samples in our archive.

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9) Data cross checking has begun. We currently have three data files: the field data, an excel data file, and a Google Earth file. Any discrepancies are being flagged and will be reconciled. The technician tasked with the comparison did not enter the data into the electronic databases, ensuring an internal, yet independent, check of the data.

Additionally, we have requested funds (various cooperative agreements, expanded SOWs, and grants) to move forward on the following:

1) Using aerosol pipette tips for our procedures.
2) Obtaining multiple sets of pipettes so we do not cross pipettes from one step of the eDNA procedures to another (i.e. separate sets for DNA extraction, PCR, and gel electrophoresis)
3) Improving photo-documenting equipment
4) Increased proportion of samples sequenced
5) Purchase of disposable collection bottles

We thank you for helping us improve our eDNA surveillance quality assurance.

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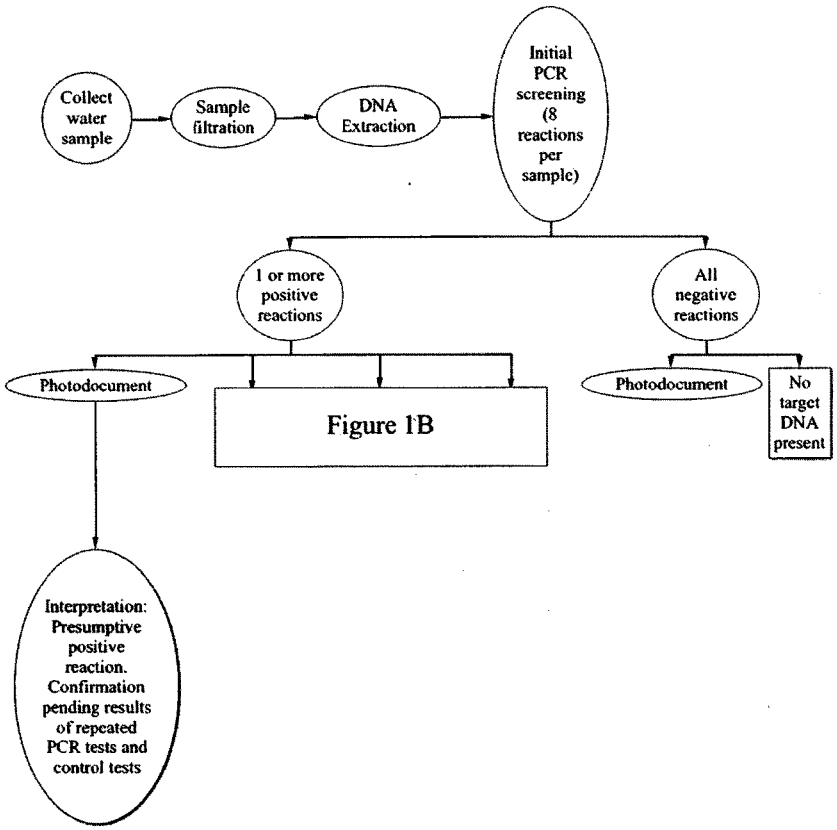

Figure 1a. QAQC flowchart implemented for eDNA surveillance research.

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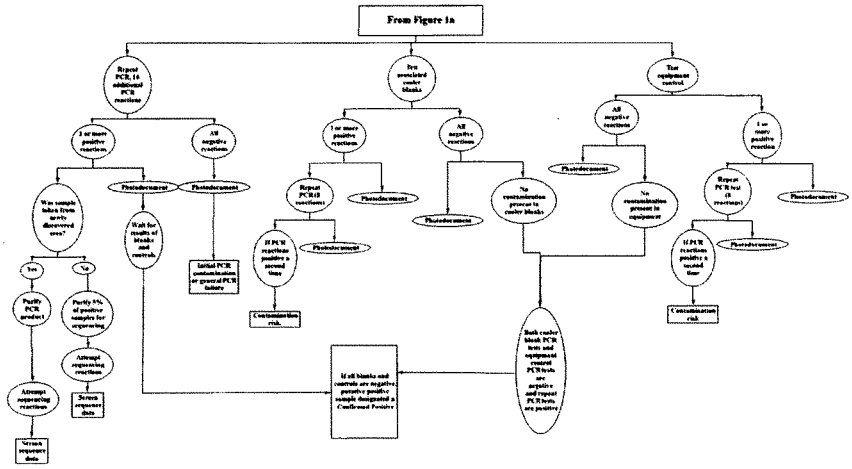

Figure 1b. QAQC flowchart implemented for eDNA surveillance research.

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS

STATEMENT OF:
MAJOR GENERAL JOHN PEABODY
COMMANDER, GREAT LAKES AND OHIO RIVER DIVISION
U.S. ARMY CORPS OF ENGINEERS

BEFORE:
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
UNITED STATES HOUSE OF REPRESENTATIVES

ON

ASIAN CARP AND THE GREAT LAKES

FEBRUARY 9, 2010

Madam Chair and members of the Subcommittee, I am Major General John Peabody, Commander of the Great Lakes and Ohio River Division, U.S. Army Corps of Engineers. Thank you for the opportunity to testify about ongoing efforts to address the risk to the Great Lakes posed by the migration of two species of Asian carp, the silver and bighead, through the Chicago Area Waterway System. Asian carp represent a grave threat to the Great Lakes fisheries and aquatic resources, including those managed by the National Park Service in areas such as Sleeping Bear Dunes National Lakeshore, Isle Royale National Park and Apostle Islands National Lakeshore. The Army Corps of Engineers (Corps) remains committed to use all available authorities, capabilities, and resources to combat this invasive species. The Corps cannot do this on its own, but continues to work intensively with, and leverage the full capabilities of Federal, State, provincial, bi-national, and municipal agency partners. I would like to briefly describe the Corps of Engineers' role in this important effort, current actions that the Corps is taking, plans for the immediate future and near term, as well as the Corps' longer term strategy.

The Corps' principal role in this effort has been to address potential migration of Asian carp via the most direct pathway, the Chicago Sanitary and Ship Canal, by building, operating, and improving the electrical dispersal barrier system at Romeoville, Illinois. This fish barrier is the largest fielded operational electrical dispersal barrier in the world and constitutes a complex and dynamic project with significant research and development components. It currently consists of two separate barriers, Barrier 1 and Barrier 2A, with a third, Barrier 2B, under construction. Barrier 1 was built as a demonstration barrier for the purpose of preventing migration of the aquatic nuisance species from Lake Michigan into the Chicago Area Waterway System and has limited operational parameters. It has been operating at its design capacity since 2002. Today, Barrier 2A currently stands as the primary impediment to Asian carp migration. Corps of Engineers' laboratory testing shows that the operating parameters we are applying at Barrier 2A are effective at repelling Asian carp. However, we continue to research the optimal operating parameters and will make adjustments to Barrier 2A as research indicates. Any changes will be preceded by a thorough safety review in conjunction with the U.S. Coast Guard. American Recovery and Reinvestment Act

funds have accelerated construction of Barrier 2B by a year; construction is now scheduled to be completed this fall. This barrier will ensure redundancy in the system for maintenance and unexpected actions.

The electrical barriers must be turned off periodically for maintenance. The barrier maintenance, which took place in early December, was successfully completed thanks to the synchronized application of rotenone by the Illinois Department of Natural Resources and the cooperation of multiple federal, state, and provincial entities. Application of rotenone ensured that Asian carp would not pass through the barrier during the brief maintenance period. The single Asian carp discovered following this operation was found below the barrier system. This is an outstanding example of the multi-agency collaborative efforts necessary to be successful in this challenging effort.

It is important to recognize that the electrical barriers do not provide a guarantee that Asian carp will be prevented from entering Lake Michigan. Essential to the Corps' operation of the barriers are actions to ensure their efficacy and to address possible bypasses by Asian carp. Section 3061 of the Water Resources and Development Act of 2007 authorizes the Corps to carry out an "Efficacy Study" in order to develop recommendations for permanent solutions to Asian carp bypass scenarios as well as other potential barriers and impediments to Asian carp migration in the Chicago area. Recent authority, Section 126 of the 2010 Energy and Water Development Appropriations Act, allows the Secretary of the Army to approve measures recommended in the Efficacy Study and other emergency measures as necessary until October 28, 2010 – one year after passage of the bill.

Under these authorities, the Corps has already taken action to address possible bypass of the electrical barriers. On January 12, 2010, the Assistant Secretary of the Army (Civil Works) approved an interim report that recommended emergency measures to address potential bypasses of the barriers. The Corps plans to begin construction of those emergency measures this spring. The recommended structural solutions include installing specially designed fence and concrete barriers at locations along the Des Plaines River adjacent to the Chicago Sanitary and Ship Canal where bypass of the fish barrier could occur during flood events, such as the flooding that most recently occurred in September 2008. The Corps also plans to block flow through the Illinois and

Michigan Canal at the natural flow divide to prevent circumvention of the barrier via that pathway. The current schedule provides that construction will be completed by this fall. The Final Efficacy Study will evaluate other potential measures of improving the efficacy of the fish barrier in the Chicago Area Waterway System, such as additional electrical barriers or other types of behavioral barriers, controlling ballast water and other potential transit pathways, modified lock operations, and Asian carp population control. The study will be completed this fall. These critical activities are being funded through FY 2010 appropriations provided to the U.S. Environmental Protection Agency (EPA) for the interagency Great Lakes Restoration Initiative. In support of the Initiative, which includes invasive species prevention as one of its highest priorities, EPA allocated $13.5 million to the Corps for implementation of the recommended emergency measures and additional monitoring.

Monitoring Asian carp migration is an essential part of the inter-agency effort. As part of a comprehensive review of the Corps' activities begun in the Fall of 2008, we determined that the tools available at that time, principally netting and electro-fishing conducted primarily by our partner agencies, could tell us the locations where fish were likely located in abundance, but not necessarily how far they had migrated up the system in smaller numbers. As a result, the Corps canvassed the scientific community for alternative methods, and discovered the University of Notre Dame's environmental DNA (eDNA) research in May of 2009. The University's Dr. David Lodge, along with his team and partners from The Nature Conservancy, agreed to apply their emerging technology to assist us in our efforts to improve understanding of where Asian carp may be located.

Results of eDNA research are an important tool in our ability to confront this threat. Asian carp eDNA testing remains to be fully validated and results should be considered preliminary. Further, the identification of eDNA in a waterway cannot, at present, tell us such things as the size of any Asian carp population, how recently Asian carp have been there, whether the DNA came from a living or dead fish, or whether Asian carp tissue or DNA might have been transported in ballast or bilge water, or via other mechanisms, from some remote location. Because eDNA is a new approach to assessing the presence of Asian carp and is being applied operationally before

standard independent scientific review could occur, the Corps continues to collaborate with the University of Notre Dame to determine what eDNA does and does not tell us and continues to research how to improve the usefulness of this technology to inform management decisions. This effort is consistent with the Corps' policy of ensuring that its technical, engineering, and scientific work undergoes an open, dynamic, and vigorous review process to ensure confidence in our decisions and policy recommendations – especially when those decisions may have dramatic consequences. While eDNA is important to the overall effort it is important to recognize that it is a technique for improving our ability to detect the presence and map the distribution of Asian carp and not by itself a tool for prevention.

On January 27, 2010, the Corps received a summary Audit Report on the eDNA scientific process and the reliability of the testing and surveillance methods from the U.S. Environmental Protection Agency. Although the report made recommendations for future method development and quality system improvement, the U.S. Environmental Protection Agency auditors expressed overall "confidence in the reliability of the eDNA protocol implemented" by the University of Notre Dame laboratory. The Corps looks forward to intensely reviewing the final Audit Report to inform our judgments and additional research that may be needed.

Sampling by Dr. Lodge's team has returned positive results for DNA from silver and bighead Asian carp, the two species of concern, in various locations. Identification of Asian carp DNA in the Brandon Road pool in August 2009, which is just over 6 miles downstream of the electrical barriers, triggered the Corps' decision to increase the operating parameters of Barrier 2A. Between August and November 2009, all returned results for Asian carp sampled above the fish barrier were negative. On November 17, 2009 Asian carp DNA was reported as having been detected in the Cal-Sag Channel and Calumet River near the O'Brien Lock, in three areas ranging from 10 to 30 miles upstream of the fish barrier. An intensive fishing effort followed and although over 1,000 fish were caught near the O'Brien Lock, none of them were Asian carp. Recently, positive detections of Asian carp eDNA have also been reported north of the fish barrier near the Wilmette Pumping Station and lakeward of the O'Brien Lock. The Corps continues to consult with and rely upon the assessment of our partner agencies,

including the U.S. Fish and Wildlife Service, Illinois Department of Natural Resources, and the U.S. Environmental Protection Agency in evaluating these results.

In the meantime, the Corps of Engineers, working through the Asian Carp Regional Coordination Committee, is urgently developing additional measures to apply in the Chicago Area Waterway System once warmer weather in the spring prompts increased fish activity. Measures the Corps is discussing with our partner agencies include modified operations at existing locks and controlling works, installing other types of barriers near the locks, assessing options to block the alternate pathways of the Grand and Little Calumet Rivers, and supporting efforts to reduce or eliminate Asian carp populations that may be present. Such supporting efforts may include intensive fishing efforts around the navigation structures and the application of rotenone by partner agencies. All measures under consideration will be evaluated taking into account stakeholders' use of these structures, especially by public health, security and safety agencies, such as the Chicago Fire and Police Departments, and the Department of Homeland Security, as well as for purposes of flood risk management, navigation, and water quality. To be effective, any measures would have to be taken in concert with actions by other agencies on matters within their expertise and authority to eliminate or reduce the numbers of any Asian carp that may be in the vicinity. The National Invasive Species Council (NISC) was established by Executive Order 13112 to coordinate federal actions on invasive species. The Secretaries of the Interior, Agriculture, and Commerce are the co-chairs of NISC. The Secretary of Defense is a member of NISC. The Corps of Engineers works with its NISC partner agencies to stop the spread of Asian carp and other invasive species.

Finally, building on all of these efforts, the Corps has a long term strategy. The Corps is undertaking the Congressionally-authorized Great Lakes and Mississippi River Interbasin Study to explore the options and technologies that could be applied to reduce the risk of aquatic invasive species transfer throughout multiple points between the Great Lakes and Mississippi River basins. This study will include the possibility of ecosystem separation and will analyze the impact that alternative possible plans would have on the current uses of the Chicago Area Waterway System, including the Chicago Sanitary Ship Canal. The Corps plans to conduct this study in close coordination with

partner governmental agencies, such as the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service and the U.S. Coast Guard. The initial area of emphasis will focus on the Chicago Area Waterway System and is anticipated to be completed as an interim report before the final study is complete.

In conclusion, the fish barrier remains our most important immediate defense mechanism against Asian carp migration, but the Corps is working with our partner agencies to transition to a multi-tiered defense. Efforts to prevent Asian carp from establishing a population in Lake Michigan are collaborative, involving numerous federal, state, and local agencies. This effort requires the synchronization of structural, chemical, biological, and other methods to be effective. In order to achieve success, all federal, state and local entities must apply their authorities, capabilities and resources as part of a comprehensive plan to address this challenge. The Corps will continue to apply its authorities and capabilities to achieve success.

Madam Chair, this concludes my testimony. I would be happy to answer any questions you or other members of the Subcommittee may have.

Illinois Department of
Natural Resources
One Natural Resources Way Springfield, Illinois 62702-1271
http://dnr.state.il.us

Pat Quinn, Governor
Marc Miller, Director

ILLINOIS ASIAN CARP CONTROL EFFORTS

Marc Miller, Director
Illinois Department of Natural Resources

House Committee on Transportation and Infrastructure
Subcommittee on Water Resources & Environment
Honorable Eddie Bernice Johnson, Chair
2167 Rayburn Office Building
February 9, 2010

Thank you Madam Chair and members of the subcommittee, for this opportunity to testify on the actions Illinois Department of Natural Resources has undertaken since the early 1990's. I also will outline our action plans for the immediate future in our shared battle to prevent the spread of Asian carp to the Great Lakes.

Our commitment to this task has been and remains unwavering. We have been working closely with our partner states including Michigan and Wisconsin, and the federal agencies to develop effective control strategies. Illinois has contributed significant resources to controlling Asian carp over time. One example is that we were the local sponsor for the study, and testing of electric barrier system. Illinois contributed $1.8 million to this effort.

Most recently Illinois DNR served as the lead agency for the successful Rapid Response effort last December to prevent the migration of Asian carp when the electric barrier system was shut down for maintenance. The unified response of the Great Lakes States and Provinces was a shining leadership moment for our region, and a prime example of how a small group of committed people can make a difference.

This unprecedented effort demonstrated that Federal, Provincial, State, and Local partners can work together to ensure that this invasive species would not enter the Great Lakes and threaten one of the world's great ecosystems. Over 400 people worked together with contributions of supplies, equipment and crews from every member of the Basin. The Rapid Response team safely applied Rotenone to a six mile stretch of the Chicago Sanitary and Ship Canal. The USACE performed critical maintenance on the electric barrier system, and conducted cleanup and removal of 18,000 fish including one Big Head carp.

It is important to note that as we consider additional operations, the cost of this single action was $3,000,000 and would not have been possible without the substantial donations from the states and provinces and financial support of our federal partners. Thank you.

There are several lessons that we learned from this experience that I would like to share with the committee: first, meeting this challenge will require greater collaboration and levels of partnership. We must enlist the scientific and communication resources as well as the political leadership of every state and province in the basin to join in this effort.

Second, early outreach to key stakeholders, proactive communication strategies and operational transparency must continue to be maintained as we move forward with our framework strategy and operations.

Finally the collaborative approach that has been developed with our local, state, and federal partners is working very well and we believe represents the best model for future efforts.

I now wish to now outline the actions to control Asian carp that IDNR has identified to begin immediately or as soon as funding can be secured.

- We will conduct a targeted Asian carp removal operation throughout the entire Chicago Area Waterways System. This includes identification, containment and removal using conventional methods netting, electro fishing, commercial fishing, rotenone, etc.
- IDNR will contract with Commercial Fisherman to operate below the barrier system to reduce populations and propagule pressure.
- Intensive E-DNA monitoring, sampling and removal in hotspots of the Cal Sag. This includes the entire length of the Cal Sag below O'Brien Lock & Dam to the electric barrier.
- Participate with USACE efforts to refine the E-DNA technology to understand population densities and other factors.
- In the next 90 days IDNR will conduct a survey of all retail live bait locations to determine that live Asian carp minnows are not being sold in NE Illinois.

We have also identified several longer term actions that we are proposing as well:

- Prepare for Rapid Response contingency operations, including training, advance procurement of supplies and necessary equipment.
- Co-Chair the Asian Carp Management and Control Implementation Task Force with USFWS. This plan outlines 133 different actions that will be deployed nationally in all watersheds where Asian Carp are a problem.

- Conduct tagged fish research into barrier effectiveness using Didson side scan sonar
- Enhance commercial markets for Asian carp and investigate requirements for use of Asian carp products for humanitarian relief purposes.

This is a problem that is not going to be solved by one state, or one agency. As a region we have a long and established history of using a proactive and collaborative approach. Our Great Lakes Region is stronger when we work together in partnership to solve common problems, and Asian carp is a national problem.

When we are divided, solutions to our problems can remain elusive. Illinois DNR looks forward to working with the other Great Lakes States and Federal Agencies in developing sustainable solutions to our common problem

Statement of

Del Wilkins
Vice President of Terminal Operations & Business Development
Canal Barge Company
23213 South Youngs Road
Channahon, IL 60410
(815) 521-3570

On behalf of

The American Waterways Operators
801 North Quincy Street, Suite 200
Arlington, VA 22203
(703) 841-9300

Before the
Subcommittee on Water Resources and Environment
Committee on Transportation and Infrastructure
United States House of Representatives
Washington, DC

February 9, 2010

Good afternoon Madame Chairman. I am Del Wilkins, Vice President of Terminal Operations & Business Development for Canal Barge Company. Canal Barge Company is a family-owned business headquartered in New Orleans, Louisiana that has been in business for 76 years, and operates throughout the inland waterways system, from the Texas coast up to Pittsburgh and Chicago. Canal Barge owns Illinois Marine Towing, a Chicago-area towing and barge fleeting company, and Canal Terminal Company, a bulk liquid storage facility just south of Joliet, Illinois. Canal Barge and its affiliates are daily users of the Illinois waterways and bring both liquid and dry cargo in and out of the Chicago area from all over the country. I am pleased to testify today on behalf of the American Waterways Operators, the national trade association for the tugboat, towboat and barge industry. Thank you for the opportunity to be here and share our concerns about the manner in which government addresses the serious issue of the spread of Asian carp into the Great lakes.

As commercial users of the inland rivers, coastal waterways and Great Lakes, the tugboat, towboat and barge industry has a genuine commitment and obligation to stewardship of the environment in which we operate. Our industry is safe, environmentally responsible, cost-efficient, and uncommonly progressive in partnering with government to make our nation's waterways as safe and as clean as possible. Our full commitment to collaboration is best exemplified by the results of the more than 15 years of industry effort, in cooperation with Congress and the U.S. Coast Guard, to put into practice our commitment to safe operations and zero pollution. In 1994, AWO became the first transportation trade association to establish a code of safety and environmental stewardship for member companies. For a decade, the AWO Responsible Carrier Program has been a condition of membership in AWO, and members must pass an independent safety audit every three years or forfeit their membership in the association. Since 2004, AWO has cooperated with the Army Corps of Engineers, the Coast Guard, the Environmental Protection Agency and federal and state agencies concerning the operation of the electric fish barrier on the Chicago Sanitary and Ship Canal to protect the Great Lakes and the Western Rivers from invasive species, promoted the recovery of threatened and endangered species and established practices to reduce emissions from tank barges.

In the fight against the spread of Asian carp, and other invasive species, our fundamental message is this: the question of whether to protect the environment or ensure the continued flow of vital maritime commerce is an unnecessary choice, and one our nation cannot afford to make. We fully support robust protections for the Great Lakes from the Asian carp. We must also preserve human health and safety and maintain the free flow of waterborne commodities that are critical to the national and regional economy. We are confident that congressional and Administration leadership and stakeholder cooperation will lead us to a sustainable solution that protects the Great Lakes ecosystem without sacrificing critical jobs and the environmental and economic benefits of barge transportation.

Finding such a solution is critical because inland waterways navigation is essential to our economy and is the most environmentally friendly mode of freight transportation. A 2007 study conducted by the Texas Transportation Institute for the U.S. Department of Transportation found that inland waterways transportation is the safest, cleanest and most economical method of freight transportation. In a modal comparison, the study found that waterways transportation has the lowest hazardous material spill record and generates fewer emissions than rail or truck

transportation. Moreover, a typical inland barge has a dry cargo capacity at least 16 times greater than a single rail car, and 70 times greater than a single semi-trailer truck. A single tank barge can carry as much liquid cargo as 144 trucks or 46 rail cars. Barge transportation plays an integral role in the multimodal freight transportation system of the Midwest-Great Lakes region by reducing truck and rail traffic and highway congestion.

Balanced solutions to the problem of invasive species in the Great Lakes are achievable. An integrated approach can arrest the advance of the Asian carp, protect the Great Lakes ecosystem, utilize science to develop more effective ways to combat the carp's spread, and maintain safe, efficient and reliable navigation on vital commercial waterways. We stand ready to act as a constructive partner with federal, state and other concerned stakeholders in that process. Below is a list of nine promising measures that warrant consideration and can be part an integrated strategy to prevent the spread of Asian carp.

- **First, expedite construction of the third barrier on the Chicago Sanitary and Ship Canal, known as Barrier IIB.** AWO continues to work with the Corps of Engineers and other stakeholders to ensure that electric fish barriers are both effective in preventing Asian carp movements while allowing for the safe passage of vessels and their crews. We support the immediate completion of Barrier IIB, coupled with cumulative safety tests of the voltage for all three barriers to ensure safe transit of commercial and recreational vessels.
- **Second, consider other types of fish barriers to prevent Asian carp from moving into the Lakes, such as bubble or acoustic technology barriers.** Preliminary research shows that bubbles and noises can frighten away the carp, thereby providing an important line of defense.
- **Third, immediately complete barriers to guard against carp entering the Great Lakes when floods occur.** While barriers are effective in preventing carp movements during normal water levels, floods can sweep carp over and around those barriers, as we have learned in the Mississippi River. Additional structures should be built specifically for flood conditions.
- **Fourth, conduct tagged fish research to validate the effectiveness of all primary and secondary barriers.** As government agencies take action to construct barriers against carp movement, the effectiveness of those barriers should be assessed by tagging fish and tracking their movements.
- **Fifth, employ consistent measures to catch fish, such as electro-fishing, netting and commercial fishing.** These actions will both reveal where the carp are located, as well as reduce their populations, while providing a minimal interruption to navigation.
- **Sixth, fund research on Asian carp-specific biological control agents.** A federal agency, such as the U.S. Geological Survey, should be immediately tasked with identifying and developing agents that will either kill the carp or inhibit their reproduction, as has been done successfully with other invasive species.
- **Seventh, sample barges and other vessels for Asian carp or their eggs.** AWO supports efforts to determine all possible ways that the carp could travel into the Great Lakes. We are currently involved with a Coast Guard-led working group that will make certain that the ballast tanks of barges are not inadvertently transporting juvenile carp or carp eggs.

- **Eighth, impose further restrictions on the importation of aquatic invasive species.** Asian carp were purposely brought into the Unites States to clean fish farms; however, floods swept them into the Mississippi river. AWO supports legislation that would impose significant penalties for knowingly bringing aquatic invasive species into the United States or further transporting the species beyond its current habitat.
- **Finally, conduct more scientific studies about the ability of carp to survive within the Great Lakes ecosystem.** It has not yet been proven that Asian carp can establish a self-sustaining population in the Great Lakes ecosystem. However, if studies prove that survival is possible, then immediate action must be taken to mitigate population growth.

AWO believes that there are a number of options for controlling the Asian carp without putting the Chicago-area economy, jobs, environment and quality of life in jeopardy. The environment and the economy are inexorably linked; any measures to alter one will invariably affect the other. It is crucial that we act quickly and in concert with government, industry and environmental stakeholders to make sound decisions that benefit both the environment and the economy in the Great Lakes and Western Rivers.

Proposals have been made in both legislation and litigation to close locks in the Chicago Waterway System. We strongly oppose those proposals. These ideas do not meet the test of our fundamental principle to ensure that appropriate actions balance environmental protection with commercial sustainability. Closing the locks would stop barge traffic, replacing the lower emissions and high capacity of barge transportation with crippling levels of truck and rail congestion, coupled with a commensurate increase in air pollution. Proposals to close locks also wrongly assume that those structures are watertight barriers to fish, which they are not. And, speaking personally, closing locks would in all likelihood cause Illinois Marine Towing to go out of business, leading to the loss of over 100 jobs for the shore-side and vessel personnel of our company. Our company, and the other vessel operators working on the Illinois waterways, provides family wage employment to hard-working Americans. Together with government agencies and other concerned stakeholders, we need to develop effective solutions to stopping the Asian carp in a way that does not sacrifice jobs at a time when they are in such short supply.

Conclusion

Madam Chairman, Mr. Ranking Member, and Members of the Subcommittee, thank you for the opportunity to testify today. This committee has a history leadership in finding solutions to complex and challenging public policy issues without framing them as an "either, or" decision. AWO is a committed to working with you, with federal and state agencies and with other stakeholders of the Great Lakes and Western Rivers to ensure a balanced approach to environmental stewardship and economic sustainability. We are convinced that both goals can be realized.

Thank you. I look forward to answering any questions you may have.

February 9, 2010

The Honorable Eddie Bernice Johnson
Chair, Subcommittee on Water Resources & Environment
U.S. House of Representatives Transportation and Infrastructure Committee
1511 Longworth Office Building
Washington, DC 20515

The Honorable John Boozman
Ranking Member, Subcommittee on Water Resources & Environment
U.S. House of Representatives Transportation and Infrastructure Committee
1519 Longworth House Office Building
Washington, DC 20515

RE: Written Testimony on the Water Resources and Environment Subcommittee's Asian Carp hearings

Dear Chairwoman Johnson and Ranking Member Boozman;

Please find attached Clean Wisconsin's written testimony on the danger Asian Carp pose to Wisconsin's economy and recreational opportunities. Clean Wisconsin is a state-wide environmental advocacy organization made up of 10,000 members across Wisconsin. Clean Wisconsin protects Wisconsin's clean water and air and advocates for clean energy by being an effective voice in the state legislature and by holding elected officials and polluters accountable. Our mission is to protect the special places that make Wisconsin such a wonderful place to live, work and play.

We respectfully request inclusion of this written testimony into the record of the House Transportation and Infrastructure Subcommittee on Water Resources and the Environment hearings on the Asian Carp.

Thank you for your consideration.

Sincerely,

Melissa Malott, Attorney
Clean Wisconsin Water Program Director

Testimony of Representative Judy Biggert, IL-13
Before the
Water Resources and Development Subcommittee,
Committee on Transportation and Infrastructure
Hearing on Asian Carp and the Great Lakes
Tuesday, February 09, 2010
2 p.m.

Members of the Subcommittee on Water Resources and Development:

Thank you for holding today's subcommittee hearing on Asian carp and the Great Lakes. I commend your efforts to convene all important stakeholders interested in balancing the mission of the waterway system with that of Asian carp mitigation efforts. Keeping Asian carp out of the Great Lakes is a priority we all share and I trust today's hearing will enlighten the Members of the Water Resources and Development Subcommittee of the intense and coordinated efforts that the State of Illinois and relevant agencies have taken in an effort to keep Asian carp out of the Great Lakes.

As you might know, my district represents the front line in the fight to keep this fish from decimating the ecosystem of our Great Lakes. The Chicago Sanitary and Ship Canal transverses my district and forms a unique, man-made link between the Great Lakes and Mississippi River. While it is a critical avenue for commerce, it also provides aquatic invasive species access between these two bodies of water.

Since I was first elected to Congress, I have worked with the Corps to build and expand the electric dispersal barriers. The Corps, specifically, has invested a tremendous amount of time and resources in the barriers to prevent invasive species from migrating through the Chicago Sanitary and Ship Canal. A project that once started as a demo barrier for zebra mussels in 2000 grew into a second, more powerful barrier for Asian Carp. And it has worked.

Events in the last year have elevated the concern that Asian carp may be closer to Lake Michigan than originally thought. In response, the Corps, EPA, Fish and Wildlife, and the Illinois Department of Natural Resources have executed an all-hands-on-deck approach to discover and destroy carp in area waterways. They have done an exemplary job of using all preventative means available, including fish sampling, electro-fishing, the completion of a second electric barrier, and the recent deployment of Rotenone in an effort to combat the carp. Their efforts have succeeded. To date, one bighead carp was recovered (a dead one) – below the electric dispersal barriers.

In recent weeks, efforts to litigate and legislate Chicago – area lock closures as a means of keeping Asian carp out of Lake Michigan has created enormous

concern in the region. The "act now - think later" approach would no doubt cause more harm than good, for two reasons:

First, closing the locks could increase the risk of Asian carp entering the Great Lakes. The Metropolitan Water Reclamation District of Chicago (MWRD) manages wastewater and storm water for Chicago and 124 municipalities through an intricate system of sluice gates, tunnels and reservoirs that has taken decades to construct. Closing the locks would overwhelm that tunnel system and cause massive flooding, affecting more than 3 million people and 1.4 million structures in Chicago and 51 surrounding suburbs.

If the locks were to remain closed, as some proposals suggest, excess floodwater could not be released back into Lake Michigan and could flow over the top of the lock - creating more avenues for carp to migrate into the lake and significant loss of life and property in the area.

Second, closing the locks would devastate the Midwest economy. In 2008, 19 million tons of commodities moved through the Chicago, O'Brien, and Lockport locks combined. Of that 19 million tons, 7 million tons moved through the O'Brien lock alone.

In fact, a 2007 study commissioned by the Illinois Chamber of Commerce suggests that lock and dam closures could diminish the shipping and receiving of over $29 billion dollars worth of petroleum, chemicals, building materials and farm products that depend on Illinois waterways. And, there is no viable alternative to re-routing that commerce. According to the American Waterways Operators, a single barge can carry an amount of liquid cargo - like asphalt - that would fill 144 semi-trailer trucks or 46 rail cars. Our rail and highway routes are not equipped to make up that difference.

As the committee pursues options to address Asian carp prevention efforts, I hope the focus will remain on the coordinated approach underway with the Asian Carp Rapid Response working group. Whether it's funding, or legislation - like my bill to list the Bighead carp as injurious – we need to exercise proven options that protect the lakes and the livelihoods of Illinois residents. That includes enhancing our electronic barriers, deploying fish toxin, additional DNA tracking, and the creation of new barriers against flooding threats. I hope that my colleagues from other states would join in that effort.

Thank you.

Judy Biggert

Written Testimony
Submitted by

Melissa Malott
Water Program Director, Attorney
Clean Wisconsin

Before the House of Representative
Committee on Transportation and Infrastructure
Subcommittee on Water Resources and the Environment

Asian Carp: Now is the Time to Act to Prevent Significant Damage to Lakes Michigan and Superior

February 9, 2010

Thank you, Madame Chairwoman and Mr. Ranking Member. My name is Melissa Malott, and I am the Water Program Director and attorney at Clean Wisconsin. On behalf of Clean Wisconsin and our 10,000 members across the state of Wisconsin, I appreciate the opportunity to submit testimony to this subcommittee to discuss the threat that Asian Carp pose to the Great Lakes and why we need to take immediate action to prevent Asian Carp from reaching Lake Michigan. I want to thank you for this Committee's work in support of our Great Lakes. You are to be commended for your continued commitment to the Great Lakes, which are not only an amazing fresh water resource for our region, but our nation and the world.

Right now, Asian carp are poised to enter Lake Michigan through the Chicago Sanitary Ship Canal and devastate the recreational and economic value the Great Lakes provide Wisconsin. I want to give you a clear picture of what this would look like for Wisconsinites. Asian carp are voracious feeders that can grow to more than 4 feet long and weigh up to 100 pounds, and they jump several feet out of the water when disturbed by a boat motor. Imagine a 30-pound fish leaping out of the water and smacking into someone; adults have sustained broken collar bones, noses, and teeth. Think about what would happen to a child hit by one of these fish.

Asian carp can quickly dominate aquatic ecosystems by gobbling up the same food that sustains our native fish Walleye, Bass, and Perch populations. Coupled with the other invasive species in the Great Lakes, this could result in the collapse of Lakes Michigan and, eventually, Superior's food web. If Asian carp invade the Great Lakes, they could also devastate the region's $7 billion fishing industry and permanently alter how recreational boaters, anglers and tourists use and enjoy the lakes and their many tributaries. If Asian carp make it into the Great Lakes, they will soon reach our inland waters; in Wisconsin, the Asian carp would profoundly change the nature of public use of Lakes Winnebago and Butte des Morts. According to a 2007 UW-Extension report, angling contributes $155.5 million and 3,500 jobs from direct spending to the Lake Winnebago economic region, which includes Outagamie County. Asian carp pose a true threat to boating and fishing on these lakes, resulting in a loss of serious revenue and quality of life for our state and citizens. The impact of the Asian carp would be irreversible to the people, wildlife, and economies that rely upon them.

We know from experience the devastating impacts of invasive species on the Great Lakes. Too rarely do we have the opportunity to prevent the damage of invasion before it begins, yet such an opportunity is now on our doorstep. There are no second chances. Future actions based on good science-based information are crucial to the health of the Great Lakes ecosystem and our economy.

First, temporary lock closure will help deter, but not fully prevent, fish migration into Lake Michigan. Until a decision to temporarily close the locks is made, the locks leading to Lake Michigan must be operated and managed in a way that reduces further transfer of Asian carp into Lake Michigan. We acknowledge that this may cause short-term disruptions in navigation in the canal system. However, a variety of temporary changes in lock operations can slow future movement of additional Asian carp toward Lake Michigan. We recognize that there is a legitimate concern about flooding and emergency response in the City of Chicago. Planning for flooding events can be anticipated so we expect to see contingency plans in place to deal with the locks being opened for flood control. Lock operations for emergency responders can also be addressed in a similar fashion.

Clean Wisconsin supports all of the recommendations made by the Healing Our Waters – Great Lakes Coalition in their January 28, 2010 letter to Cameron Davis, Senior Adviser to the Administrator at the EPA. Four of the twelve recommendations are of highest priority for immediate action.

1. Complete the Dispersal Barrier Efficacy Study by August. Also, immediately begin implementation of the measures recommended in the Study's first interim report. Building barriers between the Des Plaines River and the Chicago Sanitary and Ship Canal and the Calumet-Sag Channel will help eliminate the risk that Asian carp will find their way into the Chicago Waterway System during flooding events. Construction of these barriers should be completed by fall 2010.

2. Operate the Dispersal Barrier System at optimal power and frequency and expedite both the completion of Barrier IIB by the end of this summer and the upgrade of Barrier I.

3. Close the sluice gates at the Wilmette Pumping Station and immediately install interim barriers in the Grand Calumet and Little Calumet Rivers, as necessary, to prevent Asian carp from migrating to Lake Michigan.

4. Expedite the Chicago portion, including all National Environmental Policy Act (NEPA) requirements, of the Great Lakes and Mississippi River Interbasin Transfer Study so that it is completed by 2011 instead of 2014 as is currently expected. Although we support the study's basin-wide perspective, the crisis in the Chicago Waterway System shows that the Chicago area should be prioritized so long-term solutions, like ecological separation, can be identified and implementation begun expeditiously.

Thank you for the opportunity to present this testimony to the subcommittee. As you deliberate, please consider the important impacts that Asian Carp, if allowed admission to the Great Lakes, would have on our natural resources, economy, and quality of life.

If you would like additional information for the record, please contact me at Clean Wisconsin, by phone at 608.251.7020 x13, by fax at 608.251.1655, or by e-mail at mmalott@cleanwisconsin.org.

NATURAL RESOURCES DEFENSE COUNCIL

February 9, 2010

The Honorable Eddie Bernice Johnson, Chairwoman
The Honorable John Boozman, Ranking Member
U.S. House of Representatives
Committee on Transportation and Infrastructure
Subcommittee on Water Resources and Environment
2165 Rayburn House Office Building
Washington, D.C. 20515

Dear Madame Chairwoman and Mr. Ranking Member:

I respectfully submit the attached testimony for the February 9 subcommittee hearing on "Asian Carp and the Great Lakes" and request that it be made part of the hearing record.

Sincerely,

Henry Henderson
Director, Midwest Program

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United States House of Representatives
Committee on Transportation and Infrastructure
Subcommittee on Water Resources and the Environment

Hearing on "Asian Carp and the Great Lakes"

Testimony of Henry L. Henderson
Director of the Midwest Program
Natural Resources Defense Council

February 9, 2010

Thank you for the opportunity to present testimony on this urgent crisis. My name is Henry Henderson, and I am the Director of the Midwest Program of the Natural Resources Defense Council. NRDC is a national environmental action group, combining the grassroots power of 1.3 million members and online activists with the courtroom clout and expertise of more than 350 lawyers, scientists and other professionals. The future of the Great Lakes, 20% of the world's fresh water, is a priority for our many members and our mission to protect the resources and systems upon which all life depends. Our work to stop the destruction of the Great Lakes by invasive species has included successful litigation and policy advocacy to regulate ballast water discharges to control a major source of biological pollution in our waters, and in this work we have been closely allied with Michigan and New York in support of their enhanced regulation of ballast discharges.[1]

Asian carp threaten billions of dollars in the regional tourism and fishing industries. And more importantly, they threaten the drinking water of 40 million people and the quality of life that we enjoy in the Great Lakes region. By permanently and effectively responding to the crisis created by these invasive fish the Great Lakes Community, the Chicago Region and the nation have an incredible opportunity to safeguard the Lakes while modernizing commercial transportation and water management in the Great Lakes, beginning with the Chicago Waterway system, and establishing a model for the nation in one of our great cities.

In short, we have an opportunity to meet the invasives threat by rebuilding Chicago's transportation and water management system to set the standard for the 21st Century. It is the most propitious time to make this effort---there is a Great Lakes-basin wide consensus that the ecosystem needs to be restored. There is unprecedented commitment of resources to do this; and there is consensus among all of the Great Lakes community, in this country and in Canada, that the developments in the Chicago waterway present an immediate and lingering threat to the very future of the Great Lakes----that exception is Illinois,which officially is out of step and seems to feel neither the urgency of the challenge or the inclination to seize the opportunity before us to fix the problem and fundamentally improve our water and transportation policies, practices and infrastructure. It is an issue made quite clear in the language of the Great Lakes Compact and in the State of Michigan's Supreme Court case, no matter what its eventual outcome.

Federal action too, has been out of step with the Great Lakes States. The Asian Carp Working Group strategic framework released yesterday points to some progress, but without more

[1] *See Fednav v. Chester*, 547 F.3d 607 (6th Cir. 2008); *Port of Oswego Authority v. Grannis*, 2010 WL 375502 (N.Y.A.D. 3 Dept. Feb. 4, 2010).

concrete details it cannot be evaluated. Illinois and the administration can help redress this situation to lead the important progress towards a renewed, vibrant Great Lakes community.

The Problem.
The threat is clear. The Chicago Waterways, built and enjoyed by the State of Illinois and its sub units of government, present an unambiguous threat to the health, safety and economy of the 20% of the world's fresh water----the largest fresh water body in the Western Hemisphere. Asian carp filter feeding has the potential to not only destroy an already weakened Great Lakes fishery, but to turbo-charge ecosystem changes already initiated by invasive zebra and quagga mussels which threatens to make the bottom of Lake Michigan an environment more friendly to dangerous human pathogens. Worse, the silver and bighead carp do not represent the end of the threat. Other invasive species are queued up to follow, including the even more dangerous black carp.

What Must be Done
In the short-term, we must proactively attack this problem to prevent the fish from establishing themselves in the waterways of the Chicago Diversion and in Calumet Harbor where testing shows that the fish may have already reached Lake Michigan. As the Army Corps of Engineers tests are clearly showing, Asian carp DNA is being found in more and more dispersed Chicago waterways. The longer we dither, the greater the threat. Most of the Great Lakes advocacy NGOs believe that a short-term, temporary closure of the locks would slow the carp's advance and allow for an aggressive eradication effort to ensure the elimination of the invasive fish. The new Framework implies that this tool is indeed viable, despite earlier protestations to the contrary. This does not in any way solve the problem. It only slows the fishes' advance while eradication efforts and a permanent solution can be put into place.

Asian Carp Contingency Plan

A clear, public, practical plan to deal with the rapidly developing scenarios and changing data points in the Chicago Waterway Asian Carp crisis is needed in order to govern the diverse agency actions, assure appropriate levels of preparation and coordination, and provide the public with the necessary assurance that the responsible state and federal agencies are prepared and that effective action is being taken as the crisis develops. The Contingency Plan needs to clearly acknowledge that we are faced with an urgent threat of Carp invasion of the Great Lakes, that the eDNA evidence is indeed "actionable evidence" as determined by the Notre Dame scientists and USEPA scientific audit, and identify what those "actionable" steps are both "offensively" and "defensively," and how they are specifically triggered by evidence of the Carp's presence.

Presently, there is no such plan. This remains true even after the release of yesterday's "Framework" document, which raises at least as many questions as it answers.

The absence of a plan becomes progressively more unacceptable as the eDNA evidence grows more alarming. Indeed, the line of "concern" seems to regress as each new piece of evidence of the advance of the Asian Carp is confirmed. For instance, at one time the trip wire for implementing emergency actions to stop the Carp's advance seemed to be Carp presence beyond Lockport. When that line was passed, the trip wire became the electric barriers. When that line was passed and evidence of Carp north of the barrier was found in the Calumet-Sag Channel, at the O'Brien Lock, and in the Des Plaines River, it was unclear what further trip wire

would be relevant, and steps such as temporary closure of the navigational locks leading to Lake Michigan seemed commensurate to the urgency of the threat. Finally, now that eDNA evidence has been found at the Wilmette, IL sluice gate in North Branch of the Chicago River, and then subsequently in Lake Michigan itself, there seems to be no further possible trip wire for urgent action----except that Mr. Wooley of the U.S. Fish and Wildlife Service then suggested that the real concern would be identifying a population of 200 to 400 live Asian Carp in the Lake. There seems to be no rhyme, reason or warrant for these shifting trigger events, and certainly no specific set of actions associated when triggers are sprung. One might be tempted to conclude that it is too late to have a contingency plan with triggers, given that evidence of the Carp has been found in Lake Michigan already---but given the assurances of the scientists that there is still an opportunity to stop the infiltration of a population of fish necessary for establishment in the Great Lakes, it seems necessary and appropriate that a set of agreed-to measurements for fish be established, and a set of actions identified for when specific triggers are reached.

Actions Related to Triggers: A comprehensive and aggressive management plan to use rotenone or other piscicides, along with traditional management methods like netting and electro fishing, to eradicate all Asian carp within the Chicago Waterway System. This plan should include specific actions tied to specific triggers. For instance, if certain concentrations of eDNA are found at the O'Brien Locks, the locks will be closed while specific netting, electric shocking and other actions are taken to assure that any fish present are driven away from the locks. Similarly with the Chicago River locks, the Wilmette sluice gates, and the rest of the Chicago Waterway System.

To Be Prepared: To inform the process, we need to expand and aggressively use eDNA testing to make management decisions. Adequate resources and lab capacity need to be made available to Dr. Lodge and his team to assure that this critical effort is supported at the highest and most robust level.

The clear agency authority on instituting emergency and affirmative actions must be officially established in a public Memorandum of Understanding. To the extent that additional legislative authorization is necessary to conduct appropriate management steps, including lock closure, such a request should be made. Under no circumstances should a responsible agency hide behind a purported lack of authority as a justification for not undertaking a particular management action.

Needed Short-Term Actions

Given that a serious number of triggering events have already occurred, we believe that affirmative actions need to be immediately undertaken now to address the developments. They are:

First, temporarily close the locks leading to Lake Michigan. We acknowledge that this may cause short-term disruption in navigation in the canal system. However, we believe that temporary lock closure will serve as a barrier, however imperfect, to slow future movement of additional Asian carp toward Lake Michigan. We recognize that there is a legitimate concern about flooding and emergency response in the City of Chicago. We support operating the locks for flood control. We think flooding can be anticipated and planned for, however, so we expect to see contingency plans in place to deal with the locks being opened. Lock operations for emergency responders can also be addressed in a similar fashion. A detailed, appropriate

protocol for determining when emergency opening of the locks and gates must be developed with explicit authorities and chain of command structure to govern the protocol.

Second, immediately install interim barriers in both the North Shore Channel and the Grand Calumet and Little Calumet Rivers, as necessary, to prevent Asian carp from migrating to Lake Michigan. Confirm that the Wilmette sluice gates will NOT be opened unless absolutely necessary to manage flood conditions, and institute immediate actions to assure that the fish are driven back from the North Branch Channel as a precaution in the event that the sluice gates do need to be opened.

Third, immediately implement the measures recommended in the Dispersal Barrier Efficacy Study's first interim report. Building barriers between the Des Plaines River and the Chicago Sanitary and Ship Canal and the Calumet-Sag Channel will help eliminate the risk that Asian carp will find their way into the Chicago Waterway System during flooding events. Construction should be completed by fall 2010.

Fourth, operate the Dispersal Barrier System at optimal power.

Fifth, expedite both the completion of Barrier IIB and the upgrade of Barrier I.

Sixth, expedite the Chicago portion of the Great Lakes and Mississippi River Interbasin Transfer Study in order that it is completed by 2011 instead of 2012 as is currently expected by the Army Corps. Although we support the study's basin-wide perspective, the crisis in the Chicago Waterway System shows that the Chicago area should be prioritized so long-term solutions, like ecological separation, can be identified and implementation begun expeditiously.

Long-term Solutions

The more important work and opportunities for this region come from the permanent solution to the problem. Invasive species will not stop threatening the Great Lakes until the two great fresh water ecosystems of the Great Lakes and the Mississippi watershed are separated once again.

When the Chicago Diversion was first built, it was both an engineering marvel and a response to a public health emergency. Not only did the Chicago Sanitary and Ship Canal move water pollution away from Lake Michigan and the thirsty city's drinking water, it also connected the Great Lakes with the Mississippi River basin, for the first time allowing rapid movement of goods through Chicago. At the same time, as the Supreme Court recognized in 1929, "damage due to the diversion at Chicago relates to navigation and commercial interests, to structures, to the convenience of summer resorts, to fishing and hunting grounds, [and] to public parks and other enterprises" throughout the Great Lakes region.

Today, the Chicago Diversion is threatening the Great Lakes not because of the amount of water that is being withdrawn from Lake Michigan, but because the Chicago canal system has become a highway for "living pollution" that now threatens the drinking water supply that it was intended to protect. Asian carp are just the latest in a long line of invasive species that have used the Chicago canal system to move between the Mississippi River and the Great Lakes. But ecologists and government agencies predict that their effect on the Lakes could be catastrophic: potentially as bad as, or even worse than, that of the infamous zebra mussel. For an ecosystem that has already been severely damaged by invasive species, Asian carp could be the death knell.

Although Chicago still uses its Sanitary and Ship Canal to move both sewage and goods, a permanent disconnection of the canal system from Lake Michigan could actually be good for Chicago if it is turned into an opportunity to make long-needed investments in upgrading this 19th Century infrastructure. It is long past time for MWRD to upgrade its sewage treatment and begin disinfecting the human waste that it dumps into the canal system. And Chicago's once vaunted transportation system has long needed an overhaul to a more sustainable, modern, and efficient network.

The status quo of this transportation system is not acceptable, either for Chicago or for the nation whose freight passes through the aging Chicago system. As the Chicago Council on Global Affairs recognized in its important study "The Global Edge":

"Of all infrastructure, the transport system___the ability to move people and goods___is most crucial. No city can compete globally without a twenty-first century transport system. In the Chicago region, this system is antiquated, often decrepit, congested, uncoordinated, and inadequate."

("The Global Edge: An Agenda for Chicago's Future," p.23, 2007, The Chicago Council on Global Affairs). The Chicago Waterway System is not even being considered as part of what this transportation modernization needs to encompass---but a nineteenth century back water, unconnected to rail and other surface transportation. Left in isolation, the waterway system will continue to decline and descend into merely a source of ever greater problems for Chicago and the Great Lakes. Taking the opportunity to reconfigure the waterway as part of a vital transportation system, which helps move goods efficiently and protects the Great Lakes and Mississippi watersheds, is the opportunity before us today.

It is time to summon the spirit of innovation and reinvention that led to the Chicago Diversion to examine how fixing it can untangle our railroads, modernize our woeful water system, and keep the carp at bay.

Protecting Northern Michigan's Water Resources

February 5, 2009

Congresswoman Eddie Bernice Johnson
1511 Longworth Office Building
Washington, DC 20515

Congressman John Boozman
1519 Longworth House Office Building
Washington, DC 20515

Dear Madame Chairwoman and Mr. Ranking Member:

I respectfully submit the attached testimony for the February 9 subcommittee hearing on "Asian Carp and the Great Lakes" and request that it be made part of the hearing record.

Sincerely,

Jennifer McKay
Policy Specialist

426 Bay Street, Petoskey, MI 49770-2428
phone: 231.348.1181 fax: 231.347.5928
website: www.watershedcouncil.org

Before the House Transportation and Infrastructure's Subcommittee on Water Resources and Environment
Hearing on "The Impact of Aquatic Invasive Species on the Great Lakes"

Testimony of Jennifer McKay
Policy Specialist, Tip of the Mitt Watershed Council

February 9, 2010

Madame Chairwoman Johnson and members of the Subcommittee, thank you for the opportunity to submit testimony on Asian carp and the Great Lakes. As a means of introduction, Tip of the Mitt Watershed Council, founded in 1979, is a nonprofit organization whose purpose is to protect, restore, and enhance water resources, including inland lakes, rivers, wetlands, groundwater, and the Great Lakes. We base all our programs on sound science and policy analysis, and have garnered respect for our work from local, state, and federal agencies, businesses, fellow environmental organizations, and citizens. As the lead organization for water resources protection in Antrim, Charlevoix, Cheboygan, and Emmet Counties, the Watershed Council is working to preserve the heritage of Northern Michigan - a tradition built around our magnificent waters.

My testimony focuses on the local impacts associated with aquatic invasive species, the characteristics associated with silver and bighead Asian carp, and key actions needed now to prevent Asian carp from entering and devastating the Great Lakes ecosystem.

We Need To Act Now

The invasion of exotic species is one of the gravest dangers facing the Great Lakes today. Invasive species such as round-gobies, zebra and quagga mussels, sea lamprey, and ruffe have taken over Great Lakes ecosystems not only at the expense of native species, but also to the expense of Great Lakes residents and businesses as well. Since the 1800s, more than 186 alien species have invaded the Great Lakes ecosystem from around the world, costing us millions, and in some cases, irreparably damaging the Great Lakes ecosystem.

There are both economic and ecological impacts, both of which are quite serious. Ecologically, aquatic invasive species impacts include food-web disruptions, native species reduction or loss, water quality degradation, and the introduction of pathogens. Furthermore, ecosystem disruptions and imbalances can result in increased danger to human health. Once introduced into the Great Lakes, many aquatic invasive species can find their way into inland lakes, rivers, wetlands, and other waterways, thus greatly compounding the problems associated with invasive species.

The negative economic impact of invasive species is in the billions of dollars and once they are introduced into the Great Lakes ecosystem, controlling them is a losing battle. Invasive species adversely affect many commercial, agricultural, aquacultural, and

recreational activities that rely heavily on a strong and stable ecosystem. The cost to control aquatic and terrestrial invasive species in the US is estimated at more than $137 billion annually. Economic losses in the Great Lakes Basin from aquatic invasive species were estimated in 2005 at $5 billion per year. Preliminarily results, based on a set of conservative parameters, show that in 2006, ship-borne invasive species alone may have cost upwards of $200 million in lost economic benefits to consumers by reducing sport and commercial fisheries, reducing wildlife watching, and increasing the operating costs for raw water users. Additionally, the costs incurred by the state, local municipalities, and businesses to respond to the introduction of an aquatic invasive species is quite significant.

Of great importance, the economies of the Great Lakes states and especially Northern Michigan is inextricably linked to our water resources, capitalizing on the astounding beauty that stems from the diverse array of wildlife and natural places in the region. As a result, tourism has grown to become one of the top industries in each of the eight Great Lakes states. Economically, aquatic invasive species result in losses in tourism, sports-fisheries, and more. Michigan ranks fifth in the nation in numbers of licensed resident and non-resident anglers, who together contribute $2 billion annually to the state's economy, a figure that could drop substantially as aquatic invasive species disrupt ecosystems and impact fisheries. In Michigan, tourism boasts a $16 billion business that supports approximately 173,000 jobs. The Great Lakes Commission estimated that in 2003, boaters spent $3.9 billion on trip and craft expenses in Michigan, which supported 51,000 jobs.

Clean water, vibrant wildlife habitat, and beautiful landscapes are fundamental to the success of tourism in Northern Michigan. The continual onslaught of aquatic invasive species threatens the very attributes that allow our tourism industry to thrive. For an area whose population triples in the summer months due to the tourists, introductions of invasive species could mean devastation. In fact, the Great Lakes as a tourist destination are at stake as the Great Lakes experience, way of life, and heritage declines with each new invasion.

Typically, we discover aquatic invasive species after they have already been introduced into our ecosystem. Rarely do we have the opportunity to actually know that an invasive species is knocking at our Great Lakes door and to take action to prevent the introduction. Yet we have that opportunity now with the Asian carp and we must act upon it before it passes us by.

Characteristics of Asian Carp

The characteristics associated with Asian carp make this invasive species particularly threatening to the health of the Great Lakes ecosystem and those who rely on the lakes and justify the imperative need for any and all actions to be taken immediately to prevent the introduction and/or establishment of Asian carp in the Great Lakes.

The Asian carp due to their large size, ravenous appetite, and rapid rate of reproduction pose a significant risk to the Great Lakes ecosystem. Carp have shown an affinity for becoming the dominant large fish species over more desirable native species or established fish that are recreationally and economically important. Asian carp aggressively out-compete and eventually displace native fish altogether. With no natural predators and the ability to produce 2.2 million eggs, the Asian carp could devastate the Great Lakes' multibillion dollar fishing industry. If the carp impact our forage fish, there could be a serious impact to fish like smallmouth bass, walleye, and trout. A $7 billion dollar commercial and sport fishery in the Great Lakes could be impacted by the introduction of the silver or bighead carp.

In addition to the threat Asian carp pose to Great Lakes fisheries, carp also pose an actual physical threat to boaters and those who recreate on our Great Lakes. A scene one would think out of a movie, a giant fish jumping 10 feet in the air threatening the boater below, is becoming reality in part of the United States. The silver species of Asian carp can leap out of the water creating a hazard for boaters and water-skiers as the fish crash into boats, hitting people and damaging equipment. There have been numerous reports of boaters injured by flying carp, to the point were there is now a need to carry not only standard boating safety equipment but personal protection as well. This is not the future we want for the 4.3 million recreational boaters in the Great Lakes region.

Additionally, populations of the silver and bighead carp are impossible, both technically and financially, to control and ultimately eradicate if found within the Great Lakes ecosystem. Eradication would be not be feasible due to the characteristics of the carp species including their rapid reproduction and growth patterns and opportunistic feeding habits in consuming primarily phytoplankton, as well as zooplankton, bacteria, and detritus.

As noted, because the ability to eradicate the Asian carp is virtually impossible, there is little likelihood for rehabilitation or recovery of the Great Lakes ecosystem if the Asian carp species are introduced. Even if rehabilitation or recovery were technically feasible, the costs associated with such an endeavor would prove prohibitive to its success. Introduction and establishment of Asian carp species can have significant impacts on valuable native fisheries to the point of extinction.

Michigan, strategically located in the heart of the Great Lakes, has the most to gain and the most to lose if we are not successful in keeping the Asian carp out of the Great Lakes ecosystem. Therefore, we must take action now to protect the Great Lake's water quality, fish and wildlife habitat, and public health and safety from the introduction and establishment of silver carp and bighead carp.

Actions Steps Needed

Tip of the Mitt Watershed Council fully supports implementation of the following recommendations that were submitted to Cameron Davis, Senior Advisor to the

Administrator, Environmental Protection Agency by numerous entities throughout the Great Lakes Basin. These key actions are not listed in order of priority.

- Temporary lock closure will help deter, but not fully prevent, fish migration into Lake Michigan. Until a decision to temporarily close the locks is made, the locks leading to Lake Michigan must be operated and managed in a way that reduces further transfer of Asian carp into Lake Michigan. We acknowledge that this may cause short-term disruptions in navigation in the canal system. However, a variety of temporary changes in lock operations can slow future movement of additional Asian carp toward Lake Michigan. We recognize that there is a legitimate concern about flooding and emergency response in the City of Chicago. Planning for flooding events can be anticipated so we expect to see contingency plans in place to deal with the locks being opened for flood control. Lock operations for emergency responders can also be addressed in a similar fashion.
- Outline different scenarios agencies may face in the near-term and describe what actions would be triggered based on each scenario. We need to move away from reacting to each announcement of additional eDNA results as a separate crisis to a focus on what steps are being taken as a result of discovering Asian carp DNA in a particular area. For example, this type of planning would outline how much eDNA evidence would trigger use of rotenone or other management methods like netting and electro fishing to find and eradicate all Asian carp within the Chicago Waterway System (CWS) or any portion of it. Each scenario should outline how much rotenone must be purchased and stockpiled and what other logistical issues need to be overcome for each response.
- Until all Asian carp that have entered the CWS are found and eradicated, agencies must identify and take actions that interrupt their spawning behavior. These actions as outlined in the plan should be applied wherever positive eDNA tests are detected during spring and summer spawning.
- Complete the Dispersal Barrier Efficacy Study by August. Also, immediately begin implementation of the measures recommended in the Study's first interim report. Building barriers between the Des Plaines River and the Chicago Sanitary and Ship Canal and the Calumet-Sag Channel will help eliminate the risk that Asian carp will find their way into the CWS during flooding events. Construction of these barriers should be completed by fall 2010.
- Operate the Dispersal Barrier System at optimal power and frequency and expedite both the completion of Barrier IIB by the end of this summer and the upgrade of Barrier I.
- Close the sluice gates at the Wilmette Pumping Station and immediately install interim barriers in the Grand Calumet and Little Calumet Rivers, as necessary, to prevent Asian carp from migrating to Lake Michigan.
- Eliminate any risk of Asian carp by-passing the Dispersal Barrier System by waterway traffic, including the strict enforcement of the Coast Guard's prohibition of ballast/bilge water transfers to and from below and above the dispersal barriers.
- Expand eDNA testing and use eDNA results to make management decisions. eDNA testing indicates that Asian carp are present in the CWA and now Lake

Michigan. We also expect that agencies will work quickly to verify not simply that eDNA results indicate the presence of fish but in addition attempt to gather information on the extent and characteristics of carp in the area of the positive results.

- Make adequate resources and lab capacity available to more quickly process the expanded collection of eDNA test results from more areas within the CWS and around the Chicagoland region, including in Lake Michigan and high-risk tributaries in the area.
- Begin immediate implementation of the Aquatic Nuisance Species Task Force's November 2007 Asian carp management plan, especially the strategies related to population control.
- Provide clear agency authority on instituting emergency and affirmative action's through a public Memorandum of Understanding between agencies or some other public mechanism. We suggest that EPA be that lead agency given its leadership role in coordinating government action through the Great Lakes Interagency Task Force.
- Expedite the Chicago portion, including all National Environmental Policy Act (NEPA) requirements, of the Great Lakes and Mississippi River Interbasin Transfer Study so that it is completed by 2011 instead of 2014 as is currently expected. Although we support the study's basin-wide perspective, the crisis in the CWS shows that the Chicago area should be prioritized so long-term solutions, like ecological separation, can be identified and implementation begun expeditiously.

Conclusion

We commend Madame Chairwoman Johnson and the members of this Subcommittee for your leadership in scheduling this hearing. The Great Lakes are some of the most magnificent natural resources on Earth, holding nearly 20% of the planet's fresh surface water. We have a rare opportunity to actually be proactive rather than reactive and prevent an aquatic invasive species from being introduced into the Great Lakes ecosystem. But that window of opportunity is quickly closing so we must act now. Asian carp will devastate an environment that is already on the tipping point of ecological collapse. If we are going to maintain the proud heritage of the Great Lakes, now is the time to shut the door on the Asian carp.

Subcommittee on Water Resources and Environment

Members of the
Subcommittee on Water Resources and Environment
Committee on Transportation and Infrastructure
U.S. House of Representatives
111th Congress

February 9, 2010

Dear Esteemed Members of the Committee:

I am writing to urge you to oppose any effort to control the migration of the Asian Carp that includes closures—even intermittent or temporary—of the Chicago River Controlling Lock and the Thomas J. O'Brien Lock.

These proposed closures would have a devastating impact on the local economy, far-reaching effects on commerce and consumers, and ruinous consequences for the thousands of families directly involved in this industry. My husband and I are both captains on the Chicago River who would be devastatingly impacted by such desperate and extreme measures. There are other options for carp control proposed by the U.S. Army Corps of Engineers including subsidized fishing, acoustic and bubbler, and electric barriers, as well as others. The closures of both the Chicago River Lock and the Thomas J. O'Brien Lock should be considered only as the last resort after all other avenues have been tried, exhausted, and have been proven to have failed. The results of the electric barriers have shown to be effective with only one of the targeted fish being found beyond that barrier. Construction of more of these barriers would create much needed jobs in Illinois, protect the environment of the state, and safeguard jobs already in place.

The "science" being cited with regard to the advancement of the carp into the Chicago area is dubious at best. The study was conducted by a for-profit entity with a stake in the outcome. Results from impartial, nonpartisan organizations such as the EPA should be submitted and studied before such impactful and potentially devastating measures are implemented. Also, more needs to be studied of how the carp have been present in Lake Erie, a warmer and shallower lake (which should be a more hospitable environment), without the damaging effects prognosticated for the rest of the Great Lakes.

As a mariner, I love the water and its related ecosystem, and while I support efforts to control the migration of the carp, the Chicago Lock System should not be part of that solution.

Captain Ragna L. Russo

Captain Ragna Russo
Wendella Boats

Subcommittee on Water Resources and Environment

Members of the
Subcommittee on Water Resources and Environment
Committee on Transportation and Infrastructure
U.S. House of Representatives
111th Congress

February 9, 2010

Dear Esteemed Members of the Committee:

I urge you to exhaust all other methods of controlling the Asian carp migration before closing the lock system in the Chicago area. I appeal to you not only as a Mariner who has worked for 27 years on this waterway but also as a father and provider. The closure of this lock system would effectively destroy the lives of not only my family but that of thousands of others who earn their living here.

I appreciate the need to control these invasive and destructive fish. However, please make the lock closures the very last line of defense in a system that has many options to explore first.

Thank you,

Captain Robert Davis
Wendella Boats

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