

# ISAC RECOMMENDATIONS 2009–2018

## *Biofuels: Cultivating Energy, not Invasive Species (2009)*

To minimize the risk of biofuel crop escape into the surrounding environment, the U. S. government needs to employ and promote ecological studies and scientific models that characterize the invasion risk of each biofuel species or cultivar (as appropriate) within a target region and identify ecosystems most susceptible to invasion. Information generated from biofuel crop ecological studies, risk analyses, bioeconomic and climate match modeling, and other methods can guide the government's risk mitigation plans. Depending on their authorities, Federal agencies can take strategic steps at appropriate points within research and development, crop production, harvest and transportation, conversion/refinery practices, and/or regulatory action to minimize the risk of biofuel crops becoming invasive. ISAC recommends that the Federal government apply the following recommendations to its own biofuels programs, as well as use them as a basis for standards of operation when engaging with the private sector and other partners.

### 1. *Review/Strengthen Existing Authorities*

Identify Federal authorities relevant to biofuels. Determine their likely influence on biofuel invasiveness (i.e., prevention or facilitation). Identify gaps and inconsistencies in authorities within and among Federal Departments or Agencies. As appropriate, develop policies and programs to minimize invasion risk.

### 2. *Reduce Escape Risks*

In order to determine potential biofuel benefits and risks, the invasive potential of each candidate biofuel crop needs to be evaluated in the context of each region proposed for its production. Use/promote species (including unique genotypes) that are not currently invasive and are unlikely to become invasive in the target region. Choose species or cultivars with a low potential for escape, establishment and negative impact. Where appropriate, implement mitigation strategies and plans to minimize escape and other risks.

### 3. *Determine the Most Appropriate Areas for Cultivation*

Ideally, biofuel crops should be propagated in containable systems (e.g., terrestrial or aquatic sites constructed specifically to cultivate biofuel crops) and be unable to survive outside of cultivation. Use research findings to identify the most appropriate sites (e.g., unlikely to impact sensitive habitat or create disturbances that will foster invasion) for cultivation of biofuel crops within landscapes. Support for biofuel research and demonstration projects will require site selection that minimizes the potential escape of plant species or cultivars to sensitive areas and the loss of wildlife habitat.

4. *Identify Plant Traits that Contribute to or Avoid Invasiveness*

Incorporate desirable traits (e.g., sterility or reduced seed production, inability to regenerate by stem fragments) into biofuel varieties to minimize their potential for invasiveness. Use information from plant research, agronomic models, and risk analyses to guide breeding, genetic engineering, and variety selection programs.

5. *Prevent Dispersal*

Develop and coordinate dispersal mitigation protocols prior to cultivation of biofuel plants in each region or ecosystem of consideration. Implement a comprehensive plan, appropriate to the specific crop, throughout the cultivation period. Examples of dispersal mitigation measures include the use of sterile cultivars, species not likely to genetically mix with other plants (different species or cultivars), harvesting prior to seed maturity, cleaning equipment, and minimizing propagule dispersal throughout the biofuel production cycle.

6. *Establish Eradication Protocols for Rotational Systems or Abandoned Populations*

Proactively develop multiple year eradication protocols to plan for the rapid removal of biofuel crops if they disperse into surrounding areas or become abandoned or unwanted populations (e.g., those which persist beyond desired crop rotation period).

7. *Develop and Implement Early Detection and Rapid Response (EDRR) Plans and Rapid Response Funding*

Develop EDRR plans that cover multiple years to eliminate or prevent establishment and spread of escaped invasive populations. A flexible funding source needs to be in place to support EDRR efforts.

8. *Minimize Harvest Disturbance*

Disturbed environments are especially prone to plant invasion. Minimize the soil disturbance resulting from biofuel harvest by rapidly replanting, using cover crops, or employing other methods that will prevent the potential for future invasion of non-native plants from the surrounding area into the harvested site.

9. *Engage Stakeholders*

Identify and employ cooperative networks (e.g., working groups and councils), communication forums, and consultation processes through which the Federal agencies can work with state agencies, tribes, the private sector, and other stakeholders to reduce the risk of biological invasion via the biofuels pathway.

## *Invasive Species and Public Investment in the Green Economy (2010)*

We call on the member Departments and Agencies of the National Invasive Species Council (NISC) and potential partners to:

1. Establish a national survey of invasive species, to be administered at the state-level. Support this program by substantially increasing Federal and state jobs at all technical levels to survey, identify, map, catalog, and model patterns/trends of invasive plants and animals. Include the existing state and regional invasive species committees/councils in the development and implementation process. Place priority on invasive species known or projected to have substantial impacts.
2. Supplement the Federal and state workforce by creating contract jobs in the private sector and offering grants to encourage business innovation and entrepreneurship (e.g., native plant and seed companies, ecosystem restoration, invasive species mapping and control services, and education/outreach programs).
3. In order to counter the dramatic decline in taxonomic capacity (i.e. the decrease in the number of people trained to identify specific species), provide grants to support research/education/training in taxonomy as well as job creation for taxonomists and parataxonomists (people who lack formal higher-level education, but who are trained to undertake species identification tasks).
4. Capitalize invasive species prevention and management needs (e.g., along roadways and on government lands) to create entry–mid level, high impact social development programs for youth and persons at risk (e.g., minimum security prison population). Establish Federal initiatives and/or offer grants to states and tribes.
5. Substantially increase Federal and state agency staffing in the areas of import/border inspection for agriculture and wildlife (Reaser and Waugh 2007), specimen identification, pest risk analysis (including pre-import screening), and invasive species program management (esp. public education/outreach, regulatory enforcement, and early detection/rapid response).
6. Establish/strengthen internships in invasive species identification, control/eradication, mapping, and monitoring for high school and college students. Support comparable Federal, state, tribal, and non-profit initiatives.
7. Develop stronger relationships between the Federal government and green industries potentially impacted by and/or managing invasive species. For example, work with the Invasive Species Advisory Committee (ISAC) and/or NISAW to organize an Invasive Species & Green Industries Summit.
8. Mandate that, prior to receiving Federal support: 1) renewable energy projects (esp. solar, wind, and biofuel) have adequate invasive species mitigation plans in place and 2) biofuel developers/producers demonstrate that non-native species are of low invasion risk (to the propagation site, area of potential dispersal, and along transport pathways) based on a

competent invasive species risk analysis.

## *Invasive Species and Climate Change (2010)*

We call on the member Departments and Agencies of the National Invasive Species Council and potential partners to:

1. Use the Global Change Research Act of 1990 (GCRA)<sup>48</sup> (PL 101-606) to aggregate information about the implications of a changing climate for invasive species spread so scientific data may be synthesized through existing authorities to inform policy-makers.
2. Streamline and focus agency programs to address invasive species climate interactions effectively and efficiently by establishing: 1) strategic plans that anticipate climate impacts on invasives, 2) forward-looking environmental compliance documents (e.g., NEPA, nationwide Environmental Impact Statements on invasives prevention, management, and restoration), and 3) focus awareness programs to anticipate and manage potential climate driven ecosystem changes.
3. Assess new climate driven invasion pathways and strengthen prevention programs to address invasives in ballast water, bio-fouling, interstate and international movement of materials and equipment (e.g., energy development, wildfire response, national defense), and screening of plant and animal imports taking account of climate impacts.
4. Support monitoring and adaptive management programs for invasive species at the landscape scale so that natural resource managers can identify new threats and respond quickly and appropriately to invasive species in changing climatic conditions.
5. Foster collaboration of existing networks to address the broad geographic nature and altered management of invasive species issues in a time of climate change. This will allow the national response to be coordinated, efficient, and capitalize on current capacities using a synergistic approach.
6. Increase research and development targeted at climate change and invasive species by supporting and expanding the USDA-ARS and U.S. Forest Service Climate Change Programs, as well as competitive research programs such as USDA's Agricultural and Food Research Initiative, the Environmental Protection Agency's Project Grants, National Science Foundation's Conservation and Biology program, and NOAA's Sea Grant program. Better understanding of the interaction of climate change and invasive species will result in more relevant prioritization and management on the ground. This includes recognizing the economic basis for invasive species management decisions and supporting work that integrates economic, ecological, and biological data providing policy and management support.

7. Use climate matching and ecological niche models to prioritize management of species that are most likely to cause the greatest harm in the future as a result of climate change.

This will require the Federal response to be coordinated, empowered, and appropriately funded.

### *Marine Bioinvasions and Climate Change (2011)*

Changes in the Earth's climate will likely continue, or even accelerate, over the next century. The economic, energy, social, and environmental impacts of invasions mediated by climate change may be profound. Our understanding of climate-driven species movements is only the tip of the iceberg: a great many more species are in motion. Predictions of how species and their habitats will respond to climate change will assist in making conservation decisions and managing our natural resources. Invasive species management will need to develop tools that include both invasion biology and climate change impacts. The following are recommendations to assist the development of such tools:

1. *Fund Research Programs*

Dedicated research programs across a diversity of regions (e.g. high, mid and low latitude sites) must be developed and adequately funded to detect species movements and likely interspecies interactions, in order to predict, and possibly prevent, the impact of invasion resulting from global climate change. These goals will best be accomplished via focused, mechanistic studies of invasive species to inform and predict how global climate change factors may impact native species, invasive species and interact with local stressors to affect invasion success.

2. *Increased Coordination*

Build partnerships among federal agencies and academic institutions to enhance capacity for detecting, responding to, and managing invasive species.

3. *Develop Rapid Response Plans*

Risk assessments are needed to prioritize species that deserve rapid responses. Strategies need to be developed for rapid response to these species. Further, an emergency fund for such efforts should also be established.

4. *Vector Management*

These scenarios of the "ghost of Christmas future" support the need to strikingly enhance vector management policies to prevent future invasions.

5. *Expand Educational and Outreach Programs*

It is imperative for the public to understand the implications of their actions, with or without the climate change message. Increased efforts should be initiated to translate the combined risks

from climate change and biological invasion to the public through real-world examples.

#### 6. *National Strategy for Monitoring*

Global climate change will result in the loss of species; yet without adequate monitoring the extent of this loss may not be known. For example, some species are endemic to Alaska; however, as a result of the large size and remoteness of the state, many species still are unknown.

Extensive monitoring across environments is needed to document the distribution of native species, identify range shifts, and detect invasions.

### *Validation of PCR-Based Assays and Laboratory Accreditation for Environmental Detection of Aquatic Invasive Species (2012)*

To encourage the development of a validation/accreditation system for AIS eDNA detection methodologies and laboratories, ISAC recommends that the NISC member Departments and Agencies and their partners consider adoption of the following recommendations.

1. Encourage and develop funding for the National Academy of Sciences to undertake a review of the reliability and effectiveness of PCR and other DNA-based applications for detecting AIS, focusing on establishment of appropriate validation processes and a framework and standards for this new and potentially invaluable tool in the early detection, eradication, prevention and control of AIS.
2. Establish and fund an ongoing independent performance testing program for laboratories utilizing DNA-based AIS detection methodologies such as that recently undertaken for evaluating laboratory performance in PCR detection of dreissenid mussel larvae (Frischer et al. 2011). Testing results should be made public so that managers may make informed decisions about the accuracy and reliability of a laboratory's performance when including an eDNA component in an AIS monitoring and early detection system.
3. Utilize lessons learned in establishing a laboratory performance testing system to fully develop a validation/accreditation program(s) for other invasive species eDNA methodologies and laboratories.

### *Invasive Species and E-Commerce (2012)*

We conclude that relevant federal agencies need to adjust existing regulations and enforcement practices to better mitigate the risks of trade and transport of invasive species through e-commerce. We offer the following recommendations to enhance our collective ability to engage in e-commerce without promoting the introduction or spread of invasive and potentially invasive species.

1. U.S. Fish and Wildlife Service (DOI) and Animal and Plant Health Inspection Service (USDA): Expedite listing processes for the national importation of injurious wildlife and other animals and noxious plants under the Lacey Act, the Plant Protection Act and the Animal Health Protection Act to better assess and address emerging invasive species threats, including those associated with e-commerce.
2. U.S. Fish and Wildlife Service (DOI): Incorporate all species-specific data submitted with Form 3-177 declarations for wildlife imports into the Law Enforcement Management Information System (LEMIS) or another accessible database.
3. Department of Homeland Security: Expand cooperation with the U.S. Postal Service to monitor and increase the capability to interdict international mail containing potentially invasive species and encourage the U.S. Postal Service to expedite requirements for advance electronic manifests associated with packages sent through international mail similar to current practice for international express mail and consignments.
4. Animal and Plant Health Inspection Service (USDA): Expand the scope of webcrawlers and related enforcement and monitoring activities used by the Smuggling Interdiction and Trade Compliance unit to include a broader array of invasive plants and plant pests, and enhance cooperation with
5. U.S. Fish and Wildlife Service (DOI) to address injurious wildlife.
6. Agricultural Research Service (USDA): Support development of and capacity for an Internet clearinghouse of federal and state-listed invasive species such as injurious wildlife, other animals and noxious weeds and of relevant regulations. Such a resource could be located at the National Agricultural Library's Invasive Species Information Center or another appropriate website and should include relevant agency contact information and a general reporting form that allows the public to report suspected violations.
7. U.S. Fish and Wildlife Service (DOI), Animal and Plant Health Inspection Service (USDA), National Oceanic and Atmospheric Administration (Department of Commerce [DOC]) and other relevant agencies: Provide a reference catalog or database of taxonomic resources that commercial interests can use to verify the taxonomic identity of organisms in trade.
8. Department of State and Office of the U.S. Trade Representative: Given that a significant portion of e-commerce entities is based outside the U.S., explore further cooperative and legal measures with foreign trading partners and relevant international institutions and other bodies to address the illegal import of invasive species into the U.S.
9. U.S. Fish and Wildlife Service (DOI), Animal and Plant Health Inspection Service (USDA), National Oceanic and Atmospheric Administration (DOC): Promote outreach to individuals and

businesses involved in the sale and exchange of species over the Internet to reduce intentional and unintentional sales or purchases of species listed as invasive in the U.S. or particular states.

### *Harvest Incentives: A Tool for Managing Aquatic Invasive Species (2014)*

Incentivized harvest is just one type of strategy used to manage and control invasive species. As dedicated funding for invasive species management is limited, resource managers should conduct a basic analysis of various options based on the life history of the target species and relevant socioeconomic factors to identify the most effective solution. The anticipated costs and risks of eradication should be weighed against long-term control and management that mitigates damage to an acceptable level. ISAC recommends the following be considered before implementing any harvest incentive program:

1. *Develop a management plan prior to undertaking a harvest incentive program. The plan should incorporate each of the following:*
  - a. Program goals and measures of success: The goal of the program and the method used to measure progress toward completion of the goal should be clearly identified.
  - b. Cost analysis: Once the decision has been made to reduce numbers of a specific invasive species, then costs (both monetary and welfare) of various potential control methods should be compared to identify the most cost-effective method.
  - c. Target species' biology: Managers should gather the best available information about the species.
  - d. Address humane treatment: Processes for humane treatment of target species, including euthanasia, should be established.
  - e. Human and wildlife health risks: Before managers encourage harvest, they should ensure that the target species and the associated harvest activities do not pose a significant risk to human or wildlife health through any aspect of the harvest program.
  - f. Potential ecological outcomes: Species interactions and the effect of removing or reducing the target species from the ecosystem should be evaluated prior to program start.
  - g. Risk of creating perverse incentives: Before initializing a program, identify the possible perverse incentives that may exist and include a plan to address them.
  
2. *Incorporate the following into the implementation of any harvest incentive program after the development of a management plan:*
  - a. Monitor for unintended consequences: Incentive programs and commercialized harvest of invasive species may create perverse incentives that do little to encourage long-term control or eradication. The program should be adequately supervised to prevent such occurrences.
  - b. Monitor for ecological disturbances: Project activities should be evaluated to reduce any potential disturbances to native populations or habitats.



- c. Incorporate adaptive management: Harvest may be successful early on when there are large, easily accessible populations, but other control measures may be needed as species density declines or if methods are unsuccessful.
- d. Encourage active enforcement to help mitigate perverse incentives by creating a disincentive to release the target species back into the control area or previously non-invaded areas.

### 3. *Incorporate Outreach*

- a. All outreach should be clear about the goals of the program to encourage public and stakeholder support throughout the development, implementation and completion the program.
- b. All outreach should help ensure that public does not grow to “desire” the targeted species. Success is more likely if the public understands the long-term harm the species can cause.
- c. When outreach is the primary objective of a harvest program be sure to carefully plan for maximum media exposure.

### *Background Paper on Systematics (2015)*

1. The USDA Agricultural Research Service (ARS) and the Smithsonian Institution conduct a survey and gap analysis of their Federal systematics collections, associated resources, and capabilities.
2. Survey results should be translated into an ARS 10 Year Systematics Action Plan and a Smithsonian Institution 10 Year Systematics Action Plan.
3. The Plans should be used by agency leaders to improve the systematics capabilities and resources of the agencies in all taxa to strengthen their ability to predict, prevent and manage invasive species.
4. The coordination of federal systematics efforts referenced in the Federal Interagency Committee for Invasive Terrestrial Animals and Pathogens (ITAP) *Situation Report* should be implemented.
5. The ITAP’s Systematics Subcommittee should assist the agencies in the Surveys recommended by the Situation Report.

### *Enhancing Effectiveness of Biological Control Programs of Invasive Species by Utilizing an Integrated Pest Management Approach (2015)*

Recognizing that biological control of widespread established invasive species can be the most cost-effective sustainable control mechanism, particularly as part of an integrated pest management (IPM) program, ISAC recommends:

1. Federal land-management agencies that oversee and conduct control operations utilizing biological control agents should do so in the context of an adaptive IPM strategy by partnering with federal, state, tribal, and local scientists and agencies of relevant pest-management disciplines to improve the effectiveness of biological control agents.
2. Federal land-management agencies should place increased emphasis on post-release monitoring to provide feedback and input to the decision-making process and enhance the

success and economic performance of biological control programs. To accomplish this, project funding must be assured for the full duration of the project, as well as the broader framework of the IPM approach.

3. Federal land-management agencies should include long-term stewardship and sustainability of desired ecosystem functions as the ultimate goal of all biological control programs. To this end, IPM programs may include ecological rehabilitation that will provide resilience to the ecosystem and help prevent re-invasion or replacement of one invasive species with another. This will require coordination among many local, state, tribal, and federal agencies, including those responsible for developing the biological control programs and those in charge of resource management.
4. Responsible federal agencies should give increased attention during selection of biological control agents for release to: 1) characterizing natural enemy candidates using morphological taxonomy or genetic markers at the onset of a program, 2) utilizing climatic matching models to accurately determine the most likely areas of successful establishment of candidate agents, 3) understanding biological control agent host-finding behavior and attack rates/efficacy, and 4) recognizing the most relevant habitat characteristics/associations of biological control agents in their place of origin to better predict rates of colonization, spread, and impact in the invaded range.
5. When biological control is used, federal land management agencies should consider utilizing the information made available from the federal regulatory agencies to more effectively implement biological control programs.

### *Addressing the Needs of Classical Biological Controls (2016)*

Recognizing that classical biological control plays an essential role in the suppression of invasive species in both natural and agricultural ecosystems, ISAC recommends that NISC agencies:

1. Develop transparent criteria to prioritize those invasive species for which classical biological control is the most cost-effective control option. For high priority invasive species provide sufficient resources to fully support the development, implementation and monitoring of classical biological control programs.
2. Identify and establish collaborations with local scientists in the country of origin to facilitate collection and shipment of new biological control agents in areas of limited accessibility (e.g., due to political instability).
3. Work with the International Organization for Biological Control of Noxious Animals and Plants Global Commission and the Convention on Biological Diversity (Nagoya Protocol) to exclude biological control agents from the list of organisms regulated by access and benefit sharing procedures.
4. Encourage APHIS and DHS to continue their efforts to streamline shipping and entry requirements for the importation of biological control agents approved for testing and/or quarantine rearing.
5. Institute a holistic ecological risk/benefit analysis in the regulatory decision-making process that assesses the threat, treatment options and benefits (economic, environmental, social, and cultural) of the release of biological control agents.
6. Establish a defined process and timeline for the approval or disapproval of requests to import and release a new imported biological control agents.
7. Improve communications regarding biological control decision-making among the tag, APHIS, and FWS and the classical biological control petitioner.
8. Review federal permitting requirements, such as the interstate movement of fully established

classical biological control agents and associated host material and the movement of not fully established biological control agents with the aim of improving the implementation of biological control.

### *Invasive Species Impacts on Infrastructure (2016)*

Invasive species impact American infrastructure and therefore affect the programs of federal agencies with infrastructure missions. However, the impact of invasive species on those agency missions is not well documented, and so those agencies are not in a position to systematically mitigate their impact to infrastructure. The ISAC therefore recommends:

1. NISC should work with relevant federal agencies to help them assess the physical and economic impacts of invasive species on the infrastructure projects that they manage directly or support through federal funding. Documentation should include baseline inventories, infrastructure risk assessment, long-term strategies, budgetary needs and measures of success.
2. Given that it is difficult for agencies to quantify the costs of invasive species infrastructure impacts because those costs are often included in overall maintenance and repair budgets, ISAC recommends that NISC work with relevant federal agencies to quantify the actual cost of invasive species management to federally owned or supported infrastructure.
3. For existing infrastructure, ISAC recommends to NISC that relevant federal agencies establish mechanisms for funding early detection and rapid response to minimize the impact and the economic burden of invasive species management.
4. In the case of new construction or major renovation to existing infrastructure, ISAC recommends that NISC help agencies adopt innovative construction practices that will prevent future impact from invasive species.

### *Strengthening Federal-State Coordination (2017)*

ISAC recommends that NISC establish and maintain a Federal-State Invasive Species Coordinating Committee to conduct high-level policy and planning functions to advance federal-state coordination as set forth in Executive Orders and the NISC Management Plan and to address the findings and conclusions of this Task Team. We further recommend that membership on this Coordinating Committee be restricted to representatives from government (federal, state, municipal, territorial, tribal, etc.) in order to avoid having to establish this group under the requirements of the Federal Advisory Committee Act (FACA).

ISAC further recommends that NISC adopt the following agreement:

#### **Federal-State Invasive Species Coordinating Committee**

1. Establishment: NISC shall establish a committee, to be known as the “Federal-State Invasive Species Coordinating Committee” (Coordinating Committee) to enhance coordination of policy activities of federal and state governments when taking action to prevent, eradicate, or control invasive species, address emerging federal-state invasive species issues, and to restore ecosystems and natural resources impacted by invasive species.
2. Composition: The Coordinating Committee shall be composed of governmental representatives from the following (one from each unless otherwise noted):
  - 2.1. Three representatives from NISC departments/agencies.
  - 2.2. NISC Secretariat.

- 2.3. Association of Fish and Wildlife Agencies.
- 2.4. National Association of State Foresters.
- 2.5. National Association of State Departments of Agriculture.
- 2.6. A member of the Invasive Species Advisory Committee who serves in state government.
- 2.7. Three representatives from State Invasive Species Councils, or equivalent, from geographically diverse regions of the United States.
- 2.8. The National Governors Association.
- 2.9. Such other persons as determined, from time to time, by the Executive Director of the NISC Secretariat.
3. Chairperson: The Executive Director of the NISC Secretariat shall secure (or designate) and maintain a full-time staff member to support federal-state coordination functions and to serve as chairperson of the Coordinating Committee.
4. Duties: The Coordinating Committee shall:
  - 4.1. Provide direction and coordination of selected actions of NISC departments and agencies in coordination with State agencies to effectively address the invasive species priorities set forth in Executive Orders 13112 and 13751, and in the NISC Management Plan.
  - 4.2. Address the findings and conclusions of the ISAC Task Team on Federal-State Coordination to the extent possible consistent with Executive Orders 13112 and 13751, and the NISC Management Plan, and as federal and state agency resources allow.
5. Meeting:
  - 5.1. The Coordinating Committee shall meet at least twice annually to review progress in addressing the aforementioned duties. More frequent meetings may be scheduled to address emerging or high-priority invasive species issues at the discretion of the chairperson, request of a majority of Committee members, or at the direction of the Secretary. All meetings shall be conducted electronically such that travel will not be required.
  - 5.2. The Chairperson or NISC Executive Director shall provide updates on Coordinating Committee activities and seek input from ISAC members at ISAC meetings.
6. Compensation
  - 6.1. Federal members: Members who are full-time officers or employees of the United States shall receive no additional pay, allowances, or benefits by reason of their service on the Coordinating Committee.
  - 6.2. State and other non-federal members: State and other non-federal members of the Coordinating Committee shall receive support from their employers in accordance with their institutional policies and provisions.

## *Enhancing Federal-Tribal Coordination of Invasive Species (2017)*

### Recommendation #1

NISC will notify potentially impacted indigenous peoples when it is considering the actions set forth in its management plans and relevant executive orders, and consult with these entities upon commitment of federal resources to these actions. A three-phase consultation with affected indigenous peoples is encouraged, including *exploratory consultation* (to determine if an impact of the federal action is likely), *pre-consultation* (to establish technical-level cooperation), and *formal consultation* (a government-to-government consultation including relevant agreements for cooperative management of invasive species and invasion pathways).

### Recommendation #2

NISC will provide grants to indigenous peoples to support the development of invasive species

plans, as well as the integration of the invasive species issue into broader natural and culture resource planning efforts, including those activities relevant to human health, safety, and livelihoods.<sup>2</sup> These plans are to include an assessment of the needs and opportunities for strengthening coordination and cooperation between specific federal agencies and indigenous peoples in their efforts to prevent, eradicate, and control invasive species.

#### Recommendation #3

NISC will direct the NISC Secretariat to establish a virtual toolkit (“portal”) for the dissemination of information on the linkages between invasive species and indigenous peoples, to include but not be limited to grants information, management plans, educational and outreach materials, case studies, and scientific publications.

#### Recommendation #4 (a & b)

NISC will support (a) the creation of an annual national conference on the linkages between invasive species and indigenous peoples, as well as (b) direct federal agencies to mainstream the inclusion of indigenous peoples in invasive species training courses, workshops, outreach campaigns, and other education-oriented activities.

#### Recommendation #5 (a & b)

NISC will (a) make training courses in invasive species prevention, eradication, and control available to indigenous peoples through grants and other types of support and, as feasible, (b) work with indigenous peoples to include traditional ecological knowledge in federal training course curricula.

#### Recommendation #6

NISC will create a Federal-Tribal Coordinator position within the NISC Secretariat to increase communication, coordination, and cooperation between federal agencies and indigenous peoples as a standard practice in the prevention, eradication, and control of invasive species across shared landscapes.

### *Advanced Biotechnology Tools for Invasive Species Management (2017)*

We recommend that relevant NISC members work together to:

1. Foster the development of decision support tools and updated guidance for federal activities related to advanced bio- technology applications and invasive species, including:
  - prioritization frameworks to identify optimal targets (species and sites) for the application of advanced biotechnologies, and assessments of available and potential biotechnologies and their suitability for specific taxa/species in specific environments or under specific conditions (including climatic changes);
  - updated guidance on confinement and containment protocols for laboratory and field testing and release;
  - standardized risk analysis frameworks addressing aspects of risk assessment, management and communications appropriate to the full R&D cycles (i.e., project conceptualization, problem formulation, laboratory testing, field trials, scaled environmental releases); and
  - evaluation of risk minimization and mitigation measures including physical, biogeographic, and temporal containment and application technologies.
2. Establish a multi-stakeholder technical advisory group focused on intentional environmental releases of advanced bio- technology applications. Modeled after the Technical Advisory Group

for Biological Control Agents of Weeds, the group would identify emerging technical, social and environmental issues with their use and to help facilitate communication across the research, conservation and regulatory communities.

3. Call for relevant federal agencies to undertake a periodic horizon-scanning exercise to identify anticipated developments in advanced biotechnologies and their applications to invasive species prevention, detection, eradication, and control and report their findings to NISC via its Secretariat. This would include identification of implications for social license, policy and regulatory reviews, and resources needed for stewardship.
4. Direct the development and publication of guidance/best practices for developers of advanced biotechnology applications to invasive species to facilitate regulatory reviews, including clarity on regulatory jurisdictions, information/data necessary for reviews, and processes to interface with other relevant agencies where necessary and appropriate. The FDA, EPA, and USDA, as well as the Departments of Defense and the Interior have critically important roles in this process.
5. Direct relevant agencies to develop and publish a process to assess the ethical, social and interjurisdictional (i.e., federal, state, tribal, territorial) dimensions of emerging advanced biotechnologies and their deployment. This could include best practices, public engagement, and securing social license.
6. Enable relevant federal research and development agencies to support research into new platform-providing advanced biotechnologies that can be applied widely to different invasive species and incentivize the development of novel approaches for invasive species management including the use of grand challenges as mechanisms to drive the development of new technologies.

### *Managed Relocation: Reducing Risk of Biological Invasion (2018)*

*Develop a clear national policy for managed relocation consistent with agency duties as set forth in E.O. 13751. This may be best accomplished through a Presidential Memorandum or CEQ-published NEPA guidance document that is further supported by agency-specific guidance.*

The actions taken in response to this recommendation should be standardized and streamlined among all federal agencies even though perhaps challenging at department and agency levels. Proposals for managed relocation are likely to vary substantially in goals, locations, species, relevant authorities, agency jurisdictions, and available management resources. Public resource managers might propose actions that range from translocating genotypes across portions of species ranges (e.g., tree seed zones) to transferring suites of species in an effort to migrate ecosystems. Similarly, the rationale for such actions may range from reducing extinction risk among endangered species to altering forest composition for timber production or adjusting the composition of zooxanthellae to increase resilience of coral to bleaching.

Good governance requires that the evidence presented by the proponent of managed relocation is evaluated by a qualified, neutral third-party. Therefore, any evaluation and approval actions made in accordance with national or agency-specific policies, or both, should be conducted through an external review process.

At a minimum, the national policy and any supporting policies should:

- A. *Limit the use of managed relocation to extra-ordinary circumstances;*
- B. *Delineate conditions that constitute legitimate exceptions to E.O. 13571 (e.g, imminent*

extinction of a keystone species), recognizing that the national need may supersede the caution imposed by the executive order;

- C. Develop a clear and consistent *definition of actions* and *definition of reasonable expected benefit* that, among other things, address the need for enacting this extreme management measure;
- D. Require a *standardized risk assessment* that evaluates the potential:
  - 1. degradation of recipient ecosystems caused by the introduced species ;
  - 2. losses of other native species or diminishment of valued ecosystem services;
  - 3. degradation of adjoining ecosystems caused by the introduced species expanding its distribution resulting in losses of other native species or diminishment of valued ecosystem services;
  - 4. degradation of the recipient ecosystem caused by associated pests or pathogens accidentally moved with the deliberately introduced species, resulting in unwanted disease or damage to resident native species;
  - 5. risk that moving individuals of a species further degrades the potential of that species to persist within its historic distribution; and
  - 6. risk that moving individuals of non-local genotypes drives undesirable evolutionary trajectories through mixing with local genotypes;
- E. Require a *monitoring and safeguard plan* that establishes protocols that evaluates each of the six risk factors (above) in addition to the success or failure of the action on the target species. The safeguard component should address containment, or elimination of the translocated species in the event that the prescribed monitoring demonstrated that risk factors were larger than originally estimated and that ecosystem damage exceeds the benefits gained through the translocation. The critical nature of this policy component means that funding must be established and dedicated to support post-release monitoring and enacting safeguard measures. The temporal delimitation for enacting monitoring and safeguarding practices should be context-specific and articulated clearly in the plan; and
- F. Identify measures to be taken if the guidelines are violated.

## ***Reducing the Risk of Invasive Pathogens to Wildlife Health in the United States (2018)***

ISAC recommends that NISC direct agencies, as appropriate, to:

### **Recommendation 1**

*Conduct a comprehensive audit of the statutory authority, regulations, legal mandate, and internal policies and priorities for each relevant NISC Agency to address and govern invasive pathogens that might harm wildlife.* This audit should include a real-world assessment of how much of each agency's respective authority is actually used and carried-out relative to invasive pathogens that 1) might be imported with shipments of wildlife and wildlife products or other shipments entering the United States, or 2) which might affect the health of native wildlife species, habitats or ecosystems. An assessment of areas in which traditional programmatic priorities might differ from full statutory authority needs to be included. NISC should then create a single cross-referenced index that can facilitate the rapid identification of which agency has the lead on a particular threat to wildlife health, what authority and mandate each has to respond to a particular threat, and what resources and expertise each can contribute.

Such a comprehensive review will allow NISC and its member agencies and entities to:

- a) Identify the existing gaps in coverage, protection, and response capability.

- b) Determine if gaps exist in statutory authority, budgetary capacity, or administrative discharge of existing authority, and develop strategies and tactics to resolve those gaps to reduce vulnerability and harm.
- c) Identify opportunities for current programs and practices to be more collaborative, effective, and efficient, including the generation of formal agreements amongst NISC members, and between federal agencies and state and local partners.

## **Recommendation 2**

*Increase coordination and collaboration among NISC member agencies:*

- a) Promote collaboration among NISC members, and between NISC agencies and relevant State, territorial, tribal, and local government entities, to address issues involving invasive pathogens and wildlife disease. This includes coordination of activities and authorities, and the sharing of expertise and resources, to assure that all potential threats and vulnerabilities are identified, assessed, and addressed.
- b) Fully integrate wildlife health into a “One Health” approach and establish adequate resources to implement it. Coordinate efforts aimed at threats of invasive pathogens that affect the health of humans, food security, wildlife, and the environment. And assure that all agencies and personnel are fully trained and aware of the complexity of the potential threats of invasive pathogens, and how best to prevent, manage or eliminate those threats, regardless of whether or not their respective agencies have primary responsibility for any specific threat. Implement a system and culture of cross-reporting for all relevant agencies.
- c) Promote uniform, compatible, and accessible databases related to wildlife health by all relevant federal and state agencies, in all regulated activities (*e.g.*, scientific research, scientific collection permits, wildlife rehabilitation, educational use and display, captive breeding, incidental take, etc.), and standard reporting at all levels in order to more easily consolidate information and effectively identify current and potential health issues in native wildlife, including the rapid identification of emerging wildlife disease threats (*e.g.*, transport of pathogens in infected animals and shipping containers).
- d) Facilitate efficient sharing of information related to invasive pathogens and wildlife disease among member agencies and entities, and between the federal government and states, tribes, and other wildlife and health agencies at the international, national, regional, or local level. This should be facilitated through standardized and automated data systems and resources and cross-reporting that can be readily accessed by inspectors, regulators, exporters, importers, scientists, or others charged with identifying and eliminating threats to wildlife or other interests posed by invasive species.

## **Recommendation 3**

*Develop and implement a rapid response strategy and specific tactics to identify, isolate, and eliminate invasive pathogens which enter the United States, before they become established or cause extensive harm to wildlife populations.*

- a) Create the capacity and facilities at ports of entry to detain and effectively isolate or quarantine shipments that might contain invasive pathogens that may harm native wildlife.
- b) Create and implement risk-based response strategies and tactics to proactively scan for and respond to potential threats before invasive pathogens arrive at United States ports or become established within the United States. This should include establishing the capacity to implement emergency inspection or certification procedures prior to allowing exports bound



for the United States to leave the country of origin, or to prioritize specific types of shipments, or shipments from targeted regions that arrive at United States borders. It should also include establishing the authority to designate prohibited species or cargoes on an emergency basis, and to rapidly establish and implement surveillance and response strategies for any threat to wildlife health, as appropriate. If the extent of a threat might exceed the rapid response capabilities of a single agency, or overwhelm the resources in a particular location, action thresholds and contingency plans should be developed that could use the full range of biosecurity threat responses available to the federal government.

- c) Establish port/border security procedures and protocols which are uniform across all agencies and all ports of entry, to facilitate coordination, sharing of facilities, equipment and personnel, and to optimize the effectiveness of government response strategies and tactics. NISC agencies should:
1. Execute appropriate agreements (MOUs) to share authority, responsibility, personnel and resources.
  2. Establish comprehensive training programs to assure that all inspection personnel are cross-trained to recognize and respond to the full spectrum of risks, institute interagency response teams, regardless of which agency has primary responsibility for surveillance and response, and provide site-specific training at each point of entry to identify, isolate, and contain risk or threats until they are appropriately resolved
  3. Identify an Incident Command System for various scenarios, with pre-incident agreement by relevant agencies, to avoid conflicts at the time deployed. Ensure required training, continuing education, and certification(s) have been obtained and maintained by potential future responders.

#### **Recommendation 4**

*Develop and deploy advanced technologies needed to facilitate identification and destruction of invasive pathogens that might harm native wildlife (e.g., molecular-based surveillance, thermal scans, eDNA, rapid screening, and other new and emerging technologies).*

- a) New technologies must be developed, evaluated, and validated before use in a regulatory environment.
- b) Methods of destruction of invasive pathogens without harming the animals or products imported should be developed and after proper training, deployed.
- c) Assure that these technologies are known, available, and fully used at all inspection facilities, and that personnel from all agencies are able to access them.

#### **Recommendation 5**

*Establish inter-agency public education programs to increase public awareness for preventing the introduction of invasive pathogens that might harm native wildlife.*

- a) Assure a multifaceted approach that uses traditional educational technologies, social media, and other methods
- b) Target educational campaigns toward specific activities, regions, and populations, as appropriate

#### **Recommendation 6**

*Re-establish regular and mandatory all-agency port meetings, trainings, and other effective strategies*

*to assure that all relevant agencies (federal, state and local), custom brokers, importers and other affected stakeholders are fully informed about priority wildlife health issues, in order to achieve full and effective compliance with regulations, procedures, and other processes. Emphasize how protecting wildlife protects public health, the environment, and agriculture.*

### **Recommendation 7**

*Identify, or create and deploy applied information tools, databases and reference resources for use by inspectors and other stakeholders to assure that the most current and comprehensive information related to invasive pathogens and wildlife health is available, and is being fully used.*

- a) Create applied information tools for invasive species of concern, using existing resources (e.g., World Organisation for Animal Health (OIE), APHIS, National Association of State Health Veterinarians, Wildlife Disease Association, National List of Reportable Animal Diseases, ProMed, wild-one) that can assist personnel in the field (e.g., biologists at deer check stations, wildlife veterinarians and rehabilitators, resource managers) identify and respond to invasion of invasive pathogens.
- b) Establish a listing of appropriate agencies or authorities for reporting discovery of invasive pathogens to, and a description of what to do to minimize the risks to native wildlife populations from discovered invasive pathogens.
- c) Identify, standardize, and integrate current on-line databases that have information on diseases of concern at state, national, and international levels.
- d) Promote implementation of an eDocs system for submitting Declaration for Importation or Exportation of Fish or Wildlife (3-177), health certifications, and permits to assist with the identification of wildlife health risks.

### **Recommendation 8**

*To facilitate the enhanced protection of national interests, in general, and the implementation of the recommendations that we present here:*

- a) Establish a rapid response fund that can be used for responding to outbreaks of disease that might affect non-agricultural interests (e.g., native wildlife and sport and commercial fisheries)
- b) Encourage federal agencies to facilitate inter-jurisdictional collaboration and coordination with and among the States.
- c) Increase federal government support for research to identify appropriate risk management actions that can be taken for pre-import certifications.
- d) Enhance current and future global disease surveillance technologies, through which threats to human health and agriculture are detected, to include disease threats to wildlife.

### **Recommendation 9**

*Evaluate economic costs and benefits of recommended pre-import, import, and post-import actions.*

- a) Based on this assessment, identify and prioritize those measure with can be implemented with existing resources
- b) Identify and prioritize measures that will require new or additional funds and quantify the potential return on these investments based upon the increased efficiencies and more effective discharge of statutory and other mandates.

## *ISAC Memo: Considerations for the 2019-2021 NISC Management Plan (2018)*

To strengthen the biosecurity of the United States, including its territories and possessions, against the introduction and spread of invasive species, ISAC recommends that NISC consider the following recommendations when developing the *2019–2021 NISC Management Plan*:

1. Meet regularly and provide coordinated leadership for the prevention, eradication, and control of invasive species across respective agencies, including via relevant authorities, capacities, programmatic priorities, and actions. This includes ensuring continued support for the NISC Secretariat and the Invasive Species Advisory Committee.
2. Enhance the effectiveness of federal response capacities by streamlining federal regulatory and administrative processes (e.g., National Environmental Policy Act; Endangered Species Act; Federal Insecticide, Fungicide, And Rodenticide Act). For example, create a centralized mechanism for sharing risk assessments among agencies and apply exemptions (categorical and programmatic) for pesticides, biocontrol, and emerging technologies.
3. Facilitate open access to and sharing of invasive species data to improve decision support capacities at all levels of government and in the private sector, including public and private universities and colleges.
4. Identify, apply, and participate in existing state and local cooperative agreements (e.g., cooperative weed management areas, cooperative invasive species management areas, coordinated resource management approaches, partnerships for regional invasive species management) to increase the capacity of government agencies to respond to local and regional invasive species issues.
5. Identify and expand use of Good Neighbor Authority and cooperative agreements with local, state, territorial, and tribal invasive species management agencies.
6. Establish a rapid-response funding mechanism, taking into consideration third party administrative options (e.g., the National Fish and Wildlife Foundation). The fund should have the flexibility to address first time introductions to the United States, as well as the eradication or containment of species already established in the country.
7. Strengthen coordination between federal agencies, states, territories, and federally-recognized tribes to prevent the introduction and spread of invasive species. This include by, for example, establishing a Federal-State-Tribal Invasive Species Coordinating Committee, designating a full-time staff member to serve as chairperson of the Coordinating Committee, and enhancing on-the-ground implementation of federal-state-tribal invasive species efforts.
8. Support regional and international coordination efforts of federal agencies, states, territories and federally-recognized tribes to prevent the introduction and spread of invasive species, including negotiation of relevant international agreements, information sharing, research collaboration, and providing development assistance.
9. Promote the development and application of innovative tools and technologies for prompt and effective prevention, eradication, and control of invasive species.
10. Improve public engagement on the invasive species issue by supporting and expanding existing education and outreach efforts, emphasizing unified messaging and the application of social media platforms.
11. Review and address recommendations from the previous ISAC White Papers, reporting progress to ISAC on at least an annual basis.

