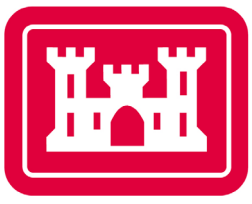
United States Department of the Army

Invasive Species Strategic Plan



US Army Corps
of Engineers ®

Executive Summary

Invasive species pose a significant threat to the ecological, economic, and cultural integrity of America's lands and waters and the communities they support. Their control can be complex, costly, and often conducted indefinitely. In some cases, the harm they cause may appear to be irreversible. Strategic solutions advanced in collaboration with others can often successfully resolve or forestall invasive species impacts.

The Department of the Army/U.S. Army Corps of Engineers Invasive Species Strategic Plan (Plan), developed pursuant to the John D. Dingell, Jr. Conservation, Recreation Act (Public Law 116-9), enacted March 12, 2019, provides an overarching framework for the broad spectrum of nationwide activities performed by the U.S. Army Corps of Engineers (USACE). The Plan includes goals, objectives, strategies, and metrics. The strategies reflect both ongoing work and opportunities to focus on emerging priorities.

USACE has identified the following goals to advance invasive species management:

1. **Prevention** - Find cost-effective ways to prevent the introduction and spread of invasive species onto USACE lands and within the United States.

2. **Early Detection and Rapid Response (EDRR)** - Implement a coordinated set of actions to find and eradicate initial invasive species infestations before they spread and cause harm avoiding the long-term costs and economic burden that invasive species cause.

3. **Control, Eradication and Restoration Management -** Control and, when possible, eradicate established invasive species populations while promoting the use of native species for ecosystem restoration.

4. **Coordination and Cooperation -** Work strategically, using all USACE scientific, management, and partnership resources in unison, to manage invasive species. Collaborate across USACE and with other entities to optimize operations through leveraging partnerships, educational efforts, and funding.

5. **Research and Development (R&D) —**Utilize science-based decision support tools to determine which species are likely to become invasive and their pathways of spread, as well as best management practices to focus resources.

6. **Communication, Education, and Information Management -** Effectively communicate the importance of invasive species management (prevention, control and eradication, early detection, and rapid response) to the public, partners, and stakeholders alike.

None of these goals are attainable without continuous collaboration across USACE and with other Federal, Tribal, State, and non-governmental organizations (NGOs). Such collaboration optimizes operations through leveraging partnerships, educational efforts, and funding. Preventing the introduction, controlling the spread, and eradication of invasive species into the United States will take time and will require adequate funding.

Nationally, USACE's current priorities related to advancing invasive species management are found within the goals of prevention, EDRR, and R&D in order to maximize operation and maintenance efficiencies and effectiveness.

Specific species efforts and methodologies will vary regionally based on current and emerging priorities and needs of Divisions and Districts, as well as those of partners and stakeholders. The Plan underscores the importance of integrating efforts across a diverse array of stakeholders at multiple levels and scales. It emphasizes coordination, communication, partnerships, and science-based decision-making, as well as strategic on-the-ground action to reduce the threat of invasive species.

Implementation of this Plan will require effective and cost-efficient strategies to prevent the introduction and inhibit the spread of invasive species to aid in protecting the resources of the Nation's lands and waters, as well as the livelihoods of those that rely upon them.

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Key Terms

Eligible State: Includes a state, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and the U.S. Virgin Islands.

Invasive species: Non-native organisms whose introduction to a particular ecosystem causes, or is likely to cause, economic or environmental harm, or harm to human, animal, or plant health.

Invasive species management: With respect to invasive species, the active implementation of any activity to reduce or stop the spread of the invasive species and the inhibition of further infestations of the invasive species, the spread of the invasive species, or harm caused by the invasive species.

Prevent: To hinder the introduction of an invasive species onto land or water or to impede the spread of the invasive species within land or water by inspecting, intercepting, or confiscating the species threats prior to the establishment of the species onto land or water.

*Figure 1. USACE Strategic Plan at a Glance**

*Summarized from USACE's Invasive Species Leadership Team Program Management Plan

Introduction

Invasive species are non-native organisms whose introduction to a particular ecosystem causes, or is likely to cause, economic or environmental harm, or harm to human, animal, or plant health (EO 13751, *Safeguarding the Nation From the Impacts of Invasive Species*, Dec. 5, 2016*)*. Invasive species are a significant threat to the ecological, economic, and cultural integrity of America's lands and waters and the communities they support. While the scale of the problem is daunting, opportunities exist for USACE to take a more coordinated approach to managing invasive species (Figure 1).

USACE's Plan recognizes the impacts that invasive species have on USACE's missions and the nation. It calls for increased coordination across agencies and stakeholders to improve prevention, early detection, eradication, and control and containment. Through increased partnerships, improved data collection and sharing, and effective coordination of resources, the Plan aims to facilitate more effective efforts at preventing introductions and controlling the spread of established invasive species.

Managing invasive species reduces negative impacts to USACE's missions and thereby advances USACE's broader goals which includes utilizing science in land, water, species, and habitat management to support decisions, activities, and balanced stewardship of public lands.

New invasive species continue to enter the U.S. while existing invasive species continue to expand their ranges, increase their populations, and hybridize with native species. Management options for addressing invasive species are directly related to the stages of the invasion process, with fewer and more costly management options required as an invasion progresses (Figure 2 and Figure 3). Coordinated efforts are essential to protect natural and cultural resources. Many USACE programs have made advances in invasive species management, and opportunities exist to expand this work to ensure the most effective and efficient use of available resources are utilized.

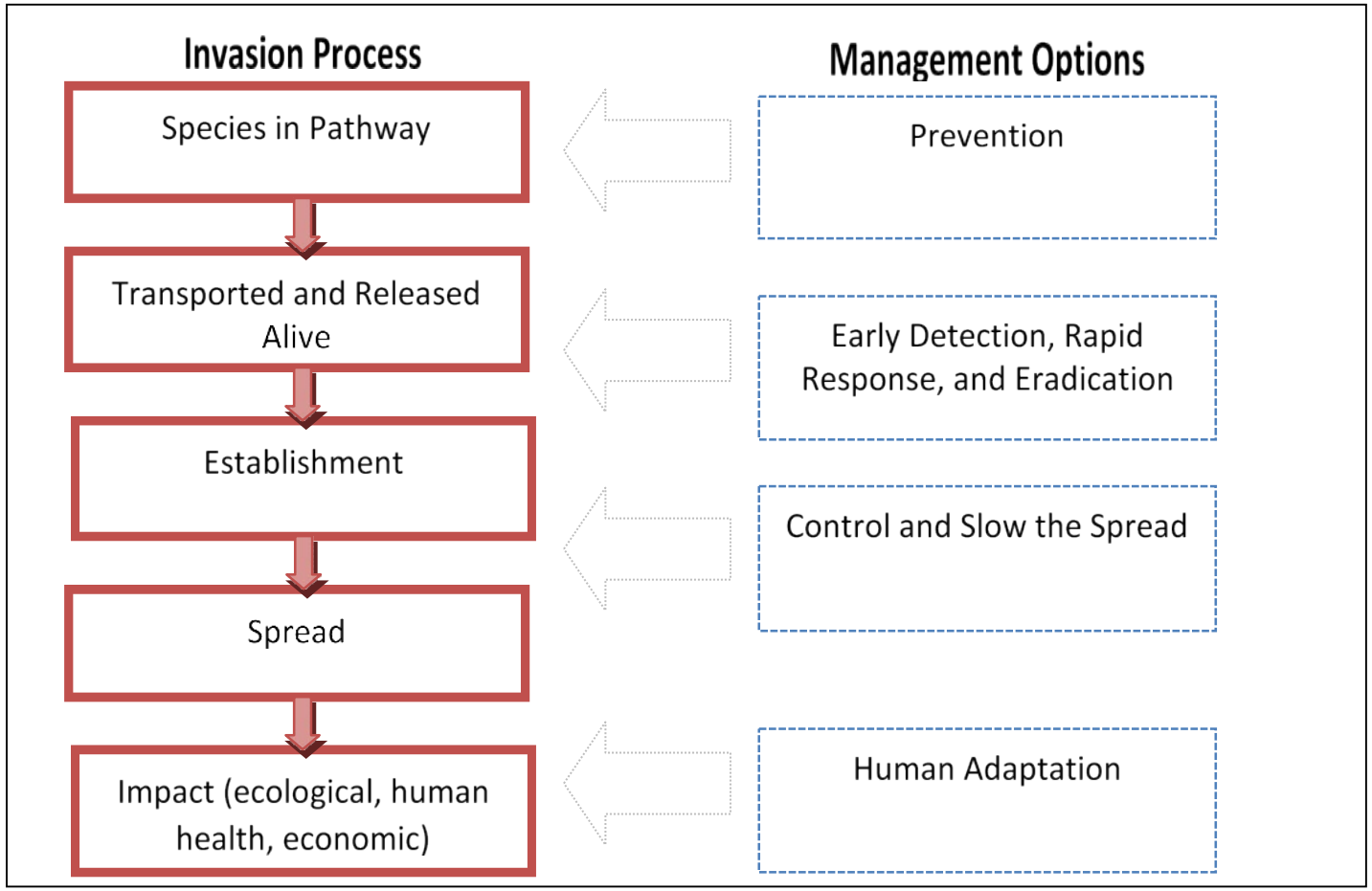

Figure 2. Invasion Process and Management Options (Adapted from Lodge et al., 2006, at p. 457)*
** Stages common to all invasions by non-native species (left column) and general management options (right column) associated with each stage of invasion.*

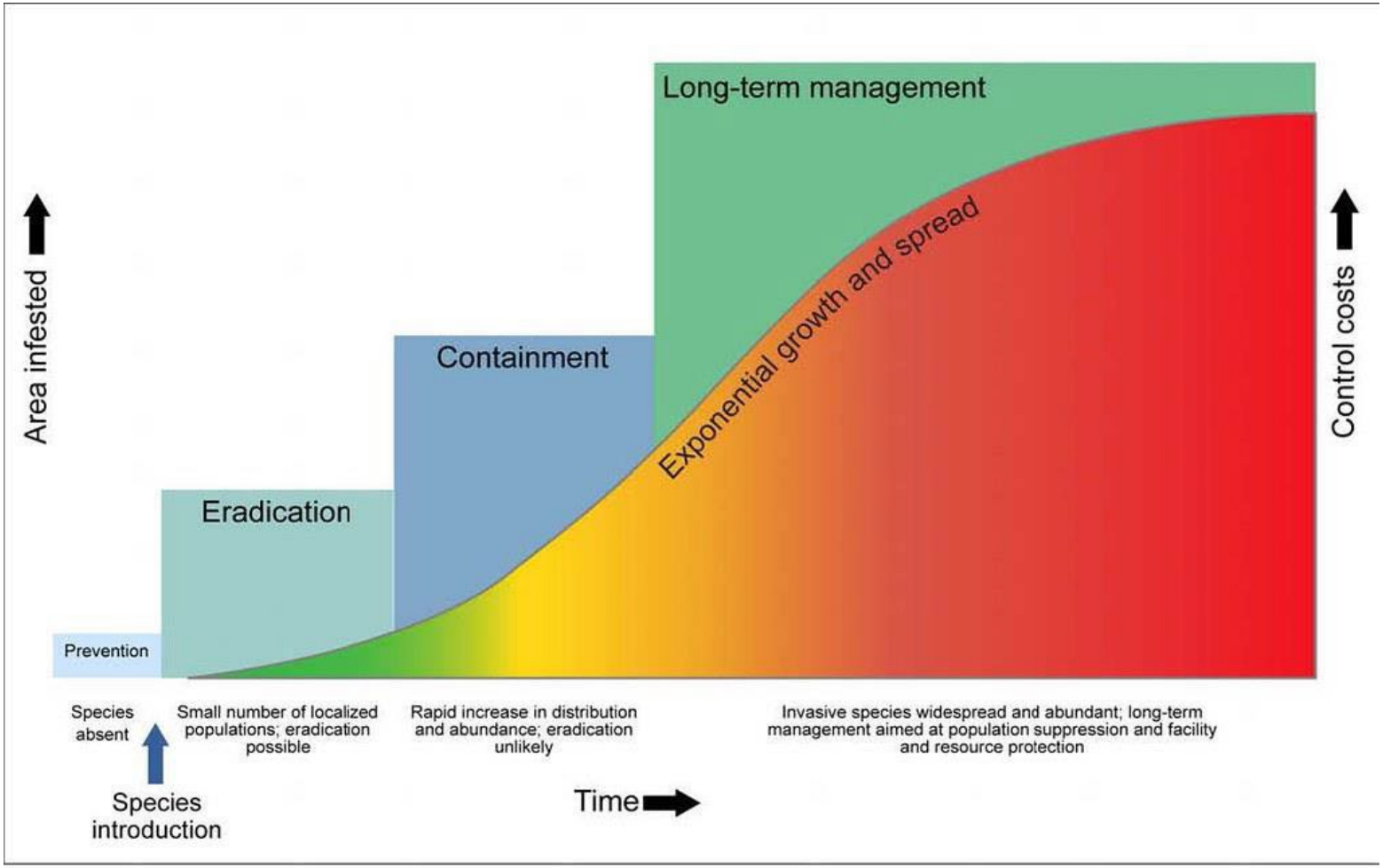

Figure 3. Phases of the Invasion Curve (Rodgers, Adapted from Invasive Plants and Animals Policy Framework, State of Victoria, Department of Primary Industries, 2010, at p. 14).

Long-term management problems can be avoided through early detection and rapid response eradication actions. Preventing the introduction of invasive species is the first and most cost-effective defense against biological invasion. The second line of defense is eradication, where the approach is to eliminate founding populations of invasive species while doing so is feasible. Early detection and rapid response actions are generally necessary to achieve eradication. When eradication is no longer feasible, then containment or long-term control of an invasive species population is the remaining management option. Long-term control programs often require substantial financial investments indefinitely.

USACE continues working nationwide to prevent and slow the spread of invasive species. Our vision is to integrate the goals and objectives of this plan into all Civil Works projects and programs to prevent or reduce the establishment of invasive and non-native species.

USACE's Invasive Species Leadership Team and Program Management Plan

In order to address the large-scale issues that invasive species have on the agency's missions, USACE created a national and interdisciplinary leadership team to help strategize policy, research and development, and implementation guidance across the major functional areas of USACE. The Invasive Species Leadership Team (ISLT) is composed of members from each of the USACE's major regions and includes representatives from a variety of professional backgrounds and echelons. From its inception on July 13, 2005, the ISLT has developed and maintained a Program Management Plan (PgMP)[1] that lays out a national strategy through actionable goals and objectives to consistently improve the way the agency tackles invasive species issues. This Plan, prepared in response to the John D. Dingell, Jr. Conservation, Management, and Recreation Act (Public Law 116-9), incorporates the ISLT's PgMP by reference. The goals and objectives of the Plan are adapted largely from the PgMP and are included in Appendix A for easy reference.

Guidance issued through executive orders and legislation contains broad recommendations for managing invasive species at a national scale. The PgMP was developed to assist USACE in finding ways to conform with the recommendations regarding invasive species while acknowledging known constraints within our organization. The availability of resources will affect when, and how, the ISLT's PgMP is implemented.

Management recommendations and budgets are developed at the project level, with support from the District, and funding decisions are determined at Division and Headquarters levels. On military lands, funds are requested and directed specifically per installation.

Coordination with Stakeholders

USACE regularly gathers input on its invasive species management activities via engagement with other Federal agencies, state and local governments, Tribal governments, and other stakeholders. As a Federal agency, USACE routinely works in collaboration with stakeholders on a variety of mission activities, including aspects of invasive species management, prevention, and/or control. Through the ISLT and its national and interdisciplinary makeup, the agency incorporates this input into its national strategies, plans, policy, goals, and objectives.

Economic Impact of Invasive Species

Invasive species impose substantial costs on society and disrupt vital ecosystem functions

[1] Invasive Species Leadership Team Program Management Plan
https://corpslakes.erdc.dren.mil/employees/islt/pdfs/ISLT-PgMP-2023.pdf

including pollination, water filtration, pest control, and protection from erosion, wildfires, and other natural hazards. As cited by the National Invasive Species Information Center, a 2021 study estimated that invasive species cost North America $2 billion per year in the early 1960s, increasing to over $26 billion per year since 2010 (Crystal-Ornela, R. et al., 2021, at p. 494). Globally, it is estimated that the economic cost of invasive species has been $1.288 trillion over the past 50 years (Zenni, R.D. et al., 2021, at p. 1). In Fiscal Year 2023, USACE alone invested an estimated $310 million to manage invasive species.

Invasive species:

- Impact endangered species and often increase regulatory costs necessary to support the T&E species,
- Increase wildfire threat and intensity across the globe, especially in the U.S.,
- Impact the nation's infrastructure by negatively effecting water delivery for consumption and agriculture, damaging infrastructure and increasing operations and maintenance (O&M) costs and degrading recreational opportunities and tourism.

For example, within USACE, invasive quagga and zebra mussels (QZM) negatively impact each mission area.

- QZM infestations result in lost hydropower generation and increased O&M costs.
- QZM impact USACE's water supply mission by reducing capacity in water supply equipment and increasing O&M costs.
- QZM negatively impact USACE's recreation mission by inhabiting shallow water areas thus making the area unpleasant for swimmers, wade fisherman, and other recreational users.
- QZM negatively impact USACE's environmental stewardship mission and environment by reducing quality habitat for native mussels and native fish.

Figures 4 provides a summary of USACE's estimated expenditures related to invasive species for all programs since FY12. This information is provided to the National Invasive Species Council (NISC) as part of their annual crosscut budget exercise and reporting. Figure 5 depicts USACE's FY23 estimated invasive species related expenditures aligned with the NISC reporting categories of prevention, early detection and rapid response, control, restoration, research, education and public awareness, and leadership and coordination.

Table 1 presents examples of economic impacts and management costs estimated for various high-profile invasive species. These estimates may not include certain losses resulting from the ecological degradation caused by the species (such as losses that are difficult to quantify but that can negatively impact and ultimately impose costs on economic activities as well as on human health and property).

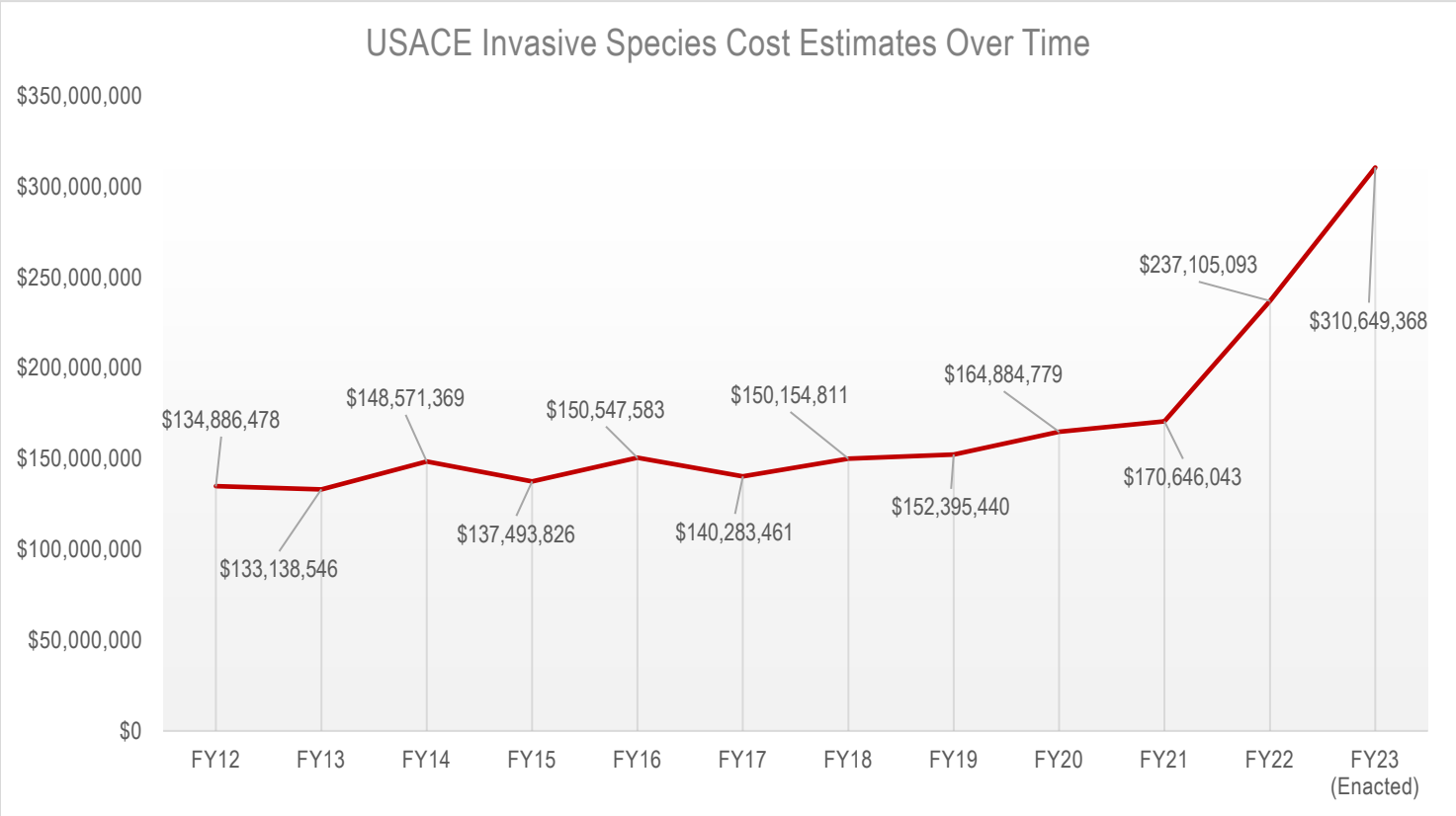

Figure 4. USACE Invasive Cost Estimates Over Time (FY12 - FY23)

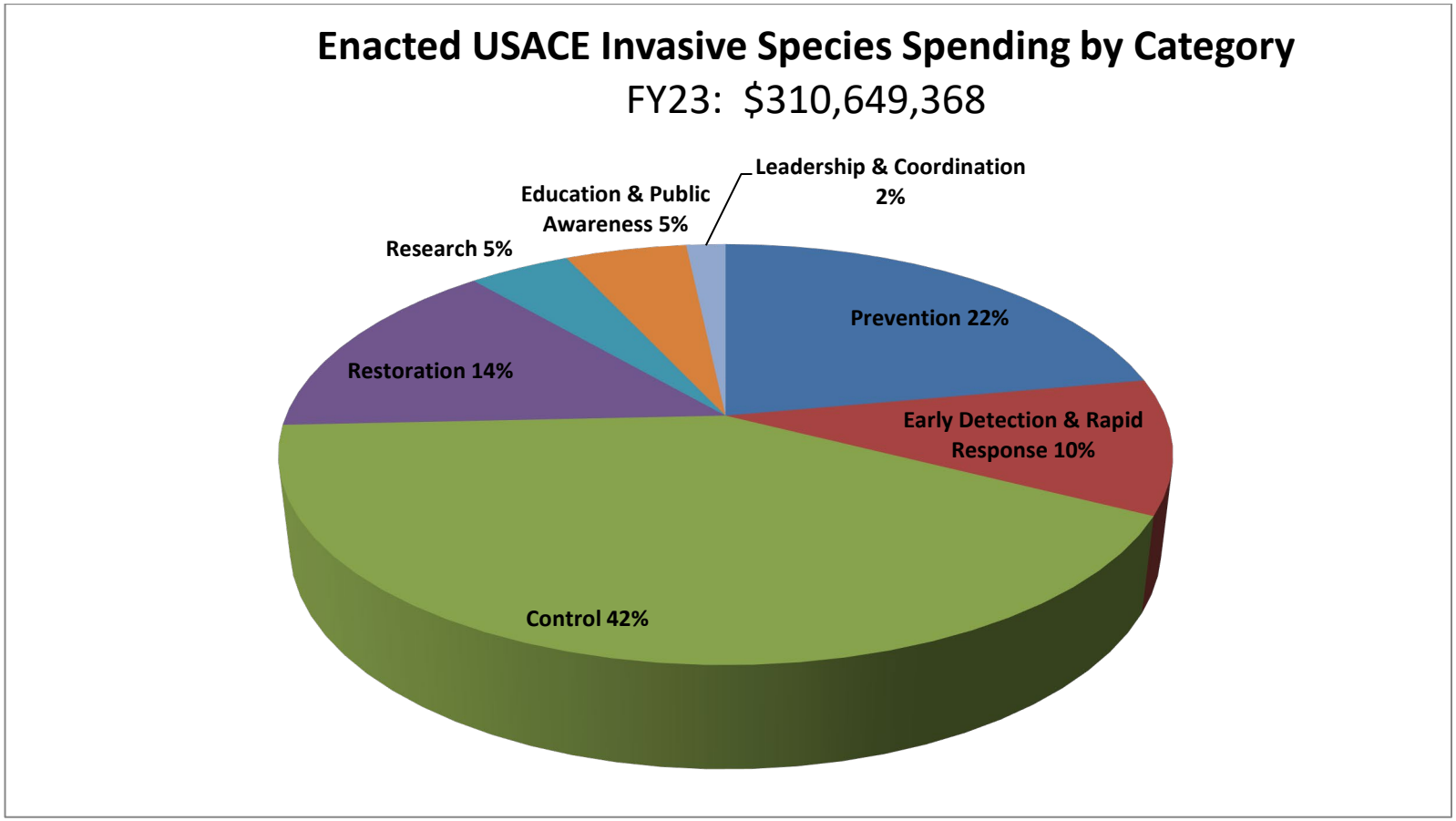

Figure 5. USACE Invasive Spending (FY23 Estimates)

*Table 1. Examples of Estimated Economic Impacts of Various Invasive Species**

Invasive Species	Impacted Sectors	Estimated Economic Impacts	Estimated Management Expenditures
Zebra, Quagga Mussels 	Hydro-electric Power Recreation Water Supply Infrastructure Environmental Stewardship	$1 billion per year (includes both estimated economic impacts and management expenditures in the Great Lakes and Pacific Northwest only)	Included as part of economic impacts
Invasive Carp 	Environmental Stewardship, Recreation	$102 million over 10 years (Great Lakes commercial fishery); $2.4 billion over ten years (Great Lakes recreational fishery)	$58 million in 2017 (Ohio and Upper Mississippi River Basins)
Water Hyacinth 	Hydro-electric Power Water supply Recreation Environmental Stewardship Flood Risk Management	*Not available*	*Not available*
Feral Swine 	Flood Risk Management Infrastructure Recreation Environmental Stewardship	$190 million in 2014 (crop production losses across ten states); $40 million in 2017 (livestock damages across 13 states)	*Not available*
Phragmites 	Navigation Recreation Flood Risk Management Environmental Stewardship Mitigation	$2.9 million per year (Maryland Chesapeake Bay commercial fishing, sportfishing, hunting, and wildlife viewing)	*Not available*
Alligator weed 	Recreation Flood Risk Management Water Supply Environmental Stewardship	*Not available*	$18 million from 2015-2019 (Department of Interior managed lands)
Emerald Ash Borer 	Environmental Stewardship	$130 million per year (timber losses, nationwide); $830 million per year (residential property value losses, nationwide), especially in Midwestern states	$10.7 billion over 10 years (nationwide)

**Estimates represent a wide range of regions, time periods, and types of impacts and costs. Dollar values are presented in nominal terms and have not been adjusted to a constant dollar-year. For these reasons, it is not appropriate to sum these values. The estimated economic impacts and estimated management expenditures are not exclusive to USACE.*

USACE Involvement in Addressing Invasive Species

USACE has a critical role to play in the national effort to control invasive species and mitigate their impacts on the public interest. USACE's civil and military missions reach across the entire nation and impact everything from recreation to fish and wildlife resource management to the protection of threatened and endangered species and ecosystem restoration. USACE core missions include managing coastal and inland navigation projects, generating hydropower, providing water supply storage, and mitigating the risk of flooding for the nation's communities.

USACE has long recognized both the potential and realized impacts of invasive species on these critical missions and has been working to mitigate or prevent them since the enactment of the Rivers and Harbors Act in 1899. USACE missions and the benefits provided to the nation are noted below.

- *ENVIRONMENTAL STEWARDSHIP - USACE manages 12 million acres of public land and water nationwide which includes the stewardship of about 5.3 million acres of wetlands, 3.4 million acres of forests and 1 million acres of grasslands. Within the 12 million acres are 45,700 cultural resource sites requiring USACE to engage and collaborate with many federally-recognized Tribes. The agency has more than 450,000 acres of environmentally sensitive areas that support unique ecosystems. The ecological diversity of these resources is tremendous and provides habitat to more than 340 species of concern, which include threatened and endangered species Seven of the top 10 migratory bird flyways cross USACE managed waters.*

- *FLOOD RISK MANAGMENET - USACE operates and maintains approximately 700 dams nationwide and in Puerto Rico that provide significant and multiple benefits to the nation—its people, businesses, critical infrastructure, and the environment. These include 50% of all federally-owned dams, six of the 10 largest U.S. reservoirs, and six of the 10 largest U.S. embankment dams. The benefits provided by these dams include flood risk management, navigation, water supply, hydropower, environmental stewardship, fish and wildlife conservation, and recreation.*

- *HYDROPOWER - USACE is the largest owner-operator of hydroelectric power plants in the U.S. and one of the largest in the world. The 75 U.S.-based based plants managed by USACE have a total installed capacity of nearly 22,000 megawatts and produce over 72 billion kilowatt-hours a year. This is approximately 25% of the nation's total hydropower output.*

- *NAVIGATION - USACE maintains 12,000 miles of inland and intracoastal waterways with 218 lock chambers at 176 sites; and 13,000 miles of inland and harbor channels with 23 locks maintained by the agency at 1,067 sites.*

- *REGULATORY - The mission of USACE Regulatory Program is to protect the nation's aquatic resources and navigable capacity while allowing reasonable development through fair and balanced decisions.*

- *WATER SUPPLY - USACE has 136 multi-purpose reservoirs that contain storage for municipal and industrial water supply in 25 states. These projects can provide approximately 6.9 billion gallons of water per day for use by local communities and businesses. That is enough water to supply the average daily household needs of about 101 million people.*

- *RECREATION - As one of the nation's largest Federal providers of outdoor recreation, USACE hosts approximately 260 million visitors a year at more than 4,800 recreation areas across 43 states. USACE lakes and parks include over 94,000 campsites, 27,400 miles of trails, and are home to 14 percent of all freshwater lake fishing in the U.S.*

USACE has been actively engaged in managing invasive species since the Rivers and Harbors Act of 1899. Despite these efforts, significant challenges remain in managing existing and new invasive species. Invasive species and their impacts will likely increase in the coming decades as the global movement of people and materials, and increased tourism and trade, will further disperse species around the world. The impacts of climate change and associated alterations in weather patterns, precipitation, and extreme weather events disrupts ecosystems, making them more susceptible to biological invasions.

Given these challenges, coordination within USACE as well as with federal, state, Tribal, territorial, local partners, and stakeholders is needed. This plan, in conjunction with USACE PgMP, provides guidance for applying a more consistent and comprehensive management approach across USACE and emphasizes collaborative conservation. In addition, USACE's experience indicates the need for a coordinated federal role in developing and maintaining invasive species geospatial distribution information making it available to others.

Understanding biological invasions and the consequences of world-wide species movements is a rapidly evolving science and management discipline. These efforts are critical to successfully managing established invasive species and prevent future invasions.

Plan Development, Implementation, and Reporting

This Plan was developed in response to the John D. Dingell, Jr. Conservation, Management, and Recreation Act [Act] of 2019. Section 7001 of the Act directs each Secretary to, "develop a strategic plan that will achieve, to the maximum extent practicable, a substantive annual net reduction of invasive species populations or infested acreage on land or water managed by the Secretary concerned." It also directs that the plan be developed in coordination with states, political subdivisions of states, in consultation with federally-recognized Tribes, and in accordance with the priorities of state governors. Furthermore, the Act directs that the plan takes into consideration the economic and ecological costs of action or inaction, as applicable.

Communication and consultation with other federal agencies, state and local governments, federally-recognized Tribes, and NGO's regarding invasive species and invasive species management is a prioritized and continuous effort at each level of the USACE organization. In particular, the USACE's ISLT consists of one representative from each Major Subordinate Command (MSC) Division Office, a representative from one of the District Offices within each MSC, HQUSACE proponents, and liaisons representing the research community from ERDC, Armed Forces Pest Management Board (AFPMB), and the USACE Interagency Working Group on Harmful Algal Blooms and Hypoxia Research and Control Amendments. ISLT members represent USACE on regional invasive species teams, Aquatic Species Nuisance Regional Panels, and/or work directly with their representatives on these teams in their MSC's geographic area. The objectives and actions developed in the ISLT's PgMP and incorporated in this Plan reflect the communication, coordination, and consultation with each

of our partnering entities in invasive species management.

Additionally, invasive species management plans and other planning documents at multiple geographic and organizational levels of USACE have been, and are continuing to be, developed with direct engagement of stakeholders. Early and thorough coordination and collaboration occurs with federal agencies, state, local, and Tribal governments, NGO's, stakeholders, partners, and the public. A review of these plans provided information that was beneficial in establishing the objectives and actions established in the PgMP and thereby this Plan.

As with the PgMP, this Plan emphasizes strengthening partnerships, promoting cross-boundary collaborative conservation, and advancing mutual priorities. It promotes coordination and collaboration of resources within USACE and between our partners and stakeholders. USACE work through this Plan will inform priorities for interagency coordination and planning by the National Invasive Species Council, the Aquatic Nuisance Species Task Force, and other interagency coordinating bodies. Likewise, the priorities of these interagency bodies will also inform USACE activities/missions.

USACE will track implementation of the Plan through the ISLT's current reporting metrics while selectively adding new metrics, in coordination with its partners and stakeholders (Appendix A) and in coordination with USACE leadership. Implementation of priority activities in the Plan are subject to budgetary and statutory authorization constraints and assumes only the set of federal legal authorities in place as of its writing (Appendix B).

Invasive Species Management Mission and Vision

Mission

To manage resources and partner with others to cost-effectively protect the Nation's economy, environment, public health, infrastructure, natural resources, and cultural heritage from the harmful impacts of invasive species for the benefit of current and future generations.

Vision

USACE's vision is to integrate the goals and objectives of the Invasive Species Policy into all Civil Works projects and programs to prevent or reduce the establishment of invasive and non-native species. USACE will work to support the following directions from the John D. Dingell, Jr. Conservation, Management, and Recreation Act (Public Law 116-9) through USACE Invasive Policy and the ISLT PgMP:

- Prevent invasive species from entering the United States;
- Collaborate with partners in development of early detection and rapid response capabilities to prevent introduced invasive species from becoming established;
- Manage established invasive species to limit their spread and reduce negative impacts;
- Support and use scientific and technological innovation that make the

management of invasive species more feasible;

- Reduce and prevent USACE-managed lands and waters from becoming sources of invasive species that damage the lands, waters, and resources of neighboring lands and waters;

- Share information and raise awareness to mobilize action to address invasive species;

- Manage lands and waters so they are resistant to invasive species infestations and are resilient to disturbance;

- Integrate the lessons learned from the work our Districts and support entities (e.g., ERDC) are performing regarding invasive species at the regional and national levels to promote effectiveness and efficiency.

- Engage with partners to address mutual invasive species priorities, including those identified by state, Tribal, territorial, and local governments and other federal agencies; and

- Incorporate cost-effective measures in all actions USACE undertakes to achieve its invasive species management mission.

Specific species efforts and methodologies will vary regionally based on the current and emerging priorities and needs of Divisions and Districts, as well as those of partners and stakeholders.

Goals and Objectives

The goals, objectives, and strategies of this Plan, are the same as those identified in the ISLT's PgMP and are intended to guide USACE efforts going forward. They reflect both core activities that are in progress as well as emerging priorities. The specific strategies (actions) for each goal and objective are provided in Appendix A.

Goal 1: Prevention. Prevention is the first and best line of defense against invasive species. Keeping invasive species out of an area avoids their adverse impacts as well as the costs to manage them. Once invasions occur, greater commitments of money, time, and other resources are required to reduce the harm caused. For some invasive species, there are no, or very few, tools available for their control once their populations are established. Therefore, prevention is the most cost-effective and, in some cases, the only available approach.

- ***Objective 1:*** *Identify pathways by which invasive species could potentially invade USACE and military lands as requested.*

- ***Objective 2:*** *Take steps to block pathways that are recognized as significant sources for the unintentional introduction of invasive species.*

- ***Objective 3:*** *Implement a process for identifying high priority invasive species that are likely to be introduced unintentionally.*

- ***Objective 4:*** *Increase the use of prevention practices to inhibit the secondary spread*

of invasive species within the United States and reduce long-term economic impacts.

- ***Objective 5:*** *Develop exclusion and sanitation methods for preventing spread of invasive species in all USACE projects and programs.*

Goal 2: Early Detection and Rapid Response. The next most effective strategy to prevention efforts, is detecting invasions and halting the establishment of additional invasive species through the development and capacity to identify, report, and effectively respond to newly discovered/localized invasive species. National coordination and communication among federal and non-federal entities increases the overall effectiveness of these efforts for invasive species management.

- ***Objective 1:*** *Take steps to improve detection and identification of introduced invasive species and implement management actions to track invasive species data.*

- ***Objective 2:*** *Develop a program for coordinating rapid response to incipient invasion on USACE projects.*

- ***Objective 3:*** *Leverage environmental compliance and pre-planning to increase the speed of rapid response activities while ensuring adequate coverage though NEPA and other environmental laws and regulations.*

Goal 3: Control, Eradication and Restoration Management. Control and wherever possible eradicate established invasive species populations and promote ecosystem restoration. Efforts to contain and reduce the spread and populations of established invasive species to minimize their harmful impacts should be planned using decisive actions and goals that employs an IPM program and best management practices. Restoring native species and habitat conditions and rehabilitating high value ecosystems and key ecological processes that have been impacted by invasive species to meet desired future conditions should be foremost.

- ***Objective 1:*** *Establish performance measures to determine the efficacy of prevention and control methods and adapt and modify plans as necessary.*

- ***Objective 2:*** *Develop and issue a protocol for ranking priority of invasive species control projects at local, regional, and ecosystem-based levels.*

- ***Objective 3:*** *Develop and implement control measures for invasive species in accordance with budget appropriations.*

Goal 4: Coordination and Cooperation. Work strategically to use all USACE scientific, management, and partnership resources in unison to manage invasive species. Enhance the coordination and effectiveness of federal programs to better leverage resources and fully engage state, Tribal, territorial, and local governments as well as international and private sector partners. Use the best available science to guide management decisions, policy development, and provide authoritative information to the public.

- ***Objective 1:*** *Increase engagement in partnerships at multiple scales and "do our share" to 1) advance mutual priorities, promote efficacy, and leverage cost efficiencies and 2) promote trust and respect between entities.*

- ***Objective 2:*** *Minimize risks associated with pathways through public outreach. Provide education, communication, and interpretive programs to the public to gain their trust and assistance in the prevention, detection, identification, and control of invasive species.*

Goal 5: Research and Development. Conduct appropriate research and development activities to ensure management programs are effective and science based. Sound scientific information is critical in guiding management activities, determining the magnitude of invasive species problems, planning future research and management programs, and improving intervention efforts. Outcomes of these assessments inform both regulatory and nonregulatory approaches.

- ***Objective 1:*** *Develop priorities for invasive species research needs and participate in the research field review.*

- ***Objective 2:*** *Leverage research and innovation to develop safe and cost-effective tools, technologies, and methodologies to prevent, control or eradicate invasive species and secondary spread; restore native species and ecosystems; and adapt to environmental changing conditions.*

Goal 6: Communication, Education, and Information Management. Provide education, through clear and transparent communication, and interpretive programs to the public, our partners and collaborators to gain their trust, assistance and support in the detection, identification, prevention and control of invasive species. Obtain buy-in on the development of invasive species plans as well as promoting partnerships and collaboration in their implementation.

- ***Objective 1:*** *Input invasive species data into the Natural Resources Management (NRM) tool and Geographic Information Systems, to the extent practical, and promote their use within the Environmental Community of Practice (ECoP).*

- ***Objective 2:*** *Develop a communication plan to share information about invasive species infestations on USACE projects.*

- ***Objective 3:*** *Partner, develop, and implement a national public awareness campaign.*

- ***Objective 4:*** *Partner, develop, and implement a model public awareness program on USACE projects that incorporates national, regional, state, Tribal, and local level invasive species public education activities.*

- ***Objective 5:*** *Increase information exchange across USACE and with others to share expertise on invasive species science and management and promote efficiency and cost-savings.*

- ***Objective 6:*** *Increase understanding about invasive species and motivate actions to address them.*

- ***Objective 7:*** *Minimize risks associated with pathways through public outreach. Provide education, communication, and interpretive programs to the public to gain*

their trust and assistance in the prevention, detection, identification, and control of invasive species.

- ***Objective 8:*** *Increase coordination of resources and investments across USACE and with others to support mutual priorities.*

Conclusion

USACE has an important role in managing invasive species. The coordinated approach outlined in this Plan will leverage resources more effectively and bolster programs, practices, and services necessary to reduce the negative impacts of invasive species. USACE is committed to working across the federal family and with states, Tribes, territories, local governments, and other partners to collectively manage invasive species to conserve the Nation's resources for the benefit of current and future generations.

Appendix A: USACE Invasive Species Leadership Team: Program Management Plan – Goals, Objectives, and Action Items

GOAL 1: PREVENTION Prevention is the first and best line of defense against invasive species. Keeping invasive species out of an area avoids their adverse impacts as well as the costs to manage them. Once invasions occur, greater commitments of money, time, and other resources are required to reduce the harm caused. For some invasive species, there are no, or very few, tools available for their control once their populations are established. Therefore, prevention is the most cost-effective and, in some cases, the only available approach.	
Objective 1: Identify pathways by which invasive species could potentially invade USACE and military lands as requested.	
Action:	
1.1.1	Identify pathways of invasion at USACE facilities.
1.1.2	Document critical pathways via oceans, rivers, air, and land that have led to historic invasive species invasions.
1.1.3	Create a library of existing risk assessments (National, Regional, Local) on USACE's NRM Gateway website.
1.1.4	Conduct regional risk assessments to determine priority species at USACE managed facilities and areas.
Objective 2: Take steps to block pathways that are recognized as significant sources for the unintentional introduction of invasive species.	
Action:	
1.2.1	Insert invasive species prevention language in applicable ERs and EPs.
1.2.2	Promote boat inspection stations and boat wash stations at all USACE lake projects.
1.2.3	Work with partners to support legislation to limit the importation of nonnative species.
1.2.4	Conduct research on barriers to invasive species.
1.2.5	Develop and implement prevention programs for identified priority invasive species and areas.
1.2.6	Develop - or adopt/promote existing - an alert system to warn projects of new species in their area.
Objective 3: Implement a process for identifying high priority invasive species that are likely to be introduced unintentionally.	
Action:	
1.3.1	Ensure USACE staff are aware of relevant authorities that can be used for prevention and encourage their implementation at all organizational levels.

1.3.2	Through the National Invasive Species Council, support other federal and state agencies as well as NGOs in their efforts to implement their own statutory authorities to reduce the risk of invasive species introductions through pathways not regulated by USACE.
Objective 4: Increase the use of prevention practices to inhibit the secondary spread of invasive species within the United States and reduce long-term economic impacts.	
Action:	
1.4.1	Develop and implement site specific prevention and containment practices for pathways that are likely to introduce or spread invasive species onto and from USACE-managed lands.
Objective 5: Develop exclusion and sanitation methods for preventing spread of invasive species in all USACE projects and programs.	
Action:	
1.5.1	Develop cleaning protocols for equipment and distribute within applicable USACE elements.
1.5.2	Educate USACE elements and Promote Hazard Analysis Critical Control Point (HACCP) Plans.
1.5.3	Develop standard contract language for sanitizing equipment and post on the NRM Gateway website.

GOAL 2: EARLY DETECTION AND RAPID RESPONSE The next most effective strategy to prevention efforts, is detecting invasions and halting the establishment of additional invasive species through the development and capacity to identify, report, and effectively respond to newly discovered/localized invasive species. National coordination and communication among federal and non-federal entities increases the overall effectiveness of these efforts for invasive species management.	
Objective 1: Take steps to improve detection and identification of introduced invasive species and implement management actions to track invasive species data.	
Action:	
2.1.1	Develop monitoring plans for all USACE managed projects and as requested, for military lands.
2.1.2	Train staff to develop invasive species monitoring plans for USACE project lands.
2.1.3	Promote and utilize the USGS Nonindigenous Aquatic Species Alert System at all USACE projects http://nas.er.usgs.gov/AlertSystem/default.aspx
2.1.4	Disseminate and promote the utilization of existing databases (EDDMapS University of Georgia, Plants data USDA, Nonindigenous Aquatic Species database – USGS).
Objective 2: Develop a program for coordinating rapid response to invasion on USACE projects.	
Action:	
2.2.1	Develop a comprehensive EDRR plan for USACE.

2.2.2	Inventory and post (or link) to existing Rapid Response Plans from partner NGOs, stakeholders, federal, state, and local agencies on the NRM Gateway website.
2.2.3	Develop and implement emergency authority and funding mechanism for rapid responses.
2.2.4	Explore the potential to work with or leverage other federal and state agency rapid response resources.
Objective 3: Leverage environmental compliance and planning to increase the speed of rapid response activities while ensuring adequate coverage.	
Action:	
2.3.1	Work with the Environmental Planning CoP to identify and implement opportunities for advanced coverage or tiered compliance documentation for rapid response actions.

GOAL 3: CONTROL, ERADICATION AND RESTORATION MANAGEMENT Control and wherever possible eradicate established invasive species populations and promote ecosystem restoration. Efforts to contain and reduce the spread and populations of established invasive species to minimize their harmful impacts should be planned using decisive actions and goals that employs an IPM program and best management practices. Restoring native species and habitat conditions and rehabilitating high value ecosystems and key ecological processes that have been impacted by invasive species to meet desired future conditions should be foremost.	
Objective 1: Establish performance measures to determine the efficacy of prevention and control methods and adapt and modify plans as necessary.	
Action:	
3.1.1	Develop a strategic plan for the implementation of the invasive species program to achieve, to the maximum extent practicable, a substantive annual net reduction of invasive species populations or infested acreage on land or water managed by USACE.
3.1.2	Update USACE ERs and EPs to reflect the Invasive Species Policy.
3.1.3	Provide strategic recommendations regarding invasive species policy to HQ.
3.1.4	Include invasive species monitoring, adaptive management, and mitigation plans in planning study documents and risk registers.
3.1.5	Consider invasive species in the NEPA process during project development.
3.1.6	Discuss invasive species as a part of the After Action Review (AAR) process.
3.1.7	Ensure certified habitat evaluation models support quantification and evaluation of habitat functions relative to invasive species.
Objective 2: Develop and issue a protocol for ranking priority of invasive species control projects at local, regional, and ecosystem-based levels.	
Action:	
3.2.1	Develop management checklist protocols that address prevention of re-infestations on project lands.

3.2.2	Develop and distribute standard invasive species management recommendations for Regulatory use when evaluating permits and Civil Works projects.
3.2.3	Compile information for a national report.
Objective 3: Develop and implement control measures for invasive species in accordance with budget appropriations.	
Action:	
3.3.1	Oversee the implementation of invasive species policy by MSC, Districts, and business lines.
3.3.2	Advocate for adequate O&M funding for existing invasive species programs at ERDC.
3.3.3	Identify invasive species control as part of annual project lands budgets.
3.3.4	Use OMBIL data fields so they reflect the information needed for accurate and usable reports.

GOAL 4: COORDINATION AND COOPERATION Work strategically to use all USACE scientific, management, and partnership resources in unison to manage invasive species. Enhance the coordination and effectiveness of federal programs to better leverage resources and fully engage state, Tribal, territorial, and local governments and international and private sector partners. Use the best available science to guide management decisions, policy development, and provide authoritative information to the public.	
Objective 1: Increase engagement in partnerships at multiple scales and “do our share” to: 1) advance mutual priorities, promote efficacy, and leverage cost efficiencies, and 2) promote trust and respect between entities.	
Action:	
4.1.1	Develop invasive species plans collaboratively with NGOs, state, Tribal, and local governments.
4.1.2	Coordinate with the National Invasive Species Council on development and implementation of the National Invasive Species Management Plans.
4.1.3	Leverage existing interagency bodies, partnerships, and networks and establish new collaborative efforts, as needed and appropriate, to manage invasive species.
4.1.4	Develop and implement interjurisdictional management plans, in collaboration with others, that advance mutual priorities.
4.1.5	Use Memoranda of Understanding, cooperative agreements, or other instruments, as appropriate, to strengthen collaboration to advance efficient management activities.
4.1.6	Incentivize partnerships that work across jurisdictions to address mutual priorities.
4.1.7	Collaborate with partners to identify mechanisms to reduce interstate movement of invasive species.
4.1.8	Leverage USACE environmental and scientific leadership to bolster coordination across USACE and with partners to address regional and national prevention priorities.

4.1.9	Look for opportunities to partner in developing and distributing key messages.
4.1.10	Promote community-based partnerships that coordinate actions and leverage resources to achieve regional goals.
Objective 2: Minimize risks associated with pathways through public outreach. Provide education, communication, and interpretive programs to the public to gain their trust and assistance in the prevention, detection, identification, and control of invasive species.	
Action:	
4.2.1	Maintain and update the external and internal USACE invasive species web pages.
4.2.2	Publish scientific findings in ERDC Technical Reports and journals.
4.2.3	Publish articles on Invasive Species Management actions in District newsletters.
4.2.4	Embed invasive species management in existing USACE training (PROSPECT).
4.2.5	Develop interpretive materials for field use.

GOAL 5: Research and Development Conduct appropriate research and development activities to ensure management programs are effective and science based. Sound scientific information is critical in guiding management activities, determining the magnitude of invasive species problems, planning future research and management programs, and improving intervention efforts. Outcomes of these assessments inform both regulatory and nonregulatory approaches.	
Objective 1: Develop priorities for invasive species research needs and participate in the research field review.	
Action:	
5.1.1	Assemble or update research needs list at each ISLT meeting.
5.1.2	Engage and employ SMEs that can be used for research field review.
5.1.3	Develop appropriate monitoring protocols.
5.1.4	Identify innovative removal and eradication techniques.
5.1.5	Develop response and enhancement techniques for ensuring that native species can compete and thrive with restoration and management actions.
5.1.6	Assist ERDC with technology transfer and supplement their efforts as appropriate.
Objective 2: Leverage research and innovation to develop safe and cost-effective tools, technologies, and methodologies to prevent, control or eradicate invasive species and secondary spread, restore native species and ecosystems, and adapt to environmental changing conditions.	
Action:	
5.2.1	Enhance decision-support tools to conduct risk analyses that identify high-risk species and high-risk pathways that are likely to negatively impact USACE- managed resources.

5.2.2	Leverage USACE expertise and external partners to increase efficacy of tools, designs, or practices to prevent the introduction and spread of invasive species.
5.2.3	Develop and promote new tools and technologies to control or eradicate invasive species and to restore native species and ecosystems.
5.2.4	Use tools to cultivate awareness, understanding, and support for the development and implementation of new technologies.
5.2.5	Collaborate across USACE and with partners to satisfy regulatory requirements for application of new tools and technologies.
5.2.6	Develop and promote decision-support tools and best practices to aid managers in planning for and responding to climate and other environmental change, including extreme weather events, which may increase the risk of invasive species introductions.
5.2.7	Develop and use predictive modelling and other tools to identify high-risk species and pathways of introduction into the United States.
5.2.8	Conduct research on barriers to invasive species.

GOAL 6: Communication, Education, and Information Management Provide education, through clear and transparent communication, and interpretive programs to the public, our partners and collaborators to gain their trust, assistance and support in the detection, identification, prevention and control of invasive species. Obtain buy-in on the development of invasive species plans as well as promoting partnerships and collaboration in their implementation.	
Objective 1: Input invasive species data into the NRM tool and Geographic Information Systems, to the extent practical, and promote their use within the ECoP.	
Action:	
6.1.1	Collect and input invasive species data from project lands managers.
6.1.2	Compile information for a national report.
6.1.3	Provide EGIS protocols for standardized data entry.
6.1.4	Determine which National database USACE should use - EDDMapS, Plants data base, NAS dbase, or other.
Objective 2: Develop a communication plan to share information about invasive species infestations on USACE projects (NRM Gateway website).	
Action:	
6.2.1	Offer and expand, as needed, invasive species training opportunities.
Objective 3: Partner, develop, and implement a National public awareness campaign.	
Action:	
6.3.1	Identify key stakeholders and develop strategies for engaging them on the invasive species policy.
6.3.2	Develop invasive species training programs for USACE employees.

6.3.3	Identify ongoing outreach activities currently being undertaken by the invasive species committees, task forces, and teams within each MCS and utilize their programs.
6.3.4	Develop outreach tools to provide to USACE Natural Resource Specialists in order to educate stakeholders at USACE-managed facilities.
6.3.5	Look at effective campaigns that have been successful and pattern the outreach messages after these with effective messaging.
Objective 4: Partner, develop, and implement a model public awareness program on USACE projects that incorporates national, regional, state, and local level invasive species public education activities.	
Action:	
6.4.1	Draft a guidance letter for the invasive species policy.
6.4.2	Participate in policy awareness activities through presentations, posters & booths.
6.4.3	Develop, distribute, and tabulate a questionnaire on policy awareness.
6.4.4	Conduct training on such policy including workshops and presentations.
6.4.5	Oversee the implementation of invasive species policy by MSC, Districts, and business lines.
6.4.6	Provide strategic recommendations regarding invasive species policy to HQ.
6.4.7	Modify regulations to include invasive species policy including Title 36 and business lines.
6.4.8	Inform visitors to USACE-managed lands and waters of pertinent invasive species laws and regulations and cooperate closely with appropriate federal and non-federal law enforcement personnel to ensure compliance.
Objective 5: Increase information exchange across USACE and with others to share expertise on invasive species science and management and promote efficiency and cost-savings.	
Action:	
6.5.1	Use and enhance current mechanisms for coordination, communication, and reporting, including leveraging information technology for elements such as geospatial mapping and authoritative databases to expedite information-sharing.
6.5.2	Share a nationwide network of USACE SMEs that could provide training or technical assistance on invasive species management activities.
6.5.3	Increase engagement with Tribes and indigenous communities to understand how culture, subsistence, and traditional ecological knowledge can be incorporated into management goals and activities.
Objective 6: Increase understanding about invasive species and motivate actions to address them.	
Action:	
6.6.1	Leverage national invasive species education and outreach campaigns and websites to educate the public and provide informational resources for managers.
6.6.2	Leverage USACE capabilities to inform target audiences about invasive species, including information on distribution, impacts, and management solutions.

6.6.3	Promote coordination among state, Tribal, territorial, and federal invasive species and communication experts to ensure the public receives accurate and actionable messaging about invasive species.
Objective 7: Minimize risks associated with pathways through public outreach. Provide education, communication, and interpretive programs to the public to gain their trust and assistance in the prevention, detection, identification, and control of invasive species.	
Action:	
6.7.1	Maintain and update USACE invasive species web pages.
6.7.2	Publish scientific findings in ERDC Technical Reports and journals.
6.7.3	Publish articles on Invasive Species Management actions in District and HQUSACE newsletters and electronic media.
6.7.4	Embed invasive species management in existing USACE training (PROSPECT)
6.7.5	Develop interpretive materials for field use
Objective 8: Increase coordination of resources and investments across USACE and with others to support mutual priorities.	
Action:	
6.8.1	Improve reporting and analysis of USACE invasive species investments and other, related investments, particularly those allocated to high impact species.
6.8.2	Identify mutual priorities across USACE and with others and leverage investments and resources to address those priorities.
6.8.3	Develop and maintain database reporting costs and benefits of invasive species management to include savings in Operations expenses over time and in Endangered Species Act compensation under terms of Section 7 Biological Opinions.

Appendix B - Federal Laws, Regulations, and Administrative Polices Applicable to USACE Invasive Species Management

Rivers and Harbors Act of 1899 (Ch. 425, 30 Stat.), as amended – provided USACE's first authority to remove aquatic plants. Chapter 425 authorized the Removal of Aquatic Growths (RAG) Project in Florida, Alabama, Mississippi, Louisiana, and Texas. The Act authorized the construction and operation of vessels and log booms for the removal and containment of water hyacinths int eh waters of Florida and Louisiana.

The Lacey Act (18 U.S.C.§ 42; 16 U.S.C. §§ 3371-3378) – prohibits importation of wild vertebrates and other animals listed in the Act or declared by the Secretary of the Interior to be injurious to humans or agriculture, horticulture, forestry, wildlife, and wildlife resources except under certain circumstances and pursuant to regulations. The wildlife trafficking provision of 16 USC 3372 of the Lacey Act prohibits the import, export, transport, sale, receipt, acquisition, or purchase of any fish or wildlife that was taken, possessed, transported, or sold in violation of any law or regulation of any state, tribal, or foreign law; this includes invasive species laws.

Rivers and Harbors Act of 1958 (Pub. L. 85-500), as amended – establishes USACE's Aquatic Plant Control (APC) Program; a comprehensive program to provide for prevention, control, and progressive eradication of noxious aquatic plant growths and aquatic invasive species from navigable waters, tributary streams, connecting channels, and other allied waters. The APC Program combined interests of navigation, flood control, drainage, agriculture, fish and wildlife conservation, public health, and related purposes, including continued research for development of the most effective and economic control measures, to be administered by the Chief of Engineers, under the direction of the Secretary of the Army, in cooperation with other federal and state agencies.

Endangered Species Act (Pub. L. 93-205) – protects and recovers imperiled species and the ecosystems upon which they depend. Many listed species are listed in part due to the impact of invasive species on them.

Federal Noxious Weed Act (Pub. L. 93-629) - authorizes the Secretary "to cooperate with other federal and state agencies, and others in carrying out operations or measures to eradicate, suppress, control, prevent, or retard the spread of any noxious weed. Many noxious weeds are also considered invasive species.

Federal Insecticide, Fungicide and Rodenticide Act (Pub. L. No. 95-396) – establishes procedures for the registration, classification and regulation of all pesticides, some of which are used to control invasive species.

Nonindigenous Aquatic Nuisance Prevention and Control Act (Pub. L. 101-646) – assigns responsibilities to the U.S. Fish and Wildlife Service, the U.S. Coast Guard, the Environmental Protection Agency, the U.S. Army Corps of Engineers, and the National Oceanic and Atmospheric Administration to develop a program of prevention, monitoring, control, and study to prevent introduction of and to control the spread of introduced aquatic nuisance species and the brown tree snake, including membership on an Aquatic Nuisance Species Task Force.

National Invasive Species Act of 1996 (Pub. L. 104-332) – amends the Nonindigenous Aquatic Nuisance Prevention and Control Act to mandate regulations to prevent introduction and spread of aquatic nuisance species into Great Lakes through ballast water; authorizes funding for research on aquatic nuisance species prevention and control (Chesapeake Bay, Gulf of Mexico, Pacific Coast, Atlantic Coast, and San Francisco Bay-Delta Estuary); requires ballast water management program to demonstrate technologies and practices to prevent nonindigenous species from being introduced; modifies composition of the Aquatic Nuisance Species Task Force; and requires the Task Force to develop and implement a comprehensive program to control the brown tree snake in Guam.

Brown Tree Snake Control and Eradication Act 2004 (Pub. L. 108-384) – provides for the control and eradication of the invasive brown tree snake on the Island of Guam and the prevention of the introduction of the brown tree snake to other areas of the United States.

Noxious Weed Control and Eradication Act of 2004 (Pub. L. 108-412) – establishes a program to provide state assistance to eligible weed management entities to control or eradicate harmful, nonnative weeds on public and private lands.

Water Resources Reform and Development Act of 2014 (Pub. L. 113-121; Section 1039, Invasive Species) – amends the 1958 Rivers and Harbors Act to modify the agency's Aquatic Plant Control Program to include control of all Aquatic Invasive Species and established authority to cost-share watercraft inspection stations within the Columbia River Basin.

Harmful Algal Bloom and Hypoxia Research and Control Amendments Act of 2014 (Pub. L 113-124) – amends the Harmful Algal Blooms and Hypoxia Research and Control Act (HABHRCA) of 1998 to reauthorize and expand efforts for interagency coordination on harmful algal blooms in both freshwater and marine environments and adds the Centers for Disease Control and Prevention to the Inter-agency Task Force on HABHRCA. The law requires expedited coordination and sharing of information pertaining to harmful algal bloom (HAB) research in efforts to detect and management HABs.

Water Infrastructure Improvements for the Nation Act of 2016 (Pub. L. 114-322; Section 1178, Columbia River) – modifies the authorities of the Aquatic Plan Control Program's watercraft inspection station reimbursable cost-share program to include Rapid Response and the ability to reimburse for efforts outside of the Columbia River Basin that provide basin protection.

Harmful Algal Bloom and Hypoxia Research and Control Amendments Act of 2017 (Pub. L. 115-423, Section 9) - amended Harmful Algal Blooms and Hypoxia Research and Control Act (HABHRCA) of 1998 to reauthorize and expand efforts for interagency coordination on harmful algal blooms in both freshwater and marine environments and adds the Centers for Disease Control and Prevention to the Inter-agency Task Force on HABHRCA. The law requires expedited coordination and sharing of information pertaining to HAB research in efforts to detect and management HABs.

America's Water Infrastructure Act of 2018 (Pub. L. 115-270) - provides significant amendments to USACE authorities for invasive species-related programs. Of particular importance are Section 1108 - Aquatic Invasive Species Research, Section 1109 - Harmful Algal Bloom Technology Demonstration, and Section 1170 - Watercraft Inspection Stations.

Water Resources Development Act of 2020 (Pub. L. 116-260; Section 505, Invasive Species Mitigation and Reduction) – establishes authority for USACE to enter into reimbursable cost-share agreements within new river basins (Russian River Basin and the U.S.-Canada Border Region). Modified the location criteria for the placement of watercraft inspection stations to those with the highest likelihood of preventing the spread of aquatic invasive species into, or out of, waters of the U.S.

John D. Dingell, Jr. Conservation, Management, and Recreation Act, (Pub. L. 116-9) makes recommendations to agencies to conserve trust resources including recommendations regarding invasive species and requires agencies to develop a plan to manage and reduce invasive species on federal lands and reduce impacts to neighboring lands.

Administrative Policies

Executive Order 13112 – Invasive Species (February 3, 1999) **–** directs the establishment of the National Invasive Species Council and the National Invasive Species Management Plan.

Executive Order 13751 – Safeguarding the Nation from the Impacts of Invasive Species (December 8, 2016) – directs federal agencies to prevent the introduction of invasive species, provide for their control, and minimize the economic, plant, animal, ecological, and human health impacts caused by invasive species.