

National Priorities of the Invasive Species Advisory Committee, 2022-2024

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Introduction

Executive Order (E.O.) 13751, *Safeguarding the Nation from the Impacts of Invasive Species*, expanded the federal definition of invasive species in 2016 as follows: Invasive species means “a non-native organism whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health.” New research shows that biological invasions cost the United States up to \$26 billion per year (Fantle-Lepczyk et al. 2022, Diagne et al. 2021), a number which consists primarily of resource damages and loss to the agricultural sector and terrestrial habitats. This value was generated using reliable data for monetary costs only and is likely a severe underestimation. Economic assessments are just one of many ways to quantify the magnitude and diversity of harm caused by invasive species. Some invasive species cause or contribute to species extinctions or degrade irreplaceable ecological systems or ecosystem processes. Invasive species impact access to and use of culturally important species, harm that extends to communities, generational knowledge, practices, and ways of life. Invasive pests of crops destabilize food security, impoverishing people, cultures, and economies. Comprehending the impacts of invasive species beyond economic measures is challenging, yet crucial, as many losses are incalculable.

The Invasive Species Advisory Committee (ISAC) was first established in 1999 by E.O. 13112 and furthered by E.O. 13751 to provide information and advice for consideration by the National Invasive Species Council (NISC). Members

of the advisory committee represent diverse stakeholders and have a wide range of expertise to advise the NISC. The initial assignment for the ISAC 2022-2024 class members was for each to identify three national issues that they thought could benefit from NISC’s attention. Over 40 topics were collated and reviewed, and at the March 2023 ISAC meeting, a subcommittee was formed to draft this white paper. This white paper summarizes eight key priority issues of national significance, **1) Coordination and Leadership, 2) Supporting International Engagement to Prevent Entry into the United States and its Territories, 3) Early Detection and Rapid Response, 4) Domestic Prevention Programs, 5) Long-term Management, 6) Research, 7) Climate Change, and 8) Underserved Communities.** Herein, these priority issues are summarized and linked to relevant NISC agency priorities as identified by their strategic plans or websites. ISAC developed this paper concurrently with other input to NISC on climate change and underserved communities, which are also reflected in this paper.

RECOMMENDATION

Review the priority issues addressed in this paper for further consideration by NISC, NISC member agencies, and/or ISAC. Herein, ISAC recognizes that appropriate resources and funding are critical for advancing priorities.



1. COORDINATION AND LEADERSHIP

Leadership and coordination to address invasive species are critical to advancing strategies that protect the United States from the detrimental impacts of invasive species. This can be accomplished by supporting existing expertise, infrastructure, and projects that currently operate on local, tribal, state, territory, regional, national, as well as international levels. NISC leadership sets the tone and vision for federal efforts and should work with member departments and agencies to implement that vision.

Increase federal interagency communication coordinated by NISC

The overarching duty of the NISC is to provide the high-level vision and leadership necessary to sustain and expand federal, state, and tribal efforts to safeguard the interests of the United States by preventing, eradicating, and controlling invasive species, as well as restoring ecosystems and other assets impacted by invasive species. Seeking opportunities for NISC member agencies to interact with regular frequency would allow for greater continuity on invasive species issues across the member agencies. Further, greater coordination of agency efforts and reporting may be facilitated by continued support and maintenance of the [National Invasive Species Information Center website](#) by the USDA Agriculture Research Service's National Agricultural Library. This website is the primary portal to Federal agency information on invasive species and further improvement of its functionality should be explored.

The issues highlighted within *Coordination and Leadership* are of relevance to all of the NISC agencies; however, the following NISC agencies explicitly recognize their importance:

- Department of Homeland Security: Strengthen Preparedness and Resilience
- Department of Defense: Succeed through Teamwork
- U.S. Agency for International Development: Renew U.S. Leadership and Mobilize Coalitions to Address the Global Challenges that Have the Greatest Impact on Americans' Security and Well-being

Topic for consideration: Regular meetings of NISC and coordination of input into the National Invasive Species Information System.

Supporting Local, State, Regional, Tribal, and National Partnerships and Engagement

Coordination across the United States and its territories is needed to ensure that information can be shared efficiently, and duplication of effort is minimized. There are multiple coordination mechanisms and bodies that may serve as models to strengthen existing coordination, including state invasive species councils, National Plant Board, Aquatic Nuisance Species Task Force and its regional panels, Cooperative Invasive Species Management Areas, Partnerships for Regional Invasive Species Management, Regional Invasive Species and Climate Change Management Networks, and other statewide and regional collaborative groups.

Often the most effective partnerships are those that engage with industries historically responsible for introduction of invasive species, and with organizations responding to them. Existing and emerging cooperatives should be supported to continue their focus on invasive species and cultivate productive relationships among stakeholders. For example, across the United States and its territories, 15 state invasive species councils, and the Cooperative Extension Service at most Land Grant and Sea Grant universities, already focus on invasive species. Support for these existing or establishing interstate and territorial invasive species councils, intertribal and other coordinating bodies for national coordination across geographic boundaries will aid in the successful advancement of interjurisdictional efforts.

Finally, NISC should participate and provide leadership in North American efforts such as the North American Invasive Species Management Association, North American Plant Protection Organization, Trilateral Committee for Wildlife and Ecosystem Conservation and Management Commission on Environmental Cooperation, and similar efforts/organizations.

Topic for Consideration: Increased engagement with coordination mechanisms at local, state, tribal, territorial, regional, national, and international levels to support mutual interests.

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2. SUPPORTING INTERNATIONAL ENGAGEMENT TO PREVENT ENTRY INTO THE UNITED STATES AND ITS TERRITORIES

Prevention is the most cost-effective segment of the biosecurity continuum. International prevention strategies rest on collaboration with international trade partners. For example, the Department of Agriculture, Department of Homeland Security, and the U.S. Agency for International Development currently interact with overseas agricultural exporters and develop local prevention capacity. This effort has brought successes and should be supported especially in important trade partner countries. There are opportunities for other agencies to include international invasive species prevention in their portfolio and acknowledge the damage by invasive species as a significant economic externality.

Federal agencies collect a large amount of information relevant to invasive species prevention, risk assessments, offshore and at-port regulatory compliance and incidence, for internal use and not shared with state regulatory agency counterparts. State agencies also collect and hold their own regulatory information. These data would be immensely useful for inter-agency cooperation and to academic researchers, non-profits, and private entities seeking to better understand and reduce the threat of invasive species. Sharing interception data in particular could help states, industry partners, and researchers identify areas of risk to prioritize for monitoring and response, and agencies should make every effort to provide data that is publicly accessible. An improved process for sharing interception data must be developed so that information transparency becomes a tool for continuous improvement of invasive species prevention and management.

Topic for Consideration: Increased availability of interception and other data collected by federal and state agencies that can be used to analyze and increase the efficacy of efforts to prevent the introduction of invasive species into the United States.

Tools to strengthen prevention of entry into the United States and its Territories

A more comprehensive invasive species prevention framework in the United States is needed. The globalization of commodities and human activities, and factors associated with a changing climate bring biosecurity to the forefront as a method by which the United States may better protect, prepare, identify, and respond to invasive species. A pathway identification and analysis approach that considers emerging or migrating pest species, source regions, commodities, conveyances, and social factors may be the most viable option for our ability to predict invasive species considering the further complexities created by climate change. Expansion and support for state and territorial capacity for trade and travel inspections and data collection (such as the Agriculture Quarantine Inspection Monitoring Program) would provide benefits beyond risk assessments and profiling.

Topics for Consideration: Strengthened biosecurity of the United States, including the territories and Freely Associated States, against the introduction and spread of invasive species including:

- Identification of gaps in programs that may unintentionally allow some transmission of invasive species, and recommendations for both policy and operational improvements (for example, cut flower imports or private vessels are sources of pests that are controlled in most other pathways).
- Support for overseas cooperative trade biosecurity, policy coordination, pre-invasion research, and education programs for those industries or regions that have been high volume or disproportionate sources of invasive pests and diseases. Such international coordination should be understood as an investment in trade security and cost-effective development of prevention capacity.
- Support for a unified prohibited species database, including development and maintenance of an online database of federal and state-listed prohibited/restricted organisms. Support the participation of states in the process to ensure their reporting in return.
- Modernize and promote the development of lists of lower-risk pathways and a “safe list” of species, allowing regulatory focus on higher risk pathways.
- The sufficiency of staff, resources, and cross-jurisdictional collaboration for effective implementation of preventative tools, such as Injurious Wildlife listings, the Federal Noxious Weed List and other regulated pests and pathogens must be evaluated according to current trade volume and life stage identification complexity. This should include education, training for state and local professionals, risk assessments for species of concern, research on species of concern, importation enforcement, and empowering public-private partnerships with industry.
- A programmatic and infrastructure review and analysis by the U.S. Government Accountability Office of the multi-agency responsibilities and activities at ports of entry to the United States. The outcome of such an analysis would determine critical biosecurity gaps and resource needs.
- Development of a national biosecurity plan, which should include the tools listed above, plus the priorities below.

The issues highlighted within *International Engagement to Prevent Entry* are of highest relevance to the following NISC member agencies and their associated initiatives:

- Department of Homeland Security, Customs and Border Protection Services: Strengthen Preparedness and Resilience
- Department of the Interior
- U.S. Agency for International Development
- U.S. Department of Agriculture
- U.S. Department of State



3. EARLY DETECTION AND RAPID RESPONSE

Early Detection and Rapid Response (EDRR) is a coordinated set of actions to find and eradicate new and emerging invasive species in a specific location before they can spread and cause further harm. An emphasis on timely reactions and responses are critical to EDRR, and, when considering known, exotic and invasive pests, it is one of the most cost-effective and ecologically viable methods for controlling invasive species, particularly when prevention efforts fail (Blaalid et al. 2021). Early interventions are more likely to be successful, whereas later detections and subsequent interventions are more costly and less likely to succeed. EDRR efforts help protect native plant and animal biodiversity, improve water quality, safeguard agriculture and food production systems, reduce wildfire risk, maintain forest and rangeland health and productivity, and protect critical infrastructure for water supply (potable, agricultural, and industrial), transportation, communications, and energy.

EDRR efforts are undertaken across a range of various state and federal agencies. Due to successful outreach and education efforts, some domestic invasive species are often detected early enough to prevent establishment. Further, engaging people in observing, reporting, and assisting in invasive species monitoring improves the management of invasive species. Multiple key reports on invasive species for first detections in the United States were made by community members, including dreissenid mussel-contaminated moss balls, northern giant hornet (*Vespa mandarinia*), and Asian longhorned beetle (*Anoplophora glabripennis*). NISC agencies should continue to support coordinated community science efforts and first detector campaigns.

ISAC believes that EDRR efforts can be amplified with the coordination of funding priorities amongst agencies and stakeholders. Shared priorities will allow for the consolidation of smaller goals and resources to collectively undertake EDRR. A multi-agency, cross functional EDRR program, if established, would rectify this issue, and ensure a nimble complementary approach to EDRR for the United States.

Topics for Consideration: A nationally coordinated EDRR program that is sustainable for long-term implementation, including:

- Continued national leadership and coordination where federal agencies work in tandem with state programs and are inclusive of stakeholders.
- Determination of notification processes of new detections between federal and non-federal organizations that clearly communicate with all agencies and stakeholders in a timely fashion.
- Review of external, regulatory impacts and acquisition of local, state, or federal operational permits that impede response times or allow target invasive species movement to continue longer than necessary while EDRR tactics are on hold.

- Development of regional “invasive species response teams” where teams are trained in rapid response and invasive species management for multiple taxa, including Incident Command System trainings and table-top exercises. These teams would be available to assist with any new priority invasive species response.
- Full implementation of a pilot Rapid Response fund to address high priority invasive species projects to initiate rapid response activities for non-agricultural, non-injurious species and continue to support the development of EDRR methods/mechanisms for species that fall outside of agricultural priorities.
- Development and maintenance of a national list of vetted experts and contacts database, as well as the protocols for who to contact and the responsibilities of each party based on species groups.
- Development and utilization of consistent taxonomy that is required for data sharing. The [Integrated Taxonomic Information System](#) could be used as the basis for this but should be expanded to include all invasive species of concern.
- Development and utilization of unified reporting platforms including continued support of National Agricultural Pest Information System, National Plant Diagnostic Network and their National Data Repository, EDDMapS, U.S. Geological Survey Nonindigenous Aquatic Species Database, and iMapInvasives, as well as state databases.
- Continued development of automated data scanning, notification, and verification tools to utilize data in public platforms by leveraging emerging technologies such as machine learning.
- Development of publicly accessible recognition systems that use artificial intelligence to identify priority invasive species.
- Consideration of a robust bio-surveillance network which includes regional programs that deploy trained specialists to strategically monitor for new introductions/infestations.

The issues highlighted within *Early Detection and Rapid Response* are of highest relevance to the following NISC member agencies and their associated initiatives:

- Department of Homeland Security, Customs and Border Protection Services: Strengthen Preparedness and Resilience
- Department of the Interior
- Department of Transportation
- U.S. Department of Agriculture

4. DOMESTIC PREVENTION PROGRAMS

Science-based education campaigns that are focused on unique user groups and proven field standards provide consistent messaging across jurisdictions to achieve behavior change through recommended actions that slow the secondary (domestic) spread of invasive species. The following are existing successful regional or national pathway-based behavior change campaigns: Certified Weed Free Products, Don't Let it Loose, Don't Move Firewood, Habitattitude, Hungry Pests, PlayCleanGo, Stop Aquatic Hitchhikers, and Clean Drain Dry.

Additionally, data on the spatial occurrence of established invasive species is increasingly crowd-sourced, and harvested and interpreted by machine-learning applications. Agencies may consider involvement in, or support for, data science applications and policies that lead to the verification of available information and prevent unintended or undesired consequences (e.g., media attention to unverified or inaccurate reports.)

Topics for Consideration:

- Expanded integration and use of outreach campaigns for changing social behavior related to activities that locally introduce or domestically spread invasive species.
- The advantages and disadvantages of using Artificial Intelligence, machine learning, and other cutting edge information tools for conveying, gathering, and vetting information on invasive species.

5. LONG-TERM MANAGEMENT

The following tools have been used in invasive species management for decades, often with unparalleled success, and ISAC encourages agencies to explore options for greater support including development, refinement, and application. These tools also carry risk, and it is critical that the risks are recognized, and potential indirect effects, non-target effects, and unintended consequences be thoroughly considered and tested. Therefore, maintaining the robustness of approval processes and also dedicating adequate funding and staff implementation are recommended.

Biological Control

Biological control is one of the few available, cost-effective, long-term control tools for mitigating the impacts of certain types of invasive species that are considered “established.” It is also a tool that can be used to preemptively control emerging pests, aiding rapid response actions. It consists of selecting, testing, and introducing host-specific natural predators, parasites, or pathogens of invasive species. Even as modern techniques have

reduced the risk of non-target impacts, regulatory requirements have not been updated to reflect the new landscape of scientific knowledge. NISC member agencies could focus on collaboration to identify and where possible streamline regulatory requirements for biological control research without compromising standards of research, implementation, and monitoring. Further, funding for better coordinated local, regional, and international programs and facilities could reduce impacts of many widespread invasive species in the United States.

Chemical Control

ISAC supports efforts among NISC member agencies to improve pesticide and herbicide approval and permitting. This includes a well-supported process that utilizes the best available science, enables rapid approval while maintaining protections for vulnerable species and non-target species. Most currently used pesticide chemistries have been developed for agriculture and have not been appropriately researched for use in natural ecosystems.

Containment Control

ISAC supports the further development and coordination from NISC member agencies of successful containment measures for established invasive species. For example, to prevent the spread of invasive species once established in a waterbody, containment measures could include stronger legal and social tools for better restricting or closing waterbodies to vessels. Measures would be based on invasive species biological characteristics such as dispersal and fecundity, as well as application of social science to increase user group compliance to such measures.

Topics for Consideration:

- Assessment of options for regulatory streamlining the review and approval of biological control agents that do not compromise standards of research, implementation, and monitoring.
- Assessment of options for regulatory improvements on the review and approval of chemical controls for invasive species that consider potential risks to human health and other non-target effects.
- Research on and development of improved containment measures and control technologies, including species dispersal and fecundity as well as social factor analysis.

The issues highlighted within *Long-term Management* impact all NISC member agencies operating domestically with greatest relevance to those listed below and their associated initiatives:

- Department of the Interior: America the Beautiful
- Department of Transportation
- Environmental Protection Agency: Enforce Environmental Laws and Ensure Compliance; Ensure Clean and Healthy Air for All Communities; Ensure Clean and Safe Water for All Communities; Ensure Safety of Chemicals for People and the Environment
- U.S. Department of Agriculture

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6. RESEARCH

Biological invasions have been considered a stream of “unknown unknowns;” many were imported through unexpected pathways and their ecologies defied old models. Fortunately, with recent increases in data availability and improved models, our ability to predict new pathways and pests, weeds, and pathogens and prevent their introduction or spread is increasing. This suggests that research investments can play a key role in national biosecurity.

From artificial intelligence-guided detection to social research on attitude change, many research areas promise beneficial technologies to address invasives. However, support for the exploration of new data sources and the testing and adoption of emerging technologies is lacking. If innovations in management are adopted, they often originate in other sectors. For example, most herbicide chemistries utilized by natural area resource managers were initially developed for agricultural applications, and as such they may not be suitable for applications in natural or urban areas.

It is not only applied research that agencies need to invest in, but also basic, fundamental research. The history of science shows that breakthrough solutions are rarely devised via incremental, short-term research. Unexpected discoveries routinely originate in curiosity-driven research. Management of invasive species can be locked in the use of outdated tools and may not take advantage of emerging knowledge on the species’ weaknesses. Federal agencies responsible for fundamental research can be tasked with investment in innovation related to invasive species. For example, a program supporting invasion biology could reside within the National Science Foundation or within the National Institute of Food and Agriculture. Other agencies which are regulatory but have research arms, such as the U.S. Department of Agriculture Agricultural Research Service, would benefit from a dedicated investment in fundamental research, not just incremental, short-term deliverables.

Agencies responding to invasive species should incorporate project monitoring and outcome assessment and support frontline states, regions, and underserved communities with data analysis services. Whether it is the agency collecting and managing the data, or funding external partners, an assessment plan needs to be a part of the strategy from the outset. It is

difficult to adapt and improve management strategies if the outcomes are not known. It is also difficult to communicate success to stakeholders, policy makers, and the media, which weakens the justification for further funding. However, it is important that reporting be results-oriented (e.g., whether the species was successfully controlled, if ecosystem and economic services were restored, modeling of introductions averted when prevention methods are implemented), not just measure activities (e.g., acreage treated, person hours expended).

Topics for Consideration:

- Assessment and application of new technologies to address the introduction, spread, and impacts of invasive species, for example
 - efficacy of heat-treatment of solid wood packaging,
 - vessel hull cleaning technologies that capture and mitigate chemical and biological contaminants, and
 - breeding resistance in native trees species impacted by invasive pathogens and restoring their populations.
- Investment in fundamental research to underpin broader efforts to prevent and manage invasive species.
- Incorporation of project monitoring and outcome assessment into invasive species management actions in ways that engage non-federal partners and improve communication with stakeholders.

The issues highlighted within *Research* impact the following NISC agencies and their associated initiatives:

- Department of Commerce, National Oceanic and Atmospheric Administration: Promoting the Blue Economy
- Department of Health and Human Services: Restore Trust and Accelerate Advancements in Science and Research for All
- Department of the Interior: America the Beautiful
- National Aeronautics and Space Administration: Expand Human Knowledge through New Scientific Discoveries
- U.S. Department of Agriculture, Agricultural Research Service and National Institute of Food and Agriculture

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7. CLIMATE CHANGE

Invasive species are a significant threat to climate preparedness and resilience. Invasive species impacts fundamentally alter natural and built systems, reducing the resilience needed to deliver climate change solutions. Failures to systematically integrate invasive species considerations into federal priorities and paradigms will slow or even prevent meeting climate adaptation goals. To achieve transformative adaptation to climate change, benefiting all sectors and communities, the nation must actively integrate invasive species management into climate action planning, funding, and implementation.

The ISAC provides specific recommendations on climate change in a separate 2023 white paper, *Invasive Species Threaten the Success of Climate Change Adaptation Efforts*. The inclusion of climate change here is intended to emphasize the unanimous agreement among ISAC members as to the urgency this issue represents to address invasive species nationally.

Topics for Consideration: See 2023 ISAC paper on Invasive Species Threaten the Success of Climate Change Adaptation Efforts.

The issues highlighted on climate change impact all the NISC member agencies.



8. UNDERSERVED COMMUNITIES

Invasive species can have negative economic, agricultural, ecologic, public health, social, and cultural impacts, and disadvantaged and underserved communities are directly or indirectly affected by those impacts. Most of the documented examples focus on economic, agricultural, ecological, and public health impacts and costs, yet invasive species can also negatively affect community wellness, cultural and indigenous practices, and social traditions, effects which are notoriously difficult to quantify and/or document. In addition, there are clear, synergistic effects between invasive species and climate change that are already occurring and that will likely be compounded in the coming years, with implications and solutions that should be considered and addressed in tandem. In most cases, the negative effects of these two change-drivers will likely be compounded for underserved communities, even if infestations occur outside of the geographies of those communities.

Invasive species management is inherently planned and conducted by communities on the frontlines, with or without dedicated funding structures, who must coordinate EDRR initiatives, research programs, and climate change mitigation strategies. The Federal Government has made great strides in working with and in support of local, regional, tribal, and national climate mitigation and resilience strategies, and the same level of effort and engagement is desperately needed for invasive species issues.

A series of Executive Orders, the Justice 40 Initiative, and bill language in the Bipartisan Infrastructure Act and the Inflation Reduction Act have called on each federal agency to identify how they will identify and equitably support the underserved communities that they serve. To aid in identifying underserved communities, the White House Council on Environmental Quality constructed a publicly available website, the Climate and Economic Justice Screening Tool, that uses more than 30 datasets to map communities experiencing burdens in any of eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. However, invasive species datasets are largely absent from the screening tool and it appears

that data collection on a variety of invasive species has not been prioritized for collection or integration. Further, the interactions between invasive species and climate change, the implications of these synergistic impacts, the clarity of their dual impacts on underserved communities, and recommendations to meet these needs are the subject of a separate 2023 ISAC white paper, *Underserved Communities and Invasive Species*.

The inclusion of underserved communities here is intended to emphasize unanimous agreement among ISAC members as to the critical importance of this issue when addressing invasive species nationally.

Topic for Consideration: See 2023 ISAC paper on Underserved Communities and Invasive Species.

The issues highlighted on *Underserved Communities* impact the following NISC agencies and their associated initiatives:

- Department of Commerce, National Oceanic and Atmospheric Administration: Equitable Delivery of Services to Underserved Communities
- Department of the Interior: Strengthening Indian Country
- Department of Transportation: Equity
- Environmental Protection Agency: Take Decisive Action to Advance Environmental Justice and Civil Rights
- U.S. Department of Agriculture: Advancing Racial Justice, Equity, Opportunity, and Rural Prosperity
- U.S. Department of State: Climate and Environment; Science, Technology, and Innovation
- White House Council on Environmental Quality: Climate Justice and Economic Screening Tool

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by the full ISAC, which also included as Voting Members: Laura Brewington, Arizona State University, East-West Center; Slade Franklin, Wyoming Department of Agriculture (Chair); Leigh Greenwood, The Nature Conservancy (chair); Jack Hicks, Choctaw Nation of Oklahoma; David Pegos, California Department of Food and Agriculture; LeRoy Rodgers, South Florida Water Management District; Lizbeth Seebacher, Pacific Northwest Invasive Plant Council, University of Washington; and Paul Zajicek, National Aquaculture Association; and as Ex Officio Members: Mitzi Reed, Native American Fish and Wildlife Society; and William Simshauser, National Association of Conservation Districts.

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