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1955–2005
Great Lakes Fishery Commission

THE THREAT POSED TO THE GREAT LAKES BASIN BY ASIAN CARP

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House Subcommittee on Fisheries and Oceans
Wayne Gilchrest, Chairman
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INTRODUCTION: THE ASIAN CARP THREAT

Mr. Chairman and members of the committee, thank you for the opportunity to appear before you to discuss the risk associated with the invasion of Asian carp into the Great Lakes basin. My name is Gerry Barnhart. I am the chair of the Great Lakes Fishery Commission (commission). I was appointed to the commission by President Bush in 2003. I am also the Director of Fish, Wildlife, and Marine Resources for the New York State Department of Environmental Conservation.

The Great Lakes are an extremely valuable and unique resource for both the United States and Canada. The Great Lakes commercial, sport, and tribal fisheries are collectively valued at more than $7 billion annually. For more than five decades, efforts have been underway to protect the fishery resource from the introduction of, and extensive harm caused by, invasive species. In the Great Lakes, we know well how important prevention is.

The Great Lakes Fishery Commission was established in 1955 by the Canadian and U.S. *Convention on Great Lakes Fisheries*. One of the commission's primary objectives is to control the destructive sea lamprey. Sea lampreys—primitive fishes resembling large snakes—are native to the Atlantic Ocean and invaded the Great Lakes through shipping canals in the early 1900s. Sea lampreys are fish parasites, and having no predators in the Great Lakes, were able to wreak unimaginable damage on the ecosystem and cause significant economic harm to the fishers of the region. The commission's control program has been successful, reducing sea lamprey populations by 90% in most areas of the Great Lakes. Nevertheless, eradication is impossible. The commission has spent more than $250 million since 1956 controlling sea lampreys. This amount, while large, does not take into account the billions of dollars of revenue lost to commercial, tribal, and recreational fishers of the Great Lakes basin, nor does it take into account the billions of dollars spent by the state and federal governments over several decades to rehabilitate and propagate the fishery after the sea lamprey invasion. Moreover, this figure does not include the immeasurable damage to the ecology of the Great Lakes basin.

There are some tough lessons from the sea lamprey invasion:

- A single species can cause significant, permanent damage to the economic and ecological health of a region. Sea lampreys changed a way of life in the Great Lakes and even with control, they remain a permanent, destructive element of the Great Lakes fishery. Most—if not all—management decisions made by federal, state, tribal, and provincial agencies must take sea lampreys into account.

- Prevention is key, as eradication is not possible.
- Invasive species management programs are costly and borne by the taxpayers.

To date, more than 180 non-native species have been introduced into the Great Lakes. While not all have been damaging, the ones that are pose billions of dollars in economic damage. Society has very few tools to manage invasive species. In fact, sea lampreys are the only ones we can control. That is why prevention is so important. Three species of Asian carp – the silver, bighead, and black carps – threaten to be the next invaders and have the potential to cause large-scale disruption to the ecosystem. Asian carp clearly demonstrate the vulnerability of the Great Lakes, the inadequacy of existing laws, and the need for comprehensive invasive species legislation. Addressing the invasive species threat is a top priority for the administration. In May, 2004, President Bush called for the development of a comprehensive Great Lakes restoration plan which identified invasive species as one of eight focal points. The Great Lakes Fishery Commission actively participated in this large endeavor by co-chairing the development of the Aquatic Invasive Species (AIS) portion of the restoration plan. The threat posed by the invasion of Asian carp was a major component of the AIS action plan and has been at the forefront of the commission's priorities.

Asian carp are seen today as the most likely new invaders. The injurious Asian carp were imported into the southern United States to keep aquaculture facilities clean and to serve the food fish industry. Grass carp were imported into the United States in 1962 from Taiwan and Malaysia. Black carp, native to China, contaminated these shipments and were later intentionally introduced in the 1980s. Bighead carp were imported from China in 1972. A year later, in 1973, silver carp were brought into the U.S. from China and astern Siberia. These non-native fish escaped from aquaculture facilities during flooding events throughout the late 1980s and early 1990s. The floods provided extensive spawning and rearing habitat which facilitated high survival rates for offspring. In the early 1990s, the presence of these fish in the Arkansas River was reported.

Since their escape just over a decade ago, bighead and silver carp have besieged the Mississippi River basin and Illinois River system. Between 1991 and 1993, the Upper Mississippi River Long Term Resource Monitoring Program documented a 100-fold increase in Asian carp numbers in an area known as Pool 26, which is on the Illinois River upstream of St. Louis**.** Commercial harvest of bighead carp in the Mississippi River Basin increased from 5.5 tons to 55 tons between 1994 and 1997. In the fall of 1999, an investigation of a fish kill in the off-channel waters of a National Wildlife Refuge near St. Louis documented that Asian carp made up 97% of the biomass. During this time 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. Between 1999 and 2000, the Upper Mississippi River Long Term Resource Monitoring Problem documented a 600-fold increase in Asian carp numbers in the LaGrange Pool, which is downstream of Peoria, IL. Sampling during the summer of 2000 in the off-channel areas and backwaters of the Mississippi River downstream from St. Louis documented the presence of bighead carp at a ratio of 5:1 to native paddlefish (*Polyodon spathula*). They continue to migrate northward at a steady pace.

Asian carp are particularly troubling in that they grow to very large sizes by eating vast quantities of food. An Asian carp is capable of eating 40% of its body weight each day. Bighead and silver carp voraciously consume plankton, stripping the food web of the key source of food for small and big fish. Black carp are especially worrisome because they have the potential to wipe out native mussel populations in a relatively short period of time. According to the U.S. Geological Survey, a four-year-old black carp consumes an average of 3-4 pounds of mussels per day; older, larger black carp likely consume more mussels. At this rate of consumption, a single black carp could eat more than 10 tons of native mollusks during its life. To make matters worse, portions of the Great Lakes are perfectly suited for Asian carp, and biologists are very concerned that if Asian carp find their way into the Great Lakes, they will make the lakes home, spread, and deprive our most prized species of food. Observing the path of destruction on areas carp have already invaded, biologists are very worried indeed. Clearly, these fish have the ability to become

established rapidly, reproduce in large numbers, and become the dominant species in an ecosystem. Once established, there is little chance fishery managers will be able to control Asian carp. Like the sea lampreys, they will become a permanent element of the Great Lakes.

ASIAN CARP MIGRATION

Asian carp have two major pathways into the Great Lakes: the migration through canals and waterways and the unintentional and intentional introduction through vectors associated with the live trade regime.

Canals and Waterways: Asian carp have a pathway into the Great Lakes through the Chicago Sanitary and Ship Canal, a canal that artificially connects the Great Lakes to the Mississippi River via the Illinois Waterway. Monitoring on the Mississippi River and the Chicago canal has been tracking the migration of Asian carp. Agencies report that silver and bighead carp are within 20 miles of the barrier (described below) on the Chicago canal, less than 50 miles from Lake Michigan. In the Mississippi River, self-sustaining populations of bighead carp have been observed near Clinton, Iowa and self-sustaining populations of silver carp have been observed near New Boston, Illinois (both locations are south of the Wisconsin border). However, sightings of the species have been seen as far north as Alma, Wisconsin, which is south of Minneapolis. It is unknown whether lack carp are abundant in the wild. Live black carp have been observed at the mouth of the Illinois River, near St. Louis, and in the Red River, in Louisiana.

To prevent the migration into the Great Lakes through the Chicago Sanitary and Ship Canal, a number of local, state, and federal agencies have collaborated to design, build and fund two electrical dispersal barriers in the Chicago Sanitary and Ship Canal. The first dispersal barrier (barrier I) is experimental and was designed to have a relatively short life span. It was activated in 2002 and is currently failing. The second barrier (barrier II) is under construction and is designed to be a permanent structure. It will be necessary to retrofit barrier I to create a lengthy barrier system on the canal. Both barriers are operated by the U.S. Army Corps of Engineers, and the corps should be commended for its work to protect the Great Lakes from invasive species.

In addition, several local and binational authorities have cooperated with the state of Illinois to develop a rapid response plan for the Chicago Sanitary and Ship Canal that will be implemented should Asian carp approach or breach barrier I. This plan calls for the application of a piscicide, rotenone, over a five mile stretch of the canal to kill Asian carp.

The Trade of Live Organisms: Importation, interstate commerce, and trade are among the most dangerous pathways for introduction of Asian carp and other species in the Great Lakes ecosystem. The transportation and sale of live Asian carp into the Great Lakes basin poses considerable risk to the biological integrity of the Great Lakes.

The trade of live organisms is a significant and growing risk. According to the U.S. Fish & Wildlife Service, in 2002, no fewer than 223 million fish were imported into the United States. This is a significant volume of organisms, yet serious problems and many loopholes in the trade regime exist. For instance, according to the AIS strategy team, the trade regime is badly broken. The team concluded: (1) existing federal, state, and local programs that address the trade of live organisms have evolved without coordination and are often reactionary; (2) currently, the U.S. Fish and Wildlife Service charges only one person with the task of evaluating potentially injurious wildlife species (implementing the Lacey Act) while hundreds of species await review; (3) in the U.S., when a shipment of live species arrives, complete inspection is nearly impossible due to the need for expediency; (4) in 2002, there were only 97 inspectors at the 32 ports designated for fish and wildlife are importations to inspect the 223 million live fish that were imported; (5) federal and state law enforcement officers are stretched thin, making it virtually impossible for proactive enforcement to occur; and (6) most requirements for licenses to sell live fish lack substance; typically, the payment of a fee and a documentation of sales are all that are required.

The regime governing the trade of live organisms clearly falls far short of what is necessary to protect the Great Lakes from invasive species. The impending Asian carp invasion is a clear example of how the trade of species can seriously threaten the ecosystem and why a screening process for importation of new species is needed.

Efforts to prevent the introduction of Asian carp into the Great Lakes basin have been extensive, though much still needs to be done. Despite continuous efforts for the past four years to list the black, silver, and bighead carp as injurious under Title 18 of the Lacey Act, these species continue to be transported throughout the Great Lakes basin for sale at fish markets. As a result, jurisdictions within the Great Lakes basin have been forced to take a piecemeal approach to try to keep these fish out of the basin. Myriad local, state, and tribal agencies have collaborated to ban importation, possession, transportation, purchase, sale, release, and exportation of live Asian carp. To this end, regulations have been promulgated in Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, New York and Ontario. Legislation is pending in Wisconsin. Despite individual state action, the strongest regulations can only prohibit the sale of live fish at the point of sale. Having done all they can, states are not able to interfere with interstate transportation. Fish can still be transported live into and throughout the basin, creating a major loophole around state action. Certainly this pathway is not closed.

Existing federal law is inadequate to address the increasing threat posed by injurious species. The primary gap in the U.S. federal program is that only a very small number of species are listed as injurious under the Lacey Act. In fact, despite the proliferation of injurious species, only three families of fishes, one species of crustacean, one species of mollusk, and one reptile species are listed under the act. Hundreds await review, and the list does not include many species that have been banned in the Great Lakes basin. Furthermore, the process for adding to the list is cumbersome. Although the USFWS has the authority to issue emergency regulations, it has generally operated through a standard notice and comment process. To make matters worse, the Lacey Act creates an almost impossible situation. To be listed under the act, a species must be proven to be injurious. To merit listing, a species must be shown to cause significant economic and environmental harm. The problem is, to prove such harm, the species must be causing damage. By the time such determination is made, the species has likely spread to a point where management would be unfruitful. Clearly, the burden of proof to demonstrate non-injuriousness must be on the proposed importer. By placing an ex-post-facto burden of proof on the states and federal government, the Lacey Act sets us up for failure.

Even if a species is listed as injurious, the reactivity of the listing combined with inadequate federal resources dedicated to inspections and enforcement limits the effectiveness of this action. Furthermore, with respect to the Lacey Act prohibition on species traded or possessed in violation of state law, the USFWS applies a number of criteria in determining when to use this authority to prosecute, and has acknowledged that its resources to do so are generally quite limited.

As the implementation of the Lacey Act, and the lack of an effective screening process demonstrate, most approaches to reducing and eliminating the release of aquatic invasive species from pathways involving trade and commerce are reactive instead of preventative. The existing trade regime has left the waters of the United States extremely vulnerable. Overall, a lack of political will to curb the trade of destructive invasive species, a lack of sufficient resources to complete the cumbersome process to list species as injurious, and the lack of an effective screening process to evaluate proposed importations promote this vulnerability.

LEGISLATIVE NEEDS

Clearly, there is a need for the federal government to take swift legislative action to address Asian carp. Comprehensive legislation to prevent future introductions of invasive species in the Great Lakes is

required. This legislation must address issues such as: prevention, research, outreach and education, early detection, rapid response, control, management, and coordination.

Chairman Gilchrest, I commend you for your efforts to address the invasive species threat. Your legislation—H.R. 1591, the National Aquatic Invasive Species Act—will be a major step forward in addressing the Asian carp problem and many other threats posed by invasive species. H.R. 1591 is comprehensive. It addresses the canal and live trade vectors for Asian carp as well as other AIS pathways such as ballast water. It provides for rapid response, and, in combination with H.R. 1592, the companion bill, it provides for the research needed to implement the policies. The nation needs a screening process for proposed importations of new species so that we can prevent the next invasion. Your legislation establishes such a screening process. We desperately need this bill passed and I hope the committee will act on it swiftly.

Other legislation in Congress specifically addresses the trade of Asian carp. H.R. 3049, introduced by Congressman Mark Green, and S. 1402 introduced by Senator Mike DeWine, would add the black, silver, and bighead carps to the Lacey Act list of "injurious" species, thus stopping the interstate transportation. This listing is long overdue. The state-by-state approach has been piecemeal and far from optimal. We strongly support the Green/DeWine legislation.

Despite this legislation, we need to deal with the Chicago Sanitary and Ship Canal vector more quickly than H.R. 1591 is likely to move. The carp are not waiting. Members have requested that authority and funding for the barriers on the Chicago Sanitary and Ship Canal be included in the Energy and Water appropriations conference bill. The commission strongly supports this request because the Asian carp barriers must be fully operational as soon as possible.

In addition to these recommendations, we also need to address shortcomings in the Lacey Act. There needs to be more resources for implementation and enforcement. Also, there needs to be a reasonable risk assessment protocol that allows us to evaluate risk and list a species as injurious without having to wait until the species has actually spread—when it's too late.

Finally, we need to adopt and implement the recommendations of the Aquatic Invasive Species Strategy Team, a team that has produced a comprehensive invasive species strategy. Specific to Asian carp and organisms in trade, the team has recommended that:

1. the Chicago waterway vector be addressed;
2. a list of problem species in trade be produced immediately and that states limit the commerce of those species;
3. a screening process be implemented—similar to the proposal in your bill; and,
4. the screening process be enforced.

The five-page action plan—which includes recommendations for comprehensive AIS policy—is appended to this testimony (attachment 1). This action plan reflects the consensus of more than 200 people who worked on its development. A final version of the plan will be unveiled in December.

CONCLUSION

Mr. Chairman, thank you for the opportunity to discuss Asian carp and other invasive species issues before the committee. Asian carp pose a significant threat to the very future of the Great Lakes and other regions of the country. We must do everything possible to limit the spread of Asian carp and to install meaningful measures to prevent this situation from happening again.

Barnhart Testimony
Attachment 1

AQUATIC INVASIVE SPECIES
(As produced by the AIS Strategy Team, October, 2005)

I. Problem Statement

Significant progress over the previous three decades to restore the Great Lakes has been interrupted and undermined by the present crisis of Aquatic Invasive Species (AIS). Invasive species come from outside an ecosystem, degrade habitat, kill native and naturalized species, and short-circuit food webs needed to maintain and rehabilitate biological resources. The Great Lakes region continues to face wave after wave of aquatic invasion. Sadly, even after decades of high-profile invasions like the sea lamprey and zebra mussel, the rate of new introductions has not slowed.[1] Our Great Lakes, which are the world's greatest freshwater lakes, are succumbing to an irreversible "invasional meltdown"[2] that may be more severe than chemical pollution, as AIS often make the Great Lakes home, they reproduce and spread, rendering eradication impossible. Existing measures to prevent the introduction of new species and to control species that are already established are woefully inadequate. The Great Lakes cannot afford even one new invader, and as invasions are irreversible, prevention is paramount.

An "invasive species" is defined as a species: 1) that is not native, and 2) whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.[3] AIS have entered or may enter the lakes through vectors such as maritime commerce (e.g., ship ballast), aquaculture, canals and waterways, recreational activities, and the trade and use of live organisms. The AIS Strategy Team's plan addresses species invasion through these vectors.

More than 160 non-native aquatic species are established in the Great Lakes, and during the last several decades established populations At least 162 non-native, aquatic species are established in the Great Lakes, and an average of one new species is discovered every eight monthsNon-native aquatic species have been discovered at an average rate of one every 8 months, adding to the more than 160 of these species already present in the system..[4] Not all of those species are invasive, but economic losses in the Great Lakes Basin from those that areAIS were estimated in 2005 at $5.0 billion per year.[5] Moreover, 42 percent of threatened and endangered species in the U.S. are at risk, mainly because of invasive species, so AIS threaten native species and the ecology of the Great Lakes Basin.[6]
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Recommendations below apply only to the U.S. While a heightened U.S. response to AIS is welcomed and overdue, the U.S. should work closely with Canada to ensure commensurate action on both sides of the border, especially with regards to ballast water controls for ships transiting the St. Lawrence Seaway either in ballast or declaring no ballast on board. Bi-national cooperation is required to prevent introductions of AIS into the Great Lakes via maritime commerce, canals and waterways (including Long Lac and Ogoki diversions, St. Lawrence Seaway, and Welland Canal), trade of live organisms, and recreational activities.

II. Goals and Milestones

Goal: Prevent all new introductions of AIS into the Great Lakes.

Goal: Stop the spread of AIS within the basin, extirpate harmful AIS, or if impossible, then control to levels that ensure sustainable ecosystems and the social, economic and cultural uses they support.

Interim Milestones: Several milestones were developed to measure progress through 2010 toward reaching the goals (Appendix A). The most important interim milestones supporting the recommendations are to:

- enact comprehensive federal legislation (*specifically* legislation that would incorporate all of the terms contained in S. 770, H.R. 1591 and 1592 as introduced in the 109th Congress; collectively the *National*

Aquatic Invasive Species Act—NAISA; with modifications as outlined in recommendation #3) to authorize and fund AIS programs; and
- provide expanded federal support for AIS research and outreach programs, and
- develop a binational plan of action to prevent additional species invasions, and control established populations of the most damaging AIS.

III. Recommendations

The AIS Strategy Team offers the following five recommendations. A complete list of recommendations is included as appendix A. Dollar figures have been included in the recommendations, where available. The dollar amounts provided are often incomplete estimates; more realistic figures should be developed.

1) Ship and barge-mediated introductions and spread of AIS in the Great Lakes should be eliminated, through the immediate promulgation of environmentally protective standards for ballast water, and the implementation of effective ship-board treatments and management measures. Specifically:
- **the immediately requirrequire, verify, and enforceement (in the current shipping season under existing authorities) that ocean-going vessels in the no ballast on board condition (NOBOB) implement practices that are an improvement over current practices. Examples of such practices (including residual flushing in the ocean) are provided in recommendation 4.4 of appendix D[7];**
- **the immediate application immediately require, verify and enforce of best performing ship-board ballast water treatment and hull management methods for ocean-going vessels (with a set approval period), with continued upward ratcheting of the treatment floor as treatment performance improves. Approved treatment must be to anthe environmentally protective standard by 2011;. This process should be conducted pursuant to the requirements provided in S. 770 as introduced in the 109th Congress, the *National Aquatic Invasive Species Act*;**
- **immediately require ment for monitoring, reporting, and public dissemination of all ballasting activities, prevention practices, and outcomes such that progress toward the goal is measurable and enforcement practical;**
- **review and applyication of best-performing ballast water management practices applied to non-ocean-going vessels operating exclusively within the Great Lakes (including application of ballast water treatment for new ships) to eliminate the spread of AIS already introduced into the system; and**
- **immediately and significantly expandsion of research, testing, and evaluation of policies and technologies as alternatives to on-board treatment. Alternatives to be investigated should include (but are not be limited to) cargo transfer, shore-based treatment, use of Clean Water Act discharge permits, and state/regional actions. Programs under which these investigations can be conducted include the Ballast Water Technology Demonstration Program and the Environmental Technology Verification Program. These investigations will hasten development of effective shipboard treatment systems. If ship-board treatments are shown to be inadequate, the team recommends implementation by 2011 of effective alternatives that prohibit ballast water from ocean-going ships from being discharged into the Great Lakes.**

Rationale: The failure to install meaningful and enforceable regulations for treatment of ballast water from ballasted and NOBOB ocean-going ships remains a major inhibitor for achieving the protection and restoration of the Great Lakes. Moreover, some AIS have limited means to disperse throughout the Lakes without the help of ships. Clearly, the status quo is unacceptable and does not protect the Great Lakes. Ocean-going ships are the prime vector for AIS introductions into the waters of the Great Lakes, so stopping those introductions is a top priority. Also, preventing the spread of AIS by the Great Lakes shipping industry is also a priority, so ballast water management practices for ships that operate within the Great Lakes should be reviewed and modified. Quick passage and immediate implementation of comprehensive federal legislation is required to prevent ship-mediated introductions of AIS into the Great Lakes. The government has significant authority under existing law to take immediate action, particularly in the management of NOBOB ships. Ship-board treatment actions must be fully implemented now, and evaluated well in advance of 2011. This will require immediate action by the Coast Guard to promulgate ballast water regulations. In addition, research and

planning on alternatives is needed immediately so that methods may be applied by 2011, in the event best-performing ship-board treatment fails to fully protect the Great Lakes and the nation.

Cost: $13.212.5 million annually for five years.

2) Federal, state, and/or local governments mustshould enact measures that ensure the region's canals and waterways are not a vector for AIS, including full federal funding of the Chicago San-Ship Canal barrier and the sea lamprey control program.) Specific recommendations are toically:

- **the completeion construction of barrier II, make barrier I permanent, and provide federal funds to operate bothion of the dispersal barriers in the Chicago Waterway system, and completeincluding a study of options to for investigate permanent hydrological and/or biological separation of the Great Lakes and Mississippi River systems;**
- **completion of a study to fully examine options and their economic benefits and costs to prevent the spread of AIS via the Lake Champlain Canal and other canal systems linking the Great Lakes with other basins;**
- **closeing or modifying, through the use of physical barriers or control structures, canals that have fallen into disuse or disrepair—if rebuilt, full consideration to prevent passage of aquatic invasive species must be taken;**
- **prohibiting the development of new cross-drainage basin connections;**
- **addressing intermittent flood-related connections;**
- **initiateing measures to prevent or reduce the movement of AIS into stream segments opened up by dam/impediment removal or culvert construction, and fully consider benefits to native species and impacts from AIS when evaluating cost-benefits of proposed fish passage projects.;;**
- **the development and implementation of AIS monitoring plans to provide comprehensive monitoring and reporting of AIS through the canal vector; and**
- **fully funding for the Great Lakes Fishery Commission's sea lamprey control program.**

Rationale: A unified (federal) approach is preferred, but some canals and waterways are under state or local jurisdiction that will require state or local legislation. Canals facilitate the conveyance of bulk goods and commodities and are used for recreational activities, but they also facilitate the spread of AIS by allowing cross-basin transfer between watersheds. Canal closure can re-establish the natural geographic separation of the Great Lakes from other drainage basins. Work to complete the barrier system on the Chicago Waterway is moving forward, and provisions supporting this project exist in the pending NAISA legislation and in the Senate version of the Water Resources Development Act of 2005 (S. 728). New legislation is needed to study options for hydrological separation and to address issues in other canals, particularly in un-used waterways. Existing canals and waterways should include dispersal barriers, flood control barriers, physical barriers, and other provisions to ensure hydrologic separation of historically disconnected watersheds. Wherever possible, canals that have fallen out of use should not be improved and, in fact, should contain physical barriers to prevent the free-flow of organisms. Dam removal, while often an important element of habitat rehabilitation, should be done carefully, with full coordination of federal, state, and local agencies, so as not to solve one problem by creating another, an AIS pathway. The sea lamprey control program, successfully carried out by the Great Lakes Fishery Commission, should be fully funded so that this species, which entered the system through canals, remains under suppression.

Cost: $453.5 million annually for five years.

3) Federal and state governments mustshould take immediate steps to prevent the introduction and spread of AIS through the trade and potential release of live organisms. Specifically:

- **the development of a list of species of concern for the Great Lakes basin and an immediate moratorium by the States on the trade of species on that list, until the species are screened and approved for trade[8];**
- **implement provisions of the pending NAISA legislation, as introduced, that establish and implement a federal screening process for organisms proposed for trade;**

- **modifiycation of the pending NAISA legislation mandating that the screening process should classify species proposed for trade into three lists—prohibited, permitted, and conditionally prohibited/permitted;**
- **modifiycation of NAISA to clearly stateing that the screening process established must place the burden of proof of non-injuriousness on the importer;**
- **the allocation of sufficient resources to heighten the number of species under the Lacey Act listed as "injurious," to prevent the interstate transportation of harmful species;**
- **allocate sufficient resources to heighten the number of species under the Lacey Act as "injurious," to prevent the interstate transportation of harmful species; the Fish and Wildlife Service FWS should list black, bighead, and silver carps as injurious under the Lacey Act;**
- **significantly increaseed resources for the enforcement of laws governing the trade of live organisms; and**
- **development and implement tation of risk models for organisms in aquaculture.**

Rationale: The trade of live organisms is vibrant. Hundreds of millions of fish and hundreds of thousands of invertebrates, plants, and other organisms are traded live each year. However, serious problems and many loopholes in the trade regime exist. In many cases, trade is unregulated, making importation, interstate commerce, and trade among the pathways that pose the greatest risk for introduction of invasive species into the Great Lakes ecosystem. This recommendation is designed to close the loopholes in the trade regime. It calls for an immediate listing of species and a state moratorium on trade of those species. It supports the provisions of NAISA that establish a screening process and it proposes that the screening process be based on a three-list approach. The recommendation also improves the implementation of key federal laws that restrict the interstate transportation of injurious species and calls for increased law enforcement to ensure the laws are implemented properly. Underlying the above recommendations is the requirement that the burden of proof demonstrating that an organism is not injurious be placed on person(s) who proposes to import it. When the screening process is developed pursuant to NAISA, it will be important to place the burden of proof on the importer. Placing the burden on the government to demonstrate injuriousness (which occurs usually after it is too late to address the problem, if at all) does little to contain the spread of AIS through trade, and does not protect the Great Lakes.

Cost: $17 million annually for five years.

4) Establish a Great Lakes Aquatic Invasive Species Integrated Management Program to implement rapid response, control, and management programs and assess the effectiveness of those programs. This program, which will require authorization, shouldmust include:

- **allocate fundsions for development and implementation of State and Interstate Aquatic Nuisance Species Management Plans through the Aquatic Nuisance Species Task Force, with a particular emphasis on the immediate use of techniques to control or slow the spread of AIS;**
- **development of voluntary agreements and codes of best practices for industrial trade groups;**
- **encourageing the investigation of economic requirements and incentives (e.g., bonds or insurance) to prevent new introductions;**
- **establish a revolving fund for rapid response actions;**
- **establish an interagency, Great Lakes Federal Rapid Response Team, that will conduct activities on federal lands, and in other locations with State, Tribal, and local cooperation; and**
- **funds allocate funds to implement a system of enhanced monitoring and ecological surveys in the Great Lakes;**
- **support additional a concerted research effort to develop and implement new control methods for uncontrolled species of concern;**
- **the establishment of a coordinated data management system, through the Smithsonian Institution, the Great Lakes Environmental Research Laboratory, or other suitable entity, to develop an accessible, integrated, and centralized database that allows for the reporting and tracking of AIS infestations; and**

- **ensure overall coordination and accountability through the Invasive Species Council, including developing regular and comprehensive reports summarizing the status of AIS activities (including those of the ANS Aquatic Nuisance Species Task Force and the Great Lakes Panel on ANS in implementing the National Invasive Species Management Plan), formulating a complete AIS federal budget request, overseeing progress in addressing AIS, evaluating the collective response to AIS, and communicating AIS needs and problems to Congress and the public. The National Invasive Species Management Plan should include specific focus on AIS in the Great Lakes.**

Rationale: The Government Accountability Office (then the General Accounting Office) observed that more than 20 federal agencies in ten departments are involved in AIS management and that States also play a significant role,[9] and much better coordination of federal, state, and local actions is needed. One entity should be empowered to coordinate the AIS actions in the Great Lakes. For example, fifty years ago the governments of the U.S. and Canada mandated and funded the development of successful control techniques for sea lampreys. A similar mandate is required for other AIS. Part of improved coordination is the systematic collection and free dissemination of AIS information. There must be a central place for the public, researchers, managers, and others to report AIS infestations. This information, in turn, should be available to anyone and should be used in implementing AIS programs. To achieve better detection and management of AIS, States and the federal government must cooperate in the development of AIS management plans, including plans allowing for monitoring, rapid response, and control. Moreover, codes of best practices for industry and the use of economic incentives (for example insurance and posting of bonds prior to engaging in practices where there is a risk of unintentional release) would significantly help industry participate in AIS management. When an AIS is first detected in the Great Lakes, States and the federal government must be prepared with pre-approved plans and funds to mount a rapid response action. Implementing an integrated pest management program in the Great Lakes will result in immediate cost-effective benefits[10].

Cost: $4481 million annually for five years.

5) Federal, state and tribal agencies, academic institutions and other organizations should receive adequate support to conduct and evaluate cost-effective AIS vector-specific outreach and education programs. These programs should focus on behavior change and responsibility of resource users. Specifically:

- **support programs that educate Great Lakes boaters and anglers on how to take preventive actions against AIS;**
- **the continueuation of AIS-focused Hazard Analysis and Critical Control Point (HACCP) training and plan implementation including for research and management agencies within and outside of the Great Lakes basin;**
- **support for a program that educates all facets of the Great Lakes maritime commerce industry including ports, carriers, shippers, mariners, resource users and users of goods produced from cargoes transported to and from the Great Lakes by ships, about the urgency and cost-effectiveness of preventing/containing AIS, the status of prevention, and what is needed to advance prevention; and**
- **support for a new comprehensive AIS Organisms-in-Trade educational campaign including the bait industry, modeled on the Sea Grant AIS-HACCP and Pet Industry Joint Advisory Council/Sea Grant/USFWS Habitattitude™ campaigns. Measurable objectives and timetables for these programs are included in Appendix F.**

Rationale: People of all walks of life play a role in preventing the introduction and spread of AIS and, therefore, must be involved. Education and outreach are critical in an effective program to address AIS and recommends a vigorous educational campaign. Several entities have developed and implemented extremely successful educational campaigns (e.g., Sea Grant's HACCP program, U.S. Fish and Wildlife Service/Aquatic Nuisance Species Task Force's Stop Aquatic Hitchhikers™ campaign, and Pet Industry Joint Advisory Council/Sea Grant/U.S. Fish and Wildlife Service Habitattitude™ campaign). These programs should be expanded, emulated, and applied to all aspects of AIS, and particularly applied to reach people who pose the greatest risks of AIS introductions. The proposed educational campaign targeting maritime commerce, for

instance, would involve shippers, ports, consumers, and others touched by the marine shipping industry, thus involving all people who work in and benefit from shipping. Effective educational campaigns rely on repetition and sustained messages from multiple sources.

Cost: $19.5 million annually for five years.

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[1] International Association of Great Lakes Research. 2002. Research and management priorities for aquatic invasive species in the Great Lakes. [online] URL www.iaglr.org/scipolicy/ais/ais_iaglr02.pdf.

[2] Ricciardi, A. 2001. Facilitative interactions among aquatic invaders: is an "invasional meltdown" occurring in the Great Lakes? Can. J. Fish. Aquat. Sci. 58: 2513-2525.

[3] Executive Order 13112. http://www.invasivespecies.gov/laws/eo13112.pdf.

[4] Mills, E, J. Leach, J. Carlton, C. Secor. 1993. Exotic Species in the Great Lakes: A history of biotic crises and anthropogenic introductions. J. Great Lakes Res. 19(1): 1-54; Drake, J.M., C. Costello, and D.M. Lodge. 2005. [Letter:] When did the discovery rate for invasive species in the North American Great Lakes accelerate? *BioScience* 55:4; Holeck KT, EL Mills, HJ MacIsaac, MR Dochoda, RI Colautti, and A Ricciardi. 2004. Bridging troubled waters: biological invasions, transoceanic shipping, and the Laurentian Great Lakes. BioScience 54:919-929; Holeck KT, EL Mills, HJ MacIsaac, MR Dochoda, and A Ricciardi. 2005. [Letter] Response from Holeck and colleagues. BioScience 55:4-5.

[5] Pimentel, D. 2005. Aquatic nuisance species in the New York State Canal and Hudson River systems and the Great Lakes basin: an economic and environmental assessment. Environ. Manage. 35(1): 1–11.

[6] Wilcove, DS, D Rothstein, J Dubow, A Phillips, and E Losos. 1998. Quantifying threats to imperiled species in the United States. BioScience 48:607-615.

[7] The Steering Committee of the Collaboration has requested the Strategy Teams put forward recommendations that can be implemented even before the process is finalized in December, 2005. The AIS Strategy Team recommends this action on NOBOBs as one for immediate implementation.

[8] For predictions about which fish species from Eurasia would be most damaging to the Great Lakes, and thus for insights into an immediate candidate list for damaging species that should be listed in the Lacey Act listed, see: Kolar, C.S. and D.M. Lodge. 2002. Ecological predictions and risk assessments for alien species. *Science* 298:1233-1236.

[9] Government Accountability Office (formerly General Accounting Office). 2002. Invasive Species: Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem. Report GAO-03-1.

[10] For background on the cost-effectiveness of slowing the spread of AIS, see: Leung, B., D.M. Lodge, D. Finnoff, J.F. Shogren, M. Lewis, and G. Lamberti. 2002. An ounce of prevention or a pound of cure: bioeconomic risk analysis of invasive species. *Proc Royal Soc London B* 269: 2407-2413.