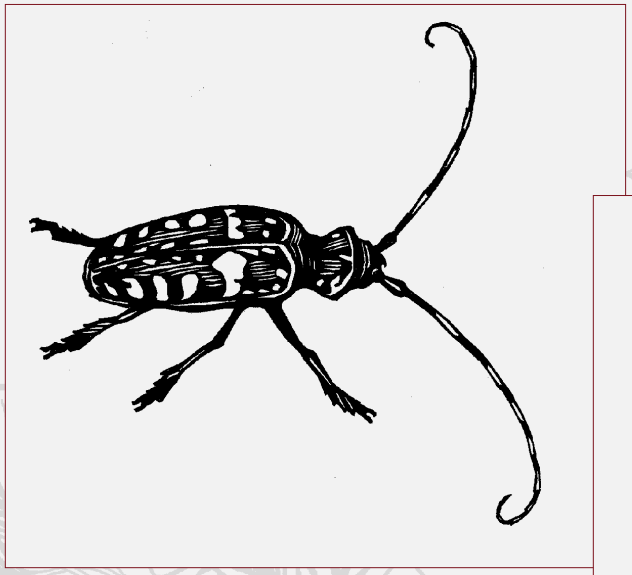
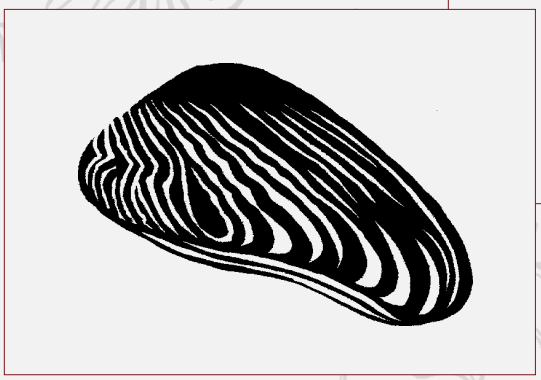
HALTING THE INVASION

State Tools for Invasive Species Management





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Drawings are of kudzu, purple loosestrife, zebra mussel and Asian longhorned beetle.

HALTING THE INVASION:
State Tools for Invasive Species Management

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Halting the Invasion: State Tools for Invasive Species Management

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The Environmental Law Institute is responsible for the views and research contained in this report, including any omissions or inaccuracies that may appear. The information contained in the report was obtained primarily through the research of state statutes and regulations conducted from February 2001 through February 2002. Although we believe that the report captures the vast majority of the state invasive species tools and programs authorized through state law or promulgated through state rulemaking, we cannot guarantee its complete accuracy. Comments or corrections are welcome and should be directed to the authors.

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CHAPTER I: INTRODUCTION

Non-native invasive species, or invasives, significantly threaten the ecological integrity of our nation's natural systems.[1] These species invade natural communities, farmland, forestland, wetlands, waterways, and pastures. They displace native plants and animals, disrupt ecological processes, upset the stability of our ecosystems, and can permanently change our natural landscapes. Not only do invasives undermine biological diversity, but they also cause substantial economic burdens. States and local governments spend hundreds of millions of dollars to control infestations and damage caused by such invasive species as the zebra mussel, Asian long-horned beetle (*Anoplophora glabripennis*), purple loosestrife, and melaleuca tree.[2] It is estimated that invasives cost the U.S. economy at least 137 billion dollars each year.[3]

The large majority of non-native species—also referred to as exotic, alien, foreign, introduced, or nonindigenous species—do not pose a threat to the natural or human systems in which they are introduced.[4] However, a small percentage of non-native species that do establish have the potential to become invasive and to cause significant economic, environmental, and human health consequences.

The economic and ecological harm caused by the prolific spread of invasive species has captured national attention, particularly in recent years. However, despite such increased awareness, current federal law offers limited protection from this menacing problem. Multiple federal laws and programs address invasive species in a fragmented manner and primarily focus on the impacts to our natural resource-based industries, particularly agriculture; thus, they fail to adequately cover invasive species that cause widespread damage to our natural areas. Federal resources currently devoted to this national catastrophe simply do not reflect the severity of the problem—neither its economic impacts nor its impacts to the nation's biological diversity and biological integrity.

Even though many invasive species are not regulated or controlled federally, states have passed a wide array of laws designed to address invasive species problems. As with the federal invasive species programs, state programs are varied and dispersed within and between multiple state agencies and organizations. There are many opportunities, however, to utilize existing state laws to address the problem of invasive species at a more local level. Many states have agricultural pest control laws in place to address invasive species that pose a threat to agricultural crops. States are also beginning to adopt non-agricultural weed prohibitions to protect natural systems, especially aquatic or wetland areas. Many of these laws provide states with the authority to control the spread of invasive species in the agricultural context and to address invasive species that impact the natural environment more broadly.

This report analyzes the current legal tools available at the state level to combat invasive species. Only those mechanisms and programs approved through state legislation or agency rulemaking have been covered. States may also have a variety of tools and programs available to them that were not established through legislation or administrative action; these were not addressed in this report. This study does not make an attempt to evaluate how state programs are enforced or implemented. Rather, this report outlines the tools that are currently available in the states.

States currently possess a wide variety of tools to address the threat posed by invasive species. The adop-

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[1] This report adopts the definition outlined in Executive Order 13112 on Invasive Species, signed by President Clinton on February 3, 1999, which states that an "invasive species" is one that is non-native to the affected ecosystem and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. For the sake of simplicity, this publication refers to non-native invasive species as invasive species or invasives.

[2] U.S. General Accounting Office. 2000 (August). Invasive Species: Federal and Selected State Funding to Address Harmful, Nonnative Species. GAO/RCED-00-219. 34 pp. [Hereinafter GAO (2000)].

[3] Pimentel, D., L. Lach, R. Zuniga, and D. Morrison. 2000. Environmental and economic costs of nonindigenous species in the United States. BioScience 50:53-65.

[4] Alien Plant Working Group. 2000 (July 11). "Alien Plant Invaders of Natural Areas: Background." <www.nps.gov/plants/alien/bkgd.htm>. (15 Nov 2001). (Organisms are considered non-native when they occur in locations beyond their known historical natural ranges and are brought in from other continents, regions, ecosystems, or habitats.)

tion and implementation of strong state polices can provide an effective option for managing invasive species problems. This study identifies seventeen state tools that are grouped into five categories, each discussed below. In addition, how states choose to define invasive species will determine which species will be addressed through the state's laws and regulations.

DEFINING AN INVASIVE SPECIES

To manage invasive species effectively, states must first address the fundamental issue of defining which non-native species will be considered invasive for the purposes of regulation. The adopted definition determines the type and range of species the state will regulate, and therefore the scope of the state's statutes, regulations, programs, and authorities. An effective state program affirmatively declares that all non-native invasive species are subject to regulation, thereby regulating all categories of species, including wildlife, aquatic life, plants, insects, microorganisms, and pathogens. States may also use the definition of "invasive" to expand coverage of the laws and regulations beyond those species that impact agriculture to those that cause harm to the natural environment, human health, and the economy.

Once a state comprehensively defines what constitutes an invasive species, it may then build on this definition by naming specific species that fall under the adopted definition and which therefore should be regulated. States generally follow one of two approaches to listing: a "dirty list" or a "clean list." The clean list approach identifies species approved for import, introduction, or release, thus resulting in the regulation of all non-listed invasive species.[5] The use of a clean list is a more stringent, proactive approach to the regulation of non-native and potentially invasive species, which places the burden on the importer to prove that the new species will not pose any economic or environmental threat. This stringent approach generally presumes that all species should be prohibited unless they have been officially determined to be "clean." In contrast, dirty lists designate species that are banned from import, introduction, or release. This more permissive approach allows all species unless they have been demonstrated to be harmful and have been listed as prohibited. The majority of state (and federal) programs have adopted the dirty listing approach.

After developing a definition and method for identifying invasive species, the state should then adopt and enforce state statutes, regulations, and policies to control, use, and manage these species. This report presents seventeen tools that states can adopt to create a strong, comprehensive policy for addressing invasive species. These tools fall into five categories:

- Prevention
- Regulation
- Control and Management
- Enforcement and Implementation
- Coordination

PREVENTION

The first line of defense against invasive species is prevention. Over the long term, preventing the introduction and establishment of invasives is the most effective and cost-efficient strategy that states can adopt.[6] To help prevent the entry of unwanted invasive species, states may rely upon the following prevention tools:

- Identifying and mitigating future threats
- Detection
- Import/Introduction/Release requirements
- Quarantines
- Education

Identifying and mitigating future threats: State officials need to be well-informed about potential future invaders to interdict introductions. States can establish programs to identify non-native species that may pose a future threat to the state or to particular regions within the state. For example, states can keep track of invasive species causing problems in neighboring states or to neighboring counties within the state. These data can alert state and local officials to the potential and relative risks of new infestations and provide opportunities for early detection and rapid response before invasives spread. In addition, the state can adopt measures to regulate and address known invasives pathways, such as requiring the treatment of certain imported lumber.

Detection: Early detection and a timely response by states are essential for containing or eradicating invasive species before they cause widespread damage and

[5] U.S. Congress, Office of Technology Assessment (OTA). 1993. Harmful Nonindigenous Species in the United States. OTA-F-565. U.S. Governmental Printing Office. Washington, D.C. 391 pp. [Hereinafter OTA (1993)].

[6] National Invasive Species Council. 2001 (January). Management Plan: Meeting the Invasive Species Challenge. Washington, D.C. 89 pp. [Hereinafter NISC Management Plan (2001)].

become technically and financially difficult to control.[7] States may provide a designated state agency with the authority to ensure that new invasive species are detected promptly, reported adequately, and addressed early. A strong state detection program may include the following three components: 1) the authority to routinely and systematically survey both private and public lands for the presence of invasive species, 2) the authority to map invasive species locations and sensitive/high-risk areas, and 3) the ability to inspect both public and private lands and to establish border inspection stations.

Import/Introduction/Release requirements: State policies may require those individuals or entities interested in importing, introducing, or releasing known or suspected invasive species to acquire a permit and health certificate. These import, introduction, and release standards can incorporate science-based decisionmaking processes, which require evaluation of potential environmental impacts and risks posed by invasive species. Implementing techniques, such as a risk-based prescreening system before entry and release of a non-native species, help to minimize the impacts of future infestations. To secure scientific input, states may appoint scientific advisory committees to comment on decisionmaking protocols. Many of these screening functions could be coordinated across states or by the federal government to ensure that relevant information is shared and duplication is minimized.

Quarantines: To interdict unintentional and unwanted introductions, such as plant pests and pathogens arriving in association with trade commodities, states may authorize the use of three types of quarantines for all categories of invasive species: 1) quarantines of certain areas, facilities, or species within the state suspected of being invaded or infected, 2) quarantines on the transportation into or within the state of species classified as potentially harmful, and 3) mandatory post-entry quarantines to allow state officials to monitor whether certain non-native species are infected or have the potential to become invasive. The implementation of these three types of quarantines will help to contain potential infestations so that they do not become widespread.

Education: The cumulative actions of individuals, industries, and government agencies may inadvertently promote the spread of non-native invasive species, largely because of a lack of awareness of the nature and scope of the invasives problem. Those in both the public and private sectors should be better educated about the need to adopt business practices, codes of conduct, and other preventative measures—such as landscaping with native or non-invasive species rather than invasive species, selling only non-invasive nursery plants and seeds, and properly cleaning boating equipment and gear before traveling to a new waterway. Each state can authorize the adoption of a strong education program that seeks to inform the many sectors and groups affecting invasive species management, including the general public, private landowners, key industry groups, and public land managers, about the multitude of threats caused by invasive species. An effective education campaign that capitalizes on public-private partnerships will better equip and motivate stakeholders to become a part of the solution, resulting in increased compliance with existing laws and regulations and improved implementation of state policies.

Melaleuca tree (*Melaleuca quinquenervia*)

REGULATION

Since many non-native species will continue to be used and introduced within and across U.S. borders, mechanisms should be in place to allow state officials to regulate the manner in which invasive species are transported, released, possessed, and used to minimize associated impacts. Many states have regulation tools to control invasive species once they enter the state. These include:

- Permits and licenses
- Transportation and shipping requirements
- Monitoring
- Bonds and insurance

Permits and licenses: States may require permits and licenses to control the type and manner of invasive species possession. State policies may require a permit or license to import, possess, transport, release, or use

[7] *Id.*

invasive species, or to operate a facility containing such species. State policies may ensure that any individual or entity wishing to obtain a permit or license must first satisfy certain requirements, such as facility siting and maintenance; state access to inspect facilities and operations; measures to prevent the potential escape of species; and the retention of adequate records on the species and associated operations.

"We must make no mistake: We are seeing one of the great historical convulsions in the world's flora and fauna."

- Charles Elton (1958), The Ecology of Invasions by Animals and Plants, p.31

Transportation and shipping requirements: States may authorize transportation and shipping requirements to regulate the movement of known or suspected invasive species within and across their state. State policies can require those transporting or shipping invasives into or within the state to undergo a prior registration process and to notify appropriate state agencies. Such registration and notification will ensure that the state is aware of, and approves of, the associated transportation activities. State policies may require either a permit or a health/inspection certificate to transport or ship invasive species through the state and may provide for the inspection of shipments and establishment of border inspection stations adequate for all categories of invasive species.

Monitoring: Since a large number of invasive species are imported and subsequently released or become established without prior evaluation of their potential invasiveness, states may authorize post-release monitoring and evaluation to ensure that there are no unforeseen consequences for the affected ecosystem. By monitoring population expansions and dynamics, as well as resulting biological interactions and abiotic changes, states are better equipped to determine whether the introduced species pose a threat to the environment. Timely monitoring will enable state officials to act quickly, circumventing any future potential problems.

Bonds and insurance: The control and management of invasive species that have infested natural systems and working landscapes have proven very costly to states. For example, the invasive aquatic plant hydrilla was introduced into Florida's waterways in the 1950s by the discard of tropical aquarium plants[8] and has cost the state approximately 14.5 million dollars in control and 10 million dollars in recreational losses each year.[9] To help alleviate this unilateral economic burden, states may require those wishing to possess particularly harmful invasive species to either post a bond or obtain liability insurance. Although few states employ this tool, bonds or liability insurance are an effective way to ensure that those who are importing, possessing, or using invasive species financially contribute if they escape or spread. The state is thereby not left solely responsible for financing the containment, eradication, or management response measures.

CONTROL AND MANAGEMENT

As a second line of defense after prevention, states may implement control and management measures to rapidly respond to an early detection of an invasive and may institute tools to control, manage, and mitigate widespread infestations. A state control and management strategy may encompass four tools:

- General control and management authority
- Emergency powers
- Biological control agents
- Restoration

General control and management authority: States may authorize a designated agency or agencies to control or manage identified or emerging invasive species. These agencies may be notified of escapes or illegal releases so state officials can quickly capture, contain, and treat or dispose of these species. State policies may allow the state access to both public and private lands to perform any necessary control and management work effectively, such as mechanical or chemical control (i.e., hand-picking weeds or use of toxic bait or pesticides) or habitat management (e.g., prescribed burning).

Emergency powers: States may authorize emergency powers to rapidly respond to outbreaks of invasive species that may quickly cause widespread damage or become permanently established. These powers enable the state to increase its authority when facing an impending infestation. Components of emergency powers may include the ability to dispose of species, the ability to bypass notice periods for entering private land,

[8] Joyce, J. 1992. Impact of *Eichornia* and *Hydrilla* in the United States. ICES Marine Science Symposium 194:106-109.

[9] Center, T., J. Frank, and F. Dray. 1997. Biological control. Pages 245-266 *In* Simberloff, D., D. Schmitz, and T. Brown, editors. Strangers in Paradise. Island Press, Washington, D.C. 480pp.

and a source of emergency funds in order to rapidly respond to early detections.

Regulation of biological control agents: Biological control agents have been used to manage invasive species that have become established. A wide variety of biological control agents have been used to control infestations, usually those impacting agriculture.[10] By 1998, seventy-three biocontrol agents had been released on thirty-eight weeds in the continental U.S.[11] and during the 1990s, twenty-eight states operated their own biological control programs.[12] This control method, however, is not without controversy or potential negative environmental repercussions. Early introductions have caused native species extinctions and harm to the affected natural systems. For example, fifty-five percent of the twenty-seven species of native moths (*Lepidoptera spp*) have gone extinct on the Hawaiian Islands due to the impacts of biological control agents.[13] While biological control agents may be effective solutions for certain widespread infestations, states may retain the authority to regulate their release to ensure that they do not become invasive themselves.

Restoration: Since invasive species can impose significant, and potentially long-term, environmental perturbations, states may adopt laws and regulations that institute restoration programs. In many cases non-native species are better able to take hold in disturbed ecosystems. Therefore, restoring pre-invasion conditions may help protect against additional, future outbreaks of invasive species. For example, states may establish and fund technical assistance and grant programs for public lands and private lands of exceptional natural value.

[10] U.S. Department of Agriculture's Animal and Plant Health Inspection Service. 2001. "About NBCI." <www.aphis.usda.gov/ppq/nbci/aboutnbci.html>. (1 March 2002). (According to the Animal Plant Health and Inspection Service, biological control or biocontrol is the use of living organisms such as predators, parasites, and diseases, as natural enemies in controlling agricultural or other environmental pests.)

[11] Zimmerman, H. and H. Klein. 2000. The use of biological control agents for the control of plant invaders and the importance of partnerships. Pages 130-138 *In* G. Preston, G. Brown, and E. van Wyk, editors. Best Management Practices for Preventing and Controlling Invasive Alien Species. Symposium Proceedings: Working for Water Programme. Cape Town, South Africa.

[12] U.S. Congress, Office of Technology Assessment. 1995. Biologically-based technologies for pest control. OTA-ENV-636. U.S. Government Printing Office, Washington, D.C.

[13] Howarth, F. 1991. Environmental impacts of classical biological control. Annual Review of Entomology 36:485-509.

ENFORCEMENT AND IMPLEMENTATION

A state may have the most comprehensive and stringent statutes and regulations on the books to address invasive species, but whether or not these tools prove effective lies in the level and manner in which they are implemented and enforced. Without adequate enforcement authority and earmarked resources it is likely that invasive species policies will never be realized to their fullest extent. The enforcement and implementation category contains two main tools:

- Enforcement authorities
- Funding

Enforcement authorities: Enforcement authorities are necessary to ensure broad compliance with invasive species laws and regulations. State policies may include four provisions: 1) enforcement mechanisms for all categories of invasive species, 2) penalties strict enough to deter violations, 3) liability for the costs of rectifying violations, and 4) positive enforcement mechanisms to encourage and reward compliance with invasive species provisions.

Funding: Adequate funding is essential to guarantee that authorized state policies can be translated from words into on-the-ground action. States may establish specific funds earmarked for invasive species prevention, control, and management to ensure that funds are not vulnerable to budget maneuvering by agencies. States legislatures may also designate an adequate amount of funding to these programs to enable full implementation of state policies and priorities and prompt action by state agencies. States could also spend these funds over multiple years to account for the long-term repercussions of invasives outbreaks.

COORDINATION

Coordination among federal, state, and local agencies, in addition to key players within the private sector, is essential to better address the gaps in regulatory and administrative authorities; avoid duplication of efforts; develop integrated and consensus-based program priorities; and identify funding and research needs. States will be better able to implement and enforce existing authorities and tools aimed at the prevention, control, and management of invasives if they coordinate their use. This can be done by establishing the following coordination tools:

- Councils
- Plans

Whether through state legislation, agency rulemaking, gubernatorial executive order, or memoranda of understanding, states may establish a statewide invasive species council or councils and may initiate the development of a statewide invasive species plan or plans to facilitate the coordination of statewide actions to combat invasive species. Earmarked funding for implementation of council and/or plan action items is essential.

Councils: Comprehensive statewide invasive species councils may include members of all relevant state agencies and divisions, as well as key players within academic institutions, environmental organizations, agricultural and commercial interests, and private landowners. These councils may also address all categories of harmful invasive species afflicting the state.

Plans: Interagency councils or work groups may be required to develop a statewide comprehensive invasive species plan, which outlines viable, performance-oriented goals and measurable objectives. In relation to the stated goals and objectives, specific implementation strategies, action items, and timelines may be set forth to address major state invasive species issues, such as inter-governmental coordination, prevention, early detection and rapid response, control and management, research, and public outreach.

CONCLUSION

States have a wide variety of tools available to address invasive species. Chapters V through X of this report explore each of these seventeen tools in greater detail. In these chapters each tool is introduced and a comprehensive and intermediate state model for that tool are presented. In addition, charts provide the reader with detailed information on which states have the highlighted tool at their disposal. Chapter XI provides recommendations for states to build on their existing invasive species tools with the hope that all states will strive to achieve the outlined gold standard. A checklist is available in Appendix A to allow the reader to assess which of the seventeen tools discussed is available in a given state and the strength of that state's tools for addressing invasive species.

CHAPTER II: BIOLOGICAL INVASIONS—A SPREADING THREAT TO AMERICA'S NATURAL HERITAGE

GROWING IN NUMBERS

The American landscape is being dramatically and, at times, permanently altered by the rapid spread of non-native invasive species. Since the earliest human settlement, new species have been introduced, both intentionally and accidentally, into the United States.[14] Non-native species continue to be introduced intentionally for agricultural, horticultural, commercial, or recreational purposes, while others enter our borders unintentionally as hitchhikers on commodities such as produce and nursery stock, or stowaways in packing materials, shipping containers, and ballast water.[15] Introductions by natural means—such as arriving by wind, water currents, or transported by migratory species—are considered quite uncommon, and today, almost all non-native species entries are ultimately facilitated by human activities.[16] Due in large part to our expansive commerce and travel, more invasives have entered North America than any other continent.[17] About 53,000 interceptions of harmful insects, pathogens, and plants are made by officials of the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) when checking a slim 2 percent of cargo and baggage arriving in the U.S. each year.[18]

The exact number of foreign species that have been introduced into our forests, wetlands and grasslands, marine and coastal areas, and agricultural and urban areas may never be fully known. However, scientists estimate that at least 6,600 non-native plants, animals, insects, and microorganisms have been introduced into the country.[19] Of those that are introduced, it is predicted that 10 to 15 percent will become established, resulting in self-sustaining populations in natural areas, and about 10 percent of these established non-native species will become invasive.[20] Although the probability of invasion appears low, this should not mask the fact that this percentage of established non-native species can have catastrophic environmental, social, and economic impacts.

The ability of a non-native species to invade a natural community may be further facilitated when landscapes become modified, degraded, and fragmented by humans.[21] Non-native species now comprise approximately 5 percent of the total U.S. continental biota,[22] and in some states, almost 50 percent of the total flora.[23]

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[14] Cox, G. 1999. Alien Species in North America and Hawaii: Impacts on Natural Ecosystems. Island Press, Washington, D.C. 387pp. (Arthropod and pathogen introductions are primarily accidental, usually arriving in association with trade commodities, whereas the introductions of most nonindigenous plants and animals in the U.S. are intentional.)
Marinella, H. and L. Crowder. 2000. Introduction: Redefining the weed. Pages 4-6 *In* J. Randall and J. Martinella, editors. Invasive Plants: Weeds of the Global Garden. Brooklyn Botanic Garden, New York. 111pp.
(For example, about half of the several hundreds of plants now invading natural areas in the continental U.S. and Canada were imported for gardens.)

[15] NISC Management Plan (2001), *supra* note 6.

[16] National Research Council's Board on Agriculture and Natural Resources. 2002. Predicting Invasions of Nonindigenous Plants and Plant Pests. National Academy Press, Washington, D.C. 185pp. [Hereinafter BANR (2002)].

[17] Cox (1999), *supra* note 14.

[18] BANR (2002), *supra* note 16.

[19] Cox (1999), *supra* note 14. (Estimates 6,600 introduced species.) Pimentel (2000), *supra* note 3. (Estimates 50,000 introduced species.)

[20] OTA (1993), *supra* note 5. (Similar to the OTA report finding is the tens rule, originally proposed by Williamson in 1993, which states that of the large number of species introduced into a new region, 10% will appear in the wild. Of these species appearing in the wild, 10% will establish self-reproducing populations; of these established populations, 10% will pose significant problems. As discussed in Williamson (1996), *Williamson, M. 1996. Biological Invasions. T.J. Press, Padstow, Great Britian. 244 pp.*.)

[21] Vitousek, P., C. D'Antonio, L. Loop, and R. Westbrooks. 1996. Biological invasions as global environmental change. American Scientist 84:468-478.

[22] Cox (1999), *supra* note 14.

[23] Rejmanek, M. and J. Randall. 1996. Invasive alien plants in California: 1993 summary and comparison with other areas in North America. Madrono 41(3):161-177.

An estimated 5,000 introduced plant species persist in natural ecosystems within the U.S., compared with about 17,000 identified species of native plants.[24]

Every ecosystem within the United States has been impacted by non-native species. California, Florida, and Hawaii have been among the hardest hit. Over 674 species of non-native plants have become naturalized in California, comprising over 11 percent of the total flora.[25] Over the past 300 years, invasive species have infested millions of acres of land and water in Florida.[26] In Hawaii alone, over 4,500 invasive plants and animals have become established in the wild.[27] Nonindigenous species make up approximately 45 percent of plant species and 25 to 100 percent of animals on the islands.[28]

Invasive species have a dramatic impact on not only our lands but also our waters. Since the eighteenth century, the rate of known marine invasions has increased exponentially with no signs of slowing down or even leveling off.[29] In the San Francisco Bay alone, from the 1960s until mid-1990s, an average of one new introduction was established every fourteen weeks. About 234 non-native species currently live in the Bay, which account for 97 percent of the total number of aquatic organisms and 99 percent of the total biomass in this water body.[30]

GROWING ENVIRONMENTAL CONSEQUENCES

While it is true that many introduced species have produced and will continue to produce great benefits—such as food crops, livestock, pets, horticultural/landscape improvements, biological control agents, and recreational opportunities—it remains undeniable that some non-native species cause grave environmental impacts. As more and more non-native species invade natural communities, native species are crowded out and, at times, eliminated.[31] When species that evolved in other parts of the world are transplanted to new areas, they encounter environments free from their natural predators, competitors, parasites, and diseases, which would normally limit population sizes in their native ranges. As a result, these species may have a substantial advantage over local species.[32]

The impacts of non-native species are compounded by their interaction with other introduced species. The establishment of invasive species is known to facilitate further introductions. Introduced species may alter an environment—by affecting pollination, dispersal, or habitat conditions—in a way that increases the likelihood of reproduction and survival of other invasives.[33] For example, in the vanishing Hawaiian rainforests, introduced feral pigs disperse the seeds of invasive plants and uproot the forest floor, causing massive erosion and destruction of understory vegetation and further spreading invasive invertebrates and plants such as kahili ginger (*Hedychium gardnerianum*), banana polka (*Passiflora mollissima*), and strawberry guava (*Psidium cattleianum*).[34]

Invasive species that become established in new environments can greatly influence the composition of native communities through direct predation, competition for resources, hybridization with native species, or alteration of ecosystem properties (e.g., fire regimes) in a way that threatens the continued persistence of indigenous species. Invasive species are threatening almost 50 percent of all endangered and imperiled species.[35] The spread of invasive species is now considered the second largest—and likely the fastest growing—threat to biodiversity after habitat destruction,[36] and has

[24] Kartesz, J. 1994. A Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland, 2nd edition. Timber Press, Portland, Oregon. 622 pp.

[25] Mooney H. and J. A. Drake, eds. 1986. Ecology of Biological Invasions of North America and Hawaii. Springer-Verlag, New York, NY. 321pp.

[26] Simberloff, D., D. C. Schmitz, and T. C. Brown, eds. 1997. Strangers in Paradise: Impact and Management of Nonindigenous Species in Florida. Island Press, Washington, D.C. 467pp.

[27] Eldredge, L. and S. Miller. 1998. Numbers of Hawaiian Species: Supplement 3, with notes on fossil species. Bishop Museum Occasional Papers 55:3-15.

[28] Simberloff et al. (1997), *supra* note 26.

[29] Ruiz, G., P. Fofonoff, J. Carlton, M. Wonham, and A. Hines. 2000. Invasion of coastal marine communities in North America: Apparent patterns, processes, and biases. Annual Review of Ecology and Systematics 31:481-53.

[30] Cohen, A. and J. Carlton. 1998. Accelerating invasion rate in a highly invaded estuary. Science 279:555-558.

[31] Williamson (1996), *supra* note 20.

[32] Mack, R. D. Simberloff, W. Lonsdale, E. Evans, M. Clout, and F. Bazzaz. 2000. Biotic invasions: Causes, epidemiology, global consequences, and control. Ecological Applications 10:689-710.

[33] Simberloff, D. and B. Von Holle. 1999. Positive interactions of nonindigenous species: invasional meltdown? Biological Invasions 1:21-32.

[34] Westbrooks, R. 1998. Invasive plants, changing the landscape of America: Fact book. Federal Interagency Committee for the Management of Noxious and Exotic Weeds, Washington, D.C. 109 pp. *And* Cox (1999), *supra* note 14.

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

[36] Vitousek, P., C. D'Antonio, L. Loop, M. Rejmánek, and R. Westbrooks. 1997. Introduced species: a significant component of human-caused global change. New Zealand Journal of Ecology 21:1-16. *And* Wilcove (1998), *supra* note 35.

been identified as the foremost threat in regions such as South Florida[37] and Hawaii.[38]

The underlying, most insidious effect of the spread of invasives is the global homogenization of biological diversity. Although the introduction of novel species may increase local biodiversity within certain taxa, regions, or timeframes,[39] *global* diversity within and among species, ecosystems, and genetic material becomes degraded over the long term. Worldwide, introduced species are implicated as the major cause of 25 percent of extinctions of fish, 42 percent of reptiles, 22 percent of birds, and 20 percent of mammals.[40] They are colonizing all continents, substantially impoverishing endemic species and local habitats, and replacing unique biota with commonplace pest species.[41]

PROFILES OF INVASION

Invasive species not only contribute to native species declines and the homogenization of unique regional biota but also to the wholesale alteration and disruption of ecosystems, which threatens the ecological integrity and productivity of our natural systems and landscapes.[42] Biological invasions can alter and disrupt ecological patterns and processes, such as hydrology, soil moisture and salinity regimes, nutrient cycling and energy flow patterns, structure and dynamics of vegetation, frequency and intensity of disturbances (such as fire, flooding, and pathogen outbreaks), and properties such as ecosystem resilience and stability.[43]

Grassland ecosystems are being dramatically threatened due to the introduction of invasive weeds. A significant example is the dramatic destruction of shrubsteppe or sagebrush steppe habitat of the Columbia Plateau and northern Great Basin by cheatgrass (*Bromus tectorum*), an introduced bromegrass from central Eurasia.[44] This fire-loving annual grass, along with other non-native grasses such as red brome (*Bromus rubens*) and medusahead (*Taeniatherum caput-medusae*), is now the dominant plant species on more than 100 million acres of western lands. The region's native sagebrush grasslands have become irreversibly transformed into a weed-infested wasteland that now burns more intensely and more frequently than during any other period in history.[45] Before the invasion of cheatgrass, fire burned every 60 to 110 years allowing the establishment of native shrubs. Now major fires occur every three to five years causing a near extirpation of native flora and fauna, which are replaced by monocultures of non-native invasive grasses with fundamentally different nutrient cycling patterns.[46]

Alongside rangelands and pastures, healthy wetlands are disappearing in this country as they are rapidly degraded by invasive species. Every year, thousands of acres of wetlands are invaded by purple loosestrife (*Lythrum salicaria*), an ornamental plant introduced from Europe in the 1800s.[47] This weed now occurs in all continental states, seriously affecting the Northeast and upper Midwest. This invasive species alters the fundamental structure of its new habitat by filling open waters with dense, impenetrable stands up to thousands of acres in size.[48] Invasive plants are not the only problem faced by these systems; invasive animals have also had significant impacts. Nutria (*Myocastor coypus*), introduced from South America for commercial fur production, threatens the last remaining coastal salt marshes

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[37] Simberloff et al. (1997), *supra* note 26.

[38] Moulten, M. and S. Pimm. 1986. Species introductions in Hawaii. Pages 231-249 *In* H. Mooney and J. Drake, editors. Ecology of Biological Invasions of North America and Hawaii. Spinger-Verlag, New York, NY.

[39] di Castri, F. 1989. History of biological invasions with special emphasis on the Old World. Pages 1-26 *In* J. Drake, H. Mooney, F. di Castri, R. Groves, F. Kruger, M. Rejmanek, and M. Williamson, editors. Biological Invasions: A Global Perspective. John Wiley & Sons, New York. 552 pp.
(di Castri asserts that as a result of human-induced plant invasions, the central European flora has become more diverse as compared to historical times.)

[40] Reid, W. and K. Miller. 1989. Keeping Options Alive: The Scientific Basis for Conserving Biodiversity. World Resources Institute, Washington, D.C. 140pp.

[41] Cox (1999), *supra* note 14.

[42] Vitousek et al. (1997), *supra* note 36. *And* Hobbs, R. and H. Mooney. 1998. Broadening the extinction debate: Population deletions and additions in California and Western Australia. Conservation Biology 12:271-283.

[43] Cox (1999), *supra* note 14.

[44] *Id.*. (The region of Columbia Plateau and northern Great Basin lies within the northern intermontane region, encompassing British Columbia south through Washington and Idaho to Oregon, Nevada, and Utah. Cheatgrass occurs as a weed in grain fields, giving it the common name "cheat" because it cheats grain farmers of their expected wheat yields.)

[45] Westbrooks (1998), *supra* note 34. *And* Christensen, J. 2000 (May 22). Fire and cheatgrass conspire to create a weedy wasteland. High Country News 32(10):1-7.

[46] Cox (1999), *supra* note 14. *And* Westbrooks (1998), *supra* note 34.

[47] Cox (1999), *supra* note 14.
Thompson, D.Q., R.L. Stuckey, and E.B. Thompson. 1987. Spread impact and control of purple loosestrife (*Lythrum salicaria*) in North American wetlands. USDI Fish and Wildlife Service. Washington, D.C. 215pp.

[48] *Id.*

in Louisiana. Due to their intensive and selective feeding patterns, this invasive rodent is changing species composition, reducing overall biomass, and increasing the conversion of marsh to open water at a rate of about 2 percent per year.[49]

Invasive species have forever changed our forested landscapes as well. The American chestnut (*Castanea dentata*) was once the most abundant hardwood in eastern deciduous forests and among the most economically important trees in the eastern United States.[50] This tree was essentially eliminated in the early twentieth century by the chestnut blight fungus (*Cryphonecria parasitica*). Believed to have originated in Asia, this fungus permanently altered the ecology of eastern forests. Forests throughout the U.S. continue to contract new, devastating diseases. The hemlock woolly adelgid (*Adelges tsugae* Annand) and balsam woolly adelgid (*Adelges piceae* Ratzeburg), for example, are killing native hemlock and fir trees in the East, while the recently discovered sudden oak death disease is killing thousands of oaks in California and potentially threatening other trees such as the mighty redwoods.[51]

Due to increasing marine and freshwater invasions, our aquatic ecosystems are also at risk. Introduced around 1985 into the Great Lakes by ballast-water discharge, the zebra mussel (*Dreissena polymorpha*) has exhibited the most explosive population growth and range expansion of any invasive species in North America.[52] By 1990, zebra mussels were found in all of the Great Lakes; four years later they had established in nineteen states.[53] This mollusk is likely to colonize rivers, lakes, ponds, and estuaries throughout much of the United States and southern Canada,[54] resulting in the possible extinction of up to 140 U.S. species.[55] Although the full extent of its biological impacts remains unclear, this invasive profoundly changes the nutrient and primary production of affected aquatic systems by substantially removing planktonic material and disrupting natural food webs allowing benthic communities to become more dominant. [56]

Cheatgrass (*Bromus tectorum*)

The most significant ecological threat posed by invasive species is their potential to disrupt entire ecosystems.[57] They are essentially changing the rules of nature by altering and degrading natural systems, ecological patterns and processes, and global biodiversity at a catastrophic scale.[58] The negative impacts of invasive species are likely permanent,[59] resulting in diminished ecosystem services and the natural resources base upon which humans ultimately depend.

POSING HUMAN HEALTH RISKS

Invasive species not only threaten the ecological stability of our natural systems and cause environmental harm, but also pose direct human health risks as well.

[49] Cox (1999), *supra* note 14.
[50] Stein, B. and S. Flack, editors. 1996. America's Least Wanted: Alien Species Invasions of U.S. Ecosystems. The Nature Conservancy, Arlington, VA. 31pp.
[51] BANR (2002), *supra* note 16.
[52] Cox (1999), *supra* note 14.
[53] U.S. Geological Survey. 2001. "*Dreissena polymorpha*." <http://nas.er.usgs.gov/zebra.mussel/docs/sp_account.html>. (20 Nov. 2001). (In addition to the Great Lakes, by 1992 zebra mussels had established in the Arkansas, Cumberland, Hudson, Illinois, Mississippi, Ohio, and Tennessee Rivers. By 1994, the following states had reported zebra mussels within their borders or in adjacent water bodies: Alabama, Arkansas, Illinois, Indiana, Iowa, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, New York, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, West Virginia, and Wisconsin.)
[54] Strayer, D. 1991. Projected distribution of the zebra mussel, *Dreissena polymorpha*, in North America. Canadian Journal of Fisheries and Aquatic Sciences 48:1389-1395.
[55] Stein and Flack (1996), *supra* note 50.
[56] Cox (1999), *supra* note 14.
[57] Mack, R. D. Simberloff, W. Lonsdale, E. Evans, M. Clout, and F. Bazzaz. 2000. Biotic invasions: Causes, epidemiology, global consequences, and control. Ecological Applications 10:689-710.
[58] Vitousek et al. (1997), *supra* note 36.
[59] BANR (2002), *supra* note 16.

Many human diseases and disease vectors, such as rodents and mosquitoes, are non-native and spreading in this country due to increased transportation, human expansion into new ecosystems, and human-induced environmental degradation.[60] The West Nile virus, commonly found in Africa, West Asia, and the Middle East, is spreading in the U.S. by infected birds and has been detected in twelve eastern states and the District of Columbia.[61] Introduced rodents, such as the European (black) rat (*Rattus rattus*), the Asiatic (Norway or brown) rat (*Rattus norvegicus*), and the house mouse (*Mus musculus*) carry and pass on several other diseases, including salmonelosis and leptospirosis.[62] The Asian tiger mosquito (*Aedes albopictus*), likely introduced into Texas through shipments of used tires from Japan, has spread to at least twenty-five states, acting as a vector for invasive viral diseases, including dengue fever, yellow fever, and encephalitis.[63]

In addition to carrying harmful pathogens, invasive species, in and of themselves, can create health hazards. Melaleuca (*Melaleuca quinquenervia*), a wetland tree native to Australia, which is invading the Florida Everglades at a rate of 50 acres per day, has a root system that excretes substances poisonous to native plants and produces air-borne particles that can cause human respiratory problems and skin irritations.[64] Other health problems derive from poison hemlock and the ornamental species myrtle spurge in Colorado, which are responsible for severe allergic reactions in children.[65]

RESULTING ECONOMIC COSTS

By undermining biological diversity, disrupting natural systems, diminishing ecosystem resources and services, posing public health risks, and burdening the agricultural, ranching forestry, and fisheries industries, invasive species are inflicting significant economic burdens. Precise economic impacts, particularly those unrelated to agriculture, industry, and human health damages, are not well documented. As a result, economic damages tend to be chronically underestimated.[66] The Office of Technology Assessment reports that seventy-nine invasive species have cost the United States about 97 billion dollars in damages during the period of 1906 to 1991.[67] This figure only represents a fraction of the actual costs as it fails to include the damages caused by agricultural weeds, which tend to have the most expensive impacts.[68] Taking into account a greater number of species and impacts posed to the agricultural sector, scientists at Cornell University estimate that invasives cost Americans an estimated 137 billion dollars annually,[69] more than double the annual economic damage caused by all domestic natural disasters.[70]

Biological invasions have direct economic consequences for agriculture, forestry, ranching, fisheries, tourism, and other industries. These cost money and time due to lost yields, expensive control measures, increased operating costs, decreased property values, and lost use of land and natural resources.[71] The economic impact of introduced weeds alone on the U.S. economy is estimated at 26.4 billion dollars annually; in addition, at least 13.9 billion dollars and 21 billion dollars per year result in crop losses due to invasive pest insects and plant pathogens, respectively.[72]

In response to the economic impact that invasives can have on agriculture, forestry, tourism, and other resource-based industries, states are spending significant amounts to control impacts. In one year alone, the states of Florida and California spent 127.6 million dollars and 87.2 million dollars, respectively, on control and eradication efforts.[73]

Nonindigenous aquatic species pose a significant economic burden by choking waterways, obstructing industrial cooling systems, damaging boats and docking facilities, and reducing recreational use of rivers and lakes.[74] The zebra mussel is projected to cost 750 million to 1 billion during the last decade (1989-2000).[75] This species invades and clogs water intake pipes and water filtration and electric generating plants, along with

[60] Pimentel et al. (2000), *supra* note 3.
[61] BANR (2002), *supra* note 16.
[62] Pimentel et al. (2000), *supra* note 3.
[63] Craig, G. 1993. The diaspora of the Asian tiger mosquito. Pages 101-120 *In* B. McKnight, editor. Biological Pollution: The Control and Impact of Invasive Exotic Species. Indiana Academy of Science, Indianapolis, IN. 261pp.
[64] Westbrooks (1998), *supra* note 34.
[65] Lane, E., State Weed Coordinator. Colorado Department of Agriculture. *Personal communication.* 29 April 2002.
[66] GAO (2000), *supra* note 2.
[67] OTA (1993), *supra* note 5.
[68] GAO (2000), *supra* note 2.
[69] Pimentel (2000), *supra* note 3.
[70] BANR (2002), *supra* note 16.
[71] Vitousek et al. (1996), *supra* note 36.
[72] Pimentel (2000), *supra* note 3.
[73] GAO (2000), *supra* note 2.
[74] *Id.*
[75] O'Neill, C. 2000. National Aquatic Nuisance Species Clearinghouse, New York Sea Grant Extension, Brockport, NY, personal communication, 22 Dec 2000. *As cited in* Carlton, J. 2001. Introduced Species in U.S. Coastal Waters: Environmental Impacts and Management Priorities. Pew Oceans Commission, Arlington, Virginia. 28pp.

squeezing out native species. Infestations of the invasive aquatic plant hydrilla (*Hydrilla verticillata*) force Florida to spend approximately 14.5 million dollars per year. Despite these control efforts, hydrilla infestations in just two Florida lakes have resulted in an estimated 10 million dollars per year in recreational losses.[76] The control of invasive aquatic weeds costs the U.S. at least 100 million dollars annually.[77]

Numerous other examples illustrate the economic toll that non-native invasive species take on specific industries, such as agriculture and tourism. However, the most significant and long-lasting damage is too often overlooked or unaccounted—that of diminished "ecosystem services." The services provided by ecosystems, such as water filtration, regulation of biological productivity and climate, and waste and pollution processing ultimately sustain both human and natural systems. On a global scale, these services have an economic value of at least 33 trillion dollars annually, which is greater than the global Gross National Product.[78] Although no estimates are available for the extent to which invasives have disrupted or diminished such ecological services, the figure likely ranges in the billions of dollars.[79]

[76] Center et al. (1997), *supra* note 9.
[77] OTA (1993), *supra* note 5.
[78] Costanza, R., R. D'Arge, R. de Groot, S. Farber, M. Grasso, B. Hannon, K. Limberg, S. Naeem, R. O'Neill, J. Paruelo, R. Raskin, P. Sutton, and M. van den Belt. 1997. The value of the world's ecosystem services and natural capital. Nature 387:253-260.
[79] Cox (1999), *supra* note 14.

CHAPTER III: FEDERAL AUTHORITIES AND ROLES

FEDERAL AUTHORITIES AND ROLES

Federal authorities for the introduction of nonnative species—both intentional and unintentional—are fragmented and incomplete. No existing federal law or combination of laws provides clear authority to prohibit or regulate the import of all classes of invasives or to regulate all vectors or pathways.[80] As a result, the federal government's ability to respond to new infestations or widespread outbreaks across the U.S. is severely limited. Adequate authority to prevent introductions is lacking for even insects, the most highly regulated group, and ballast water, the most clearly regulated pathway.[81]

Federal legislation and policies primarily address pests that pose an economic threat to agriculture, and to a lesser extent horticulture, forestry, and aquaculture, rather than the wide range of invasive species plaguing our natural landscapes and ecosystems. Certain laws, such as the Plant Protection Act (PPA), Federal Noxious Weed Act (FNWA), and Federal Seed Act, provide authorities to curtail the introduction and spread of invasive weeds and plant pests, while different statutes address injurious wildlife and animal diseases (e.g., the Lacey Act, Animal Damage Control Act, and the animal quarantine laws) and aquatic nuisance species issues (National Invasive Species Act) (see Appendix D).

The scope and effect of these laws have been limited, in large part, by narrow agency interpretation and implementation. FNWA, which was superceded by the PPA of 2000, provided broad authority to the Secretary of Agriculture to prohibit the introduction and interstate movement of listed noxious weeds. Until regulations under the FNWA were amended in 1999 to specifically require a permit for interstate movement of listed species, however, APHIS policy regarding interstate movement followed the legislative history of the act. The law suggested that interstate movement could only be regulated for listed species that were quarantined and were being actively controlled or eradicated. Since witchweed (*Striga asiatica*) was the only listed Federal Noxious Weed that had ever been quarantined, this interpretation rendered the law of little value in preventing the interstate spread of listed species. When the FNWA was superceded by the PPA in 2000, the amended regulation was carried forward under the new law, and permits are now required to legally move listed species across state lines. This amendment finally gave APHIS the legal authority to implement the law as it was clearly written.

Even though the FNWA (and now the PPA) clearly authorized the Secretary of Agriculture to list invasive plants that threaten all types of environments, the majority of species that have been listed to date are primarily regarded as agriculture weeds. However, this narrow application of the law was expanded in 1991 when melaleuca (*Melaleuca quinquenervia*), a major scourge of South Florida wetlands, was finally listed under extreme congressional pressure. Both of these changes in APHIS weed policy in the 1990s enhanced the agency's ability to carry out the original intent of the law—preventing entry and establishment of listed species. Political support and funding, however, for new initiatives still loom as the primary limiting factors in effectively carrying out the domestic components of the law.[82]

The National Invasive Species Act, passed in 1996, amends the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. The act was passed in reaction to zebra mussel outbreaks, but has the potential to greatly complement the Lacey Act by controlling the unintentional introduction of nonindigenous species. Although one of the purposes of the act is "to

[80] Pitts, K. and M. Miller. 2000 (July 3). Interim Report: Policy & Regulation Working Group of the Invasive Species Advisory Council. 11pp.

[81] *Id.*

[82] Westbrooks, Randy. U.S. Geological Survey, Whiteville, NC. *Personal communication* (May 10, 2002).

develop and carry out environmentally sound control methods to prevent, monitor, and control unintentional introductions of nonindigenous species from pathways other than ballast water exchange,"[83] the act has been narrowly interpreted and applied to only nonindigenous aquatic species.[84]

"The current federal framework is largely an uncoordinated patchwork of laws, regulations, policies, and programs. Some focus on narrowly drawn problems. Many others peripherally address nonindigenous species. In general, present federal efforts only partially match the problems at hand."

– Office of Technology Assessment

The Lacey Act and FNWA provide ample authority for controlling the introduction and spread of invasive species. The listing approach they have adopted, however, has limited their reach. Under the current U.S. system, most non-native plants and animals can be legally imported without any consideration of their potential invasiveness[85] and are often prohibited only after they have become established and have caused significant economic damage.[86] This is termed the "dirty list" approach. As a result, whole categories of organisms are imported without regard to their potential invasiveness, particularly invasives that threaten primarily natural systems. Only a limited number of invasives and potentially invasive species have been banned from importation and release with this listing approach, in large part because the listing process is arduous and time-consuming.[87]

Overall, federal response and devotion of federal resources have been greatest when invasive species infestations have significant economic impacts, and more specifically when they threaten agricultural industries as opposed to natural areas. Approximately 90 percent of federal dollars devoted to invasive species activities in 2000 were provided by USDA, and only 5 percent came from the Department of the Interior, the agency that oversees the national park and wildlife refuge systems.[88] Over 75 percent of federal funding for rapid response to invasive species was spent to control species primarily threatening agriculture crops or livestock. The remainder was spent to control two species threatening the forestry industry.[89] The impact of invasives on natural areas has traditionally received minimal attention from the federal government. In part, this is due to the fact that agencies are often uncertain about who should take the lead, and no one entity is ultimately held accountable.[90] The lack of leadership in this arena also stems from the absence of economically affected and vocal constituencies demanding prompt federal action.[91]

Due to the uncoordinated, disjointed, and complex federal legal framework for addressing invasive species, over twenty federal agencies have responsibilities, authorities, and programs that deal with some facet of non-native species research, use, prevention, control, monitoring, and management (see Appendix D).[92] Invasive species management on federal lands is conducted by a number of land management agencies, including the USDA Forest Service (USDA FS), U.S. Fish and Wildlife Service (FWS), National Park Service, Bureau of Land Management, U.S. Geological Survey, Bureau of Indian Affairs, and Departments of Defense, Energy, and Transportation. Although numerous federal programs deal with biological invasions, they tend to tackle problems species by species, or habitat by habitat, in a reactive rather than proactive manner.[93]

Several federal attempts, however, have been made to craft a more comprehensive and cooperative national response—the creation of the Federal Interagency Committee for the Management of Noxious and Exotic Weeds and the Aquatic Nuisance Species Task Force

[83] 16 U.S.C. §4701(b)(3).

[84] Bean, M. and M. Rowland. 1997. The Evolution of National Wildlife Law, Third Edition. Praeger Publishers. Westport, Connecticut. 568pp.

[85] Westbrooks, R., W. Gregg, and R. Eplee. 2001. My view. Weed Science 49:303-304.

[86] OTA (1993), *supra* note 5.

[87] *Id.* (Under the Lacey Act and the Federal Noxious Weed Act, harmful species continue to be imported legally until added by regulation to a published black list.)

[88] GAO (2000), *supra* note 2.

[89] U.S. General Accounting Office. 2001 (July). Invasive Species: Obstacles Hinder Federal Response to Growing Threat. GAO-01-724. 48pp. [Hereinafter GAO (2001)].
(In 2000, 118 million dollars was spent on agriculturally related invasive species, compared to 30 million dollars for species that threaten forestry and natural areas. Of the 30 million dollars, 80 percent was spent on the Asian long-horned beetle and the European gypsy moth, which threaten forestry-related industries.)

[90] *Id.*

[91] Schmitz, D. and D. Simberloff. 2001. Needed: A National Center for Biological Invasions. Issues in Science and Technology, Summer 2001. <http://www.nap.edu/issues/17.4/schmitz.htm>. (19 February 2002).

[92] GAO (2000), *supra* note 2.

[93] Schmitz and Simberloff (2001), *supra* note 91.

European Gypsy Moth (*Lymantria dispar Linnaeus)*

(ANS Task Force or ANSTF) exemplifies such efforts. Despite limited funding and a lack of program authority, both committees have made substantial contributions to the coordination of federal action on invasive plants and aquatic nuisance species (see Appendix E). The most recent and most promising effort was the establishment of the National Invasives Species Council (NISC) in 1999 through Executive Order 13112 (see Appendix D and Appendix E). This is the first federal council charged with addressing the full spectrum of invasive species issues—clearly a step in the right direction. This council now faces the Herculean challenge of attempting to coordinate the hundreds of prevention, research, and management programs in which all federal agencies are involved. To be effective in this assignment, NISC will certainly require significant staff and resources, as well as more supportive federal infrastructure and statutory authorities.[94]

[94] *Id.* (Schmitz and Simberloff (2001) propose the establishment of a National Center for Biological Invasions to provide a more effective, local-state-federal coordinating mechanism, which they consider essential to the success of nonindigenous species prevention and management in the U.S.)

CHAPTER IV: TURNING TO STATES

Inconsistencies and gaps in current federal laws and policies covering non-native invasive species inhibit clear, comprehensive policymaking and enforcement at the national level.[95] Thus, looking to states to help solve the invasives problem is essential.

States play a significant role in the regulation and management of invasive introductions.[96] Invasive species not only invade by penetrating U.S. borders from other countries but also by crossing interstate lines or natural boundaries within one state or even within one county. States generally control the entry and release of invasive species within their borders, particularly fish and wildlife species.[97] Since states benefit from local knowledge and on-the-ground familiarity with their lands and resources, they may be better equipped to identify and address localized problems. State and local action is essential to ensuring early identification and rapid response to incipient infestations.

Due to considerable biological, social, economic, and political variations among and within many states and regions, there may be distinct local and state invasive species management issues. Federal policies and activities may fail to account for unique threats to and priorities of particular states or regions, in part because the type and level of impacts may vary with different environmental, socio-economic, or political settings. State policies and programs can act as a safety net to address significant invasive species problems not currently covered federally. They also may regulate invasive species more comprehensively and implement policies more effectively than possible under parallel federal laws and programs.[98]

State tools may provide a remedy for weaknesses in federal statutes. They also provide models that states can use when seeking to adopt new legal tools, revise existing ones, or more effectively enforce and implement those already on the books. State experiences and legal approaches provide useful information and a basis for action that can inform and catalyze future state, as well as federal, reforms.

In an effort to provide states with this information, this study identifies all the state statutory and regulatory tools to control, manage, and prevent the introduction of invasive species. These legal authorities were analyzed to determine the types of tools available at the state level. The study considered state statutes and regulations that are specifically designed to address invasive species, as well as those that provide some authority to address invasive species, but which may not have been specifically designed for that purpose. While this study uses specific state programs to illustrate the use of specific tools, it does not seek to evaluate states or compare them to one another. It is important to note that while state laws and policies may exist on the books, they may not be adequately funded or utilized to the full extent of their authority. There is a wide range of tools available at the state level to deal with invasive species. Whether or not states choose to take advantage of these tools is to a large degree dependent on political will.

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[95] Pitts and Miller (2000), *supra* note 80.

[96] *Id.* (The Policy and Regulation Working Group of the Invasive Species Advisory Council for the National Invasive Species Council asserts that while states are able to address the entry of exotic species across state lines and their release within the state, they are unable to stop the importation and release of exotics in neighboring states. Therefore, although increased state attention to the problem of controlling invasives is undeniably needed, the federal government's role in coordinating state programs is necessary as part of any comprehensive effort to protect and restore our nation's natural heritage. Clearly, "wise [national] invasive species policy must include cooperative activities among states, and developed invasive species programs within states for prevention, identification, control, eradication, and education efforts.")

[97] OTA (1993), *supra* note 5. (States retain almost unlimited power, notwithstanding the Lacey Act, to make decisions about which fish and wildlife species are imported and/or released. This is in contrast to several major federal laws, particularly the Plant Protection Act, Federal Noxious Weed Act, and Federal Plant Pest Act, which set national policy for weeds and other plant pests.)

[98] *Id.*

CATEGORY DEFINITIONS

The invasive species tools discussed in this report are grouped into the following five categories:

Prevention – Prevention is the first line of defense against the introduction and spread of invasive species. This category includes tools to prevent the introduction of invasive species and to respond rapidly to early detection.

Regulation – States are often limited in their ability to prohibit the introduction and use of all invasive species within their borders. This category includes tools to regulate which species may enter the state and in what manner they may be used and transported.

Control and Management – Since invasive species have been introduced and become established in all states, measures must be taken to prevent their further spread and decrease their impacts. This category includes tools to control and manage unwanted invasive species and widespread infestations and to restore areas affected by invasives. Control and management measures may include eradication, containment, treatment, and suppression of invasive species.

Enforcement and Implementation – In order to effectively use available laws and regulations state programs must be funded and states must have the ability to enforce violations. This category contains tools to ensure that invasive species laws, regulations, and policies can be enforced and implemented.

Coordination – This category includes tools to facilitate the coordination of work within and across the variety of agencies and organizations involved in state invasive species efforts. Coordination can involve the establishment of a task force or committee or the development of a plan to address one species, a group of species (such as aquatic nuisance species), or all invasive species in the state.

ANALYSIS OF STATE TOOLS

This report highlights seventeen invasive species tools contained in state statutes and regulations. Each tool is a distinct policy step that states have taken to address the invasive species problem. The combination of these different tools results in a comprehensive state policy for addressing invasives. These tools are divided into five main categories:

- Prevention
  - Identifying and mitigating future threats
  - Detection
  - Import/Introduction/Release requirements
  - Quarantines
  - Education
- Regulation
  - Permits and licenses
  - Transportation and shipping requirements
  - Monitoring
  - Bonds and insurance
- Control and Management
  - General control and management authority
  - Emergency powers
  - Biological control agents
  - Restoration
- Enforcement and Implementation
  - Enforcement authorities
  - Funding
- Coordination
  - Councils
  - Plans

The following chapters describe the variety of tools within each broad category listed above that are available to the states. The description for each specific tool includes the following sections:

- Explanation of tool: a detailed definition of the tool and its components
- Comprehensive model: a description of how the tool could be used to its fullest extent along with a description of an exemplary state program
- Intermediate model: a discussion of a state program that has taken steps towards reaching the comprehensive model but could still be strengthened
- Chart: a state-by-state summary that outlines the different tool components that are available in each state

For the purposes of legal review, this report exam-

Africanized honeybee

ines the state statutes and regulations affecting five general categories of invasive species:

- Invasive Wildlife
- Invasive Aquatic Species
- Invasive Plants
- Plant Pests and Diseases, including pathogens and microorganisms
- Insects

As discussed earlier, states have adopted invasive species laws and regulations to address threats from specific invasive species or categories of invasive species. The division of species into these categories is based on the legal definitions states use and not necessarily on an established biological classification. State statutes and regulations that apply to invasive wildlife appear under the invasive wildlife section. The invasive aquatic species section includes state statutes and regulations that apply to invasive aquatic species, including aquatic plants and the regulation of ballast water. The invasive plant section includes state statutes and regulations that apply to invasive plants and biological control agents, or living organisms used as natural enemies in controlling agricultural or environmental pests. The main categories under the invasive plants section are noxious weeds and seeds. The state statutes and regulations that apply to plant pests and diseases, including nurseries, forestry, and quarantine statutes and regulations, are under the plant pests and diseases section. The insect section includes statutes and regulations that address specific insect species, such as bees and ants. Most of the general insect provisions are covered under the plant pest and disease section.

The results of the review of each state's statutes and regulations are presented in state-by-state reports available as an appendix to this report provided on a searchable CD-ROM and on ELI's web site, <http://www.eli.org>.

CHAPTER V: DEFINING AN INVASIVE SPECIES

To manage invasive species effectively, states should first address the fundamental issue of defining what will be legally considered an invasive species. The large majority of non-native species —also referred to as exotic, alien, noxious, foreign, nuisance, introduced, or nonindigenous—do not pose a threat to the natural or human systems in which they are introduced.[99] The small percentage of non-native species that do establish viable populations have the potential to become invasive and cause significant economic, environmental, and/or human health consequences. In addition, non-native species that become established can vary widely in the rate of their spread and the harm they cause.

Therefore, states should develop a definition for determining which non-native species will be considered invasive for the purposes of regulation. This definition will then designate the species to which their laws, regulations, and policies will apply. For example, if a state's laws apply only to those species that have been labeled "pests," how the state makes that determination becomes very important in the number of species to which the law applies. The more broadly a state defines the category of species that a particular tool is designed to address, the more leeway states have to utilize the tool to handle all invasive species, even if the law was originally adopted to deal with a more narrow set of species, such as those that impact agriculture.

Although a great deal is known about the general factors that facilitate invasions, specific scientific principles that could be used to predict the potential invasiveness of non-native species in a range of environmental conditions are, unfortunately, absent.[100] The scientific community has much to contribute to help proactively identify potential invaders before they are introduced and cause significant damage. Through the help of the scientific community, states can increase their ability to predict which non-native species have the potential to be the next harmful invader. Although it may be more appropriate for the federal government to coordinate screening programs, states can play a critical role, as many non-native species may be invasive in only certain states.

States use a variety of terms to refer to invasive species, including non-native, nonindigenous, noxious, alien, pest, and exotic. This presents a problem for comparing programs from state to state. A species that falls into a legal definition of an "invasive species" for the purposes of regulation and control in one state may not meet the legal definition in another.

Currently, most states do not use one term, such as "invasive species" to refer to all classes of invasives, but rather use multiple terms to refer to separate classes of invasive species. A term such as "non-native" refers to invasive wildlife and another term such as "noxious" refers to invasive plants and still another term such as "pests" refers to plant diseases. Without a comprehensive definition of invasive species, the tools that a state authorizes are restricted to a subpart, such as only to invasive wildlife or only to plant diseases. "Pest," as used by some states, provides the most comprehensive definition as it often refers to many different species. Most states, however, define the term "pest" in relation to its effect on the agricultural industry, rather than considering the effect of the pest species on the environment as a whole.

In the state statute and regulations addressing **wildlife** and **aquatic species**, almost 90 percent of the states do not define the terms that they use for invasive species. It is assumed, however, that the use of terms such as "non-native" or "nonindigenous" refer to all species that are not native to a particular state. Some states, such as Georgia, Hawaii, and Tennessee, have expanded upon this to specifically exclude from the non-native or nonindigenous definition species that have been introduced by a state agency. Kentucky has expanded its

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[99] Alien Plant Working Group. 2000 (July 11). "Alien Plant Invaders of Natural Areas: Background." <www.nps.gov/plants/alien/bkgd.htm>. (15 Nov 2001). (Organisms are considered non-native when they occur in locations beyond their known historical natural ranges and are brought in from other continents, regions, ecosystems, or habitats.)

[100] BANR (2002), *supra* note 16.

definition of non-native to include as invasive those animals that have been extirpated from Kentucky and cannot be reasonably expected to survive in the wild if introduced. New Hampshire defines exotic aquatic weeds as those that were not part of New Hampshire's aquatic flora before 1950.

In contrast, in the state statutes and regulations addressing invasive **plants**, almost 90 percent of the states define either the term "noxious weeds" or "noxious weed seeds." Only six states do not define either noxious weeds or noxious weed seeds.[101] The majority of state definitions of noxious weeds or noxious weed seeds focus on the difficulties associated with controlling the plant and the effect of the plant on agriculture. For example, thirty-five states[102] define prohibited weeds or weed seeds as those that are "highly destructive and difficult to control by ordinary good cultural practices," and thirty-two states[103] define restricted weeds or weed seeds as those that are "objectionable in fields but able to be controlled through cultural practices." Five states define noxious weeds based on whether the plant is a serious agricultural threat.[104] Three states, Minnesota, Montana, and New Mexico, have expanded their definition to consider the effect of the plant on the environment and not just on agriculture. Six states have also expanded their definition to consider the effect of the plant on human health.[105] Five states define noxious weeds based on whether the plant is detrimental and difficult to control.[106] Five states combine both of these definitions to include whether the plant is difficult to control and whether it is injurious to agriculture, health, and the land.[107]

The state statutes and regulations addressing **plant pests and diseases** offer the greatest potential for a comprehensive definition of invasive species since many of the states' definitions include many types of species. Although they use the term, fifteen states do not define their use of "pests."[108] Kentucky and Maryland have only a vague definition that refers to plants that can "normally be considered a pest." With a narrow scope, Oregon and Pennsylvania only define forest pests. Currently, most state definitions of "pest" are targeted at the protection of agriculture and focus on the impact to economically valuable plants. The most common definition of "pest," which is used by fifteen states, is a variation on "insects, mites, nematodes, slugs, snails, protozoa, invertebrate animals, bacteria, fungi, parasitic plants, virus, or anything that can injure plants or present a threat to agriculture."[109] States, however, have begun to expand this definition in two ways. First, a few states have expanded on the categories of species that can be considered pests to also include vertebrate animals. Four states, Arizona, Minnesota, South Carolina, and Wisconsin, while still focusing on the impact to plants, expanded the definition to include animals, and California includes any organism dangerous to the agricultural industry. Second, a few states have expanded their definition of pest beyond its impact on agriculture. For example, Oklahoma considers whether the organism is a significant threat to agriculture or the general environment. Two states, Georgia and Tennessee, also consider the impact on "other interests of the state," and Maine considers whether the pest would cause "injury." Two other states, Hawaii and Idaho, also consider the impact on livestock, and Michigan and South Dakota consider whether the pest is liable to spread.

In the state statutes and regulations addressing **insects**, only eight states define what constitutes an invasive insect.[110] Many states instead include insects in their definition of plant pest, as discussed above. Five of the eight states that do provide a definition base their definition on the threat to the apiary industry.[111] Arizona bases its definition of an invasive insect on the capability of that insect to carry disease-causing organisms. Hawaii broadly defines an injurious insect as an

[101] Arkansas, Kansas, Ohio, Texas, Vermont, and Washington.
[102] Alaska, Arizona, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, North Carolina, North Dakota, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Utah, Virginia, Washington, and West Virginia.
[103] Alaska, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, North Carolina, North Dakota, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Virginia, Washington, and West Virginia.
[104] Alabama, Delaware, Maryland, Nebraska, and New York.
[105] Idaho, North Carolina, South Carolina, Utah, Virginia, and West Virginia.
[106] Arizona, Florida, Nevada, Washington, and Wyoming.
[107] California, Colorado, Hawaii, North Dakota, and South Dakota.
[108] Alaska, Arkansas, Colorado, Connecticut, Florida, Illinois, Indiana, Iowa, Louisiana, Massachusetts, Nevada, New Jersey, Texas, Utah, and Wyoming.
[109] Alabama, Delaware, Kansas, Mississippi, Missouri, Montana, Nebraska, New Mexico, North Dakota, Ohio, Rhode Island, Vermont, Virginia, Washington, and West Virginia.
[110] Arizona, Hawaii, Illinois, Iowa, New Hampshire, North Carolina, Oklahoma, and South Dakota.
[111] Iowa, New Hampshire, North Carolina, Oklahoma, and South Dakota.

Purple loosestrife (*Lythrum solicaria*)

insect detrimental to industry, public health, or natural resources or that has an adverse effect on the environment. Illinois bases its definition on whether a species of bee may present a hazard to beekeeping and/or the public.

A comprehensive definition of invasive species would include a wide variety of species and would focus on the impact of the species on natural areas and public health, rather than specifically on its impact to agriculture. An alternative to this model would be several taxa-specific definitions for different statutes that would still cover all potential invasive species and would focus on the broad impact of the species on natural areas and public health. This alternative would require the passage of a greater number of statutes or a greater number of revisions to statutes and would need to be coordinated to ensure that no taxa of invasives is omitted.

New Hampshire, for example, has adopted a comprehensive definition. A New Hampshire statute defines an invasive species as an alien species whose introduction causes or is likely to cause economic or environmental harm or harm to human health. This definition could encompass all taxa of invasive species. In addition, this definition considers both the economic and environmental effect of the potentially invasive species.

Several states have taken incremental steps toward adopting this comprehensive definition. For example, Oklahoma defines a pest as an insect, snail, nematode, fungus, bacteria, weed, parasitic plant, or plant that is a significant threat to agriculture, silviculture, horticulture, or the environment as a whole. While this definition excludes wildlife and aquatic animals, it considers the impact of the species on the general environment. Minnesota's definition of pest includes any form of plant or animal life that is dangerous to plants. This definition allows all plants and animals to be considered pests but focuses exclusively on the effect of these species on plants. If states want to be able to use their existing tools more broadly they may be able to do so by amending the existing definition in their current laws.

Once a state has defined what constitutes an invasive species, it may then build on this definition by creating lists that designate specific species that fall under the adopted definition and therefore should be regulated. These lists may then be used to determine which species can be imported, transported, released, or possessed in the state. Lists have the advantage of specificity in that they clearly outline which species are to be regulated. Lists, however, may also be limiting if they narrowly target the number and type of species that the state may regulate. There are at least two approaches, a dirty list and a clean list. The dirty list prohibits certain unacceptable species and allows unlisted species to be imported. This approach places the burden on regulators to determine whether a species is harmful.[112] An alternative to the dirty list is the clean list approach, which prohibits all species unless they are determined to be acceptable. This puts the burden on the importer to prove that a species is not harmful prior to its introduction. The use of a clean list is a more stringent, proactive approach to the regulation of non-native and potentially invasive species.[113]

The use of lists can help target which species the state chooses to regulate, but it can also narrow the scope by limiting the number and type of targeted species. The authorization alone for the creation of lists does not guarantee that a state is regulating a wide spectrum of invasive species. How aggressively states choose to develop and implement their lists will dictate the

[112] OTA (1993), *supra* note 5.
[113] *Id.*

strength of the state's invasive species policies. Although listing species may prove scientifically challenging, it enables states to regulate a clear number of species.

Adopting a dirty list was the traditional approach and is still widely used among most state and federal plant regulatory agencies. Under this listing approach, all species are permitted entry unless they are formally listed. This "pick and choose" approach to listing was effective in earlier days before modern trade and transportation created numerous new vectors and pathways for the spread of harmful species. At that time the main concern was a few high profile, readily apparent crop and livestock pests such as the gypsy moth (*Lymantria dispar*) and imported fire ants (*Solenopsis invicta*) that threatened the nation's food and fiber production.

Recognizing that the content of the lists is extremely important in determining the strength of a state's policies, this report also examines the process states use in creating their lists. Some states authorize the state agency to create the lists without public input. Other states allow the public to comment on the lists. In addition, some states may authorize the formation of advisory committees to provide input on the content of the lists. When states fail to specify the process for adding to lists, the state agency may issue regulations or guidelines for specifying the content of the lists. Finally, states may adopt a prescribed prescreening approach that would require all imported species to be assessed for their invasiveness to determine if they should be regulated (placed on a dirty list) or permitted entry (placed on a clean list). Under this approach, every imported species would be assessed to determine if it should be formally regulated, discouraged from use, or approved for entry. [114]

Some states do not choose to use lists to identify regulated species but instead may prohibit any invasive species to be imported or released without a permit. The use of permits will be discussed in the prevention category under the import/introduction/release requirements tool. This approach also puts the burden on the importer to prove that a species is not harmful.

In the state statutes and regulations addressing **wildlife**, fifteen states do not use listing.[115] Of the states that do, the traditional dirty list approach is still more prevalent than the clean list. Twenty-nine states[116] use a dirty list for imports, while seventeen states[117] use a clean list for imports. Sixteen states[118] use a dirty list for releases, and only five states[119] use a clean list for releases. Mississippi has authorized its fish and wildlife department to create a clean and a dirty list, but these lists have not been generated. In determining the content of the lists, fourteen states authorize the state agency to create the lists without public input.[120] Two states, Colorado and Utah, allow the public to petition for changes to the lists. Only two states, Hawaii and Tennessee, authorize the creation of advisory committees with the ability to comment on the lists. Seventeen states do not specifically mention the process used to generate their lists.[121]

In the state statutes and regulations addressing **aquatic life**, thirteen states do not use listing.[122] Of the states that do authorize lists, the traditional dirty list is still more prevalent than clean lists, but the number of states authorizing clean lists under the aquatic life section is higher than under the wildlife section. Twenty-eight states[123] use a dirty list for imports, while twenty-

[114] Westbrooks, Randy. U.S. Geological Survey, Whiteville, NC. *Personal communication.* (May 10, 2002).

[115] Alaska, Arizona, Delaware, Florida, Indiana, Iowa, Maine, Michigan, North Carolina, Ohio, Oklahoma, South Dakota, Texas, Vermont, and West Virginia.

[116] Alabama, Arizona, California, Colorado, Connecticut (quadrupeds), Georgia, Hawaii, Kansas, Kentucky, Louisiana (quadrupeds), Maryland (reptiles and amphibians), Minnesota, Mississippi, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota (nontraditional livestock), Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Utah, Virginia, Washington, and Wyoming.

[117] Colorado, Idaho, Illinois, Maryland (reptiles and amphibians), Massachusetts, Minnesota, Missouri, Montana, Nebraska (reptiles and amphibians), Nevada, New Hampshire, New Jersey, Oregon, Pennsylvania, South Carolina, Tennessee, and Wyoming.

[118] Alabama, Arizona, California, Colorado, Connecticut (quadrupeds), Hawaii, Illinois, Kansas, Kentucky, Minnesota, Montana, New Hampshire, New Jersey, South Carolina, Virginia, and Washington.

[119] Colorado (birds), Hawaii, Minnesota, New Hampshire, and Tennessee.

[120] California, Georgia, Idaho, Kansas, Massachusetts, Minnesota, Missouri, Montana, New Hampshire, New York, Rhode Island, Washington, and Wisconsin.

[121] Alabama, Arizona, Connecticut, Illinois, Kentucky, Louisiana, Maryland, Mississippi, Nebraska, Nevada, New Jersey, New Mexico, North Dakota, Oregon, Pennsylvania, South Carolina, and Virginia.

[122] Alaska, Delaware, Idaho, Maine, Missouri, New Jersey, Oregon, Rhode Island, South Dakota, Vermont, West Virginia, Wisconsin, and Wyoming.

[123] Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Minnesota, Mississippi, New Hampshire, New York, North Carolina (aquatic weeds), Ohio, Oklahoma, South Carolina, Tennessee, Texas, Utah, Virginia, and Washington.

one states[124] use a clean list for imports. Fifteen states[125] use a dirty list for releases, and seven states[126] use a clean list for releases. North Dakota authorizes the wildlife agency to promulgate a clean list of fish, but this list has yet to be created. In determining the content of the lists, eleven states authorize the state agency to create lists without public input.[127] Only one state, Utah, allows the public to request a change to the list. Four states authorize the creation of advisory committees.[128] Twenty-two states do not specifically mention the process used to generate the lists.[129]

In the state statutes and regulations that address invasive **plants**, only Vermont does not authorize listing. Thirty-six states[130] have dirty lists of plants, and forty-one states[131] have a dirty list for seeds. In addition, Washington and Colorado have lists of weeds that must be monitored. Texas has authorized the state department of agriculture to promulgate a noxious weed list, but the list has not yet been created. In determining the content of these lists, sixteen states authorize a state agency to determine the content without outside input.[132] Georgia relies upon the federal noxious weed list and therefore does not take an active role in determining the content of its own list. Nine states authorize a public hearing to create the lists.[133] Seven states authorize an advisory committee to participate in the creation of the lists.[134] Iowa authorizes input from the state botanist, and Illinois, North Dakota, and Oregon authorize input from their state universities. Twenty states do not specifically mention how the lists are generated.[135]

In the state statutes and regulations that address **plant pests and diseases**, only twelve states authorize the creation of a list.[136] Three of these states, Arkansas, Florida, and Iowa, have dirty lists for import and release. Of the twelve states that publish a list, eight states do not specifically mention the process used to create the lists.[137] Hawaii's list is created by the state agriculture department, and additions to the list can be initiated by the head of the department or at the request of the government or private organizations, with final approval by the Board of Agriculture. For Wyoming's list, any person may make a proposal to the district board that then passes the proposal to the Weed and Pest Council. The council can then pass it onto the Board of Agriculture for approval. Arkansas' list is promulgated by the State Plant Board and Iowa's by the state entomologist.

The state statutes and regulations that address **insects** narrowly include only ants and bees. There are also some general statutes that pertain to insects. Only five states authorize a list for regulating insects.[138] California has a clean list of insects that may be imported and shipped without a permit, and Florida has a dirty list of honeybee pests that may not be imported. New Hampshire has both a clean and dirty list of insect pests.

[124] California, Hawaii, Illinois, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Utah, and Virginia.

[125] Alabama, Arizona, Arkansas, Colorado, Florida, Hawaii, Indiana, Kansas, Minnesota, Mississippi, New Hampshire, South Carolina, Texas, Virginia, and Washington.

[126] Hawaii, Illinois, Minnesota, Montana, New Hampshire, North Carolina, and Tennessee.

[127] Florida, Georgia, Kansas, Massachusetts, Minnesota, Montana, New Hampshire, New York, North Carolina (aquatic weeds), North Dakota, and Pennsylvania.

[128] Hawaii, Maryland, Ohio, and Tennessee.

[129] Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Illinois, Indiana, Iowa, Kentucky, Louisiana, Michigan, Mississippi, Nebraska, Nevada, New Mexico, North Carolina (exotic fish), Oklahoma, South Carolina, Texas, Virginia, and Washington.

[130] Alabama, Alaska, Arizona, Arkansas, California, Colorado, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Maryland, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Utah, Virginia, Washington, Wisconsin, and Wyoming.

[131] California, Colorado, Connecticut, Delaware, Florida, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[132] Arkansas, California (weeds), Colorado (seed), Delaware, Idaho, Maine, Massachusetts, Missouri (weeds), New Jersey, North Dakota (seed), Oklahoma (seed), South Carolina, Utah, Virginia (seed), and Wisconsin.

[133] Alabama, Arizona, Colorado (weeds), Maryland, Minnesota (seeds), New Mexico, Rhode Island, Tennessee, and Virginia (weed).

[134] California (seed), Minnesota (weeds), Montana, Pennsylvania, South Dakota (weeds), Washington, and Wyoming.

[135] Alaska, Connecticut, Florida, Hawaii, Indiana, Iowa (seeds), Kansas, Kentucky, Louisiana, Michigan, Mississippi, Missouri (seed), Nebraska, Nevada, New Hampshire, New York, North Carolina, Ohio, South Dakota (seed), and West Virginia.

[136] Arkansas, California, Florida, Hawaii, Iowa, Mississippi, South Carolina, South Dakota, Tennessee, Texas, and Wyoming.

[137] California, Florida, Louisiana, Mississippi, South Carolina, South Dakota, Tennessee, and Texas.

[138] California, Florida, Maryland, New Hampshire, and South Dakota.

Only California and South Dakota describe how their lists are generated and both rely on the state agency without outside input.

A comprehensive listing approach should contain a state policy requirement to develop clean lists for both imports and releases, with best available scientific information. States that choose to create lists should adopt clean lists, which identify species approved for import, introduction, or release, and result in the regulation of all other non-listed invasive species.[139] The use of a clean list is a more stringent, proactive approach to the regulation of non-native and potentially invasive species and places the burden on the importer to prove that the new species will not pose any economic or environmental threat. In addition, states should create advisory committees to secure scientific input in the creation of these lists. Due to increased global trade and travel the nation is much more vulnerable than ever to harmful non-native species that have not been assessed for invasiveness. To counter this rapidly emerging threat to biological security, state agencies could adopt a mandatory prescreening approach in which all imported plants and animals are prescreened for invasiveness to determine if they should be prohibited entry (i.e., listed), regulated entry (e.g., harmful species with commercial benefits), or approved for entry.

Hawaii's statutes and regulations, for example, authorize a comprehensive list. The statutes and regulations authorize the creation of both clean and dirty lists for the release of wildlife and aquatic species. Hawaii's statutes and regulations also authorize the establishment of lists of plant pests and lists of restricted and prohibited plants. Its policies authorize the establishment of an advisory committee to provide scientific input on the content of the wildlife and aquatic life lists.

After developing a definition and method for identifying invasive species for the state, the state should then adopt and enforce state statutes, regulations, and policies for the control, use, and management of these species.

[139] OTA (1993), *supra* note 5. (Clean lists designate non-native invasive species that are approved for import, introduction, or release. Thus, this approach generally presumes that all species should be prohibited unless they have been officially listed as allowed or "clean." In contrast, dirty lists designate species that are banned from import, introduction, or release. This listing approach presumes that all species may be allowed unless they have been listed as prohibited. The latter approach is the one that dominates federal and state decisionmaking.")

CHAPTER VI: PREVENTION

Preventing the introduction and establishment of invasives is the most proactive and cost-effective strategy that states can adopt in the long run.[140] Once a state has defined and identified what it considers to be an invasive species, the state should then take action to prevent their introduction, transport, and spread. State tools that can be used to accomplish this goal include:

- Identifying and mitigating future threats
- Detection
- Import/Introduction/Release requirements
- Quarantines
- Education

1. IDENTIFYING AND MITIGATING FUTURE THREATS

Explanation of Tool

Determining which species pose a threat to native flora and fauna, public health, and the economy is an important aspect in identifying the non-native species to be controlled. States can then develop strategies to counteract these specific threats and to mitigate known invasive pathways. Some states have begun to study potential invasive species in order to enable officials to better predict which species present a danger to the state and their pathways for introduction and spread. This knowledge enables state officials to stop invasives at the borders and make quick decisions about whether and how to control or eradicate them before widespread infestation.

Studies identifying future threats are not widely authorized through state law or regulations. In fact, no states use this tool in their statutes and regulations addressing **wildlife** or in those addressing **insects**, and for **aquatic life**, only three states, Florida, Washington, and Wisconsin, authorize this tool. Florida identifies invasive aquatic plants that have invaded areas with climates similar to Florida's and places them on a prohibited aquatic plant list. Washington authorizes its Aquatic Nuisance Species Committee to consult with representatives from industries and other activities that may serve as pathways in order to develop practical strategies that will minimize the risk of new introductions. Wisconsin authorizes reports on areas that are highly susceptible to damage by aquatic nuisance species.

In the state statutes and regulations that address invasive **plants**, eight states authorize studies to identify future threats.[141] Two states, Florida and Hawaii, authorize the most comprehensive versions of this tool. Florida has a Pest Exclusion Advisory Committee that is charged with identifying non-native plants and pests in foreign countries that could pose a threat to agriculture in Florida. The committee must also identify areas at high-risk from the introduction of these species. In Hawaii, the Division of Plant Industry is authorized to conduct a continuous program of study and evaluation of potential noxious weeds and specific plant species. Four states, Colorado, Montana, Oregon, and Washington, have the authority to identify new and potentially harmful noxious weeds and to develop lists of weeds that are not yet present in their states but are in nearby states and are capable of invading. Illinois authorizes the director of agriculture to investigate noxious weeds outside of Illinois to protect the agriculture industry. Lastly, Virginia authorizes the identification of non-native plant species that have the potential to become invasive.

In the state statutes and regulations that address **plant pests and diseases**, three states, California, Florida, and Hawaii, authorize studies to identify future threats. California authorizes the State Department of Agriculture, along with the USDA and other state agencies, to conduct pest and disease investigations outside of California to protect the state's own agricultural industry. California also authorizes the creation of high-risk pest exclusion programs in each county and authorizes the identification and listing of countries that are potential sources of invasive plant and animal pests. Florida has

[140] NISC Management Plan (2001), *supra* note 6.

[141] Colorado, Florida, Hawaii, Illinois, Montana, Oregon, Virginia, and Washington.

a Pest Exclusion Advisory Committee to identify non-native plants and pests in foreign countries that pose a threat to Florida and to identify high-risk areas for their introduction. Hawaii authorizes a continuous program of study and evaluation of insects, mites, pests, and diseases for potential designation as pests and authorizes the gathering of information on insects and diseases injurious to vegetation and the ways of preventing those that are not yet in the state.

Once a state is aware of future threats, it can turn to the mitigation of known invasive pathways. Once a certain pathway is known to facilitate entry of invasive species, a state may require that this pathway be limited to prevent the occurrence of invasive species. For example, a state may require that suspect imported lumber be treated before it can enter the state.

Management of ballast water, a common invasives pathway, is an important tool for preventing the introduction of aquatic nuisance species in those coastal and Great Lakes states with interstate and international shipping industries.[142] Six states authorize an aquatic nuisance control program but do not provide specifics in their statutes and regulations on what this constitutes.[143] Hawaii authorizes an interagency team to address ballast water treatment but does not outline the specifics of the team's responsibilities. Only four states, California, Maryland, Michigan, and Washington, require vessels to use specified ballast water management practices. Alaska prohibits the discharge of ballast water from a cargo tank or a tank vessel, unless necessary for the safety of the vessel. Ohio and Wisconsin require boat operators to remove visible aquatic plants and animals before leaving state waters. Managing ballast water is inherently cross-jurisdictional due to the nature of the shipping industry, thus there is great opportunity for the federal government to play a significant role in ensuring that management practices are uniform across affected jurisdictions—both across states and internationally.

[142] Natural Research Council's Commission on Ship's Ballast Operations. 1996. Stemming the Tide: Controlling Introductions of Nonindigenous Species by Ship's Ballast Water. National Academy Press, Washington D.C. 160pp.

[143] Massachusetts, Minnesota, Ohio, Vermont, Virginia, and Wisconsin.

Comprehensive Model

A comprehensive state strategy to identify and mitigate future threats should include a program to research potential future invaders into the state, identify high-risk areas, and determine future invader pathways. Florida's and Hawaii's statutes and regulations, as examples, authorize strong proactive policies to identify potential invasive species threats. Florida's policies have created a Pest Exclusion Advisory Committee to identify non-native plants and pests in foreign countries that may pose a future threat to the state, to identify high-risk areas for pest introduction, and to develop partnerships with other public and private entities to assist in implementing a pest exclusion program. Hawaii's policies authorize a program of continuous study and evaluation of insects, mites, pests, and diseases for potential designation as pests and authorizes the gathering of information on insects and diseases injurious to vegetation and ways of preventing such invasives from entering the state.

Michigan also recently adopted a strong policy with respect to the treatment of ballast water. Under Michigan's policy vessel operators must provide confirmation that they are using recommended ballast water treatment methods. These confirmed vessels will then be placed on a list. Vessels that are not on the list and anyone who contracts with a vessel that is not on the list, will not be eligible for a new grant, loan, or award from the state agency. While Michigan has a strong policy with respect to the treatment of ballast water, Michigan's policies overall fail to authorize surveying for invasive species or mapping for invasive species locations and sensitive areas.

Intermediate Model

While Colorado's policies do not authorize a comprehensive study of future threats, they do provide an example of strong initiative and demonstrate that Colorado has taken incremental steps towards the comprehensive model. Colorado's policies authorize the creation of lists of weeds that are not yet established in the state but that counties are encouraged to contain and eradicate before they proliferate and have a significant impact. The strength of Colorado's program is that it identifies and enables counties to be alert to harmful plant introductions. Colorado's policy could be further strengthened by authorizing a specific entity to evaluate methods of preventing the introduction of these identified weeds.

TABLE 1: IDENTIFYING AND MITIGATING FUTURE THREATS

The states that specifically authorize the identification and mitigation of future invasive species threats to their state in their statutes and regulations.

STATE	WILDLIFE	AQUATIC LIFE	PLANT	PLANT PEST	INSECT
ALABAMA					
ALASKA					
ARIZONA					
ARKANSAS					
CALIFORNIA				X	
COLORADO			X		
CONNECTICUT					
DELAWARE					
FLORIDA		X	X	X	
GEORGIA					
HAWAII			X	X	
IDAHO					
ILLINOIS			X		
INDIANA					
IOWA					
KANSAS					
KENTUCKY					
LOUISIANA					
MAINE					
MARYLAND					
MASSACHUSETTS					
MICHIGAN					
MINNESOTA					
MISSISSIPPI					
MISSOURI					
MONTANA			X		
NEBRASKA					
NEVADA					
NEW HAMPSHIRE					
NEW JERSEY					
NEW MEXICO					
NEW YORK					
NORTH CAROLINA					
NORTH DAKOTA					
OHIO					
OKLAHOMA					
OREGON			X		
PENNSYLVANIA					
RHODE ISLAND					
SOUTH CAROLINA					
SOUTH DAKOTA					
TENNESSEE					
TEXAS					
UTAH					
VERMONT					
VIRGINIA			X		
WASHINGTON		X	X		
WEST VIRGINIA					
WISCONSIN		X			
WYOMING					

GIANT SALVINIA (*Salvinia molesta*)

2. DETECTION

Explanation of Tool

Detection tools used by states are an important first line of defense against the spread of invasives once they begin to invade a state. Detection is important to ensure that new invasive species are promptly identified, reported, and addressed. States can then make decisions about how and whether to contain or eradicate the threat before it spreads and causes widespread damage. Components of the detection tool include:

- Surveying for invasive species
- Mapping invasive species locations and sensitive areas
- Inspection authority

The first component of the detection tool is surveying, which ideally consists of a program that systematically searches the state for an invasive species. States that authorize surveying for plant pests, for example, enable the state to quickly detect an invasion. The ability to survey for invasive species on both private and public lands is crucial for fully understanding which species are posing a risk and the extent to which the species has already spread. Ideally, invasive surveying efforts should be coordinated between states as part of a regional or national effort. If survey methods are uniform, they can help to build a valuable data infrastructure on the spread of invasive species. The second detection component involves mapping invasive species locations and sensitive areas. Mapping allows the state to track and isolate invasions and also to be aware of areas that are prone to infestations.

The third component of detection is inspection authority, or investigation authority in some states. Inspection authority is vital if states are to detect infestations before they spread. Components of this inspection authority include the ability to inspect on public and private lands, notice requirements, and border inspection stations. This section focuses on the ability of the states to conduct investigations to detect the presence of invasive species, rather than on the use of routine inspections, which will be discussed under the regulation section. Border inspection stations are important for stopping unwanted invasive species before they enter the state. Some invasive species that are prohibited in one state may be legally acquired in another state, and thus border inspection stations are useful in stopping the importation of unwanted invasives.

The detection tool is authorized least often in the state statutes and regulations that address **wildlife**. Only one state, Utah, authorizes the first component of detection, the survey authority. No states authorize mapping authority. Eleven states authorize the third component of detection, the inspection or investigation authority.[144] Two of these eleven states, California and Hawaii, authorize border inspection stations. Hawaii and Kentucky authorize the inspection of public and private lands. The remainder of the states that authorize either the survey or inspection authority do not specify the types of land to which it applies.

In the state statutes and regulations that address **aquatic life**, the detection tool is only authorized in a limited number of states, but is more prevalent than in the wildlife context. Nine states authorize surveying for invasive species, but these states only survey for a limited number of invasive species.[145] Only one state, Indiana, authorizes the mapping of invasive species lo-

[144] California, Hawaii, Illinois, Kentucky, Maine, New Hampshire, New Jersey, Rhode Island, South Carolina, Virginia, and West Virginia.

[145] California (hydrilla), Delaware (giant reed grass), Florida (noxious aquatic plants), Maine (infested waters), Maryland (giant reed grass), Minnesota (purple loosestrife), North Carolina (giant salvinia), South Carolina (aquatic plants), and Wisconsin (aquatic nuisance species).

cations and sensitive areas, and specifically the mapping of zebra mussel locations. Nineteen states authorize the inspection/investigation authority.[146] Three of these nineteen states, California, Hawaii, and Montana, authorize border inspection stations. Ten states authorize the inspection and survey authority on both public and private lands, and the rest of the states do not specify the scope of this authority.[147]

The detection tool is widely authorized in the state statutes and regulations that address invasive **plants**. Nine states authorize surveying for invasive plants.[148] Three states, California, Montana, and Utah, authorize mapping of invasive species locations and sensitive areas. Thirty-eight states authorize the investigation/inspection component of the detection tool.[149] Three of these thirty-eight states, Arizona, Florida, and Hawaii, authorize border inspection stations. Thirty states authorize the inspection or survey on both public and private lands.[150] Texas and Wisconsin limit their inspection authority to private land, and the rest of the states do not specify the types of land that can be inspected or surveyed.

The detection tool is most widely authorized in the state statutes and regulations that address **plant pests and diseases**. Twenty-four states authorize surveying for plant pests and diseases.[151] Only one state, California, authorizes the mapping component. Almost all states, forty-seven, authorize the inspection/investigation component of the detection tool.[152] Of these forty-seven states, five states authorize border inspection stations.[153] Thirty-six states authorize surveys or investigations on private and public lands.[154] Two states, Montana and Wisconsin, limit the survey authority to agricultural lands. Oregon limits its survey authority to nonfederal lands and Texas limits its authority to private lands. The rest of the states do not specify the types of lands that may be investigated or surveyed.

The detection tool is only authorized in a limited number of state statutes and regulations that address **insects**. Only two states, Minnesota and New Mexico, authorize surveying for insects: Minnesota authorizes grasshopper surveys, and New Mexico authorizes the determination of range pest areas. No states explicitly authorize mapping. Thirty states authorize inspections.[155] Fourteen states authorize inspection on public and private lands, and the rest of the states do not clarify the limits of the inspection authority.[156]

Although only twenty-four states authorize surveying and one authorizes mapping through their statutes and regulations that address plant pests and diseases, many states perform these activities through a cooperative agreement with or in partnership with the federal government. For example, the Forest Health Monitoring program is a federal-state partnership to survey and map forest insect and disease occurrences nationwide.[157]

[146] Arizona, California, Connecticut, Delaware (giant reed grass), Hawaii, Illinois, Indiana, Iowa, Kentucky, Maine (aquatic plants), Minnesota, Montana, Nebraska, Oregon, Rhode Island, South Carolina, Tennessee, West Virginia, and Wyoming.

[147] Arizona, California, Delaware, Hawaii, Illinois, Kentucky, Minnesota (with notice), Montana (with notice), Oregon, and South Carolina.

[148] Arkansas, California, Delaware, Iowa, Kansas, Maryland, Montana, Nevada, and West Virginia.

[149] Alabama, Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Carolina, North Dakota, Oregon, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[150] Alabama, Arizona, Arkansas, California, Colorado (consent or warrant), Connecticut, Delaware, Georgia, Hawaii, Idaho, Indiana (notice), Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Montana, Nebraska, Nevada, New Mexico (consent), North Carolina, North Dakota, Oregon, South Carolina (warrant), South Dakota (consent or warrant), Utah, Virginia, Washington, West Virginia, and Wyoming.

[151] Alaska, Arkansas, California, Delaware, Florida, Indiana, Iowa, Maine, Minnesota, Mississippi, Missouri, Montana, Nevada, New Jersey, North Dakota, Oregon, Pennsylvania, South Carolina, South Dakota, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

[152] Alabama, Alaska, Arizona, Arkansas, California, Colorado, Delaware, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[153] Arizona, California, Hawaii, Louisiana, and Mississippi.

[154] Alabama, Alaska, California, Colorado (consent or warrant), Delaware, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico (consent), New York, North Dakota (consent or warrant), Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia (with notice), Washington, West Virginia, and Wyoming.

[155] Alabama, Alaska, Arizona, Arkansas, Colorado, Delaware, Hawaii, Idaho, Illinois, Iowa, Kansas, Louisiana, Minnesota, Mississippi, Missouri, Nevada, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Utah, Virginia, Washington, West Virginia, and Wisconsin.

[156] Arizona, Arkansas (notice), Delaware, Illinois, Kansas, New Hampshire, New York, Ohio (consent or warrant), Oklahoma, Pennsylvania, South Dakota, Tennessee, Virginia, and West Virginia (consent).

[157] U.S.D.A. Forest Service. "National Forest Health Monitoring Program." <http://www.na.fs.fed.us/spfo/fhm/index.htm>. (5 May 2002).

TABLE 2: DETECTION TOOL

The states that authorize the different types of detection tools: surveying for invasive species, mapping invasive species locations and sensitive areas, and random inspections for invasive species.

STATE	SURVEY	MAPPING	INSPECTION
ALABAMA			P, D, I
ALASKA	D		P, D, I
ARIZONA			A, P, D, I
ARKANSAS	P, D		D, I
CALIFORNIA	A, P, D	P, D	W, A, P, D
COLORADO			P, D, I
CONNECTICUT			A, P
DELAWARE	A, P, D		A, P, D, I
FLORIDA	A, D		P, D
GEORGIA			P, D
HAWAII			W, A, P, D, I
IDAHO			P, I
ILLINOIS			W, A, P, D, I
INDIANA	D	A	A, P, D
IOWA	P, D		A, P, D, I
KANSAS	P		P, D, I
KENTUCKY			W, A, P, D
LOUISIANA			D, I
MAINE	A, D		W, A, D
MARYLAND	A, P		P, D
MASSACHUSETTS			P, D
MICHIGAN			D
MINNESOTA	A, D, I		A, P, D, I
MISSISSIPPI	D		D, I
MISSOURI	D		P, D, I
MONTANA	P, D	P	A, P, D
NEBRASKA			A, P, D
NEVADA	P, D		P, D, I
NEW HAMPSHIRE			W, P, D, I
NEW JERSEY	D		W, D, I
NEW MEXICO	I		P, D, I
NEW YORK			D, I
NORTH CAROLINA	A		P, D
NORTH DAKOTA	D		P, D
OHIO			D, I
OKLAHOMA			D, I
OREGON	D		A, P, D
PENNSYLVANIA	D		D, I
RHODE ISLAND			W, A, D
SOUTH CAROLINA	A, D		W, A, P, D
SOUTH DAKOTA	D		P, D, I
TENNESSEE			A, P, D, I
TEXAS			P, D
UTAH	W	P	P, I
VERMONT	D		D
VIRGINIA	D		W, P, D, I
WASHINGTON	D		P, D, I
WEST VIRGINIA	P, D		W, A , P, D, I
WISCONSIN	A, D		P, D, I
WYOMING			A, P, D

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As these agreements, however, are not authorized through state law or regulation, these programs were not addressed in this report.

Comprehensive Model

A comprehensive model should contain the authority for surveying public and private lands for invasive species, mapping invasive species locations and sensitive areas, and inspection of private and public lands for the presence of invasive species. These components should apply to all categories of species. California's statutes and regulations provide an example of a comprehensive detection tool. In California, the commissioner of agriculture may conduct surveys and investigations on any premises in order to prevent the introduction of injurious insects, animal pests, plant diseases, and noxious weeds. These surveys enable the state to identify the presence of invasives before a widespread infestation can occur. The commissioner must also chart the extent and location of any infestations. In addition, if the commissioner receives information of a pest not generally distributed within California, he must investigate its existence and any premises liable to become infested. This ability to investigate suspected invasive species on both public and private lands allows the state to determine if an infestation has occurred elsewhere in the state. California's policies also authorize the establishment of inspection stations to regulate the entrance of unwanted species into the state.

Intermediate Model

Several states have strong policies that call for one component of this tool but fail to include strong provisions that instate all components. For example Kentucky's policies authorize inspections on both public and private lands for wildlife, aquatic life, invasive plants, and plant pests, yet its policies fail to authorize any type of surveying or mapping for invasive species.

3. IMPORT/INTRODUCTION/RELEASE REQUIREMENTS

Explanation of Tool

Many invasive species have been intentionally introduced without knowledge of the harm they could bring to the environment. The use of introduction/import/release requirements enables states to control which species enter the state. Since invasives laws differ from state to state, this is a particularly important tool for states to monitor which species are allowed to enter their state. States often exercise this authority by requiring transporters to obtain permits and/or health certificates. The standards used in determining the issuance of the permits vary greatly, with some states requiring a science-based process to evaluate all introductions and releases of invasive species for potential risks and some simply considering the effect of the release on public health. Some states choose not to have specific introduction/import/release requirements but instead rely on their invasive species clean or dirty lists, as discussed earlier, to determine whether a person can import, introduce, or release a species into the state. Some states have also begun to use advisory committees to ensure scientific input into these important decisions.

In the statutes and regulations addressing **wildlife**, thirty-four states use their lists to determine which species can and cannot be imported, introduced, or released.[158] Ten states require a permit to introduce wildlife.[159] Twenty-three states require a permit or permission to release wildlife into the state,[160] and twelve states require a permit to import wildlife into the states.[161] Two states, Pennsylvania and Washington, prohibit the introduction of certain categories or species of wildlife into the state, and ten states prohibit the release of invasive wildlife in the state.[162] Three states, Alabama, Vermont, and Virginia, allow the state agency to introduce wildlife. The most states authorize specific import/introduction/release standards for wildlife, with twenty-

[158] Alabama, Arizona, California, Colorado, Connecticut (quadrupeds), Georgia, Hawaii, Idaho, Illinois, Kansas, Kentucky, Louisiana (quadrupeds), Maryland (reptiles, amphibians), Massachusetts, Minnesota, Mississippi, Missouri, Montana, Nebraska (reptiles, amphibians), Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Utah, Virginia, Washington, and Wyoming.

[159] Alaska (venomous reptiles), Connecticut, Florida, Hawaii, Idaho, Iowa, Minnesota, North Dakota, South Carolina, and Wisconsin.

[160] Arizona, Illinois, Iowa (falcon), Kansas, Louisiana, Maryland, Michigan, Minnesota (raptor), Mississippi, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, Tennessee (falcon), Utah, Virginia, and Wyoming.

[161] California, Delaware, Georgia, Indiana, Kansas, Maine, Massachusetts, Rhode Island, South Dakota, Tennessee, West Virginia, and Wyoming.

[162] Arkansas, Colorado, Georgia, Hawaii, Kansas, Kentucky, Maryland, (amphibians and reptiles), Pennsylvania, South Dakota, and Washington.

five states doing so.[163] The stringency of these standards ranges greatly. For example, Delaware will issue a permit to import a species if it is in the public interest, while Hawaii has a list of specific factors that must be met before a species may be introduced. Two states, Hawaii and Maine, authorize the creation of advisory committees to provide input on import, introduction, and release decisions.

In the statutes and regulations addressing **aquatic life**, thirty-five states use their lists to determine which species can and cannot be introduced, released, or imported in the state.[164] Twenty-one states require a permit or permission to introduce aquatic life into the state.[165] Twenty-four states require a permit or permission to release aquatic life in the states.[166] Twelve states prohibit the introduction or release of certain aquatic species.[167] Five states authorize the state agency to introduce or release aquatic life.[168] Twenty states authorize specific standards governing the decision to allow the import, introduction, or release of a species into the state.[169] Only two states, Hawaii and Illinois, authorize an advisory committee to provide input on the introduction decisions.

In the statutes and regulations addressing invasive **plants**, states primarily rely on their lists to determine which species cannot be imported or introduced. Specifically, twenty-two states prohibit the importation or introduction of plants on their noxious weed or harmful plants lists,[170] and forty-three states prohibit the importation or introduction of seeds on their noxious weed seed list.[171] In addition, New Mexico and Virginia rely on their definitions of noxious weeds and harmful plants to determine which species cannot be introduced or imported. Eight states require a permit to introduce noxious weeds, and Illinois requires a permit to import exotic weeds. Arizona requires a certificate of release in order to import certain plants.[172] Seven states do not allow the introduction of invasive plants in certain natural areas.[173] Seven states regulate the use of introduced species to revegetate mining operations.[174] Only Hawaii and Minnesota's policies have specific standards regulating the introduction of plants. Hawaii's policy requires that the state agency gather information on useful or ornamental plants before determining whether these plants should be introduced, and Minnesota's policy requires a committee to evaluate a species for invasiveness, difficulty of control, cost of control, benefits, and amount of injury caused by these plants. States that do not authorize specific standards governing which species can be introduced, imported, or released must instead rely on the content of their lists to guarantee that unwanted species are not brought into the state. Only three states, Hawaii, Minnesota, and Montana, authorize advisory committees to assist in decisionmaking related to the introduction or release of plants.

In the statutes and regulations addressing **plant pests and diseases**, states rely much more on their definition of plant pest to regulate the species that may be imported, introduced, and released. In contrast, for invasive plants states rely mainly on lists. Only seven states rely on their list of plant pests and diseases to determine

[163] California, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Montana, Nevada, New Hampshire, New Mexico, New York, Rhode Island, South Carolina, Tennessee, Washington, and Wyoming.

[164] Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Utah, Virginia, and Washington.

[165] Connecticut, Delaware, Iowa, Kentucky, Maine, Minnesota, Mississippi, Nevada, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, Washington (shellfish), Wisconsin, and Wyoming.

[166] Alaska, Arizona, Arkansas, Connecticut, Idaho, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maine, Minnesota, Mississippi, Nevada, New York, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Utah, Washington, and Wyoming.

[167] Alaska, Alabama (exotic aquatic plants), California, Florida, Hawaii, Kansas, Nebraska, New Jersey (oysters), North Carolina, Oklahoma, Pennsylvania (listed fish), and Washington (exotic aquatic plants).

[168] Alabama, Rhode Island, South Carolina, Virginia, and Washington.

[169] Alaska, Arizona, Georgia, Hawaii, Illinois, Iowa, Kansas, Kentucky, Maine, Massachusetts, Minnesota, Mississippi, Montana, Nevada, New Hampshire, New York, North Dakota, Oregon, South Carolina, and Washington.

[170] Alaska, Arizona, Arkansas, California, Delaware, Florida, Georgia, Hawaii, Idaho, Indiana, Iowa, Maryland, Massachusetts, Minnesota, Montana, North Carolina, Oregon, South Carolina, South Dakota, Washington, West Virginia, and Wisconsin.

[171] Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[172] Alabama, Florida, Hawaii, New Mexico, Ohio (multiflora rose), Oregon, Virginia, and West Virginia.

[173] Arkansas, California, Delaware, Hawaii, Illinois, Kentucky, and Virginia.

[174] Colorado, Illinois, Indiana, Kentucky, Mississippi, South Dakota, and Wyoming.

[175] Arkansas, California, Hawaii, Iowa, Louisiana, Mississippi, and Tennessee.

TABLE 3: IMPORT/INTRODUCTION/RELEASE REQUIREMENTS

The states that authorize requirements for the importation, introduction, or release of invasive species, specifically whether the states require a permit or certificate to do these activities and whether the states prohibit certain invasive species from being imported, introduced, or released. In addition, this chart illustrates which states authorize specific standards to govern the allowance of invasive species to be imported, introduced, or released.

STATE	IMPORT		INTRODUCTION		RELEASE		STANDARDS
	Permit/ Certificate	Prohibitions	Permit/ Certificate	Prohibitions	Permit/ Certificate	Prohibitions	
ALABAMA	D, I	I	P, D	A		A	D
ALASKA	D, I	P	W, D	A, P	A	A	A
ARIZONA	P, D	P	P	W, A			A
ARKANSAS	D, I	P		P	A	W	
CALIFORNIA	W, I	P		A, P		A	W
COLORADO	I					W	
CONNECTICUT	I		W, A		A		
DELAWARE	W, D, I	P	A	P			W
FLORIDA	D, I	P	W, P, D	A, P		A	W
GEORGIA	W, D, I	P	D	P		W	W, A
HAWAII	D, I	P	W, P	A, P		W, A	W, A, P, D
IDAHO		P	W	P	A		W
ILLINOIS	P, D, I		D	P	W, A		W, A
INDIANA	W, D, I	P	D	P	A		W
IOWA	D, I	P	W, A	P	W		W, A
KANSAS	W, D, I			A	W, A	W, A	W, A
KENTUCKY	D		A, D	P	A	W	A
LOUISIANA	I				W, A		
MAINE	W, I	D	A		A		W, A
MARYLAND	D, I	P	D	P	W	W	W
MASSACHUSETTS	W, D, I	P, D	D	P			W, A
MICHIGAN					W		
MINNESOTA	I	P	W, A	P	W, A		W, A, P
MISSISSIPPI	D, I		A		W, A		W, A
MISSOURI	D, I						
MONTANA	I	P		P	W		W, A
NEBRASKA	D, I		D	A	W	A	
NEVADA	I		A		A		W, A
NEW HAMPSHIRE	D, I						W, A
NEW JERSEY	I	D		A	W	A	
NEW MEXICO	D, I		P	P	W		W
NEW YORK	D, I		D		W, A		W, A, D
NORTH CAROLINA	I	P		A, P		W	A
NORTH DAKOTA	I		W, A		W		A
OHIO	D, I	I	A, P		A		
OKLAHOMA	I			A	W	A	
OREGON	D	P, D	P, D	P	W, A		A
PENNSYLVANIA	I		A	W, A	A	W, A	
RHODE ISLAND	W, I		A		A		W
SOUTH CAROLINA	I	P, D, I	W, A	P	W, A		W, A
SOUTH DAKOTA	W, I	P	A	P	A	W	
TENNESSEE	W, D, I		A, D		W		W
TEXAS			A				
UTAH	D, I			W, A			
VERMONT	D		A, D				
VIRGINIA	D, I		A, P, D	P	W		
WASHINGTON	D, I	P, I	A, D	W, A, P	A	W, A	W, A
WEST VIRGINIA	W, D, I	P	P, D	P			
WISCONSIN	D, I	P, I	W, A, D	P			
WYOMING	W, I		A		W, A		W

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which species can and cannot be imported or introduced.[175] Eighteen states require a permit to import or introduce plant pests or diseases or articles that may contain plant pests or diseases.[176] Five states generally prohibit the importation of any plant that may cause the introduction of a disease.[177] Twenty-one states require that imported nursery stock must be certified,[178] and two states, Hawaii and New Mexico, require a permit or a license to import nursery stock. California requires that a person importing nursery stock notify the state agency, and Illinois requires that a person receiving nursery stock from a foreign country notify the state agency. Only three states, Alabama, Hawaii, and New York, authorize specific standards governing the importation of species, and no states authorize an advisory committee to provide input on importation and introduction decisions.

In the statutes and regulations addressing **insects**, states rely primarily on certificates or permits to regulate their importation or introduction. Only two states, California and Florida, rely on their lists to determine which insects can and cannot be imported. Thirty-four states require that a certificate of inspection or health accompany imported bees.[179] Twenty-three states require a permit to import certain insects.[180] Pennsylvania requires permission to import bees from any country except Canada, and Wisconsin prohibits the importation of bees from any place with undesirable honeybees. Two states, Alabama and South Carolina, prohibit the importation of used beekeeping equipment and supplies, and two states, Ohio and Washington, prohibit the importation of Africanized bees. None of the states authorize standards governing the decisions to allow the introduction or release of insects but instead rely primarily on the permitting system. No state policies authorize the establishment of committees to advise on these decisions.

Comprehensive Model

Comprehensive import/introduction/release requirements should instate permitting or licensing so that the state can monitor which species are being brought into the state. The comprehensive model should also have scientific standards governing which species a person may import, introduce, or release, and these standards should consider whether the introduced species will displace native species, impact negatively on the environment, damage state resources, or adversely impact humans. This aspect of the comprehensive model may be dependent on current available science. Lastly, the model should authorize the establishment of advisory committees to provide expert input into these crucial decisions. Minnesota's statutes and regulations provide authority for comprehensive import/introduction/release requirements and are particularly strong for invasive plants. Minnesota's policies authorize the creation of a noxious weed list and a prohibited and restricted noxious weed seed list. Species on these lists cannot be imported or introduced in Minnesota. Minnesota's policy also authorizes a committee to evaluate species for placement on these lists. The committee must evaluate species for their invasiveness, difficulty of control, cost of control, benefits, and amount of injury caused by the species. In addition, Minnesota's policy requires that the species on these lists be reevaluated every five years. Under statutes and regulations addressing wildlife, aquatic life, and insects, Minnesota's policies rely on permits and lists to determine which species can be imported, introduced, and released. Minnesota's policies addressing wildlife and aquatic life also include standards governing the import, introduction, and release decisions. Minnesota's policies could be strengthened by also requiring these standards for plant pests and diseases.

Intermediate Model

Massachusetts' policies provide an example of an intermediate model. Massachusetts' statutes and regulations authorize the use of lists for wildlife, aquatic life, invasive plant, and plant pest and disease categories and authorizes permits for the wildlife, plant pest and disease, and insects categories. Massachusetts' policies do authorize standards governing the decision to import wildlife into the state; these standards, however, are not very strong. Massachusetts' standards only consider

[176] Alabama, Alaska, Florida, Georgia, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Nebraska, New York, Oregon, Tennessee, Vermont, Virginia, Washington, West Virginia, and Wisconsin.
[177] Massachusetts, Maine, New Jersey, Oregon, and South Carolina.
[178] Alabama, Arizona, Arkansas, Delaware, Illinois, Indiana, Iowa, Kansas, Maryland, Massachusetts, Mississippi, Missouri, New Hampshire, New Mexico, New York, Ohio, Oregon, Tennessee, Utah, Vermont, and West Virginia.
[179] Alabama, Alaska, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Illinois, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Montana, Nevada, New Hampshire, New Jersey, New Mexico, Ohio, Oklahoma, Rhode Island, South Carolina, Tennessee, Utah, Virginia, West Virginia, Wisconsin, and Wyoming.
[180] Colorado, Delaware, Illinois, Indiana, Iowa, Kansas, Maine, Massachusetts, Minnesota, Mississippi, Missouri, Montana, Nebraska, New York, North Carolina, North Dakota, Rhode Island, South Carolina, South Dakota, Tennessee, Virginia, Washington, and West Virginia.

whether the imported wildlife will negatively affect the resident wildlife populations and do not consider the impact of the imported species on the entire ecosystem. The statutes and regulations in Massachusetts could be strengthened by amending these standards to also consider the impact of imported, introduced, or released species on the ecosystem.

4. QUARANTINES

Explanation of Tool

To ensure that unintentional and unwanted introductions are interdicted, states authorize three main types of quarantines. First, states use quarantines to isolate infected species or premises to prevent an outbreak of a particular pest or disease. For example, a state may quarantine a nursery and its nursery stock if a plant pest is discovered on the premises. Second, states use quarantines to prevent or regulate certain identified invasive species from being shipped into or within the state. For example, a state may prohibit the transportation of purple loosestrife through the state. Third, states may authorize mandatory quarantines to monitor whether a species is infected or infested before it may be freely possessed within the state. For example, a state may require that all foreign plants be held in quarantine for a specified period to determine that they do not harbor any plant pests.

In the state statutes and regulations that address **wildlife**, fourteen states do not authorize the use of any quarantines.[181] Of the remaining states that authorize quarantine authority, thirty-three authorize the first type. Specifically, sixteen states[182] authorize the quarantine of wildlife that are either diseased or that do not have a permit or health certificate, and seventeen states[183] authorize the quarantine of wildlife and premises. Four states, Hawaii, New Jersey, Pennsylvania, and Tennessee, authorize quarantines to prevent or regulate certain species from being transported into or within the state. Finally, seven states authorize a mandatory quarantine for certain species.[184]

In the statutes and regulations that address **aquatic life**, thirty-four states do not authorize the use of any quarantine authority.[185] The aquatic life statutes and regulations contain the least number of quarantine provisions. Of the states that do authorize the quarantine authority, all sixteen authorize quarantines to isolate infected species or premises. Specifically, fifteen states authorize the quarantine of aquatic species and associated facilities that are diseased or do not have required documentation, and North Carolina authorizes the quarantine of aquatic weed transport mechanisms.[186] Four states authorize the use of quarantines to prevent or regulate certain identified species from being transported into or within the state.[187] No states in the aquatic life area authorize mandatory quarantines.

For the quarantine tool, the discussion of the state statutes and regulations that address invasive **plants** and **plant pests and diseases** have been combined as they greatly overlap. In these categories, only Massachusetts does not authorize the use of quarantines. Of the states that do authorize the quarantine authority, forty-two states authorize the first use. Specifically, four states, Alabama, Maryland, Mississippi, and Wisconsin, authorize the quarantine of certain plants and pests when found in the state, and thirty-eight states authorize the quarantine of certain plants and pests and the premises containing the plants and pests.[188] Louisiana also au-

[181] Alabama, Arkansas, Florida, Indiana, Kentucky, Massachusetts, Minnesota, Nebraska, Nevada, New Mexico, North Carolina, Oklahoma, Texas, and Vermont.

[182] Alaska, Arizona, California, Colorado, Georgia, Idaho, Illinois, Iowa, Maine, Maryland, Mississippi, Missouri, North Dakota (nontraditional livestock), Tennessee, Virginia, and Wisconsin.

[183] Delaware (exotic bird), Hawaii, Kansas, Louisiana (fox/coyote hunting preserve), Michigan, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, South Carolina (birds), South Dakota, Utah, Washington, West Virginia, and Wyoming.

[184] California (listed wildlife), Connecticut (bird or quadruped), Hawaii (animals subject to rabies), Maryland (animals under special permits), Montana (imported game farm animals), Rhode Island (listed species), and Utah (imported elk).

[185] Alabama, Arkansas, Delaware, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, and Wisconsin.

[186] Alaska, Arizona, California, Colorado, Connecticut, Florida (aquatic plants), Hawaii, Louisiana (turtles), Montana, Nebraska, Texas, Utah, Washington, West Virginia, and Wyoming.

[187] California (hydrilla), Florida (aquatic plants), Hawaii, and Washington (lythrum).

[188] Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Virginia, Washington, West Virginia, and Wyoming.

TABLE 4: QUARANTINES

The states that authorize the quarantine of potentially invasive species and areas containing these species, the quarantine on the transportation of certain species through the state, and mandatory quarantines for certain potentially invasive species.

State	Species and/or Premises/Area	Transportation	Mandatory
ALABAMA	P, I	P, I	
ALASKA	W, A, P, I	P	
ARIZONA	W, A, P	P	
ARKANSAS	P	P, I	
CALIFORNIA	W, A, P	A, P	W
COLORADO	W, A, P, I	P	
CONNECTICUT	A, P		W
DELAWARE	W, P, I		
FLORIDA	A, P, I	A, P	
GEORGIA	W, P, I	P, I	
HAWAII	W, A, P	W, A	W
IDAHO	W, P	P	
ILLINOIS	W, P, I	P, I	
INDIANA	P	P	
IOWA	W, I	P	
KANSAS	W, P, I	P, I	
KENTUCKY	P	P, I	
LOUISIANA	W, A, P	P	
MAINE	W, I	P	
MARYLAND	W, P, I	P	W
MASSACHUSETTS			
MICHIGAN	W, P, I	P, I	
MINNESOTA	P, I	P	
MISSISSIPPI	W, P	P, I	
MISSOURI	W, P, I	P, I	
MONTANA	A, P, I	P, I	W
NEBRASKA	A, P, I	P	
NEVADA	P, I	P	
NEW HAMPSHIRE	W, P, I	P	
NEW JERSEY	W, P, I	W, P	
NEW MEXICO	P	P, I	
NEW YORK	W, P, I	P	P
NORTH CAROLINA	A, I	P, I	P, I
NORTH DAKOTA	W, P	P	
OHIO	W, P	P, I	
OKLAHOMA	P, I	P, I	
OREGON	W, P, I	P, I	
PENNSYLVANIA	W, P	W, P, I	P
RHODE ISLAND	P, I	P, I	W
SOUTH CAROLINA	W, P, I	P, I	
SOUTH DAKOTA	W, P, I	P	P
TENNESSEE	W, I	W, P, I	
TEXAS	A	P	
UTAH	W, A, I	P	W
VERMONT	P		
VIRGINIA	W, P	P	
WASHINGTON	W, A, P, I	A, P	
WEST VIRGINIA	W, A, P	P, I	
WISCONSIN	W, P	P, I	
WYOMING	W, A, P, I		

W - WILDLIFE P - PLANTS AND PLANT PESTS AND DISEASES I - INSECTS A - AQUATIC LIFE

thorizes a quarantine on items from a state that quarantines these same items that are being exported from Louisiana. Forty-five states authorize the use of quarantines to prevent or regulate certain species or items from a certain area from being transported into or within the state.[189] The percentage of states authorizing transportation quarantines is large because states often authorize quarantines on certain agricultural products that may carry plant pests or diseases harmful to industry. Finally, four states authorize mandatory quarantines.[190]

In the state statutes and regulations that address **insects**, twelve states do not authorize the use of quarantines.[191] Thirty states authorize the first use of quarantines. Specifically, Maine authorizes the quarantine of diseased bees, and twenty-nine states also authorize the quarantine of diseased insects and associated facilities or areas.[192] Twenty-one states authorize the quarantine of certain insects moving into or within the state.[193] Only one state, North Carolina, authorizes a mandatory quarantine, with a post-entry quarantine of one year for honeybees that require an entry permit.

Comprehensive Model

A comprehensive quarantine tool should include the authority to quarantine certain species and areas of the state, the authority to regulate the transportation into or within the state of certain items, and the authority for mandatory quarantines. These quarantine authorities should apply across all categories of invasive species. No state policy currently fulfills this model. South Dakota's statutes and regulations come close. South Dakota's statutes and regulations authorize the use of all three types of quarantine with regard to invasive plants and plant pests and diseases. South Dakota's policies could be strengthened by expanding this comprehensive quarantine authority to also cover invasive wildlife, aquatic life, and insects. South Dakota's policies only authorize the first type of quarantine in the statutes and regulations addressing wildlife and insects and do not authorize any quarantine authority for aquatic life.

Intermediate Model

Montana and North Carolina's policies provide examples of states that have adopted an intermediate model. Montana's policy is strong in that it has adopted the second use of quarantines, the quarantine on the transportation of species moving into or within the state, across all types of invasive species. Montana's policy could be strengthened by authorizing all three types of quarantines across all invasive species. North Carolina's policy is strong in that it has adopted mandatory quarantines for certain foreign nursery stock and for honeybees with an entry permit. However, North Carolina's policy does not authorize any quarantine authority in the wildlife category and only authorizes the quarantine of aquatic weed transport mechanisms in the aquatic life category.

5. EDUCATION

Explanation of Tool

Education can be used by states to inform the public, decisionmakers, and many others about the dangers of invasive species and the ways the public can help prevent their introduction and spread. Education is an important tool in the prevention category as it creates awareness and enables citizens to participate in the prevention of invasive species. This study tracks only the handful of states that specifically authorize education programs in their statutes and regulations. States, however, may have extensive invasive species education and outreach programs that are not mandated by statute or regulation.

In the statutes and regulations addressing **wildlife**, only three states, California, Hawaii, and Montana, specifically authorize the education of the public on invasive species. In California, the state wildlife and agricultural agencies must furnish material on listed regulated animals, which explains why the animals are des-

[189] Alabama, Alaska, Arizona, Arkansas, California, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

[190] New York (certain propagating materials), North Carolina (foreign nursery stock), Pennsylvania (certain plants), and South Dakota (foreign shipments).

[191] Alaska, Arizona, Connecticut, Hawaii, Idaho, Indiana, Louisiana, Massachusetts, North Dakota, Texas, Vermont, and Virginia.

[192] Alabama, Arkansas, Colorado, Delaware, Florida, Georgia, Illinois, Iowa, Kansas, Maryland, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Washington, and Wyoming.

[193] Alabama, Arkansas, Georgia, Illinois, Kansas, Kentucky, Michigan, Mississippi, Missouri, Montana, New Mexico, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, West Virginia, and Wisconsin.

ignated as undesirable and why they are a menace to native wildlife or agriculture. Hawaii authorizes the use of educational workshops and materials on invasive wildlife. In Montana, the wildlife agency is authorized to educate the agricultural community and the general public on vertebrate pest management problems and needs.

In the statutes and regulations addressing **aquatic life**, seven states authorize the education tool.[194] All of these states authorize the development of educational materials or workshops for the public on invasive aquatic life. In addition, Wisconsin authorizes the development of education programs for public officials in charge of the maintenance of highways and forest and park lands on methods to identify and control purple loosestrife.

In the statutes and regulations addressing **plants**, thirteen states explicitly authorize the education tool.[195] Eleven states authorize state agencies or academic institutions to develop educational materials, conduct workshops, or develop demonstration projects on weed management and invasive pests for the public.[196] Two states, Colorado and South Dakota, authorize programs directly targeted at private landowners. Colorado authorizes the education of state land lessees on the threat of noxious weeds, and South Dakota's Weed and Pest Control Commission is specifically charged with promoting landowner responsibility to control noxious weeds.[197]

In the statutes and regulations addressing **plant pests and diseases**, seven states authorize the education for the prevention of invasive species.[198] The majority of these programs authorize the development of workshops and the dissemination of general educational materials. In addition, Delaware's program specifically authorizes the agriculture department to provide training assistance to local governments and public organizations about urban and community forestry, including information on invasive pests.

In the statutes and regulations addressing **insects**, five states, Arkansas, California, Hawaii, Rhode Island, and Tennessee, authorize the development of education programs to assist with the prevention of invasive species. Arkansas authorizes the Fire Ant Advisory Board to finance educational programs. California authorizes programs that train beekeepers how to maintain colonies free of Africanized bees. Hawaii authorizes educational workshops and materials on invasive insects. Rhode Island authorizes public education as a control procedure for infected apiaries. Tennessee authorizes the state apiarist to provide educational literature and conduct training programs for beekeepers on the prevention and detection of bee diseases and pests.

Comprehensive Model

A comprehensive state education program should seek to inform the various sectors and groups that can play a role in invasive species management about the many threats caused by invasives. Targeted audiences should include the general public, private landowners, key industry groups, and public land managers. California's statutes and regulations provide authority for education programs that are close to this comprehensive model. With respect to the general public, California's policies are very strong. California's authorized education policies include a program to disseminate information at airports and marine terminals about California's pest control and quarantine requirements. In addition, California's policies authorize a task force of representatives from various industries to develop educational materials and special training for employees of carriers who handle cargo to detect plant pests, to develop educational materials and special training for passenger ticket agents to educate potential passengers of California's pest exclusion measures, and to make public announcements to passengers en route to California about California's pest exclusion measures. For the key industry groups, California's policies authorize the distribution of all relevant information and studies concerning pests to winegrape producers. California's policies are lacking in the education of public officials about invasive species.

Intermediate Model

Wisconsin's policies provide for a strong education program that is not as extensive as the comprehensive model. Its authorized education program for aquatic life is particularly strong. Wisconsin's policies authorize the education of private landowners on methods to identify and control purple loosestrife, the general public on the effects of purple loosestrife, and public au-

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[194] Hawaii, Maine, Minnesota, New Hampshire, Texas, Washington, and Wisconsin.

[195] California, Colorado, Hawaii, Idaho, Illinois, Indiana, Kansas, Montana, New Mexico, North Dakota, South Dakota, Virginia, and Washington.

[196] California, Colorado, Hawaii, Idaho, Illinois, Indiana, Kansas, New Mexico, North Dakota, Montana, and Virginia.

[197] Other states may do this as a matter of practice, but only South Dakota explicitly mentions this in its statutes and regulations.

[198] California, Delaware, Georgia, Hawaii, Indiana, Oregon, and South Dakota.

TABLE 5: EDUCATION

The states that authorize education programs in their statutes and regulations to inform the public and decisionmakers about the dangers of invasive species and ways they can prevent the spread and introduction of invasive species.

STATE	WILDLIFE	AQUATIC LIFE	PLANT	PLANT PEST AND DISEASE	INSECT
Alabama					
Alaska					
Arizona					
Arkansas					X
California	X		X	X	X
Colorado			X		
Connecticut					
Delaware				X	
Florida					
Georgia				X	
Hawaii	X	X	X	X	X
Idaho			X		
Illinois			X		
Indiana			X	X	
Iowa					
Kansas			X		
Kentucky					
Louisiana					
Maine		X			
Maryland					
Massachusetts					
Michigan					
Minnesota		X			
Mississippi					
Missouri					
Montana	X		X		
Nebraska					
Nevada					
New Hampshire		X			
New Jersey					
New Mexico			X		
New York					
North Carolina					
North Dakota			X		
Ohio					
Oklahoma					
Oregon				X	
Pennsylvania					
Rhode Island					X
South Carolina					
South Dakota			X	X	
Tennessee					X
Texas		X			
Utah					
Vermont					
Virginia			X		
Washington		X	X		
West Virginia					
Wisconsin		X			
Wyoming					

thorities in charge of the maintenance of highways and forest and park land on how to identify and control purple loosestrife. Wisconsin's policies do not authorize the education tool for any other invasive species and thus could be strengthened by expanding the scope of this tool.

Prevention Trends

Although prevention is the first line of defense against invasive outbreaks, many of the tools in the prevention category have not been widely adopted by states. States seem to rely primarily on quarantines and inspection authority to prevent the establishment of unwanted invasives. In general, the west coast states have adopted more prevention tools.

An important tool to prepare a state against future invasives outbreaks is the ability to identify future threats; only nine states, however, have authorized studies to identify future invasive threats. Studies to identify future threats can produce data to alert officials to the potential risks of new infestations, provide opportunities for early detection and rapid response, and promote interstate coordination. The authorized state studies predominantly address threats posed by invasive plants.

The inspection authority is also an important tool for preventing widespread invasive infestations. The majority of states, however, rely on random investigations of public and private land and of specific facilities to determine the presence of invasives, rather than using routine surveys to detect invasives. Although almost half of the states authorize routine surveys for plant pests and diseases, the use of this tool has not carried over to other categories of invasives. The use of random inspections may allow invasive species to go undetected, leading to outbreaks.

States have begun to use importation, introduction, and release requirements to minimize the intentional introduction of harmful species. Many states have developed standards that must be met before a species may be released. The risk of introducing new species can be reduced by using methods such as risk analysis, cost/benefit analysis, environmental impact assessment, and decisionmaking protocols.[199] Twenty-three states use some type of standards to determine the species of wildlife that may be imported, introduced, or released, and eighteen states use standards for determining the types of aquatic life. The use of standards has not been widely adopted for plants, plant pests and diseases, or insects.

In addition to the use of standards, a few states have begun to authorize the creation of advisory committees to guide importation, introduction, and release decisions and to solicit scientific input on these important decisions. Two states authorize the use of committees for decisions affecting wildlife and aquatic life, and three states authorize committees to oversee decisions affecting plants and plant pests and diseases. No states authorize the use of committees for insects.

The quarantine tool has been widely authorized and is fairly universal among states for plants and plant pests and diseases. Only Massachusetts does not have the authority to institute quarantines in these areas. In addition, over two-thirds of the states have the ability to use quarantines for wildlife and insects. Only twenty states, however, have quarantines that address aquatic life.

A few states have begun to authorize the use of mandatory quarantines for certain known invasives or for certain shipments that may contain invasives. Mandatory quarantines can help ensure that a certain species or shipment will not cause a negative effect on the state's environment and will not lead to widespread infestation. The use of these mandatory quarantines is only authorized by seven states for wildlife, by three states for plants and plant pests and diseases, and by one state for insects. No states authorize the use of mandatory quarantines for aquatic life.

Finally, less than half of the states have adopted some form of statutorily mandated education on invasive species. Education is an important tool to inform the public, private landowners, key industry groups, and pubic land managers about the severity of the invasive species threat. Thirteen states authorize education programs for plants and seven states authorize education programs for plant pests and diseases.

[199] OTA (1993), *supra* note 5, at 7.

CHAPTER VII: REGULATION

States have developed a variety of mechanisms for regulating the invasive species that it chooses to allow into the state. The regulation tools can also be used by the state to effectively eliminate unintentional introductions. The four most common regulation tools include:

- Permits and licenses
- Transportation and shipping requirements
- Monitoring
- Bonds and insurance

I. PERMITS AND LICENSES

Explanation of Tool

The issuance of permits and licenses is an important tool for helping states regulate invasive species. Permits and licenses can be used to monitor who can possess invasive species and in what manner. Some states may not have a formal permit system but instead may require permission or authorization from a state agriculture or natural resources agency in order to regulate certain invasive species. States generally use permits and licenses to regulate the importation, transportation, possession, and release of species and to specify conditions that are tied to the receipt of the permit or license. Specific conditions most often include access to inspect facilities and operations; information on where facilities may be sited; measures to prevent the potential escape of species; and the retention of adequate records on the species and associated operations. States also use permits and licenses to regulate invasive species facilities, such as aquaculture pens and game farms, and specify the conditions tied to the receipt of a facility permit or license. States may also require dealers of certain species to register with the state.

The use of permits and licenses also serves as a means to exclude unwanted invasive species. Through a permit and license scheme, the state ensures that the importer has complied with state regulations before a species is introduced, rather than simply creating a prohibition that can only be invoked after a species has already been released.

In the statutes and regulations addressing **wildlife**, forty-five states require a permit or license to import, possess, transport, or release certain wildlife.[200] In addition, Alabama requires permission to import certain species, and Arkansas and Louisiana require permission to release certain species. Of the states that require a permit or license, fourteen states specify conditions for the receipt of the permit or license.[201] Several states tie more than one requirement to the issuance of a permit or license. Nine[202] of these fourteen states have inspection requirements, seven[203] have escape prevention requirements, and seven[204] have record requirements. Delaware, New Hampshire, and Tennessee have the most extensive conditions, making the permit or license contingent upon satisfying inspection, prevention of escape, and record requirements. Thirty-four states require a permit or license to operate commercial wildlife facilities, such as game farms or hunting preserves.[205] In addition, Virginian wildlife dealers must register with

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[200] Alabama (raptors), Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[201] California, Delaware, Florida, Kansas, Minnesota, Nevada, New Hampshire, New Mexico, New York, Oregon, Rhode Island, Tennessee, West Virginia, and Wyoming.

[202] California, Delaware, Florida, Minnesota, New Hampshire, Rhode Island, Tennessee, West Virginia, and Wyoming.

[203] Delaware, Kansas, Minnesota, New Hampshire, New Mexico, Oregon, and Tennessee.

[204] California, Delaware, Nevada, New Hampshire, New York, Tennessee, and Wyoming.

[205] Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Minnesota, Mississippi, Montana, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Utah, Virginia, and West Virginia.

the state. Of these states, twenty-nine impose conditions on the receipt of the facility license or permit, a much larger number than in the first category of permits or licenses.[206] Several states tie more than one requirement to the issuance of a permit or license. Of these twenty-nine states, twenty[207] have inspection requirements, thirteen[208] have escape prevention requirements, and fourteen[209] have record requirements. Only two states, Ohio and Idaho, condition the facility permit or license on a siting requirement. In addition, Idaho has the most extensive conditions, making the permit or license contingent upon satisfying inspection, escape prevention, siting, and record requirements.

In the statutes and regulations that address **aquatic life**, forty-four states require a permit or license to import, possess, transport, or release aquatic life.[210] Fourteen of the forty-four states include specific conditions for the receipt of the permits or license.[211] Several states tie more than one requirement to the issuance of a permit or license. Of these fourteen states, twelve states[212] condition the permit or license on the ability to inspect, four[213] on escape prevention, and two[214] on the record requirements. Thirty-five states require a permit or license to operate an aquatic facility, such as a fish hatchery, fish pond, or aquaculture facility.[215] In addition, seven states require aquatic facilities to be registered with the state.[216] Of the states requiring a permit, license, or registration, twenty-six states require conditions for their receipt, with some states requiring multiple conditions.[217] Of these twenty-six states, twenty-two states[218] have inspection requirements, seven[219] have siting requirements, eleven[220] have escape prevention requirements, and twelve[221] have record requirements. In addition, four states, Maryland, Mississippi, Ohio, and Utah, have the most extensive conditions, requiring the applicant to satisfy inspection, siting, escape prevention, and record requirements.

Very few states authorize the use of permits or licenses in their statutes and regulations that address the importation, transportation, or possession of invasive plants, with only fifteen states doing so.[222] States primarily rely on prohibitions, quarantines, or inspection

[206] Alabama, Arizona, Arkansas, California, Connecticut, Georgia, Hawaii, Idaho, Illinois, Indiana, Kentucky, Louisiana, Maryland, Minnesota, Mississippi, Montana, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Utah, Virginia, and West Virginia.

[207] Alabama, Arizona, Arkansas, California, Georgia (deer farm), Hawaii, Idaho, Illinois, Indiana, Kentucky, Maryland, Mississippi, Montana, New Hampshire, New York, North Dakota, Oregon, South Dakota, Virginia, and Utah.

[208] Arizona, Arkansas, California, Georgia (deer farm), Idaho, Illinois, Maryland, New Hampshire, New Jersey, Oregon, Pennsylvania, Virginia, and West Virginia.

[209] Alabama, Connecticut, Georgia (bird dealer, shooting preserve), Idaho, Kentucky, Louisiana, Maryland, Minnesota, Mississippi, New Hampshire, New York, Oregon, Rhode Island, and Tennessee.

[210] Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nevada, New Hampshire, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[211] California, Colorado, Connecticut, Delaware, Florida, Kansas, Louisiana, Minnesota, Montana, North Dakota, South Carolina, Tennessee, West Virginia, and Wyoming.

[212] California, Colorado, Connecticut, Florida, Louisiana, Minnesota, Montana, North Dakota, South Carolina, Tennessee, West Virginia, and Wyoming.

[213] California, Kansas, Louisiana, and Minnesota.

[214] California (triploid grass carp) and Delaware.

[215] Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, West Virginia, Wisconsin, and Wyoming.

[216] California, Delaware, Michigan, Pennsylvania, Utah, Washington, and Wisconsin.

[217] Arizona, California, Colorado, Connecticut, Delaware, Idaho, Illinois, Iowa, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Nebraska, Nevada, New Mexico, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Tennessee, Utah, Wisconsin, and Wyoming.

[218] Arizona, California, Colorado, Delaware, Illinois, Iowa, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Nebraska, Nevada, New Hampshire, Ohio, Oregon, Rhode Island, Tennessee, Utah, Wisconsin, and Wyoming.

[219] California, Idaho, Maryland, Minnesota, Mississippi, Ohio, and Utah.

[220] Illinois, Kentucky, Maryland, Mississippi, New Hampshire, New Mexico, Ohio, Pennsylvania, Tennessee, Utah, and Wisconsin.

[221] Colorado, Connecticut, Louisiana, Maryland, Minnesota, Mississippi, New Hampshire, New York, Ohio, Oregon, Tennessee, and Utah.

[222] Alabama, Florida, Hawaii, Illinois, Indiana, Minnesota, Missouri, New Mexico, North Carolina, Ohio, Oregon, South Dakota, Virginia, Washington, and West Virginia.

TABLE 6: PERMITS AND LICENSES

The states that require the issuance of a permit or license in order to import, possess, or release an invasive species or to operate a facility containing invasive species, such as an aquaculture facility or a nursery. In addition, this chart illustrates whether the states attach specific conditions to the issuance of these permits and licenses such as allowing the state agency to inspect and requiring the maintainence of records on the invasive species.

State	Species		Facility	
	Permit/License	Conditions	Permit/License	Conditions
Alabama	W, P, D, I		W, A, I	W, I
Alaska	W, A, D		A	
Arizona	W, A, D		W, A	W, A
Arkansas	W		W, A, I	W, I
California	W, A, D, I	W, A	W, A	W, A
Colorado	W, A, I	A	A	W, A
Connecticut	W, A	A	W, A	A
Delaware	W, A, D, I	W, A	W, I	A, I
Florida	W, A, P, D	W, A	I	I
Georgia	W, A, I, D	I	W, I	W, I
Hawaii	W, A, I	I	W, A	W
Idaho	W, A	W, A, I		W, A
Indiana	W, A, I	W, A		W
Indiana	W, A, I	W, A		W
Iowa	W, A, I	I	W, A	A
Indiana	W, A, I		W, A	W
Kentucky	W, A		W, A	W, A
Louisiana	A	A	W, A, I	W, A
Maine	W, A, I	I	A	
Maryland	W, A, I		W, A, I	W, A, I
Massachusetts	W, A, I		W, A	
Michigan	A			A
Minnesota	W, A, I	W, A	W, A, I	W, A
Mississippi	W, A, I	W, A, I		W, A
Missouri	W, A, I			
Montana	A, I	A	W, A, I	W
Nebraska	I		A	A
Nevada	W, A	W	A	A
Indiana	W, A, I		W, A	W
New Jersey	W		W, I	W, I
New Mexico	W, A	W	W, A, I	A, I
Indiana	W, A, I		W, A	W
North Carolina	W, A, I			
North Dakota	W, A, I	A	W, A, I	W
Ohio	I		W, A, I	W, A, I
Oklahoma	W, A, I		A	
Oregon	W, A	W	W, A, I	W, A
Pennsylvania	W, A		W, A, I	W, A
Rhode Island	W, A, I	W, I	W, A, I	W, A
South Carolina	W, A, I	A		
South Dakota	W, I		W, I	W
Tennessee	W, A, I	W, A	W, A, I	W, A, I
Texas	W, A		A	
Utah	W, A		W, I	W, A, I
Vermont	W, A			
Virginia	W, A, I		W	W
Washington	W, A		I	I
West Virginia	W, A, I	W, A	W, A, I	W
Wisconsin	W, A		A	A
Wyoming	W, A, I	W, A, I	A, I	A, I

W – Wildlife A – Aquatic Life P – Plants D – Plant Pests and Diseases I - Insects

certificates rather than permits or licenses to regulate the importation, transportation, and possession of invasive plants. Of these fifteen states that do authorize permits or licenses, Hawaii conditions its permit on the ability to inspect, and Virginia and West Virginia condition their permits on adequate safeguards to prevent the plant's spread. Eighteen states permit or license the use of facilities, such as seed distributors,[223] and four states require seed labelers and dealers to be registered with the state.[224] Of these states requiring a permit, license, or registration, nine states require conditions for their receipt, with some states having multiple conditions.[225] Two states, California and Texas, have inspection requirements; one state, California, requires adequate safeguards to prevent the plant's spread; and eight states have record requirements.[226]

In the statutes and regulations that address **plant pests and diseases**, thirty-four states require a permit or license to import, transport, or possess a plant pest or disease, and one state, Colorado, requires permission to do so.[227] Of these states, only six states include specific conditions for the receipt of the permit, license, or permission.[228] Four states, California, Illinois, Massachusetts, and North Carolina, condition the permit on inspection requirements. Two states, Virginia and West Virginia, condition the permit on adequate safeguards to prevent the spread of plant pest or diseases. Thirty-one states authorize the use of a permit or license for facilities such as nurseries,[229] and seven require the registration of nursery dealer's.[230] Of these states that require a permit, license, or registration, seventeen states authorize condition of their receipt, with some states authorizing multiple conditions.[231] Twelve states[232] authorize inspection requirements, and seven states authorize record requirements.[233]

In the statutes and regulations that address **insects**, thirty states require a permit to import or move insects.[234] Seven of these thirty states condition the permit on the ability to inspect.[235] On the facility use of permits or licenses, four states, Georgia, Maine, North Dakota, and Ohio, require a permit or license to sell bees, and twenty-five states require apiaries or beekeepers to be registered with the state.[236] Of these states, fourteen condition the registration of the apiary or the issuance of the permit on the allowance of inspections.[237] Two states, California and Pennsylvania, condition the registration of the apiary on allowing inspections and siting of the apiary.

Comprehensive Model

The comprehensive model should include a permit or license requirement to import, possess, transport, or

[223] Alabama, Arizona, Arkansas, California, Georgia, Hawaii, Illinois, Iowa, Maine, Mississippi, Nebraska, Oregon, South Carolina, Tennessee, Texas, Virginia, Washington, and Wyoming.

[224] California, Colorado, Kentucky, and West Virginia.

[225] Alabama, Arkansas, California, Illinois, Kentucky, Mississippi, Tennessee, Texas, and Virginia.

[226] Alabama, Arkansas, Illinois, Kentucky, Mississippi, Tennessee, Texas, and Virginia.

[227] Alabama, Alaska, Arizona, California, Delaware, Florida, Georgia, Hawaii, Illinois, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, Nebraska, Nevada, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, South Carolina, South Dakota, Tennessee, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

[228] California, Illinois, Massachusetts, North Carolina, Virginia, and West Virginia.

[229] Alabama, Arkansas, California, Delaware, Georgia, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, Montana, Nevada, New Hampshire, New Mexico, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Utah, Virginia, Washington, and Wyoming.

[230] Colorado, Florida, Georgia, Minnesota, Tennessee, Texas, and West Virginia.

[231] Alabama, Arkansas, California, Colorado, Delaware, Florida, Georgia, Illinois, Kansas, Kentucky, Maryland, Minnesota, New Hampshire, New York, Rhode Island, South Carolina, and Wyoming.

[232] Arkansas, California, Colorado, Delaware, Florida, Georgia, Kansas, Maryland, Minnesota, New York, South Carolina, and Wyoming.

[233] Alabama, Georgia, Illinois, Kentucky, Maryland, New Hampshire, and Rhode Island.

[234] Alabama, California, Colorado, Delaware, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Minnesota, Missouri, Mississippi, Montana, Nebraska, New York, North Carolina, North Dakota, Ohio, Oklahoma, Rhode Island, South Carolina, South Dakota, Tennessee, Virginia, West Virginia, and Wyoming.

[235] Georgia, Hawaii, Illinois, Iowa, Maine, Rhode Island, and Wyoming.

[236] Alabama, Arkansas, Delaware, Florida, Georgia, Idaho, Illinois, Louisiana, Maryland, Minnesota, Mississippi, Montana, New Jersey, New Mexico, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Utah, Washington, West Virginia, and Wyoming.

[237] Alabama, Arkansas, Delaware, Florida, Georgia, Illinois, Maryland, New Jersey, New Mexico, Ohio, Tennessee, Utah, Washington, and Wyoming.

TABLE 7: BONDS AND INSURANCE

The states that require a person to either post a bond or obtain liability insurance in order to possess particularly harmful invasive species.

State	Bonds	Insurance
Alabama		
Alaska		
Arizona		
Arkansas		
California		
Colorado		
Connecticut		
Delaware		
Florida		
Georgia		W
Hawaii	W, A	
Idaho		
Illinois	W	
Indiana		
Iowa		
Kansas		
Kentucky		
Louisiana	A	
Maine		
Maryland		
Massachusetts		
Michigan		
Minnesota	W	
Mississippi		
Missouri		
Montana		
Nebraska		
Nevada		
New Hampshire		
New Jersey		
New Mexico		
New York		
North Carolina		
North Dakota		
Ohio		
Oklahoma		
Oregon		
Pennsylvania		
Rhode Island	A	
South Carolina	D	
South Dakota		
Tennessee		
Texas		
Utah		
Vermont		
Virginia		
Washington		
West Virginia		
Wisconsin		
Wyoming		

W – Wildlife A – Aquatic Life P – Plants D – Plant Pests and Diseases

TABLE 8: POST-RELEASE MONITORING

The states that authorize in their statutes and regulations post-release monitoring of introduced species to ensure that these species do not have unforeseen effects on other species, ecosystems, or their processes.

State	Wildlife	Aquatic Life	Plant	Plant Pest and Disease	Insect
Alabama					
Alaska					
Arizona					
Arkansas					
California					
Colorado					
Connecticut					
Delaware					
Florida		X			
Georgia					
Hawaii	X	X			
Idaho					
Illinois					
Indiana					
Iowa					
Kansas					
Kentucky					
Louisiana					
Maine					
Maryland					
Massachusetts					
Michigan					
Minnesota					
Mississippi					
Missouri					
Montana					
Nebraska					
Nevada	X	X			
New Hampshire					
New Jersey					
New Mexico					
New York					
North Carolina					
North Dakota					
Ohio					
Oklahoma					
Oregon					
Pennsylvania				X	
Rhode Island					
South Carolina					
South Dakota					
Tennessee					
Texas					
Utah					
Vermont					
Virginia					
Washington					
West Virginia					
Wisconsin					
Wyoming					

release species. In order to receive the permit or license, the applicant should also be required to meet siting, inspection, escape prevention, and record requirements. In addition, a permit or license should be required to operate a facility containing invasive species and conditions should be attached to these permits or licenses. Tennessee's permitting and licensing program contains all of these elements and thereby provides an example of a state policy that is used to closely regulate which species are allowed in the state and the conditions under which they may be possessed in the state.

Intermediate Model

Colorado has taken steps toward developing policies that reach the comprehensive model. Colorado's current policy requires a permit or license to import, possess, transport, or release invasive species and a permit or license to operate a facility containing invasive species. This requirement enables the state to regulate invasive species within the state but does not specifically outline the conditions necessary to receive these permits in the wildlife and insect categories. While these requirements may appear in internal agency guidelines, inclusion of these conditions in the statutes or regulations would ensure that they are enforceable and applied consistently to permittees.

2. BONDS AND INSURANCE

Explanation of Tool

The control and management of invasive species that have escaped and infested natural and human systems are very costly to states. For example, the invasive aquatic plant hydrilla was introduced into Florida's waterways in the 1950s by the discard of tropical aquarium plants and now costs the state approximately 14.5 million dollars in control and 10 million dollars in recreational losses annually.[238] To provide protection against this potential economic burden, six states have begun to require the payment of a bond or the receipt of liability insurance in order to possess specified invasive species.[239] This tool is used to make people who are importing a particularly dangerous invasive species financially contribute to control and eradication efforts if the species escapes or spreads.

In the statutes and regulations that address **wildlife**, only two states, Hawaii and Minnesota, require the posting of a bond in order to possess certain species of wildlife, and Illinois requires that an exotic game hunting area permittee obtain a ten thousand dollar bond. Only one state, Georgia, requires liability insurance to possess certain species of wildlife. In the statutes and regulations that address **aquatic life**, three states, Hawaii, Louisiana, and Rhode Island, require the posting of a bond in order to possess certain species. No states require liability insurance to possess aquatic life. In the statutes and regulations that address **plant pests and diseases**, only one state, South Carolina, requires the posting of a bond by out-of-state nursery dealers in states that do not recognize the inspections made by the commissioner of agriculture on shipments from South Carolina. There are no bond or insurance requirements in the statutes and regulations that address **insects** or invasive **plants**.

Comprehensive Model

A comprehensive model should require the payment of a bond or the receipt of liability insurance in order to possess particularly harmful invasive species to insure that the state is not left paying for damages caused by the escape of an invasive species. Although no state policies meet the standard of the comprehensive model, Minnesota and Georgia's policies have some strengths. Minnesota's bonding program requires that a person who possesses listed restricted species must file a bond or deposit a set amount with the state agency to pay for costs and damages if the species escapes. Minnesota's requirement transfers the financial liability for damage from the state to the permittee. Georgia is the only state whose statutes and regulations require liability insurance. Georgia's policy, which is limited to wildlife, requires that a person desiring to possess an inherently dangerous animal must obtain liability insurance. Georgia's requirement guarantees that the possessor will be able to financially contribute to any damages that the wildlife may cause.

Intermediate Model

Louisiana has taken incremental steps toward a strong bonding requirement. Louisiana's policy requires that a person who cultures the invasive tilapia must either post a twenty-five thousand dollar performance

[238] Joyce (1992), *supra* note 8.

[239] Georgia, Hawaii, Louisiana, Minnesota, Rhode Island, and South Carolina.

bond or present a letter of credit to the state agency. A permittee that is allowed to keep a tilapia must either post a ten thousand dollar performance bond or a letter of credit to the state agency. Louisiana's policy recognizes that the escape of tilapia would be damaging to the state's resources and thus requires the bond to ensure that the permittee can contribute to any damages. Louisiana's policy is strong in respect to tilapia but does not cover any other species. Louisiana's statutes and regulations could be strengthened by expanding this requirement to the possession of other invasives.

3. MONITORING

Explanation of Tool

Post-introduction monitoring of invasive species is a valuable regulation tool that has not been authorized in many states. Post-release monitoring and evaluation help to minimize unforeseen effects of invasives on other species, ecosystems, or their processes.

In the statutes and regulations that address **wildlife**, only two states, Hawaii and Nevada, authorize the monitoring of introduced wildlife. In the statutes and regulations that address **aquatic life**, three states, Florida, Hawaii, and Nevada authorize the monitoring of introduced species. In the statutes and regulations that address **plant pests and diseases**, only one state, Pennsylvania, authorizes the monitoring of certain plantings. No state statutes and regulations that address invasive **plants** or **insects** authorize post-release monitoring. State statutes and regulations that address the release of biological control agents are covered in Chapter VIII.

Comprehensive Model

A comprehensive model should require a post-release monitoring period for all deliberately introduced species. This monitoring should continue until the species has reached a state of equilibrium in the ecosystem. No state satisfies the comprehensive model across all types of species. Hawaii's policies, however, provide authority for a comprehensive program for post-release monitoring of wildlife and aquatic species. Hawaii's policies require the state agency to conduct studies of the introduced species in the new habitat. This monitoring will continue until the species are established on a stable basis. The state agency must also monitor the rate of the species' spread and its impact on habitat. Hawaii's program provides an opportunity for quick action if it is needed. Hawaii's program would be strengthened by expanding to the statutes and regulations addressing invasive plants, plant pests and diseases, and insects.

Intermediate Model

Nevada's policies provide an example of a state policy that has taken steps toward reaching the comprehensive model. Nevada's statutes and regulations authorize the inspection of introduced wildlife and aquatic species. The strength of Nevada's policy is that it does allow inspections of introduced species. However, Nevada's policy is not comprehensive since it does not provide for an evaluation of the impact of the introduced species on the environment, but instead focuses solely on inspection of the introduced species itself.

4. TRANSPORTATION AND SHIPPING REQUIREMENTS

Explanation of Tool

Transportation and shipping requirements are used by states to regulate the transportation and shipping of invasive species through and within the state. This tool differs from importation requirements, which are discussed earlier under the prevention category, as transportation and shipping requirements regulate invasive species being shipped or transported through the state rather than just into the state. Some states do not have specific transportation requirements, but instead may rely on their importation requirements to cover the movement of invasive species, or states may have very limited requirements covering only a few species. Five types of transportation and shipping requirements are discussed:

- Prohibitions on the transportation of certain categories of invasive species
- Required permits and licenses
- Inspection authority for shipments
- Labeling requirements
- Registration of transporters

The stringency of the state's transportation and shipping requirements often depends on whether the species being shipped is wildlife, aquatic life, a plant, a plant pest or disease, or an insect. For example, in the statutes and regulations addressing wildlife, seventeen

TABLE 9: TRANSPORTATION AND SHIPPING REQUIREMENTS

The states that authorize requirements on the transportation and shipping of invasive species through the state. These requirements include: prohibitions on the movement of certain species, the issuance of a permit or certificate to shippers, the ability for the state to inspect shipments, labeling of shipments, and the registration of shippers with the state agency.

State	Prohibition	Permit/Certificate	Inspection	Labeling	Registration
Alabama	W, A	D, I	P, D, I	P	
Alaska	A, I	W, A, D	P, D, I	P, D	
Arizona		W, A, P, D	P, D	P	
Arkansas	A	W, D, I	P, D	P	
California	A, P, I	W, A, D, I	W, P, D, I	A, P, D	
Colorado	A	W, A, D, I	P, D, I	P	
Connecticut	P	A, D, I	P		
Delaware	P, I	W, A, D	P		
Florida	A	W, A, P, D, I	A, P, D	D	D
Georgia	P	W, A, D, I	P, D	P	
Hawaii	P	W, A, P, D, I	W, A, P, D, I	P, D	
Idaho	P	W, A	D	P	
Illinois	P	W, A, D, I	P	A, P	
Indiana	P	D, I	P, D	P	
Iowa	A, P	W, D, I	D	A, P	
Kansas		D, I	P, D	P	D
Kentucky	P	W, A, D	A, P, D	P	
Louisiana	A, P	W, A, D, I	A, P, D, I	A, P, D	
Maine		D, I	P	P	
Maryland	P	A, D, I	P, D, I	P	A
Massachusetts	P	A, D, I	D	P	
Michigan	P	A, D	D	A, P	
Minnesota	A	W, A, P, I	A, P, D, I	P	D
Mississippi	A, P	D	D, I	P, D	
Missouri	P	W, D, I	D	P	D
Montana		W, A, D, I	W, A, I	P	
Nebraska	A, I	P, D	P		
Nevada	W, A, P	W, A, D, I	A, P, D	P	
New Hampshire	A, P	W, A, P, D, I	W, D	A, P	
New Jersey		D, I	P, D	P	D
New Mexico	P	W, A, P, D, I	A, P, D, I	P	A
Indiana					
North Carolina	A, P	D	P, D		
North Dakota	W, P	W, A, D, I	W, A, P, D	P	
Ohio	W	D	D	A	
Oklahoma	A	W, A, D	P	P	
Oregon	P	W, A, D	P, D	P	
Pennsylvania	P	A, D, I	A, P, D	P	A
Rhode Island	P	W, D, I	P, D		D
South Carolina	W, A	A, D, I	P, I	A, P	D
South Dakota	P	P, D, I	P, D		
Tennessee	W, A, P	W, D, I	W, A, P, D	P	
Texas		W, D		P	
Utah	W, I	W, D, I	W, I	P	A, D
Vermont	A	D			
Virginia	P	W, A, P, D	P, D	P	
Washington	A, P	A, D, I	D, I	P	
West Virginia	P	W, A, P, D, I	A, I	P	D
Wisconsin		A, P, D	P, D, I	P	
Wyoming	A, P	W, A, D, I	P, D	W, A, P	

W – Wildlife A – Aquatic Life P – Plants D – Plant Pests and Diseases I – Insects

states[240] do not have any or have very limited transportation or shipping requirements, but in the statutes and regulations addressing plant pests and diseases, every state has some type of transportation or shipping requirement. States most commonly authorize permits and/or health and inspection certificates to regulate the transportation or shipping of invasive species through their state. In addition, states may authorize inspections of the shipments, require notice to the state agency, and establish border inspection stations. The inspection authority is most commonly found in the statutes and regulations addressing plants and plant pests. Thirty-nine states[241] authorize the inspection of plant pest shipments, and thirty-five states[242] authorize the inspection of plant shipments, though more than half of these states only authorize the inspection of seed shipments. Only seven states[243] authorize inspections in the statutes and regulations addressing wildlife, and only twelve states[244] do so in the statutes and regulations addressing aquatic life. States may also require that shipments of invasive species be labeled. The labeling requirement is authorized most often in the statutes and regulations addressing plants with forty-one states requiring labels, primarily for seed shipments.[245] Finally, some states require that shippers of certain species be either registered with the state or on a state's official inspection registry before being allowed to ship to the state. This authorization was only found in the statutes and regulations addressing aquatic life in four states[246] and in those addressing plant pests and diseases in eight states.[247]

In the statutes and regulations addressing **wildlife**, fourteen states do not have specific transportation requirements.[248] In addition, three other states have very limited transportation requirements.[249] Seven states prohibit certain types of wildlife from being transported through their state.[250] Thirty-six states require a permit and/or a health certificate/certificate of veterinary inspection in order to transport invasive wildlife through the state.[251] Seven states have inspection requirements. Of these seven states, two, California and Hawaii, re-

[240] Connecticut, Indiana, Kansas, Maine, Maryland, Massachusetts, Michigan, Mississippi, Nebraska, New Hampshire, New Jersey, North Carolina, Pennsylvania, South Dakota, Vermont, Washington, and Wisconsin.

[241] Alabama, Alaska, Arizona, Arkansas, California, Colorado, Florida, Georgia, Hawaii, Iowa, Idaho, Indiana, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Virginia, Washington, Wisconsin, and Wyoming.

[242] Alabama, Alaska, Arizona, Arkansas, California, Colorado (seeds), Connecticut, Delaware (seeds), Florida, Georgia (seed, feed), Hawaii, Illinois, Indiana, Kansas, Kentucky (seeds), Louisiana (seeds), Maine (seeds), Maryland (seeds), Minnesota (seeds), Nebraska, Nevada (seeds), New Hampshire (seeds), New Jersey (seeds), North Carolina, North Dakota, Oklahoma (seeds), Oregon (seeds), Pennsylvania (seed, feed), Rhode Island (seed), South Carolina, South Dakota, Tennessee (seed, feed), Virginia (seed, feed), Wisconsin (seed), and Wyoming.

[243] California, Hawaii, Montana, New York, North Dakota, Tennessee, and Utah.

[244] Florida, Hawaii, Kentucky, Louisiana, Minnesota, Montana, Nevada, New Mexico, North Dakota, Pennsylvania, Tennessee, and West Virginia.

[245] Alabama, Alaska, Arizona, Arkansas, California, Colorado, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Dakota, Oklahoma, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[246] Maryland, New Mexico, Pennsylvania, and Utah.

[247] Florida, Minnesota, Missouri, New Jersey, Rhode Island, South Carolina, Utah, and West Virginia.

[248] Connecticut, Indiana, Kansas, Maine, Massachusetts, Michigan, Mississippi, Nebraska, New Hampshire, North Carolina, Pennsylvania, Vermont, Washington, and Wisconsin.

[249] Maryland (intrastate shipment of game birds and mammals requires an itemized bill of sale and shipment out of Maryland requires a bill of lading), New Jersey (pheasants, partridge, and quail must be tagged when transported), and South Dakota (game birds can only be shipped by the licensee or with a bill of sale).

[250] Alabama (infected animals), Nevada (clean and dirty list), North Dakota (species license species), Ohio (raccoon dog, monk parakeet, and blacktail prairie dog), South Carolina (dirty list, diseased or public health hazard), Tennessee (nongame wildlife and game birds), and Utah (diseased wildlife or wildlife from quarantined area).

[251] Alaska, Arizona, Arkansas, Georgia, Hawaii, Iowa, Kentucky, Louisiana (only exotic deer), Missouri, Texas, Utah, Virginia, and West Virginia – permit and health certificate/certificate of veterinary inspection; California, Colorado, Delaware (limited species), Florida, Hawaii, Idaho, Illinois (raptor), Louisiana (alligator), Minnesota, Nevada, New Mexico (limited species), New York, North Dakota (limited species), Oklahoma, Oregon, Rhode Island (limited species), Tennessee, and Utah (domestic elk) – permit or license; and Illinois, Montana, North Dakota (limited species), Utah, and Wyoming (limited species) – health certificate.

quire that shippers hold non-native species for inspection by a state agency; Montana requires that animals transported from a licensed game farm be inspected; North Dakota grants the authority for transported non-traditional livestock and farmed elk to be inspected; Tennessee authorizes the inspection of vehicles hauling animals and requires that the state agency be notified twenty-four hours in advance of the shipment of wildlife imported for release; and Utah requires that domestic elk be inspected and branded when being transported. Only one state, Wyoming, requires that containers of wildlife be labeled. Hawaii requires that people transporting animals through Hawaii fill out a declaration form.

In the statutes and regulations addressing **aquatic life**, only seven states do not have any specific transportation/shipping requirements.[252] Nineteen states prohibit certain categories of aquatic life from being transported through their state.[253] In addition, Maine does not allow invasive aquatic plants to be transported in a manner that may cause them to enter state waters. Thirty-two states require a permit and/or certificate of inspection or health.[254] Nine states require certain species to be labeled.[255] Twelve states have inspection authority.[256] Hawaii also requires that anyone transporting aquatic species through Hawaii fill out a declaration form. Four states require that out-of-state suppliers be registered.[257]

The statutes and regulations for the transportation and shipping of invasive **plants** and **plant pests and diseases** greatly overlap since many plant pests are found in shipments of plants. Only three states, Kansas, Ohio, and Vermont, do not have transportation or shipping requirements for invasive plants. Twenty-four states prohibit the transportation of prohibited noxious weed seeds.[258] Five states prohibit the transportation of noxious weeds and noxious weed seeds.[259] Hawaii prohibits the transportation of restricted plants and soil, and Oklahoma prohibits the transportation of noxious weeds. Thirteen states require a permit and/or a certificate of inspection for shipments.[260] Forty-one states[261] require seed shipments to be labeled and Hawaii requires all shipments to be labeled. Thirty-five states authorize inspection of shipments.[262] Of those states that authorize inspection, only three states authorize the establishment of border inspection stations.[263] In addition, Hawaii's policy requires notice of shipments of invasive

[252] Indiana, Kansas, Missouri, New Jersey, Rhode Island, South Dakota, and Texas.

[253] Alabama (game fish), Alaska (aquatic plants), Arkansas (exotic fish, zebra mussels, undesirable species, and lythrum), California (Caulerpa species), Colorado, Florida (listed aquatic plants), Iowa (bait fish list), Louisiana (fish list), Minnesota (listed aquatic plants), Mississippi, Nevada (list), New Hampshire (exotic aquatic weeds), North Carolina (listed fish and aquatic weeds), Oklahoma (noxious aquatic plants), South Carolina (list), Tennessee (nongame fish), Vermont (list), Washington (listed aquatic weeds), and Wyoming (bait fish).

[254] Alaska, Arizona, Connecticut, Hawaii, Louisiana, Minnesota, West Virginia, and Wyoming – permit and certificate of inspection; California, Colorado, Delaware (listed fish), Florida, Georgia, Idaho, Illinois, Kentucky, Massachusetts, Michigan (salmonid), Montana (salmonid, bait leeches), Nebraska, Nevada, New Mexico, New York, North Dakota, Oklahoma, Oregon, Pennsylvania, South Carolina, Virginia (game fish), Washington (aquaculture), and Wisconsin (rough fish) – permit; Maryland – health certificate.

[255] California (aquatic plants, aquaculture), Illinois (aquatic products), Iowa (fish), Louisiana, Michigan (aquaculture), New York, Ohio (aquaculture), South Carolina, and Wyoming.

[256] Florida, Hawaii, Kentucky, Louisiana, Minnesota, Montana, Nevada, New Mexico, North Dakota, Pennsylvania, Tennessee, and West Virginia.

[257] Maryland, New Mexico, Pennsylvania, and Utah.

[258] California, Connecticut, Georgia, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Massachusetts, Michigan, Mississippi, Missouri, Nevada, New Hampshire, New Mexico, North Carolina, North Dakota, Pennsylvania, Rhode Island, Tennessee, Virginia, West Virginia, and Wyoming.

[259] Delaware, Maryland, Oregon, South Dakota, and Washington.

[260] Alabama and North Carolina – permit or certificate; Arkansas – certificate; Arizona, Florida, Hawaii, Minnesota, New Mexico, New York, South Dakota (seeds), Virginia, West Virginia, and Wisconsin (biological control agent).

[261] Alabama, Alaska, Arizona, Arkansas, California, Colorado, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Oklahoma, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[262] Alabama, Alaska, Arizona, Arkansas, California, Colorado (seeds), Connecticut, Delaware (seeds), Florida, Georgia (seed, feed), Hawaii, Illinois, Indiana, Kansas, Kentucky (seeds), Louisiana (seeds), Maine (seeds), Maryland (seeds), Minnesota (seeds), Nebraska, Nevada (seeds), New Hampshire (seeds), New Jersey (seeds), North Carolina, North Dakota, Oklahoma (seeds), Oregon (seeds), Pennsylvania (seed, feed), Rhode Island (seed), South Carolina, South Dakota, Tennessee (seed, feed), Virginia (seed, feed), Wisconsin (seed), and Wyoming

[263] Arizona, Florida, and Hawaii.

plants and requires anyone shipping plants into Hawaii to fill out a declaration form.

All of the states have some type of transportation/shipping requirement for **plant pests and diseases** and the requirements are much more extensive than for other categories of invasives. Forty-seven states require permits and/or certificate of inspections to transport plant pests across or within their states.[264] Sixteen states[265] require shipments to be labeled, and thirty-eight states[266] authorize the inspection of shipments. Of the thirty-eight states that authorize inspection, six states[267] authorize inspection stations and seven states[268] require notification of a state agency of the arrival of shipments of plant pests. In addition, Illinois requires notification of a state agency of the shipment of nursery stock from a foreign country. Finally, nine states require nurseries to be certified or on a state registry in order to ship nursery stock into the state.[269]

Eight states do not have transportation/shipping requirements in their statutes and regulations for **insects**.[270] Four states prohibit the transportation of diseased bees, and Hawaii prohibits the transportation of injurious insects.[271] Thirty-eight states require a permit and/or a health certificate to transport or ship insects through their state.[272] Sixteen states authorize inspections of shipments.[273] Seven of the sixteen states that authorize inspection require notification to the state department when shipping or transporting insects.[274]

Comprehensive Model

A comprehensive model should include requiring either a permit or a health/inspection certificate to transport or ship invasive species through the state, the ability to inspect shipments, and the authority to establish inspection stations. Hawaii's statutes and regulations contain all of these elements, and they contain them across all of the different types of invasive species. The transportation of wildlife, aquatic life, plants, plant pestsand diseases, and insects into Hawaii requires a permit. Hawaii's policy also authorizes the inspection of shipments and establishes inspection stations for all types of invasive species. In addition, Hawaii's policy goes beyond simply authorizing inspection of shipments and establishing inspection stations to also require anyone who transports or ships wildlife, aquatic life, plants, plant pests, or insects into Hawaii to notify the State Department of Agriculture in order to have their shipment inspected. Furthermore, everyone arriving in Hawaii by a common carrier must fill out a declaration form for the agriculture department if transporting wildlife, aquatic life, or plants. Therefore, Hawaii's statutes and regulations authorize a comprehensive program that results in awareness and approval of potential invasive species transported or shipped into or through the state.

Intermediate Model

Arizona has taken incremental steps toward reaching the comprehensive model for transportation and

[264] Colorado, Delaware, Hawaii, Kentucky, Massachusetts, New York, Oregon, Tennessee, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming – permit and certificate; Alaska, Florida, and Indiana – permit or permission; Alabama, Arizona, Arkansas, California, Connecticut, Georgia, Illinois, Iowa, Kansas, Louisiana, Maine, Maryland, Michigan, Mississippi, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, and Utah - certificate.

[265] Alabama, Alaska, Arizona, Arkansas, California, Colorado, Florida, Iowa, Louisiana, Maryland, Minnesota, Mississippi, Missouri, New Mexico, Ohio, and Oregon.

[266] Alabama, Alaska, Arizona, Arkansas, California, Colorado, Florida, Georgia, Hawaii, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Virginia, Washington, Wisconsin, and Wyoming.

[267] Alaska, California, Florida, Hawaii, Louisiana, and Mississippi.

[268] Hawaii, Massachusetts, Michigan (foreign), New Jersey, Ohio (foreign), Rhode Island, and South Dakota (foreign).

[269] Florida, Kansas, Minnesota, Missouri, New Jersey, Rhode Island, South Carolina, Utah, and West Virginia.

[270] Arizona, Idaho, Kentucky, Michigan, Oregon, Texas, Vermont, and Virginia.

[271] Alaska, California, Delaware, and Utah.

[272] Colorado, Georgia, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts, Minnesota, Montana, Nebraska, Rhode Island, South Carolina, and South Dakota – permit and certificate; North Carolina, Ohio, and Oklahoma – permit or certificate; Alabama (fire ants), California (fire ants), Indiana, Missouri, New York, and North Dakota – permit; Arkansas, California, Connecticut, Florida, Hawaii, Louisiana, Nevada, New Jersey, New Mexico, Pennsylvania, Tennessee, Utah, Washington, West Virginia, and Wyoming – certificate.

[273] Alabama, Alaska, California, Colorado, Hawaii, Louisiana, Maryland, Minnesota, Mississippi (fire ants), Montana, New Mexico, South Carolina, Utah, Washington, West Virginia, and Wisconsin.

[274] Colorado, Hawaii, Maryland, New Mexico, Pennsylvania, Utah, and West Virginia.

Fire ants (*Solenopsis genus*)

shipping requirements. Arizona's policy requires a health certificate or permit to transport or ship wildlife, aquatic life, certain plants, and plant pests into and through the state. Arizona's policy also authorizes inspections of invasive plants and plant pests but does not include these inspection requirements in the invasive wildlife, aquatic life, and insect statutes and regulations. Arizona's inspection authority includes the inspection of all shipments of plants and plant pests and the establishment of border inspection stations. A carrier must declare all commodities at a port-of-entry and hold the commodity until it is inspected and a certificate of release issued. Also all commodities entering a bulk mail facility must be held for inspection, and any commodity shipped by railroad must be inspected at its destination. In addition, nursery stock shipments cannot enter Arizona on weekends or during a legal holiday. Extending Arizona's inspection authority to include invasive wildlife, aquatic life, and insects would place the state among those that have comprehensive transportation and shipping requirements.

Regulation Trends

States almost universally rely on permits and licenses to regulate the possession of invasive species and the manner in which they may be possessed. Permit and license programs are used to ensure that importers have complied with state regulations before a species is imported.

A handful of states have adopted requirements for posting bonds or purchasing liability insurance in order to possess certain particularly harmful invasives. This approach places the liability for costs incurred from the introduction of invasives on the possessor rather than the state. Three states have adopted bonding requirements for wildlife and one state requires liability insurance. Three states require bonding for aquatic life and one state requires bonding for plant pests and diseases.

Post-release monitoring is an important tool that has only been adopted in a few states. This tool is particularly important for verifying that an intentionally released invasive species is not disrupting the ecosystem or negatively affecting native species. Only two states authorize the monitoring of introduced wildlife, only three states authorize the monitoring of introduced aquatic life, and only one state authorizes the monitoring of certain plants.

Transportation and shipping requirements are regularly used by states to control the manner and type of species that may be transported through the state. The stringency of the state's transportation and shipping requirements often depends on whether the species being shipped is wildlife, aquatic life, a plant, a plant pest or disease, or an insect. For example, sixteen states do not have any or have very limited transportation or shipping requirements for wildlife, but every state has some requirements for plant pests and disease. Similarly, while thirty-seven states authorize the inspection of shipments of plant pests, only six states have such authority for wildlife. States can enhance the effectiveness of this tool by extending requirements to shipments and transportation of all categories of invasives.

CHAPTER VIII: CONTROL AND MANAGEMENT

If prevention tools are not successful and an invasive species is introduced into a state, the state must then determine whether and how best to control or manage the species. As a second line of defense, states have implemented control and management measures to rapidly respond to an early detection of invasive species and to control and manage widespread infestations. Control and management measures may include eradication, containment, treatment, and suppression of invasive species. The four tools that can be used to accomplish control and management include:

- General control and management authority
- Emergency powers
- Biological control agents
- Restoration

1. GENERAL CONTROL AND MANAGEMENT AUTHORITY

Explanation of Tool

Many states authorize tools to control and manage invasive species once they are detected in the state. The general control and management authority in the wildlife, aquatic life, and insect categories addresses the ability of the state to control and manage diseased and illegal species. The general control and management tool in the statutes and regulations addressing wildlife relates to the state's authority to capture escaped invasive species and illegal releases. States may also require that owners of invasive species notify the state agency of an escape so that the state can search for the species before it impacts the environment. The general control and management authority in the statutes and regulations addressing plants and plant pests and diseases relates to which entity – the state, county, local agency, or landowner – is responsible for making decisions about the control and management of the invasive species.

The ability of the state to make decisions on whether and how to control and manage species on public and private lands is discussed for all of the invasive species categories. The ability of states to control invasive species on federal, state, and private lands is an important aspect of general control and management authorities. It is generally not cost-effective for a state to thoroughly control a plant pest on state land if the pest is present on adjacent private and federal lands and has the ability to spread onto state-owned land.

In the statutes and regulations that address **wildlife**, only eleven states do not have some form of general control and management authority.[275] Nineteen states authorize the state agency to destroy or treat diseased or undesirable animals,[276] and sixteen states authorize the seizure of any animal without a license or permit.[277] Nineteen states authorize the state to capture or destroy any escaped wildlife,[278] and fourteen states require that the state agency be notified of the escape of any wildlife.[279] Three states have specific management plans for invasive species.[280] Seven states require that certain types of released wildlife be tagged.[281] Louisiana and New Jersey authorize any measures necessary to control and manage diseases but do not specify the measures authorized. Wisconsin authorizes an administrative law judge to issue an order for the control or disposal of animals.

In the statutes and regulations that address **aquatic life**, fourteen states do not have some form of general

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[275] Alaska, Arkansas, Florida, Illinois, Indiana, Missouri, Nebraska, New Mexico, North Carolina, Oklahoma, and West Virginia.

[276] Alabama, California, Colorado, Connecticut, Georgia, Hawaii, Iowa, Kentucky, Maine, Maryland, Massachusetts, Montana, New York, Ohio, Pennsylvania, South Carolina, South Dakota, Tennessee, and Washington.

[277] Georgia, Hawaii, Iowa, Kentucky, Michigan, Minnesota, Mississippi, Montana, New Hampshire, New York, North Dakota, Rhode Island, Utah, Vermont, Virginia, and Washington.

[278] Arizona, California, Colorado, Delaware, Georgia, Idaho, Minnesota, Mississippi, Montana, Nevada, North Dakota, Oregon, Rhode Island, South Dakota, Tennessee, Utah, Virginia, Washington, and Wyoming.

[279] Delaware, Georgia, Kansas, Minnesota, Mississippi, Nevada, North Dakota, Oregon, Rhode Island, South Dakota, Tennessee, Utah, Virginia, and Wyoming.

[280] Maryland (nutria), Minnesota, and Montana.

[281] Delaware, Idaho, Minnesota, Montana, Ohio, Texas, and Washington.

control and management authority.[282] Twenty-one states authorize the state agency to destroy or treat diseased or undesirable aquatic life,[283] and twelve states authorize the seizure of aquatic life without a permit or license.[284] Nineteen states authorize a state control program for aquatic life, a much higher number than in the wildlife category.[285] In contrast to the wildlife category, only three states require that the state agency be notified of the escape of aquatic life and authorize the department to then capture the escapees.[286]

In the statutes and regulations that address invasive **plants**, nine states do not authorize any form of general control and management authority.[287] In the invasive plant statutes and regulations, the general control and management authority focuses on which entity is responsible for the control and management of invasive species on public and private lands. Twenty-six states authorize a state agency (or political subdivision) to notify landowners when an invasive species is found and then require the owner to undertake control and management within a specified time or the state agency will complete the control and management measures.[288] Nine states rely on the landowner to control invasive species on private lands.[289] Four states grant the state agency blanket authority to treat or destroy noxious weeds on public and private lands,[290] and six states grant the state agency authority on public lands only.[291] Texas's policy authorizes the state agency to sue the landowner for compliance with weed control districts, and Arkansas requires that landowners report the presence of invasive species to the state agency. Fifteen states authorize the formation of control districts for certain invasive species.[292] Seventeen states authorize weed control programs or plans.[293]

In the statutes and regulations that address **plant pests and diseases**, only North Carolina does not have any form of general control and management authority. Authority to control and manage plant pests and diseases is subdivided and applies to nurseries, forests, or more generally. Seventeen states grant the state agency authority to control or manage plant pests,[294] and four states rely on the landowner to control or manage plant pests and diseases.[295] Twenty-two states require that the state agency notify the landowner of the presence of plant pests and diseases and require control and eradication or the state will do so.[296] Thirteen states authorize eradication areas or programs.[297] Four states require the landowner to notify the state agency of plant pests and diseases.[298] Eleven states notify the nursery owner of an infestation and require control or management or the state agency will do so.[299] Thirteen states rely on the nursery owner to control or manage infested

[282] Arkansas, Colorado, Idaho, Kansas, Missouri, New Mexico, North Carolina, Oklahoma, Pennsylvania, Rhode Island, South Dakota, Texas, Virginia, and West Virginia.

[283] Alabama, Alaska, California, Connecticut, Georgia, Hawaii, Illinois, Maine, Maryland, Michigan, Montana, Nebraska, Nevada, New York, North Dakota, Tennessee, Utah, Vermont, Washington, Wisconsin, and Wyoming.

[284] Arizona, California, Florida, Georgia, Hawaii, Indiana, Iowa, Kentucky, Maine, Minnesota, New Hampshire, and New York.

[285] Alaska, Delaware (giant reed grass), Florida, Illinois (aquatic plants), Louisiana, Maine, Maryland, Massachusetts (aquatic nuisance), Minnesota, Mississippi (mussels), New Hampshire (exotic aquatic plants), New Jersey (aquatic weeds), New York (aquatic plants), Ohio, Oregon, South Carolina, Vermont, Washington, and Wisconsin.

[286] Louisiana (tilapia), Minnesota, and Mississippi.

[287] Alaska, Connecticut, Georgia, Maine, Mississippi, New Hampshire, New Jersey, North Carolina, and Rhode Island.

[288] Arizona, Arkansas, California, Colorado, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Massachusetts, Michigan, Minnesota, Montana, Nevada, New Mexico, New York, North Dakota, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, Utah, Vermont, and Washington.

[289] Delaware, Florida (under department supervision), Idaho, Maryland, Missouri, Nebraska, Oklahoma, Wisconsin, and Wyoming.

[290] Alabama, Louisiana, South Carolina, and West Virginia.

[291] Delaware, Florida, Ohio, Oregon, Washington, and Wisconsin.

[292] Arkansas, California, Colorado, Hawaii, Idaho, Missouri, Montana, Nevada, New Mexico, Oregon, Pennsylvania, Tennessee, Texas, Washington, and Wyoming.

[293] Arizona, Colorado, Delaware, Florida, Hawaii, Idaho, Illinois, Iowa, Kentucky, Maryland, Montana, New Mexico, North Dakota, South Dakota, Utah, Virginia, and Wyoming.

[294] Alabama, Colorado, Connecticut, Kansas, Louisiana, Maryland, Missouri, Nebraska, New Hampshire, New Mexico, North Dakota, Pennsylvania, Tennessee, Texas, Vermont, Virginia, and Washington.

[295] Idaho, Maine, Oklahoma, and Wyoming.

[296] Arkansas, California, Delaware, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kentucky, Massachusetts, Michigan, Minnesota, Mississippi, Nevada, New Jersey, New York, Oregon, Rhode Island, South Carolina, South Dakota, and Wisconsin.

[297] Alabama, Arkansas, California, Florida, Hawaii, Idaho, Missouri, New Mexico, Oregon, Tennessee, Texas, Washington, and Wyoming.

[298] Arkansas, Iowa, Mississippi, and Montana.

[299] Alabama, Idaho, Illinois, Kentucky, Maryland, Montana, Ohio, Rhode Island, South Dakota, Virginia, and Washington.

TABLE 10: GENERAL CONTROL AND MANAGEMENT AUTHORITY

States that authorize a state agency to control and manage invasive species require the public to inform the state agency of the presence of invasive species on their land, and that have statewide control or management plans or programs for certain invasive species.

State	State Agency Authority	Required State Notice	Statewide Plans/Programs
Alabama	W, A, P, D, I		D
Alaska	A, D, I	I	A
Arizona	W, A, P, D, I		P
Arkansas	P, D, I	D	D
California	W, A, P, D, I		D
Colorado	W, P, D, I		P
Connecticut	W, A, D, I		
Delaware	W, A, P, D, I	W, I	A, P
Florida	A, P, D, I		A, P, D
Georgia	W, A, D, I	W	
Hawaii	W, A, P, D, I		P, D
Idaho	W, P, D, I		P, D
Illinois	A, P, D, I		A, P
Indiana	A, P, D, I		
Iowa	W, A, P, D, I	D	P
Kansas	W, P, D, I	W	
Kentucky	W, A, P, D, I		P
Louisiana	W, A, P, D, I	A	A
Maine	W, A, D, I		A
Maryland	W, A, P, D, I	I	W, A, P
Massachusetts	W, A, P, D, I		A
Michigan	W, A, P, D, I		
Minnesota	W, A, P, D, I	W, A	W, A
Mississippi	W, A, D, I	W, A, D	A
Missouri	P, D, I		D
Montana	W, A, P, D, I	D	W, P
Nebraska	P, D, I		
Nevada	W, A, P, D, I	W	
New Hampshire	W, A, D, I		A
New Jersey	W, A, D, I		A
New Mexico	P, D, I		P, D
New York	W, A, P, D, I	I	A
North Carolina	I		
North Dakota	W, A, P, D, I	W	P
Ohio	W, A, P, D, I		A
Oklahoma	P, D, I		
Oregon	W, A, P, D, I	W	A, D
Pennsylvania	W, A, P, D, I		
Rhode Island	W, A, D, I	W	
South Carolina	W, A, P, D, I		A
South Dakota	W, A, P, D, I	W	P
Tennessee	W, A, P, D, I	W, I	D
Texas	W, A, P, D, I		D
Utah	W, A, P, D, I	W	P
Vermont	W, A, P, D, I		A
Virginia	W, A, P, D, I	W, I	P
Washington	W, A, P, D, I		A, D
West Virginia	P, D, I		
Wisconsin	W, A, P, D, I		A
Wyoming	W, A, P, D, I	W	P, D

W – Wildlife A - Aquatic Life P - Plants D - Plant Pests and Diseases I - Insects

nursery stock,[300] and four states, New Hampshire, North Dakota, Utah, and Vermont, rely on the state agency to control or manage infested nursery stock. Eight states require the forest landowner to control or manage infestations or the state agency will do so.[301] Four states rely on the forest owner to control or manage infestations,[302] and fourteen states authorize the state agency to undertake control and management on forest lands.[303] Finally, fourteen states authorize the establishment of forest infestation zones.[304]

In the state statutes and regulations that address **insects**, all of the states have some form of general control and management authority. Twenty-six states require that the beekeeper destroy an infected apiary or the state agency will do so.[305] Nine states require that the state agency control or manage diseased apiaries,[306] and seven states rely on the beekeeper to control or eradicate diseased apiaries.[307] Six states require that beekeepers notify the state agency if their apiaries contain diseased bees.[308] Six states authorize the formation of abatement or control districts.[309]

Comprehensive Model

Comprehensive general control and management authority should include a provision which allows the state to make decisions on the control and management of invasive species on public and private lands, require that a landowner notify a state agency of the presence of an invasive species and of the escape of a species, and establish statewide programs or districts to control and manage invasive species. Minnesota's policies come close to satisfying the comprehensive model. Minnesota's policies authorize the state agency to seize any wildlife without a permit or license. In addition, Minnesota's polices require a landowner to control and eradicate invasive plants, plant pests and diseases, and insects or the state may undertake the necessary control and eradication measures on the affected lands. In addition, Minnesota's policies require that the state agency be notified of escaped wildlife and aquatic species so that these species can be captured by the state agency before they cause much damage to the environment. Minnesota's policies are also strong in that they require the formation of state control programs for wildlife, aquatic species, and for insects. Lastly, Minnesota's policy requires that released restricted wildlife be tagged. This requirement can assist in the control and monitoring of released wildlife.

Nutria (*Myocastor coypus*)

Intermediate Model

Maryland's statutes and regulations provide an example of an intermediate model for general control and management authority. Maryland's policies include both strong provisions and weak provisions. Maryland's policies allow the state to control or manage diseased wildlife or aquatic species and plant pests and diseases. In addition, Maryland's policies allow the state agency to notify a nursery owner or a beekeeper that he must undertake control and management measures or the state will do so. Maryland's policies are strong in authorizing state involvement in control and management for wildlife, aquatic species, plant pests and diseases, and insects, but Maryland's policies are lacking a comparable authority for invasive plants. Maryland's policies rely on landowners to control and manage invasive

[300] Arizona, California, Connecticut, Delaware, Indiana, Iowa, Kansas, Massachusetts, Mississippi, New Jersey, New York, Pennsylvania, and West Virginia.

[301] Alabama, Alaska, Georgia, Kansas, Minnesota, New Hampshire, South Dakota, and Texas.

[302] California, Maine, New Jersey, and Virginia.

[303] Arkansas, Connecticut, Kansas, Kentucky, Massachusetts, Michigan, Mississippi, Nebraska, New York, Rhode Island, Tennessee, Vermont, West Virginia, and Wisconsin.

[304] Alabama, Alaska, California, Georgia, Idaho, Kentucky, Montana, Nevada, New Hampshire, Oregon, South Carolina, Vermont, Washington, and Wisconsin.

[305] Alabama, Arizona, California, Delaware, Illinois, Indiana, Iowa, Kansas, Maryland, Michigan, Minnesota, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Dakota, Utah, Virginia, Washington, and West Virginia.

[306] Arkansas, Colorado, Georgia, Kentucky, Maine, Oregon, South Carolina, Tennessee, and Wyoming.

[307] Florida, Idaho, Louisiana, Mississippi, Missouri (under supervision), Montana, and Wisconsin.

[308] Alaska, Delaware, Maryland, New York, Tennessee, and Virginia.

[309] Arkansas, California, Idaho, Minnesota, New Hampshire, and South Carolina.

plants, without any state agency oversight. This weakness could potentially lead to a widespread infestation if individual landowners are not thorough in controlling and managing invasives on their property. Another weakness of Maryland's policies is that they do not include authority for the state agency to capture escaped invasive species, and they do not require that the owner of the escapees notify the state agency. This oversight may allow an invasive species to become established without the state agency knowing of its presence. However, Maryland's policies do contain a strong notice provision that requires beekeepers with a diseased apiary to notify the state agency so that proper control and management measures are undertaken. Finally, Maryland's policies require the formation of control programs for wildlife and aquatic species but do not have similar authority for invasive plants, plant pests and disease, or for insects.

2. EMERGENCY POWERS

Explanation of Tool

States may authorize the use of emergency powers to address sudden outbreaks of invasives that can quickly lead to widespread damage. The term emergency usually constitutes an immediate threat to public health, safety, the environment, or the economy. These emergency powers enable the state to increase its authority when facing an impending infestation of an invasive species. Components of emergency powers may include the ability to dispose of species, bypass notice periods for entering private land, and dispense special funds to deal with emergency situations.

In the statutes and regulations that address **wildlife**, ten states specifically authorize emergency powers.[310] Nine states authorize the disposition or quarantine of any contaminated or threatening wildlife, and Georgia authorizes the issuance of emergency orders for nonnative birds.[311]

In the statutes and regulations that address **aquatic life**, thirteen states authorize some form of emergency powers.[312] The types of emergency powers authorized under the aquatic life statutes and regulations vary much more among the states than those authorized under the wildlife statutes and regulations. Nine states authorize the disposition or quarantine of any contaminated or threatening aquatic life.[313] Colorado authorizes the power to order the cease and desist of any act that presents an immediate danger to any fish stock. Florida authorizes the designation of additional restricted aquatic plants to its list of restricted aquatic plants in an emergency. Maine authorizes the restriction of watercraft use in waters infested with invasive aquatic plants, and Washington authorizes the denial of permits in an emergency. New Hampshire authorizes the development of an emergency response protocol to eradicate small new exotic aquatic weed infestations.

In the statutes and regulations that address invasive **plants**, nine states authorize some form of emergency powers.[314] Five states authorize emergency orders to control and eradicate invasive plants.[315] South Dakota authorizes the emergency designation of a state or local weed. Colorado authorizes emergency funding for the control and management of invasive plants, and Hawaii authorizes the creation of interim rules for up to 180 days governing the transportation of flora and fauna into and within the state. New York authorizes the state agency to bypass a waiting period for management and control of an invasive if there is an imminent danger to public health.

In the statutes and regulations that address **plant pest and diseases**, seventeen states authorize some form of emergency powers.[316] Eleven states authorize emergency control and management measures.[317] Three states, California, Oregon, and Virginia, authorize the state agency to bypass notice requirements before entering land to control or manage an emergency infestation. Two states, California, and Florida, authorize emergency funding, and two states, Louisiana and Wisconsin, authorize an emergency use permit for pesticides.

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[310] Arizona, Connecticut, Delaware, Georgia, Hawaii, Maryland, Montana, South Dakota, Tennessee (nongame wildlife), and Utah.

[311] Arizona, Connecticut, Delaware, Hawaii, Maryland, Montana, South Dakota, Tennessee (nongame wildlife), and Utah.

[312] Arizona, Colorado, Connecticut, Florida, Hawaii, Kentucky, Maine, Minnesota, Montana, New Hampshire, Tennessee, Utah, and Washington.

[313] Arizona, Connecticut, Hawaii, Kentucky, Minnesota, Montana, Tennessee, Utah, and Washington.

[314] Arizona, Colorado, Hawaii, Indiana, Montana, New York, Oregon, South Carolina, and South Dakota.

[315] Arizona, Indiana, Montana, Oregon, and South Carolina.

[316] Alabama, Arkansas, California, Florida, Hawaii, Indiana, Louisiana, Maine, Maryland, Minnesota, New Mexico, Oregon, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

[317] Alabama, Arkansas, Hawaii, Indiana, Maine, Maryland, Minnesota, New Mexico, Vermont, Washington, and West Virginia.

TABLE 11: EMERGENCY POWERS

The states that authorize emergency powers in their statutes and regulations to address invasive species outbreaks.

State	Wildlife	Aquatic Life	Plants	Plant Pests and Diseases	Insects
Alabama				X	
Alaska					
Arizona	X	X	X		
Arkansas				X	
California				X	
Colorado		X	X		X
Connecticut	X	X			
Delaware	X				
Florida		X		X	
Georgia	X				
Hawaii	X	X	X	X	
Idaho					
Illinois					
Indiana			X	X	X
Iowa					
Kansas					
Kentucky		X			
Louisiana				X	
Maine		X		X	
Maryland	X			X	
Massachusetts					
Michigan					
Minnesota		X		X	X
Mississippi					
Missouri					
Montana	X	X	X		
Nebraska					
Nevada					
New Hampshire		X			
New Jersey					
New Mexico				X	
New York			X		
North Carolina					
North Dakota					
Ohio					
Oklahoma					X
Oregon			X	X	
Pennsylvania					
Rhode Island					
South Carolina			X		
South Dakota	X		X		
Tennessee	X	X			
Texas					
Utah	X	X			X
Vermont				X	
Virginia				X	
Washington		X		X	
West Virginia				X	
Wisconsin				X	
Wyoming					

In the statutes and regulations that address **insects**, five states authorize some form of emergency powers.[318] Colorado and Utah authorize emergency measures on public and private lands to control insect infestations. Four states, Alabama, California, Colorado, and Florida, have emergency insect and disease funds. Minnesota and Oklahoma allow the state agency to bypass the notice requirement before entering land to control or manage an emergency infestation. Indiana authorizes emergency orders to prevent the movement or destroy any plant or element of beekeeping that may pose a hazard.

Comprehensive Model

A comprehensive model for emergency powers should consist of authority to undertake emergency control and management measures to combat infestations of any type of species and should also authorize appropriate funding. None of the states' policies meet the comprehensive model, but Arizona's statutes and regulations come close. Arizona's policies authorize emergency powers in the wildlife, aquatic life, and invasive plant categories. Arizona's program could be strengthened by expanding these emergency powers into the statutes and regulations that address plant pest and diseases and insects. In addition, Arizona's program should authorize funding to undertake the emergency control and management measures.

Intermediate Model

Colorado's statutes and regulations provide an example of state policy that has taken intermediate steps toward the comprehensive model. Colorado's policies authorize limited emergency powers in the aquatic life, invasive plant, and insect categories, but do not authorize any powers for wildlife or plant pests and diseases. Colorado's authorized powers are not consistent across the different types of invasive species. For example, Colorado's aquatic life statutes and regulations do not authorize the state to undertake any emergency control or management measures whereas they do for insects. For aquatic life the state only has the authority to require a person to stop a particular action that is harming fish stocks. While Colorado has adopted some emergency powers, Colorado should grant authority to control and manage emergency infestations of all types of invasive species. Colorado has also adopted another important provision that authorizes emergency funding for invasive plants and insects. Colorado could strengthen this provision by expanding the emergency funding to cover the wildlife, aquatic life, and plant pest and diseases categories.

[318] Colorado, Indiana, Minnesota, Oklahoma, and Utah.

3. BIOLOGICAL CONTROL AGENTS

Explanation of Tool

Several states have authorized the use and regulation of biological control agents, which counteract the effects of invasive species. Like most invasive species management methods, this control method is not without controversy or potential negative environmental consequences. Early introductions have caused native species extinctions and harm to natural systems. For example, the Indian mongoose (*Herpestes javanicus*), introduced in Hawaii to control rats infesting sugar cane fields, ended up preying upon non-target native birds, which contributed to their demise.[319] The federal government and states regulate biological control agents to ensure that they do not become invasive species themselves.

The use of biological control agents is only specifically mentioned in a few state statutes and regulations. In fact, the use of biological control agents is not specifically mentioned in regard to **wildlife** or **insects**.

In the state statutes and regulations that address **aquatic life**, five states specifically mention the use of biological control agents.[320] Two states, California and Florida authorize state agencies to use biological control agents, and North Carolina authorizes the use of biological control agents to eradicate noxious aquatic weeds. Three states, California, Indiana, and Vermont, require either approval from a state agency or a permit or license to use a biological control agent. In addition, Vermont authorizes a standard to determine whether a permit should be issued.

The greatest number of states, a total of twelve, mention the use of biological control agents in relation to invasive **plants** within their statutes and regulations.[321] Seven states simply authorize the use of biological con-

[319] Williamson, M. 1996. Biological Invasions. T.J. Press, Padstow, Great Britian. 244 pp.

[320] California, Florida, Indiana, North Carolina, and Vermont.

[321] California, Delaware, Florida, Kansas, Minnesota, Montana, Nevada, New Hampshire, New York, North Carolina, South Dakota, and Wisconsin.

TABLE 12: MANAGEMENT OF BIOLOGICAL CONTROL AGENTS

States that require either approval, a permit, or a license to use a biological control agent in the state, and states that have authorized standards require the approval or a permit or license to use a biological control agent

State	Approval, Permit, or License	Standards
Alabama		
Alaska		
Arizona		
Arkansas		
California	A	
Colorado		
Connecticut		
Delaware	P	P
Florida	P, D	P, D
Georgia		
Hawaii		
Idaho		
Illinois		
Indiana	A	
Iowa		
Kansas	P	
Kentucky		
Louisiana		
Maine		
Maryland		
Massachusetts		
Michigan		
Minnesota		
Mississippi		
Missouri		
Montana		
Nebraska	D	
Nevada		
New Hampshire		
New Jersey	D	
New Mexico		
New York		
North Carolina		
North Dakota		
Ohio		
Oklahoma		
Oregon		
Pennsylvania		
Rhode Island		
South Carolina		
South Dakota		
Tennessee		
Texas		
Utah		
Vermont	A, D	A, D
Virginia		
Washington	D	D
West Virginia		
Wisconsin	P	P
Wyoming		

A - Aquatic Life P - Plants D - Plant Pests and Diseases

trol programs.[322] Four states, Delaware, Florida, Kansas, and Wisconsin, require a permit, license, or approval and three of these states, Delaware, Florida, and Wisconsin, authorize specific standards to regulate the issuance of a biological control agent permit or license. North Carolina authorizes the adoption of regulations to protect the state from biological control organisms, but these regulations have not been promulgated.

In statutes and regulations that address **plant pests and diseases**, seven states mention the use of biological control agents.[323] Three states, Arizona, New Jersey, and North Dakota, authorize the use of biological control programs. Five states require either approval or a permit or a license to use a biological control agent.[324] Three states, Florida, Vermont, and Washington, authorize specific standards to regulate the issuance of a biological control agent permit or license.

Comprehensive Model

A comprehensive state model would require approval or a permit or license to use a biological control agent. In addition, the comprehensive model would require confirmation that the biological control agent would not affect non-target organisms before it was released, and it would require assessment of the potential for movement of the biological control agent across state lines. Finally, the comprehensive model would require post-release monitoring of the biological control agent. No states currently satisfy the comprehensive model, but Florida and Vermont's policies come close. Florida's statutes and regulations for plants and plant pests and diseases require a permit to use a biological control agent. Florida also has standards for the issuance of the permit that require the biological control agent to be target-specific and confirmation that it is not likely to become a plant pest. Florida's policies could be strengthened by expanding the permitting of biological control agents to also cover wildlife, aquatic life, and insects. Vermont's statutes and regulations addressing aquatic life and plant pests and diseases require the issuance of a permit to use a biological control agent. Vermont's policies also require that the biological control agent be an acceptable risk to the non-target environment, be a negligible risk to public health, and either be a benefit to or have no adverse effect on the public good. Vermont could strengthen its policies by expanding them to cover biological control agents that combat wildlife, plants, and insects.

Intermediate Model

Nebraska's statutes and regulations provide an example of state policy that has adopted intermediate provisions toward reaching the model program. Nebraska's policies addressing plant pests require a permit to import a biological control agent. Nebraska's policy, however, could be strengthened by expanding the permit requirement to also cover wildlife, aquatic life, plants, and insects. Nebraska's policy is also lacking an enforceable standard governing the issuance of these permits, which would ensure the use of target-specific biological control agents.

4. RESTORATION

Explanation of Tool

After a state controls or manages an invasive species, an important next step is to restore native species to areas harmed by invasives. It is important to note that this study does not discuss state policies that primarily address the preservation of native species. While the preservation of native species is an important step in protecting a state's biodiversity, the focus of this study is more specifically on tools to control and manage invasive species and not the protection and restoration of biodiversity.

Only eleven states have adopted specific restoration policies, which vary greatly in their requirements.[325] Three states, California, Delaware, and Nevada, have policies for the restoration of native **wildlife** species. The policies range from Delaware and California's, which require the protection and enhancement of natural areas and native species, to Nevada's, which mentions restoring native animal species. Five states have policies for the restoration of native **aquatic species**.[326] The policies in Montana and North Carolina focus on removing specific invasive fish species and restoring

[322] California, Minnesota, Montana, Nevada, New Hampshire, New York, and South Dakota.

[323] Arizona, Florida, Nebraska, New Jersey, North Dakota, Vermont, and Washington.

[324] Florida, Nebraska, New Jersey, Vermont, and Washington.

[325] California, Delaware, Florida, Hawaii, Indiana, Kentucky, Montana, Nevada, New Hampshire, North Carolina, and Tennessee.

[326] Delaware, Montana, Nevada, New Hampshire, and North Carolina.

native fish. The policies in Delaware, Nevada, and New Hampshire are more general and require the protection and enhancement of natural areas and/or native species.

Seven states have specifically authorized restoration programs for native **plants** in their statutes and regulations.[327] Many of these policies, such as those in California, Florida, and Hawaii, are much more comprehensive than the state restoration policies for wildlife and aquatic species. California has a program to restore areas to protect native wildlife, fish, and plant species, and it has authorized the establishment of a state seed bank to assist in the reforestation of private and public lands that have been damaged through insects, disease, or other natural causes. Florida has passed a statute to restore Florida land in general and another statute to specifically restore the Everglades. In Hawaii, the state natural resources agency may enter into a conservation plan with any landowner to restore natural communities. The state also has a forest stewardship program designed to restore native vegetation.

State policies for other categories of invasive species are not as detailed. Indiana's policy encourages the restoration of native species when restoring wetlands and the restoration of native plant communities in unique natural areas. Nevada has a program that focuses on restoring native plants. Kentucky's policy authorizes the restoration of native plants in nature preserves, and Tennessee's policy is limited to restoring native wildflowers.

Comprehensive Model

Comprehensive restoration provisions should require the restoration of areas after the landowner or state agency has eradicated the invasive species. None of the states have authorized comprehensive restoration policies for wildlife, aquatic species, or plants. The few states that do have policies state that native species should be restored, but do not explain where native species should be restored, the circumstances under which native species should be restored, or how the restoration will be maintained. Florida's Everglades Act is the most detailed of the state policies. The statute emphasizes that the Everglades need to be restored and requires surveys to maintain the restoration.

[327] California, Florida, Hawaii, Indiana, Kentucky, Nevada, and Tennessee.

Intermediate Model

The adoption of a program that focuses on restoring native plants to areas that were invaded by nonnative species is an incremental step that states can take. Once these programs are adopted, details can then be added to strengthen the program and make it more comprehensive. For example, Nevada's Natural Heritage Program is authorized to restore native plants, animals, and biotic communities. The details of this program are not contained in existing statutes or regulations. It is significant, however, that restoration is a recognized goal of the program.

Control and Management Trends

The general control and management authority tool in the statutes and regulations addressing wildlife, aquatic life, and insects mainly involves the state's ability to manage and control diseased and illegal species. An important component of the control and management tool is the requirement that the public notify the state agency of the escape of an invasives species. This notification allows the state agency to respond to the escape before a widespread infestation occurs. Another component of this tool is the creation of specific management plans so that the state can systematically work towards controlling an identified invasive species.

The general control and management authority tool in the plants and plant pests and diseases categories mainly relates to which entity—state, county, local agency, or landowner—is responsible for controlling or managing invasives species on their land. Only nine states rely completely on private landowners to control invasive plants, while the remainder allow the state to control and manage invasive plants if the landowner fails to do so. Only four states provide this authority for plant pests and diseases. The state agencies are given more authority to control and manage plants and plant pests and diseases on private land than they are given for wildlife and aquatic species. In contrast to the wildlife and aquatic life statutes and regulations, only one state requires notification to the state agency of the presence of invasive plant species, and only four states have this requirement for plant pests and diseases. Many more states authorize the creation of overarching control programs for invasives plants than for wildlife or aquatic life; seventeen states authorize weed control programs to manage the presence of invasive weeds, and fifteen states authorize the formation of control districts for certain invasive species.

TABLE 13: RESTORATION POLICIES

States that authorize restoration policies for areas that have been invaded by different types of invasive species.

State	Wildlife	Aquatic Life	Plant	Plant Pest and Disease	Insect
Alabama					
Alaska					
Arizona					
Arkansas					
California	X		X		
Colorado					
Connecticut					
Delaware	X	X			
Florida			X		
Georgia					
Hawaii			X		
Idaho					
Illinois					
Indiana			X		
Iowa					
Kansas					
Kentucky			X		
Louisiana					
Maine					
Maryland					
Massachusetts					
Michigan					
Minnesota					
Mississippi					
Missouri					
Montana		X			
Nebraska					
Nevada	X	X	X		
New Hampshire		X			
New Jersey					
New Mexico					
New York					
North Carolina		X			
North Dakota					
Ohio					
Oklahoma					
Oregon					
Pennsylvania					
Rhode Island					
South Carolina					
South Dakota					
Tennessee			X		
Texas					
Utah					
Vermont					
Virginia					
Washington					
West Virginia					
Wisconsin					
Wyoming					

While the emergency powers tool is extremely important in allowing the state to quickly respond to an invasives outbreak before it becomes widespread, only a small number of states have some form of emergency powers for each category of invasive species. In addition, a necessary component of emergency powers is the existence of emergency funding so that states can utilize these powers to contain infestations. States without any emergency powers are scattered across the country. The majority of states fail to authorize emergency funding. Only one state authorizes emergency funding for invasive plants, two states authorize emergency funding for plant pests and diseases, and four states do so for insects.

The regulation of biological control agents is important to determine that they will not negatively affect non-target species or the environment, yet their use remains largely unregulated by the states. Only sixteen states have statutorily authorized some type of regulation of biological control agents, and these states have done so only for aquatic life, plants, or plant pests and diseases. Western states are most likely to have this tool. An even smaller percentage of states require approval from a state agency or a permit or license to use a biological control agent.

Only ten states have authorized the restoration tool. Restoration is an important step to restore native species to areas harmed by invasive species. States that have been severely impacted by invasives, California, Florida, and Hawaii, have adopted this tool along with a sprinkling of other states across the nation.

CHAPTER IX: ENFORCEMENT AND IMPLEMENTATION

Another category of tools used by states is enforcement and implementation. This category is extremely important as without these tools the statutes and regulations are simply words on paper. Although a state may have the best statutes and regulations on the books, whether they prove to be effective lies in the level and manner in which they are implemented on the ground. The tools discussed in this section include:

- Enforcement authorities
- Funding

1. ENFORCEMENT AUTHORITIES

Explanation of Tool

Enforcement authorities are necessary to ensure compliance with invasive species policies. Most states authorize the seizure of invasive species that are illegally possessed. The traditional enforcement mechanisms used by the states include imposing fines and imprisonment for violations of state policies. States vary greatly in their use and severity of civil, criminal, and administrative penalties. For example, violations of aquatic species provisions in Connecticut result in a fine of $77, while violations in Colorado can result in fines of up to $5000. Most states that list a classification for violations, classify the violations as either misdemeanors or infractions. A few states, Arizona, Florida, Hawaii, Idaho, and New Hampshire, classify certain violations that are particularly egregious, such as intentional violations or for repeat offenders, as felonies. States often use different enforcement approaches depending on whether the enforcement action is in response to a violation of the wildlife, aquatic species, plants, plant pests, or insect laws and regulations. For example, in Delaware, violations of invasive wildlife provisions are misdemeanors and may result in fines and imprisonment, violations of invasive aquatic species provisions do not have any civil or criminal provisions listed, and violations of invasive plant provisions result in fines and civil penalties.

A number of states do not specifically authorize any enforcement mechanisms in their invasive species provisions, except for possible seizure authority. These states may provide enforcement mechanisms in their general statutory authorities, but they are not listed in the specific invasive species provisions.

In addition to the use of traditional enforcement mechanisms, some states require compensation for damages and costs associated with the unlawful possession or release of invasive species. This valuable enforcement tool recognizes that violations of invasive species provisions often cause environmental damage that previously went uncompensated. For example, in Washington, owners of escaped non-native wildlife are liable for the cost of recovering the animal and for any damage to Washington's wildlife or habitat.

Rather than simply focusing on the use of negative enforcement tools, some states have also developed incentive programs to encourage the public to assist in the enforcement of invasive species programs through the use of bounties and rewards. For example, Hawaii's statutes and regulations authorize an amnesty program, where a person is exempt from penalties if he voluntarily surrenders a prohibited or restricted animal before the initiation of a seizure action. In addition, Hawaii's statutes and regulations authorize a reward program, where a person who gives information about a violation will receive one-half of the penalty paid to the state. Michigan's statutes and regulations also use a unique enforcement mechanism for its ballast water provisions. In Michigan, vessels that are not on the official list of vessels with authorized ballast water treatment methods are not eligible for a new grant, loan, or award from the state.

For violations of **wildlife** provisions, eleven states do not specify enforcement mechanisms other than seizure or loss of a permit.[328] Twenty-four states[329] authorize fines for violations of wildlife provisions, and thirteen states authorize civil penalties.[330] Sixteen states

[328] Arkansas, Indiana, Maine, Michigan, Missouri, New Mexico, North Carolina, Ohio, Texas, Wisconsin, and Wyoming.

[329] Alabama, California, Connecticut, Delaware, Florida, Hawaii, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Mississippi, Montana, Nebraska, New York, Oklahoma, Oregon, Rhode Island, South Carolina, Tennessee, and West Virginia.

[330] California, Georgia, Hawaii, Illinois, Louisiana, Minnesota, Mississippi, New Hampshire, New Jersey, New York, North Dakota, Oregon, and Vermont.

authorize imprisonment.[331] Thirty-one states authorize violations to be classified as misdemeanors or infractions, and three states, Hawaii, Idaho, and South Dakota, authorize certain violations to be classified as felonies.[332] Thirteen states[333] have adopted compensation for environmental damages for violations of wildlife provisions. Only Hawaii has adopted positive enforcement tools in the wildlife statutes and regulations.

For violations of **aquatic species** provisions, twelve states[334] do not specify enforcement mechanisms, and two states, Indiana and North Carolina, only have limited provisions for violations of aquatic weed provisions. Twenty-two states[335] authorize fines for violations of aquatic provisions, and twelve states authorize civil penalties.[336] Fifteen states authorize imprisonment.[337] Thirty-one states authorize violations to be classified as misdemeanors or infractions, and Hawaii authorizes certain violations to be classified as felonies.[338] Nine states authorize compensation for environmental damages for violations of aquatic species provisions.[339] Three states, California, Hawaii, and Michigan, authorize positive enforcement tools.

Only four states, Louisiana, Ohio, Utah, and Vermont, do not have enforcement mechanisms for violations of **plant** provisions. Twenty-seven states[340] authorize fines for violations of plant provisions, and twenty-seven states authorize civil penalties.[341] Eleven states authorize imprisonment.[342] Forty-two states authorize violations to be classified as misdemeanors or infractions, and three states, Arizona, Hawaii, and New Hampshire, authorize certain violations to be classified as felonies.[343] Three states, Hawaii, New Mexico, and South Dakota, authorize compensation for environmental damages for violations of plant provisions. Two states, Hawaii and North Dakota, authorize positive enforcement tools.

Only two states, Arizona and Utah, do not specifically authorize enforcement mechanisms for violations of **plant pest and disease** provisions. Twenty-six states[344] authorize fines for violations of plant pest and disease provisions, and twenty-eight states authorize the use of civil penalties.[345] Nineteen states authorize imprison-

[331] California, Delaware, Florida, Hawaii, Idaho, Kansas, Louisiana, Maryland, Massachusetts, Mississippi, Montana, New Jersey, New York, Oklahoma, South Carolina, and West Virginia.

[332] Alabama, Alaska, Arizona, California, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maryland, Minnesota, Mississippi, Montana, Nebraska, New Hampshire, New York, North Dakota, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Utah, Virginia, and West Virginia.

[333] California, Colorado, Delaware, Hawaii, Louisiana, Minnesota, Nebraska, Nevada, New Hampshire, North Dakota, Oregon, Tennessee, and Washington.

[334] Arkansas, Delaware, Georgia, Illinois, Kansas, Missouri, Nevada, New Jersey, Ohio, Texas, Wisconsin, and Wyoming.

[335] California, Colorado, Connecticut, Hawaii, Idaho, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Montana, Nebraska, New York, Oklahoma, Rhode Island, South Carolina, Tennessee, Vermont, Washington, and West Virginia.

[336] Arizona, California, Hawaii, Idaho, Indiana, Louisiana, Maine, Minnesota, New York, North Dakota, South Carolina, and Washington.

[337] California, Hawaii, Idaho, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Montana, New York, Oklahoma, Rhode Island, South Carolina, Vermont, and West Virginia.

[338] Alabama, Alaska, Arizona, California, Colorado, Florida, Hawaii, Idaho, Iowa, Kentucky, Louisiana, Maine, Maryland, Michigan, Minnesota, Mississippi, Montana, Nebraska, New Hampshire, New Mexico, New York, North Carolina, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Virginia, and West Virginia.

[339] California, Colorado, Hawaii, Louisiana, Minnesota, Montana, New Hampshire, Oregon, and South Carolina.

[340] Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Kansas, Kentucky, Massachusetts, Montana, New Jersey, New Mexico, New York, North Carolina, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, West Virginia, Wisconsin, and Wyoming.

[341] Arizona, Arkansas, California, Colorado, Delaware, Idaho, Illinois, Indiana, Iowa, Maine, Maryland, Michigan, Mississippi, Missouri, Montana, New Hampshire, New Jersey, New York, North Dakota, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Washington, West Virginia, and Wisconsin.

[342] Colorado, Idaho, Kentucky, Montana, New Jersey, New York, Pennsylvania, South Carolina, West Virginia, Wisconsin, and Wyoming.

[343] Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Virginia, Washington, West Virginia, and Wyoming.

[344] Arkansas, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Idaho, Illinois, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Nevada, New York, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Washington, West Virginia, Wisconsin, and Wyoming.

[345] Alaska, Arkansas, California, Colorado, Delaware, Idaho, Illinois, Indiana, Louisiana, Maine, Maryland, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Jersey, New Mexico, New York, North Dakota, Oregon, South Carolina, Tennessee, Texas, Vermont, Washington, West Virginia, and Wisconsin.

ment.[346] Thirty-four states authorize violations to be classified as either misdemeanors or infractions, and California and Florida authorize certain violations to be classified as felonies.[347] Two states, Idaho and South Dakota, authorize compensation for environmental damages for violations. No states have positive enforcement tools in their plant pest and disease statutes and regulations.

Fourteen states do not authorize enforcement mechanisms for specific violations of **insect** provisions.[348] Sixteen states[349] authorize fines for violations of insect statutes and regulations, and eighteen states authorize civil penalties.[350] Eleven states authorize imprisonment.[351] Twenty-nine states classify violations as either misdemeanors or infractions, and one state, New Hampshire, classifies certain violations as felonies.[352] No states authorize compensation for environmental damages or have positive enforcement tools in their insect statutes and regulations.

[346] Arkansas, California, Colorado, Georgia, Idaho, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Nevada, New York, Pennsylvania, Rhode Island, South Carolina, Washington, West Virginia, and Wisconsin.

[347] Alabama, Alaska, Arkansas, California, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Maryland, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Mexico, New York, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Virginia, Washington, West Virginia, Wyoming.

[348] Alaska, Arizona, Connecticut, Florida, Hawaii, Indiana, Kentucky, Massachusetts, Michigan, New York, Tennessee, Texas, Utah, and Vermont.

[349] Alabama, California, Colorado, Delaware, Georgia, Idaho, Kansas, Mississippi, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, West Virginia, Wisconsin, and Wyoming.

[350] California, Colorado, Idaho, Illinois, Louisiana, Maine, Minnesota, Montana, Nevada, New Hampshire, New Jersey, North Carolina, North Dakota, Oregon, Pennsylvania, South Dakota, Washington, and West Virginia.

[351] Alabama, Colorado, Georgia, Idaho, Mississippi, Montana, Oregon, South Carolina, West Virginia, Wisconsin, and Wyoming.

[352] Alabama, Arkansas, California, Colorado, Georgia, Idaho, Iowa, Kansas, Maryland, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Virginia, Washington, West Virginia, and Wyoming.

Boll weevil (*Anthonomus grandis*)

Comprehensive Model

Important elements of a comprehensive model include enforcement mechanisms across all areas of invasive species, penalties strict enough to deter violations, liability for the costs of rectifying violations, and positive tools to encourage and reward compliance with invasive species provisions. Hawaii's laws and regulations contain all of these elements. Hawaii's policies use similar enforcement tools for violations across invasive species. Most violations of wildlife, aquatic life, plant, plant pest, and insect provisions are misdemeanors, carrying fines of up to twenty-five thousand dollars. Hawaii's policies have strict penalties to deter intentional violations, which are felonies, punishable by fines of up to two hundred thousand dollars. Hawaii's policies also require violators of invasive species policies to pay an amount to the state based on the cost of a program that is developed to capture, control, or eradicate a pest or escaped or introduced wildlife, plant, or aquatic species. The use of these large fines and the possibility of a felony conviction are strict penalties for violations of invasive species laws and provide incentives for compliance.

In addition to the use of negative enforcement tools such as fines, Hawaii's policies also contain positive in-

TABLE 14: ENFORCEMENT MECHANISMS

States that authorize the different enforcement mechanisms: fines, civil penalties, imprisonment, misdemeanors/infractions, felonies, compensation for environmental damages, and positive incentives in order to enforce their invasive species statutes and regulations.

State	Fines	Civil Penalties	Imprisonment	Misdemeanor/ Infraction	Felony	Compensation for Damages	Positive Incentives
Alabama	W, I	I	W, A, P, D, I				
Alaska		D		W, A, P, D			
Arizona		A, P		W, A, P	P		
Arkansas	P, D	P, D	D	P, D, I			
California	W, A, P, D, I	W, A, P, D, I	W, A, D	W, A, P, D, I	D	W, A	A
Colorado	A, P, D, I	P, D, I	P, D, I	A, P, D, I		W, A	
Connecticut	W, A, P, D			P			
Delaware	W, P, I	P, D	W	W, P		W	
Florida	W, P, D		W	W, A, P, D	D		
Georgia	P, D, I	W	D, I	W, P, D, I			
Hawaii	W, A, P, D	W, A	W, A	W, A, P	W, A, P	W, A, P	W, A, P
Idaho	W, A, P, D, I	A, P, D, I	W, A, P, D, I	W, A, P, D, I	W D		
Illinois	W, P, D	W, P, D, I	W, P, D				
Indiana		A, P, D		P, D			
Iowa	W, A, P	P		W, A, P, D, I			
Kansas	W, P, D, I		W	W, P, D, I			
Kentucky	W, A, P, D		P, D	W, A, P			
Louisiana	W, A, D	W, A, D, I	W, A, D	W, A		W, A	
Maine	W	A, P, D, I		A, P			
Maryland	W, A, D	P, D	W, A, D	W, A, D, I			
Massachusetts	A, P, D		W, A				
Michigan	A, D	P	A, D	A, P, D			A
Minnesota		W, A, D, I	D	W, A, P, D, I		W, A	
Mississippi	W, A, D, I	W, P, D	W, A, D, I	W, A, P, D, I			
Missouri		P, D		P, D, I			
Montana	W, A, P	P, D, I	W, A, P, I	W, A, P, I		A	
Nebraska	W, A	D		W, A, P, D, I		W	
Nevada	D	I	D	P, D, I		W	
New Hampshire		W, P, I		W, A, P, D, I	P, I	W, A	
New Jersey	P	W, P, D, I	W, P	P			
New Mexico	P	D		A, P, D, I		P	
New York	W, A, P, D	W, A, P, D	W, A, P, D	W, A, P, D			
North Carolina	P	I	A, P, I				
North Dakota		W, A, P, D, I		W, P, I		W	P
Ohio				D, I			
Oklahoma	W, A, P, D, I		W, A	W, A, D, I			
Oregon	W, P, I	W, P, D, I I		W, P, D		W, A	
Pennsylvania	P, D, I	P, I	P, D	W, A, P, I			
Rhode Island	W, A, P, D, I		A, D	A, P, D, I			
South Carolina	W, A, P, D, I	A, P, D	W, A, P, D, I	W, A, P, D, I		A	
South Dakota		P, I		W, A, P, D, I	W	P, D	
Tennessee	W, A	P, D		W, A, P, D		W	
Texas		D		P, D			
Utah				W, A			
Vermont	A	W, D	A				
Virginia				W, A, P, D, I			
Washington	A, D	A, P, D, I	D	P, D, I		W	
West Virginia	W, A, P, D, I	P, D, I	W, A, P, D, I	W, A, P, D, I			
Wisconsin	P, D, I	P, D	P, D, I				
Wyoming	P, D, I		P, I	P, D, I			

W – Wildlife A – Aquatic Life P – Plants D – Plant Pests and Diseases I – Insects

centive programs. Hawaii's policies encourage compliance with invasive species provisions by authorizing an amnesty program, which exempts a person from penalties if he voluntarily surrenders a prohibited or restricted wildlife or aquatic animal before the state initiates a seizure action. Hawaii's policies also encourage the cooperation of the public in enforcing the invasive species provisions through a reward program, which grants half of the penalty paid to the state for a violation of wildlife provisions to the person who provides the information leading to the conviction and payment of the violation. Hawaii could improve its authorized enforcement tools by expanding its positive enforcement tools to include invasive plant violations.

Intermediate Model

Washington's statutes and regulations provide an example of a state that has undertaken several incremental steps towards achieving a model enforcement program. Washington's policies authorize fines and imprisonment for violations of aquatic species, invasive plants, plant pests, and insect provisions, but it does not authorize these similar mechanisms for violations of wildlife provisions. Fines may be assessed up to one thousand dollars for violations of plant provisions and up to five thousand dollars for violations of plant pest and insect provisions. Washington's fines are not as strict as Hawaii's, and Washington's policies do not instate harsher penalties for intentional violations. Washington's statutes and regulations authorize enforcement mechanisms across all categories of invasive species but they could better address invasive wildlife.

Another important intermediate step that Washington's statutes and regulations have authorized is mandated compensation for damages to the environment caused by violations of invasive species provisions. Washington's policy holds the owner of escaped nonnative wildlife liable for the cost of recovering the animal and for any damage to Washington's wildlife or habitat. Washington's policy also holds the possessor of aquatic nuisance species responsible for the costs of abating the infestation. In addition, Washington's policy requires that a person who knowingly violates a plant pest and disease quarantine and causes an infestation must pay the costs of the state's control or eradication measures. Washington's enforcement regime is missing several positive enforcement tools such as compliance incentives and rewards to encourage public involvement.

2. FUNDING

Explanation of Tool

Adequate funding is necessary for implementing authorized state policies. Without adequate funding, state policy is ineffective. State invasive species policies and programs are funded through the general funds of an agency or through specific funds appropriated by state legislatures to implement designated invasive species control programs. In addition, some states may require that entities that require inspections pay the state for conducting these inspections. This section identifies the existence of specific state funds designed to target invasive species. While the existence of a specific fund does not guarantee funding, these specific funds do allow the state agencies to set aside funds specifically for invasive species activities. This study does not address the specific dollar amounts available through each funding source.

Four states have specific funds dedicated to the management of invasive **wildlife**.[353] The funds in Arizona, California, and Delaware cover invasive species management only indirectly. The funds are primarily devoted to conservation, which also covers management of non-natives. California has a specific fund, the Vertebrate Pest Control Research Account, earmarked for the management of vertebrate pests. Hawaii has a Permit Revolving Fund, which covers the management of invasive species generally.

Eight states have specific funds for the management of invasive **aquatic species**.[354] The funds in Arizona and Delaware and one of the funds in California only cover invasive species management indirectly as these funds primarily focus on conservation. California also has an Exotic Species Control Fund for ballast water programs. Florida and South Carolina have Aquatic Plant Management Trust Funds for the control of aquatic plants on state lands. Texas has an Aquatic Vegetation Management Fund for developing aquatic vegetation management plans; for research, education, and outreach; and for vegetation control. Hawaii has a Permit Revolving Fund, which covers the management of invasive species generally. Maine has an Invasive Aquatic Plant and Nuisance Species Fund.

Fifteen states have specific funds for the management of invasive **plants**.[355] Of these fifteen states, eleven

[353] Arizona, California, Delaware, and Hawaii.

[354] Arizona, California, Delaware, Florida, Hawaii, Maine, South Carolina, and Texas.

[355] California, Colorado, Florida, Hawaii, Idaho, Illinois, Missouri, Montana, Nebraska, North Dakota, Oregon, South Dakota, Texas, Utah, and Wyoming.

TABLE 15: SPECIFIC FUNDS

States that authorize specific funds to implement their statutes and regulations that address invasive species.

State	Wildlife	Aquatic Life	Plant	Plant Pest and Disease	Insect
Alabama				X	
Alaska					
Arizona	X	X			
Arkansas					
California	X	X	X	X	
Colorado			X		X
Connecticut					
Delaware	X	X		X	
Florida		X	X	X	
Georgia				X	
Hawaii	X	X	X	X	X
Idaho			X	X	
Illinois			X		
Indiana				X	
Iowa					
Kansas					
Kentucky					
Louisiana					
Maine		X		X	
Maryland				X	
Massachusetts					
Michigan					
Minnesota				X	
Mississippi				X	
Missouri			X		
Montana			X		
Nebraska			X	X	X
Nevada					
New Hampshire					
New Jersey					
New Mexico				X	X
New York					
North Carolina					
North Dakota			X	X	
Ohio					
Oklahoma					
Oregon			X	X	
Pennsylvania				X	
Rhode Island					
South Carolina		X		X	
South Dakota			X	X	
Tennessee				X	
Texas		X	X		
Utah			X	X	
Vermont					
Virginia				X	
Washington				X	
West Virginia				X	
Wisconsin				X	
Wyoming			X	X	

of the state funds are for noxious weed management.[356] Idaho and North Dakota have range improvement funds that include the management of noxious weeds. Nebraska also has a Seed Administration Cash Fund for the management of seeds. Hawaii has a Permit Revolving Fund, which covers the management of invasive species generally. California's fund is a conservation fund, which only covers the management of invasive species indirectly. Florida has a specific fund for the management of noxious weeds on conservation and recreation lands, a fund for invasive plant control, and the Florida Forever Fund, which provides funds for invasive plant management.

Twenty-six states have specific funds for the management of **plant pests and diseases**.[357] Of these states, fifteen have authorized a pest control insurance fund through an interstate pest control compact.[358] Six states have specific pest control funds.[359] Four states, Alabama, California, Idaho, and Virginia, have specific forest insect and disease funds. Three states, Alabama, California, and Florida, have emergency insect and disease funds. Three states, Florida, Maryland, and Nebraska, have plant protection funds. Virginia and Wisconsin have specific funds for gypsy moth control, Mississippi has a specific fund for the control of boll weevils, and California has a specific fund for Pierce's disease. Hawaii has a Permit Revolving Fund, which covers the management of invasive species generally.

Four states, Colorado, Hawaii, Nebraska, and New Mexico, have specific funds for the management of **insects**. Colorado has an emergency fund for insect infestations. Nebraska has a State Apiary Cash Fund, and New Mexico has a grasshopper control fund that covers other range pests. Hawaii has a Permit Revolving Fund, which covers the management of invasive species generally.

[356] California, Colorado, Idaho, Missouri, Montana, Nebraska, Oregon, South Dakota, Utah, Texas, and Wyoming.

[357] Alabama, California, Delaware, Florida, Georgia, Hawaii, Idaho, Indiana, Maine, Maryland, Minnesota, Mississippi, Nebraska, New Mexico, North Dakota, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[358] California, Delaware, Georgia, Maine, Maryland, Minnesota, New Mexico, North Dakota, Oregon, Pennsylvania, South Carolina, Tennessee, Utah, Virginia, and West Virginia.

[359] Idaho, Indiana, South Dakota, Virginia, Washington, and Wyoming.

Comprehensive Model

A comprehensive funding program should contain specific funds earmarked for invasive species management. These funds should be adequate to undertake the required state invasive species activities and they should be available over multiple years to allow for the annual variability of invasives outbreaks. As discussed earlier, this study did not research the actual dollar amounts allocated to invasive species programs and thus cannot provide an example of a state providing adequate funding. However, this study did note the existence of specific funds for invasive species programs, and California's policies provide an example of a comprehensive funding program in this respect. California's policies authorize specific funds for all categories of invasive species, except insects.

Enforcement and Implementation Trends

The traditional enforcement mechanisms used by the states include imposing fines, civil penalties, and imprisonment for violations of state policies. The majority of states categorize violations of invasive species laws as misdemeanors; a few states, however, have begun to count certain egregious or intentional violations as felonies. States have also recently begun to hold possessors of invasives liable for damages to the environment caused by that species. Thirteen states have adopted enforcement provisions authorizing compensation for environmental damages caused by invasive wildlife, nine states for damage by invasive aquatic species, three states for invasive plants damage, and four states for plant pest and disease damage.

States have also begun to adopt positive incentives to encourage compliance with invasives statutes and regulations. These incentive programs encourage the public to assist in the enforcement of invasive species programs through the use of bounties, rewards, and amnesty programs. Incentive programs have only been adopted in four states.

Funding is an important tool that ensures on-the-ground implementation of state policies. Over two-thirds of the states have earmarked funds for invasives control work. While the existence of a specific fund does not guarantee funding, these funds do allow state agencies to set aside money specifically for invasive species activities. States could strengthen the effectiveness of their funding program if they allow these funds to be used over multiple years to account for the variability of invasive species outbreaks.

CHAPTER X: COORDINATION TOOLS

Coordination among federal, state, and local agencies, alongside key players within the private sector, allows for more comprehensive and complementary coverage and implementation of regulatory and administrative authorities, policies, programs, and priority issues regarding invasive species within a state. To facilitate interagency and intersector coordination and cooperation, the following two coordination tools may be adopted:

- Councils
- Plans

Explanation of Tool

Many state invasive species laws and regulations were developed in isolation from one another and were largely aimed at addressing threats posed by specific species or affecting specific industries. As a result, an array of different entities is charged with implementing invasive species laws and policies. Within each state multiple agencies might have regulatory or administrative responsibilities for invasive species prevention, management, control, and research. State and federal agencies often share responsibilities and authorities, particularly related to agricultural pests.[360] For example, nine state agencies in Florida have prevention, detection, control, monitoring, and restoration responsibilities, and three agencies have regulatory authorities.[361] Seven state agency divisions and branches and nine federal agencies have responsibilities for the prevention and control of invasives in Hawaii, along with at least six private sector groups.[362] As many as thirty entities in any given state may be responsible for dealing with invasive species, including multiple state, local, or federal agencies, tribes, academic institutions, environmental organizations, agricultural and commercial interests, and private landowners. [363]

The patchwork of policies, programs, and laws complicate a coordinated response to the spread of invasive species at the state level. For example, a state department of transportation may define noxious weeds differently than the state department of agriculture, leading to conflicting treatments of a particular invasive plant

[360] OTA (1993), *supra* note 5.

[361] Florida Invasive Species Working Group. 2002 (February 4). Florida Statewide Invasive Management Plan, Fifth Draft. 43pp. [Hereinafter Florida Management Plan (2002)].

[362] Ikuma, E, D. Sugano, J. Mardfin. 2002. Filling the Gaps in the Fight Against Invasive Species. Report No. 1, 2002. Legislative Reference Bureau, Honolulu, Hawaii. 122pp. [Herein after Filling the Gaps (2002)]. (The state agencies include: the Hawaii State Department of Agriculture, Plant Quarantine Branch and Plant Pest Control Branch (within the Plant Industry Division); and the Inspection Quarantine Branch and Livestock Disease Control Branch (within the Animal Industry Division). Within the Department of Land and Natural Resources: the Division of Forestry and Wildlife, and the Division of Aquatic Resources. Within the Department of Health, the Vector Control Branch (within the Environmental Health Services Division). The federal agencies include: the U.S. Customs Service, Department of Treasury; U.S. Fish and Wildlife Service and National Park Service, Department of Interior; Forest Service, Agricultural Research Service, and Animal and Plant Health Inspection Service, Department of Agriculture; U.S. Postal Service; U.S. Food and Drug Administration, Department of Health and Human Services; and Military Customs Inspection Program. Private organizations include: the Bernice Pauahi Bishop Museum; The Nature Conservancy of Hawaii; Hawaiian Sugar Planters' Association; Hawaiian Humane Society; Maui Humane Society; and Sierra Club.)

[363] Westbrooks, R. *In review*. National Invasive Species Partnership Initiative: A Plan of Action for Establishing Local, State, Regional, National, and International Invasive Species Partnerships in the United States. 23 pp.

(see *Defining an invasive species*). Due to overlapping and, at times, conflicting policies, establishing mechanisms to coordinate the efforts of multiple agencies and sectors becomes essential.[364]

The two most common mechanisms states have adopted to facilitate coordination are the establishment of a statewide council and the development of a statewide management plan.[365] The objective of developing either a statewide invasive species council or plan is to facilitate the coordination of statewide actions regarding prevention of and early detection and rapid response to new invaders; control and management of established invasive species; restoration of native species and invaded habitats; and monitoring, research, and public education and outreach efforts.[366] The preparation of an aquatic nuisance species management plan is also required to meet the eligibility requirements for federal cost-sharing for the plan's implementation.[367] Through a more coordinated process, gaps in regulatory authorities and enforcement can be more adequately addressed, duplication of efforts better avoided, more integrated and consensus-based program priorities and policies set, and funding and research needs better identified.

1. STATEWIDE INVASIVE SPECIES COUNCILS

Invasive species authorities and efforts from multiple sectors and across agencies can be coordinated in a variety of ways. States may choose to establish separate entities to address specific categories of invasives, for example, separate councils for invasive plants, aquatic nuisance species, etc. This may facilitate more targeted, local efforts. Alternatively, states may integrate these separate areas of invasive species through the establishment of one body. Comprehensive councils may better address gaps or overlapping authorities and activities. Ultimately, these decisions may rest upon a complex mixture of political will, agency leadership, available resources, public support, historical choices and relationships, and timing.

Thirty-six states have established some type of interagency invasive species council or working group, which may be either nonprofit organizations, governmental entities, or more loosely associated coordinating bodies.[368] Twelve states have formed interagency or interorganizational councils that address all classes of non-native invasive species.[369] Of these councils, Delaware, Hawaii, Idaho, Maryland, Minnesota, New

[364] OTA (1993), *supra* note 5. *And* NISC Management Plan (2001), *supra* note 6.

[365] To determine whether a state has established an invasive species council or plan, statutes, regulations, and agency websites were reviewed. Information was gathered less systematically through state contacts. State coordination tools not found in statutes, guidelines, or on state websites, or in preliminary planning stages were likely not captured.

[366] Filling the Gaps (2002), *supra* note 362. *And* S.B. 2971 S.D.2, 2002 Legis. (HI 2002). <http://www.capitol.hawaii.gov/sessioncurrent/bills/sb2971_sd2_.htm>. (The designation of a lead agency or specific staff position responsible for the coordination of multi-agency invasive species efforts is another approach to deal with fragmented state programs, authorities, and responsibilities. The lead agency approach has been adopted in Minnesota, for example, to cover certain pests. In Hawaii, the designation of both a lead agency and a state coordinator position for invasive species activities in the state has been proposed under Senate Bill 2971 S.D.2. The lead agency or state coordinator approach, however, was not considered in this analysis.)

[367] Windle, Phyllis. Union of Concerned Scientists. *Personal correspondence* (April 9, 2002).

[368] Only interagency or interorganizational councils and plans that affect invasive species programs and efforts across multiple levels (local and state) and multiple sectors (public and private) throughout the state are noted. Local efforts (such as county-level weed management areas) or those led and run by a single agency (such as state weed board/committees specific to state department of agriculture programs) are not covered. Groups or associations that may deal with non-native invasives issues peripherally, but without invasives control and management as their sole mission, are also not covered (such as Native Plant Societies or ecosystem management/ biodiversity initiatives). In addition, councils or plans at the regional level (e.g., among multiple states) are not addressed. For example, a majority of the states participate on Aquatic Nuisance Species Regional Panels, established through the Aquatic Nuisance Species Task Force, including the Great Lakes, Western, Gulf of Mexico, and Northeast Regional Panels (the Mississippi River Basin and the Mid-Atlantic Regional Panels are in the process of being established). The only states not involved in Regional Panels are those in the southeast. In addition, there are regional Exotic Pest Plant Councils that have formed in the following regions: Southeast, Mid-Atlantic, New England, and Pacific Northwest. Similarly, the Western Weed Coordinating Committee and the Intermountain Noxious Weed Advisory Committee have formed between states to address invasive plant issues.

[369] Delaware, Florida, Hawaii, Idaho, Maryland, Minnesota, Nevada, New Hampshire, Oregon, Rhode Island, and Virginia; Wisconsin is currently in the process of forming such a council. These councils are defined broadly enough to encompass all categories of invasive species, such as covering terrestrial and aquatic plants, invertebrates, and animals.

Hampshire, Oregon, Rhode Island, and Wisconsin have broad representation, with membership including relevant state agencies (particularly agriculture, fish and game, water quality/management, transportation, and land management agencies and divisions); federal agencies (e.g., USDA, FWS, USDA FS); local agencies (e.g., county governments); universities/research institutions (e.g., cooperative extension programs); environmental organizations (e.g., Native Plant Societies, The Nature Conservancy); and the private sector (e.g., nursery and horticultural industries, ranchers/farmers). Florida's council only has state agency representation; the Nevada, and Virginia councils only have state and federal agency membership. Most of the comprehensive councils have been established on a voluntary basis. There are, however, several examples of councils that were not. The Florida Invasive Species Working Group and the Nevada Invasive Species Council were established at the request of the governor,[370] the Idaho Invasive Species Council[371] and Wisconsin Task Force on Invasive Species through a gubernatorial executive order;[372] and the New Hampshire Invasive Species Committee[373] and Oregon Invasive Species Council[374] through legislation.[375]

The most common type of statewide coordinating body is a noxious weed or pest plant council. Twenty-three states have established coordinating bodies to address invasive plant species;[376] this number would be even higher if agency-initiated committees, such as state weed teams or noxious weed committees organized by state departments of agriculture were included.[377] Several states have established aquatic nuisance,[378] species specific,[379] or habitat specific[380] councils to deal with more local or tailored problems. To date, fourteen states have not yet established any interagency or interorganizational invasive species council, according to available documentation.[381]

Comprehensive Model

Ideally a state invasive species council would be created through a statute, or alternatively through an ex-

[370] Florida Management Plan (2002), *supra* note 361.

[371] The Office of the Governor. 2001 (Sept. 26). Establishing the Idaho Invasive Species Council. Executive Order No. 2001-11. State of Idaho, Executive Department, Boise, ID. <http://www.agri.state.id.us/animal/weedintro.htm>.

[372] Executive Order No. 12. The Wisconsin Task Force on Invasive Species is now defunct. Currently legislation is proposed to establish a permanent Wisconsin Invasive Species Council.

[373] N.H. Rev. Stat. Ann. §430:54.

[374] Or. Rev. Stat. §561.685.

[375] Councils have various names across different states, which may or may not adequately reflect their scope. To best categorize the diverse state councils, it was determined—through statutory language, mission statements, or activity descriptions (when applicable and available)—the category(ies) of invasives that the council predominately addresses. Councils were characterized as to whether they address (or have the ability to address) all potential invasive species (termed comprehensive invasive species councils) or whether they primarily focus on certain groups of invasives, such as pest plants or noxious weeds (termed invasive plant councils), and aquatic nuisance species (termed aquatic nuisance species councils).

[376] Alaska, Arizona, California, Colorado, Connecticut, Florida, Georgia, Idaho, Kentucky, Maine, Michigan, Mississippi, Montana, Nebraska, Nevada, New Mexico, New York, North Carolina, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Washington, Wisconsin, and Wyoming. Although these councils have various names, such as noxious weed, invasive plant, exotic pest plant councils, and interagency weed action groups, they are collectively referred to as invasive plant councils in this report.

[377] Noxious weed committees or state weed teams —as found in Pennsylvania, South Dakota, Utah, and Washington— were not included as a statewide council because of their narrow purview. These committees are often organized by state departments of agriculture to help guide state noxious weed programs, rather than assuming a more statewide cross-agency coordinating purpose. If state weed teams have assumed a more statewide coordination role, as in the case of Oregon and Wyoming, they have been included. For more detail, see specific state appendices.

[378] Seven states have some form of aquatic nuisance species committee. Illinois, Louisiana, Maine, Ohio, and Washington have established an interagency task force to address invasive aquatic plants and nuisance species. South Carolina and Texas have both established aquatic plant management councils or societies. Other states are involved in efforts, not specific to their state but in coordination with regional panels and efforts coordinated by the federal Aquatic Nuisance Species Task Force.

[379] At least five states have species-specific councils: Arizona (sweet resinbush and karoo bush weed management area), California (pine pitch canker task force); Michigan (zebra mussel task force); Nebraska and South Dakota (joint purple loosestrife committee); South Dakota (grasshopper management committee).

[380] California has established a forest pest council and Florida has established the Pest Exclusion Advisory Committee that deals with agricultural pests (including plants, animals, and diseases).

[381] Alabama, Arkansas, Indiana, Iowa, Kansas, Massachusetts, Missouri, New Jersey, North Dakota, Oklahoma, Pennsylvania, Utah, Vermont, and West Virginia.

ecutive order or agency rulemaking. In order to be comprehensive such a council should be charged with addressing all categories of invasive species that pose a current or impending future threat to the state. It should also include representation from top officials within relevant state, local, and federal agencies, as well as key stakeholders within private sector and public interest groups (see Table 16).[382] The council should strive to coordinate all state invasive species efforts within the state, facilitated by the development of a statewide policy and plan. To implement objectives and action items derived from consensus, the council also should be able to draw from earmarked state funding. Failure to receive official state recognition diminishes councils' abilities to secure necessary financial and political support.

Councils developed in Oregon and Hawaii provide two of the best examples of statewide invasive species councils. Oregon is one of only two states that have legislatively created an invasive species council.[383] The Oregon council is charged with addressing all non-native organisms that cause economic or environmental harm and are capable of spreading to new areas of the state.[384] Core council members are from four agencies and universities: the state department of agriculture, state fish and wildlife agency, Portland State University, and Sea Grant College of Oregon State University.[385] Two additional members are appointed by each core member, creating a twelve-member council. This allows for broader representation from local agencies, Native American governments, environmental organizations, and industry groups (including representatives from ports, aquaculture, pet and grass/seed industries, and nurseries).[386] Currently, the four core members rotate each year as chair of the committee. In the future, given adequate funding, the council may establish advisory and technical committees to aid and advise the council,[387] and may appoint a state invasive species coordinator.[388]

Initiated on January 1, 2002, the Oregon council is just in its beginning stages. It has been charged with developing a statewide plan for dealing with invasive species, which will include a review of state authority to prevent the introduction of invasive species and to eradicate, contain, or manage existing invasives.[389] The first step undertaken by the council to date—which will serve as a foundation for the plan—is the identification of the state's 100 most threatening invasive species (including plants and animals and terrestrial and aquatic species).[390] Following will be recommendations on how to prevent their entry and establishment.[391] The Invasive Species Council is also charged with creating websites, toll-free telephone numbers, or other means of communication for use in reporting sightings of invasive species in Oregon;[392] forwarding reports of invasives sightings to appropriate agencies;[393] producing educational materials and press releases concerning invasive species; and conducting educational meetings and con-

[382] Gray, B. 1985. Conditions facilitating interorganizational collaboration. Human Relations 38(10):911-926. (To determine which stakeholders should be involved in either a council or the development of a plan, a state should evaluate whether a potential member or partner is meaningfully affected by the issues under consideration and also has the capacity to participate. In addition, parties who have the ability to impede future agreements or actions should also be included in the decisionmaking process.)

[383] New Hampshire and Oregon are the only two states that have created an invasive species council/committee legislatively. The primary purpose and scope of the council created in New Hampshire is more narrowly defined than Oregon's and is to develop the "New Hampshire Restricted Invasive Species List"—a list of invasive species "deemed to present an immediate danger to the health of native species, to the environment, to commercial agricultural or forest crop production, or to human health." Due to the narrow scope of the definition, council tasks will only focus on issues directly related to the development and implementation of this list, such as establishing criteria to implement the list, determining potential associated penalties, and conducting outreach and education targeting groups most affected by the new listing process. The committee does not have any earmarked funding to carry out their objectives, and therefore must solicit private funding to conduct tasks such as education and outreach efforts (e.g., constructing a website).

As cited in: Title 40 Chapter 430 §53 *and* Smagula, A. Chair of the Invasive Species Committee, Department of Environmental Services. *Personal communication.* (11 March 2002).

[384] Or. Rev. Stat. §561.685.

[385] *Id.* §561.687.

[386] Hilburn, D., Chair, Invasive Species Council. Plant Division, Oregon Department of Agriculture. *Personal communication.* (18 June 2002).

[387] Or. Rev. Stat. §561.693.

[388] *Id.* §561.691

[389] *Id.* §561.685.

[390] Hilburn, D., Chair, Invasive Species Council. Plant Division, Oregon Department of Agriculture. *Personal communication.* (18 June 2002).

[391] *Id.*

[392] *Id.*

[393] *Id.*

TABLE 16: COUNCILS

States with interagency or interorganizational coordinating bodies (termed councils) that either address all categories of invasive species (comprehensive councils); invasive plants (invasive plant council); aquatic nuisance species (aquatic nuisance council); specific invasive species (species-specific council); or types of invasives like forest pests or agricultural pests. Councils may either be nonprofit organizations, governmental entities, or more loosely associated coordinating groups.

State	Comprehensive Council	Invasive Plant Council	Aquatic Nuisance Council	Species Specific Council	Other Council(s)
Alabama					
Alaska		X			
Arizona		X		P	
Arkansas					
California		X		D	forest pest
Colorado		X			
Connecticut		X			
Delaware	X				
Florida	X	X			agricultural pest
Georgia		X			
Hawaii	X				
Idaho	X	X			
Illinois			X		
Indiana					
Iowa					
Kansas					
Kentucky		X			
Louisiana			X		
Maine			X		
Maryland	X				
Massachusetts					
Michigan		X		A	
Minnesota	X				
Mississippi		X			
Missouri					
Montana		X			
Nebraska		X		P	
Nevada	X	X			
New Jersey					
New Hampshire	X				
New Mexico		X			
New York		X			
North Carolina		X			
North Dakota					
Ohio			X		
Oklahoma					
Oregon	X	X			
Pennsylvania					
Rhode Island	X				
South Carolina		X	X (aquatic plant)		
South Dakota				P, I	
Tennessee		X			
Texas		X	X (aquatic plant)		
Utah		X			
Vermont					
Virginia	X				
Washington			X		
West Virginia					
Wisconsin	pending	X			
Wyoming		X			

X — states that have the types of councils and pending indicates states currently in the process of developing invasive councils. A — species-specific councils that address specific types of aquatic life

P — plants D — plant pests and diseases I — insects

*States with multiple councils of the same type were not noted in this table; for example, California has two statewide coordinating bodies that address invasive plant species in the state.

ferences.[394] To support basic administration of the council, six thousand dollars per year was provided through general funds of the state treasury; in addition an Invasive Species Council Account was established to accept donations and grants.[395]

In contrast to Oregon's legislatively created council, broad-based voluntary invasive species councils have been established in Hawaii. At the grassroots level, Invasive Species Committees (ISCs) have been formed on four of the five Hawaiian islands.[396] These committees were formed to address serious plant and animal invaders threatening agriculture, watersheds, native ecosystems, tourism, industry, and human health.[397] They are voluntary partnerships among local, state, and federal governments; environmental organizations; agricultural, development, trade, and tourism groups; and private industry. Subcommittees have formed to better address unique issues or specific categories of invasives. For example, the Oahu Invasive Species Committee has subcommittees for budget and strategic planning, policy, education, detection, control, aquatics, and restoration. Each ISC has its own tailored mission statement and individually develops island action plans.[398]

The island committees work together and with the Coordinating Group on Alien Pest Species (CGAPS) to implement a more unified, statewide approach to harmful non-native species prevention and control and to help enact more effective statewide policies, procedures, and legislation in Hawaii. CGAPS is also a voluntary multi-agency partnership that formed in 1995 among twenty-eight agencies and organizations to push the invasives agenda and elevate government awareness at the state level. Thus far this council has served as an umbrella organization to help garner support—politically, technically, and financially—for the individual island ISCs.[399] The challenge for both the ISCs and CGAPS has been to secure adequate operational and programmatic funding and political backing, since these groups lack formal state recognition. Funding has largely been acquired piecemeal and through private sources.[400]

During the last legislative session, attempts were made to formally create an extensive invasive species council, through an executive order or legislation.[401] To help ensure high-level political leadership, which has eluded CGAPS,[402] the statewide council was to include chairs or directors of key state agencies—without the option of appointing designees.[403] Top leadership within statewide councils is necessary for securing funding and enacting significant legislative or policy changes.[404] Under the proposed house bill, the council was to be charged with creating and implementing a statewide plan that includes "the prevention, early detection, rapid response, control, enforcement, and education of the public with respect to invasive species, as well as . . . a mission statement articulating the State's position against invasive species."[405] Earmarked funding from general state revenues was to be provided for the first fiscal year to carryout council tasks and responsibilities set forth in the Act.[406] The invasive species council as proposed in this bill would have provided official state recognition and funding for an extensive invasive species council and the development of a statewide plan. Due to a lack of agency stakeholder support, however, attempts to create a state invasive species council failed.[407] Rather,

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[394] *Id.*

[395] Or. Rev. Stat. §561.695.

[396] Oahu, Maui, Kauai, and the Big Island.

[397] Invasive Species Council. 2001 (November 20). Hawaii State Island Invasive Species Committee (ISCs). <http://www.hear.org/alliscs/index.html>. (13 December 2001).

[398] Maui Invasive Species Committee is the most established and active Invasive Species Committee, being successful at securing grant money. It develops a comprehensive, annual action plan for the entire island, as well as individual weed management plans and a list of target species. A field crew helps put the plan into action and acts as a rapid response team to control the worst pest species.

[399] Thomas, P. Hawaii Ecosystems At Risk Program. *Personal correspondence.* (10 June 2001).

[400] Coordinating Group on Alien Pest Species. *Personal correspondence.* (10 June 2001).

[401] Executive Order No. 2002-, draft. Establishing the Hawaii Invasive Species Council. [Hereinafter Ex. Order on Hawaii Invasive Species Council (2002)]. *And* H.B. 2212 H.D.1, 2002 Legis. (HI 2002). <http://www.capitol.hawaii.gov/sessioncurrent/bills/hb2212_hd1_.htm>.

[402] Filling the Gaps (2002), *supra* note 362.

[403] Ex. Order on Hawaii Invasive Species Council (2002), *supra* note 401. (State agencies will include the State Departments of Agriculture; Land and Natural Resources; Business Economic Development and Tourism; Health; Transportation; Commerce and Consumer Affairs; Hawaiian Homes Land; and University of Hawaii. Also county, state, and federal governments, as well as representatives from the profit and not-for-profit sectors, will be invited to participate as members.)

[404] Filling the Gaps (2002), *supra* note 362.

[405] H.B. 2212 H.D.1, §2(b)(4), 2002 Legis. (HI 2002).

[406] *Id.* §3.

[407] Coordinating Group on Alien Pest Species. *Personal communication.* (13 June 2002).

Brazilian Pepper (*Schinus terebinthifolius*)

funding was provided to the island-level Invasive Species Councils to continue early detection and rapid response efforts through allocations from the state Division of Forestry and Wildlife-Natural Area Reserves System operating monies; additional funding will also be provided through a new line item in the state's Department of Land and Natural Resources budget. The CGAPS has instead undertaken the drafting of a statewide invasive species management plan, patterned after the national plan.[408]

Intermediate Model

Although only a handful of states have established invasive species councils that comprehensively address all categories of invasives, almost half of the states (23) have established coordinating bodies that deal with invasive plants. Establishing a narrowly focused council may be the most logical first step or the most effective strategy for certain states, since a particular category of invasives may impose disproportionate environmental impacts. For example, nonindigenous plants have caused the greatest harm of all invasive species in Florida.[409] Several states have established more than one type of invasive plant coordinating body (such as Arizona, California, Nevada, New Mexico, Texas, Wisconsin, and Wyoming), thus totaling thirty groups. Of these 30 entities, 16 are independent or nonprofit organizations, a large proportion being Exotic Pest Plant Councils (EPPCs).[410] EPPCs have been established in several states, including California, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee, as well as in specific regions, such as New England, the Southeast, the Mid-Atlantic, and the Pacific Northwest. EPPCs are nonprofit organizations with members from many sectors that aim to raise public awareness about the spread of non-native invasive plants and facilitate the exchange of information concerning their control and management.[411]

The remaining thirteen coordinating bodies are state-appointed or agency-initiated, predominately by state departments of agriculture. Eleven states have established such invasive plant councils, which are quasi-governmental entities, either spearheaded or coordinated by state or federal agencies or serving in an advisory role to state agencies.[412]

2. STATEWIDE INVASIVE SPECIES PLANS

The development of a statewide plan often follows the establishment of an interagency forum. These plans are designed to provide a more concrete strategy for coordination and action. In certain states, such as

[408] Coordinating Group on Alien Pest Species. *Personal communication*. 13 June 2002.

[409] Simberloff et al. (1997), *supra* note 26.

[410] States with independent, nongovernmental, or nonprofit invasive plant organizations are: Arizona, California, Colorado, Connecticut, Florida, Georgia, Kentucky, Michigan, Mississippi, Montana, Nevada, New Mexico, New York, North Carolina, South Carolina, Tennessee, and Wisconsin.

[411] Southeast Exotic Plant Pest Council. 2002 (Jan 28). "Southeast Exotic Plant Pest Council." < http://se-eppc.org>. (7 March 2002).

[412] Alaska, Arizona, California, Idaho, Nebraska, Nevada, New Mexico, Oregon, Texas, Wisconsin, and Wyoming. In addition, Pennsylvania, South Dakota, Utah, and Washington have state weed boards or noxious weed committees, specific to state departments of agriculture (as mentioned earlier in text).

Alaska,[413] Colorado, [414] Florida,[415] Idaho,[416] and Wisconsin,[417] councils or working groups were formed for the express purpose of developing and/or implementing a statewide invasive management plan. To date, only four states have developed or are in the process of developing comprehensive invasive species management plans that cover all potentially harmful invasive species.[418] At least ten states have developed, or are in the process of developing, a comprehensive invasive plant management plan,[419] and thirteen states have developed or are in the process of developing some type of aquatic nuisance species plan or strategy.[420] Additionally, at least six states have developed species specific or habitat specific invasive species management plans.[421]

Comprehensive Model

A comprehensive plan should cover all categories of invasive species that pose a threat to the state's economy, ecology, and the quality of life of its citizens. It should address not only threats on publicly owned and managed lands, but also those on private lands. All key stakeholders—particularly affected state, local, and federal agencies—should be involved in the development of the plan. The final plan should be formally approved and endorsed by top officials within relevant agencies and the private sector and/or by the governor or state legislature to acquire political backing, earmarked funding, and continued participation. Administrative (e.g., staff time) and fiscal resources need to be devoted to implementing the approved plan.[422] In addition, a formal procedure needs to be followed (deter-

[413] Hébert, M. 2001 (December). Strategic Plan for Noxious and Invasive Plants Management in Alaska. University of Alaska, Cooperative Extension Service, Fairbanks, Alaska. 20pp.

[414] Lane, E. 2001 (December). Colorado's Strategic Plan to Stop the Spread of Noxious Weeds. Colorado Department of Agriculture. 29pp. (At the request of the Colorado General Assembly, the Department of Agriculture was charged with preparing a strategic plan to stop the spread of noxious weeds throughout the state. To develop and implement the plan, a state noxious weed group, consisting of state, local and federal agencies, nonprofit organizations, agricultural groups, and academic institutions, was formed.)

[415] Florida Management Plan (2002), *supra* note 361. (In 2001, the Governor of Florida requested the development of a statewide invasive species management plan, which will encompass all harmful invasive species in Florida, with the exception of those organisms that only cause human diseases. In response, the Invasive Species Working Group, made up of thirteen state agencies and divisions, was formed to develop the plan.)

[416] Idaho Weed Coordinating Committee. 2000 (March 27). Idaho Weed Coordinating Committee Memorandum of Understanding, draft. <http://www.agri.state.id.us/PDF/Animal/iwccchar.pdf>.

[417] Farrow, M. and D. Vrakas. 2002 (February 1). Final Report of the Governor's Task Force on Invasive Species. <http://www.ltgov.state.wi.us/document_view.asp?doccatid=1>. (11 March 2002). (The Governor's Task Force on Invasive Species, in Wisconsin, was established to develop a statewide control plan for invasive species and to obtain federal funding for the implementation of this plan. The Task Force, however, was to be dissolved upon the acceptance of the final report by the Governor. This report, issued in February 2002, recommended that a more permanent Invasive Species Council be created to oversee a statutorily created Statewide Invasive Species Program.)

[418] Florida, Hawaii, Oregon, and Wisconsin. Florida's plan has been drafted and is awaiting approval from the governor and state legislature. Hawaii, Oregon, and Wisconsin are under development.

[419] Alaska, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, and Wyoming have developed a statewide invasive plant plan/strategy; Arizona and Texas are in the process of developing a statewide invasive plant management plan/strategy.

[420] Illinois, Iowa, Massachusetts, Michigan, New York, Ohio, Oregon, Washington, and Wisconsin have developed comprehensive aquatic nuisance species management plans that cover both plant and animal species (associated with the federal Aquatic Nuisance Species Task Force); Louisiana and Maine are in the process of developing a statewide plan to address invasive aquatic plants and nuisance species; South Carolina and Texas have developed aquatic plant management or treatment plans.

[421] Arizona (local weed management areas and regional invasive plant councils have developed species-specific action plans); California (pine pitch canker strategy and several plans addressing aquatic nuisance species); Florida (melaleuca, Brazilian pepper, and lygodium management plans and an agricultural pest report pending approval); Michigan (zebra mussel plan and species specific action plan for Lake Huron); Minnesota (gypsy moth plan); South Dakota (grasshopper management plan).

[422] Gross, S. Executive Secretary, Aquatic Nuisance Species Task Force. *Personal communication.* (8 March 2002). *And* NISC Management Plan (2001), *supra* note 6. (To help ensure effective implementation of ANS plans, NANPCA requires a proposed ANS management plan to be signed and submitted to the ANS Task Force by the governor of the state. If approved by the ANS Task Force, the state is then eligible to receive federal assistance from the U.S. Fish and Wildlife Service for up to 75 percent of the cost incurred by implementing the plan. The NISC Management Plan recommends a grant program, similar to that authorized under the Nonindigenous Aquatic Nuisance Prevent and Control Act of 1990 and 1996 amendments, to help states develop and implement more comprehensive invasive species plans.)

mined by a designated lead agency, interagency council, or statewide coordinator) which requires an annual update and modification of the plan as new information and emerging concerns are addressed.

Guidance created by the ANS Task Force for state (and interstate) aquatic nuisance species management plans provides an example of content that should be included in a statewide aquatic invasive species plan.[423] The ANS Task Force recommends that comprehensive plans must describe viable goals, quantifiable objectives, strategies, and actions to be taken.[424] Crucial to understanding the scope of the problem is identification of all introduced species and probable pathways for the entire geographic area (i.e., the state). Relevant federal, state, tribal, and regional authorities and activities should be evaluated to identify potential gaps in coverage. The plan should include an implementation table to describe the steps and timeline of stated objectives and action items. To facilitate the development of an implementation table, problems should be ranked in order to prioritize action items. In addition, economic and ecological costs and benefits of proposed actions should be estimated, preferably using ecological risk assessment principles.[425] To be adaptive, the plan should implement a strong program evaluation component to monitor progress (via performance measures) and respond to associated outcomes, and should cover a time span of at least five years.[426]

Florida is in the final stages of drafting a statewide invasive species management plan, which if adopted in its current form, will be the most comprehensive statewide plan. The plan was developed by thirteen state agencies and divisions and covers all harmful invasive species in the state with the exception of organisms that solely cause human diseases. It spans five years and outlines performance-oriented goals with measurable action items and specific implementation timelines, including: intergovernmental coordination, prevention, early detection and rapid response, control and management, and public education. Restoration of invaded habitats, however, was not explicitly covered. The plan also summarizes existing state programs and makes recommendations on how to improve their scope and implementation.[427] The plan does not benefit from earmarked funding, rather, member state agencies and divisions will likely devote individual funding toward its implementation.[428]

Intermediate Model

Statewide plans that deal with specific categories of invasives, such as aquatic nuisance species or invasive plant management plans, facilitate better statewide coordination and action. For example, in 1999, Idaho developed a strategic plan for managing noxious weeds. The plan was endorsed by nineteen local, state and federal agencies, private associations, industry, environmental organizations, tribes, and academic institutions.[429] The state legislature supported its development, and the final plan was approved by the governor in February of the same year.[430] The plan addresses eight broad issues critical to building a successful statewide invasive plant management program: 1) organization and leadership, 2) coordination and partnerships, 3) awareness and education, 4) funding and resources, 5) inventory, mapping, and monitoring, 6) assessments and adaptive planning, 7) research and technology, and 8) compliance and enforcement.

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[423] Short, C. and A. Beeton. 2001. ANS Task Force Guidance for State and Interstate Aquatic Nuisance Species Management Plans. Aquatic Nuisance Species Task Force, Arlington, VA. 31pp. [Hereinafter ANS Task Force Guidance (2001)].

(Although the Aquatic Nuisance Species Task Force guidance is directed toward plans that cover aquatic nuisance species, including aquatic plant and animal invasive species, the recommendations can be applied more broadly to facilitate the development of a statewide plan that not only covers aquatic but also terrestrial invasives. Thus, this report applies the guidance to cover all categories of non-native invasive species.)

[424] For a discussion of the difference between goals, objectives, strategies, and actions, see ANS Task Force Guidance (2001), found at <http://anstaskforce.gov/state_guidance.htm>.

[425] For ecological risk assessment guidelines, see <http://www.epa.gov/ncea/ecorsk.htm>.

[426] ANS Task Force Guidance (2001), *supra* note 423.

[427] Florida Management Plan (2002), *supra* note 361.

[428] Schmitz, D. Florida Department of Environmental Protection. *Personal communication*. (11 June 2002).

[429] Idaho State Department of Agriculture, Idaho Department of Lands, Idaho Transportation Department, Idaho Weed Control Association, Idaho Association of Weed Control Superintendents, Nature Conservancy, Bureau of Land Management, Forest Service-Intermountain Region and Northern Region, Idaho Association of Counties, University of Colorado, Idaho Fertilizer and Chemical Association, Idaho Hay Growers, Idaho Water Users Associations, Food Producers of Idaho, Idaho Association of Soil Conservation Districts, Nez Pierce Tribe, Idaho Department of Fish and Game, and Bureau of Reclamation.

[430] Secrist, G. Noxious Weed Department, Idaho State Department of Agriculture. *Personal communication*. (11 June 2002).

TABLE 17: PLANS

States with statewide approved plans that either address all categories of invasives (comprehensive plan); invasive plants (invasive plant plan); aquatic nuisance species (aquatic nuisance plan); specific invasive species (species-specific plan); or groups of invasives like agricultural pests.

State	Comprehensive Plan	Invasive Plant Plan	Aquatic Nuisance Plan	Species Specific Plan	Other Plan
Alabama					
Alaska		X			
Arizona		pending		P	
Arkansas					
California				A, D	
Colorado		X			
Connecticut					
Delaware					
Florida	X			P	pending (agricultural pests)
Georgia					
Hawaii	pending				
Idaho		X			
Illinois			X		
Indiana					
Iowa			X		
Kansas					
Kentucky					
Louisiana			pending		
Maine			pending		
Maryland					
Massachusetts			X		
Michigan			X	A	X (lake Huron)
Minnesota				I	
Mississippi					
Missouri					
Montana		X			
Nebraska					
Nevada		X			
New Jersey					
New Hampshire					
New Mexico		X			
New York			X		
North Carolina					
North Dakota					
Ohio			X		
Oklahoma					
Oregon		X	X		
Pennsylvania					
Rhode Island					
South Carolina			X (aquatic plant)		
South Dakota				I	
Tennessee					
Texas		pending	X (aquatic plant)		
Utah					
Vermont					
Virginia					
Washington			X		
West Virginia					
Wisconsin	pending		X		
Wyoming		X			

X — states that have the types of councils and pending indicates states currently in the process of developing invasive plans
A — plans that are specific to aquatic life; P — plants D — plant pests and diseases I — insects

To promote on-the-ground implementation, the centerpiece of the strategic plan is the creation of cooperative weed management areas (CWAs) at the local level.[431] Through cooperative agreements, county weed advisory committees or steering committees are formed for each CWA to ensure an integrated approach to managing noxious weeds across all relevant jurisdictional boundaries within the designated areas. In addition the development of an integrated weed management plan and an annual operating plan with measurable objectives and a budget must be developed in order to be eligible for cost-share grants administered by the lead agency (the state department of agriculture).[432] Earmarked funding (by the state legislature) is available to assist CWAs in developing and implementing their integrated weed management plans, which has increased from 118 thousand dollars in 1998 to over 2.4 million dollars in 2001. To date, thirty-three cooperative weed management areas have been formed and have developed or are in the process of developing management plans, with almost 90 percent state coverage.[433]

The Idaho Weed Coordinating Committee, a state coordinating committee made up of federal, tribal, state, county, local, and private entities, serves to support the local weed management areas and to coordinated a statewide weed management program.[434] The strategic plan has also led to the hiring of a statewide mapping program coordinator to provide Geographical Positioning System/Geographic Information Systems training and technical support to weed management programs and a statewide education program coordinator to launch a public awareness program to mobilize citizens to stop the spread of weeds.[435] Funding for these programs and positions come from both state and federal sources.

[431] Idaho State Department of Agriculture. 1999 (February). Idaho's Strategic Plan for Managing Noxious Weeds. 11pp.

[432] Idaho State Department of Agriculture. 2000 (May 23). "Noxious Weed Cost-Share Program." <www.agri.state.id.us/animal/CostShare.htm>. (11 June 2002).

[433] Secrist, G. Noxious Weed Department, Idaho State Department of Agriculture. *Personal communication*. (11 June 2002).

[434] Idaho Weed Coordinating Committee. 2000 (May 27). Memorandum of Understanding. <www.agri.state.id.us/animal/weedintro.htm>. (11 June 2002).

[435] Idaho State Department of Agriculture. "Overview of Idaho's Noxious Weed Program 2001." <www.agri.state.id.us/animal/weedoverview.htm.>. (11 June 2002).

Coordination Trends

The most common coordinating mechanism used by states is the development of an interagency or interorganizational council or committee to address invasives. These groups may have nonprofit status, may be government entities (e.g., state appointed task forces or boards), or more loosely arranged, ad hoc groups operating without charters. Representation may include exclusively state agencies or county authorities, state and federal agencies, or may have broader representation from local, state, and federal agencies, tribes, nonprofit organizations, and private sector entities.

The majority of councils address primarily invasive plants; almost half of the states have some form of an interagency or interorganizational invasive plant council or committee. This development is the result of longstanding attention afforded to noxious weeds in the agricultural sector, and the support and leadership provided by state departments of agriculture and federal entities. In the west, these efforts are often associated with locally based weed management areas.[436] Relatively few states have developed statewide invasive plant management strategies or plans. The control and management of noxious weeds are often delegated to local entities, particularly in western states, where councils and/or integrated weed management plans are developed at the county or watershed level.

Few states have formed state-based councils to comprehensively address aquatic nuisance species. Almost every state, however, participates on Aquatic Nuisance Species Regional Panels established by the federal ANS Task Force. Financial support and coordination provided by the ANS Task Force has facilitated the development of several state aquatic nuisance species plans. Task Force efforts have led to the development of as many statewide aquatic nuisance species plans as statewide invasive plant or noxious weed management plans.

States are beginning to tackle the invasives problem in a more comprehensive and integrated manner with the establishment of councils that address all categories of invasives, and to a lesser extent through the development of statewide invasive species management plans. Twelve states have created or are in the process of creating comprehensive councils; of this group, only Florida has completed drafting a statewide plan to address all categories of invasives.

[436] Westbrooks, R. *In review*. National Invasive Species Partnership Initiative: A Plan of Action for Establishing Local, State, Regional, National, and International Invasive Species Partnerships in the United States. 23 pp.

CHAPTER XI: RECOMMENDATIONS

This report analyzes the wide variety of state tools authorized through statutes or agency rulemaking to respond to the problem of invasive species. The invasive species tools available in the states were established, under varying circumstances and for differing reasons, to address a pervasive problem that threatens not only our natural resource based industries, such as agriculture and forestry, but also the diversity of native plants, animals, and ecosystems throughout the country. These authorities are scattered across and among a wide array of state and federal agencies and organizations. In addition, although a tool is on the books in a particular state, the state may not implement the program to its fullest extent due to lack of funding, political will, or any number of other reasons. Setting aside the question of whether or how effectively a given program is implemented, the first step to building a state's arsenal of invasive species control tools is to ensure that adequate statutes are on the books and that the relevant authorities exist to give those statutes sufficient force.

This study did not evaluate individual states or compare them to one another. Examples of particularly good state programs were used to illustrate comprehensive or intermediate models. If states, however, are to improve upon their existing complement of programs—either through the adoption of new laws and policies or through amendments to existing laws and regulations—they should have some specific targets in mind. These targets need not require extensive new legislation.

Acknowledging that states may not presently be in a position to adopt an array of new laws, three standards are set forth below: gold, silver, and bronze.[437] The hope is that states can use these standards to determine how strong their existing programs are, where they have significant gaps, and where improvements can be made. States that are able to make a strong commitment to tackling the problem of invasive species should look to the gold standard highlighted below. States that have met the gold standard have exemplary policies across all sets of tools and all categories of invasive species. States that meet the silver standard are those that are willing to take strong steps towards responding to invasive species. The policies, however, in these states could be strengthened. Finally, states that meet the bronze standard recognize that they need to address the problem of invasive species and have taken some first steps towards achieving this end. At a minimum, these states have in place a comprehensive definition of invasive species and some tools in each of the five categories. The bronze standard should be viewed as the minimum set of tools that all states should have available to them.

GOLD STANDARD

States wishing to achieve the gold standard must meet all of the requirements for each tool in every category. First, states achieving the gold standard must adopt a comprehensive definition for invasive species. The state's definition should affirmatively declare that all non-native invasive species are subject to regulation, encompassing all categories of species, including wildlife, aquatic life, plants, insects, and microorganisms. The state should also clearly define the species to be regulated in terms of their impact on the environment. This comprehensive definition will broaden the scope of the state's statutes and regulations and allow them to target all types of invasive species. In addition, gold standard states must build on this broad definition to create clean lists for invasive species that may be imported or introduced. These states should also establish a prescreening process so that every imported species can be assessed to determine if it should be formally regulated, discouraged from use, or approved for entry. The burden must be placed on the party seeking to import or introduce invasive species to show that the species will not harm the ecosystem.

[437] The gold, silver, and bronze standards were developed after analyzing the fifty states' laws and regulations and determining the most comprehensive set of tools and also the minimum set of tools. In addition, the Environmental Law Institute sought the advice and input from external reviewers.

REQUIREMENTS FOR MEETING THE GOLD STANDARD

Definition of Invasive Species

Coordination
- Comprehensive invasive species council
- Comprehensive invasive species plan

Prevention
- Identifying and mitigating future threats
- Detection
  - Surveying for invasive species
  - Mapping invasive species and sensitive locations
  - Inspection authority
- Introduction/Import/Release requirements
  - Standards
  - Advisory committee
- Quarantines
  - Specific species and facilities
  - Transportation
  - Mandatory
- Education

Regulation
- Permits and licenses
- Transportation and shipping requirements
  - Prohibitions
  - Permits and licenses
  - Inspection authority
  - Labeling requirements
  - Registration of shippers
- Monitoring
- Bonds and Insurance

Control and Management
- General control and management authority
  - Authority over public and private lands
  - Notice to state agency of presence of invasive species
  - Statewide program
- Emergency powers
- Biological control agents
  - Permits and licenses
  - Standards
- Restoration

Enforcement and Implementation
- Enforcement
  - Criminal and civil sanctions
  - Liability for damages
  - Positive incentives
- Funding

Coordination

Under the coordination category, the gold standard state will require the establishment of a comprehensive council and the development of a comprehensive plan. Both the council and the plan should be charged with addressing all categories of invasive species threatening the state. The council and plan should benefit from formal state recognition and earmarked funding to ensure political backing and financial support. The gold standard state recognizes that the effective management of invasive species requires the coordination of state agencies to combat the problem of invasive species as a whole. A council will facilitate coordinated state actions and a plan will direct that council's actions.

Prevention

The gold standard state recognizes that prevention is the first line of defense against invasive species. The gold standard state's policy must first authorize the study of future threats to ensure that state officials are alert to the potential and relative risks of new infestations. This proactive approach will provide opportunity for rapid response, early containment, and eradication before widespread infestation results. Second, gold standard states must also authorize the detection tool with the following components: surveying for invasive species, mapping invasive species locations and sensitive areas, and inspection authority on private and public lands. Third, gold standard states should authorize import/introduction/release requirements, which should contain scientific standards and encourage the formation of an advisory committee to inform decisionmaking. These scientific standards should consider whether the introduced or imported species will displace native species, threaten state resources, or adversely impact humans. Fourth, gold standard states should authorize quarantines to prevent suspect species or material from introducing invasive species or disease. Specifically, the quarantine authority should extend to cover the quarantine of specific species and facilities, the restriction and prohibition of certain items transported into the state, and mandatory quarantines for particularly dangerous invasive species. Finally, gold standard states must have a strong education program that seeks to inform the public, private landowners, and public land managers about the threats of invasive species. The education program should authorize the development of educational materials and workshops, training courses, and private landowner outreach programs.

Regulation

Under the regulation category, the gold standard state must first have a permitting or licensing program to possess an invasive species or to operate a facility containing invasive species. The permit or license must be conditioned on allowing the state agency access for inspection and on siting, escape prevention, and recordkeeping requirements. The use of permits or licenses allows the state to regulate the possession of invasive species and in what manner to ensure that only qualified entities do so. Second, gold standard states must regulate the transportation and shipping of invasive species through the state so that the state is aware of and approves of all shipments of invasive species. Specifically, transportation and shipping programs must have the authority to prohibit the transport of certain categories of invasive species, require permits or licenses, allow inspections of shipments, establish boarder inspection stations, require labeling of invasive species shipments, and require the registration of invasive species shippers with the state. Third, gold standard states must authorize a post-release monitoring program that evaluates newly released species to control unforeseen effects on the ecosystem or unintended spreading. This monitoring should continue until the species has reached a state of equilibrium in the ecosystem. Finally, gold standard states must require bonds or insurance in order to possess invasive species. The gold standard state recognizes that certain invasive species have the potential to cause great damage to the environment if they escape from the possessor's control. The bonds or insurance tool guarantees that the possessor of the invasive species will be able to contribute to the damages caused by the invasive species if it were to escape. Under the enforcement section the state holds the possessor liable for damages to the environment.

Control and Management

Under the control and management category, the gold standard policy must first authorize the state agency to undertake control and management measures on both public and private lands. Under this general control and management tool, the gold standard state must also require that persons notify the state of the presence of particular invasive species on their land so that the state can quickly act to control or manage the species. In addition, under this tool, the gold standard state must establish a statewide program of control and management for specific invasive species. Second, the gold standard state must authorize emergency powers to allow the state to quickly respond to emergency outbreaks before widespread infestation. This power is particularly important in minimizing the damage from an infestation. Third, the gold standard state must regulate the use of biological control agents so that the agent does not in turn become an invasive species problem. Specifically, the gold standard state must require a permit or license to use a biological control agent, the state should ensure that the biological control agent does not impact non-target species before issuing the permit or license, and the state should assess the potential for movement of the biological control agent across state lines. Finally, the gold standard state must authorize a restoration program. The gold standard state recognizes that eradicating invasive species from an area is only the first step in recovery. The crucial next step is to restore the native species to provide protection against future outbreaks of invasive species.

Enforcement and Implementation

Under the enforcement and implementation category, the gold standard state must first authorize enforcement measures that acknowledge the importance of these invasives species statutes and regulations. Specifically, the enforcement measures must include criminal and civil sanctions, liability for damages to the environment, and positive incentives. The state must authorize criminal or civil sanctions to add some bite to the invasive species statutes and regulations. With the threat of criminal or civil sanctions, people will recognize the importance of these laws and will consequently be more concerned with compliance. In addition, under the enforcement tool the state must require that the possessor of an invasive species be held liable for any damages that the invasive species causes to the environment through an illegal release or escape so that the state is not left paying for the harm to the state's environment. Gold standard states must also establish a positive incentive program, such as an amnesty program, to reward those who comply with invasive species statutes and regulations. Reward programs can be designed to encourage the public to assist in the enforcement of invasive species laws and regulations. Second, the gold standard state must authorize adequate and specifically designated funds for invasive species activities to avoid tampering by the state agency. Finally, the state should allow the funds to be used over multiple years.

REQUIREMENTS FOR MEETING THE SILVER STANDARD

Definition of Invasive Species

Coordination
- Either a comprehensive council or plan

Prevention
- Identifying and mitigating future threats
- Detection
  - Surveying for invasive species
  - Inspection authority
- Import/Introduction/Release requirements
  - Standards
- Quarantines
  - Specific species or facilities
  - Transportation
- Education

Regulation
- Permits and licenses
- Transportation and shipping requirements
  - Prohibitions
  - Permits and licenses
  - Inspection authority
- Monitoring

Control and Management
- General control and management authority
  - Authority over public and private lands
  - Statewide program
- Emergency powers
- Biological control agents
  - Permits and licenses
  - Standards

Enforcement and Implementation
- Enforcement
  - Criminal and civil sanctions
  - Liability for damages
- Funding

SILVER STANDARD

States wishing to meet the silver standard must have available all of the tools listed in Box 3. First, silver standard states must adopt a comprehensive definition for invasive species. The states' definition should affirmatively declare that all invasive species are subject to regulation, encompassing all categories of species, including wildlife, aquatic life, plants, insects, and microorganisms. It should also clearly define the species to be regulated in terms of their impact on the environment. This comprehensive definition will broaden the scope of the state's statutes and regulations and allow them to target all types of invasive species. In addition, silver standard states should build on this broad definition to create clean lists for invasive species that may be imported or introduced, and it should establish a prescreening process so that every imported species can be assessed to determine if it should be formally regulated, discouraged from use, or approved for entry. The burden will be placed on the party seeking to import or introduce invasive species to show that the species will not harm the ecosystem.

Coordination

Under the coordination category, a state reaching the silver standard must have either a comprehensive interagency council or plan. The state recognizes the need for coordination between state agencies to combat the problem of invasive species and also recognizes the importance of addressing invasive species across biological classifications. The silver standard state has not formed both a comprehensive council and a comprehensive plan.

Prevention

Under the prevention category, the silver standard state must first authorize studies identifying future threats to enable the state to mitigate potential pathways for invasives. States need to be aware of the potential threats to their ecosystem so that state officials can properly respond to the presence of new and dangerous invasive species. Second, the silver standard state must authorize a detection program, which contains authority to survey for invasive species and inspection authority on public and private lands. Third, the silver standard state must authorize introduction/import/release requirements, which include scientific standards governing the decision to allow a particular introduction, import, or release. These standards are critical for preventing unintended harmful effects from intentional introductions. Fourth, the silver standard state must authorize quarantine authority, specifically the ability to quarantine a specific species or facility and the ability to prohibit or restrict the transportation of certain species into the state. Finally, the silver standard state must authorize education. Education programs can empower the general public and public officials to assist the state agency in recognizing and reporting the presence of invasive species.

Regulation

Under the regulation category, the silver standard state must first authorize the use of permits and licenses to possess an invasive species or to operate an invasive species facility. Second, the silver standard state must authorize transportation and shipping requirements. Specifically, the silver standard state must include the ability to prohibit certain categories of invasive species from being transported through the state, to require permits or licenses, and to inspect shipments that pass through the state. These requirements will give the state awareness of and approval authority over all invasive species being shipped through the state. Finally, the silver standard state must authorize post-release monitoring.

Control and Management

Under this category, the silver standard state must first authorize general control and management authority. The silver standard state must include authority for the state to undertake control and management measures on both public and private lands and the creation of statewide programs to control and manage specific species. Second, the silver standard state policy must authorize emergency authority to enable the state to quickly counteract emergency infestations. Finally, the silver standard state must authorize the regulation of biological control agents to ensure that these agents do not in turn become invasive species problems. The silver standard state must require either a permit or license to use a biological control agent, have standards governing the issuance of the permit or license, and assess the possibility of the biological control agent crossing state lines.

Enforcement and Implementation

Under this category, silver standard states must first authorize the enforcement tool and include criminal or civil sanctions and compensation for damages. The silver standard state recognizes that enforcement measures are important in strengthening their invasive species statutes and regulations, and the silver standard state recognizes that the possessor of an invasive species should be held liable for any damages that the invasive species causes to the environment through an illegal release or escape. Second, the silver standard state must authorize specific funds for invasive species activities. The silver standard state recognizes that state statutes and regulations cannot be effectively implemented without proper funding.

BRONZE STANDARD

The bronze standard state must have available all of tools listed in Box 4. The bronze standard outlines the minimum authorities needed in a state to begin to manage invasive species effectively.

Bronze standard states should adopt a comprehensive definition for invasive species. The states' definition should affirmatively declare that all invasive species are subject to regulation, encompassing all categories of species, including wildlife, aquatic life, plants, insects, and microorganisms. It should also clearly define the species to be regulated in terms of their impact on the environment. This comprehensive definition will broaden the scope of the state's statutes and regulations and allow them to target all types of invasive species.

Coordination

To meet the bronze standard, the state must authorize the formation of an interagency council. The state recognizes that coordination between different state agencies is crucial to the management of invasive species. At the bronze level, the state has not adopted a comprehensive interagency council with public participation but does have an interagency council to address a certain area of invasive species, such as noxious weeds.

Prevention

Under the prevention category, the bronze standard state must first authorize a detection program, which contains authority for the state to inspect for the presence of invasive species on public and private lands. While the bronze standard state recognizes that detection is essential for rapid response, the bronze standard state relies on random inspections and fails to authorize routine surveying and mapping of invasive species locations. Second, the bronze standard state policy must have introduction/import/release requirements, which include scientific standards that attempt to avert the potential impact of the species on the state's environment. Third, a bronze standard state must authorize quarantine authority. Specifically, this quarantine authority must include the ability to quarantine specific species and facilities and the ability to prohibit or restrict the transportation of certain species into the state.

REQUIREMENTS FOR MEETING THE BRONZE STANDARD

Definition of Invasive Species

Coordination
- Interagency invasive species council

Prevention
- Detection
  - Inspection authority
- Introduction/Import/Release requirements
  - Standards
- Quarantines
  - Specific species and facilities
  - Transportation

Regulation
- Permits and licenses
- Transportation and shipping requirements
  - Permits and licenses
  - Inspection authority

Control and Management
- General control and management authority
  - Authority over public and private lands
- Emergency powers

Enforcement and Implementation
- Enforcement
  - Criminal and civil sanctions
- Funding

Regulation

Under the regulation category, the bronze standard state must first authorize the issuance of permits and licenses to possess an invasive species or to operate a facility containing invasive species. This tool enables the state to monitor which species are entering the state and under whose control. Second, the bronze standard state policy will contain transportation and shipping requirements, including permit or license requirements and inspection authority. The bronze standard state is relying on the issuance of permits and random inspections to monitor which species are entering the state and in what manner.

Control and Management

Under this category, the bronze standard state must authorize general control and management authority. The general control and management authority must allow the state agency to undertake control and management measures on both public and private land. Again, the bronze standard state is relying on random state inspections and control and management measures to manage invasive species outbreaks rather than forming a comprehensive plan or requiring that landowners notify the state of the presence of invasive species. In addition, the bronze standard state must authorize emergency powers, which allow the state to quickly respond to emergency outbreaks before widespread infestation. This power is particularly important in minimizing the damage from an infestation.

Enforcement and Implementation

Under the enforcement and implementation category, the bronze standard state must first adopt criminal or civil sanctions. The bronze standard state recognizes that with the threat of criminal or civil sanctions, people may be more concerned with compliance. The bronze standard state has not moved beyond the traditional enforcement mechanisms to recognize liability for damage to the environment or to include positive incentives for compliance. Second, bronze standard states recognize the importance of adequate funding for the implementation of the statutes and regulations and therefore will establish specific funds for invasive species activities.

SUMMARY

Taking steps to meet the requirements outlined in the bronze, silver, and gold standards, does not necessarily require the adoption of a wide array of new state laws. Most states already have on the books a variety of tools that can be strengthened through amendments, agency rulemaking, or redefining the category of species that are covered by the program. A state may meet the gold standard in the treatment of invasive plants but only the bronze standard for its treatment of invasive wildlife. Once states recognize the strengths and weaknesses of their current state policies, the state can then adjust its policies to assemble a more comprehensive and coordinated approach to the control and management of invasive species. Some states may only need to implement existing laws and regulations or tailor their current ones in order to better deal with the problem of invasives. Other states may need to pass new laws and regulations. States seeking to meet the gold standard or improve existing programs should look to the comprehensive models outlined in each chapter.

Giant Reedgrass (*Phragmites australis*)

CHAPTER XII. CONCLUSIONS

Non-native species are entering the United States at an unprecedented rate. Those that prove to be invasive are causing serious damage to our nation's croplands, rangelands, pastures, forests, wetlands, waterways, and parks by diminishing the economic value and use of the land; interfering with recreational activities; destroying native plant and animal communities; disrupting ecological processes; and threatening the stability of our ecosystems. To combat this growing and pernicious problem, states have adopted a diverse arsenal of tools that range from preventing introductions, to regulating those allowed, to eradicating unwanted species. To further state efforts, this report has discussed an array of tools used by and available to states to address invasive species, as revealed by state statutes, regulations, and guidelines. Armed with this information, states will be better equipped to implement and enforce existing policies, adopt improved measures, and garner the necessary public support for investments needed to tackle invasive species problems over the long term.

APPENDICES

APPENDIX A: STATE TOOLS CHECKLIST

To evaluate the status of your state, refer to the charts in chapters V through X and circle the Xs for those tools your state has authorized.

	Gold	Silver	Bronze	State
Definition of Invasive Species	X	X	X	
Coordination				
Comprehensive invasive species council	X	X		
Comprehensive invasive species plan	X	X		
Interagency invasives species council	X	X	X	
Prevention				
Identifying and mitigating future threats	X	X		
Detection				
Surveying for invasive species	X	X		
Mapping invasive species and sensitive locations	X			
Inspection authority	X	X	X	
Introduction/Import/Release requirements				
Standards	X	X	X	
Advisory committee	X			
Quarantines				
Specific species and facilities	X	X	X	
Transportation	X	X	X	
Mandatory	X			
Education	X	X		
Regulation				
Permits and licenses	X	X	X	
Transportation and shipping requirements				
Prohibitions	X	X		
Permits and licenses	X	X	X	
Inspection authority	X	X	X	
Labeling requirements	X			
Registration of shippers	X			
Monitoring	X	X		
Bonds and insurance	X			
Control and Management				
General control and management authority				
Authority over public and private lands	X	X	X	
Notice to state agency of presence of invasive species.	X			
Statewide program	X	X		
Emergency powers	X	X	X	
Biological control agents				
Permit and license	X	X		
Standards	X	X		
Restoration	X			
Enforcement and Implementation				
Enforcement				
Criminal and civil sanctions	X	X	X	
Liability for damages	X	X		
Positive incentives	X			
Funding	X	X	X	

APPENDIX B: ACRONYMS

ANSTF (or ANS Task Force) – Aquatic Nuisance Species Task Force

APHIS – Animal and Plant Health Inspection Service

BANR – Board on Agriculture and Natural Resources

CGAPS – Coordinating Group on Alien Pest Species

CWA – cooperative weed management area

EPPC – Exotic Pest Plant Council

FICMNEW – Federal Interagency Committee for the Management of Noxious and Exotic Weeds

FNWA – Federal Noxious Weed Act

FWS – Fish and Wildlife Service

GAO – General Accounting Office

ICES – International Council for the Exploration of the Sea

NANPCA – Nonindigenous Aquatic Nuisance Prevention and Control Act

NBCI – National Biological Control Institute

NISA – National Invasive Species Act

NISC – National Invasive Species Council

NOAA – National Oceanic Atmospheric Administration

OTA – Office of Technology Assessment

PPA – Plant Protection Act

USDA – U.S. Department of Agriculture

APPENDIX C: SIGNIFICANT FEDERAL INVASIVE LAWS

Note: Summarized from the National Invasive Species Council Management Plan (2001), and the U.S. Congress, Office of Technology Assessment (1993) unless otherwise noted. Please see these aforementioned reports for further details on federal laws and authorities.

Lacey Act of 1900

The Lacey Act,[438] originally enacted in 1900 and administered by the U.S. Fish and Wildlife Service, is the key federal mechanism for controlling or banning "injurious animal" introductions in the U.S. The Act provides authority to the Department of the Interior to prohibit the importation and possession of certain categories of animal species determined to be "injurious to human beings, to the interests of agriculture, horticulture, forestry, or to wildlife or the wildlife resources of the United States." Under the Act, certain prohibited or blacklisted animal species are prohibited while other foreign species require a permit for importation. The blacklist currently covers two genera of mammals, four genera of birds, and two families of fishes.[439] Blacklisting is a weak approach since it does not prohibit new, unlisted invasives but rather only prohibits a short list of species that are already established and causing harm. In 1973, the Department of the Interior attempted to improve the implementation of this law by proposing a white list approach. Under this scenario the burden of proof is reversed—all foreign animal species are prohibited unless identified as low-risk and formally approved. Due to intense resistance from pet and trade zoos, game ranches, agriculture, and aquaculture, this proposal was abandoned.[440] The Act only applies to certain categories of intentionally introduced "wild" animals, including mammals, birds, fish, amphibians, reptiles, mollusks, and crustaceans.

A separate amendment in 1981[441] makes it unlawful for any person to import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce any fish, wildlife, or plant taken, possessed, transported, or sold in violation of any federal, tribal, or state law. This statute does not grant general authority to regulate the importation, transportation, or possession of any species, but it does make activities of this kind subject to civil and criminal penalties if they are in violation of a governing law. This amendment makes interstate movement of state-listed injurious fish and wildlife a federal offense and subject to enforcement.

Animal Damage Control Act of 1931

The Animal Damage Control Act, as amended in 1937 and 1991, provides the Wildlife Services division of U.S. Department of Agriculture's Animal and Plant Health and Inspection Service with general authority to investigate and control wildlife damage on federal, state, or private land. Wildlife Services manages invasive species damages in thirty-one states.

Federal Seed Act of 1939

The Federal Seed Act was established to require accurate labeling and purity standards for agricultural, lawn, and turf seeds to ensure that they are free of noxious weeds. Nine species of widespread weeds are listed under the Act.

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[438] 18 U.S.C.§42.

[439] Ruesink, J., I. Parker, M. Groom, and P. Kareiva. 1995. Reducing the risks of nonindigenous species introductions. Bioscience 45:465-477.

[440] OTA (1993), *supra* note 5.

[441] 16 U.S.C. §§3371 *et seq.*

Plant Protection Act of 2000

The Plant Protection Act (PPA) consolidates the authorities of the Plant Quarantine Act of 1912,[442] Federal Plant Pest Act of 1957,[443] Federal Noxious Weed Act (FNWA) 1974, and other plant-related statutes and authorizes the U.S. Department of Agriculture to prohibit or restrict the importation or interstate movement of any plant, plant product, biological control organism, or plant pest. After passage of FNWA, a black listing approach was adopted for weeds, similar to that under the Lacey Act. There are currently ninety-five taxa of aquatic and terrestrial plants listed as "federal noxious weeds" which are prohibited entry into the U.S.[444] Although interstate transport of designated weeds is also prohibited, a nationally coordinated program does not exist to detect and respond to the introduction of new weeds.[445] The Federal Interagency Committee for the Management of Noxious and Exotic Weeds, however, is now leading a national effort to develop and implement a national early warning and rapid response system for invasive plants.[446] Although the PPA expanded federal authority to address invasive plant species that threaten natural resources and the environment, change in federal actions or policy has not yet occurred.[447]

National Invasive Species Act of 1996

The National Invasive Species Act (NISA) reauthorized and amended as the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA), passed in 1990 in response to the zebra mussel infestation in the Great Lakes. This Act charged the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration, among others, with controlling the introduction and spread of non-native aquatic invasions and created the Aquatic Nuisance Species Task Force (see Appendix D). The Act directs the U.S. Coast Guard to issue regulations to control the spread of nonindigenous species through ballast water releases and to administer a National Ballast Water Control Program. Under NANPC, this program applied to the Great Lakes, but it was expanded to all U.S. ports through NISA. The Act also authorized funding for research on aquatic nuisance species prevention and control, and for the development of state aquatic nuisance species management plans. In 2002, NISA is up for reauthorization. As it currently stands, NISA only addresses a subset of non-native organisms arriving inadvertently through ballast water discharge and only applies to a portion of international ship traffic.[448]

Executive Order 13112 on Invasive Species

In response to hundreds of scientists, resource managers, and state officials, President Clinton issued an Executive Order in February of 1999, requiring federal agencies to take steps to prevent further introductions of invasive species into the country and to provide for their control and management. A new inter-departmental group, the National Invasive Species Council (see Appendix D), was created to provide national leadership, to coordinate and support federal activities and planning, to identify international policy options, and to prepare a national Invasive Species Management Plan. The Management Plan was released in January 2001.

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[442] The Federal Plant Quarantine Act of 1912 gave authority to the U.S. Department of Agriculture to regulate the importation and interstate shipment of plant materials to prevent the spread of diseases and insects injurious to plants, essentially only agricultural crops.

[443] Federal Plant Pest Act of 1957 aimed at preventing the import of agricultural pest species and regulating their interstate transport.

[444] Westbrooks et al. (2001), *supra* note 85.

[445] *Id.*

[446] Westbrooks, Randy. U.S. Geological Survey, Whiteville, NC. *Personal communication.* (May 10, 2002).

[447] GAO (2000), *supra* note 2.

[448] Windle, P. 2001. Biological invasions. Issues in Science and Technology, Winter 2001. <http://bob.nap.edu/issues/18.2/forum.html>. (20 February 2002).

APPENDIX D: FEDERAL AGENCY ROLES AND INTERAGENCY COORDINATION

Note: Summarized from the National Invasives Species Council Management Plan (2001), General Accounting Office (2000), and U.S. Congress, Office of Technology Assessment (1993), unless otherwise noted. See these reports for further details on federal activities and programs.

Department of Agriculture

The department with the largest federal role in managing and controlling non-native invasive species is the U.S. Department of Agriculture (USDA), with at least eight separate agencies that have related responsibilities. USDA provides the bulk of federal funding for species-related activities; the Department provided almost 89 and 88 percent of federal funding for invasives in 1999 and 2000, respectively. In this regard, the **Animal and Plant Health Inspection Service** (APHIS) has the lion's share of responsibilities, with jurisdiction over plant pests, certain biological control organisms, the import and export of plant species, and animals and animal diseases considered a threat to livestock or poultry. This entity works to prevent the introduction of agricultural pests and pathogens by conducting agriculture quarantine inspection programs at 178 U.S. ports of entry.[449] APHIS also conducts several monitoring programs to track nonindigenous crop pests and pathogens and works with other federal and state agencies to detect, contain, and eradicate infestations before they become entrenched.

Through the Cooperative Forestry Assistance Act of 1978, the **U.S. Department of Agriculture Forest Service** has the authority to control and manage forest and rangeland pest species within the national forest system (approximately 192 million acres of federal lands) and is authorized to provide technical and financial assistance on other public lands and on private lands. The service also has the ability to control invasives through its timber sale and service contracts. The **Natural Resources Conservation Service** is the major natural resource conservation information and technical assistance provider to private landowners. The **Agriculture Research Service** provides research and expertise to agency partners on taxonomy, identification, monitoring methods, rapid response, and eradication techniques of invasive species. Another research arm, the **Cooperative State Research, Education, and Extension Service**, through its partnership with the Land Grant University System, supports research, extension, and education efforts aimed at invasive species control, management, and restoration.

Department of the Interior

At least five agencies within the Department of the Interior have invasive species responsibilities. Of these, the **Fish and Wildlife Service** (FWS) has the most expansive role. FWS regulates the import of animals found injurious under the Lacey Act; enforces laws and regulations governing movement of wildlife in the U.S.; is authorized to protect threatened and endangered species (often threatened by invasives); addresses national aquatic invasive species issues through the Aquatic Nuisance Species Task Force; and manages approximately 91 million acres mostly under the National Refuge System. Other interior agencies, such as the **Bureau of Land Management**, **National Park Service**, and **Bureau of Reclamation** control and manage invasive species on associated public lands, parks, and water systems. The **Geological Survey** researches invasion by non-native species in both terrestrial and aquatic ecosystems, with a focus on Interior lands and regions particularly threatened by invasives, such as Hawaii, the western rangelands, and the Great Lakes. The Department of Interior provided the second largest amount of federal invasive species funding in 1999 and 2000, 4 and 5 percent of federal funds, respectively.[450]

Department of Defense

In 1999 and 2000, the Department of Defense provided the third largest amount of federal funding to

[449] Shea, D. and M. Hawkins. 2000 (February 15). Invasive Plants and Animals: Globalization's Impacts on America's Economy, Health, and the Environment. Natural Resources Group, Washington D.C. 12 pp.

[450] GAO (2000), *supra* note 2.

combat invasive species nationwide, spending 2 percent in both years.[451] The Department of Defense manages over 25 million acres of lands and prevents and controls invasive species, and restores native species, according to individual installation base plans.

The **U.S. Navy** and **U.S. Coast Guard** are involved in many invasive control and management efforts, including: ballast water and anchor system management practices via their participation in the Aquatic Nuisance Species Task Force; developing a clearinghouse (the National Ballast Water Information Clearinghouse) in 1997 with the Smithsonian Environmental Research Center for the synthesis, analysis, and interpretation of national data concerning ballast water management and ballast-mediated invasions; and jointly establishing Uniform National Discharge Standards for the management of liquid discharges from Armed Forces vessels with the Environmental Protection Agency. The **Army Corps of Engineers** provides aquatic plant control and removal in non-Corps and non-federal waters and supports zebra mussel research efforts.

Department of Commerce

Under the Nonindigenous Aquatic Nuisance Prevention and Control Act, the **National Oceanic Atmospheric Administration** (NOAA) together with the FWS is responsible for control and management of aquatic nuisance species in the U.S. NOAA funds research, education and outreach, and control activities through the National Sea Grant Program and the National Marine Fisheries Services.

INTERAGENCY EFFORTS

Federal Interagency Committee for the Management of Noxious and Exotic Weeds

In 1994, sixteen federal agencies[452] formed the Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW). The committee was established to coordinate an integrated federal approach to managing noxious and invasive weeds on federal and private lands. FICMNEW members participate voluntarily in addition to their regular responsibilities. This committee has no delegated authority to set policy for its signatory agencies nor does it have an operating budget. Project support is primarily on an ad hoc basis and comes from discretionary funds. As a result, the Committee is constrained by its ability to pool or share funds. Its activities are generally limited to information-sharing.[453] FICMNEW has developed a national weed strategy, which defines broad goals and potential tasks to address weed research, coordination, information management, and education, for which an action plan is to follow.[454] It also sponsors the Pulling Together Initiative which is a cost-share program funded by seven federal agencies to foster partnerships to establish local weed management areas. Currently, FICMNEW is leading a national effort to develop an early warning system for early detection assessment and rapid response to new invasive plants in the U.S. In 1998, FICMNEW published a non-technical weed fact book, "Invasive Plants, changing the landscape of America," which has become a popular resource on invasive plant prevention and management.[455]

Aquatic Nuisance Species Task Force

Under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, the Aquatic Nuisance Species Task Force was established to coordinate federal invasive aquatic species activities. The Task Force is co-chaired by FWS and NOAA and consists of seven federal agency representatives and ten ex officio members who represent nonfederal governmental interests.[456] According to the Office of Technology Assessment, this

[451] *Id.*

[452] Federal Interagency Committee for the Management of Noxious and Exotic Weeds members include: the Department of the Interior, Bureau of Land Management, Bureau of Reclamation, U.S. Fish and Wildlife Service, National Biological Service, Bureau of Indian Affairs, Department of Agriculture, Animal and Plant Health Inspection Service, Agriculture Research Service, Agricultural Stabilization and Conservation Service, Forest Service, Agricultural Extension Service, Agricultural Marketing Service, Cooperative State Research Service, Department of Defense, Department of Transportation, and Department of Energy (Jackson, N. and E. Schneider. 1999 (September 20).).

[453] *Id.* "Update: Federal Interagency Committee for the Management of Noxious and Exotic Weeds." California Exotic Pest Plant Council. <www.caleppc.org/symposia/95symposium/jackson.html>. (19 February 2002).

[454] Federal Interagency Committee for the Management of Noxious and Exotic Weeds. 1998 (April 27). "Strategy for containment and control of harmful nonindigenous plant species." <http://bluegoose.arw.r9.fws.gov/FICMNEWFiles/FICMNEWStrategy.html>. (27 June 2000).

[455] Westbrooks. (1998), *supra* note 34.

[456] Aquatic Nuisance Species Task Force 2001. "ANSTF members." <http://anstaskforce.gov/roster.htm>. (18 December 2001).

[457] NISC Management Plan (2001), *supra* note 6.

program could allow for a more coordinated federal response to the spread of invasive aquatic species, however, lack of appropriations has impeded its implementation.

National Invasive Species Council

This National Invasive Species Council (NISC) was established through Executive Order 13112 in February 1999 to provide national leadership and oversight on invasive species and to coordinate federal agency efforts. Other responsibilities include: "promoting action at local, state, tribal, and ecosystem levels; identifying recommendations for international cooperation; facilitating a coordinated network to document, evaluate, and monitor invasive species' effects; developing a web-based information network on invasive species; developing guidance on invasive species for federal agencies to use in implementing the National Environmental Policy Act; and preparing the National Invasive Species Management Plan."[457] NISC members include ten federal departments and agencies.[458] NISC released their national Management Plan on January 18, 2001, and outlined fifty-seven federal actions to be taken with regard to leadership and coordination, prevention, early detection and rapid response, control and management, restoration, international cooperation, research, information management, and education and public awareness. They are currently in the implementation phase of this plan.

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[458] Secretaries of the Interior, Agriculture, Commerce, State, Defense, Treasury, Transportation, and Health and Human Services, as well as the Administrators of the Environmental Protection Agency and the U.S. Agency for International Development.

APPENDIX E: GLOSSARY

AQUACULTURE – The farming of aquatic organisms, also termed fish or aquafarming.

APIARY – A facility that houses bees for honey extraction.

BALLAST WATER – Water that is taken on to or discharged from a ship to compensate for changes in weight during loading or unloading of cargo. This water may contain living organisms, which can be transported large distances and discharged into new waters where they may invade.

BENTHIC – The floor of aquatic systems that is inhabited by benthic algae, submerged vascular plants, and associated invertebrates.

BIODIVERSITY (or biological diversity) – The variability among living organisms and the environments to which they belong; including diversity at the genetic, species, population, and ecosystem levels.

BIOLOGICAL CONTROL AGENT – An organism that is a natural enemy of a target pest. Predators, parasitoids, pathogens, antagonists, or competitors may be used to control pests by reducing their numbers or by inhibiting their destructive activities.

BIOLOGICAL INTEGRITY – A balanced, integrated, and adaptive community of organisms having species composition, diversity, and functional organization characteristic of the ecosystem's natural state.

BIOTIC – Of life or produced by living organisms. Conversely "abiotic" refers to non-living elements.

CLEAN LIST – A listing approach that identifies species approved for import, introduction, or release, and thus results in the regulation of all non-listed exotic species. The use of a clean list is a more stringent, proactive approach to the regulation of non-native and potentially invasive species, as it places the burden on the importer to prove that the new species will not pose any economic or environmental threat.

DIRTY LIST – A listing approach that prohibits certain unacceptable species from import, introduction, or release and allows unlisted species to be imported. This listing approach presumes that all species may be allowed unless they have been listed as prohibited and thus places the burden on regulators to determine whether a species is harmful.

DISEASE AGENT – A virus, microorganism, or other substance that causes disease.

DISEASE VECTOR – An organism, or other entity, that carries and transmits disease.

ECOSYSTEM – A unit of biological organization that encompasses a community of organisms and their physical environment.

GLOBAL HOMOGENIZATION – A worldwide trend where fewer species, usually generalists, dominate ecosystems; this simplification causes great loss of biological diversity.

INVASIVE SPECIES (or alien species, aquatic nuisance species, exotic species, foreign species, injurious species, introduced species, nonindigenous species, non-native species, nuisance species, or xenobiotic organisms) – A species that enters an ecosystem beyond its natural range and causes economic or environmental harm.

LANDSCAPE – An area of land composed of a mosaic of interacting ecosystems that is repeated in similar form throughout.

MITIGATION WETLAND – The site where permitted wetland impacts are replaced through wetlands restoration, creation, enhancement, or preservation.

NATURALIZE – The process by which an invasive species establishes and grows undisturbed as if native.

NOXIOUS WEEDS – Native or non-native plants, or plant products, that injure or cause damage to interests of agriculture, irrigation, navigation, natural resources, public health, or the environment.

PATHOGEN – An infecting agent such as a virus, microorganism, or other substance that causes disease.

PATHWAY – Mode by which a species is transported to a new environment.

PERSIST – When a species establishes and continues to exist in a new environment.

PLANKTONIC MATERIAL – Microscopic animal and plant life, or once living material, found floating or drifting in the ocean or in other bodies of fresh water.

QUARANTINE – Any isolation imposed to prevent invasives from spreading.

TAXA (plural of taxon) – Taxonomic categories or units, such as species, genus, etc.

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