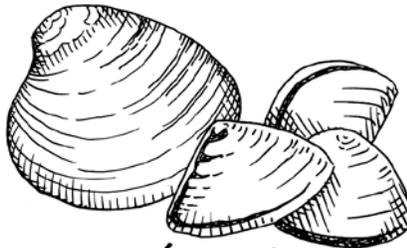


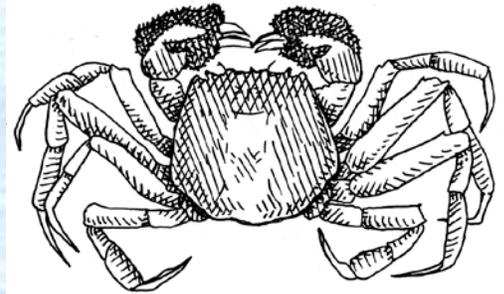
Aquatic Nuisance Species Task Force Strategic Plan (2013 - 2017)



New
Zealand
Mudsnail



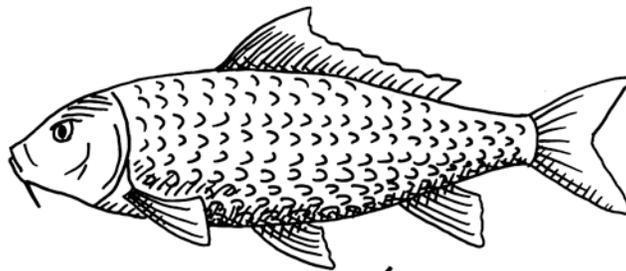
Invasive Clams
and Mussels



Mitten Crab



Hydrilla



Carp Species

Purple
Loosestrife



European
Green Crab

ANS Task
Force

Dedicated to the prevention and control of aquatic nuisance species

Aquatic Nuisance Species Task Force Strategic Plan (2013 – 2017)

This plan was approved by the Aquatic Nuisance Species Task Force (ANSTF) on May 3, 2012 following review from Task Force member agencies, *ex-officio* members, and Regional Panels. Many contributed their knowledge and experience to the writing of this Plan; however, the ANSTF would like to recognize the members of the Strategic Plan Committee whose considerable efforts shaped the development of this Plan through several preliminary versions.

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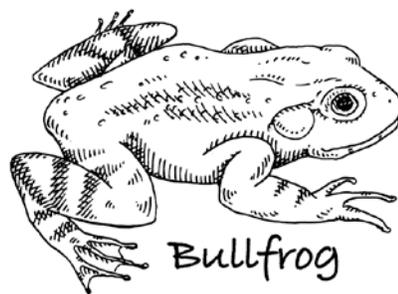
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EXECUTIVE SUMMARY

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 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.

ANS are one of the largest threats to the ecosystems and economies of the United States. Approximately 49% of the species on the threatened or endangered species lists are at risk primarily because of predation or competition with exotic species. In fact, impacts of invasive species are second only to habitat destruction as a cause of global biodiversity loss. ANS such as snakehead fish, sea lamprey, hydrilla, and the New Zealand mudsnail may prey upon, displace, alter habitat, or otherwise harm native species. Other ANS may reduce production of fisheries, decrease water availability to residential and commercial users, block transport routes, choke irrigation canals, foul industrial and public water supply pipelines, degrade water quality, accelerate filling of lakes and reservoirs, and decrease property values. The damages to human enterprises caused by ANS results in enormous economic costs. The United States invests more than \$120 billion per year in damage and control costs to combat invasive species. As the world trade network continues to grow, the number and frequency of introduced species are expected to increase. Additionally, climate change may also allow increased introductions. This plan presents the strategic priorities designed to address ANS in the United States under current and future conditions.

In 1990, Congress passed the Nonindigenous Aquatic Nuisance Prevention and Control Act to establish a broad national program to prevent introduction and control the spread of introduced ANS; this legislation was reauthorized and furthered with the National Invasive Species Act in 1996. The Aquatic Nuisance Species Task Force (ANSTF) is an intergovernmental organization dedicated to preventing and controlling aquatic invasive species and implementing these Acts. The ANSTF, 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.

The ANSTF serves to develop and implement a program for waters of the United States to prevent introduction and dispersal of ANS, monitor, control, and study such species, and disseminate related information. In 1994, the *Aquatic Nuisance Species Program* document was drafted to guide the work of the ANSTF, establishing the core elements of the Task Force. A broader focus was established with the 2002-2007 and 2007-2012 Strategic Plans, placing more emphasis on prevention strategies. This *Aquatic Nuisance Species Task Force Strategic Plan 2013-2017* (Strategic Plan) carries through many of the goals and objectives established in previous plans 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 Strategic Plan also calls attention to other areas of management including habitat restoration and research. The Strategic Plan establishes eight goals, each with objectives and action items to be completed in the next 5 years.

Coordination: The ANSTF was created to facilitate cooperation and coordinate efforts between Federal, State, tribes, and local agencies, the private sector, and other North American interests. The objectives for the coordination goal include strengthening cooperation at both national and regional levels within the ANSTF and the Regional Panels and encouraging the development and implementation of ANS plans and regulations.

Prevention: Prevention is the first-line of defense against ANS. This goal calls for developing strategies to identify and reduce the risk of ANS introduced by increasing development and use of risk assessments, Hazard Analysis and Critical Control Point programs (HACCP), and pathway assessment and interdiction options.

Early Detection and Rapid Response: Early Detection and Rapid Response programs are designed to monitor habitats to discover new species soon after introduction, report sightings of previously unknown species in an area, and work quickly to keep the species from becoming established and spreading. Objectives for the ANSTF include improving detection and monitoring programs and facilitating development and implementation of rapid response contingency plans.

Control and Management: Control and management tools are needed to assess, remove, and contain ANS populations as well as to guide management decisions. The ANSTF will implement this goal by evaluating and providing support to management plans, increasing training opportunities, and encouraging the development of management techniques.

Restoration: Habitat restoration is an essential to guard against future invasions and to minimize harm from invasive species. This goal focuses on restoring impacted ecosystems and consideration of potential ANS during planning and implementation of restoration activities.

Education/Outreach: The lack of awareness concerning ANS impacts is one of the largest management obstacles. Few people understand the threat some nonindigenous species pose and how their actions might introduce them. Objectives by the ANSTF for education and outreach include reaching out to the general public, providing technical guidance to targeted audiences, and raising awareness among legislators and decision makers.

Research: Research supports all facets of the Strategic Plan and is necessary to increase the effectiveness of prevention, detection, response, and control and management of invasive species. To help ensure that research addresses critical needs, this goal focuses on coordination among government agencies, academia, and other participating entities.

Funding: Securing dedicated long-term and emergency funding is necessary to achieve the goals laid out in the Strategic Plan. The actions outlined by the ANSTF focus on coordinating Federal agency budgets to support ANSTF priorities, develop partnerships, and seek opportunities to leverage funds within Federal and State agencies, local governments, tribal entities, industry, as well as other entities including non-governmental organizations.

The Strategic Plan should not be considered a comprehensive list of all ANS strategic actions; it does contain a targeted set of priority strategic goals, objectives, and associated action items that are intended to be completed in the next 5 years. The accomplishment of specific objectives and action items will be dependent upon budgets of individual agencies and the Regional Panels; and in some cases, legal or regulatory changes as well as enforcement of these changes. An Operational Plan will be composed to depict short-term efforts to achieve the actions in the Strategic Plan to ensure the goals and objectives of the Strategic Plan are measurable and accountable. The Operational Plan will be completed by the ANSTF members working together and separately with support of the Regional Panels and committees. The actions in the Operational Plan will be updated regularly and reported on to measure the progress towards meeting the goals of the Strategic Plan.

Management of ANS is challenging; however, considerable success is being achieved in the prevention, detection, eradication, control, and outreach efforts of ANS along with increased emphasis for the restoration of ecosystems that have been impacted by ANS. Additional research and information exchange, new detection and eradication techniques, and innovative control methodologies are increasing our capacity to address invasive species problems. The *Aquatic Nuisance Species Task Force Strategic Plan 2013–2017* takes a deliberate, cooperative approach and builds on existing programs. The Task Force will strive to maximize efforts over the next 5 years to prevent and control invasive species with the purpose of protecting our environment, economy and human health.

INTRODUCTION

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. In addition to the severe and permanent damage to the habitats they invade, ANS may also adversely impact society by hindering economic development, preventing recreational and commercial activities, decreasing the aesthetic value of nature, and serving as vectors¹ of human disease. The table below provides a list of the three classes of adverse impacts caused by ANS.

The term ANS is often used interchangeably with aquatic invasive species (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.

Selected Examples of Aquatic Nuisance Species Impacts		
Environmental Effects	Economic Impacts	Public Health
Habitat Alterations	Industrial Water Supplies	Disease Epidemics
Water Quality	Municipal Water Supplies	Public Safety
Predation	Power Plants	Physical Injury
Competition	Commercial Fisheries	Bacterial Risks
Hybridization	Recreation	Harmful Algal Blooms
Parasitism	Navigation and Shipping	Parasites
Introduction of Pathogens	Aquaculture	Flooding

Environmental Harm

In the United States, approximately 49% of the species on the threatened or endangered species lists are at risk primarily because of predation or competition with exotic species². In fact, impacts of invasive species are second only to habitat destruction as a cause of global biodiversity loss³. ANS impact the habitats they invade by reducing the abundance of native species and altering ecosystem processes. They can impact native species through predation, competition for food and space, hybridization, as well as the introduction of pathogens and parasites. Normal functioning of the ecosystem, including hydrology, nutrient cycling, or productivity, may also be altered by ANS. Aquatic weeds provide an excellent example of the severe impact an exotic organism may have on the environment. Non-native aquatic plants including Eurasian water-milfoil (*Myriophyllum spicatum*), hydrilla (*Hydrilla verticillata*), and water hyacinth (*Eichhornia crassipes*) can negatively impact the diversity of native aquatic plants and invertebrates, the efficiency for large predator fish to obtain prey, water quality, and aquatic recreational activities including swimming, fishing and boating. Invasive fish species also have the ability to alter aquatic ecosystems. For example, the common carp (*Cyprinus carpio*) is capable of reducing native vegetation and increasing turbidity. These types of habitat alterations are responsible for the extinction of several native fish species⁴.

¹ 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).

² Wilcove DS, Rothstein D, Dubow J, Phillips A, Losos E. 1998. Quantifying threats to imperiled species in the United States. *BioScience* 48:607-615.

³ Lawler JJ, Aukema JE, Grant, JB, Halpern BS, Kareiva P, Nelson CR, Ohleth K, Olden JD, Schlaepfer MA, Silliman BR, Zaradic P. 2006. Conservation science: a 20-year report card. *Frontiers in Ecology and the Environment* 4: 473-480.

⁴ Zambrano L, Martinez-Meyer E, Menezes N, Peterson AT. 2006. Invasive potential of common carp (*Cyprinus carpio*) and Nile tilapia (*Oreochromis niloticus*) in American freshwater systems. *Canadian Journal of Fisheries and Aquatic Sciences* 63: 1903–1910.

Economic Harm

ANS are seen as a threat not only to native biodiversity and ecosystem functioning, but also to economic development. They can reduce production of fisheries, decrease water availability to residential and commercial users, block transport routes, choke irrigation canals, foul industrial and public water supply pipelines, degrade water quality, accelerate filling of lakes and reservoirs, and decrease property values. The damages to human enterprises caused by ANS result in enormous economic costs.

Over the past 200 years, more than 50,000 non-native plant and animal species have become established in the United States. Approximately one in seven has become invasive⁵, with damage and control costs estimated at more than \$120 billion per year⁶ - a cost higher than the total of all other natural disasters combined⁷. Zebra and quagga mussels (*Dreissena polymorpha*, *D. rostriformis bugensis*) alone cause one billion dollars per year in damages.⁸ Another 100 million is spent annually in the United States to control non-native aquatic weeds.⁹ In two California lagoons, more than \$5 million was spent in the first 3 years of an on-going eradication program for the seaweed *Caulerpa taxifolia*.¹⁰ As a final example, the Great Lakes States invested over \$26.7 million toward prevention and control of aquatic invasive species in just 2 years, of which almost \$900,000 was committed to Asian carp¹¹ control efforts.¹² These numbers are likely underestimated as they do not consider ecosystem health or the aesthetic value of nature, which can influence tourism and recreational revenue. Estimating the economic impact associated with ANS is further confounded as monetary values are difficult to estimate for the extinction of species or loss of native biodiversity and ecosystem services.

Harm to Human Health

Throughout history, epidemic diseases such as malaria, yellow fever, typhus, and bubonic plague have spread using organisms as vectors and reservoirs. Further, there has been conjecture that the ballast water of ships may transport waterborne pathogens and diseases¹³ as well as causative agents of harmful algal blooms (HABs)^{14,15}; however, additional study is needed to link the transport of microorganisms to outbreaks of human disease. The effect of ANS on public health extends beyond the immediate effects of disease and parasites; human injury may also result from ANS. For instance, hazards may occur from collisions between boaters and jumping silver carp (*Hypophthalmichthys molitrix*) or from the sharp-edged mussel shells found in recreational areas. Additional risk to human is perceivable as chemicals used to control invasive species can pollute soil and water. Other ANS, such as invasive mussels, may increase human and wildlife exposure to organic pollutants such as polychlorinated biphenyls (PCBs), as these toxicants accumulate in their tissues and are passed up the food chain.

⁵ United States Department of Agriculture APHIS Fact Sheet. Invasive Species. October. 1999.

⁶ 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.

⁷ Simpson A. 2004. The Global Invasive Species Information Network: What's in it for you? *BioScience* 54: 613-614.

⁸ Army, 2002. Economic Impacts of Zebra Mussel Infestation. http://www.wes.army.mil/el/zebra/zmis/zmis/zmishelp/economic_impacts_of_zebra_mussel_infestation.htm (Accessed April 1, 2012).

⁹ 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.

¹⁰ Walters LJ, Brown KR, Stam WT, and Olsen JL. 2006. Ecommerce and *Caulerpa*: unregulated dispersal of invasive species. *Frontiers in Ecology and the Environment* 4: 75–79.

¹¹ For the purposes of this document the term “Asian carps” refers to four species: black carp (*Mylopharyngodon piceus*), bighead carp (*Hypophthalmichthys nobilis*), grass carp (*Ctenopharyngodon idella*), and silver carp (*H. molitrix*).

¹² 2012 Asian Carp Control Strategy Framework. Asian Carp Regional Coordinating Committee. February 2012. <http://asiancarp.us/documents/2012Framework.pdf>. Accessed May 3, 2012.

¹³ Ruiz GM, Rawlings TK, Dobbs FC, Drake LA, Mullady T, Huq A, Colwell RR. 2000. Global spread of microorganisms by ships. *Nature* 408:49–50.

¹⁴ Boesch DF, Anderson DM, Horner RA, Shumway SE, Tester PA, Whitedge TE. 1997. Harmful Algal Blooms in Coastal Waters: Options for Prevention, Control, and Mitigation. NOAA Coastal Ocean Program Decision Analysis Series No. 10. NOAA Coastal Ocean Office, Silver Spring, MD. 46pp. + appendix.

¹⁵ Cohen, A.N. 2010. *Non-native Bacterial and Viral Pathogens in Ballast Water: Potential for Impacts to ESA-listed Species under NOAA's Jurisdiction*. A report prepared for the National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Endangered Species Division, Silver Spring, MD. Center for Research on Aquatic Bioinvasions (CRAB), Richmond, CA

ANS - WHAT CAN BE DONE?

Prevention is the most cost effective and environmentally protective tool to control ANS. Preventative measures include decontaminating boats and gear that could transport ANS and restricting the importation or release of potentially harmful species. However, even the best prevention efforts may not stop all invasions. When a new species is introduced, the best strategy is early detection and rapid response. This includes monitoring habitats to discover new species soon after introduction, reporting sightings of previously unknown species in an area, and working quickly to keep introduced species from becoming established and spreading. Once established, invasive species can be difficult to control and nearly impossible to eradicate. Control methods include mechanical, chemical, and biological approaches. The methods used will vary dependent upon the species and location; however, control efforts are typically costly, labor intensive, and indirectly affect native species. Furthermore, control efforts often create disturbance, which may render the habitat vulnerable to subsequent invasions. Accordingly, habitat restoration is necessary following eradication or control efforts to minimize the chance an area will be reinvaded.

Education and outreach are critical tools to prevent and manage the impacts of ANS. The public must understand the problems and impacts associated with ANS so they can be active partners in solving the problem. More importantly, people need to know what they can do to help prevent the introduction and spread of ANS. Federal, State, and local programs and legislation have implemented regulations to prevent the introduction and reduce the spread of invasive species. These regulations include mandatory boat inspections at public boat ramps, live species prohibitions and restrictions, and ballast water regulations at shipping ports. To successfully address ANS issues collaboration, cooperation, and coordination are necessary among and between Federal and State agencies, local governments, tribal entities, industry, as well as other entities including non-governmental organizations.

FUTURE CHALLENGES

Global trade and intercontinental travel have been cited as major causes of biological invasion. For example, it has been estimated that 10,000 marine species are transported around the world in ballast water every day¹⁶. As the world trade network continues to grow, new markets and trade routes continually open. This growth will increase the number of new species that are introduced and the frequency with which such introductions are repeated. Managing this increased rate of aquatic bioinvasion will require the United States and other countries to strengthen approaches for preventing introductions while maintaining trade.

Additional challenges to ANS management 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. Fast growth, rapid reproduction, and the ability to survive in a wide range of environmental conditions are among some of the life history traits shared by ANS that may allow them to capitalize on the biotic and abiotic changes generated by global climate change. Furthermore, species that have long been "in motion," but failed to establish and reproduce in hostile conditions, may soon be able to invade these once "off limit" thermal regimes. Other species will migrate to maintain the temperature conditions needed for reproduction, growth, and feeding. There is a growing concern that these shifting species will begin to function as invasive species, disrupting the structure and function of their new communities. Many communities have already experienced the impacts of warming coastal waters and have shown subsequent alterations in species proportions as well as changes to community structure and dynamics. Predictions of how species will respond to climate change will help guide conservation decisions and management of natural resources. Future ANS managers will need to develop tools that include both invasion biology and climate change impacts.

¹⁶ Carlton JT. 1996. Marine bioinvasions: The alternation of marine ecosystems by nonindigenous species. *Oceanography*. 9: 36-43.

STRUCTURE OF THE AQUATIC NUISANCE SPECIES TASK FORCE

The Aquatic Nuisance Species Task Force (ANSTF) 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 ANSTF is an interagency committee established by Section 1201 of the Act and serves to develop and implement a program for waters of the United States¹⁷ 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

FEDERAL AND EX-OFFICIO MEMBERS

The ANSTF's charter is authorized by the Federal Advisory Committee Act (FACA) of 1972. The charter provides the ANSTF with its core structure and ensures an open and public forum for its activities. To meet the challenges of developing and implementing a coordinated and complementary Federal program for ANS activities, the ANSTF members include 13 Federal agency representatives and 13 representatives from ex-officio member organizations. 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.

The Act designated the Director of the Fish and Wildlife Service and the Undersecretary of Commerce for Oceans and Atmosphere as the ANSTF Co-chairpersons. It specified six Federal agencies¹⁸ that would constitute the ANSTF, but also gave the co-chairs legal authority to include other Federal agencies as members of the ANSTF, as appropriate. Members of ANSTF are responsible for committing resources to achieve the goals of the Strategic Plan and reporting annually on their progress. At the time of Plan adoption (May 3, 2012), the following were ANSTF member departments and agencies:

- **United States Fish and Wildlife Service (USFWS)—co-chair**
- **National Oceanic and Atmospheric Administration (NOAA)—co-chair**
- Army Corps of Engineers (ACOE)
- Bureau of Land Management (BLM)
- Bureau of Reclamation (BOR)
- Department of State (DOS)
- Environmental Protection Agency (EPA)
- United States Forest Service (USFS)
- Department of Transportation (DOT), Maritime Administration (MARAD)
- National Park Service (NPS)
- United States Coast Guard (USCG)
- United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS)
- United States Geological Survey (USGS)

¹⁷ The term "waters of the United States" is defined by the Clean Water Act 40 CFR 230.3(s)

¹⁸ Federal agencies specified within the Act include the U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Environmental Protection Agency, United States Coast Guard, Army Corps of Engineers, United States Department of Agriculture.

The Act also named four organizations¹⁹ to be included in the base ANSTF membership, yet authorized the co-chairs to invite representatives of specific regional organizations, State agencies, and other governmental entities to participate as *ex-officio* members of the ANSTF. At the time of Plan adoption (May 3, 2012), the following were *ex-officio* members of the ANSTF:

- 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 Society²⁰
- National Association of State Aquaculture Coordinators
- Smithsonian Environmental Research Center
- *Fisheries and Oceans Canada (invited observer)*

ANSTF REGIONAL PANELS

The ANSTF focuses its work on ANS issues of national concern that require or could benefit from collaborative solutions. It strives to create opportunities and synergies among members and participants to work collaboratively 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. Section 1203 of NANPCA created the Great Lakes Regional Panel to identify priorities, to coordinate ANS program activities, and to advise public and private interests on control efforts in their region. The 1996 amendment required the ANSTF to encourage the development of additional regional panels to provide an intergovernmental mechanism for the development of a coordinated Federal program to prevent and control nonindigenous ANS as authorized by the Act. The Regional Panels are responsible for implementing actions that assist in achieving the Strategic Plan's goals and reporting annually on their progress²¹. At the time of Plan adoption (May 3, 2012), the ANSTF had established six Regional Panels:

- Great Lakes Regional Panel
- Western Regional Panel
- Gulf and South Atlantic Regional Panel
- Northeast Regional Panel
- Mississippi River Basin Regional Panel
- Mid-Atlantic Regional Panel

¹⁹ Organizations specified within the Act include the Great Lakes Commission, Lake Champlain Basin Program, Chesapeake Bay Program, and San Francisco Bay-Delta Estuary Program.

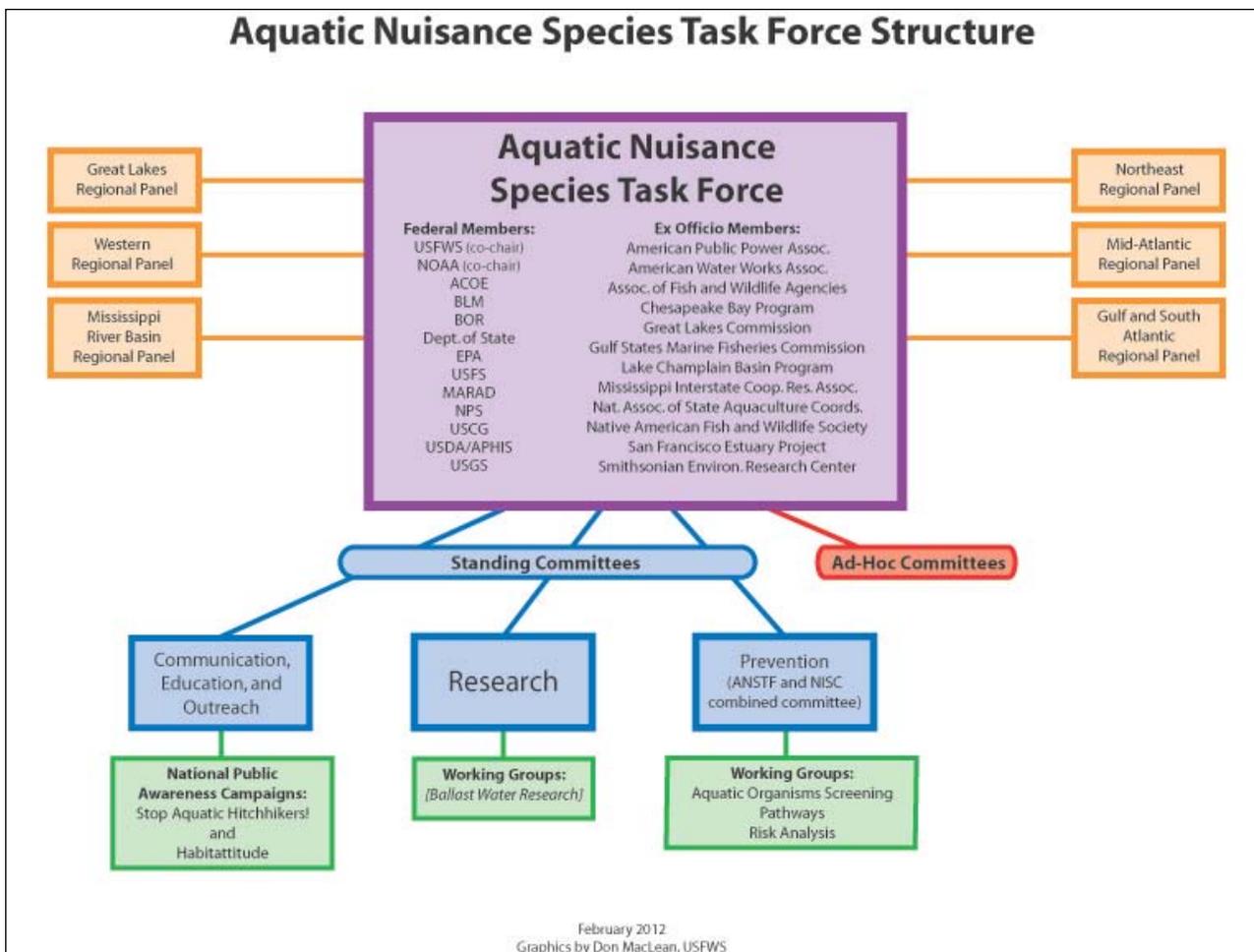
²⁰ Two members co-represent the Native American Fish and Wildlife Society

²¹ Section 1202(k) (2) of NANPCA, requires the ANSTF to submit, on an annual basis, a report to Congress focusing on progress in carrying out the provisions of the Act. Under the Act, the Regional Panels are required to submit an annual report to the ANSTF describing activities in their regions related to ANS prevention, research and control activities. Additionally, contracts for funding the panels require an annual report.

Regional Panel membership is composed of Federal, State, intergovernmental, tribal, industry, and environmental non-governmental organization representatives. In addition, some panels may include international representation (e.g. Canadian Federal and Provincial representatives) as observers. The Regional Panels make a concerted effort to involve a broad spectrum of stakeholders in order to provide balanced advice to the ANSTF on regional priorities and issues of local significance.

ANSTF COMMITTEES

To obtain the necessary technical coordination of various ANS efforts, the ANSTF has established several issue- and/or species-specific standing and ad hoc committees to carry out the Act. Committee membership includes all affected entities, such as Federal and State agencies, tribes, non-governmental organizations, industry groups, and academia. Committees are made up of member agency representatives and subject matter experts. Committee activities include the development of public awareness/action campaigns, species-specific control and management plans, standardized scientific protocols, research priorities, theoretical frameworks to screen organisms prior to their entry to the United States., and providing technical advice to the ANSTF. Committees, both standing and ad hoc, are responsible for reporting to the ANSTF on goal attainment under this Plan. At the time of Plan adoption (May 3, 2012), the ANSTF had established three standing committees that oversee related working groups: the Communication, Education and Outreach Committee, Research Committee, and Prevention Committee (the latter is a joint committee with the National Invasive Species Council (NISC)). In addition, ad hoc committees are formed as needed to focus on a specific discipline or issue that warrants the attention of the ANSTF.



ANSTF STRATEGIC PLAN

Section 1202 of the Act authorized the ANSTF to develop and implement 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. The *Aquatic Nuisance Species Program* document guided the work of the ANSTF from 1994 to 2002. The document tracked the requirements outlined in the NANPCA (1990). It established the core elements of the ANS program (prevention, detection and monitoring, control) and support elements (research, education, and technical assistance), provided for prioritization of activities, and charted a course for implementation of the Act. The ANSTF Strategic Plans for 2002–2007 and 2007-2012 maintained the key elements of the ANS Program, but provided a broader focus for activities consistent with provisions of NISA (1996). These plans provided more emphasis on prevention strategies, particularly for intentional introductions.

The ANSTF Strategic Plan for 2013 – 2017 (hereafter, the Strategic Plan) carries through many of the goals and objectives established in previous plans 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 Strategic Plan also calls attention to other areas of ANS management, including habitat restoration and research. The Strategic Plan establishes eight goals:

- 1) *Coordination - Maximize the organizational effectiveness of the Aquatic Nuisance Species Task Force*
- 2) *Prevention - Develop strategies to identify and prevent the establishment of new and slow the spread of existing ANS in the waters of the United States*
- 3) *Early Detection and Rapid Response - Identify and respond to aquatic nuisance species within a timely manner following introduction in order to prevent their establishment and/or spread*
- 4) *Control and Management - Control established aquatic nuisance species when feasible and when the benefits of managing the established species outweigh the costs of removing them with respect to harm to the environment, the economy, and public health*
- 5) *Restoration – Protect and rehabilitate native species and ecosystems by conducting habitat restoration efforts on multiple scales*
- 6) *Education / Outreach - Increase awareness concerning the threats of aquatic nuisance species, emphasizing the impacts, importance of prevention and containment, and recommendations for appropriate domestic and international actions*
- 7) *Research - Facilitate research to address environmental, economic, and human health risks and impacts associated with aquatic nuisance species*
- 8) *Funding - Coordinate Federal agency budgets to support Aquatic Nuisance Species Task Force priorities and establish a clear process that links State and regional needs in their areas of responsibility*

The strategic goals serve as a blueprint and coordination tool for the ANSTF. The order in which the goals are presented in the Plan represent the logical arrangement determined by the ANSTF; accordingly, the hierarchy of the goals do not represent individual importance or priority level. Under each goal, objectives describe what is to be accomplished over the next 5 years. Action items listed under the objectives describe how ANSTF expects to accomplish the goals and objectives. The accomplishment of specific objectives and action items will be dependent upon budgets of individual agencies and the Regional Panels; and in some cases, legal or regulatory changes as well as enforcement of these changes. The Strategic Plan should not be considered a comprehensive list of all ANS strategic actions; it does contain a targeted set of priority strategic goals, objectives, and associated action items that are intended to be completed in the next 5 years.

ANSTF OPERATIONAL PLAN:

In addition to its Strategic Plan, the ANSTF will compose a separate Operational Plan. Its function is to ensure the goals and objectives of the Strategic Plan are measurable and accountable. In contrast to the action items in the Strategic Plan that outline long-term or continual actions, the actions listed in the Operational Plan will depict short-term efforts used to support and implement the Strategic Plan. The Operational Plan will be completed by the ANSTF members working together and separately with support of the Regional Panels and committees. To the greatest extent possible, implementation of the actions within the Operational Plan will build on and fill gaps in existing activities and programs rather than supplanting them. Responsibilities will be assigned to specific agencies, Regional Panels, or committees. Implementation will be assumed by those specified in line with their specific mandates, priorities, expertise, and funding. The Operational Plan will include, when available, the time frame, lead and supporting agencies or groups, and allocated funding. Further, the Operational Plan will be regularly amended to reflect changes in circumstances, plans, or priorities. The actions listed in the Operational Plan will be reported annually to measure the progress towards accomplishing the over-arching goals and objectives identified within the Strategic Plan.

COORDINATION WITH OTHER FEDERAL AND STATE INVASIVE SPECIES MANAGEMENT PLANS

The ANSTF recognizes that many Federal and State agencies, interagency groups, and local entities contribute to the management of invasive species. The largest and most comprehensive invasive species-focused committees and working groups are the National Invasive Species Council (NISC), Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW), and the Federal Interagency Committee on Invasive Terrestrial Animals and Pathogens (ITAP). As described below, these working groups facilitate communication and collaboration at all levels of the Federal government and with State, local and private partners by focusing on particular taxa and pathways.

The National Invasive Species Council (NISC) was established by Executive Order 13112 (Order). NISC is co-chaired by the Secretaries of Agriculture, Commerce, and the Interior and includes 10 member departments and their constituent agencies as well as a small staff assigned specifically to the Council. The Order directs the Secretary of the Interior to establish an Invasive Species Advisory Committee (ISAC) composed of non-federal experts and stakeholders to provide advice and recommendations to NISC on invasive species-related issues. NISC provides national leadership and oversight on both terrestrial and aquatic invasive species and ensures that Federal programs and activities to prevent and control invasive species are coordinated, effective, and efficient. NISC has specific responsibilities including promoting action at State, tribal, local, and ecosystem levels; identifying recommendations for international cooperation; facilitating a coordinated network to document, evaluate, monitor invasive species' effects; developing a web-based information network on invasive species; and developing guidance on invasive species for Federal agencies to use in implementing the National Environmental Policy Act. NISC is also responsible for preparing a National Invasive Species Management Plan which directs Federal efforts to prevent, control and minimize invasive species and their impacts

The Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW) was established through a Memorandum of Understanding signed by agency leadership in August 1994. FICMNEW represents an unprecedented formal partnership between 16 Federal agencies with direct invasive plant management and regulatory responsibilities spanning across the United States and territories. FICMNEW members interact on important national and regional invasive plant issues and share information with various public and private organizations participating with the Federal sector to address invasive plant issues. FICMNEW's charter directs the committee to coordinate, through the respective Secretaries, Assistant Secretaries, and Agency heads, information regarding the identification and extent of invasive plants in the United States and to coordinate Federal agency management of

these species. FICMNEW accomplishes these portions of its charter by developing and sharing scientific and technical information, fostering collaborative efforts among Federal agencies, providing recommendations for national and regional level management of invasive plants, and sponsoring technical and educational conferences and workshops concerning invasive plants.

ITAP is the Federal Interagency Committee on Invasive Terrestrial Animals and Pathogens. ITAP's mission is to support and facilitate more efficient networking and sharing of technical information for program planning and coordination among Federal agencies and departments involved with invasive species research and management. ITAP focuses on several major taxonomic groups of invasive species for which improved technical coordination is essential to facilitate effective Federal responses.

Invasive species management plans prepared by these groups and others provide an opportunity to identify priorities and establish cooperative, well-coordinated approaches to invasive species management. Invasive species issues are significant in their breadth and scope; as this area involves all taxa of life and threatens natural ecosystems around the globe. A variety of pathways are capable of transporting species into new environments including ballast water and hulls of ships, materials associated with the trade of nursery stock, importation of fruits and vegetables, and the international movement of people. Furthermore, multiple efforts are necessary to encompass the various components of invasive species management, including prevention, monitoring, removal, restoration, research, and education. The great extent needed to manage invasive species and their impacts infers that one agency, task force, or work group cannot tackle it alone. Work can be done with greater effectiveness and efficiency if it is focused on specific taxonomic, ecosystem, or regional priorities. To ensure that redundancy and overlap does not occur while addressing invasive species-related issues, the ANSTF communicates with Federal and State agencies and interagency groups to create a big picture framework for existing management plans. Working with other agencies and organizations allows the ANSTF to identify areas where legislation is needed to fill gaps in statutory authority, suggest priority policy issues, and define roles and responsibilities for managing invasive species.

States also play a critical role in preventing and controlling the spread of invasive species and have numerous programs relating to the wide variety of invasive species found within their borders. ANSTF encourages State and interstate planning entities to develop management plans describing detection and monitoring efforts of ANS, prevention efforts to stop their introduction and spread, and control efforts to reduce their impacts. In addition, these plans serve to coordinate efforts between State agencies, local governments, tribal entities, industry, as well as other entities including non-governmental organizations. Consequently, they are a valuable and effective tool for identifying and addressing ANS problems and concerns in a climate of many jurisdictions and other interested entities. Once a State or interstate ANS management plan is approved, the ANSTF monitors the activities of the planning entity to ensure the plans are implemented. This monitoring process allows the ANSTF to evaluate the capacity and capability at State and local levels to coordinate, detect, and respond to invasive species. This information allows the ANSTF to better identify strategies for monitoring, containment, outreach, and other ANS activities. It also allows for identification of priority activities and species, obstacles to fully implementing the ANS State management plans, and cooperative partnerships that exist among entities managing ANS. This information is critical for recognizing the amount and type of data and management methods available, which allows for an assessment of gaps, redundancies, and opportunities for collaboration among agencies that are not being realized. It is clear that actions and goals performed at the Federal level will not will not succeed unless they are undertaken in cooperation with stakeholders; for that reason, coordination and joint action with State partners is critical for addressing invasive species problems within the United States.

CONCLUSION

Management of ANS is challenging; however, considerable success is being achieved in the prevention, detection, eradication, control, and outreach efforts of ANS along with increased emphasis on the restoration of ecosystems that have been impacted by ANS. Additional research and information exchange, new detection and eradication techniques, innovative control methodologies, and collaborative models are increasing our capacity to manage ANS. Since the establishment of the ANSTF, awareness of the problems caused by ANS has dramatically improved, as evidenced by increased activity at Federal, State, and local levels. Despite the significant increase in activity and awareness, much remains to be done to prevent and mitigate the impacts of ANS. The intent of the ANSTF Strategic and Operational Plans is to create a strategic approach to minimize harm to the environment, economy, or human health that results from ANS. This involves taking advantage of what has been learned and creating next steps that are well planned and coordinated.

Brazilian
Egeria



Goal 1: Coordination - *Maximize the organizational effectiveness of the Aquatic Nuisance Species Task Force*

The scope and complexity of ANS management summons the strengths of different government agencies and private organizations in different ways. A primary objective of the ANSTF is to facilitate cooperation and coordinate Federal government efforts relating to ANS in the United States with those of the private sector and other North American interests by utilizing Regional Panels and issue-specific committees and including bi-national bodies where applicable. The Regional Panels established by the ANSTF are a critical and effective mechanism for achieving the goals and objectives established by the ANSTF Strategic Plan. The memberships within each of the panels include representatives of States, Indian 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, making recommendations to the ANSTF, and providing advice to public and private interests concerning methods of ANS management and control.

To further increase coordination, the ANSTF encourages State and interstate planning entities to develop management plans describing detection and monitoring efforts of ANS, prevention efforts to avert their establishment and spread, and control efforts to reduce their impacts. In addition, management and control plans have been developed or are under development by the ANSTF and other partners for several species. Under Section 1204 of the Act, management plan approval from the ANSTF is required for both State and species plans to obtain funding. Regardless of financial incentives, plans are a valuable and effective tool for identifying and addressing ANS problems and concerns in a climate of many jurisdictions and interested entities.

Fulfilling Goal 1 requires ongoing cooperation, communication, and dialogue as well as an understanding of the views and roles of all agencies and organizations involved. The actions suggested below will allow the ANSTF to lower institutional barriers to efficiency and effectiveness, beginning with enhanced Federal agency collaboration. The actions also include a thorough analysis of the roles, responsibilities, and supporting legislation involving ANS so gaps in authority can be identified. Further, strong monitoring and evaluation of the ANSTF Strategic and Operational Plans are encouraged to provide measures of success toward reaching goals and providing information for future revisions of the plans.

Objective 1.1: Strengthen the coordination capacity of the ANSTF

- a. Increase communication among the members, Regional Panels, and committees of the ANSTF to prioritize issues and activities
- b. Continue to build capacity within and among the Regional Panels in order to increase regional and international coordination, identify needs and emerging issues, and communicate recommendations to ANSTF members
- c. Provide technical guidance and resource assistance to States through a coordinated effort by the Regional Panels
- d. Strengthen the working relationship with NISC, working cooperatively to implement ANS activities identified in the ANSTF Strategic Plan and NISC National Management Plan
- e. Identify, increase communication, and encourage participation with other interagency organizations dedicated to invasive and nuisance species
- f. Identify, increase communication, and encourage participation with industry, tribes, and other stakeholders affected by ANSTF and Regional Panel activities
- g. Annually report on the ANSTF Operational Plan; when warranted, utilize this information to update and amend the ANSTF Operational Plan

Objective 1.2: Evaluate the ability of statutory authorities, regulations, and programs necessary to implement ANSTF goals and objectives

- a. Identify gaps in statutory authorities, regulations, and programs necessary to meet ANSTF goals and objectives
- b. Recommend revisions to statutory authorities, regulations, and programs when needed to meet ANSTF goals and objectives

Objective 1.3: Facilitate the development and continued effectiveness of State and interstate ANS management plans

- a. Encourage plan development and provide technical drafting assistance to States without an ANS management plan
- b. Encourage State and interstate ANS management plan review and revision every 5 years to reflect completed goals and objectives, new goals and objectives, new species and pathways, and management priorities
- c. Seek opportunities to leverage funds to fully support implementation of ANSTF-approved State and interstate ANS management plans
- d. Report on the number of State and interstate ANS management plans in place and under development
- e. Review guidelines for the preparation of State and interstate ANS management plans
- f. Annually summarize and report on State and interstate ANS management plan accomplishments and expenditures; utilize this information to compose a national assessment of ANS activity

Objective 1.4: Coordinate the development and implementation of ANSTF- approved species control and management plans and pathway management plans

- a. Encourage the development of pathway management plans
- b. Coordinate discussions on species and pathways for which plans may be needed; determine a lead entity for development of such plans
- c. Distribute ANSTF-approved species management and control plans to State, tribal agencies, and relevant stakeholders to encourage State and tribal-level action
- d. Monitor the development, evaluate the effectiveness of implementation, and report on the progress of ANS plan implementation
- e. Report annually on the progress of existing ANSTF-approved species control and management plans
- f. Support the implementation and long-term efforts of ANSTF approved plans

Objective 1.5: Cooperate with nations that have neighboring waters and shared pathways with the United States to prevent, detect, and control ANS

- a. Broaden involvement with international ANS activities and organizations
- b. Continue and expand cooperation between ANSTF, Regional Panels, and foreign entities concerning the planning and implementation of prevention, monitoring, research, education, and control programs related to ANS that infest waters of the United States and neighboring nations

Goal 2: Prevention - Develop strategies to identify and prevent the establishment of new and slow the spread of existing ANS in the waters of the United States

Prevention is the first line of defense against ANS. Once a species becomes established, control efforts require significant and sustained resources. Since eradication may not be feasible, prevention is the most cost-effective means to avert the risk of harmful introductions. Investment in prevention avoids many of the long-term economic, environmental, and social costs associated with ANS. New species can arrive through many different ways, but most species that are considered to be invasive are a direct result of human activity. The movement of ANS may utilize pathways including, but not limited to, ballast water and hulls of ships, canals and waterways, aquaculture, the aquarium and pet trade, the bait industry, recreational activities, biological research, and habitat restoration projects.

Long-term success in prevention will reduce the rate of introductions, the rate of establishment, and the damage from additional ANS. One example of this success can be found in the Great Lakes. Beginning in 1970, one invader on average was recorded every 8 months in this region²²; in 2006 more stringent measures were taken to regulate ballast water discharges, and since that time no new invasive species attributed to ballast water release and transoceanic shipping in general have been reported in the Great Lakes²³. Additional successes in prevention will require Federal agency support and cooperation with State agencies and private organizations. Implementation of preventative measures may require broadening legislative mandates, strengthening the capacity of some departments, and refining or consolidating legislative and regulatory tools. The actions suggested below identify the most efficient way to reduce ANS risks by supporting authorities and programs that address intentional and unintentional introductions from all pathways. The joint ANSTF and NISC Prevention Committee via the Pathways Work Team has completed a report on major invasive species pathways (*Training and Implementation Guide for Pathway Definition, Risk Analysis and Risk Prioritization*) as well as a *Pathways Ranking Guide*. These documents will be used to guide ANSTF efforts in pathway management.

Objective 2.1: Take steps to interdict specific pathways by developing and implementing guidance and appropriate measures

- a. Develop and implement risk mitigation measures to prevent introductions through priority pathways
- b. Evaluate risk mitigation measures to prevent introductions to ensure they are effective and environmentally sound
- c. Encourage State and Federal agencies to incorporate invasive species management into emergency response and contingency plans (e.g., wildfire management and spill response plans)
- d. Recommend amendments to the injurious wildlife provisions of the Lacey Act (18 U.S.C. § 42) to allow a proactive approach for preventing the establishment of new invasive species through the trade of live organisms
- e. Recommend amendments to legislation to ensure prevention of the establishment of non-native aquatic plants though trade is addressed
- f. Encourage improved implementation and enforcement of the Lacey Act provisions on injurious wildlife and other regulations relevant to the transport, propagation, sale, collection, possession, importation, purchase, cultivation, distribution, and introduction of ANS

²² Ricciardi A. 2001. Facilitative interactions among aquatic invaders: is an “invasional meltdown” occurring in the Great Lakes? *Canadian Journal of Fisheries and Aquatic Sciences* 58: 2513–2525.

²³ Bailey SA, Deneau MG, Jean L, Wiley CJ, Leung B, MacIsaac HJ. 2011. Evaluating efficacy of an environmental policy to prevent biological invasions. *Environmental Science and Technology* 45: 2554–2561.

Objective 2.2: Facilitate use of science-based risk assessment and screening procedures to assess and prioritize pathways for the introduction of ANS or potential species of concern

- a. Identify authorities and regulations to carry out screening of specific pathways or species; recommend improvements based on identified gaps
- b. Support continued application of pathway ranking tools and related management guidance
- c. Develop and maintain a priority list for ANS pathways

Objective 2.3: Expand training and use of the Hazard Analysis and Critical Control Point (HACCP) program into work conducted by natural resource managers



Goal 3: Early Detection and Rapid Response - Identify and respond to aquatic nuisance species within a timely manner following introduction in order to prevent their establishment and/or spread

Despite the best preventive efforts, new ANS are certain to be introduced into waters of the United States. When a new species is introduced, the best strategy is early detection and rapid response (EDRR). This includes monitoring habitats to discover new species soon after introduction, reporting sightings of previously unknown species in an area, and working quickly to keep the species from becoming established and spreading. EDRR increases the likelihood that localized ANS populations will be found, contained, and eradicated before they become widely established. EDRR can slow range expansion of ANS, and avoid the need for costly long-term control efforts. Several States including Minnesota, Wisconsin, Indiana, and Virginia have successfully eradicated infestations preventing the establishment and spread of ANS. Moreover, novel approaches to enhance early detection, including genetics-based methods, are being actively developed. These methods have strong potential to improve the ability to identify likely invaders and susceptible habitats.

Providing fast access to information on taxonomy, control methods, and subject matter experts can allow new and existing ANS to be readily recognized and managed. EDRR must be supported with emergency funding and guided by contingency plans coordinated by Federal, State, and local agencies as well as other entities, including tribes and non-governmental organizations. Goal 3 also supports several other needs: it evaluates prevention and control programs, provides information on invasion patterns and future management needs, and emphasizes the value of taxonomic expertise as an essential component of EDRR efforts. The actions suggested below identify environmentally sound methods that can prevent further spread and minimize harm to public interests. In addition to increasing ANS monitoring efforts, actions include the development of rapid response capabilities as well as research and education programs specifically related to the early detection of and rapid response to ANS.

Objective 3.1: Facilitate surveys and monitoring to detect ANS

- a. Assess existing early detection monitoring programs; identify gaps and recommend improvements for a more integrated approach
- b. Develop model protocols for universal or common practices for early detection monitoring
- c. Work with agencies and organizations to incorporate invasive species monitoring into existing survey work
- d. Identify high-priority areas for targeted monitoring efforts; develop new early detection and surveillance programs as needed, including monitoring the impact of climate change on the distribution of ANS
- e. Further develop, refine, and support genetic and emerging tools based on novel approaches to improve early detection of ANS

Objective 3.2: Make taxonomic and ecological information and expertise readily available

- a. Update the ANSTF Expert Database on a regular basis
- b. Identify gaps in available expertise
- c. Support establishment of new taxonomic expertise to identify native and exotic species

Objective 3.3: Increase public and industry involvement in early detection and rapid response programs

- a. Increase public volunteer training opportunities utilizing existing programs and infrastructure
- b. Promote use of the ANS National Hotline and USGS Online Reporting Form to report sightings of non-native species
- c. Develop additional tools to encourage reporting of suspicious sightings

Objective 3.4: Facilitate development of rapid response contingency plans

- a. Review and make accessible existing model rapid response plans for aquatic invasions
- b. Support development of additional model rapid response plans for aquatic invasions based on both taxonomic groups and jurisdictional authority where invasion occurred
- c. Identify authorities and regulations to carry out emergency response actions
- d. Support implementation of the National Incident Management System (NIMS) to prevent, protect against, recover from, and mitigate the effects of ANS incidents as mandated by Homeland Security Presidential Directive (HSPD)-5²⁴

Objective 3.5: Build capacity to respond rapidly to invasions

- a. Synthesize lessons learned from previous rapid response attempts to new ANS invasions and make it readily available
- b. Make species-specific control and management information readily available
- c. Develop a rapid response technical support network that that can provide resources and technical support in response to newly detected species
- d. Increase training opportunities of the NIMS protocol
- e. Increase number of mock-NIMS based rapid response exercises to identify additional steps needed for rapid response preparedness
- f. Explore opportunities and identify obstacles for establishing an emergency rapid response fund



²⁴ Homeland Security Presidential Directive 5 (HSPD-5) required all Federal agencies and departments to adopt the National Incident Management System (NIMS) to coordinate emergency preparedness and incident management and response among the public and private sectors.

Goal 4: Control and Management - *Control established aquatic nuisance species when feasible and when the benefits of managing the established species outweigh the costs of removing them with respect to harm to the environment, the economy, and public health*

Once ANS are established, under most conditions complete eradication is usually not feasible. A more realistic approach for established populations is using control measures to slow the rate of range expansion and lessen the impacts to public interests. Management objectives may include eradication within an area, suppressing a population, limiting spread, and reducing impacts. Control measures may include mechanical, chemical, biological, and integrated pest management strategies. Adequate funding, public awareness, and management expertise are critical to success, particularly because ANS can span geographic and jurisdictional boundaries and do not recognize political boundaries or agency jurisdictions. Therefore, Federal and State agencies, Indian tribes, and private organizations should coordinate an ecosystem-level approach to managing ANS.

Multiple control and management tools are needed to assess, remove, and contain ANS populations as well as to guide management decisions. The actions suggested below seek to identify, improve, and execute these tools. Further, the Strategic Plan actions require inter-jurisdictional communication and regionally coordinated action through the continued development and implementation of control and management plans.

Objective 4.1: Support and evaluate ANSTF-approved control and management plans

- a. Identify gaps in control efforts and tools
- b. When warranted, develop or broaden existing control methods and programs to achieve the target level of control

Objective 4.2: Increase invasive species training for natural resource managers and leverage participation

- a. Increase the number of training workshops and total number of personnel and volunteers trained in control measures for ANS
- b. Review and, as needed, develop ANS training materials used by natural resource managers

Objective 4.3: Evaluate the benefits and risks associated with the commercial harvest of ANS as a means of control or eradication

- a. Develop guidelines to assist States and tribes in determining when commercial harvest may be beneficial for control of ANS
- b. Develop guidelines to assist States and tribes in developing policies for new or existing commercial harvest programs for ANS
- c. Encourage long-term monitoring and evaluation of commercial harvest activities

Objective 4.4: Encourage an Integrated Pest Management (IPM)²⁵ approach to manage existing ANS populations.

²⁵ Integrated pest management (IPM) is a broad based ecological approach that utilizes a range of practices to maximize control of a species. In IPM, one attempts to prevent introduction, to observe patterns of spread, and control as necessary by the most economical means, and with the least possible hazard to people, property, and the environment.

Goal 5: Restoration – *Protect and rehabilitate native species and ecosystems by conducting habitat restoration efforts on multiple scales*

Habitat restoration is an essential part of the control and management efforts used to guard against future invasions or to minimize harm to native ecological communities and other public interests. Restoration of the natural habitat should be addressed whenever the control or eradication of ANS is planned since habitat rehabilitation is often necessary to avoid the replacement of one invasive species with another, control flooding, or avoid other problems associated with the absence of biological organisms. Restoration activities may also include planting or stocking organisms or improving predator-prey relationships to attain food webs more similar to pre-invasion conditions. ANS can be transported by materials, equipment, vehicles, or personnel used to conduct restoration activities; accordingly all habitat restorations, even those not focused on ANS control, should call attention to actions that prevent establishment of invaders not yet present within the project site. Restoration efforts should make use of plant and animal species that are native to the particular habitat. One of the benefits of using native species includes their ability to thrive under the local conditions while being less likely to invade new habitats. Consequently, native species reduce maintenance costs and produce healthy natural communities, thus providing a practical and ecologically valuable option for restoration projects.

The actions suggested below focus on ANS concerns during habitat restoration efforts by targeting consideration of potential ANS during planning and implementation of restoration activities and encouraging post-restoration monitoring to ensure that any ANS introduced as a result of restoration are responded to in a rapid and efficient manner.

Objective 5.1: Restore impacted ecosystems

- a. Identify and support agencies or programs that can assist in restoring areas impacted by ANS
- b. Provide technical assistance on the species and methods to use in restoring native species, including means to enhance resilience against re-invasion, climate change, and other drivers of change
- c. Compile, highlight, and share lessons learned for both restoration successes and failures within the United States

Objective 5.2: Address and provide technical assistance for invasive species management before, during, and after habitat restoration projects

- a. Ensure that Federal land and water management field and guidance manuals consider ANS issues during the planning and development of habitat restoration projects
- b. Review and make accessible existing restoration project standards to mitigate impacts of ANS during restoration activities. Develop new guidelines when warranted
- c. Encourage application of adaptive management principles and assessment of treatment regimes to improve and sustain restoration efforts over time
- d. Encourage the development of Hazard Analysis and Critical Control Point (HACCP) plans for all federally funded or authorized restoration projects
- e. Support the development and expansion of markets that supply native plants and certified weed-free materials; encourage use of these materials by agencies and other organizations Encourage post-restoration monitoring for ANS by agencies and other organizations conducting habitat restoration or landscaping projects
- f. Encourage restoration of areas following ANS eradication or control efforts

Goal 6: Education and Outreach - Increase awareness concerning the threats of aquatic nuisance species, emphasizing the impacts, importance of prevention and containment, and recommendations for appropriate domestic and international actions

The lack of awareness concerning ANS impacts is one of the largest management obstacles. Few people understand the threat some nonindigenous species pose and how their actions might introduce them. 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. Further, the importation of organisms through trade has allowed species to spread by the receipt of unwanted organisms that hitchhike with the intentionally imported ones. Many policy makers, natural resource administrators, and private interest groups have facilitated the intentional introductions of species for certain economic or recreational purposes without understanding the effects these species may have on native species. These intentional and unintentional methods of introduction can be eliminated or curtailed by educating people about their potential to transfer ANS into new habitats.

Robust public awareness and action programs will help the public understand the impacts associated with invasive species so they can be partners in solving the problems. More importantly, people need to know what they can do to help prevent the introduction and spread of ANS in waters of the United States. ANSTF agency and *ex-officio* members, Regional Panels, States, tribes, and other entities have conducted workshops, created exhibits, pamphlets, information sheets, wallet identification cards, videos, websites, traveling displays, and other public education materials for distribution across the country. In recent years, many States have focused efforts on educating non-English speaking communities about ANS issues in general, and in respect to their culture. The actions suggested below focus on continuing to develop, review, and disseminate information to the general public as well as targeted user groups and businesses that may be potential vectors of ANS. Support and collaboration are necessary at many levels among and between Federal and State agencies, local governments, tribal entities, public and non-public sectors to successfully address ANS. As such, the actions below also focus on education of ANS threats and solutions for legislators and other decision makers.

Objective 6.1: Increase understanding among the general public of the problems and impacts associated with ANS and actions that can be taken to prevent and control ANS in waters of the United States

- a. Promote and expand new and existing national campaigns (e.g., Stop Aquatic Hitchhikers and Habitattitude™) with a proven track record of raising awareness and fostering behavior change among target audiences
- b. Utilize the internet and social media as well as traditional media sources to disseminate information and promote awareness of ANS
- c. Develop educational activities and products aimed at the general public regarding specific actions that can be taken to prevent, detect, and control ANS
- d. Cooperate with media outlets to reach a broad range of the public with ANS messages
- e. Participate in public affairs activities (e.g., conferences, shows, tournaments) to reach a broad range of the public with ANS messages
- f. Raise the level of understanding and expertise on ANS worldwide by encouraging technical information exchange with other countries
- g. Participate in international conferences and workshops

Objective 6.2: Disseminate ANS outreach and technical guidance materials to target audiences

- a. Identify and prioritize targeted user groups and businesses that may be potential vectors of ANS.
- b. Maintain and promote the ANSTF Recreational Guidelines
- c. Leverage opportunities with relevant user groups and businesses to ensure awareness of the threats of ANS and reduce the risk of spread via emerging pathways

Objective 6.3: Promote the use of guidance documents, best management practices (BMPs)²⁶, and other outreach materials related to ANS

- a. Encourage ANSTF member agencies, Regional Panels, and other stakeholders to submit guidance documents, BMPs, and other outreach materials to the ANSTF for review and endorsement
- b. Identify gaps in outreach materials. Develop or update these materials when needed
- c. Utilize the ANSTF website as a clearinghouse for guidance documents, BMPs, and other outreach materials endorsed by ANSTF

Objective 6.4: Promote awareness of the ANSTF and its activities and provide educational briefings on ANS threats and solutions and to legislators and other decision makers,

- a. Provide timely advice to the appropriate agencies concerning ANS that have been detected in waters of the United States, as well as waters of neighboring nations
- b. Provide educational briefings and materials to Federal, State, tribal legislators and their staff members
- c. Provide educational briefings and materials to Federal and State agency decision makers to build support for and incorporation of ANS programs into agency activities
- d. Participate in and assist NISC with the national expansion of National Invasive Species Awareness Week



²⁶ The phrase “Best Management Practice” (BMP) was originally used in the U.S. Clean Water Act and associated Federal regulations to refer to procedures used for industrial wastewater control and stormwater management. Although the term was defined by the Environmental Protection Agency as a regulatory tool used to implement Federal wastewater permit regulations, it is now commonly used in the language of environmental management. The Aquatic Nuisance Species Task Force uses the term BMP in the Strategic and Operational Plans to describe any method or technique found to be the most effective and practical means in achieving an objective while making optimum use of resources.

Goal 7: Research - Facilitate research to address environmental, economic, and human health risks and impacts associated with aquatic nuisance species

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 aquatic invasive species, 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. Research supports all facets of this Strategic Plan and is necessary to increase the effectiveness of prevention, detection, response, and control and management of invasive species. To help ensure that research addresses critical needs, the actions suggested below focus on coordination among Federal, State, and tribal governments; academia; and other participating entities. Economic research is also highlighted in this section. There is a lack of knowledge on a worldwide scale of the economic impacts of ANS. In many cases, it is the economic impacts that will be the driving force in effecting change in personal and business actions, management, and policy.

Many of the actions below encourage the continued development of risk analysis²⁷ tools to characterize the likelihood and severity of potential ANS to the environment, the economy, and human health and the means and methods to manage identified risks²⁸. Science-based risk analysis is needed to evaluate invasive species before they reach the jurisdiction of the United States and to prioritize appropriate responses once they do. Risk analysis requires a methodology that integrates environmental, economic, social, and human health considerations. The principal role of ANSTF will be to provide guidance to these institutions on research, monitoring, and risk analysis needs and to provide feedback to researchers on the effectiveness of the management tools they develop.

Objective 7.1: Develop and maintain a list of ANS research priorities; communicate this list to the scientific community

Objective 7.2: Develop and maintain guidance documents, protocols, and best management practices (BMPs) related to ANS

- a. Maintain and promote the Federal Aquatic Nuisance Species Research Risk Analysis Protocol²⁹
- b. Evaluate effectiveness and identify gaps in guidance documents and BMPs. Develop or update these documents when needed

Objective 7.3: Track the progress of research activities funded or prioritized by the ANSTF

- a. Utilize the research page on the ANSTF website as a clearinghouse for research activities funded or prioritized by the ANSTF
- b. Share information on Federal invasive species grant opportunities and programs by linking this information from agency web pages to the ANSTF website

²⁷ The term "Risk analysis" in this document includes both risk assessment and risk management. Risk assessment measures the likelihood of an event occurring and the severity of negative impacts from such an event. Risk management is the process of identifying, evaluating, selecting, and implementing actions to reduce risk and includes more subjective elements including risk prioritization, risk tolerance, and associated decisions that weigh the benefits and costs of risk minimization options.

²⁸ Additional information on ANS risk analysis methodology can be found within 1) National Research Council. 1983. Risk Assessment in the Federal Government: Managing the Process. National Academy Press, Washington DC. 2) National Research Council. 1993. Issues in Risk Assessment. National Academy Press, Washington DC. 3) Stern, P.C. and H.V. Fineberg (eds). 1996. Understanding Risk: Informing Decisions in a Democratic Society. National Academy Press, Washington DC. 4) National Research Council. 2009. Science and Decisions: Advancing Risk Assessment. National Academy Press, Washington DC.

²⁹ The ANSTF developed a research protocol as is required by the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA, 101, 104 STAT. 4671, 16 U.S.C. 4701-4741), as amended by the National Invasive Species Act, 1996. Section 1202(f) (2) of NANPCA directs the ANSTF to establish a protocol "to ensure that research activities carried out under [NANPCA] do not result in the introduction of aquatic nuisance species to waters of the United States."

Objective 7.4: Support development of socio-economic research and methods to quantify the economic impact of ANS

Objective 7.5: Support research on interdiction methods for specific pathways of ANS³⁰

- a. Facilitate the development of technologies and practices used for ballast water treatment and vessel hull fouling
- b. Support development and implementation of fully effective ANS barriers between the Mississippi River and Great Lakes Basin and other infested natural waterbodies

Objective 7.6: Support efforts to identify gaps and expand research relevant to control and eradication measures to address ANS that have become established in waters of the United States

Objective 7.7: Encourage research to develop species invasion-risk forecast tools

- a. Develop and implement risk analyses and forecast models to evaluate invasiveness of high priority species, taking into account climate change and other drivers of change
- b. Improve data collection at ports of entry so numbers and identification of species entering the United States through commerce in living organisms are available and accessible
- c. Support development of a Risk Analysis Clearinghouse based on the outcome of species invasion-risk forecast analyses

Objective 7.8: Support existing databases and global database networks so national and worldwide decision-support information for invasive species management is accessible, transparent, and accurate



³⁰ The action items listed for Objective 7.5 are included in this document as they are mandated by the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA). Additional actions taken to support this objective will be included in the ANSTF Operational Plan.

Goal 8: Funding - Coordinate Federal agency budgets to support the Aquatic Nuisance Species Task Force's priorities and establish a clear process that links State and regional needs in their areas of responsibility

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 ANSTF to provide resources that will allow the States, Regional Panels, and tribes to implement programs that reflect the goals within the Strategic Plan. The actions suggested below focus on obtaining dedicated, long-term funding for the ANSTF by developing partnerships, and seeking opportunities to leverage funds within State and Federal agencies, Indian tribes as well as public and private interests. The actions also encourage Federal agencies to continually review ANS priorities to find opportunities where agency authorities align with priority needs to create funding opportunities that can be met or communicated to the Office of Management and Budget.

Objective 8.1: Secure dedicated, long-term funding for the ANSTF Strategic Plan actions

- a. Compose an annual report focused on ANS and use it as an opportunity to reach decision makers and other leaders on the need for proper policies and funding for ANS efforts
- b. Encourage Federal agencies to take ANSTF-approved Regional Panel recommendations into consideration as budgets are developed and to provide feedback
- c. Encourage Federal agencies to continually review regional priorities for opportunities where agency authorities align with priority needs in order to create funding opportunities that can either be met or communicated to the Office of Management and Budget
- d. Coordinate with NISC to ensure ANS priorities are recorded in the Interagency Invasive Species Performance Budget and communicated to the Office of Management and Budget
- e. Seek opportunities to leverage funds for ANS activities from Federal agencies and additional partners.

Objective 8.2: Optimize use of current funding for ANS activities by engaging potential resources and programs within Federal agencies and additional partners

Objective 8.3: Develop a list of ANS funding priorities

- a. Prioritize actions based on anticipated efficacy, threat level, and costs / benefits to natural resources
- b. Annually assess the funding needs of the Regional Panels as well as species-specific and State ANS management plans



APPENDIX 1: LIST OF ACRONYMS

ACOE	Army Corps of Engineers
AIS	Aquatic Invasive Species
ANS	Aquatic Nuisance Species
ANSTF	Aquatic Nuisance Species Task Force
APHIS	Animal and Plant Health Inspection Service
BLM	Bureau of Land Management
BMP	Best Management Practice
BOR	Bureau of Reclamation
DOS	Department of State
DOT	Department of Transportation
EDRR	Early Detection and Rapid Response
EPA	Environmental Protection Agency
FACA	Federal Advisory Committee Act
FICMNEW	Federal Interagency Committee for the Management of Nuisance and Exotic Weeds
HACCP	Hazard Analysis and Critical Control Point
HSDP	Homeland Security Presidential Directive
ICS	Incident Command System
IPM	Integrated Pest Management
ITAP	Federal Interagency Committee on Invasive Terrestrial Animals and Pathogens
MARAD	Maritime Administration
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act
NIMS	National Incident Management System
NISA	National Invasive Species Act
NISC	National Invasive Species Council
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey