

STRATEGY TEAM RECOMMENDATIONS

AQUATIC INVASIVE SPECIES

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.⁴ Our Great Lakes, which are the world's greatest freshwater lakes, are succumbing to an irreversible "invasional meltdown"⁵ 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.⁶ 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 have been discovered at an average rate of one every 8 months.⁷ Not all of those species are invasive, but economic losses in the Great Lakes Basin from those that are were estimated in 2005 at \$5.0 billion per year.⁸ Moreover, 42 percent of threatened and endangered species in the U.S. are at risk, mainly because of invasive species.

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



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Great Lakes. [online] URL http://www.iaglr.org/scipolicy/ais/ais_iaglr02.pdf.

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Can. J. Fish. Aquat. Sci. 58: 2513-2525.

⁶ Executive Order 13112. <http://www.invasivespecies.gov/laws/eo13112.pdf>.

⁷ Mills, □
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invasive species in the North American Great Lakes accelerate? *BioScience* 55:4; Holeck KT, EL Mills, HJ MacIsaac, MR Dochoda, RI □
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.

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economic and environmental assessment. *Environ. Manage.* 35(1): 1-11.

transiting the St. Lawrence 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: A complete list of all milestones developed to measure progress through 2010 toward reaching the goals is included in AIS 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;
- 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:

- Immediately require, verify, and enforce (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 practices⁹;
- Immediately require, verify, and enforce 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 an environmentally protective standard by 2011;
- Immediately require 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 apply best-performing ballast water management practices 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

⁹ 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.

- Immediately and significantly expand research, testing, and evaluation of policies and technologies as alternatives to on-board treatment. Alternatives to be investigated should include (but 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: \$13.2 million annually for five years.

2) Federal, state, and/or local governments must 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 to:

- Complete construction of barrier II, make barrier I permanent, provide federal funds to operate both dispersal barriers in the Chicago Waterway system, and complete a study of options for permanent hydrological and/or biological separation of the Great Lakes and Mississippi River systems;
- 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;
- Close or modify, through the use of physical barriers or control structures, canals that have fallen into disuse or disrepair—if rebuilt, prevent passage of aquatic invasive species;
- Prohibit development of new cross-drainage basin connections;
- Address intermittent flood-related connections;
- Initiate 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;
- Develop and implement AIS monitoring plans to provide comprehensive monitoring and reporting of AIS through the canal vector; and

- Fully fund 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: \$45 million annually for five years.

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

- Develop 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 ;
- Implement provisions of the pending NAISA legislation, as introduced, that establish a federal screening process for organisms proposed for trade¹⁰;
- Modify the pending NAISA legislation mandating that the screening process should classify species proposed for trade into three lists—prohibited, permitted, and conditionally prohibited/permitted;
- Modify NAISA to clearly state that the screening process established must place the burden of proof of non-injuriousness on the importer;
- 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 increase resources for the enforcement of laws governing the trade of live organisms; and
- Develop and implement 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, facilitating 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

¹⁰ 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, see: Kolar, C.S. and D.M. Lodge. 2002. Ecological predictions and risk assessments for alien species. *Science* 298:1233-1236.

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 recommendation 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, must:

- Allocate funds 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;
- Develop voluntary agreements and codes of best practices for industrial trade groups;
- Encourage 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
- Allocate funds to implement a system of enhanced monitoring and ecological surveys in the Great Lakes;
- Support additional research to develop and implement new control methods for uncontrolled species of concern;
- Establish 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 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 (formerly 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 role¹¹, 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

¹¹ 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.

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.¹²

Cost: \$44 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, the following actions should be taken:

- Support programs that educate Great Lakes boaters and anglers on how to take preventive actions against AIS;
- Continue AIS-focused Hazard Analysis and Critical Control Point (HACCP) training and plan implementation for research and management agencies within and outside of the Great Lakes basin;
- Support 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 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. 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.

¹² 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.