

Policy Position of the Great Lakes Panel on Aquatic Nuisance Species

Research Guidance for the Prevention and Control of Nonindigenous Aquatic Nuisance Species in the Great Lakes¹

BACKGROUND

In late 1990, Congress passed the Nonindigenous Aquatic Nuisance Prevention and Control Act (P.L. 101-646) for the purpose of preventing unintentional introductions; coordinating research, control and information dissemination; developing and carrying out environmentally sound control methods; minimizing economic and ecological impacts; and establishing a research and technology program to benefit state governments. The Act specifically recognized the Great Lakes as a valuable resource and, in Section 1203, called upon the Great Lakes Commission, an interstate compact agency, to convene a Great Lakes Panel on Aquatic Nuisance Species to assist a national Aquatic Nuisance Species (ANS) Task Force in Great Lakes-related prevention and control efforts.

The Great Lakes Panel is comprised of 35 individuals drawn from U.S. and Canadian federal agencies; the eight Great Lakes states and province of Ontario; regional agencies; concerned citizen groups; municipal representatives; tribal authorities; commercial interests; and the university/research community. The Panel is responsible for identifying Great Lakes priorities; making recommendations to the ANS Task Force; assisting the Task Force in coordinating federal programs; coordinating non-federal programs in the region; advising on control efforts; and reporting on prevention, research and control activities in the Great Lakes region.

In September 1995, the Great Lakes Panel identified the need for a comprehensive research inventory to assess current and recently completed ANS research relevant to the Great Lakes region, identify research gaps and needs, highlight key findings and, in general, promote technology transfer to benefit the Great Lakes ecosystem.

Acting on this need, the Panel developed and broadly distributed an ANS research survey to relevant individuals throughout the binational Great Lakes region and beyond. Results of the survey were used as background material for an ANS Research Symposium titled "Aquatic Nuisance Species Research Relevant to the Great Lakes Region: Enhancing Prevention and Control Efforts" held April 17, 1996 in Ann Arbor, Michigan. The following policy position, adopted by the Panel membership, summarizes the findings of the Research Symposium.

POLICY POSITION

The Research Symposium was attended by more than 30 carefully selected U.S. and Canadian research scientists, managers, policy makers and resource users. Drawing upon an analysis of a descriptive research inventory (consisting of more than 250 entries from 18 states and 5 countries) along with the participants' collective expertise on ANS prevention and control, ANS research gaps and needs were identified as well as recommendations on ways to strengthen the current research infrastructure to improve linkages between research, policy makers and the management community.

The following recommendations have been reviewed and approved by the Great Lakes Panel to be used as general guidance for the Panel membership, the national ANS Task Force, and other public and private sector entities that fund, conduct, manage or apply ANS research. These recommendations will be broadly disseminated among the research, management and policy communities to guide future ANS research efforts.

General Recommendations

Several recurring themes of a general nature emerged at the Research Symposium and are reflected in the following recommendations.

- i) Enhance research on prevention efforts to provide a better balance with research on established species (proactive versus reactive). Findings from the 1995 research inventory indicated that 53 percent of all projects received

¹Adopted by the Great Lakes Panel at its Dec. 4, 1996 meeting.

examined the ecosystem effects of species already present, while only 5 percent of the total expenditure was on prevention of introductions.

- ii) Make the public aware of the potential impacts of aquatic nuisance species and thereby gain their support for prevention and control efforts. Research has shown that ecosystem changes caused by the invasion of nonindigenous species (a form of biological pollution) can be more rapid, and in some cases more significant, than changes caused by nutrient and toxic loading. Therefore, there is a need to avoid making the assumption, both in the public and private sector, that a species is "innocent until proven guilty" before action is taken.
- iii) Secure and maintain base funding for broad, multi-disciplinary nonindigenous aquatic nuisance species research that is flexible and provides contingencies for shifting research emphases on short notice (in the event of a new invasion). Research priorities, for example, should reflect the recommendations of the national ANS Task Force and/or the Great Lakes Panel on Aquatic Nuisance Species and other relevant organizations.
- iv) Encourage the transfer of information generated through research in a timely manner, so that management and control measures are conducted on the basis of the most recent scientific information. Ideally, managers and researchers should interact at all stages in planning of research, management, and control projects.

ANS Research Gaps and Needs

Recommendations on ANS research gaps and needs have been classified by six research categories adopted by the Great Lakes Panel on Aquatic Nuisance Species as well as the national ANS Task Force.

Biology and Life History

Findings: Research on population dynamics, environmental requirements and tolerances, parasites and diseases, genetics, biomanipulation, physiology and behavior all need to be examined in order to develop effective control measures and predict the potential range of spread. In many cases this information exists in the species' native country and therefore a timely literature review may provide the information necessary for managers to react quickly in implementing prevention and control measures. Research inventory results revealed that 17 percent of ANS funds have been spent on biology and life history, in particular the biology and life history of the zebra mussel (58 percent).

Recommendations

- C Perform a timely literature review and translation of information on all newly introduced species to eliminate duplication of research.
- C Determine and prepare potential range maps for all new introduced species in a region.
- C Prepare risk assessments to determine impacts on native species.
- C Study genetic characterization of invaders and source populations.

Control and Mitigation

Findings: Once a species has invaded the Great Lakes it is essential that an effective control strategy or management plan is in place to contain the species to prevent further spread. The strategy or plan may include physical (filters), chemical (biocides), biological (parasites, predators) or physiochemical (pH, heat, salinity) control measures working singularly or in combination; a description of the consequences of the control measures taken; and an effective public information/education program to alleviate public concern and increase public cooperation. Sixteen percent of ANS research expenditures has been spent on control and mitigation, particularly on the zebra mussel and the sea lamprey.

Recommendations:

- C Increase education and research activities for alternate control options and eradication of aquatic nuisance species.
- C Develop a model plan for eradication of a nonindigenous aquatic nuisance species that outlines the necessary procedures to be undertaken in the event of a new invasion.
- C Improve documentation and transfer of private sector research.
- C Enhance bioengineering of species-specific pathogens.
- C Develop and examine containment options for species already present.
- C Explore the technical feasibility of integrated pest management (IPM). IPM integrates various control measures and examines the economic benefits versus costs in determining whether control is beneficial.

Ecosystem Effects

Findings: Introduction of a new species into an ecosystem may disrupt the balance of that ecosystem by altering existing predator-prey relationships, food web structure, community structure, nutrient and contaminant cycles and existing habitat. These changes may ultimately lead to the demise of a native species. By researching the effects of an invading species (at its various life stages) on the ecosystem, researchers can develop models to assist management in making decisions on the mitigation of impacts and the control of established nonindigenous aquatic nuisance species. The majority of ANS funds (53 percent) have been spent on trying to understand the ecosystem effects caused by the invasion of the zebra mussel to the Great Lakes.

Recommendations:

- C Enhance/maintain monitoring programs to establish pre-invasion data on native species and to provide a better understanding of the community structure in the Great Lakes region. This will allow for more informed decision making on potential control options in the event of an invasion of a nonindigenous aquatic nuisance species.
- C Determine the ecosystem response (environmental and social) to the control/containment of nonindigenous aquatic nuisance species.
- C Develop the theory of ecosystem resilience toward the establishment and dominance of nonindigenous aquatic nuisance species.
- C Develop more reliable ecosystem models to assist management in making decisions on mitigation of impacts or on the control of established nonindigenous aquatic nuisance species, if control is possible.

Prevention of Introductions

Findings: The most effective defense against nonindigenous aquatic nuisance species is the defense against their initial introduction. Preventative research, however, tends to be the weakest link in implementing a nonindigenous aquatic nuisance species program. Limited dollars are directed toward researching those high profile species (such as the zebra mussel) that are already present as opposed to research on the next likely invaders, pathways of introduction, existing laws and regulations and international protocols. Only 5 percent of ANS research expenditures has been dedicated to prevention of introduction of nonindigenous aquatic nuisance species.

Recommendations:

- C Identify, understand and perform risk assessments of pathways, next likely invaders (including pathogens), and likely sources of origin for new invasions.
- C Identify maritime transportation routes that have demonstrated or have the potential capability to advance the spread of aquatic nuisance species. Develop and evaluate prevention and control options, including exploring ballast water management technologies.
- C Examine current legislation regulating the importation of nonindigenous aquatic nuisance species to ensure proper prevention and control measures are in place (e.g., aquarium and pet trade industry, aquaculture)

Socioeconomic Considerations and Analysis

Findings: The potential social and economic effects caused by the invasion of nonindigenous aquatic nuisance species can be enormous. Invading organisms may introduce disease, concentrate pollutants, contaminate drinking water, and negatively impact recreation/tourism, shipping and navigation, and municipal and agricultural water users. These types of impacts must be quantified in order to assist resource managers in prioritizing research, and developing policy and law. Results from socioeconomic research are useful in raising public awareness of the severity of the nonindigenous aquatic nuisance species problem and for gaining public support for future prevention efforts. Once the public is aware of the potential hardship they may incur, they will be more apt to support and/or participate in research and prevention efforts. Findings from the research inventory indicate that minimal funding (only 1 percent) is spent on socioeconomic research.

Recommendations:

- C Estimate the economic costs of current and historical damage (physical, biological, industrial, recreational, ecosystem) to the Great Lakes caused by the invasion of nonindigenous aquatic nuisance species.
- C Estimate the costs and benefits (economic and social) of adopting new prevention and control technologies, including an examination of ways to minimize these costs to the affected industry.
- C Utilize the concept of biological pollution when referring to the introduction of nonindigenous aquatic nuisance

species.

Spread of ANS Populations

Findings: Once an invasive species has become established in the Great Lakes, the challenge becomes preventing its spread throughout the Great Lakes system including inland lakes and rivers. Early detection of a species increases the likelihood of successful containment or potential eradication. Understanding dispersal mechanisms and tolerable habitats allows for the development of safeguards and international protocols to prevent and or slow the spread of invaders to uninfested areas.

Recommendations:

- C Identify, understand and perform risk assessments of potential dispersal pathways within the Great Lakes region.
- C Monitor and review federal, state and provincial laws and regulations to ensure that prevention and control measures address all pathways of concern (e.g., aquaculture, aquarium, pet trade) in a consistent manner from one jurisdiction to the next. Gaps and inconsistencies should be resolved accordingly.
- C Prepare potential range maps for species already present.
- C Institute programs in the U.S. and Canada for early detection and reporting with incentives for participation.
- C Require containment guidelines for all research projects handling aquatic nuisance species (public and private sector research).
- C Examine dispersal barriers i.e., choke points to control the spread of established populations (e.g., Chicago River).

Strengthening the Research Infrastructure

A basic research infrastructure was established through the Nonindigenous Aquatic Nuisance Prevention and Control Act (P.L. 101-646) of 1990. The Act provides for the dissemination of research grants conducted or funded by the federal government as well as the coordination of research activities among the national ANS Task Force membership, which includes the National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, U.S. Coast Guard, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Department of Agriculture and ex-officio members as designated by the chairperson (i.e. state agencies, the Great Lakes Commission, tribal agencies other governmental entities).

Below is a list of recommendations to strengthen the current research infrastructure, both in the U.S. and Canada.

- C Develop a national research strategy for nonindigenous aquatic nuisance species that is interjurisdictional in scope and contains three fundamental goals that operate simultaneously: prevention of new introductions, control of already introduced species, and restoration of the aquatic ecosystem as well as recognize research needs identified in state management plans for aquatic nuisance species.
- C Develop an overarching coordinated action plan or regional policy agreement (with short and long-term agendas) to ensure commitment to collective multi-jurisdictional action on ANS prevention and control. This may include commitment for interjurisdictional cooperation in prevention and control; development of consistent state/provincial laws and programs; sharpened delineation between agency roles and responsibilities; establishment of a regional emergency response team; and establishment of a center for invasive species control.
- C Develop and institute pre-clearance regulations for the importation of aquatic shipments (fish, plants). This would ensure that cargo is inspected for nonindigenous aquatic nuisance species before it leaves its destination.
- C Increase interest/concern about other less highly publicized species by designating them as aquatic nuisance species or by identifying them as regional priorities for prevention and control.
- C Institute a national program for early detection and reporting with incentives for participation.
- C Develop and link ANS research databases nationally and internationally on the Internet to foster better communication among researchers.
- C Enhance communication on ANS issues between scientists and Sea Grant agents as well as the general public.
- C Continue research on ANS by reauthorizing the federal Nonindigenous Aquatic Nuisance Prevention and Control Act (National Invasive Species Act of 1996) and adequately appropriating funds. Research priorities should reflect the recommendations of the national ANS Task Force and/or the Great Lakes Panel on Aquatic Nuisance Species and other relevant organizations.