

National Priorities for Research on Aquatic Invasive Species

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Aquatic invasive species cause tremendous harm to the ecological, economic, and cultural integrity of the Nation’s waters and the communities they support. To combat this threat, Congress established the Aquatic Nuisance Species Task Force with the passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act in 1990. Composed of 26 federal and non-federal members, the Task Force works with its partners to create a unified network that raises awareness and takes action to prevent and manage aquatic invasive species. A key component of this network is identifying priority research needs for aquatic invasive species. Although much research has been conducted for some invasive species, there are many species for which little is known. There is a need for increased knowledge to fill gaps and provide natural resource managers the tools and information they need to better protect U.S. waters from the threat of aquatic invasive species.

In 2021, the Aquatic Nuisance Species Task Force’s Research Subcommittee surveyed members of the aquatic invasive species community for their highest priority research needs in the areas of prevention, early detection and rapid response, control, restoration, outreach, and general invasive species knowledge. The subcommittee evaluated each response for its practical application, technical feasibility,

national significance, and applicability to policy and management. The research needs that ranked highest in these areas were included in a National Priorities List for Research on Aquatic Invasive Species that was approved by the Task Force in November 2021.

The research priorities were intentionally kept at a broad level, in order to be applicable throughout the Nation and to be supported by localized research on priority species or issues. The research priorities were also grouped into the management areas and as needed, management subcategories, listed below.

Prevention

Preventing harmful introductions before they occur is the most effective means to avoid the risk of aquatic invasive species, yet diverse tools and methods are needed to prevent establishment of species into ecosystems where they are not native. This includes a greater understanding of the risks associated with the movement of organisms through global trade and watercraft operation. Additional study is also needed to better anticipate what

species have the potential to become invasive, link biological invasions to the transport of microorganisms and pathogens, and evaluate the effectiveness of existing program and plans that prevent aquatic invasive species. Research priorities described in the “prevention” section of the National Priorities List for Research on Aquatic Invasive Species include:

Organism in Trade

- Increase understanding of the “organisms in trade” pathway.
- Increase understanding of the effects of changing trade dynamics on patterns of species introductions.
- Evaluate federal and state authorities to identify gaps that may result in the introduction of an invasive species.
- Evaluate “hitchhiker” organisms on product shipments.

Watercraft Pathway

- Evaluate best practices for watercraft design.
- Evaluate the efficacy of watercraft decontamination (Figure 1) protocols for aquatic invasive species and explore ways to improve the efficiency and



Figure 1. A watercraft inspection/decontamination steward doing an inspection of a vessel.

- cost-effectiveness of watercraft inspection and decontamination.
- Increase understanding of viability of mussel veliger and other aquatic invasive species in residual water from watercraft.

Ballast Water Management

- Evaluate tools and methods for rapidly determining organisms' concentration in ballast water (Figure 2) during testing of ships' ballast water discharge.
- Expand the development of ballast water treatment systems to include operationally challenging conditions and streamline the approval process.

Microorganisms and Pathogens

- Improve understanding of the invasion risk posed by microorganisms and pathogens.

Species Risk Analysis

- Identify and evaluate risk analysis mechanisms to prioritize species of concern based on the likelihood of invasion and potential impacts.

Aquatic Invasive Species Management Plans

- Evaluate the effectiveness of state and interstate aquatic invasive species management plans.

Early detection rapid response

Despite the best preventive efforts, new species introductions into waters of the United States are expected. Greater effort is needed to increase the likelihood of identifying and detecting new species before they become established. This includes the continued development of species detection tools, increased knowledge on the biological and anthropogenic factors that contribute to successful establishment, and action to encourage individuals to report sightings of suspicious organisms. Research priorities described in the “early detection rapid response” section of the National Priorities List for Research on Aquatic Invasive Species include:

New and Existing Species Detection Tools

- Develop and evaluate tools to quickly find and identify high risk aquatic invasive species to aid inspections at airports and seaports.
- Develop and evaluate aquatic invasive species detection tools for marine and coastal species.



Figure 2. Ballast water being discharged from a vessel.

- Increase understanding of species establishment and sampling methods that can detect populations before they are too large to be eradicated.
- Develop cost-efficient genetic tools and evaluate their potential and limitations for use.

Containment

- Develop and evaluate tools and methods to track movement of organisms more effectively into uninfested locations.
- Evaluate the use of physical barriers to contain aquatic invasive species, considering how use may affect native species.

Aquatic Invasive Species Reporting

- Develop and evaluate reporting platforms to encourage reporting of unusual or new species sightings.

Control and restoration

Research Priorities for this section focus on encouraging innovation for control methods and approaches to lessen the impacts of aquatic invasive species to public interests and increase the likelihood of eradication. Recognizing that not all control methods are effective, feasible, or environmentally sound for every situation, available tools should be evaluated to guide decisions on the most appropriate means to control invasive populations as

well as to restore ecosystems following the application of control measures. Research priorities described in the “control” section of the National Priorities List for Research on Aquatic Invasive Species include:

Resource Management Decision Making

- Conduct a comparative analysis of existing aquatic invasive species control options to inform development of control strategies and plans.
- Increase understanding of the importance of population dynamics and life history stages in control efforts and use this information to develop population-based tools to inform eradication or population suppression.
- Evaluate past eradication attempts and long-term control efforts to determine effectiveness and lessons learned.
- Increase understanding of the long-term effects to waterbodies or native species from control methods used to combat aquatic invasive species.
- Increase understanding of the long-term environmental and economic implications to native communities when action to control or remove aquatic invasive species is not taken.

New or Existing Control Tools

- Pursue environmentally sound technologies to aid in the eradication or control of aquatic invasive species.

- Evaluate the effectiveness of incentive programs to control aquatic invasive species.

Habitat Restoration

- Increase understanding of efforts needed to restore ecosystem function and structure to following the removal of aquatic invasive species.
- Increase understanding of steps and methods needed to re-populate native species in areas where they have been displaced by aquatic invasive species.
- Identify criteria to determine the likelihood of restoration, to assist in prioritization of areas for control and eradication.

Outreach

To prevent the introduction and spread of AIS, it is critical that individuals understand why AIS are detrimental and what actions can be taken to reduce this risk. The “outreach” section of the National Priorities List for Research on Aquatic Invasive Species includes priorities to improve the effectiveness of outreach campaigns, ensure consistent messaging, and improve collaboration and innovation in message development:

Outreach

- Evaluate outreach campaigns to identify what messages and tools are effective at raising awareness, removing barriers, and measuring behavioral change.
- Evaluate effectiveness of boat stewards and watercraft inspection and decontamination stations in their ability to increase boater awareness and encourage preventative behaviors.
- Increase understanding of public awareness of existing laws in regulating aquatic invasive species.
- Evaluate invasive species teaching resources and activities for their ability to educate students on the impacts of aquatic invasive species and the importance of not releasing potential invasive species into the environment.

General aquatic invasive

This final section calls attention to research needed to increase knowledge of the biology, potential impacts, associated control methods, and interaction with climate change and other major drivers of change. This will allow for the most effective management of aquatic invasive species. Research priorities described in

the “general knowledge” section of the National Priorities List for Research on Aquatic Invasive Species include:

AIS Impacts

- Increase understanding of impacts from aquatic invasive species to ecological systems as well as human, animal, and plant health.
- Increase understanding of the economic impacts of aquatic invasive species.
- Conduct a comparative analysis of existing tools that can be used to measure costs incurred to support a national aquatic invasive species cost estimate.

Climate Change

- Assess how climate change, including extreme events and human adaptation, may alter invasion patterns, pathways, and probabilities of species establishment.

The priorities listed above have been edited from the original document for brevity; readers are encouraged to review the full National Priorities List for Research on Aquatic Invasive Species document on the Aquatic Nuisance Species Task Force website. There is

intent to update the Research Priorities list on a regular basis to capture new or immediate threats and remove priorities that have sufficiently progressed. To inform future revisions, the Task Force is developing a system to track and report ongoing and planned research efforts that advance the research priorities. In addition, it is anticipated that providing such information through the Task Force will foster partnerships by connecting researchers with shared interests and allow agencies better target funding opportunities.

To learn more about these efforts or the Aquatic Nuisance Species Task Force, please contact Susan Pasko, Executive Secretary of the Aquatic Nuisance Species Task Force, at anstaskforce@fws.gov.

Susan Pasko is the Executive Secretary of the Aquatic Nuisance Species Task Force, with the U.S. Fish and Wildlife Service. 🐦



(From the President, continued from p. 5 . . .)

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