

Aquatic Nuisance Species Task Force

2014 Report to Congress



On a global basis... the two great destroyers of biodiversity are, first habitat destruction and, second, invasion by exotic species.

- E. O. Wilson (1997), in *Strangers in Paradise*

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About This Report

Congress established the Aquatic Nuisance Species (ANS) Task Force with the passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act in 1990 and reauthorized it with the passage of the National Invasive Species Act in 1996 (collectively, the Act). The Act charges the ANS Task Force with developing and implementing a program for waters of the United States to prevent introduction and dispersal of ANS; to monitor, control and study such species; and to disseminate related information.

Section 1202(k) (2) of the Act requires the ANS Task Force to submit a report to Congress detailing progress in carrying out the provisions of the Act. This report highlights progress of the ANS Task Force in the development and implementation of a comprehensive program of waters for the United States to combat ANS. It is designed to introduce readers

to the ANS Task Force and to report progress made toward the goals of the ANS Program, as implemented through the ANS Task Force Strategic Plans.

The last report to Congress from the ANS Task Force occurred in 2004. It would be impossible to report on each individual endeavor since this time, thus this report focuses on key accomplishments from the federal and *ex-officio* members of the Task Force and its Regional Panels. Activities on the state ANS and species-specific management plans are briefly acknowledged in the report, but not specifically discussed as these actions are not directed by the ANS Task Force. The report concludes with a series of recommendations to build a stronger, more effective national ANS program to eliminate or reduce the environmental, economic, public health and human safety risks associated with ANS.

NANPCA Section 1202: Aquatic Nuisance Species Program

(a) IN GENERAL.—The Task Force shall develop and implement a program for waters of the United States to prevent introduction and dispersal of aquatic nuisance species; to monitor, control and study such species; and to disseminate related information.

(b) CONTENT.—the program developed under subsection (a) shall—

- (1) Identify the goals, priorities, and approaches for aquatic nuisance species prevention, monitoring, control, education and research to be conducted or funded by the Federal Government;
- (2) Describe the specific prevention, monitoring, control, education and research activities to be conducted by each Task Force member;

(3) Coordinate aquatic nuisance species programs and activities of Task Force members and affected State agencies;

(4) Describe the role of each Task Force member in implement in the elements of the program as set forth in this subtitle;

(5) Include recommendations for funding to implement elements of the program; and

(6) Develop a demonstration program of prevention, monitoring, control, education and research for the zebra mussel, to be implemented in the Great Lakes and any other waters infested, or likely to become infested in the near future, by the zebra mussel.

Executive Summary

Aquatic nuisance species (ANS) are nonindigenous species that threaten the diversity or abundance of native species, the ecological stability of infested waters, and/or any commercial, agricultural, aquacultural, or recreational activities dependent on such waters. ANS include nonindigenous species that may occur within inland, estuarine, or marine waters and that presently or potentially threaten ecological processes or natural resources. The term ANS is often used interchangeably with aquatic invasive species, the preferred term of federal and state managers. An aquatic invasive species is a species not native to the ecosystem under consideration whereby introduction of this species does or is likely to cause economic or environmental harm or threaten human health.

ANS are one of the largest threats to the aquatic ecosystems within the United States. These species readily colonize and transform habitats by reducing the abundance of native species and altering ecosystem processes. Second only to habitat destruction as a cause of global biodiversity loss, ANS have caused the extinction or endangerment of numerous species throughout the world. ANS also hinder economic development; for example, they diminish fisheries, decrease water availability, block transport routes, decrease property values, and degrade the aesthetic quality of recreation and tourism sites. The damages to human enterprises caused by ANS result in enormous economic costs. The cost to manage ANS is estimated at billions of dollars each year, suggesting that ANS are a bigger threat than other environmental crises, including global climate change. ANS may also affect human health and safety, not only by introducing disease and parasites, but these species may create physical hazards or introduce dangerous toxicants into the food chain.

Congress established the Aquatic Nuisance Species Task Force with the passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act in 1990 and reauthorized it with the passage of the National Invasive Species Act in 1996 (collectively, the Act). The Act charges the ANS Task Force with implementing the Act by developing and executing a program to prevent introduction and dispersal of ANS; to monitor, control and study such species; and to disseminate related information. The ANS Task Force, co-chaired by the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration, consists of 13 Federal agency representatives and 13 ex-officio representatives. These members work in conjunction with Regional Panels and issue-specific committees to coordinate efforts amongst agencies as well as efforts of the private sector and other North American interests.

This report highlights progress of the ANS Task Force in the development and implementation of a comprehensive program to combat ANS within of waters of the United States. It is designed to introduce readers to the ANS Task Force and to report ANS Task Force progress made toward the goals of the ANS Program, as implemented through the ANS Task Force Strategic Plans. The last report to Congress occurred in 2004, thus this report focuses on key activities that have occurred since this time, using examples from the federal and *ex-officio* members of the Task Force and its Regional Panels. This is my no means a comprehensive list of actions supported by the ANS Task Force, but used to illustrate the diverse portfolio of the Task Force in terms of terms of its scope of work and geographic areas. Activities on the state ANS and species-specific management plans are briefly acknowledged in the report, but not specifically discussed, as these actions are not directed by the ANS Task Force.

Progress is reported at the national level as well as the regional level, reporting accomplishments from the six regions established by the ANS Task Force. Each section is divided into six categories: coordination, prevention, early detection and rapid response, containment and control, research, and education and outreach. Collectively, these categories make up the central mission of the ANS Task Force.

Significant progress has been achieved in the prevention and control of ANS along with increased emphasis on the restoration of ecosystems that have been affected by ANS. Enhanced research and information exchange, new detection and eradication techniques, innovative control methodologies, and collaborative models are increasing our capacity to manage ANS. Awareness of the problems caused by ANS has dramatically improved, as evidenced by increased

activity at federal, state, and local levels. However, global trade and development continues spread ANS into new habitats, a trend that is likely to be further augmented by continuing global change, especially climate change.

The ANS Task Force is well posed to manage these challenges as it is backed by a concrete structure, comprehensive strategic plan, and a wealth of expertise; however, the ANS Task Force cannot continue the battle against ANS alone. Collaboration and communication is important, yet robust, consistent resources to implement scientific research as well as ANS prevention, monitoring, and management plans is the most critical need. The report concludes with a series of recommendations to build a stronger, more effective national ANS program to eliminate or reduce the environmental, economic, public health and human safety risks associated with ANS.

1990

YEAR CONGRESS
ESTABLISHED THE AQUATIC
NUISANCE SPECIES TASK FORCE



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CONTROL AND
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STATE AND INTERSTATE AQUATIC
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EX-OFFICIO
MEMBERS

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FEDERAL
MEMBERS

About Aquatic Nuisance Species

What are Aquatic Nuisance Species?

Aquatic nuisance species (ANS)¹ are nonindigenous species that threaten the diversity or abundance of native species, the ecological stability of infested waters, and/or any commercial, agricultural, aquacultural, or recreational activities dependent on such waters. ANS include nonindigenous species that may occur in freshwater, estuarine and marine waters and that presently or potentially threaten ecological processes and natural resources. In addition, ANS may adversely impact society by hindering economic development, preventing recreational and commercial activities, decreasing the aesthetic value of nature, and serving as vectors² of human disease.

How are ANS Transported?

ANS can arrive through many different pathways and vectors, but most species arrived as a direct result of human activity. Globalization has increased long-distance travel and intercontinental commerce. These and other factors have increased the frequency by which ANS are introduced to new areas, sometimes with costly results. For example, it is widely accepted that zebra mussels, *Dreissena polymorpha*, were introduced to the Great Lakes through ballast water discharge of ships arriving from foreign ports. Likewise, the import of live, exotic foods into the U.S. can result in ANS being released into marine and fresh waters. Some of our worst invaders, such as the lionfish and *Caulerpa*, resulted from the intentional release of unwanted pets or aquaria plants. These are just a couple of examples of how species are moved around the globe. However, the problem is ubiquitous and all too common.

Common Pathways for ANS

Ballast Water and Boat Hulls

Since 95% of all foreign goods by weight enter the U.S. through ports, the potential for ANS impacts on coastal communities is immense.

Outdoor Recreation

Watercraft, fishing equipment, diving gear, and other recreational items that are transported among several water bodies have been known to spread ANS to new waters.

Aquaria Releases

Escapes or intentional release of unwanted pets can be a source of new ANS in all parts of the country.

Fishing Bait Releases

Discarding unused bait can introduce ANS that disrupt their new ecosystems and eliminate competing native species.

Aquaculture Escapes

Non-native shrimp, oysters, and Atlantic salmon in the Pacific Northwest, are just a few examples of ANS that have generated concern over disease and other impacts that might arise from their escape.

Escaped Ornamental Plants, Nurseries Sales, or Disposals

Many ANS are for sale in nurseries and watergarden shops. Only some problem species are currently banned from sale.

Science/Laboratory Escapes, Disposals or Introductions

Accidental or intentional release of laboratory animals has introduced some ANS into U.S. waters.

Live Food Industry

The import of live, exotic foods and the release of those organisms can result in significant control costs.

Cross-basin Connections

New connections between isolated water bodies have allowed the spread of many ANS.

Biological Surveys and Field-related Activities

ANS are capable of hitchhiking to new habitats on watercraft, vehicles, clothing, field equipment, and other gear and materials. Consequently, many conservation activities can become potential pathways for spreading ANS.

¹ The term ANS is often used interchangeably with aquatic invasive species, or AIS, the preferred term of Federal and State managers. An aquatic invasive species is defined as a species not native to the ecosystem under consideration whereby introduction of this species does or is likely to cause economic or environmental harm or threaten human health.

² The term "vector" is continues to vary among agencies and organizations and is commonly confused with "pathway". The ANSTF defines a vector as the physical means or agent causing a species to translocate or spread (e.g. ship, car, waders). Pathway is defined as an activity or process through which a species may be transferred to a new location (e.g. shipping, animal trade, recreational activities).

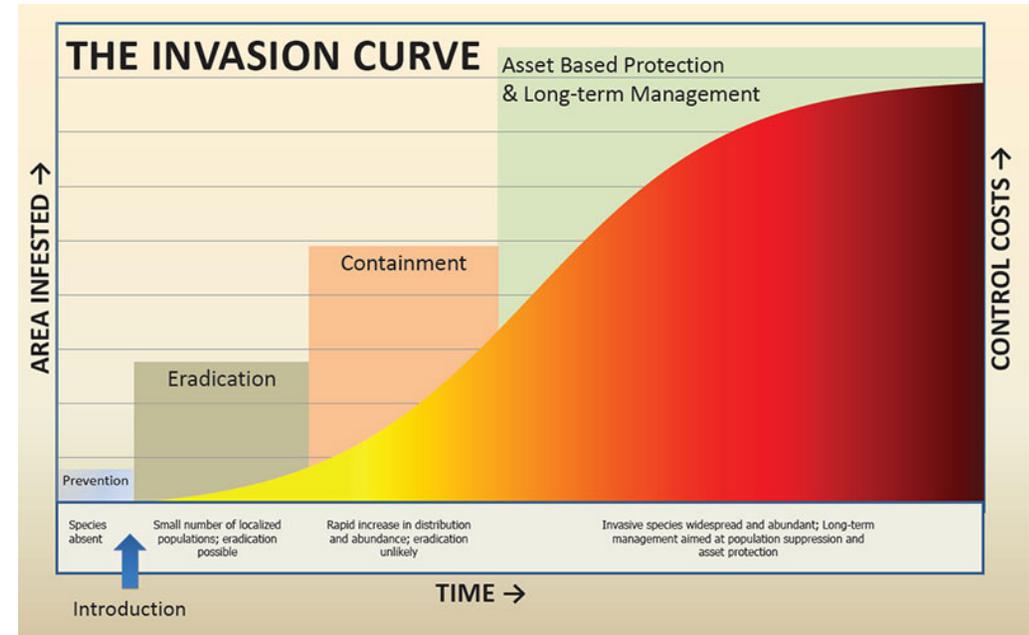
Why should we be concerned with ANS?

The impacts from ANS are immense, insidious, and usually irreversible...

ANS threaten biodiversity. Second only to habitat destructions as a cause of global biodiversity loss, ANS have caused the extinction or endangerment of numerous species throughout the world. ANS readily colonize habitats and transform habitats; the most harmful ANS displace native species, change community structure and food webs, and alter fundamental processes, such as nutrient cycling and sedimentation. ANS may also harbor disease and parasites which further threaten our native wildlife.

ANS result in enormous economic costs. ANS have diminished fisheries, decreased water availability, blocked transport routes, decreased property values, and degraded the aesthetic quality of recreation and tourism sites. In the United States, the annual cost of invasive species (both terrestrial and aquatic) is estimated at more than \$120 billion per year³ - a cost exceeding those of all other natural disasters combined.⁴ Zebra and quagga mussels (*Dreissena polymorpha*, *D. rostriformis bugensis*) alone cause one billion dollars per year in damages.⁵ Another 100 million is spent annually in the United States to control non-native aquatic weeds.⁶ The Great Lakes states invested over \$26.7 million toward prevention and control of ANS in just 2 years.

ANS spread disease and harm human health. Throughout history diseases have spread using other species as vectors. This includes malaria, yellow fever, bubonic plague, and, more recently, West Nile virus. The effect on public health extends beyond disease and parasites; human injury may also result from ANS. For instance, hazards may occur from collisions between boaters and jumping silver carp, the venomous spines of lionfish, or from the sharp-edged mussel shells found in aquatic recreational areas. Additional risk to humans is perceivable as chemicals used to control invasive species can pollute soil and water. Other ANS may increase human and wildlife exposure to organic pollutants as these toxicants accumulate in their tissues and are passed up the food chain.



Prevention is the most cost-effective means to avert the risk of harmful species introductions. Once a species becomes established, control efforts require significant and sustained resources.

³ Pimentel D, Zuniga R, Morrison D. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics* 52:273–288.

⁴ Simpson A. 2004. The Global Invasive Species Information Network: What's in it for you? *BioScience* 54: 613-614.

⁵ Army, 2002. Economic Impacts of Zebra Mussel Infestation. http://www.wes.army.mil/el/zebra/zmis/zmis/zmis/help/economic_impacts_of_zebra_mussel_infestation.htm (Accessed April 1, 2012).

⁶ Center TD, Frank JH, Dray FA, 1997. Biological control. In: Simberloff D, Schmitz DC, Brown TC. (Eds.), *Strangers in Paradise*. Island Press, Washington, DC, pp. 245– 266.

What can we do about ANS?

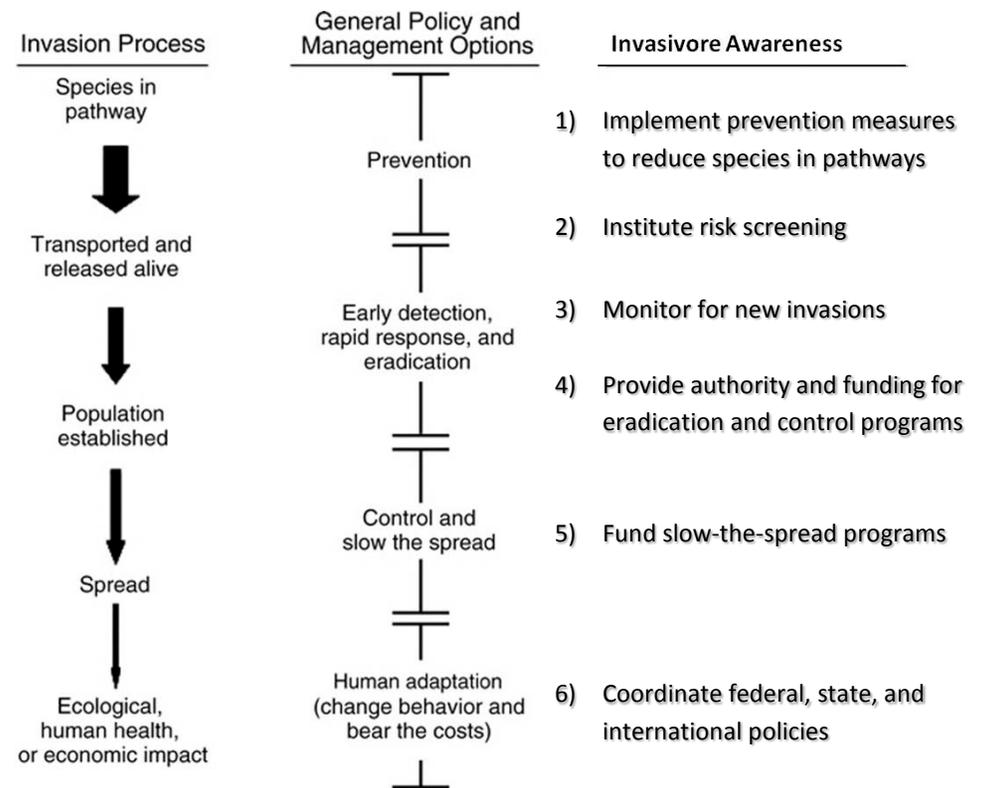
Once ANS become established, it can be extraordinarily difficult and costly to control or eradicate them. As a result, the best approaches for dealing with ANS are:

Cultivate partnerships. Coordination and cooperation between federal, state, and local entities are necessary to address possible gaps, weaknesses and inconsistencies, and to promote greater harmonization of ANS management in the U.S.

Prevent new introductions. Prevention is the most cost effective and environmentally protective tool to control ANS. *There is a potential savings of \$34 for each \$1 invested in prevention and early-detection programs*⁷. Preventative measures include decontaminating boats and gear that could transport ANS and restricting the importation or release of potentially harmful species.

Detect and quickly respond to newly detected ANS. Monitoring habitats, reporting sightings of previously unknown ANS, and working quickly to keep the species from spreading will increase the likelihood that new ANS will be eradicated and avoid the need for costly long-term control efforts.

Invest in Education and Public Awareness. Many ANS have been introduced through the actions of uninformed people; for example, disposing of bait, launching a boat, or stocking a private pond can each lead to the introduction of ANS if precautions are not taken. These methods of introduction can be eliminated or curtailed by building robust public awareness and action programs.



Stages common to all invasions by invasive species (left column), major policy and management options (middle column), and major recommendations (right column) associated with each stage of invasion.

(Adapted from Lodge et al 2006. *Biological Invasions: Recommendations for U.S. Policy and Management. Ecological Applications* 16: 2035-2054.

⁷ Cusack, C., Harte, M. J., & Chan, S. S. (2009). *The economics of invasive species*. Oregon State University, Sea Grant College Program.

Overview of the Aquatic Nuisance Species Task Force

The [Aquatic Nuisance Species \(ANS\) Task Force](#) was established by Congress with the passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) in 1990 and reauthorized with the passage of the National Invasive Species Act (NISA) in 1996 (collectively, the Act). The role of the ANS Task Force is to develop and implement the federal ANS program and serves to develop and implement a program for waters of the United States⁸ that:

- Prevents the introduction and dispersal of ANS;
- Monitors, controls and studies such species;
- Conducts research on methods to monitor, manage, control and/or eradicate such species;
- Coordinates ANS programs and activities of ANSTF members and affected State agencies; and
- Educates and informs the general public and program stakeholders about the prevention, management, and control of these species.

The ANS Task Force is guided by its [Strategic Plan for 2013 – 2017](#), which establishes eight goals that serve as a blueprint and coordination tool. This plan carries through many of the core elements established in the [Strategic Plan for 2007 - 2012](#) by remaining focused on prevention, monitoring, and control of ANS as well as increasing public understanding of the problems and impacts associated with invasive species. The current Strategic Plan also calls attention to other areas of ANS management, including habitat restoration and research.

To meet the challenges identified in the Strategic Plan, the ANS Task Force includes 13 Federal agency representatives. Other governmental entities are also represented as ex-officio members, which helps to keep discussions balanced as many of these members are either affected by ANS or by actions taken to address these species.

Federal departments and agencies of the ANS Task Force:

- **United States Fish and Wildlife Service —co-chair**
- **National Oceanic and Atmospheric Administration —co-chair**
- Army Corps of Engineers
- Bureau of Land Management
- Bureau of Reclamation
- Department of State
- Environmental Protection Agency
- United States Forest Service
- Department of Transportation, Maritime Administration
- National Park Service
- United States Coast Guard
- United States Department of Agriculture, Animal and Plant Health Inspection Service
- United States Geological Survey

Ex-officio members of the ANS Task Force:

- Great Lakes Commission
- Lake Champlain Basin Program
- Chesapeake Bay Program
- San Francisco Estuary Project
- American Public Power Association
- American Water Works Association
- Association of Fish and Wildlife Agencies
- Gulf States Marine Fisheries Commission
- Mississippi Interstate Cooperative Resources Association
- Native American Fish and Wildlife Society⁹
- National Association of State Aquaculture Coordinators
- Smithsonian Environmental Research Center

⁸ The term "waters of the United States" is defined by the Clean Water Act **40 CFR 230.3(s)**

⁹ Two members co-represent the Native American Fish and Wildlife Society

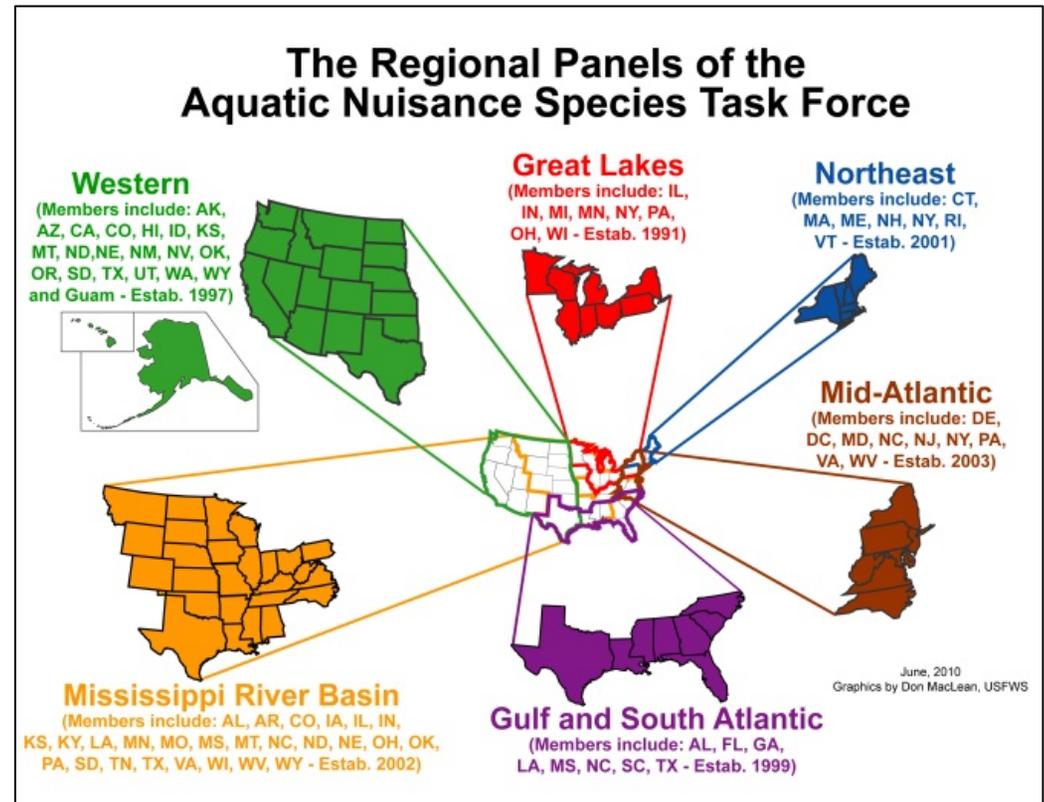
ANS Task Force Regional Panels

The ANS Task Force focuses its work on ANS issues of national concern that require or could benefit from collaborative solutions. It strives to create opportunities and synergies by sharing resources, expertise, and ideas across agency and organizational lines. While the ANSTF has a national focus, it recognizes the tremendous importance of actions taken at the regional and local level to achieve national ANS solutions.

The Regional Panels established by the ANSTF are a critical and effective mechanism for achieving the goals and objectives of the Task Force. The memberships within each of the panels include representatives of states, tribes, non-governmental organizations, commercial interests, and neighboring countries. The roles of each panel include, but are not limited to, identifying regional ANS priorities, coordinating ANS program activities in the region, and providing advice to public and private interests concerning ANS management and control.

Regional coordination efforts have been successful in pulling states together within watersheds or in similar geographic areas to address ANS problems. Communication between the Task Force and the Regional Panels is a critical feedback loop that contributes to the success of the ANS Task Force. The Regional Panels that have been established as committees of the task force include:

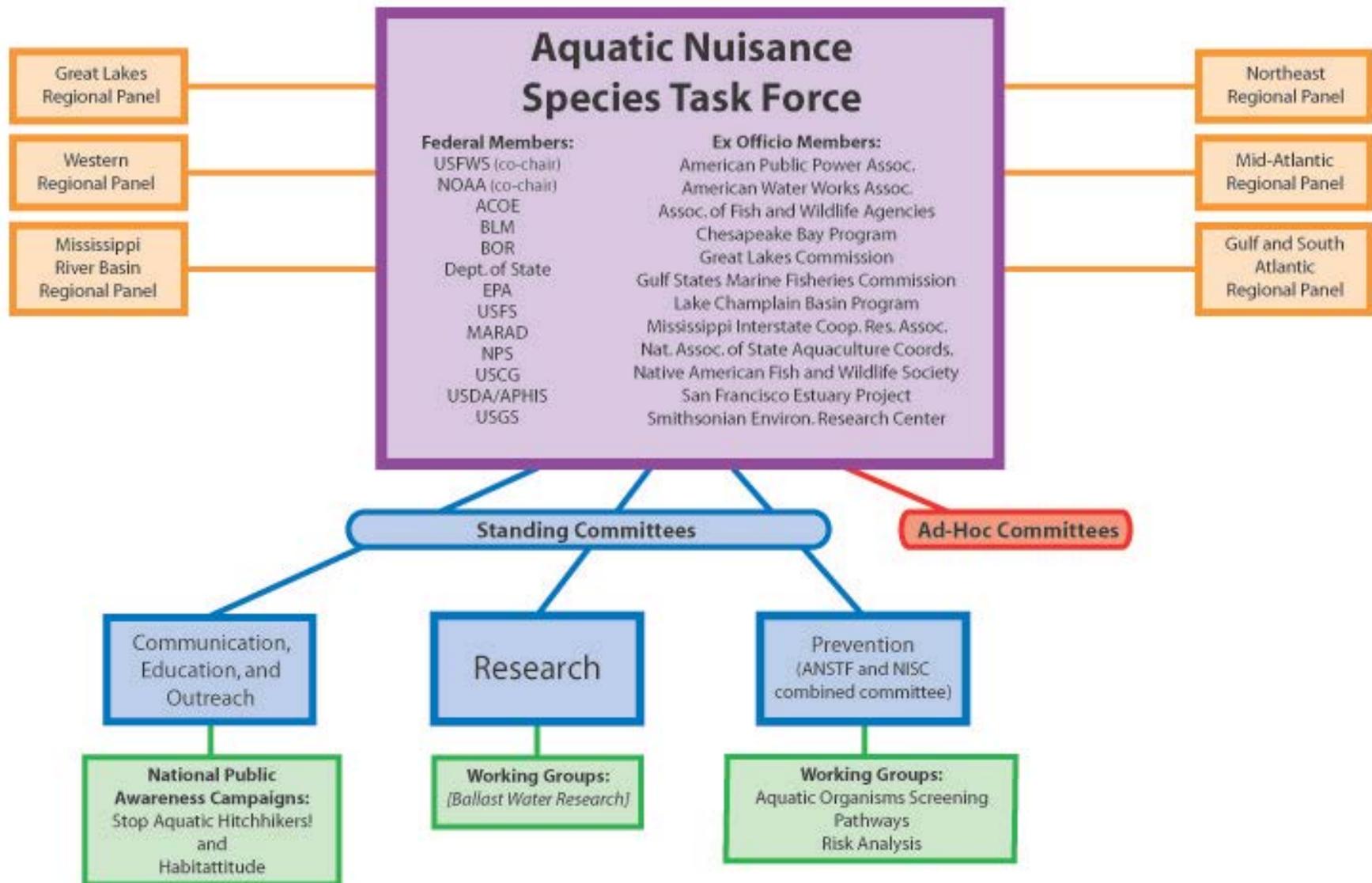
- Great Lakes Regional Panel (*established 1991*)
- Western Regional Panel (*established 1997*)
- Gulf and South Atlantic Regional Panel (*established 1999*)
- Northeast Aquatic Nuisance Species Panel (*established 2001*)
- Mississippi River Basin Regional Panel (*established 2002*)
- Mid-Atlantic Regional Panel (*established 2003*)



ANS Task Force Committees

To obtain the necessary technical coordination of various ANS efforts, the ANS Task Force has established several committees together to deal with common problems, such as control and prevention plans or outreach and education efforts. The ANS Task Force has three standing committees that oversee related working groups: the Communication, Education, and Outreach Committee; the Research Committee; and the Prevention Committee (the latter is a joint committee with the National Invasive Species Council (NISC)). Ad hoc committees are formed as needed to focus on a specific discipline or issue that warrants the attention of the ANS Task Force. Examples of previous ad-hoc committee include Ballast Water Research, Aquatic Organisms Screening, Detection and Monitoring, Risk Analysis, ANS Control, as well as several other that have come together to develop National ANS Management and Control Plans to manage specific species.

Aquatic Nuisance Species Task Force Structure



State ANS Management Plans, Examples of Accomplishments

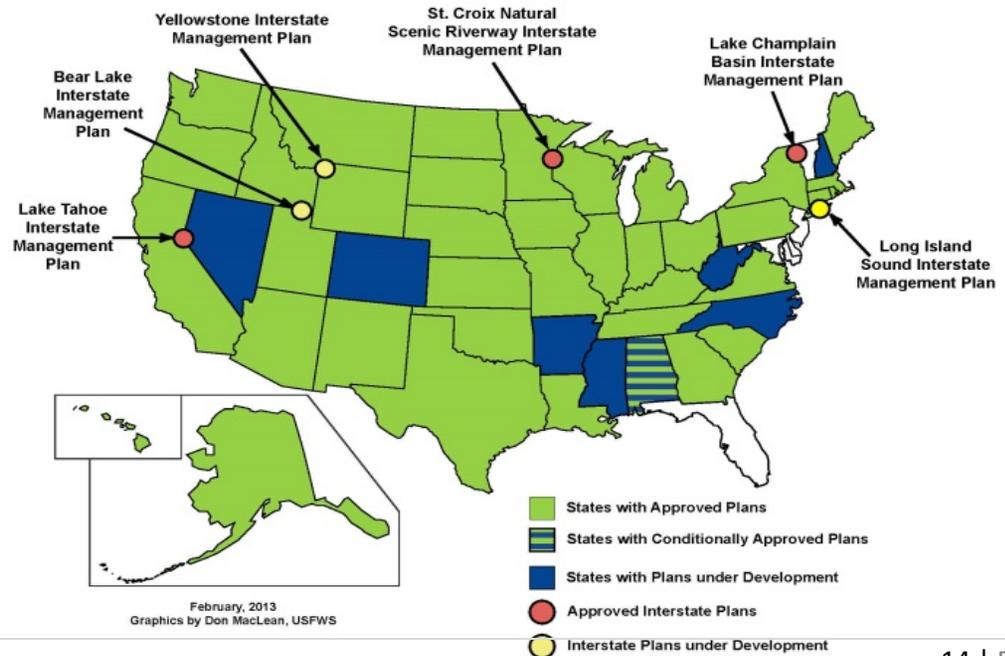
- Operating roadside inspection and watercraft decontamination stations,
- Monitoring waterbodies and detecting new invasions across the nation,
- Developing risk assessments and rapid response plans
- Conducting small-scale containment and control projects,
- Supporting research projects, including research on ANS pathways, general ecological studies, control tools, invasive species impacts, and risk assessment projects.
- Conveying ANS prevention messages to millions of people across the country through a wide variety of outreach methods, venues, media, and materials, and
- Conducting training courses in watercraft inspection training, ANS identification, monitoring, and other ANS topics.

State ANS Management Plans

The ANS Task Force encourages the development of [State and Interstate ANS Management Plans](#). The development of these plans helps state resource agencies secure the necessary support from within their state to establish formal ANS programs. ANS state management plans identify technical, enforcement, or financial assistance for activities needed to eliminate or reduce the environmental, public health, and safety risks associated with ANS. They focus on identifying feasible, cost-effective management practices and measures that will be undertaken by state agencies, local programs, cooperating federal agencies and others to prevent and control ANS infestations in an environmentally sound manner. Through their ANS Plans, state efforts weave together the tapestry of a national ANS program by supporting prevention, early detection/rapid response, containment, and control efforts. Since the passage of NANPCA more than 75% of the states have ANS Plans.

Status of State ANS Management Plans

(41 Approved Plans - 38 State, and 3 Interstate)



National ANS Management and Control Plans

NANCPA (as amended by NISA, 1996) specifies that the ANS Task Force may develop cooperative efforts to control established ANS and minimize the risk of harm to the environment and the public health and welfare. Each plan focuses on tasks that are essential to minimize the impact to areas where the species have already invaded and prevent its spread into additional habitats. The plans are developed through a cooperative process and undergo review by the ANS Task Force members and Regional Panels. Successful implementation of these plans requires the participation of states and regional entities, in addition to federal agencies.

There are currently 9 [National ANS Management and Control Plans](#) approved by the ANS Task Force:

- Asian carp (black carp (*Mylopharyngodon piceus*), bighead carp (*Hypophthalmichthys nobilis*), grass carp (*Ctenopharyngodon idella*), and silver carp (*H. molitrix*))
- Brown tree snake (*Boiga irregularis*),
- *Caulerpa* species (an invasive algae),
- European green crab (*Carcinus maenas*),
- Eurasian ruffe (*Gymnocephalus cernuus*),
- Snakehead (Family *Channidae*),
- Lionfish (*Pterois volitans* and *P. miles*)
- Mitten crabs (Genus *Eriocheir*),
- New Zealand mudsnail (*Potamopyrgus antipodarum*), and
- Zebra mussel (*Dreissena polymorpha*) and quagga mussel (*Dreissena rostriformis bugensis*)

ANS Management and Control Plans, Examples of Accomplishments

- Monitoring in Oregon and Washington has provided critical data on the abundance and population structure of the European green crab.
- Citizen science removal efforts in California have provided a sustainable model for less expensive management efforts that educate and engage stakeholders.
- Materials and lesson plans have been developed and used to introduce ANS issues to students. These educational resources have been made available to schools in as many as 38 states and 19 countries outside the U.S.
- Research on New Zealand mudsnails and removals from fish hatchery water sources has significantly reduced the risk of future invasions.
- Watercraft inspections and monitoring programs have been expanded to western water jurisdictions to prevent the further spread of zebra and quagga mussels.

Aquatic Nuisance Species Management at a Glance...

Coordination

The scope and complexity of ANS management requires the strengths of different government agencies and private organizations in different ways. Coordination and cooperation between federal, state, and local entities are necessary to address possible gaps, weaknesses and inconsistencies, and to promote greater harmonization of ANS management. A primary objective of the ANS Task Force is to facilitate cooperation and coordinate federal government efforts relating to ANS with those of the private sector and other North American interests.

Prevention

Prevention is the first line of defense against ANS and the most cost-effective means to avert the risk of harmful introductions. Prevention ensures that new ANS do not become introduced into new habitats. Without prevention, ANS may infect our nation's aquatic ecosystems by establishing incipient populations that cause severe economic and ecologic damage, which is often permanent and irreparable.

Early Detection and Rapid Response

Early detection and Rapid Response (EDRR) allow detection of new ANS before populations can establish or spread widely, thereby increasing the feasibility of eradication or containment. Actions include monitoring habitats to discover new species soon after introduction, reporting sightings of previously unknown species, and working quickly to keep new species from becoming established and spreading.

Containment and Control

After a species becomes established, management options include containment and control. Containment efforts are used to prevent further spread of the targeted ANS, while control efforts are used to suppress ANS populations so that other resource management objectives can be achieved.

Research

To deliver the components of an effective ANS program, research is often necessary to develop a greater array of management tools. Research is also needed on the basic biology and impacts of ANS to demonstrate their effects, analyze their threats, and support the most effective options for management. Research challenges continue to arise as new ANS are discovered and new issues emerge.

Education and Outreach

To prevent the spread of ANS by our highly-mobilized and globally connected society, it is critical that the public understand 1) why ANS are detrimental and why the government is involved and 2) what actions they can take to help prevent the introduction and spread of ANS. Robust public awareness programs increase understanding of the impacts associated with invasive species and allow the public to become partners in solving the problem.

National Efforts

Coordination

The ANS Task Force has developed several tools to serve agencies and organizations, as well as the general public. This includes the [ANS Experts Database](#), a nationwide list of ANS researchers and managers. This database has been an important resource to many, providing a straightforward way to identify species, describe their biology and potential impacts, and form ANS response teams and management plans. The ANS Task Force has also established a national ANS Hotline (1-877-STOP-ANS) and [online form](#) as a means for the public to report possible ANS sightings to the proper authority. The hotline is staffed 24 hours a day with reports directed immediately to personnel in the U.S. Fish and Wildlife Service's ANS program.

The joint ANS Task Force / NISC prevention committee worked with the U.S. Fish and Wildlife Service (USFWS) to develop a rapid screening tool that can quickly evaluate the risks associated with species that are intended for importation. To elevate the issue of regulating ANS movement onto and off of federally managed lands, the ANS Task Force worked alongside NISC to draft guidance and policy recommendations that strengthen national efforts to prevent and contain the spread of invasive species, both aquatic and terrestrial. The Task Force has also been an active participant in planning and executing the annual National Invasive Species Awareness Week, a week dedicated to allowing federal, state, local, and tribal officials to meet with stakeholder groups impacted by invasive species. Participants examine approaches, laws, policies, and creative approaches to preventing and reducing the invasive species threat to our health, economy, and natural resources.

Recognizing a need for improved communication and collaboration, coordination efforts occurred within ANS Task Force member agencies. For example, the U.S. Forest Service (USFS) released a [new National Policy](#)

[for Invasive Species Management](#) across the National Forest System. A Forest Service Handbook is under development and will provide specific operational requirements, standards, criteria, and guidance for invasive species management operations. The Handbook release is targeted for summer 2015.

The United States Army Corps of Engineers (USACE) developed an Invasive Species Leadership Team that coordinates and collaborates with ANS Task Force members, regional invasive species councils, other federal and state agencies and non-federal sponsors. The Team develops and implements cost effective strategies to address invasive species problems that affect USACE water resource management missions.

The National Oceanic and Atmospheric Administration (NOAA) has established an Aquatic Invasive Species Team as means to facilitate internal and external information sharing and collaboration as well as better serve the Agency's role as co-chair to both the ANS Task Force and NISC.

Prevention

Several guidance documents have been developed to minimize the risk of ANS introduction. The joint ANS Task Force / NISC Prevention Committee developed a [Guide for Pathway Definition, Risk Analysis and Risk Prioritization](#). The guide is currently under revision to expand the guidelines and develop an online tool. The ANS Task Force also established several ad-hoc committees to develop consistent, practical guidelines to inform the public and prevent the spread of ANS. The resulting guidelines relate to [recreational activities](#), [water gardening](#), and the [use of animals and plants in school classrooms](#). Organizations conducting ANS outreach are encouraged to promote and use these guidelines in their communication and outreach efforts. At a federal level, the Bureau of Reclamation (BOR) developed [the Equipment Inspection and Cleaning Manual to Help Prevent the Spread of Invasive](#)

[Species through Contaminated Equipment Use](#). This manual includes protocols for inspection and cleaning various types of equipment and is applicable to many organizations. USFWS and NOAA continue to improve upon and provide [Hazard Analysis and Critical Control Point \(HACCP\) planning](#) to state and federal partners. HACCP is a management tool that provides a structured method to identify ANS risks and focus procedures in natural resource pathway activities. The agencies also developed a HACCP “Train the Trainer” course to provide participants with tools to deliver a successful HACCP course and review submitted plans.

Efforts to manage other ANS pathways include the Aquatic Animal Health Contact Project, led by National Association of State Aquaculture Coordinators (NASAC). This project was a great success as it prevented miscommunication and accidental release of potential pathogens, thus minimizing harmful effects of ANS. Further, the Association of Fish & Wildlife Agencies (AFWA) cooperated with the Department of the Interior, the U.S. Fish and Wildlife Service, and the Pet Industry Joint Advisory Committee to develop a memorandum of understanding (MOU) establishing a general framework for collaborating on non-regulatory approaches to reduce the risk of ANS introduced into the U.S. through trade. Ongoing implementation of the MOU includes efforts by AFWA to evaluate which species should be evaluated for invasiveness and develop recommendations to limit or prevent trade of high risk species.

Ballast water discharged from ships is one of the largest pathways for the introduction and spread of ANS. To manage this pathway, the U.S. Coast Guard (USGC) issued a final rule for standards for living organisms in ships’ ballast water discharged into waters of the United States ([77 Fed. Reg. 17254](#)). The Final Rule moves forward with a consistent discharge standard adopted by the International Maritime Organization (IMO) at the Ballast Water Management Convention. The Environmental Protection Agency (EPA) completed the Final Issuance of the [2013 Vessel General Permit](#) (VGP). The VGP requires treatment of ballast water to meet numeric limits for some vessels and requires self-monitoring of

treated ballast water to ensure systems are being appropriately and meeting required limits. As effective treatment systems are installed onboard vessels, EPA expects the risk of new shipborne invasions to U.S. waters to decrease dramatically.

Early Detection and Rapid Response

Most monitoring and response efforts for ANS occur at the regional levels and are presented in the sections below. However, federal agencies have advanced tools at a national level that may assist localized efforts. For example, BOR has developed and refined polymerase chain reaction (PCR) protocols that rapidly detect zebra and quagga mussel DNA in water samples. NOAA has developed EDRR models that are currently being used to guide efforts that address marine ANS.

Containment and Control

Similar to EDRR, most ANS control efforts are on-the-ground and species-specific, yet some federal agencies have comprehensive programs or strategies that encompass multiple regions. For example, USFS finalized the [Forest Service Manual 2900](#) (Invasive Species Management Policy) to direct management of all aquatic and terrestrial invasive species across the 193 million acre National Forest System. USACE conducts control and management operations of ANS on its diverse portfolio of water resource facilities in all 50 states. These operations are conducted in collaboration with many ANS Task Force members, other federal agencies and state organizations. USACE is also conducting or participating in ten large scale ecosystem restoration activities throughout the United States, each involving ANS issues. To assist with coastal restoration, the NOAA Restoration Center funds numerous projects nationwide, in which ANS management is often a large component of the projects. NOAA also provides training and support to regional staff to ensure resource management activities do not promote further spread of ANS.

Research

The ANS Task Force Research Committee drafted a [Research Risk Analysis Protocol](#) to evaluate proposed research for its potential to result in the introduction or spread of ANS and, where appropriate, outlines the process of developing risk management plans. The ANS Task Force Ballast Water committee convened to design a coordinated research strategy for developing the data and models necessary to develop numerical ballast water discharge standards. The outcome of the workshop was a report with recommendations to advance a cohesive binational strategy that addresses the lack of information inhibiting the development and validation of ballast water technologies.

In response to national concern regarding ANS, research continues to improve ballast water treatment technologies. For example, NOAA saw the completion of three grants supporting full scale BW testing facilities and three grants to test new technologies. The U.S. Geological Survey (USGS) conducted research concerning gas mixtures to treat ballast water. The U.S. Department of Transportation (DOT), Maritime Administration (MARAD) established 3 domestic ballast water technology testing facilities and began researching hull fouling survey methods. The National Park Service (NPS) worked with researchers and private companies to develop ballast water treatment technologies that could be installed on vessels for ongoing ANS management as well as emergency response technology and operations for vessel groundings. The USCG, with its research and development partners, developed and refined new procedures for testing the efficacy of ballast water treatment systems and furthered the understanding of ballast water management technologies and their impact to vessel operation and design.

USACE conducts ANS research through two direct-funded programs: the Aquatic Nuisance Species Research Program (ANSRP) and the Aquatic Plant Control Research Program (APCRP). The ANSRP addresses all ANS that are problematic to our nations' waterways, infrastructure, and

associated resources by investigating innovative technologies regarding risk assessment, prevention, species biology, and environmentally sound options to manage ANS. The APCRP is the only federally authorized research program directed to develop technologies for the management of invasive aquatic plants. The program provides effective, economical, and environmentally compatible methods for assessing and managing problem aquatic vegetation that interfere with the valued uses of U.S. waterways. Past research projects have investigated biological control agents, chemical control strategies, biology and ecology of invasive aquatic plant species, and integrated weed management methods. Finally, The USFS supported a risk assessment that analyzed potential environmental impacts of *quaternary ammonium products* (i.e. Sparquat and many variations). This process hopefully will result in amended EPA labels approving the use these chemicals to decontaminate fire and field gear and protect against the spread of ANS.

Education and Outreach

[Stop Aquatic Hitchhikers!](#) (SAH!) is the internationally recognized public Awareness campaign that empowers recreational users to become part of the solution in stopping the transport and spread of these harmful hitchhikers. In 2012, USFWS signed a new MOU with Wildlife Forever, transferring the operational lead of the Stop Aquatic Hitchhikers! conservation messaging brand. Wildlife Forever has continued to encourage state and federal fish and game agencies, tribal organizations, and numerous NGO's including lake associations and watershed districts to support of ANS awareness through consistent messaging and outreach. What is unique about SAH! is the multi-media marketing and educational efforts targeted to anglers, boaters, hunters and other outdoor recreational users to identify and stop the spread of

invasive species. Outreach methods include: television and print advertisements, billboards, dioramas, and social media. *Silent Invaders*, a television show created by Wildlife Forever, reached millions of Americans. Overall, the SAH! campaign has attained over 1.2 billion impressions on outdoor recreational users.

Other national education efforts include a USACE webinar series that educates individuals on ANS problems, control and management technologies, and ongoing research. NPS provides on-site information regarding ANS and associated control actions. In addition to park based signage, visitor interpretation programs, and interdiction efforts, the NPS provides web based updates and other materials to inform the public of ANS impacts and management efforts.



STOP AQUATIC HITCHHIKERS!™

Prevent the transport of nuisance species.
Clean all recreational equipment.

www.ProtectYourWaters.net

"The Wildlife Forever Threat Campaign™ partnered with the "Stop Aquatic Hitchhikers!" campaign since day one. It has always been about partnerships and consistent messaging, sharing ideas, tools, resources and a commitment to conservation. I'm grateful for the ANS Task Force in what this opportunity will create"

- Pat Conzemius, Conservation Director of Wildlife Forever.

Great Lakes Region

Illinois, Indiana, Michigan, Minnesota, New York, Pennsylvania, Ohio, Wisconsin

Coordination

Content Needed

Prevention

The Great Lakes Commission (GLC), hosting organization of the GLP, is working to support prevention efforts by developing software to assess the availability of ANS via internet sales, identify sellers, and develop and implement targeted management activities. This project will provide management tools to decision-makers and regulators, present information on the Internet marketplace, better assess the risks associated with this pathway, and present options for additional actions to prevent ANS introductions. Other prevention activities within the GLP included adoption of a position statement and recommendations for a national ballast water discharge standard.

Federal efforts within the Great Lakes region include NOAA's [Great Lakes Aquatic Nonindigenous Species information System](#) (GLANSIS), a regional node of the national online [Nonindigenous Aquatic Species](#) (NAS) database (operated by the USGS). This database operates with the goal to provide one-stop access to the best available information on Great Lakes ANS in support of detection, management, and control. NOAA is currently using the system to develop and apply tools to assess invasion probability as well as potential impact to a list of "likely" invaders identified in the scientific literature.

USACE, in consultation with other federal agencies, Native American tribes, state agencies, local governments and non-governmental organizations, continues to conduct the [Great Lakes and Mississippi River Interbasin Study](#) (GLRMIS). The [GLMRIS Report](#) presented the results of a multi-year study regarding the range of options and technologies available to prevent ANS movement between the Great Lakes and Mississippi River

Great Lakes Panel on Aquatic Nuisance Species

Convened in 1991, the Great Lakes Panel (GLP) was the first regional panel to be federally authorized by the ANS Task Force. The mission of the Panel is to coordinate the development of education, research, and policy to prevent new ANS from entering the Great Lakes basin and to control and mitigate those ANS populations already established. The Panel carries out this mission by working to:

- Identify ANS priorities for the Great Lakes,
- Develop regional position statements on ANS priorities,
- Assist the ANS Task Force in coordinating federal ANS program activities,
- Provide advice concerning ANS prevention and control,
- Coordinate ANS program activities in the Great Lakes,
- Provide a forum for interagency/organizational communication, and
- Serve as a vehicle for regional dialogue and discussion on ANS issues.

The GLP has been a leader nationally. Products produced over the last 20+ years have provided guidance for its members as well as other regional panels helping to address ANS challenges. The GLP fosters binational collaboration and coordination on ANS research, education, and policy through the active participation of members representing Canadian federal, provincial, and nongovernment agencies. It creates a forum that allows information sharing, collaboration, and coordination to provide opportunities for leadership, the genesis of new ideas and approaches, and efficient operations that avoid duplication of efforts and use of resources. It leverages expertise and knowledge for "lessons learned", providing insights into what resources are available and what efforts work. The collective voice provided through the GLP is more effective to advance issues than individual states or agencies. The networking and relationship-building opportunities provided through GLP meetings and activities provide links for collaborative campaigns, projects, and products which leverages resources from private, public, and non-profit sectors.

basins through surface connections. Through GLMRIS, potential canals and waterways that exist between the Great Lakes and Mississippi River basins were identified and state and federal agencies have mobilized to reduce the risk of interbasin transfers. The long-term management of ANS control sites is still evolving and each year there are newly discovered management practices and control methods. Supporting the Great Lakes Restoration Initiative (GLRI), USFWS advanced methodologies for species risk assessment. Risk screenings, which used to take several years, can now be rapidly assessed in days. Such risk assessments have already led to the development of an initial watch list for high-risk organisms to the Great Lakes.

Early Detection and Rapid Response

The GLRI supported several pilot surveillance initiatives and developed the foundation for a multi-species early detection network. Partner agencies responded to several detections, including Silver and Bighead Carp in the Chicago Area Waterway System, Red Swamp Crayfish in Wisconsin, Grass Carp in Michigan, and Hydrilla in New York.

EPA's Great Lakes National Program Office continues to develop a Great Lakes early detection network for ANS. Outcomes from this research will include refined and robust sampling strategies for potential non-indigenous species in different coastal systems across the Great Lakes and an evaluation of the capacity and efficiency to supplement morphological identification with DNA-based identification. The project will also extend and refine early detection sampling strategies by evaluating challenges to early detection

Containment and Control

Minnesota Department of Natural Resources partnered with NPS staff to evaluate threats posed by Asian carp and actions needed to minimize their impact in waters of the upper Mississippi River. An Asian carp task force developed the Asian Carp Action Plan in 2011, which has led to early identification of carp movement, habitat evaluations for potential establishment in the Saint Croix Riverway, and initiatives to prevent the spread of Asian carp in the upper Mississippi River.

Research

The GLRI has enabled federal agencies and Great Lakes states to make progress by working together on control plans and on-the-ground actions for some of the 180 ANS that exist in the Great Lakes. At the forefront of the GLRI was the effort to prevent Asian Carp from becoming established in the Great Lakes.

Researchers are developing control techniques that target Asian carp without harming other fish species. GLRI also provided funds for the USFWS to increase their capacity to effectively support eDNA analysis. This program will allow USFS to develop a program to monitor the Great Lakes and the Chicago Area Waterway System (CAWS) for Asian carp. NOAA's Great Lakes Environmental Research Laboratory developed food web models to predict ANS impacts on Lakes Michigan, Erie, and Huron ecosystems. The lab also configured models to forecast both ecological and economic impacts of current and future species invasions to the Great Lakes. The GLRI has also provided essential funds federal agencies and their partners to synthesize and field-test sea lamprey pheromones, with the hope that pheromones could be used to boost trapping and removal efficiency.

The Inter-Tribal Fisheries and Assessment Program and Chippewa Ottawa Resource Authority (CORA) has developed and tested specially modified nets that avoid unwanted by-catch. The modifications will help tribal commercial fishermen in the 1836 treaty area avoid fouling of nets by ANS and aid in the rehabilitation of native lake trout. CORA will continue to help tribal commercial fishermen adopt and use the new system and explore opportunities to promote their methods to assist fisheries research and other commercial fisheries.

Education and Outreach

The GLC, with guidance from GLP members, developed a 14-page full-color informational booklet entitled [Great Lakes Aquatic Invasions](#). The booklet provides a comprehensive overview of ANS problems in the Great Lakes, along with challenges and the approaches being taken to address them. Nearly 10,000 copies have been disseminated to local, state and federal decision-makers, as well as other user groups from the recreational and commercial sector. The GLC also publishes an *ANS Update* newsletter that covers emerging ANS issues in the Great Lakes region, including an ANS feature article and state, provincial, and federal updates.

The Western Regional Panel on Aquatic Nuisance Species

The Western Regional Panel (WRP) was formed in 1997 to help limit the introduction, spread and impacts of ANS into the Western Region of North America. The mission of the WRP is to protect western aquatic resources by preventing the introduction and spread of ANS into western marine, estuarine, and freshwater systems through the coordinated management and research activities of state, tribal, federal, commercial, environmental, research entities, industries and other regional panels. The panel strives to achieve this mission by working to:

- Identify Western Region priorities for responding to ANS
- Make recommendations to the ANS Task Force regarding an education, monitoring, prevention, and control program to prevent the spread of zebra/quagga mussels west of the 100th Meridian,
- Coordinate, where possible, other ANS program activities in the West,
- Develop an emergency response strategy for federal, state, and local entities for stemming new invasions of ANS, and
- Provide advice to public and private individuals and entities concerning methods of preventing and controlling ANS infestations.

WRP membership is representative of inland and coastal interests with members from state, federal, and Canadian agencies, tribal representatives, and members ranging from academia, industry, commissions, non-profit conservation organizations, recreational boating, and legal interests. The greatest focus of the WRP has been placed on coordination, prevention, control and management, and education and outreach. Ensuring that member partners have a voice on ANS and sharing those concerns with the ANS Task Force has been a critical WRP role. The WRP provides a forum for sharing information on prevention, control and management, and in many cases prioritizing the needs of the diverse interests represented within our large geographic area.

Western Region

Alaska, Arizona, California, Colorado, Guam, Hawaii, Idaho, Kansas, Montana, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wyoming

Coordination

To address the spread of non-native mussels into the West, the WRP developed the [Quagga-Zebra Mussel Action Plan](#) for Western U.S. Waters (QZAP). QZAP was approved by the ANS Task Force and adopted as DOI's roadmap for addressing the western spread of quagga and zebra mussels. The FWS funded projects that support QZAP priorities, including developing effective watercraft and equipment inspection and decontamination protocols and establishing boat inspection and decontamination stations. To further advance the goals identified in QZAP, the WRP and other partners brought together leaders in ANS management, attorneys general and, state and federal law enforcement for a workshop to discuss and improve current boat inspection and decontamination programs in the west. This effort has cascaded into successful improvements in communication, relationships, protocols, and legislation.

Marine debris plagued the West Coast as a result of the 2011 Japan tsunami, bringing the potential of ANS introductions. In response, a Regional Preparedness Response Workshop to Address Biofouling and Aquatic Invasive Species was held in Portland, Oregon. Sponsors of the event included Portland State University, National Sea Grant, Oregon Sea Grant, Oregon State University, Oregon Dept. of Fish & Wildlife, USFWS, and NOAA. The workshop brought together marine debris and invasive species experts, managers, and communicators and resulted in the creation of a coherent framework for risk assessments, management, outreach and engagement, policy, and research relative to introduction of ANS by tsunami debris.

To address invasive tunicate species, the WRP hosted a workshop that brought together coastal managers, scientific leaders and other pertinent regional stakeholders. Items discussed at the workshop included known extent of existing tunicate populations, potential environmental and economic impacts, previous and planned management efforts, research and funding priorities, and control options. As an outcome of the workshop, a regional management plan is currently under development.

Prevention

The WRP developed and approved [Guidance to Prevent the Spread of AIS through Field Gear and Uniform Minimum Protocols](#) as well as Standards for Watercraft Interception Programs for Dreissenid Mussels in the Western United States. The Panel also initiated development of a multi-state watercraft inspection and decontamination program called “[Building Consensus in the West](#)”. This group, along with The National Sea Grant Law Center and the Association of Fish and Wildlife Agencies, developed [Model State Legislative Provisions](#) to offer guidance on watercraft inspection and decontamination programs and create a foundation for multi-state reciprocity.

The WRP worked alongside several federal agencies, including Bureau of Land Management (BLM), BOR, USFWS, USACE, USFS and USGS to carry out numerous activities related to zebra and quagga mussels. Efforts under the [100th Meridian Initiative](#) included assessments of high-use boat ramps for targeting prevention efforts, determining the efficacy of car washes for boat decontamination, investigating methods for decontamination of scuba gear, and the effectiveness of chemical treatments.

Early Detection and Rapid Response

The WRP, partnered with U.S. Department of Agriculture (USDA) Agricultural Research Service’s Exotic and Invasive Weed Research Unit, University of California - Davis, and Portland State University, completed a project to develop Preemptive Rapid Response Teams for Exotic Aquatic Weeds. The WRP also partnered with USFWS to monitor for

existing infestations in Pacific Region. Species surveyed included New Zealand mudsnails, nutria, Amur goby (Lower Columbia River watersheds), spartina (Willapa Bay National Wildlife Refuge, WA), brown tree snake (Guam), non-native fish (Northwest and Hawaii), amphibians, reptiles, aquatic and riparian weeds (at many National Wildlife Refuges), and pathogens (at Fish Health Centers). The NPS, upon detection of quagga mussels in Lake Mead, established an incident team and developed a quagga/zebra mussel infestation [Prevention and Response Planning Guide](#). The Lake Mead National Recreation Area also implemented containment procedures by developing a boat washing and public education program that has widely increased the understanding of invasive mussel management.

Containment and Control

The Maunalua Bay Reef Restoration Project, an invasive algal removal project was implemented in Hawaii by The Nature Conservancy with funding from NOAA through the American Recovery and Reinvestment Act (ARRA). This project completed earlier than expected and under budget; it also created or retained 75 jobs, engaged 8 local businesses and 5 local farmers, and recycled 100% of the invasive algae into compost to be used on local farms. In addition, 3,000 community members and 12 schools got involved in the reef restoration by contributing a total of 7,000 hours of community service. According to The Nature Conservancy, the volunteer program will continue, as will scientific research in the Bay.

Research

The WRP conducted research to gain a better understanding of the thermal tolerances, physiological condition, and population genetics of zebra and quagga mussels. The panel also completed a [risk assessment of recreational boating](#) traffic to more effectively manage this pathway.

In an effort to develop a cost effective method to decontaminate the ballast tanks of watercraft, a prototype ballast water filtration system was developed and tested at Lake Mead by the University of Nevada, Reno. Support for the project was provided by USFWS, California

Department of Fish and Wildlife, Colorado Parks and Wildlife
Department, Tahoe Regional Planning Agency, Pacific States Marine
Fisheries Commission and Water Sports Industry Association. Test results
showed the filtration unit will retain and/or damage Dreissenid veligers¹⁰
and zooplankton, indicative of its potential to prevent additional ANS
introductions.

Education and Outreach

The WRP updated and published the "[*Threats to the West*](#)" brochure and distributed among all WRP regional partners and other interested individuals and groups. The panel also completed a [*Guidance to Prevent the Spread of AIS through Field Gear*](#) as well as a pilot project to explore outreach to boaters on permitted rivers conducted by Invasive Species Action Network. The WRP also conducts several prevention programs, including "[*Train the Trainer*](#)" [*programs with Master Gardeners*](#) and [*Watercraft Inspection Programs*](#).

¹⁰ Planktonic larva of most bivalve mollusks

Gulf & South Atlantic Regional Panel on Aquatic Invasive Species

The Gulf and South Atlantic Regional Panel on Aquatic Invasive Species (GSARP) was established in 1999 under the Gulf of Mexico Program of the Environmental Protection Agency (EPA). In 2002 the Gulf States Marine Fisheries Commission took over administration and coordination responsibilities. The mission of the GSARP is to provide for coordination of ANS control and management activities among its member states and other organizations in the region and to help all the members develop a working relationship with each other to help facilitate communication and cooperation across the region.

GSARP members include representatives from state, federal, and international agencies, non-governmental organizations, industries, and private citizens with authorities to and/or interest in addressing ANS issues. Previously, the Panel has funded projects aimed at developing novel ways to control and eradicate ANS in the southeast region. They have also supported projects that developed and distributed outreach materials to educate the public about the impacts of ANS and the steps they can take to stop new introductions and the spread of existing populations.

Gulf and South Atlantic Region

Alabama, Georgia, Florida, Mississippi, Louisiana, South Carolina, Texas

Coordination

Content Needed

Prevention

Content Needed

Early Detection and Rapid Response

Content Needed

Containment and Control

NOAA and the Reef Environmental Education Foundation (REEF) have trained more than 250 divers and snorkelers on how to identify and safely capture lionfish. Together, these organizations coordinate lionfish derbies that have brought public attention to the lionfish invasion, removed lionfish from localized areas, and have highlighted the procedures for safe preparation and consumption of lionfish. At a broader scale, lionfish reporting efforts across the entire invaded range have been facilitated by the USGS, USFWS, and other stakeholder groups that manage lionfish reporting hotlines and websites.

In addition to the ANS Task Force- approved [National Invasive Lionfish Prevention and Management Plan](#), several agency-specific plans have been developed to complement the ANS Task Force's National Invasive Lionfish Prevention and Management Plan. For example, the NPS developed a lionfish response plan that has been used as a foundation for individual parks to develop local management plans and guide the agency and its partners in addressing the invasion of lionfish. NOAA's Office of National Marine Sanctuaries (ONMS) has prepared a Lionfish Response Plan that documents a variety of ongoing monitoring, control, research, and education/outreach activities at the three marine sanctuaries affected by the invasion.

Research

Recognizing a need for species-specific tools that can be used to eradicate invasive fish populations without adversely affecting the native species, GSARP supported a study of a “Trojan YY fish.” This study consisted of a sex-reversed fish containing two Y chromosomes that can be introduced into a normal fish population. These YY fish result in the production of a disproportionate number of male fish in the population in subsequent generations. Mathematical modeling of the system following introduction at a constant and small rate of the YY fish reveals that female fish decline in numbers over time, leading to eventual extinction. Another GSARP-supported study investigated approaches to generate sterile snails in high yields. Aquarium dumping is a primary pathway for introduction, accordingly new snail introductions could be greatly reduced if aquarium snails were made available as a sterile product, unable to reproduce if introduced into the wild.

NOAA has researched lionfish biology and ecological impacts since they were first observed by a NOAA researcher on a shipwreck off the coast of North Carolina in 2000. The agency issued its first ecological forecast of their spread and predicted Atlantic range in 2003 and is now applying the research findings to develop control and management options for coastal managers.

NASAC, in conjunction with Florida Department of Agriculture and Consumer Services, conducted a survey of the Atlantic Coastal States to summarize and compare their laws, policies and programs as pertaining

to the use of sovereign submerged lands for shellfish culture. The project produced an analysis that has been shared with the Atlantic States, NOAA’s Aquaculture Program and to shellfish producers via the East Coast Shellfish Growers Association.

Education and Outreach

GSARP created an invasive species traveling trunk, a self-contained outreach and educational tool that can be used to educate a wide variety of people about the impacts associated with ANS and the steps they can take to stop new introductions and the spread of existing populations. Currently the GSARP has 3 traveling trunks available for use by the public at no cost. Each trunk includes an annotated outline of talking points for presentation to secondary school students and the general public. Each trunk covers eleven different invasive species making them more representative of the full problem of invasive species in the Southeast.

NOAA responded to the public demand for information on lionfish through media campaigns, workshops, social media campaigns, podcasts, annual symposia, and direct briefings to fishery managers. In collaboration with the Reef Environmental Education Foundation, NOAA has coordinated lionfish derbies that have brought public attention to the lionfish invasion, removed lionfish from localized areas, and have highlighted the procedures for safe preparation and consumption of lionfish. The lionfish derbies also provide NOAA and USGS scientists with information on stomach contents, age classifications, and genetics of lionfish populations.

Northeast Region

Connecticut, Massachusetts, Maine, New Hampshire, New York, Rhode Island, Vermont

Coordination

An interagency eradication program was developed following the discovery of hydrilla (*Hydrilla verticillata*), a problematic aquatic weed, in Lake Cayuga, Inlet, NY. To prepare for possible spread into nearby waterbodies, USACE held a symposium to acquaint resource managers with information on hydrilla biology, ecology, and management, discuss trends and potential impacts of the aquatic weed, and identify and prioritize research and [management needs](#). In addition NEANS drafted a [white paper](#) and developed a Hydrilla Watch Card.

In response to recent infestations of didymo (*Didymosphenia geminata*), a freshwater diatom, the Invasive Species Action Network, NEANS, and the Mississippi River Basin Panel (MRBP) hosted an [International Didymo Conference](#). The conference successfully brought together natural resource managers, researchers, conservationists, fishing clubs, and others with an interest in learning more about didymo. Information shared at the conference will be captured in a "proceedings" publication in the peer-reviewed journal *Diatom Research*.

Prevention

Content Needed

Early Detection and Rapid Response

NEANS member agencies are involved in a variety of efforts to mobilize citizens and experts for early detection of ANS in freshwater and marine systems before they become established and impair fishing wharves, boat launch areas, harvests and catches, and the aesthetics that are so important to tourism economies. Such efforts include the citizen science program, [Marine Invader Monitoring and Information Collaborative](#) (MIMIC); [rapid assessment surveys to monitor marine areas](#), and [monitoring for mitten crabs in the Northeast](#). Further, the Lake Champlain Basin Program monitors existing infestations including zebra mussels, water chestnut, and Eurasian watermilfoil.

Northeast Aquatic Nuisance Species Panel

The Northeast Aquatic Nuisance Species (NEANS) Panel was established in 2001, the fourth regional panel established under the auspices of the ANS Task Force. The NEANS Panel's mission is to protect the marine and freshwater resources of the Northeast from invasive aquatic nuisance species through commitment and cohesive coordinated action and works with states within the regions as well as neighboring Canadian Provinces.

The Panel's members represent state, provincial, and federal governments; academia; commercial and recreational fishing interests; recreational boaters; commercial shipping; power and water utilities; environmental organizations; aquaculture; nursery and aquarium trades; tribal concerns; lake associations; and the bait industry. NEANS's activities focus on member communication, coordination, and collaboration including meetings, workshops, training opportunities, and production and distribution of outreach and education products and other tools.

Containment and Control

Content Needed

Research

Content Needed

Education and Outreach

NEANS created the [Online Guide to Aquatic Invasive Species in Northeastern North America](#) which allows users to select parameters such as freshwater or marine habitats and creates a customized, printable guide to take into the field or use for training purposes. NEANS also worked with its members to determine priority species and produce a variety of educational products to help the public identify the species and potential vectors as well as resources for reporting and additional information. These products contain Protect Your Waters and Stop Aquatic Hitchhikers! branding, and include Hydrilla and [Asian Clam Watch Cards](#), and floating key chains.

Mississippi River Basin Panel on Aquatic Nuisance Species

The Mississippi River Basin Panel (MRBP) was formed in 2002 and has been hosted by the Mississippi Interstate Cooperative Resource Association (MICRA) since 2003. The MRBP project area includes the entire Mississippi River Basin, the largest watershed in the nation, covering 1.25 million square miles, and draining 41% of the continental United States. In accordance with the six responsibilities for regional ANS panels established by legislation, the MRBP's current priorities are:

- Interagency and interbasin coordination and information exchange among management agencies and stakeholders,
- Identification and evaluation of ANS pathways,
- Training and familiarization with the Incident Command and National Incident Management Systems for implementing rapid response actions,
- Implementation of the national Asian Carp Management and Control Plan,
- Development and accessibility of ANS materials, and
- Evaluating the effectiveness of education and outreach actions to increase awareness and foster behavior change.

MRBP membership includes representatives from academia, private environmental and commercial interests, and state and federal agencies. The MRBP has three standing committees to address the panel's responsibilities, current priorities, and to assist in implementation of the ANS Task Force Strategic Plan. Meetings are held approximately every nine months to facilitate coordination and implementation of regional ANS programs and projects, identify priorities and emerging issues, and development of recommendations for the ANSTF. Efforts are also directed to the creation of regional ANS outreach products and implementation of projects to address priority ANS issues within the basin.

Mississippi River Basin Region

Alabama, Arizona, Colorado, Iowa, Illinois, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Minnesota, Missouri, Montana, North Carolina, North Dakota, Nebraska, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Texas, Virginia, Wisconsin, West Virginia, Wyoming

Coordination

MICRA, with input by the MRBP and others, developed an action plan to guide coordinated efforts in the Mississippi River Basin to prevent additional species invasion and control populations of priority ANS. The action plan has two primary goals: 1) reduce and ultimately prevent all new introductions of ANS, and 2) stop the spread of ANS within the Basin, extirpate harmful ANS, or if impossible, control ANS populations to ensure sustainable aquatic ecosystems and the social, economic, and cultural uses they support.

In response to the Asian carp invasion within the Mississippi River, MICRA also hosted a workshop and webinar to provide a forum for natural resource managers in the Mississippi River Basin to have an in-depth discussion on the potential for commercial harvest to be an effective tool to reduce carp populations. Participants identified several issues related to the commercial harvest of Asian carp and requested MICRA take a lead role in coordinating basin-wide resolution, which led MICRA to draft a [position statement](#) on the commercial harvest of Asian carps.

Prevention

The MRBP developed and refined a [Model Rapid Risk Screening Process](#) for state natural resource management. The project resulted in a process that natural resource management agencies can use to evaluate ANS risks and determine which species warrant a full risk assessment prior to being imported into the U.S. The process allows for low risk organisms in trade to not be unnecessarily held up for a full risk assessment and protects native ecosystems by identifying the highest priority species in trade that warrant further risk assessment.

A model rapid risk assessment tool was also developed by the Panel for use by state natural resources agencies to help determine classifications of species and the need for management actions. The rapid risk assessment tool identifies species of moderate or high risk of invasiveness and establishment that warrant a full risk assessment. The tool was later updated include decision support tools and a climate change component. Lastly, the MRBP worked with the USCG to complete a risk assessment of barge traffic as vectors for ANS transport and dispersal, including a study on bilge water and external transport of materials on barges within the Mississippi River Basin.

Early Detection and Rapid Response

MRBP developed a [Model Rapid Response Plan for Aquatic Invasive Species](#) in the Mississippi River Basin and will develop addendums with protocols for fish, plants, and invertebrates as separate documents. The MRBP also developed a *Field Guide to Aquatic Nuisance Species in the Mississippi River Basin* to assist the public and natural resource managers in detection efforts.

Containment and Control

MICRA continues to evaluate and identify sources and pathways of diploid grass carp. Information provided through this analysis will provide the USFWS and states with an understanding of the extent and magnitude of legal diploid and triploid grass carp sales, shipping, and stockings. The information will also assist implementation of the recommendations and strategies identified in the [Management and Control Plan for Bighead, Black, Grass, and Silver Carps in the United States](#).

Research

The MRBP assisted member states in conducting ANS surveys that determined how much boaters and anglers know about ANS and to determine where they get their information. The purpose of the survey was to use the results to direct future public information campaigns for greatest effectiveness. The results of the surveys are used by the MRBP Outreach and Education Committee to develop regional recommendations, priorities, and

projects. The information benefited the individual states that conducted surveys and provided a baseline for making future evaluations of outreach products and programs.

Education and Outreach

The MRBP hosted an international symposium on invasive Asian carp in North America. Following the symposium, MRBP worked with the American Fisheries Society and other partners to publish the [Invasive Asian Carps in North America](#). The book provides researchers and resource managers with a comprehensive resource with the most current information available on all four species of Asian carp in North America. Moreover, U.S. Representatives Mike Kelly (R-PA-3) and Betty McCollum (D-MN-4) sponsored an "Asian Carp Awareness Symposium" hosted by MICRA in the U.S. Capitol Visitor's Center during National Invasive Species Awareness Week and Great Lakes Days. Speakers from MICRA discussed the extent and magnitude of the Asian carp invasion. The symposium brought needed attention to the extent and magnitude of the Asian carp problem in the Mississippi River Basin and the need to implement the national [Management and Control Plan for Bighead, Black, Grass and Silver Carps in the U.S.](#)

To assist public education efforts, The MRBP worked with the Illinois-Indiana Sea Grant Program to design hydrilla and Brazilian elodea [WATCH cards](#). The MRBP distributed the WATCH cards to aid detection and public awareness efforts. The North Central Regional Aquaculture Center (NCRAC) supplied funding to develop educational materials, biosecurity plans, and hold six workshops to address concerns of fish farmers that the exotic disease pathogen Viral Hemorrhagic Septicemia (VHS) and ANS such as zebra mussels, rusty crayfish and Asian Carp could be a threat to their operations. NASAC assisted NCRAC and collaborative agencies to develop Best Management Practices and Biosecurity Plans for culture methods utilized in the North Central region. To date, VHS has not been found or transferred to any fish farm in the U.S.

Mid-Atlantic Region

Delaware, District of Columbia, Maryland, North Carolina, New Jersey, New York, Pennsylvania, Virginia, West Virginia

Coordination

MAP hosted an integrated program of ANS [Prevention through Vector Management](#) aimed at closing the doors as tightly as possible to harmful ANS and offering the best prospects against preventing potential new invasions. The workshop brought together distinguished scientists and policy leaders from across the country to discuss the research, management, education and public engagement challenges and opportunities for developing an action-based vector management framework to prevent new ANS introductions. Workshop participants identified significant knowledge gaps and actions required to support a vector management approach to prevent new bioinvasions.

Prevention

The Maryland Department of Natural Resources, Smithsonian Environmental Research Center (SERC), USFWS, and NOAA established a [Chinese Mitten Crab Watch](#) to investigate the status of this invasive species and prevent its spread.

Early Detection and Rapid Response

To foster an effective response to ANS introductions, MAP worked with its partners to produce [Rapid Response Planning for Aquatic Invasive Species](#). The rapid response plan employs the Incident Command System (ICS) to provide a common language and help various agencies and jurisdictions work together as a well-coordinated unit. A template was also made available to encourage states in the Mid-Atlantic and beyond to adapt the plan to their specific needs while maintaining the value of a common framework across the region.

Mid-Atlantic Panel on Aquatic Invasive Species

The Mid-Atlantic Panel on Aquatic Invasive Species (MAP) was formed in 2003 through efforts of the Chesapeake Bay Program's Invasive Species Workgroup to address the numerous ANS threats in the Chesapeake Bay watershed and the Mid-Atlantic region. MAP has a diverse membership representing state and federal agencies, academic institutions, environmental organizations, commercial interests, and regional entities.

The mission of the MAP is to assist state and federal agencies and other stakeholders in developing and implementing strategic, coordinated, and action-oriented approaches to preventing and controlling ANS in the mid-Atlantic region. The driving force behind the mission is to strengthen cooperation, coordination, and communication on ANS issues within the region and beyond. The Panel helps state, federal, and local agencies, non-profits, and private landowners tackle ANS issues by:

- Identifying and prioritizing regional issues,
- Coordinating local ANS programs,
- Operating a Small Grants Competition, and
- Assisting the ANS Task Force in coordinating federal programs that promote effective methods of preventing and managing ANS introductions.

Containment and Control

The [Invasive Catfish Task Force](#), chaired by NOAA's Chesapeake Bay Office, is responsible for coordinating the best available science and developing precautionary management approaches aimed at mitigating the spread and minimizing the impacts of invasive catfish species on the Chesapeake Bay ecosystem. The role of the Invasive Catfish Task Force is to incorporate all available information on blue and flathead catfish and to develop an agreed upon management strategy for handling these invasive species across all jurisdictions.

Research

Since 2007, MAP devotes most of its federal funding towards [annual grant competitions](#) that direct funds to ANS issues in the Mid-Atlantic states. To date, MAP has funded 31 projects totaling \$284,000. These federal dollars

brought an additional \$516,000 in matching funds to support ANS work. Projects may include aspects of ANS research, early detection, control, and /or outreach and education. MAP is in the middle of its grant process for 2014 and will fund up to \$35,000 in projects with this funding over the next two years.

MAP to add examples of past grants

Education and Outreach

MAP funded a Pennsylvania Sea Grant project to produce [Pennsylvania Aquatic Invasive Species \(AIS\) Field Guide](#). Printed on waterproof paper, this handbook is a useful tool for professional and amateur naturalists to use to identify ANS. It is a consistent and clear resource for identifying, collecting, and reporting on ANS in Pennsylvania.

Current Status of the ANS Task Force

The ANSTF operates within a limited budget to conduct semiannual meetings and provides a fraction of the support needed to achieve goals identified by the Regional Panels and ANSTF-approved management plans. It is the cornerstone of the ANS Task Force to provide resources that will allow the states, Regional Panels, and tribes to implement programs that reflect the goals within its Strategic Plan.

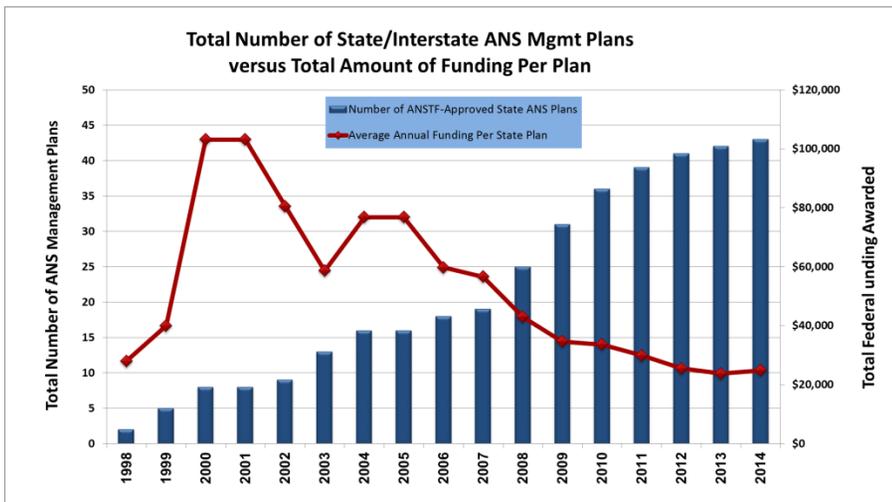
State ANS Management Plans

In 1990, the NANPCA recognized that states are integral partners in the battle against ANS and authorized the State/ Interstate Aquatic Nuisance Species Management Plan (SIANSMP) grant program. Managed by the USFWS, the program provides annual funding to states, tribes and regional organizations to support the implementation of State and interstate ANS management plans that have been approved by the ANS Task Force.

Section 1301(c) of NANPCA authorized a total of \$4 million for the SIANSMP grant program; however, that amount has never been fully appropriated. Over the years, the number of plans approved far

outpaced the capacity of the SIANSMP funding. In 2014, the USFWS was only able to allocate \$1 M of its ANS Program budget to the 42 (39 State Plans and 3 Interstate) plans. Funding is distributed equally among the states that apply for funding (unless a lesser amount is requested for individual plans); consequently, USFWS provided approximately \$24,875 in financial assistance to each of the 41 plans that applied for funding. This funding level is not adequate to meet most of the implementation request levels with the plans.

In some cases the funding from the USFWS represents the only funding the states spend on ANS, while in other cases, the annual allocation represents only a small portion of their total ANS budget. In either case, however, these funds are vital to supporting State ANS Coordinator positions or are pooled with other funds, and with other partners, to allow for effective and efficient collaborative projects to address plan priorities. For many states, a lack of dedicated funding for the ANS Plans is an ongoing problem. Over the years the states have circumvented this limitation through aggressive and successful grantsmanship, but this is becoming more difficult each year due to increasing competition for shrinking funds. There remain many elements of the ANS Plans that have not been successfully implemented due to a lack of sufficient resources.



Over the years, the number of plans approved by the ANS Task Force far outpaced the capacity of the SIANSMP funding. In 2014, the number of approved plans had reached 42. The number of plans has increased almost 2.5 times since 2004, causing the amount of annual funding per plan to decrease each year.

National ANS Management and Control Plans

The ANS Task Force or any other entity may recommend the development of a species-specific management and control plan. Development of a plan can proceed if approved by the ANS Task Force and if an entity steps forward to lead the drafting process. Once a plan is drafted and approved, however, there is no guarantee of funding for implementation. To date, limited resources have prevented any of the plans from being sufficiently funded and many critical tasks remain uncompleted. Lack of funding for plan implementation has also negatively impacted the motivation to develop new plans.

Regional Panels

The six regional panels are vital to ensuring that the ANS Task Force meets its legislative mandates. As a result of the unique position of the panels, they are able to coordinate, provide advice, and identify priorities on a broad range of complex regional aquatic ANS issues while collaborating across a broad spectrum of parties. The panels provide valuable insight and perspective as they develop recommendations for the ANS Task Force. Budgetary issues are an ongoing challenge for the Regional Panels. The panel benefits from annual funding provided by the USFWS to support operations and committees, yet recent funding for the regional panels has been threatened by federal budget restraints including sequestration. Since the establishment of the sixth panel in 2003, the panels have consistently received an annual allocation of \$50,000 each. However, in FY 13, funding was reduced to \$40,000 per panel. Already operating on tight budgets, the 20% reduction forced the panels to undergo significant changes and scale back work, greatly impacting their ability to coordinate regional ANS activities.

Examples of impacts of reduced funding to Regional Panels include:

- Decreased funding impacts the GLP's ability to convene regular meetings and conduct committee work, both of which underwrite the accomplishments of the ANS Task Force and undermine the regional framework for coordination and collaboration on ANS issues in the Great Lakes.
- Reduced budgets have required the WRP to limit participation at the ANS Task Force meetings and halt fiscal support for research or special projects. If panel funds continue to decrease, the WRP will no longer hold panel meetings, resulting in no face-to-face coordination for 19 western states.
- GSARP has stopped Panel support of member projects and reduced funding greatly jeopardizes the ability of the Panel to provide its base function of coordination across the region.
- The NEANS Panel's network is already frayed and there is no longer any ability to coordinate activities through workshops and other collaborative events. Panel funding has supported paying for a coordinator, a role that will suffer with reduced funding and will result in an increase in the duplication and overlap of efforts in the region.
- Adequate funding is needed by the MRBP to support a full-time coordinator, at least one panel coordination meeting per year, and to provide operational funds for implementation of MRBP's priority regional ANS programs and project needs. Federal and state agency member participation often wanes due to agency budget and travel restrictions, resulting in requests for panel funding to provide support for member travel expenses.
- MAP uses the majority of its federal funding to conduct a small grants program. The federal dollars are nearly doubled by state matches, resulting in an excellent return on investment. The panel is concerned that reduced federal funding will impact the grant

programs as small grants are of less interest and are logistically

problematic.

Looking Ahead...

ANS have a profound effect on aquatic ecosystems resulting in the displacement of native species, reduced biodiversity, and the alteration of community structure and food webs. As a result, biological invasions significantly contribute to species endangerment, habitat degradation and global biodiversity loss. ANS also inflict enormous economic burdens; the cost to manage ANS is estimated at billions of dollars each year, suggesting that ANS are a bigger threat than other environmental crises, including global climate change. ANS are considered an emerging global problem. As the world trade network continues to grow, invasion rates increase and pathways for introduction become more numerous and complex. Additional challenges to ANS management may result from changes in the Earth's climate that will likely continue, or even accelerate, over the next century. Very little is known of the impacts from ANS in relation to climate change, yet models suggest that the economic, energy, social, and environmental impacts may be profound.

Despite these challenges, the ANS Task Force remains optimistic.

Since its establishment, the Task Force has witnessed

considerable success achieved in the prevention and control of

ANS along with increased emphasis on the restoration of ecosystems that have been affected by ANS. Enhanced research and information exchange, new detection and eradication techniques, innovative control methodologies, and collaborative models are increasing our capacity to manage ANS. Awareness of the problems caused by ANS has dramatically improved, as evidenced by increased activity at federal, state, and local levels. The ANS Task Force is encouraged by these accomplishments and is committed to putting its strategic goals and objectives into action – but the ANS Task Force cannot continue the battle against ANS alone and there are many complex problems that remain to be addressed. Collaboration and communication is important, yet robust, consistent resources to implement ANS plans for management and scientific research are the most critical need. The ANS Task Force is well poised to move such initiatives forward as it is backed by a concrete structure, comprehensive strategic plan, and a wealth of expertise.

Benefits of the ANS Task Force

- Facilitates the exchange of ideas through participant networks and collaborative activities,
- Leverages resources across agencies and organizations,
- Minimizes duplication of efforts,
- Provides an established mechanism for interaction with states and regions, and
- Improved the likelihood of successful ANS prevention and management

Below are recommendations to build a stronger, more effective national ANS program to minimize the environmental, economic, public health and human safety risks associated with ANS.

- 1) **Adequately fund the ANS Task Force, the Regional Panels, and ANS Management Plans.** The biggest deficiency in ANS legislation is a lack of funding. There is a dramatic discrepancy between what is authorized in NISA and what is actually appropriated. Congress needs to consistently and adequately fund what it authorizes if it wants reasonable progress and results. Funding strategies need to be developed to change that status or ANS problems will continue to escalate across the country. Greater investments in prevention and management practices would be more than repaid by reduced damages from current and future ANS.
- 2) **Reauthorize the National Invasive Species Act.** The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA) was intended to identify and implement ways to prevent the unintentional introduction and spread of invasive species into waters of the United States, to work toward minimizing economic and ecological impacts of established nonindigenous species, and to establish a program to assist states in the management and removal of such species. NANPCA was last reauthorized and amended in 1996 by the National Invasive Species Act (NISA); since this time a great deal has been learned about invasive species in regards to their introduction, management, and impact to the environment, economy, and human health. Reauthorization of NISA would provide an opportunity to include these additional findings as well as authorize funding for a number of programs including a national monitoring program to document the spread of invasive species, an emergency fund for the rapid response of newly detected invasions, and to perform a comprehensive risk assessment on the vectors of non-native species.

- 3) **Coordinate Vector Management.** The possibility of an ANS is not as threatening as seeing the evidence, which is why most efforts to combat ANS are reactive. Yet, an investment in prevention avoids many of the long-term economic, environmental, and social costs associated with ANS. New invasions need to be prevented through use of new information and practices to better manage vectors to reduce the transport and release of potentially harmful ANS.
- 4) **National strategy for monitoring.** Some species will inevitably slip through prevention efforts and establish small populations. The lag time between establishment and spread associated with many invading populations provides an opportunity for early detection and rapid response. Extensive monitoring across environments would allow for the documentation of native and non-native species distribution, identifying range shifts, and detecting invasions. Further, new innovations for early detection could be explored to determine the most efficient, cost-effective means of eradicating new biological invasions.
- 5) **Control and Management of Invasive Species.** Control programs for widespread species are inevitably expensive, such as the \$18 million annual expenditure to control the sea lamprey in the Great Lakes. Nevertheless, they are often cost effective; the sea lamprey program, for example, protects a fishery worth about \$4 billion annually. Control and eradication are the most cost effective when action is taken immediately upon first detection, when populations are still localized and can be contained. In the short-term, plans should be developed to identify actions needed to respond quickly to newly detected non-native species that may cause ecosystem, public health and/or socioeconomic impacts. Further, an emergency fund for such efforts would allow such rapid responses. In the long-term, federal agencies should develop and implement effective strategies for control and management of invasive species.

- 6) **Expand Educational and Outreach Programs.** It is imperative that the public has an understanding of the problems and impacts associated with ANS so that they can be partners in solving the problem. More importantly, people need to know what they can do to help prevent the introduction and spread of invasive species. New funding could support national invasive species campaigns that are designed to increase awareness about ANS and promote actions that empower audiences to become part of the solution in preventing future invasions. Additionally, citizen-science could engage the public and enhance invasive species monitoring and management.
- 7) **Directed Research Programs.** Information and research is needed to quantify and clarify the effects that ANS are having on native species and habitat as well as to socio-economics and human health. Although much research has been conducted for some ANS, there are many species for which little is known. Increased knowledge of the biology, potential impacts, associated control methods, and interaction with climate change and other major drivers of change will allow for the most effective management of ANS.

ANS Task Force Federal Members – Roles in ANS Management

United States Fish and Wildlife Service (USFWS)

USFWS co-chairs ANSTF and houses multiple programs that address management and control of invasive species across the United States. USFWS also oversees the injurious species provisions of the Lacey Act (Title 18), which are paramount to invasive species regulation in the United States. The National Wildlife Refuge System has invasive species teams that are currently reviewing strategies and recommending potential projects involving invasive species. The Agency also has several habitat restoration programs that restore habitat degraded by invasive species as part of their overall habitat restoration activities.

National Oceanic and Atmospheric Administration (NOAA)

The National Oceanic Atmospheric Administration (NOAA) has responsibility for prevention, monitoring, control, education, and research to prevent future introductions and the spread of aquatic invasive species. NOAA provides staff support for engagement and activities related to its leadership role as the co-chair of both the National Invasive Species Council (representing Department of Commerce) and the Aquatic Nuisance Species Task Force, two interagency organizations that coordinate and ensure complementary, cost-efficient and effective Federal activities regarding invasive species. Additionally, NOAA's Sea Grant program and program offices have been actively involved in research and outreach regarding aquatic invasive species, as well as restoration of habitat that benefits native species by removal of invasive organisms.

Army Corps of Engineers (USACE)

The U.S. Army Corps of Engineers (USACE) has a number of control programs of invasive species, and is authorized to implement a 50/50 Federal/local cost sharing arrangement with State and local governments for managing nuisance aquatic plants in waterways not under the control of USACE or other Federal agencies. USACE also has a number of research programs focused on invasive species.

Bureau of Land Management (BLM)

The Bureau of Land Management (BLM) focuses primarily on controlling invasive plants, which has been identified as a top priority for the agency and has implemented an action plan, called Partners Against Weeds, to prevent and control the spread of noxious weeds on public lands. The United States Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) regulates animal pests on BLM land under a memorandum of understanding between the two agencies.

Bureau of Reclamation (BOR)

The Bureau of Reclamation (BOR) is responsible for programs that control invasive species which infest water systems, including reservoirs, rivers, distribution canals, etc. Species such as zebra mussels, Chinese mitten crabs, hydrilla, and water hyacinth obstruct water flow, reduce recreational access, and can cause structural damage. BOR manages invasive species through its Integrated Pest Management Program under its basic operation and management authority and various reclamation-enabling statutes and directives.

Department of State (DOS)

The Bureau of Oceans and International Environmental and Scientific Affairs, Office of Conservation and Water (OES/ECW) is the main point of contact in the Department of State for invasive species issues. OES is responsible for international marine and coastal

invasive species as well as terrestrial ones in a variety of contexts, and advocates for policies and approaches consistent with those of the United States at international forums such as multilateral environmental agreements and regional initiatives like the Convention on Biological Diversity. DOS works closely with other Federal agencies to develop U.S. policies on invasive species and collaborates with other agencies in international matters related to invasive species.

Environmental Protection Agency (EPA)

The US Environmental Protection Agency's mission to protect human health and the environment overlaps with multiple goals of the ANSTF strategic plan. Since 2008 EPA has adopted a primary role in AIS prevention by defining, under the authority of the Clean Water Act and in coordination with the US Coast Guard, regulatory structures aimed at reducing the risk of ballast water borne aquatic invasions. EPA also plays a major coordination and funding role in the Great Lakes region as signatory to the bi-national Great Lakes Water Quality Agreement, by coordinating federal policy and activities on the Asian Carp Regional Coordinating Committee and, more broadly, by managing and supporting grants and cooperative agreements through the Great Lakes Restoration Initiative. EPA's Office of Research and Development also directly supports prevention and early detection goals through its ongoing research efforts.

United States Forest Service (USFS)

As a major federal landowner in the United States, the Forest Service (USFS) works extensively with public and private stakeholders and other partners to conduct management activities against a wide range of aquatic and terrestrial invasive species across the 193 million acre National Forest System extending from Alaska to the Caribbean. Across the National Forest System, the USFS manages

thousands freshwater streams, rivers, lakes, vernal pools, wetlands, and other freshwater areas, as well as marine estuaries and related habitats. The USFS is recognized as a leader in invasive species ecology, management, and research in the United States, and internationally. The USFS also plays an important role in each of the national federal interagency coordinating groups addressing invasive species, including the Aquatic Nuisance Species Task Force, the Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW), and the Federal Interagency Committee for Invasive Terrestrial Animals and Pathogens (ITAP).

Department of Transportation (DOT), Maritime Administration (MARAD)

The Federal Highway Administration (FHWA) has an oversight role in federally funded highway projects that include both Interstate and State highways. FHWA's Vegetation Management Program guides States departments of transportation on invasive species issues. The Federal Railroad Administration (FRA) promotes safe and environmentally sound rail transportation and supports invasive species control efforts on rail corridors. The Maritime Administration (MARAD) promotes development and maintenance of an adequate, well-balanced, U.S. Merchant Marine, and supports the control of aquatic invasive species.

National Park Service (NPS)

The National Park Service (NPS) manages 401 parks covering more than 83 million acres, and approximately 200 of those parks have identified exotic species as an important resource management threat. NPS prohibits most introductions of exotic invasive species on land under their management and requires the use of an Integrated Pest Management approach to remove or control exotic species on NPS units. The NPS actively pursues on the ground prevention and containment efforts, providing public information on impacts and

control methods, impact assessments and monitoring, and research and development of invasive species control technologies. NPS staff also work at local, regional, and federal levels to ensure interagency collaboration on aquatic invasive species management efforts.

United States Coast Guard (USCG)

Section 1101 of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 provides authority to the U.S. Coast Guard to regulate and issue guidance for the management of ballast water as a vector for introduction of aquatic invasive species. USCG also works with other agencies to develop and enforce international fisheries and maritime agreements, including those concerning ballast water management.

United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS)

The Animal and Plant Health Inspection Service (APHIS) within the Department of Agriculture (USDA) is the primary agency charged with preventing invasive species from entering the country. APHIS authority arises from laws such as the Plant Protection Act and a number of statutes collectively referred to as the animal quarantine laws. APHIS can prohibit, inspect, treat, quarantine, or require mitigation measures prior to allowing entry of plant species, plant pests, biological control organisms, animals, animal products and by-products, or their host commodities or conveyances. APHIS is also authorized to prevent the introduction and dissemination of diseases and pests of livestock and poultry. APHIS has emergency authority to deal with incipient invasions and works in cooperation with academia, non-governmental organizations, and other federal, state, regional, and local agencies.

United States Geological Survey (USGS)

The U.S. Geological Survey (USGS) Biological Monitoring and Research Program conducts research in terrestrial and aquatic ecosystems, including invasive plants, vertebrates, invertebrates, and wildlife disease organisms. The USGS assists resource managers to obtain reliable information on invasive species, develop methods and tools to better prevent and control invasions, and to reduce their impacts on ecosystems and native species. Emphasis is given to areas administered by Interior and regions that are particularly threatened by invasive species, such as Hawaii, western rangelands, wetlands, the Great Lakes, and eastern waterways. USGS investigates the causes, effects, prevention, and management of invasive and nonindigenous organisms in the United States. USGS hosts a prominent national database on nonindigenous aquatic species that is available to the public.

List of Acronyms

AFWA	Association of Fish & Wildlife Agencies	MRBP	Mississippi River Basin Panel
AIS	Aquatic Invasive Species	NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act
ANS	Aquatic Nuisance Species	NASAC	National Association of State Aquaculture Coordinators
APHIS	Animal and Plant Health Inspection Service	NCRAC	North Central Regional Aquaculture Center
ARRA	American Recovery and Reinvestment Act	NEANS	Northeast Aquatic Nuisance Species Panel
BLM	Bureau of Land Management	NISA	National Invasive Species Act
BOR	Bureau of Reclamation	NISC	National Invasive Species Council
DOI	Department of Interior	NOAA	National Oceanic and Atmospheric Administration
DOS	Department of State	NPS	National Park Service
DOT	Department of Transportation	PIJAC	Pet Industry Joint Advisory Committee
EDRR	Early Detection and Rapid Response	QZAP	Quagga-Zebra Mussel Action Plan
EPA	Environmental Protection Agency	REEF	Reef Environmental Education Foundation
FACA	Federal Advisory Committee Act	SAH	Stop Aquatic Hitchhikers
GLC	Great Lakes Commission	SERC	Smithsonian Environmental Research Center
GLP	Great Lakes Panel	USACE	United States Army Corps of Engineers
GLRI	Great Lakes Restoration Initiative	USCG	United States Coast Guard
GSARP	Gulf and South Atlantic Regional Panel	USDA	United States Department of Agriculture
HACCP	Hazard Analysis and Critical Control Point	USFS	United States Forest Service
MARAD	Maritime Administration	USFWS	United States Fish and Wildlife Service
MICRA	Mississippi Interstate Cooperative Resource Association	USGS	United States Geological Survey
MAP	Mid-Atlantic Panel	WRP	Western Regional Panel

