

DRAFT MANAGEMENT PLAN

MEETING THE INVASIVE SPECIES CHALLENGE

National Invasive Species Council

October 2, 2000

National Invasive Species Council

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FOREWORD

For thousands of years, people have introduced plant and animal species, intentionally and unintentionally, into regions outside their native environments. Many of these provide great benefits to society. Most of our major food crops and livestock came from other countries, and many other non-native species cause no problems in their new environment. But many know how difficult it is to keep dandelions out of their gardens or have gone to a favorite fishing hole and found it covered with thickly matted plants; or were unfortunate enough to be on the receiving end of a fire ant bite. Ranchers know well the costs and frustration of grazing cattle on leafy spurge infested pastures. These are examples of unwelcome invasive non-native species.

Invasive species have wreaked havoc in our waters, farms, natural areas and backyards—just about everywhere. They have abetted the collapse of valuable commercial fisheries; ruined thousands of acres of food crops and livestock forage; nearly eliminated several native tree species; interrupted utility services; hastened the decline of many endangered species; and harmed animal and human health. Despite an array of Federal programs designed to stop or control them, the number of invasive species, and their cumulative impacts, are accelerating at an alarming rate.

As global trade and travel increase, so will the impact of invasive species. They stowaway in luggage, ships, aircraft, and other means of transport. They hitchhike on produce and wood products. Some arrive by design, like pets intended for captivity that escape. No matter how they arrive, invasive species continue to cost consumers and taxpayers billions of dollars a year in economic losses and in direct outlays for prevention and management.

The time has come to recognize that invasive species warrant the same kind of high-level, integrated response this country provides for disasters such as floods, hurricanes, and wild fires. That response will take planning as well as quick and decisive action. It will take better communication to build commitment. Ultimately, it will take a well-informed public to see that the job is done right.

In February 1999, the President issued Executive Order 13112 and established the National Invasive Species Council of eight Federal Departments with leadership roles for invasive species issues. The Order requires, among other things, that the Council prepare a plan to minimize the economic and ecological impacts and the harm to animal and human health associated with invasive species. This document is the first National Invasive Species Management Plan. It provides a blueprint for reinvigorating Federal action. The key, however, will be implementation. We need a unified and cooperative approach. This plan is an important first step, but it must evolve and be improved over time.

We hope that this Plan will give you a better understanding of the daunting challenges posed by invasive species, how urgent action is needed to slow the tide of an invasion, and how the Council plans to act. We hope you will also learn how your individual actions can help reduce the threats posed by invasive species, and we invite you to join us as part of the solution.

Bruce Babbitt, Co-chair
Secretary of the Interior

Dan Glickman, Co-chair
Secretary of Agriculture

Norman Mineta, Co-chair
Secretary of Commerce

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EXECUTIVE SUMMARY

Whether or not we realize it, invasive species affect each of our lives. They transform our ecosystems, damage our crops, destroy wetlands, alter natural habitats, and threaten native species. With the explosion of world travel and global trade, this silent invasion and the cost to society is growing at an unprecedented rate.

Invasive species have been arriving in the United States for a long time — some came planned for release or escaped from captivity, and others came as hitchhikers on commodities like produce, nursery stock, and livestock. Many arrived as silent stowaways aboard ships, aircraft, and other means of transport.

Most of our food crops and many of our farm animals are non-native species and their beneficial value is obvious. Livestock and other organisms which are actively managed are not considered “invasive”. Many others are simply benign; but a few cause serious and sometimes irreversible harm when they persist and spread beyond manageable boundaries. Environmental and economic damage often go together. Fire ants and gypsy moths, for example, cause harm on many fronts. Zebra mussels invaded the Great Lakes through freighters’ ballast water and are clogging water intake systems. The Formosan termite costs an estimated \$300 million in damage annually to New Orleans alone (Bordes 2000). The Asian longhorned beetle, which probably arrived in wood pallets made in China, literally eats trees to death. Purple loosestrife, with its beautiful purple flowers, destroys waterfowl habitats, alters their structure and function, and chokes out native plants and animals. Scientists estimate that up to 46% of the placement of plants and animals on the endangered species list can be attributed at least in part to invasive species (Wilcove *et al.* 1998). Citrus canker, a serious plant disease, has been contained by an aggressive prevention and management program, but has been reintroduced periodically. Because of a new outbreak, Florida is currently removing and burning infected trees at a cost that will exceed \$200 million for the eradication program. The nutria, a large rodent native to South America, was originally imported as a resident of a private zoo. It now exists in the wild and is devastating entire ecosystems.

Invasive species do not recognize jurisdictional boundaries. As the current trend of growth in world markets continues, an unfortunate side effect is the increased potential for the movement of invasive species. In February 1999, the President responded to these problems, issuing Executive Order 13112 on Invasive Species (Order). The Order established the National Invasive Species Council (Council), chaired by the Secretaries of Agriculture, Commerce and the Interior; and includes the Departments of State, Treasury, Defense, Transportation and the Environmental Protection Agency. The Order also directs the Council to appoint a non-Federal Advisory Committee to assist the Council in its work.

The Order directs the Council, specifically its eight department members, to provide national leadership on invasive species, to see that their Federal efforts are coordinated and effective, and in general to oversee implementation of the Order within their Departments. In addition, the Council has other specific responsibilities, including promoting action at local, State, tribal and ecosystem levels, identifying recommendations for international cooperation; facilitating a coordinated network to document 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 this document — the National Invasive Species Management Plan.

Invasions occur in diverse and dynamic landscapes. Many of the most effective measures to combat invasive species occur at the local, State and regional levels, often in partnership with Federal agencies. The Council has a responsibility to support non-Federal efforts and encourage planning and action at these levels to address invasive species problems.

We must employ diverse approaches, conduct experiments and monitor the results, and adapt management decisions that reflect the best available scientific information. This Management Plan presents areas that the Council considers high priorities in addressing invasive species problems and recommends the following actions:

Leadership and Coordination: More than 20 Federal agencies now share responsibility and authority over some facet of invasive species management, along with various agencies of all 50 states and territories. Coordination problems impede effective prevention, control and management programs among the Federal agencies and their State and local partners.

Response: The Council will establish an oversight policy to ensure that the Order is effectively implemented and that procedures are in place to resolve jurisdictional and other disputes regarding invasive species issues. The goal will be to resolve disputes at the least formal level possible in an unbiased manner involving only those parties with an interest in the dispute and utilizing unbiased third party mediators if appropriate. The Council will also coordinate a cross-cut budget initiative for invasive species involving all Council Departments, and highlight the needs assessed by Federal agencies to address invasive species.

Prevention: The first line of defense for invasive species is prevention. The most cost-effective approach to combating invasive species is to keep them from becoming established in the first place.

Response: In conjunction with industry, interested parties and members of the public, the Departments of the Interior, Agriculture and Commerce and the Environmental Protection Agency (building on existing regulatory structures, including databases, programs, facilities, and policies) will develop and test a risk assessment screening system for evaluating intentionally introduced invasive species and reducing the risk that they will become established in the United States. In addition, the Departments of the Interior, Agriculture and Commerce and the Environmental Protection Agency will identify the pathways by which invasive species move, rank them according to potential for ecological and economical impacts, and develop mechanisms to reduce movement of invasive species.

Early Detection and Rapid Response: When prevention fails, invasive species must be detected and dealt with before they become established and spread. Resources for early detection and rapid response have not kept pace with the increasing number of invasive species arriving in this country.

Response: The Council will act to speed detection of invasive species and will seek a flexible funding source and legislative authority for multi-year, interagency spending to cover costs incurred in responding to invasions.

Control and Management: Reducing established invasive species populations and limiting their spread can dramatically decrease the associated economic and ecological impacts they cause. Improved Federal land stewardship can provide a model for controlling the spread of invasive species to neighboring lands and waters. However, State and privately-owned lands comprise most of the United States, and successful control strategies will require additional personnel and financial resources for Federal, State, and local partnerships.

Response: Council members will seek additional resources to significantly enhance control and management of invasive species, especially on Federal lands. The Departments of Agriculture and the Interior will propose legislation to assist States in managing invasive species and provide incentives for voluntary actions by private landowners, and will work with States, and other stakeholder groups to determine control priorities.

Restoration: Restoring native plant communities can reduce the risk of future invasions in areas where control actions have reduced or eliminated invasive species.

Response: The Departments of the Interior, Agriculture, Commerce and the U.S. Army Corps of Engineers will develop guidelines for restoration following invasive species control actions, identify sources of propagation material for native species, and propose legislation to provide incentives for private restoration efforts.

International Cooperation: Invasive species are a global problem. Efforts to prevent the establishment of invasive species in the U.S. will be aided by cooperative international efforts to gain greater understanding of invasive species' pathways and vectors. Management of these pathways to minimize the spread of invasive species will certainly require international cooperation. Furthermore, all nations benefit when species of global concern are identified and addressed through shared information, management policies, and other inter-governmental cooperative efforts.

Response: The Council will make recommendations on the development of mutually supportive standards and codes of conduct to address invasive species issues within existing international agreements and programs, such as the International Maritime Organization (IMO) and the International Plant Protection Convention (IPPC). The Council will also collaborate with other governments and organizations to raise global awareness of the invasive species issue and to share information and technical expertise. Finally, the Council will continue to support the ongoing work of the Global Invasive Species Programme (GISP) and its associated voluntary Intergovernmental Invasive Species Initiative (IISI).

Research: In order for any invasive species program to be successful, it must be based on sound science. Both basic and applied research are needed to strengthen prevention and control efforts. Furthermore, existing scientific information must be managed efficiently with particular emphasis on mapping.

Response: The Council will propose additional research funding for invasive species, including a competitive grants program and long-term funding for core continuing research topics. The Council will promote research partnerships involving public and private universities, Federal and State government agencies, and the private sector. The Council will consult with the Committee on Environment and Natural Resources in identifying research priorities throughout the Government. The Council will also seek advice from organizations such as the Aquatic Nuisance Species Task Force and the Smithsonian Institution in identifying fundamental and applied research needs.

Information Management: The fact that there is a wealth of information about invasive species is encouraging. Improved decision making will rely upon shared information and mapping capabilities. New technologies for linking databases are expected to reduce costs and increase effectiveness.

Response: The Council will maintain and enhance a website, www.invasivespecies.gov, thus providing a gateway to Federal and other information on invasive species with the eventual goal of

providing accessible, up-to-date, and comprehensive information on invasive species that will be useful to managers, scientists, policy makers, and the general public.

Education and Public Awareness: Although most people are aware of one or more invasive species, the scope of the problem is not widely recognized by the general public. Strategies to reduce the impacts of invasive species must communicate the relationship between how we allow invaders to enter the U.S. and spread, and how that affects our quality of life. One of the most effective ways to address invasive species issues is to inform people how to avoid contributing to the problem and how they can help reduce threats posed by invasive species.

Response: The Council will develop a National Invasive Species Awareness Campaign in cooperation with States, tribes, local governments and civic organizations and industry.

This plan reflects the widespread view that a well-coordinated Federal effort, working with the States, affected parties, and international partners, can improve the extensive but fragmented approach to addressing invasive species that exists currently. This plan is a blueprint for coordinated Federal action. The key, however, is how well and expeditiously the plan can be implemented. The list of actions presented is only a start. The Plan is meant to be a living document that will be revised and improved over time through public involvement, partnerships, and careful monitoring of progress.

INTRODUCTION

The Problem

Invasive species are everywhere. They damage our crops, our industries, the environment, and public health. Scientists, academics, leaders of industry, and land managers are realizing that invasive species are one of the most serious environmental threats of the 21st century.

Several different terms have been used to describe non-native species, including: alien, nonindigenous, and exotic. However, not all non-native species are *invasive* species. Many non-native species provide important benefits and do not become invasive. These include most of U.S. food crops, domesticated animals, and many of our pets and ornamental plants. Livestock and other organisms which are actively managed are not considered “invasive”. “Invasive species” is defined in the Executive Order, and used in the Management Plan, as a species that is both non native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. The Order further provides that a Federal agency may make a determination that the benefits of an action, which may lead to the introduction or spread of an invasive species, clearly outweigh the potential harm caused by the species and take steps to minimize that harm.

Reportedly 50,000 non-native species have been introduced into the United States (Pimentel *et al.*, 2000). The Office of Technology Assessment estimates that 10 to 15 percent of introduced species will be invasive (U.S. Congress, OTA 1993). Many additional species could create problems if introduced. For example, the Animal and Plant Health Inspection Service (APHIS) of the Department of Agriculture has intercepted 7,400 species of plant pests at ports of entry since 1985, which could have become invasive if they entered the United States (APHIS unpublished data). Invasive plants are estimated to cover 100 million acres in the United States. They are spreading every year across three million additional acres, an area twice the size of Delaware. Every day, up to 4,600 acres of public natural areas are negatively impacted by invasive plant species (USDA Forest Service 1998).

Some invasive species have been intentionally introduced. These include purple loosestrife (*Lythrum salicaria*), which was introduced and is sold as an ornamental flower, salt cedar (*Tamarix* spp.) and kudzu (*Pueraria montana var. lobata*), both of which were introduced for erosion control. Many invasive species arrive as unknown stowaways by air, water, rail, or road. Their means of travel are referred to as “pathways.” Examples of these species include chestnut blight (*Cryphonectria parasitica*) and the naval shipworm (*Teredo navalis*). Chestnut blight is one of the most destructive plant diseases ever recorded. This fungus, believed to have come from Asia in imported wood, has forever changed the forest tree composition in the eastern United States. The naval shipworm was introduced into San Francisco Bay, via wooden ships, in the early part of the twentieth century where its wood excavating habits destroyed the majority of the existing pilings causing warehouses and loaded freight cars to fall into the Bay.

The diversity and number of pathways complicate efforts to prevent introduction and control the spread of invasive species. For example, green crabs have hitchhiked in bait shipments and citrus black spot is carried on orange trees. Once an invasive species becomes established at a new location, it may spread. The pace of establishment and spread depends on numerous factors including competition and predation, reproduction mechanisms, ability to acclimatize or adapt, and available pathways.

Invasive species can take a heavy economic toll. Researchers at Cornell University estimate that invasive species are costing Americans an estimated \$137 billion every year (Pimentel *et al.* 2000). Even controlling a single unwanted invader can carry a price tag in the millions. The United States and

Canada are spending \$14 million a year just to control the sea lamprey. This species caused the collapse of the lake trout and whitefish fisheries in the Great Lakes (Wilkinson pers. comm.). In 1994, invasive plants' impacts in the U.S. were estimated at \$13 billion per year (Westbrooks 1998). The list of invaders is long, and the cost of control is high and going up.

The environmental costs of invasive species can also be dramatic. They may affect native species through predation or competition for prey or space. They may introduce pathogens or parasites that affect plants, animals, or humans. When closely related introduced species crossbreed with native species, there may be harmful genetic impacts. Invasive species have also dramatically altered habitats.

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Invasions in the San Francisco Estuary

The San Francisco Bay/Delta Estuary is an example of how species invasions can change an entire ecosystem. It is possibly the most invaded estuary in the entire world (Cohen and Carlton 1998). More than 230 non-native species have become established in the system, and there are an additional 100-200 species that may be non-native but whose origin cannot yet be determined. The known invasive species cover a wide range of taxonomic groups: 69 percent of the species are invertebrates such as mollusks, crustaceans, and tubeworms; 15 percent are fish and other vertebrates; 12 percent are vascular plants; and four percent are microbial organisms. Aside from the sheer number of non-native species, non-native organisms dominate many habitats, accounting for 40 to 100 percent of the common species at many sites in the estuary, whether calculated as a percentage of the number of species present, the number of individuals, or of total biomass (Cohen and Carlton 1995). In some areas, it is difficult to find a native organism.

Non-native species introductions have dramatically reduced some native populations, altered habitat structure and energy flows, and caused billions of dollars in economic damage (Cohen and Carlton, 1995). The pace of invasion is apparently accelerating. Roughly half of the non-native species have arrived in the last 35 years. Between 1851 and 1960, a new species was established in the estuary every 55 weeks. From 1961 to 1995, the rate was a new species every 14 weeks (Cohen and Carlton, 1998).

A number of different pathways have led to new introductions, but there are definite historical patterns to the most significant pathways. Many of the early introductions were organisms transported on the hulls of wooden ships. A number of introductions around the turn of the century were due to the importation and cultivation of non-native oysters. Even though these oysters did not become established in the estuary, the oyster shipments contained a variety of other species that did. Most recently, the major pathway has been the discharge of ballast water from large ships. In other aquatic systems, additional pathways have been significant. These pathways include the introduction of pathogens and parasites via aquaculture, establishment of ornamental plants, and introduction of species as bait.

Multiple impacts from a single species—*Potamocorbula amurensis*

In October 1986, three small clams were collected in San Francisco Bay by a college biology class. They were later identified as an Asian species (*Potamocorbula amurensis*) that had never before been seen on the west coast. Nine months later, this species had become the most abundant clam in the northern part of the Bay, ultimately reaching densities of nearly 50,000 clams per square meter (Peterson, 1996). Other clams were displaced and the biodiversity of bottom-dwelling organisms was reduced (Nichols *et al.* 1990; Thompson, 1998).

Potamocorbula is also a highly efficient filter feeder. It has been estimated that clams in the northern portion of the Bay have the capacity to filter the entire water column at least once and possibly more than twice in a single day (Thompson and Luoma, 1999). As a result, the clam has virtually eliminated the annual phytoplankton blooms. Phytoplankton are at the base of the food chain and are preyed upon by zooplankton which in turn are eaten by juvenile fish. There is preliminary evidence that this cascading impact on the food chain has resulted in a reduction in zooplankton populations. – Andrew Cohen (San Francisco Estuary Institute)

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Invasive species frequently have a negative impact on native species for multiple reasons; for example, they may lack natural predators or outcompete other species. Wilcove *et al.* (1998) estimates that the placement of 35 to 46 percent of the plants and animals on the Federal Endangered Species List can be attributed in part to threats from invasive species. The brown tree snake, which probably came to Guam in military cargo, has driven a number of birds on that island territory to extinction.

Invasive species can invade both disturbed ecosystems (*e.g.*, fire ants along edges of highways) or healthy natural systems (*e.g.*, chestnut blight in eastern forests). No natural or altered ecosystem is immune to invasive species.

In some cases, invasive species have altered the ecology of an area to such an extent that the original ecosystem is fundamentally changed. Examples include invasive cheatgrass that has accelerated the fire cycle in many areas in western states by 20 fold, and saltcedar that has altered soil chemistry and impacted native plants and wildlife.

Invasive species can affect plant, animal, and human health. Pathogens and parasites may themselves be invasive species or be introduced by them. Perhaps history's most infamous example of a vectored disease is bubonic plague, which was spread by black rats carrying infected fleas. The recent introduction of the West Nile virus now threatens people and animals in six eastern states. The virus is transmitted to humans by mosquitoes that feed on the blood of infected animals. Cholera and the microorganisms that cause red tide have been moved in ballast water.

Recent studies have documented the significant damage caused by invasive species to the environment, health, and economy. These same studies have documented the need to strengthen legal authorities and existing programs. A 1993 report by the Office of Technology Assessment, *Harmful Non-indigenous Species in the United States*, stated that "Federal laws leave both obvious and subtle gaps in the regulation of harmful NIS [invasive species]" (U.S. Congress, OTA 1993). In the 1999 report compiled by the National Plant Board for the Animal and Plant Health Inspection Service, *Safeguarding American Plant Resources*, it was noted that the laws giving the agency its authorities "were passed in response to specific plant health crises" and that "overlaps and gaps in this array of statutes often leave the Agency unsure of which authority to apply in any given case..." (National Plant Board 1999). A 1996 publication by The Nature Conservancy noted that the laws that do exist often are not effective or adequately enforced (Stein and Flack 1996). A review by Cornell University researchers this year concludes, "Although [Federal] policies and practices may help reduce accidental and intentional introduction of potentially harmful exotic species [invasive species], there is a long way to go before the resources devoted to the problem are in proportion to the risks" (Pimentel *et al.* 2000).

Executive Order 13112 on Invasive Species

In 1997, 500 scientists and resource managers wrote to the Vice President and requested action on invasive species. Their letter stated: “We are losing the war against invasive exotic species, and their economic impacts are soaring. We simply cannot allow this unacceptable degradation of our Nation’s public and agricultural lands to continue.” An interagency team was launched in response to develop a comprehensive and coordinated strategy for the problem. The team prepared a review of the issue with recommendations, foremost among them that an executive order be issued providing standards and a framework for continuing action. On February 3, 1999, President Clinton issued Executive Order 13112 on Invasive Species (Appendix 1).

Executive Order 13112 (Order) directs each Federal agency whose actions may affect the status of invasive species to identify those actions and to the extent practicable and permitted by law (1) take actions specified in the Order to address the problem consistent with their authorities and budgetary resources; and (2) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, “pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.” The actions specified in the Order that call for affirmative action include preventing introduction; detecting, responding rapidly to and controlling invasions; monitoring invasive species populations; restoring native species and habitat conditions in invaded ecosystems; conducting research on invasive species and developing technologies to deal with them; and promoting public education on invasive species. All of these responsibilities are to be carried out in consultation with the National Invasive Species Council and in line with the National Invasive Species Management Plan.

The Order establishes the National Invasive Species Council (Council) chaired by the Secretaries of Agriculture, Commerce, and the Interior and includes the Departments of State, Treasury, Defense, Transportation and the Environmental Protection Agency. Throughout this document, the term “Invasive Species Council” or “the Council” means the eight member Departments and their constituent agencies. The Order directs the Secretary of the Interior to establish an advisory committee including diverse stakeholders to assist the Council (Advisory Committee), to appoint an executive director with concurrence of the other co-chairs, and to provide necessary staff and administrative support. Current Advisory Committee members are listed in Appendix 4.

The Order directs the Council to provide national leadership and oversight on invasive species and to see that Federal agency activities are coordinated and effective. In addition, the Council has specific responsibilities including: 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 this document — the National Invasive Species Management Plan (Management Plan or Plan).

National Invasive Species Management Plan

Requirements of the Order. The Council was directed by the President to issue the first edition of the Management Plan by August 2000, and to include performance-oriented goals and objectives and specific measures of success for Federal agency efforts concerning invasive species, including objectives and measures for each of the Federal agency and Council duties described above. The Plan is

also to identify the personnel, other resources, and additional levels of coordination needed to achieve its goals and objectives.

The Order requires that the Management Plan be developed through a public process and in consultation with Federal agencies and stakeholders. The first edition of the Plan is to include a review of existing and prospective approaches and authorities for preventing the introduction and spread of invasive species, including those for identifying pathways by which invasive species are introduced and for minimizing the risk of introductions via those pathways. Based on this review, the Plan is to identify research needs and recommend measures to minimize the risk that introductions will occur. The Order states that those measures are to provide for a science-based process to evaluate risks associated with introduction and spread of invasive species and a coordinated and systematic risk-based process to identify, monitor, and interdict pathways that may be involved in the introduction of invasive species. If recommended measures are not authorized by current law, the Council is charged with recommending legislative proposals for new authority.

The Council is required to update the Plan biennially and report on success in achieving its goals and objectives. Within 18 months after measures have been recommended by the Council in any edition of the Management Plan, each Federal agency whose action is required to implement such measures is required to take the action recommended or provide the Council with an explanation of why the action is not feasible.

This Management Plan. This proposed first Management Plan is the result of extensive consultation with many organizations and individuals with differing interests. Valuable guidance came from the Invasive Species Advisory Committee and members of six working groups made up of both Federal and non-Federal experts under the auspices of the Advisory Committee (Appendix 8). The working groups are (1) international; (2) communication, education, and outreach; (3) policy and regulation; (4) risk analysis and prevention; (5) management, control, and restoration; and (6) research, information, documentation, and monitoring. This Plan contains a number of actions recommended by the working groups and discussed in reports of the groups available for review at the Council's website: www.invasivespecies.gov.

The Council also heard from a wide range of organizations and individuals at five public listening sessions held in July, 2000 around the country and through numerous written comments. A preliminary draft of this Plan was put on the Council's website and comment solicited. In addition, the Advisory Committee and the Council adopted a set of Guiding Principles, which are located in Appendix 1 of this document. Meeting the invasive species challenge will require time, money and knowledge. We have far to go. But by harnessing the energy, resources and intellect of all concerned, the battle can be won.

SURVEY OF FEDERAL ROLES AND RESPONSIBILITIES

Invasive species and the problems they create are far from new. The River and Harbors Act of 1899 directed the Army Corps of Engineers to manage aquatic, invasive plants; and State laws have been on the books for over 100 years requiring the eradication or control of invasive weeds. Over the years, Federal laws, authorities and programs have also proliferated as part of efforts to prevent, control and manage the many harmful impacts and different types of invasive species. More than 20 Federal agencies now have responsibilities, authorities and programs that deal with invasive species. Some of these programs are significant in their breadth and scope (*i.e.*, APHIS' inspection and quarantine program) and some address small but important aspects of the overall problem (*i.e.*, Office of Insular Affairs' program to control and contain the brown tree snake).

This section briefly surveys the major Federal programs, policies and authorities currently in place to deal with invasive species in the areas highlighted in the Executive Order including: prevention, rapid response, control and restoration, research and monitoring, and public outreach and partnership efforts. The purpose is to set a context for the Management Plan, not to give a complete or detailed description of every program. A number of excellent reports have described Federal authorities in this area (U.S. Congress, OTA 1993, National Plant Board 1999, Congressional Research Service 1999, U.S. General Accounting Office 2000).

The latter part of this section contains a brief analysis of major gaps in Federal authorities, policies, resources and enforcement that reduce or impede the Federal effort to address invasive species.

Overview

The Council member Departments spent about 631.5 million dollars in Fiscal Year (FY) 2000 on invasive species issues (U.S. General Accounting Office, August 2000). The Department of Agriculture, a Council co-chair, has by far the largest budget to address invasive species, with Agriculture agencies accounting for almost 90 percent of the spending. Agriculture has jurisdiction over the importation and exportation of plant species, plant pests, biological control organisms and animals considered to be plant pests or a threat to livestock or poultry. The Forest Service has authority over forest pests and management of invasive species in the 190 million acre National Forest and Grasslands System. (See Table of Legal Authorities, Appendix 3.)

The Interior Department has a much smaller program – about \$31 million in FY 2000 – accounting for about 5 percent of the total invasive species expenditures (U.S. General Accounting Office 2000). Interior – through the U.S. Fish and Wildlife Service (FWS) – regulates the importation of animals found to be injurious. Federal land management agencies within the Department have responsibility to manage invasive species on lands within national parks, national wildlife refuges, and Bureau of Land Management lands. The U.S. Geological Survey (USGS), within Interior, conducts research on the prevention, control of invasive species and restoration of native species.

The Commerce Department, through the National Oceanic and Atmospheric Administration (NOAA), is trustee for the Nation's marine resources and has programs to deal with aquatic invasive species. NOAA's primary focus has been on research and outreach regarding aquatic invasive species. In FY 2000, NOAA spent a total of \$5.5 million on these programs.

According to the GAO report, the Department of Defense spent a total of \$14.5 million controlling invasive species on its installations and ensuring that invasive species are not transferred into the United States or to other nations during its operations. Of this amount, the Army Corps of Engineers spent \$9.1

million controlling aquatic growth (most of which are invasive species), and supporting zebra mussel research.

Other Federal Departments play limited but important roles. For example, the U.S. Customs Service within the Treasury Department enforces laws prohibiting or limiting the entry of invasive species, in conjunction with both the Departments of Agriculture and the Interior. The Environmental Protection Agency (EPA) regulates pesticides and biological control agents, and reviews environmental impact statements.

Prevention

The protection of agriculture has and continues to be the primary focus of prevention efforts, but damage to natural areas is increasingly being considered. About half of the total Federal expenditures on invasive species are for prevention activities. The new Plant Protection Act (PPA), which consolidated the authorities in the Plant Quarantine Act, Federal Plant Pest Act, Federal Noxious Weed Act, and other plant-related statutes, authorizes the Agriculture Department to prohibit or restrict the importation or interstate movement of any plant, plant product, biological control organism, or plant pest. Plant pest is defined very broadly to include almost any living organism (other than human) that damages or causes disease to any plant. The PPA specifically authorizes Agriculture to hold, seize, quarantine, treat or destroy any plant or plant pest moving in interstate commerce if necessary to prevent the movement of a plant pest or noxious weed into a new area. The movement of seed is regulated under the Federal Seed Act (FSA), which prohibits the importation of any agricultural or vegetable seeds containing high-risk weed seeds. FSA also allows the interstate transport of seed containing other specifically-listed weed seeds, as long as the shipment is accurately labeled and the rate of those weed seeds does not exceed the rate for the state in which it is offered. (See Table of Legal Authorities, Appendix 3).

The Animal and Health Plant Inspection Service (APHIS) within the Agriculture Department administers the Plant Protection Act. APHIS' budget for agricultural quarantine and port inspection was \$257.4 million in 1999. Using current authorities APHIS can prohibit, inspect, quarantine or require permits before allowing entry of plant and animal pests or their host commodities or conveyances. A number of domestic quarantines are in place for invasive species that have been established within the United States. In addition, APHIS "preclears" some shipments before they can be exported from foreign countries to the United States to ensure that they are free of certain invasive species. It has long been recognized that resource requirements for APHIS' exclusion activities have not kept pace with the increased volume of trade and tourism.

The Agriculture Department also has authority to regulate the importation and interstate movement of invasive animal species under a number of statutes collectively referred to as the animal quarantine laws. These laws authorize Agriculture – through APHIS – to prevent the introduction and dissemination of communicable diseases and pests of livestock and poultry. Agriculture also regulates the importation or exportation of veterinary biological products intended to treat animal disease and prohibits the importation or shipment of any products that are worthless, contaminated, dangerous or harmful. (See, Table of Legal Authorities, Appendix 3)

The Fish and Wildlife Service, within the Department of the Interior, regulates the importation of animals found to be injurious under the Lacey Act. The species that have been specifically listed as injurious include 12 genera of mammals, four species of birds, one reptile, one mollusk, and one crustacean. The Service's port inspection program is relatively small – in FY 1999, the Service's budget was just over \$3 million. Several provisions within the Lacey Act limit its ability to comprehensively

address invasive species introductions. First, the Act is limited to animals. In fact, the statute does not apply to all animals, but only those specifically listed along with mammals, birds, fish, amphibians, reptiles, mollusks and crustaceans. The Act does not apply to most invertebrates (other than mollusks and crustaceans) or any plants or plant pests. In addition, the Departments of the Interior and Commerce can regulate the interstate movement of fish and wildlife species if their movement is prohibited by State or tribal law under the Lacey Act. (See Table of Legal Authorities, Appendix 3.)

A number of agencies are charged with preventing and controlling the introduction of aquatic nuisance species under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, including the FWS, NOAA, the U.S. Coast Guard, the Army Corps of Engineers, APHIS, the EPA and the Department of State. All of these agencies serve on the Aquatic Nuisance Species Task Force (ANSTF) that coordinates Federal activities to implement the Act. The Coast Guard (Department of Transportation) is charged with issuing regulations to prevent introductions through the ballast water of vessels. Specifically, they have issued regulations requiring management of ballast water in the Great Lakes and Hudson River, and issued voluntary guidelines to prevent the introduction and spread of nonindigenous species from ballast water in ships entering other U.S. waters from outside the exclusive economic zone.

The Department of Defense (DOD) transports large shipments of vehicles and equipment into the United States that could harbor invasive species. These shipments are inspected by APHIS. In addition, DOD and other agencies ship a great number of items to other nations. The United States also has a responsibility not to create invasive species problems in other nations; this issue will be discussed under International Measures.

Other Departments assist in prevention activities. The U.S. Customs Service assists APHIS and FWS in the enforcement of plant and animal regulations by detaining, where applicable, imported or exported products awaiting clearance of APHIS or FWS inspectors.

The Federal land management agencies in both Agriculture and Interior have internal prevention strategies as well as interagency programs such as Noxious Weed-Seed Free, Forage, and Mulch and the *Slow the Spread* program, to prevent further movement of gypsy moth in the eastern forests.

Early Detection and Rapid Response

A number of Federal agencies are involved in detecting and responding to invasive species. This section refers to whether any of these agencies have special or emergency authority to identify and address new or incipient invasions rapidly, *i.e.*, before they can become established or widespread and during the time that eradication is cost effective. Only APHIS within the Department of Agriculture has emergency authority to deal with an incipient invasion. Both the PPA and the animal quarantine laws described above provide authority to seize, quarantine, destroy, hold and treat prohibited species that are imported into the U.S. or moved interstate. These authorities also authorize the Agriculture Department to declare an extraordinary emergency in order to address a situation in which the prohibited species has not been moved but the State is unable or unwilling to take appropriate action to prevent dissemination of a communicable disease of livestock or poultry. In addition, the National Park Service has established four exotic plant management teams to identify, eradicate, or control small, localized infestations on Park Service lands.

Rapid response actions must also address the duty of all Federal agencies to comply with the National Environmental Policy Act (NEPA).

Control, Management and Restoration

All Federal land and water management agencies, including the Forest Service (FS), the Bureau of Land Management (BLM), the National Park Service (NPS) and FWS and NOAA have authority to control and manage invasive species as well as restore affected areas on their lands and waters. This authority arises from the Property Clause of the Constitution (U.S. Const. Art. IV, § 3) and the various agency organic acts and other statutes that govern management, uses and planning on their lands and waters. The level of effort and budgetary resources for management, control and restoration vary with each agency. None of these agencies has the resources to control every invasive species present on Federal lands and waters. For example, by current estimates, invasive species of weeds alone cover 8.5 million acres or 5 percent of BLM's 180 million acres. Appendix 2 contains additional information about a number of individual land management agency control programs. Agencies also work in partnership with States and private landowners to control invasive species on public lands. These efforts are summarized below in the section on Partnership Efforts.

The Environmental Protection Agency has authority under three statutes that can be used to control and manage invasive species. The Clean Water Act permits EPA to treat invasive organisms as point source and non-point source pollutants bringing to bear the whole power of the Act by controlling invasive species at the source. This could result in discharge limits being set for point sources such as ballast water from ships. The Agency is currently reviewing its authorities under the Act relative to invasive species. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), is a critical statute for invasive species whenever pesticides are used to control or reduce the impact of invasive species. Examples include the use of a pesticide to control lamprey populations in the Great Lakes and the use of herbicides to control noxious weeds. FIFRA also gives EPA review authority for biological control agents when they are used to control invasive pests. Finally, EPA reviews all Environmental Impact Statements under NEPA. This review, conducted in EPA's regional offices, now includes an explicit consideration of the proposed action with regard to invasive species.

A number of other agencies are involved in control and management efforts. APHIS has authority under the PPA and other statutes for the control and management of invasive species. The PPA specifically authorizes the Department of Agriculture to develop integrated management plans for noxious weeds for the geographic region where the weed is found. The Army Corps of Engineers manages aquatic plants and other invasive species at 562 reservoirs, 237 navigation locks, 962 harbors, 75 hydropower projects and 25,000 miles of inland and coastal waterways through its operations and maintenance activities. (See Appendix 2).

Research and Monitoring

Almost all the agencies with major responsibilities in the areas of prevention and control of invasive species also have research and monitoring programs to support their efforts. For several agencies, research and monitoring are their most significant activities relating to invasive species: these include the Agricultural Research Service (ARS), FS, Cooperative State Research Education and Extension Service (CSREES), NOAA, and USGS. APHIS regularly monitors its emergency programs to determine efficacy and potential environmental impacts, and through the Cooperative Agricultural Pest Survey, has developed a database system to store information collected in the surveys, which is called the National Pest Information System. APHIS also conducts significant research efforts on invasive species under its various authorities and can request ARS to conduct research. The Army Corps of Engineers has a number of research programs focused on aquatic plant problems and zebra mussels. In addition, EPA conducts research on the risks associated with invasive species and monitors

the extent of invasive species spread by ecosystem type as part of the Agency's Research and Development authority. Specifics about the research programs of these agencies are included in Appendix 2.

International Measures

The global dimensions of the invasive species problem have increased with expanded trade and travel. Any realistic effort dealing with prevention, which has been called the first line of defense against invasive species, must include international measures and international cooperation. Currently, there are a number of agreements that deal with specific invasive species issues. These include the International Plant Protection Convention (IPPC), whose purpose is to ensure, within the World Trade Organization (WTO), that countries have the right and responsibility to develop equivalent and effective actions to prevent the spread and introduction of invasive plant pests, and to promote measures for their control in the context of international trade. This protection covers invasive pests of both economic important crops and natural flora. Under the IPPC, a number of countries are developing global standards for protection from invasive plant pests. In addition, APHIS is currently working with the WTO on the Application of Phytosanitary Measures, which places constraints on a government's power to regulate imports, with the objective of removing barriers to trade. The Departments of State, Agriculture and Interior all have international programs dealing with invasive species issues that are summarized in Appendix 2.

Public Outreach and Partnership Efforts

Given the scope and pervasiveness of the invasive species problem, outreach and partnership efforts play a center stage role in many Federal efforts. Prevention efforts will fail without the participation of an informed public. Control efforts in many cases cannot be successful unless all affected landowners --- including State, local, tribal and private -- cooperate and coordinate the control action. A number of Federal agencies have special projects and programs that provide information to the public or assistance to State, local, and private landowners for control efforts, including agencies within the Departments of the Interior, Agriculture and Commerce. Appendix 2 summarizes these programs.

Other Interagency Efforts

There are a number of Federal entities that provide coordination among Federal agencies regarding different aspects of the invasive species problem. The Executive Order specifically directs the Council to work with three of these including: the Aquatic Nuisance Species Task Force (ANSTF), which coordinates activities relating to aquatic invasive species; the Federal Interagency Committee on the Management of Noxious and Exotic Weeds (FICMNEW), which coordinates weed management efforts on Federal lands; and the Committee on Environment and Natural Resources (CENR) which coordinates research efforts. These organizations are discussed briefly in Appendix 2 below. There are many other important organizations and interagency efforts that Council members have, and will continue to work with on invasive species issues.

Gaps in Authorities, Programs and Resources

Given the number of Federal agencies and programs briefly summarized above, it is fair to ask whether additional authority, policies and programs are necessary to address invasive species. There are also a great number of State programs that are beyond the scope of this report. Some of these State programs have larger budgets to fight invasive species than many of Federal agencies efforts described in this section. While these efforts may be effective in addressing a number of discrete problems, they are not preventing the establishment of new invasive species or adequately controlling the vast majority of those already established.

According to a recent GAO study, Council members spent just over \$630 million on invasive species programs in FY 2000. This represents an increase from FY 1999 of more than \$100 million (GAO 2000). Despite this increase, spending to deal with the invasive species problem is dwarfed when compared to the estimated \$137 billion invasive species problems cost the U.S. economy per year.

This section highlights the gaps in authority, policies and funding that scientific experts, Federal agencies, the Invasive Species Advisory Committee and commentaries stressed most often and lead to many of the recommended actions contained in this report. Gaps exist in all the major ways invasive species are addressed, whether by coordination, prevention, rapid response, control, research, international cooperation, or outreach.

Although the issuing of the Invasive Species Executive Order and establishment of the Council is expected to improve coordination and leadership, concern was expressed about the lack of mechanisms to coordinate budget requests, resolve jurisdictional disputes among agencies, and efficiently share information. In addition, existing cooperative efforts including the ANSTF, FICMNEW and CENR should receive the support and resources necessary to fulfill their coordination roles.

Prevention has been identified as the most cost efficient first line of defense against invasive species and a number of gaps were identified in this area. Yet, no comprehensive system for the screening of all intentionally introduced species exists. Development and testing of a screening process that is science and risk-based would improve coordinated action on prevention. In addition, there is no risk-based process in place to evaluate and mitigate the high-risk pathways in order to stem the spread of invasive species. Once these mechanisms have been developed and tested working with stakeholders, specific gaps in the legal and regulatory authorities of the relevant Departments, if any, can be identified and addressed. Finally, FWS is currently examining the procedures for listing species as “injurious” under the Injurious Wildlife Provisions of the Lacey Act to better address invasive species.

Once a species has been introduced, the ability to quickly detect and respond to a new invasion can make eradication or containment possible - much less costly and more effective than most control efforts once a species is well established. Only APHIS within the Department of Agriculture has emergency authority under the PPA and animal quarantine laws to interdict and quarantine certain invasive species that are plants, plant pests, noxious weeds or considered a threat to poultry or livestock once it has been introduced. Neither the Federal Seed Act nor the animal health acts contain emergency authority. Nor does the Lacey Act provide for emergency response. To improve rapid response capabilities there is a need to improve identification methods, broaden emergency authorities, and set up rapid response teams that can be called on in the event of an incipient invasion.

Control, management, and restoration efforts for invasive species that are established suffer from inadequate funding, difficulties in setting priorities and need for better control methods. Lack of coordination among Federal agencies and questions about what entity is responsible for control efforts (*e.g.*, jurisdictional issues), reduce the effectiveness and efficiency of control efforts. A number of land management agencies identified additional authority to work cooperatively with tribal and private landowners on control efforts as necessary to enhance cooperative control efforts.

Almost all parties identified additional funding for research and monitoring as essential to improving response to invasive issues. Council members stressed the need to recognize and support the important role of the CENR in coordinating and prioritizing research needs. Virtually every activity relating to invasive species is dependent on scientific knowledge, and there are critical research needs in almost every area. Most Agencies identified additional funding of both basic and applied research as a significant priority.

Partnerships and cooperative efforts are critical to every aspect of invasive species. Although there are a number of programs and projects, there are many unmet needs and opportunities for collective action with States and private landowners. Grant programs that take a multi-disciplinary, regional approach may be particularly helpful for widespread invasions.

This brief overview of gaps in existing authorities, policies and resources sets the stage for the proposed action plan in the next section.

AN ACTION PLAN FOR THE NATION

This section reviews actions already taken to implement the Order, and actions planned or recommended for the future. Its intent is to address the most pressing invasive species problems, not to encompass every useful agency action that could be taken. When applicable, the following items would build on existing regulatory structures, including databases, programs, facilities, and policies. The actions are described in nine categories: leadership and coordination; prevention; early detection and rapid response; control and management; restoration, international cooperation; research; information management; and education and public awareness. These categories and actions are based on the duties of Federal agencies and the Council as established by the Order, informed by deliberations of the Council and its Advisory Committee and work groups, and by comments of Federal reviewers, interested parties, and the general public.

A. Leadership and Coordination

The Council is directed by the Order to provide national leadership and oversight on invasive species and to see that Federal agency activities are coordinated and effective. The Council established permanent staff positions and the Departments of the Interior, Agriculture and Commerce appointed liaisons from their Departments to assist the Council staff. Other agencies with responsibilities for invasive species were asked to appoint technical liaisons to the Council staff. These people represent an informal but effective interdepartmental group that works directly with Council staff to complete activities assigned by the Council and that has been instrumental in assisting the Council. The group also facilitates information flow between the Council members, Council staff, and the other Federal agencies.

The Council will meet in plenary session at least twice annually, and will convene meetings of the Advisory Committee on a regular basis and no less than four times before the first revision of this Plan in January 2003. At least two of the Advisory Committee meetings will be held in conjunction with Council meetings.

The Council staff plans to meet at least every three months with the interdepartmental technical liaison group representing all Council members. The primary purpose of these meetings will be to ensure that the Federal agency duties of the Order are being followed, including implementation of the actions recommended in this Management Plan. The liaisons will inform the Council of progress on recommendations, suggest new recommendations, and facilitate information exchange among all involved. In October 2000, the Council staff will host a meeting on actions for the new fiscal year with Federal agency representatives and Advisory Committee members.

When appropriate, the Council and its staff will draw on various existing organizations for coordination and leadership. These include, among others, ANSTF, FICMNEW, CENR, and State and regional weed boards. However, additional steps are needed to ensure a unified, effective, and coordinated Federal response. One need is for an oversight mechanism for use by Federal agencies in complying with the Order and reporting on implementation. As an example of an oversight mechanism, the Coral Reef Task Force, established by E.O. 13089, adopted an oversight policy. This policy can be reviewed at <http://coralreef.gov>.

The development of an Internet-based information sharing network as mandated by the Order will greatly facilitate coordination, and is discussed below in this Plan.

Coordination and Leadership

Actions Planned

- By April 2001, the Council will establish an oversight mechanism for use by Federal agencies in complying with the Order and reporting on implementation. The mechanism will be similar to that adopted by the Coral Reef Task Force in The National Action Plan to Conserve Coral Reefs.
- By the July 2001, the Council will ensure that procedures are in place to resolve jurisdictional and other disputes regarding invasive species issues. The goals will be to resolve disputes at the least formal level possible, in an unbiased manner; and involve only those parties with an interest in the dispute – utilizing unbiased third party mediators if appropriate.
- By January 2002, the Council will prepare an analysis of legal and policy barriers to coordinated and joint actions among Federal agencies, including transfer and pooling of funds for invasive species projects.
- By July 2002, the Council will identify at least two major invasive species issues, regulations, or policies where coordination is inadequate and will take action that fixes the problem.
- Beginning with FY 2003, and each year thereafter, the Council will coordinate and provide to OMB a proposed cross-cut budget for Federal agency expenditures concerning invasive species and in particular will address implementation of the actions recommended in this and future editions of the Management Plan. The cross-cut budget will take into account views of the Advisory Committee and the full range of stakeholders and be utilized as a tool for planning and coordination.
- The Council will give a report on success in achieving the goals and objectives of the current Management Plan, and issue an updated Plan by January 2003 and every two years thereafter. These updates and reports will be prepared in consultation with the Advisory Committee and through mechanisms securing comment from stakeholders and the general public.
- The Council will assess the effectiveness of Order no later than 2004, as required by section 5(c), and will include an evaluation of whether the President should expand or propose legislation to expand the authorities of the Council to ensure that the requirements of the Order and the Management Plan are carried out effectively and efficiently.

Facilitating Non-Federal Action

The Council is charged with facilitating action at local, State, tribal, regional and ecosystem-based levels. It has reviewed opportunities for encouraging non-Federal efforts through discussions with the Advisory Committee, participation in listening sessions, and interaction with the general public.

Actions Planned

- Council staff will seek advice from and cooperate on planning and projects with non-Federal agencies and organizations including the National Governors' Association, managers of State invasive species programs, State plant boards, tribal governments, the National Association of Counties, the National Plant Board, the U.S. Animal Health Association, the National Association of Conservation Districts, and regional compacts such as the Great Lakes Panel on Aquatic Nuisance Species and the Intermountain Noxious Weed Advisory Committee, among others. Council staff will prepare a two-year work plan identifying specific initiatives for presentation to the Council in May 2001 and will pursue projects in the interim as feasible and appropriate. The Council will develop and pursue joint projects in collaboration with the Advisory Committee and, when appropriate, the ANSTF, FICMNEW and CENR.

NEPA Guidance

The Council is currently preparing guidance based on the National Environmental Policy Act, in cooperation with the President's Council on Environmental Quality.

Actions Planned

- In 2001, Council staff, in conjunction with the Federal interdepartmental liaison group, will organize a series of regional workshops for Federal invasive species program managers and researchers and their non-Federal partners to discuss the contents of the draft guidelines and their implications.
- Council staff will report to the Council on the outcome of the workshops by December, 2001, including recommendations that may arise from the workshops and that require Council action.
- The final NEPA guidance will be available by January 2002.

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Federal/State coordination in Action: TEAM Leafy Spurge

Since its introduction into the United States, leafy spurge has doubled its acreage every ten years. This formidable terrestrial weed now infests at least five million acres in 29 states. Costs to agricultural producers and taxpayers for production losses, control expenses, and other economic impacts are estimated at \$144 million every year in North Dakota, South Dakota, Montana, and Wyoming alone.

In 1999, the Department of Agriculture's ARS began TEAM Leafy Spurge, a five-year area-wide pest management demonstration project in the Little Missouri River drainage. Partners include APHIS, FS, NPS, BLM, USGS, departments of agriculture and other State agencies, land grant universities, county weed managers, and landowners.

The TEAM's integrated pest management strategy relies on biological control agents and techniques such as combined sheep and cattle grazing. There is progress on several fronts. The effectiveness of one biological control agent, the leafy spurge flea beetle, has been demonstrated at numerous test sites. Successful establishment of flea beetles has improved because team members are working directly with landowners on the proper methods for release of the insect. Tours of the demonstration sites as part of a comprehensive public education program have already begun, and the response by farmers and ranchers has been overwhelming. Research funded by TEAM Leafy Spurge in

the United States and abroad seeks improved understanding of how biological controls work and is attempting to identify new leafy spurge parasites and pathogens for testing.

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B. Prevention

The most cost-effective and complete defense against invasive species is preventing them from becoming established. Prevention is two-pronged. Some species are intentionally introduced for some purpose whereas others arrive unintentionally as "hitchhikers" on a commodity, conveyance, or person.

Diverse tools and methods are needed to prevent invasive species from becoming established in ecosystems where they are not native. A risk-based approach is mandated by the Order, and requires consideration of the likelihood of establishment and spread and the degree of harm.

A key tool for prevention is a risk analysis and screening system for evaluating first-time intentional introductions of non-native species before entry is allowed and for realistically applying similar principles, or other management options, to species currently in trade. Another priority is identifying high-risk invasive species pathways and developing effective technologies to reduce the movement of invasive species. Pathway management is the most efficient way to address unintentional introductions. A third line of attack is to identify high-risk invasive species not yet established and the likely pathways for their entry, and then manage the pathways to prevent introduction.

Preventing invasions requires more than analysis. Both appropriate regulation and voluntary codes of conduct are essential. Research is needed on the biology of invasive species and ecosystem vulnerability to them, and on means to detect and interdict invasive species that are enroute to establishment. Finally, steps are needed to make sure the general public understands the harm that invasive species cause and the importance of preventing their introduction.

Actions Planned

Intentional Introductions

The Council will undertake development of a comprehensive screening system for evaluating intentionally introduced non-native species. The purpose of the system will be to assure, upon full implementation, that non-native species which have not previously been imported will not be intentionally introduced in the United States unless the risk of establishment and harm has been evaluated and determined to be acceptable. The system should be fully implemented by January 1, 2007.

- The comprehensive screening system referred to above will be based on consideration of the potential regulatory and non-regulatory systems for screening the introduction of non-native species. The agencies (noted in parentheses), in consultation with other Council members, the Advisory Committee, lead agencies, and interested parties, will develop and complete testing of these systems no later than January, 2003:
 - a. Introduction of non-native biological control organisms for animal pest control within the continental United States (**Departments of Agriculture and the Interior, and the Environmental Protection Agency**).

- b. Introduction of all non-native freshwater or terrestrial organisms for any purpose into Hawaii or U.S. territories or possessions in the Pacific (**Department of the Interior and the State of Hawaii**).
- c. Introduction of all non-native freshwater or terrestrial organisms for any purpose into Puerto Rico, Virgin Islands or other U.S. territories or possessions in the Caribbean. (**Department of the Interior and the Governments of Puerto Rico and the Virgin Islands**).
- d. Introduction of non-native propagative plants or seeds for any purpose (*e.g.*, horticulture or botanical gardens) within the continental United States (**Department of Agriculture**).
- e. Introduction of non-native land animals for any purpose (*e.g.*, zoo animals, terrestrial pets, or food animals) within the continental United States (**Departments of Agriculture and the Interior**).
- f. Introduction of non-native fresh water organisms for any purpose (*e.g.*, fish stocks, live bait, aquarium fish, and aquaculture stock) within the continental United States (**Departments of Agriculture and the Interior, and the Environmental Protection Agency**).
- g. Introduction of non-native marine organisms into U.S. marine and estuarine waters for any purpose (*e.g.*, sport fish, aquaculture stock and biological control agents) within the continental United States (**Departments of Commerce and Agriculture**).

These projects are intended to test the effectiveness of processes and methods for potential screening systems and to promote acceptance by the private sector of future entry requirements. In the course of these projects the lead agencies and Council staff will evaluate needs for new legislation, regulation, infrastructure, and resources.

Unintentional Introductions

- By January 2003, the Council will implement a system for evaluating invasive species pathways and will issue a report identifying, describing in reasonable detail, and ranking those pathways that it believes are the most significant. The report will also discuss the tools, methods, and monitoring systems most useful for identifying pathways, including those that are emerging or changing, and for intervening and stopping introductions most efficiently.

C. Early Detection and Rapid Response

We cannot stop all introductions. However early detection of introductions and quick, coordinated response can eradicate or contain invasive species at much lower cost than long term control which may be infeasible or prohibitively expensive. For example, the State of Florida's Department of Environmental Protection spent \$15 million controlling just three well-established invasive aquatic plants (hydrilla, water hyacinth and water lettuce) in public waters in FY 1998-1999 (DEP unpublished data).

Unfortunately, inadequate planning, jurisdictional issues, insufficient knowledge and limited technology hamper early detection and rapid response. Invasive species must be detected and identified before they become widespread. No comprehensive national system is in place for detecting and responding to incipient invasions. Key elements needed in such a system are accessing current scientific and management information; facilitating identification; establishing a standard procedure for rapid risk assessment; providing a mechanism for coordinating efforts of Federal, State and local agencies, tribal governments and private entities; and providing adequate and stable funding for emergency response.

Actions Planned

Early Detection

- The Council will improve detection and identification of introduced invasive species by taking the following steps (subject to the availability of funds):
 - a. By January 2003, the Smithsonian Institution and the Departments of Agriculture, Commerce, and the Interior – in consultation with other members of the Integrated Taxonomic Information System – will compile a list of existing taxonomic experts in the United States and internationally. Contact information for such sources of taxonomic expertise will be given widespread distribution and posted on the Council’s website. The list will also identify current gaps in taxonomic expertise.
 - b. By January 2003, USDA – in consultation with the National Wildlife Health Center, NOAA, the Centers for Disease Control (CDC), the U.S. Public Health Service, and appropriate scientific societies – will initiate a research program for the development of new methods of detection for specific pathogens and parasites that may affect human, animal, or plant health.
 - c. By January 2004, USGS and ARS will develop a user-friendly means for identifying invasive species and providing information about species and invasions to Federal, State, tribal, and possibly local agencies. This initiative will be developed in consultation with the Council staff, Smithsonian Institution, U.S. Army Corps of Engineers, NOAA, and appropriate State agencies and will be made available at the Council’s website. In addition, the USGS will set up a notification procedure to forward information on introductions of known or suspected invasive species to appropriate Federal, State, tribal, and local agencies.
 - d. The Departments of the Interior, Agriculture, Commerce, and EPA will institute periodic surveying of selected locations where introductions of invasive species are most likely to occur (*e.g.*, ports, airports, railroads, highway rights-of-way, utility rights-of-way, logging and construction sites). The sites will be selected by January 1, 2003, and the first surveys of the sites will be completed by January 1, 2004. The surveys will be developed in cooperation with appropriate Federal, State, local, and tribal agencies.

Rapid Response

- The Council in coordination with other Federal, State, local and tribal agencies will develop a program for coordinated rapid response to incipient invasions. The following actions will be taken by July, 2003:
 - a. Interagency invasive species “rapid response” teams will be established based on taxonomic, ecosystem and regional priorities, and will include management and scientific expertise and coordinate with local and State efforts.
 - b. Methods will be developed and tested for determining which rapid response measures are most appropriate.
 - c. The Council will review and take appropriate action on opportunities for revisions in policies and procedures to expedite compliance with Federal and non-Federal regulations that apply to response actions (*e.g.*, Clean Water Act, National Environmental Policy Act, ESA). The potential actions reviewed will include, for example, advance approval for specific control techniques (*e.g.*, quarantine actions or pesticides), interagency agreements addressing jurisdictional and budget issues, and streamlining in general.
 - d. A guide will be prepared to assist rapid response teams and others. The guide will incorporate the methodology developed for response measures and guidance on regulatory compliance, jurisdictional and budget issues.
- In the course of FY 2003 budget development, the Council will prepare draft legislation to establish permanent funding for rapid responses to incipient invasions of non-native species. The draft legislation will propose multi-year spending authority and will pre-authorize funding for emergency responses.

D. Control and Management

Control and management of invasive species encompasses diverse objectives such as eradication, population suppression, limiting spread, and reducing effects. Eradication is not generally feasible for widespread invasive species. Zebra mussel control, for example, is focused largely on preventing clogging of water intake pipes at public utilities.

Integrated Pest Management (IPM) is an approach to control that flexibly considers available information, technology, methods and environmental effects. Methods include physical restraints (*e.g.*, fences and electric dispersal barriers); mechanical removal (*e.g.*, hand-pulling, burning and mowing); use of pesticides; release of biological control agents such as host-specific predatory organisms or pathogens; and interference with reproductive capacity (*e.g.*, pheromone-baited traps and release of sterile males). Often a combination of methods is used. Control of the phragmites reed in the Chesapeake Bay region, for instance, involves chemical control in some areas and mechanical removal in other areas containing vulnerable species. When invasive species appear to be permanently established, the most effective action may be to prevent their spread.

Because control actions have local effect, they are often carried out by or in cooperation with State or local agencies. Control across jurisdictional borders requires such cooperation. Adequate funding and public awareness are critical to success.

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Alligator weed: A Case Study in Biological Control

Alligator weed, a plant native to South America, made its first appearance in the United States about 1890. Within a few years, it was well established from Virginia to Florida and west to Texas. Populations also exist in California. This aquatic nuisance roots in shallow water and then forms dense floating mats of vegetation that expand rapidly over the water's surface and cause major problems for navigation, irrigation, and flood control.

Alligator weed was the first aquatic plant targeted for biological control research in this country. In 1959, the U.S. Army Corps of Engineers and the U.S. Department of Agriculture began a collaborative effort based on research conducted at a facility in Argentina. The Agriculture Department established the facility to search for potential agents to manage alligator weed.

Three insects—the Alligator weed flea beetle, Alligator weed stem borer, and Alligator weed thrips—were identified as potential biological controls. After host-specificity testing in Argentina and U.S. quarantine facilities, all three species were approved for use in this country. The first to be released was the flea beetle, which had an immediate effect on target alligator weed populations. The combined impact from the three agents was so dramatic that Florida curtailed the use of herbicides to control alligator weed just three years after the insects were released in that state. Australia, New Zealand, China, and Thailand also report success in using these insects as biological agents to control alligator weed. – Al Cofrancesco (U.S. Army Corps of Engineers)

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Actions Planned

- By FY 2003, significant additional funding should be provided for Federal agencies' control and management activities to reduce the spread of invasive species to neighboring areas and to lessen the impact of invasive species on natural areas.
- By November 2001, Council member agencies with responsibility for managing public lands and waters (*e.g.*, national forests and grasslands, national parks, national wildlife refuges, national marine sanctuaries, estuarine reserves, and military bases) will issue instructions to appropriate operating units for incorporating invasive species control in management plans for such areas.
- By February 2002, the Council will explore and as appropriate adopt sanitation and exclusion methods for preventing spread of invasive species (*e.g.*, restrictions on use of contaminated soils and fills, requiring pest-free forage and mulch and weed-free sod, and managing ballast water).
- By January 2003, the Council will develop and issue guidelines for ranking priority of invasive species control projects. The guidelines will provide for consultation with expert individuals and organizations, including as appropriate consultation with ANSTF, FICMNEW, CENR, and regional, State, tribal and local agencies.
- By January 2002, the Council will prepare draft legislation to authorize matching Federal funds for State programs to manage invasive species. The draft legislation will require preparation of comprehensive State invasive species management plans before funding can be approved. The

draft legislation will also include tax incentives or other provisions to encourage participation of private landowners in control programs.

- By January 2002, the Department of Agriculture, in consultation with regional, State, tribal and local agencies, will develop a proposal for accelerating the development, testing, and transfer of safe biological control agents and submit the proposal to the Council for review.
- By January 2002, EPA will develop and provide to the Council for review a proposal for cooperation with private industry to utilize current programs and to facilitate development, testing, transfer and training concerning use of environmentally compatible pesticides and herbicides in controlling invasive species.
- Federal agencies where appropriate should manage, in cooperation with State, local and private organizations, the edges of infested areas using IPM until long-term management strategies are developed for the core infestations.
- By January 2002, the U.S. Army Corps of Engineers will prepare a list of connecting waterways to prevent movement of aquatic species between watersheds and initiate a research program on methods to prevent such movement.

E. Restoration

Executive Order 13112 requires Federal agencies to “provide for restoration of native species and habitat conditions in ecosystems that have been invaded.” Without restoration, areas may become reinfested by the same or new invasive species.

Detailed site assessments and information on invasive species biology and ecology are needed before implementing control measures in natural areas. This assures understanding of factors affecting the success of restoration. Restoration techniques have improved markedly. Some terrestrial systems can be recovered to nearly natural states with attention to site preparation, hydrology, nutrient cycling, beneficial plantings, and monitoring the effects of disturbances such as fire and flooding. Restoration of aquatic systems has proven more difficult but is important to the recovery of ecosystem processes harmed by invasive species.

Actions Planned

- By July 2002, the Council will develop and issue recommendations and guidelines for Federal land and water management agencies to use where feasible in restoration activities following invasive species control. Among other things, these will:
 - a. Address restoration programs mandated by law (*e.g.*, natural disasters, oil and chemical spills, and acid mine drainage).
 - b. Identify the appropriate uses of native and desirable non-native species and encourage management practices that promote regeneration of native species.

- c. Develop and describe the best available techniques for restoring habitats such as arid and aquatic environments and highly eroded or disturbed sites for integration with biological control, and identify research needs for technique development.
- The Departments of Agriculture and the Interior will identify sources of propagation material for native species in the areas of restoration or reclamation projects and use propagation materials from local populations when practical in order to create market incentives. The Departments will plan to purchase native plant materials on a regular schedule for restoration activities and facilities management.
- By January 2002, the Council will prepare draft legislation to authorize tax incentives and otherwise encourage participation of private landowners in restoration programs. This will be prepared as part of the draft legislation described above for control activities.

F. International Cooperation

Invasive species are inherently a global problem that demands a global solution involving increased international cooperation. World trade has increased six-fold since 1950 and as the global economy continues to expand so does the potential for invasive species to be relocated to other countries, even other continents.

The ability of the United States to prevent invasive species from entering our country depends significantly on the ability of all countries to effectively manage the potential export of invasive species through multiple invasion pathways. Therefore, it is in our best interest to take a leadership role in the development of approaches for international cooperation; and building the capacity for other governments and international organizations to deal with the problems caused by invasive species.

Challenges to import restrictions are generally referred to the World Trade Organization (WTO), if agreement cannot be reached between the two parties. The WTO will generally uphold restrictions that are scientifically based and transparent in nature. Therefore, we must ensure that any requirements that are placed on trade in an effort to combat invasive species are based on scientifically conducted risk assessments and are transparent in nature.

A Department of State survey conducted in 1999 found that only a few countries consider invasive species a priority. Even when governments are concerned, many lack resources and expertise to respond effectively. However, governments and international conventions, treaties and other agreements have begun to address this issue. For example, the Convention on Biological Diversity (CBD) calls for governments to “prevent the introduction of, control or eradicate those alien (non-native) species which threaten ecosystems, habitats or species.”

Further, APHIS has been involved for years in many bilateral, regional, and global conventions and agreements dealing with invasive plant and animal species. Most significant at the global level is work with the WTO on the international *Application of Sanitary and Phytosanitary Measures*, which places constraints on a government’s power to regulate imports, with the objective of removing barriers to trade. USDA and other Council member agencies are also involved in developing global standards for protection from invasive plant and animal pests under the aegis of the International Plant Protection Convention (IPPC) and the Office International Des Epizooties (OIE).

Recognizing there are significant differences in the capacities and political will of countries to prevent and control the spread of invasive species, U.S. efforts to build international cooperation, capacity and standards or codes of conduct will focus on the following actions.

Actions Planned

- By June 2001, the Council will make recommendations for participation of the United States in the development of mutually supportive standards and codes of conduct within international conventions, agreements, organizations or programs addressing invasive species.
- By January of 2002, the Department of State, in conjunction with the Office of the U.S. Trade Representatives, will review current and prospective U.S. trade agreements, evaluate their implications for invasive species, and ensure that new trade agreements facilitate and avoid hindering a country's abilities to prevent the movement of invasive species.
- In 2002, the Department of State will provide assistance to the Global Invasive Species Programme to conduct an international series of awareness-raising regional workshops on invasive species. The outcomes of these workshops will include an increased global awareness of the issue and a regional strategy document on managing invasive species.
- In 2002, the Department of State will provide assistance to USGS' efforts to facilitate invasive species information collection and assessment in association with the Inter-American Biodiversity Information Network (IABIN) and the North American Biodiversity Information Network (NABIN).

G. Research

A successful invasive species program relies upon sound science. Both basic and applied research contributes to improved prevention and control. Research underpins many of the activities discussed in this Management Plan. For example, research assists policy makers in assessing gaps in authority and program policy and aids field managers in setting prevention and control priorities.

Basic research priorities include developing an understanding of the dynamics of the invasion process, predicting the likelihood of a non-native species' becoming invasive, determining ecological effects of invasions (including displacement of native species and disruption of ecological processes such as nutrient cycling and fire cycles), and predicting pathways of invasion. Applied research needs include developing and testing control and restoration methodologies, developing new technologies for ballast water management, and monitoring the introduction and spread of non-native species at both spatial and temporal scales.

The Committee on Environment and Natural Resources Research (CENR) of the White House Office of Science and Technology Policy identified invasive species as a priority focus for integrated ecosystems research. It stressed the importance of sustained research programs that direct research based upon the needs determined by land and water managers and the need to strengthen core long-term resources essential for building basic understanding of invasion biology and predictive capacity for reducing invasive species impacts. CENR has emphasized that, while the Federal government has the scientific capacity to address many of the research needs, core research programs are substantially underfunded. They have also pointed out the need for coordination of research among Federal agencies and some standardization in data management.

Actions Planned

- As part of the cross-cutting budget proposal for FY 2003, the Council will include an initiative to adequately fund Federal research needs. The Council will prepare the initiative in consultation with the Invasive Species Advisory Committee, Smithsonian Institution, National Science Foundation and CENR. In addition to addressing applied research needs, the proposal will address basic research issues such as:
 - a. Studies in source and receiving countries to compare biological and ecological factors predisposing new invasions, because invasion of similar habitats in other countries is often a predictor of potential invasiveness;
 - b. Investigation of lag periods between initial establishment and invasion outbreaks and assessment of epidemiological approaches to aid control and eradication;
 - c. How invasive species influence populations of native species and lead to habitat alteration and loss of native biodiversity; and
 - d. How invasive species alter water chemistry, nutrient cycling, and disturbance regimes such as fire cycles.

- By July 2002, the Council, the Smithsonian Institution, and the National Science Foundation, utilizing input from CENR will prepare a proposal for establishing long-term and short-term basic and applied science capacity for invasive species. The proposal will address research, monitoring, information sharing (including mapping), assessment, control, and restoration. The proposal will identify personnel and resources needed to sustain fundamental research and tactical, or field-level, scientific support, including the following:
 - a. Improving Federal agency core research capability;
 - b. A competitive grants program and mechanisms for cooperative support of research by public and private universities, Federal and State governments, and the private sector;
 - c. An interagency national invasive species research program to assist with managing government funds dedicated to invasive species research; and
 - d. A multi-sector research steering committee.

- By July 1, 2001, the Council, in coordination with Smithsonian Institution, National Science Foundation, the ANSTF, and CENR will produce a catalog of existing aquatic and terrestrial control methods and propose a system to classify their effectiveness in different habitats of the United States, including recommended cost and effectiveness monitoring protocols for use by field personnel. The catalog should include the following information:
 - a. validation methods to measure and report removal efficiency, cost-effectiveness, safety, and practicality under real-world conditions;

- b. treatments and effectiveness measurement protocols; and
 - c. adaptive management measures for field personnel which base predictive models for invasiveness and priority setting on clearly delineated biological and ecological factors.
- By January 1, 2007, the Department of Agriculture will upgrade its National Veterinary Science Laboratory on Plum Island to a higher biosafety level which will focus on invasive animal diseases capable of being transmitted to humans. Such facilities currently exist abroad in Canada, Australia, and France.

H. Information Management

The Council is charged with establishing a coordinated, up-to-date information-sharing system emphasizing the Internet. The Council is also to develop a coordinated network for documenting, evaluating, and monitoring impacts from invasive species on the economy, the environment, and human health. Despite a wealth of information about invasive species, incompatible database formats and contradictory sources impede information sharing. Computer technology will help to meet this challenge. However, in many parts of the United States and other countries, scarce computer resources demand lower-tech solutions and programs to increase access to technology.

The Council is currently developing an information "gateway" accessible through the Council's website on the Internet – *www.invasivespecies.gov*. Information about the Council, Council staff, the Council's activities, and other related material will be supplemented by a listing of the invasive species each Federal Department regulates.

The Council staff plan to develop a user-friendly map enabling visitors to the website to click on their State or county and learn about the invasive species living there, what is being done to control or eradicate them, and how the individual can help. Another feature will provide an inventory of invasive many species present in the United States. Clicking on any one of those species profiles will eventually lead to extensive information as well as links to the websites of governmental and non-governmental entities that are engaged in preventing the introduction and spread of invasive species. The site is now in operation, but extensive work is ongoing to add additional information and database links to the site.

Actions Planned

- By January 2002, the Departments of Interior, Agriculture, and Commerce and the Environmental Protection Agency and U.S. Army Corps of Engineers will develop guidance for managing information concerning invasive plants and animals in aquatic and terrestrial environments. The guidance will be developed in consultation with the Advisory Committee, FICMNEW, ANSTF, CENR and Smithsonian Institution and will address:
- a. current and emerging technologies for information collection and dissemination, including low-cost tools for wide distribution;
 - b. standard protocols for information collection and sharing, including inventory and mapping, monitoring and assessment of invasive species populations; and

- c. contacts and means – including those of the Council – for sharing information with local, State, tribal, Federal, and international agencies, non-governmental organizations and interests, and private citizens.
- On a continuing basis, the Council will maintain and enhance its website, www.invasivespecies.gov, with the involvement of State, tribal, and local governments; regional compacts; non-government organizations; the private sector; and the public at large. The long-term goal is to provide accessible, up-to-date, comprehensive, and comprehensible information on invasive species that will be useful to managers, scientists, policy-makers, teachers, students, and any others interested in the subject.
- By July 2001, the Council will post and maintain on the Council's website "case studies" highlighting successful regional, statewide, local, and international management practices for possible emulation elsewhere.
- By January 2002, the Council will include a locator for occurrences of invasive species in the United States by county.
- By January 2003, the Council will be linked to all major U.S. databases, most state information networks that deal with invasive species, and websites in all nations that have active invasive species programs, particularly those cooperating with the Global Invasive Species Programme.
- By November 2001, the Council will develop and secure implementation of a memorandum of understanding among appropriate Federal Departments to establish an invasive species assessment and monitoring network comprised of on-the-ground managers of Federal invasive species programs. The network leadership, in conjunction with Council staff, will work with appropriate Federal, State and local agency personnel to implement the monitoring recommendations in this plan.

I. Education and Public Awareness

We are all adversely impacted by invasive species but may not be aware of the problem. Strategies to reduce those negative impacts must communicate to individuals the relationship between actions that facilitate or prevent invasions and the quality of our lives. Many such actions are personal. This public understanding complements and underpins governmental programs and is a cornerstone of effective action.

The Order directs Federal agencies to promote public education on invasive species and the means to address them. A key strategy is to inform specific user groups, such as boaters, fishers, plant buyers and pet owners, about what they can do to prevent harm. For example, zebra mussels, Eurasian watermilfoil, and hydrilla are just a few of the invasive species that watercraft users can spread if they're not careful. Boaters need to know how to clean their boats, as well as the correct cleaning techniques to use.

Education and public awareness strategies should be based on practical management objectives and a sound understanding of how people respond to information. The strategies should communicate the impacts that invasive species have on people's health, safety, and quality of life (*e.g.*, income, cost of

living, food, physical comfort, recreational opportunities and cultural values) as well as impacts on biodiversity.

An effective Federal communication strategy will build support for domestic and international actions and policies addressing invasive species, and should be coordinated with and complement communications efforts of other organizations and non-Federal agencies in the United States as well as other national governments and international organizations.

A successful communication strategy must address the challenge of getting information to decision makers and program managers in a timely manner and providing long-term funding, staffing, and appropriate infrastructure. The strategy must also a credible monitoring and evaluation process, to assure to current objectives are met and future needs are addressed.

The Council will coordinate development and implementation of national public awareness campaign emphasizing public and private partnerships. The campaign will be initiated after available resources are assessed and target audiences identified, and will include these actions:

Actions Planned

- By January 2002, the Departments of Agriculture and the Interior, consulting with ANSTF and FICMNEW, and other State, local and tribal organizations, will compile a comprehensive assessment of current invasive species communications, education, and outreach programs. The assessment will evaluate the strengths and weaknesses of the major programs and identify new initiatives for reaching target audiences more effectively. The information will be disseminated through the Council's website.
- By December 2001, the Council will develop and complete a public survey of attitudes and understanding concerning invasive species issues. The survey will establish a baseline for determining the success of communications strategies. This will be accomplished by using knowledge gained through social science research and contracting with entities such as the National Environmental Education Training Foundation, which conducts an annual Roper survey of public opinions and understanding of environmental issues, or other appropriate organizations.
- By January 2002, the Department of Commerce's National Sea Grant Program and the Department of Agriculture's CSREES and FS will develop (in consultation with NPS, FWS, BLM, and the Army Corps of Engineers) a model public awareness program that incorporates national, regional, State, and local level invasive species public education activities, including a plan for testing the model over the next year. The model should: a) identify key messages; b) identify the critical target audiences, accounting for the diversity of economic and social interests and backgrounds and languages in the United States; c) determine which combination of delivery techniques work best and key actions target audiences can take; d) provide training materials and a plan to initiate training; e) provide for public and private partnerships; f) include measures for evaluating program effectiveness of the program; g) identify contacts for potential professional support; and h) budget for implementation of new and ongoing programs.

CONCLUSION

The National Invasive Species Management Plan is intended to present an ambitious, yet “doable” blueprint for addressing the serious impacts of invasive species. Although the Plan provides the framework, the more important and difficult step will be implementation. To implement this plan, the Council will assist member Agencies and Bureaus as they step down the current recommendations and integrate them into existing or revised plans. This will be the Council’s immediate and highest priority.

The Council recognizes that many Federal agencies and interagency groups, including the ANSTF, FICMNEW, CENR, and others have prepared plans on invasive species. Similarly, the plans prepared by State and local entities (*i.e.*, weed management districts) provide an opportunity for Federal agencies to coordinate their planning efforts with local and regional actions as we implement this first Management Plan.

In addition, the Council will continue to develop an information-sharing network, using its website. The goal is to provide a “gateway” to Federal information and a link to non-federal sources for better communication of State, local, and regional priorities and data. The integration of these multiple levels of planning and information will be an important coordination tool.

In the past, it was common to view individual invasive species and geographic areas in isolation. This approach, and the lack of a coordinated strategy, has contributed to the problems we face today. With a global economy, increasing demand for foreign products, increased mobility, and more accessibility to distant locations, former methods of dealing with invasive species are no longer adequate. By adopting a comprehensive plan and coordinating our efforts, we can meet the challenge of the “silent” invasion and protect our lands and waters for the benefit of everyone.

Appendix 1: Executive Order 13112 and Guiding Principles

Executive Order 13112 of February 3, 1999

Invasive Species

By the authority vested in me as President by the Constitution and the laws of the United States of America, including the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*), Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended (16 U.S.C. 4701 *et seq.*), Lacey Act, as amended (18 U.S.C. 42), Federal Plant Pest Act (7 U.S.C. 150aa *et seq.*), Federal Noxious Weed Act of 1974, as amended (7 U.S.C. 2801 *et seq.*), Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*), and other pertinent statutes, to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause, it is ordered as follows:

Section 1. Definitions.

(a) "Alien species" means, with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.

(b) "Control" means, as appropriate, eradicating, suppressing, reducing, or managing invasive species populations, preventing spread of invasive species from areas where they are present, and taking steps such as restoration of native species and habitats to reduce the effects of invasive species and to prevent further invasions. "

(c) "Ecosystem" means the complex of a community of organisms and its environment.

(d) "Federal agency" means an executive department or agency, but does not include independent establishments as defined by 5 U.S.C. 104.

(e) "Introduction" means the intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity.

(f) "Invasive species" means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

(g) "Native species" means, with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

(h) "Species" means a group of organisms all of which have a high degree of physical and genetic similarity, generally interbreed only among themselves, and show persistent differences from members of allied groups of organisms.

(i) "Stakeholders" means, but is not limited to, State, tribal, and local government agencies, academic institutions, the scientific community, nongovernmental entities including environmental, agricultural, and conservation organizations, trade groups, commercial interests, and private landowners.

(j) "United States" means the 50 States, the District of Columbia, Puerto Rico, Guam, and all possessions, territories, and the territorial sea of the United States.

Sec. 2. Federal Agency Duties. (a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law.

(1) identify such actions;

(2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally

sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and

- (3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

(b) Federal agencies shall pursue the duties set forth in this section in consultation with the Invasive Species Council, consistent with the Invasive Species Management Plan and in cooperation with stakeholders, as appropriate, and, as approved by the Department of State, when Federal agencies are working with international organizations and foreign nations.

Sec. 3. *Invasive Species Council.* (a) An Invasive Species Council (Council) is hereby established whose members shall include the Secretary of State, the Secretary of the Treasury, the Secretary of Defense, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Transportation, and the Administrator of the Environmental Protection Agency. The Council shall be Co-Chaired by the Secretary of the Interior, the Secretary of Agriculture, and the Secretary of Commerce. The Council may invite additional Federal agency representatives to be members, including representatives from subcabinet bureaus or offices with significant responsibilities concerning invasive species, and may prescribe special procedures for their participation. The Secretary of the Interior shall, with concurrence of the Co-Chairs, appoint an Executive Director of the Council and shall provide the staff and administrative support for the Council.

(b) The Secretary of the Interior shall establish an advisory committee under the Federal Advisory Committee Act, 5 U.S.C. App., to provide information and advice for consideration by the Council, and shall, after consultation with other members of the Council, appoint members of the advisory committee representing stakeholders. Among other things, the advisory committee shall recommend plans and actions at local, tribal, State, regional, and ecosystem-based levels to achieve the goals and objectives of the Management Plan in section 5 of this order. The advisory committee shall act in cooperation with stakeholders and existing organizations addressing invasive species. The Department of the Interior shall provide the administrative and financial support for the advisory committee.

Sec. 4. *Duties of the Invasive Species Council.* The Invasive Species Council shall provide national leadership regarding invasive species, and shall:

(a) oversee the implementation of this order and see that the Federal agency activities concerning invasive species are coordinated, complementary, cost-efficient, and effective, relying to the extent feasible and appropriate on existing organizations addressing invasive species, such as the Aquatic Nuisance Species Task Force, the Federal Interagency Committee for the Management of Noxious and Exotic Weeds, and the Committee on Environment and Natural Resources;

(b) encourage planning and action at local, tribal, State, regional, and ecosystem-based levels to achieve the goals and objectives of the Management Plan in section 5 of this order, in cooperation with stakeholders and existing organizations addressing invasive species;

(c) develop recommendations for international cooperation in addressing invasive species; develop, in consultation with the Council on Environmental Quality, guidance to Federal agencies pursuant to the National Environmental Policy Act on prevention and control of invasive species, including the procurement, use, and maintenance of native species as they affect invasive species; (e) facilitate development of a coordinated network among Federal agencies to document, evaluate, and monitor impacts from invasive species on the economy, the environment, and human health;

(f) facilitate establishment of a coordinated, up-to-date information-sharing system that utilizes, to the greatest extent practicable, the Internet; this system shall facilitate access to and exchange of information concerning invasive species, including, but not limited to, information on distribution and abundance of invasive species; life histories of such species and invasive characteristics; economic, environmental, and human health impacts; management techniques, and laws and programs for management, research, and public education; and

(g) prepare and issue a national Invasive Species Management Plan asset forth in section 5 of this order.

Sec. 5. *Invasive Species Management Plan.* (a) Within 18 months after issuance of this order, the Council shall prepare and issue the first edition of a National Invasive Species Management Plan (Management Plan), which shall detail and recommend performance-oriented goals and objectives and specific measures of success for Federal agency efforts concerning invasive species. The Management Plan shall recommend specific objectives and measures for carrying out each of the Federal agency duties established in section 2(a) of this order and shall set forth steps to be taken by the Council to carry out the duties assigned to it under section 4 of this order. The Management Plan shall be developed through a public process and in consultation with Federal agencies and stakeholders.

(b) The first edition of the Management Plan shall include a review of existing and prospective approaches and authorities for preventing the introduction and spread of invasive species, including those for identifying pathways by which invasive species are introduced and for minimizing the risk of introductions via those pathways, and shall identify research needs and recommend measures to minimize the risk that introductions will occur. Such recommended measures shall provide for a science-based process to evaluate risks associated with introduction and spread of invasive species and a coordinated and systematic risk-based process to identify, monitor, and interdict pathways that may be involved in the introduction of invasive species. If recommended measures are not authorized by current law, the Council shall develop and recommend to the President through its Co-Chairs legislative proposals for necessary changes in authority.

(c) The Council shall update the Management Plan biennially and shall concurrently evaluate and report on success in achieving the goals and objectives set forth in the Management Plan. The Management Plan shall identify the personnel, other resources, and additional levels of coordination needed to achieve the Management Plan's identified goals and objectives, and the Council shall provide each edition of the Management Plan and each report on it to the Office of Management and Budget. Within 18 months after measures have been recommended by the Council in any edition of the Management Plan, each Federal agency whose action is required to implement such measures shall either take the action recommended or shall provide the Council with an explanation of why the action is not feasible. The Council shall assess the effectiveness of this order no less than once each 5 years after

the order is issued and shall report to the Office of Management and Budget on whether the order should be revised.

Sec. 6. *Judicial Review and Administration.* (a) This order is intended only to improve the internal management of the executive branch and is not intended to create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies, its officers, or any other person.

(b) Executive Order 11987 of May 24, 1977, is hereby revoked.

(c) The requirements of this order do not affect the obligations of Federal agencies under 16 U.S.C. 4713 with respect to ballast water programs.

(d) The requirements of section 2(a)(3) of this order shall not apply to any action of the Department of State or Department of Defense if the Secretary of State or the Secretary of Defense finds that exemption from such requirements is necessary for foreign policy or national security reasons.

WILLIAM J. CLINTON
THE WHITE HOUSE,
February 3, 1999

Guiding Principles

In addition, the Advisory Committee and the Council adopted a set of guiding principles to shape the development of the Management Plan. They provide the general scope and direction for the specific actions to be taken under the invasive species management plan. By reflecting the values and experience of a diversity of stakeholders, they are intended to support efforts to prevent and control the invasive species at local, State, national, and international scales.

Guiding Principle #1 - Take action now.

Many alien species are non-invasive and support human livelihoods or a preferred quality of life. Only those alien species that cause substantial, negative impacts to the environment, economies, and human health fall under the scope of the Invasive Species Council.

Introductions by invasive species can be a consequence of human activities such as trade, travel, and alteration of the environment. Changes in human values, beliefs, and behavior are necessary to alleviate the introduction and spread of invasive species.

In order to protect food, health, and the environment we must now take strategic action to reduce the impacts of invasive species.

Guiding Principle #2 - Be cautious and comprehensive.

Invasions are often unpredictable: caution is warranted in the intentional and unintentional relocation of all non-native organisms.

An effective management strategy for invasive species integrates information exchange, public education, prevention, early detection, rapid response, scientifically informed control, and restoration.

A comprehensive strategy for preventing the introduction and spread of invasive species addresses intentional, unintentional, authorized, and unauthorized movement of organisms among and within countries.

In order to be effective, national and international goals and actions relevant to the management of invasive species need to be congruent, integrated, and mutually supportive.

Policies that address the problem of invasive species will be most effective if they are consistently applied (across pathways, means of invasion and invaders) are comprehensive in scope, and take in the consideration of all stakeholders.

Guiding Principle #3 - Work smart, be adaptive.

Efforts to manage invasive species are most-effective when: (1) they have goals and objectives that are clearly defined and prioritized; and they are (2) proactive rather than reactive; (3) based on current biological, social, and economic information; (4) applied rapidly, even when a reasonable degree of uncertainty is present; and (5) benefit a diversity of stakeholders.

The impacts of invasive species can be significantly reduced if stakeholders work cooperatively to: (1) undertake applied, interdisciplinary research, (2) develop and apply technologies to prevent and control invasive species, and (3) incorporate these advances into management and policy decision making.

A system to coordinate and integrate information of invasive species is desirable, as is an organized approach to disseminating data and ensuring that management strategies evolve based on new

information.

Guiding Principle #4 - Find balance.

The prevention and management of invasive species can support economic growth and sustainable development and should be incorporated into policies to meet these objectives.

Develop policies and incentive programs that encourage voluntary cooperation of public agencies, States, and all other stakeholders. Back these measures with effective enforcement authorities and capabilities.

Strive for control methods that are scientifically, socially, culturally, and ethically acceptable and provide the desired affect on the target organism while minimizing the negative impact on the environment.

Guiding Principle #5 - Pull together.

The current capacities of the United States to prevent and manage invasive species are often fragmented, inefficient, and lack sufficient enforcement. Coordination and an effective regulatory framework are required at the Federal level, and a complementary, flexible approach is needed to address the complex, broad needs of stakeholders at more local levels.

Cooperative relationships among Federal, State, and county governments, as well as other stakeholders, need to be encouraged and supported to ensure the development and implementation of an effective invasive species prevention and control program nationwide.

The United States needs to raise the profile of the invasive species issue, provide leadership in the management of invasive species, share information and technologies, and contribute technical assistance to address the problem on a global scale.

Guiding Principle #6 - Be inclusive, meet specific needs.

Everyone has a stake in the management of invasive species and therefore needs to be involved in efforts to address the problem.

Education and outreach programs on invasive species will be most effective when they target the information needs and interests of specific audiences, indicate that positive progress can be made, and recommend specific actions. Stakeholder involvement can be expanded by communicating the inter-relationships between invasive species and quality of life issues, and by delivering a consistent message through a diversity of messengers and media.

Appendix 2: Federal Roles and Responsibilities

Appendix 2 provides additional information about Federal programs dealing with invasive species, and is intended to supplement the chapter on Federal Roles and Responsibilities of the Plan. Although it is more detailed, it does not represent a complete list of all programs pertaining to invasive species. It is organized according to the overall goal of the effort, including: prevention, control and management, international measures, and education and outreach.

Prevention

Department of Agriculture

One of USDA's research arms, ARS, provides research in support of its regulatory and action agency partners, in particular by identification of species collected at ports of entry.

Department of Defense

The Defense Transportation Regulation provides direction for the routine maintenance and washing of vehicles after field operations to remove mud/particulate matter which, in addition to extending the life of the vehicle, also prevents introduction of invasive or exotic species. The regulation requires conformance to customs requirements for international transport. The Department of Defense's Medical Service Quarantine Regulations are intended to prevent the introduction and dissemination, domestically or elsewhere, of diseases of humans, plants or animals, prohibited or illegally taken wildlife, arthropod vectors, and pests of health and agricultural importance.

Early Detection and Rapid Response

Department of Agriculture

ARS provides research in support of its regulatory and action agency partners by confirming identifications of invasive species, developing eradication technology, and taking part in rapid response teams.

Natural Resource Conservation Service (NRCS) provides information on invasive and noxious plants through the PLANTS website (<http://plants.usda.gov>). NRCS field office staff also work with the Cooperative extension to disburse information on invasive species and their control. The NRCS National Plant Data Center has developed an alpha version of an automated plant identification tool that permits users to identify plant species. Wetland plant and grass data have been developed cooperatively for this tool by the USFWS, NRCS, EPA, Corps of Engineers, North Carolina Botanical Garden-Biota of North America Program, and the University of Northeastern Louisiana. An interagency effort to develop invasive plant data for this tool would assist field staff immensely. Also, NRCS, FS and APHIS are cooperating to develop a module on the PLANTS website that will enable professionals and the public to review known distributional data and submit new county records, including their supporting data. These records will be funneled back through the Early Detection and Rapid Response network to the field level.

Control, Management and Restoration

Department of Agriculture

FS manages 191.6 million acres and *Stemming the Invasive Tide, the Forest Service Strategy for noxious and non-native invasive plant management*, lays out priorities of prevention, eradication and control. FS has authority to control Federal and State listed noxious weeds as well as invasive plants deemed to cause environmental or economic damage through local forest and grassland management plans. FS also manages forest pests on National Forest System lands and provides funding, technical assistance and advice for insect and disease control on private lands as well as cost share and grant programs. FS has direct authority to control invasive plants in the Pacific Islands. The Wyden Amendment (temporary authority) allows Federal funds to be used on lands adjoining Federal lands. FS timber sale contracts and service have requirements to lessen risk of spread of “unwelcome” species.

USDA initiated the cooperative Boll Weevil Eradication Program in 1983. The program is designed to eliminate the cotton boll weevil, an invasive pest that has plagued the U.S. cotton industry for over 100 years. Moving in a series of sequential expansions across the southern cotton-producing states, the program is scheduled for completion in 2005. The cooperative program involves USDA, the States, and cotton growers – usually organized into statewide or regional foundations. USDA provided the initial program management and direction, but as the program matured and demonstrated its ability to succeed, cotton growers assumed greater responsibility for daily program operations. USDA-APHIS continues to provide technical support and limited cost-share funding (5% in 2000) along with FSA-sponsored low interest loans. Regulatory authority for the program rests with the participating States.

ARS provides research in support of its land management agency partners by developing integrated pest management programs, emphasizing biologically based approaches where possible, and incorporating restoration, revegetation and rehabilitation of ecosystems where appropriate. Restoration is particularly important to integrate with biological control of weeds programs. ARS now requires this integration for their biological control of weeds programs.

Department of Defense

The Department of Defense (DOD) manages over 25 million acres of lands within military installations. DOD controls and manages invasive species in accordance with the individual plans governing each installation or base. The goals of DOD’s Invasive Species Management Program are prevention, control of invasive species present on DOD installations, and restoration using native plants. The Environmental Conservation Program addresses ecosystem management and biodiversity conservation, emphasizing related goals of maintaining and restoring native ecosystems, as well as viable populations of native species and maintaining ecological processes. The instruction also addresses integrating ecosystem conservation considerations into marine and oceangoing operational plans. DOD’s Pest Management Program establishes and assigns responsibilities for a safe, effective, and environmentally sound integrated pest management program for the prevention or control of pests and disease vectors that may adversely impact readiness or military operations by affecting health of personnel or damaging structures, materiel or property. The directive requires compliance with applicable U.S. statutes, regulations, Executive Orders, binding international agreements, other legal requirements, and U.S. environmental, safety, occupational health, explosives safety, fire and emergency services, and pest management policies.

The U.S. Army Environmental Center and the Army Corps of Engineers Laboratories (working with the Installation operators) have developed an Integrated Training Area Management (ITAM) Program for restoration. They engage contractors to restore training areas and protect them from erosion, loss of endangered species habitat, and degradation of land resources for training, which in turn may help such areas resist establishment by invasive species. Through this program and the National Defense Industrial Association, DOD can assist in restoration efforts.

The U.S. Army Corps of Engineers (CE) has a number of control programs, including the Aquatic Plant Control Program, Zebra Mussel Program, and the Removal of Aquatic Growth Program. It is also authorized to implement a 50% Federal / 50% local cost arrangement with State and local governments for managing nuisance aquatic plants in waterways not under the control of the CE or other Federal agencies.

Department of the Interior

BLM focuses primarily on controlling invasive plants which has been identified as a top priority for the agency (Congressional Research Service 1999) and has implemented an action plan, called Partners Against Weeds to prevent and control the spread of noxious weeds on public lands. APHIS regulates animal pests on BLM land under a memorandum of understanding between the two agencies.

NPS manages more than 83 million acres, and approximately 200 parks have identified exotic species as an important resource management threat. NPS Management Policies prohibit the introduction of exotic invasive species to a few situations and requires the use of an Integrated Pest Management approach to remove or control exotic species on NPS units. As part of its regulation of fishing in park units, NPS prohibits the use of most bait fish (live or dead), except in specially designated waters in order to reduce the likelihood of the introduction or spread of invasive species.

FWS has multiple programs to address management and control of invasive species. The FWS works with ANSTF and leads efforts to develop and implement cooperative plans to manage and control infestations of aquatic nuisance species across the country. The National Wildlife Refuge System has invasive species teams that are currently reviewing strategies and recommending potential pilot projects involving invasive species. In addition, invasive species issues are being included within comprehensive conservation plans that are being written for refuge units. The FWS also has several habitat restoration programs that restore habitat degraded by invasive species as part of their overall habitat restoration activities.

With a projected budget for FY 2001 of \$402,000, the Bureau of Reclamation (BOR) is responsible for programs that control invasive species that infest water systems, including reservoirs, rivers, distribution canals, etc. Species such as zebra mussels, Chinese mitten crabs, hydrilla and water hyacinth obstruct water flow, reduce recreational access and can cause structural damage. BOR manages invasive species through its Integrated Pest Management Program under its basic operation and management authority and various reclamation-enabling statutes and directives.

Research and Monitoring

Department of Agriculture

ARS plays a critical role in conducting research on the prevention, eradication and control of agricultural invasive species. ARS is also responsible for evaluating new agricultural nonindigenous species before they can be commercially distributed. ARS has established new research partnerships for

integrated management of invasive species through its areawide pest management program, in which partnerships with Federal, State and local groups are developed. ARS also provides leadership in developing biological control technologies for invasive species, including foreign exploration for natural enemies of the pests, risk assessment and host-specificity testing of high-priority candidate biological control agents, field release and evaluation, and restoration, revegetation and rehabilitation of affected areas. ARS budgeted \$70 million for this effort in FY 1999.

FS has a research branch focused on issues of environmental concern to forests, rangelands and wetlands. FS is the lead research agency for invasive insects, diseases and pathogens which affect forest, and is actively engaged in research of invasive species on range and grasslands. FS has an active biological control research program with foreign exploration supporting domestic projects. FS also supports technology development for control, monitoring and restoration.

Department of Commerce

NOAA has a major role in research regarding invasive aquatic species under the Nonindigenous Aquatic Nuisance Prevention and Control Act. NOAA's Sea Grant program manages a competitive research grant program for all aspects of aquatic nuisance species issues, including for the development of ballast water management technology. Under the program, research projects cover a wide range of issues from prevention to control to ecological monitoring. Funding for this program, which includes outreach, has averaged about \$2.8 million per year.

Department of Defense

The U.S. Army Corps of Engineers (CE) has a number of research programs focused on invasive species. The Aquatic Plant Control Research Program (APCRP) has provided effective, economical, and environmentally compatible technologies for identifying, assessing and managing aquatic plant problems for over 30 years. The Zebra Mussel Program is the only federally authorized research program for zebra mussel control.

Department of the Interior

The USGS program on Biological Research and Monitoring of Invasive Species is a research program that emphasizes areas administered by DOI and regions that are particularly threatened by invasive species (such as Hawaii, western rangelands, wetlands, the Great Lakes and eastern waterways). The program deals with the following elements: identification and reporting of new invasions and assessment of environmental risks; monitoring methods; determination of the effects of invasive species and the susceptibility of habitats to invasions; control approaches and methods; and development of regional and national invasive species information systems. USGS has also worked in partnership with the National Agricultural Library (NAL) to assist in the development of the Council's website, discussed in Section 3 of the Plan.

NPS is establishing 32 inventory and monitoring networks throughout the Service. The parks within each network are linked geographically and share natural resource characteristics. These networks will provide the parks with inventory and monitoring capabilities for priority needs within each network. Most of these networks have identified exotic or invasive species monitoring as a high priority need.

Environmental Protection Agency

EPA has a number of research and monitoring programs that can be modified to contribute to the overall assessment of invasive species. Two examples are the Environmental Monitoring and Assessment Program (EMAP) and Regional Vulnerability (ReVA).

International Measures

Department of Agriculture

APHIS is involved in a number of bilateral, regional, and global plant and animal international conventions and agreements that deal with invasive species. Most significant at the global level is APHIS involvement with the World Trade Organization on the international *Application of Sanitary and Phytosanitary Measures*, which covers measures adopted to protect plant or animal life or health which may affect international trade. A number of global standards for protection from invasive plant pest are currently under development (via International Plant Protection Convention) and for protection from invasive animal pests (via the Office International Des Epizooties) is currently taking place.

ARS works in partnership with international groups with common interests in invasive species, including Agriculture and Agri-Food Canada; CABI Bioscience, UK; Commonwealth Scientific and Industrial Research Organization, Australia; EMBRAPA, Brazil; North American Plant Protection Organization; International Organization for Biological Control; and others. ARS manages six overseas biological control laboratories (France, Italy, Greece, Australia, China and Argentina), which facilitate foreign exploration for natural enemies of invasive species. This extensive network of contacts allows ARS to respond quickly to discoveries of new invasive species.

FS International Programs (IP) focus on control and prevention of the high priority invasive species of forests affecting the United States. Activities include; leading and coordinating international efforts in FS, linking planned and ongoing international activities of other Government and non-Government organizations both internationally and domestically, and providing limited financial support for appropriate partners primarily to build and support initial projects. The budget for invasive species for FY 2000 is \$1.5 million, which focuses on biological and chemical control of the Asian long-horned beetle, kudzu, mile-a-minute weed, and beech bark scale. FS IP also supports projects to help assess, current and potential plant species affecting the Pacific Islands and to provide this information to agricultural and customs inspectors in those countries, providing a first line of defense to invasions into Hawaii, Guam and Compact countries.

Department of Defense

DOD has provided support to the South Pacific Regional Environmental Program (SPREP) and has developed bilateral and trilateral agreements with allied nations' defense departments regarding invasive species.

Department of the Interior

FWS is working to initiate grant funding to support the development of the Global Invasive Species Database and Emergency Response System, with a focus on risk assessment and intentionally imported live animals and plants. FWS has also shown leadership in working with CITES to include

intentional trade in live animals and plants, and the invasive risks associated, on the agenda of several CITES meetings. A decision on this issue was adopted by the CITES Party countries and will be on the agenda of upcoming scientific and technical meetings, including a meeting of the CITES Animals and Plants Committees to be held in the U.S. in December 2000 (hosted by FWS).

Department of State

DOS's Bureau of Oceans and International Environmental and Scientific Affairs coordinates international aspects of invasive species. The key goals of this program are: raising international public awareness; improving international communications, access to information; and supporting technical and expert assistance as needed, given available resources. DOS works closely with multilateral organizations such as GISP, CBD, CITES and the IMO. GISP held the second of two meetings in South Africa in September 2000 to decide on the second phase of its program, and DOS participated.

Interagency Group

Under the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA), the Great Lakes basin became the first geographic location where Federal legislation established a regulatory regime that targeted the prevention of aquatic nuisance species introductions carried in ballast water. A Great Lakes program developed to implement and enforce U.S. regulations, as required through mandatory compliance with NANPCA, was enacted in May, 1993. These regulations stipulate that vessels bound for the Great Lakes exchange freshwater ballast with open-ocean salt water that contains organisms not likely to survive in freshwater. They are enforced by the Canadian Coast Guard and Seaway authorities. Also, since 1956, the governments of the U.S. and Canada, working jointly through the Great Lakes Fishery Commission, have implemented a sea lamprey control program to reduce the impacts of this harmful invader.

Public Outreach and Partnership Efforts

Department of Agriculture

NRCS administers the Environmental Quality Incentive Program (EQIP), the Wildlife Habitat Improvement Program (WHIP), and Wetlands Reserve Program (WRP) which distribute monies to priority projects at the State level. Invasive species is one of the fundable topic areas. NRCS also is the major natural resource conservation information provider to private landowners, including invasive species information. The NRCS PLANTS website (<http://plants.usda.gov>) provides a single site for integrated State noxious weed lists, invasive plant lists, links to key sources of weed species biology and management information throughout the United States and the world, and Plant Guides used for restoring native plant communities. APHIS and USGS are cooperating with NRCS to expand the invasive plant information available through PLANTS, which receives over 1.3 million hits a month by users of plant information. PLANTS will exhibit APHIS information on key foreign species that are high threats targeted for exclusion.

FS administers a number of programs through Cooperative Programs that assist partnerships and encourage forest stewardship for non-industrial forest landowners, including control of invasive species. The Forest Stewardship Program that provides professional expertise and advice and the Stewardship Incentive Program which provides cost-share support private non-industrial forest landowners in

implementing Forest Stewardship Plans. Other FS programs also provide technical assistance and educational technology transfers to partners.

The Farm Service Agency helps farmers identify and control noxious weeds and invasive plant species on farmland enrolled in the Conservation Reserve Program. Private landowners and agricultural producers enrolled in the CRP are responsible for controlling noxious weeds and invasive plant species on their respective CRP acreage.

CSREES has a competitive grants program that targets integrated activities, such as research, education and extension, and multi-state (regional) approaches to invasive species problems. This program was funded for one year only for \$5.5 million. Of the 86 proposals that were received, only four were funded.

ARS' area-wide pest management programs provide about \$1 million per year for five years to transfer technology to manage invasive species. These programs concentrate on managing a single species, such as leafy spurge, codling moth and corn rootworm. About half of these funds are provided to Federal, State and local partners. NAL plays a key role in public outreach, such as developing and managing the website (www.invasivespecies.gov) for the National Invasive Species Council. All ARS individual programs produce non-technical information about its activities, and ARS scientists participate in many public field days each year.

Department of Commerce

NOAA's Sea Grant Program provides matching grants for outreach and education efforts dealing with aquatic nuisance species under the Nonindigenous Aquatic Nuisance Prevention and Control Act.

Department of Defense

The U.S. Army Corps of Engineers (CE) has a 50% Federal / 50% local cost share arrangement with State and local governments, as mentioned above in the Control, Management and Restoration section. The Army Corps of Engineers Waterways Experiment Station has produced a set of CD-ROMs. The first CD provides detailed information – identification, geographic distribution, and recommended control methods relating to 61 invasive terrestrial plants occurring on DOD lands. The second CD, subject to the availability of funding, will provide similar management information for the worst 100 noxious plant species on DOD lands (target date of 2000).

DOD's Armed Forces Information Service is used to educate laypersons within DOD, and could be helpful in an invasive species outreach and education program.

Department of the Interior

BLM, as part of its Partners Against Weeds program, funds cooperative efforts with landowners to control invasive species and cooperative outreach and education projects with schools and local/county governments.

NPS partners with the ARS, FS, and the State of Hawaii to develop and test biological control agents.

FWS works in partnership through many programs with many other entities to provide outreach, technical and financial assistance to private landowners for habitat restoration issues including those involving invasive species. These programs include the Partners for Wildlife Program and the Coastal program.

Interagency Groups

The Aquatic Nuisance Species Task Force (ANSTF) is a statutory entity set up under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. It is co-chaired by the FWS and NOAA. Other Federal members are the U.S. Coast Guard (USCG), the U.S. Army Corps of Engineers, EPA, the USDA, and DOS. The ANSTF also includes 13 *ex officio* non-Federal stakeholders. The ANSTF and its constituent agencies are responsible for carrying out and coordinating Federal invasive aquatic species activities, including: prevention of new introductions; monitoring nonindigenous species that have become established; controlling aquatic nuisance species; developing an education program; and sponsoring scientific research in order to reduce the impacts of such species.

The Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW) was established in August 1994 through a memorandum of understanding. The 16 Federal members participate voluntarily, with most agencies' representation considered a collateral duty of their position. Project support is currently provided on an ad hoc basis, usually from discretionary funds, by participating agencies and groups. FICMNEW's charter is to coordinate, through the respective Secretaries, Assistant Secretaries, and Agency heads, information regarding the identification and extend of invasive plants in the U.S. and to coordinate Federal agency management of these species. FICMNEW accomplishes this charter by sharing scientific and technical information, fostering collaborative efforts among Federal agencies, and sponsoring technical and educational conferences and workshops concerning invasive plants. Through its open meetings and various forums, FICMNEW facilitates cooperation between the signatory agencies and numerous non-Federal agencies and private organizations. It also sponsors the Pulling Together Initiative (PTI) on invasive species, managed by the National Fish and Wildlife Foundation. PTI is a cost share program, funded by seven Federal agencies, which kick starts partnerships for invasive weed management areas.

The Committee on Environment and Natural Resources Research (CENR) of the National Science and Technology Council (NSTC) was established to advise and assist the NSTC in increasing the effectiveness and productivity of Federal research and development efforts in the area of the environment and natural resources. CENR addresses science policy and R&D that cut across agency boundaries and provides a formal mechanism for interagency coordination relevant to domestic and international environmental and natural resources issues. CENR has identified invasive species as a priority focus for integrated ecosystem research, for which the Subcommittee on Ecological Systems (CENR/SES) has established an interagency Task Team on Invasive Species (TTIS). CENR members include representatives from the White House, NOAA, Smithsonian Institution, EPA, DOE, NASA, NSF, USDA, OMB, DOI, DHHS, DOT, DHUD, DOD, DOS, FEMA, Tennessee Valley Authority, Office of the Coordinator for Meteorology, Central Intelligence Agency, Council on Environmental Quality.

The Technical Advisory Group for the Biological Control of Weeds (TAGBCW) is administered by USDA-APHIS, Plant Protection and Quarantine. TAGBCW is an independent voluntary committee that was first formed in 1957 to provide advice to researchers on biological control of weeds. TAGBCW members review petitions for biological control of weeds and provide an exchange of views, information and advice to researchers and those in USDA-APHIS-PPQ responsible for issuing permits for importation, testing, and field release of biological control agents of weeds. TAGBCW members include the Governments of Canada, Mexico, USDA, DOI, EPA, and plant-related boards.

Appendix 3: Table of Legal Authorities

This Table contains a brief, general description of a number of the major legal authorities of the Council member Departments that deal with invasive species. It does not represent a complete or definitive list of all legal authorities on invasive species, but includes those most important to understanding the National Invasive Species Management Plan and its recommended actions.

Legal Authorities Available to USDA Governing Invasive Species.

1. APHIS

Preventing Introduction of Invasive Species (IS):

Plant Protection Act (7 U.S.C. §§ 7701 et seq.)

The new Plant Protection Act (PPA), which consolidated the authorities in the Plant Quarantine Act, Federal Plant Pest Act, Federal Noxious Weed Act, and other plant related statutes, authorizes USDA to prohibit or restrict the importation or interstate movement of any plant, plant product, biological control organism, noxious weed, article or means of conveyance, if the Secretary of Agriculture determines that the prohibition or restriction is necessary to prevent the introduction into the United States or the dissemination of a plant pest or noxious weed within the United States. A “Plant Pest” is defined to mean any living stage of any of the following that can directly or indirectly cause damage to, or cause disease in any plant or plant product: a protozoan, nonhuman animal, parasitic plant, bacterium, fungus, virus or viroid, infectious agent or other pathogen, or any article similar to or allied with any of these articles. A “Noxious Weed” is defined as a plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment.

The PPA specifically authorizes USDA to hold, seize, quarantine, treat, apply other remedial measures to destroy, or otherwise dispose of any plant, plant pest, noxious weed, biological control organism, plant product, article or means of conveyance that is moving (or has moved) into or through the United States or interstate, if USDA considers it necessary in order to prevent the dissemination of a plant pest or noxious weed that is new to or not known to be widely prevalent or distributed within or throughout the United States. This authority extends to progeny of prohibited items moved in violation of the PPA. The PPA also authorizes USDA to order an owner or agent of the owner of a plant, biological control organism, plant product, plant pest, noxious weed article or means of conveyance to treat, destroy or dispose of those items.

The PPA authorizes USDA to cooperate with States, local jurisdiction, associations and similar organizations and individuals to detect, eradicate, suppress, control, or to prevent or retard the spread of plant pests and noxious weeds.

Federal Seed Act (7 U.S.C. §§ 1581 et seq.)

The Federal Seed Act (FSA) prohibits the importation of any agricultural or vegetable seeds containing noxious weed seeds, as defined by USDA. The FSA allows interstate movement of agricultural seed containing noxious weed seeds if the movement is accurately labeled as to the kinds of

noxious weed seeds present and their rate of occurrence. The rate of noxious weed seeds in an interstate shipment of agricultural seeds is not allowed to exceed the rate for shipment, movement or sale in the State in which the seed is offered for transportation or transported, or in accordance with regulations issued by the Department. The Department of Agriculture has promulgated regulations setting tolerances for the nine noxious weeds specifically listed in the FSA in shipments of agricultural or vegetable seeds in interstate commerce.

There is no authority under the FSA to declare an extraordinary emergency and take action on intrastate matters when a state is unable or unwilling to take action to prevent the dissemination of a noxious weed in a shipment of seed subject to the FSA. Also, there is no authority to seek to recover the cost of actions taken by USDA to prevent the dissemination of a noxious weed from the owner or the owner's agent.

Animal Quarantine Laws (21 U.S.C. §§ 101 through 135b and 19 U.S.C. 1306)

USDA's authority to regulate the importation and interstate movement of invasive animal species derives from several statutes collectively referred to as the animal quarantine laws. The animal quarantine laws authorize USDA to promulgate regulations and take measures to prevent the introduction and dissemination of communicable diseases and pests of livestock and poultry. The animal quarantine laws authorize USDA to regulate the importation and interstate movement of all members of the animal kingdom, domestic and wild, except man, for the purpose of regulating communicable diseases and pests of livestock and poultry. The fact that a disease or pest primarily affects animals other than livestock and poultry, including man, does not limit USDA's authority to regulate a species, as long it carries a communicable disease or pest of livestock or poultry.

Under these laws, USDA is authorized to seize, quarantine, and dispose of animals (animal products or other material that can harbor disease or pests of livestock or poultry) that are moving or are being handled, or have moved or have been handled in interstate or foreign commerce if they are infected with or exposed to a communicable disease of livestock or poultry, or if the animals are moved contrary to any of the animal quarantine laws.

The animal quarantine laws authorize USDA to cooperate with States in the control and eradication of diseases and pests of livestock and poultry.

The regulations promulgated under the animal quarantine laws are found in 9 C.F.R. parts 71 through 98 and 122.

The animal quarantine laws do not cover situations involving diseases and pests that are not communicable diseases and pests of livestock or poultry. For example, they do not cover genetic disorders, exposure to radiation in nuclear accidents, or chemical residues. Further, they do not cover situations in which the method of transmission is not clearly communicable. Also, they do not cover progeny of illegally imported animals unless they have or have been exposed to a communicable disease of livestock or poultry. Further, under current law, USDA has authority to take action with regard to an individual premises only if a finding is made that the animals are infected or exposed to a communicable disease of livestock or poultry or they have been moved in violation of regulations. In the early stages of an outbreak, it may be difficult to make such a finding. Thus, there is no authority to enter any premises to ascertain whether or not a communicable disease is present without probable cause to believe that it is present. At the present time, we must rely on the voluntary permission of the owner or custodian of the animals to conduct tests or state authority to require that such tests be conducted to determine the presence or absence of infection or exposure.

Virus-Serum-Toxin Act (21 U.S.C. §§ 151 et seq.)

The Virus-Serum-Toxin Act (VSTA) authorizes USDA to regulate veterinary biological products that are intended for use in prevention, diagnosis, or treatment of diseases of animals. The include, but are not limited to, vaccines, bacterins, sera, antisera, antitoxins, toxoids, allergens, diagnostic antigens prepared from, derived from, or prepared with microorganisms, animal tissues, animal fluids, or other substances of natural or synthetic origin. The VSTA prohibits the shipment or delivery for shipment in intrastate commerce as well as in interstate commerce, and the importation or exportation, of any veterinary biological product which is worthless, contaminated, dangerous or harmful. It also prohibits the importation or exportation of any biological product not prepared in compliance with regulations prescribed by USDA at an establishment licensed by USDA. The regulations promulgated under the VSTA are found at 9 C.F.R. §§ 101-124.

Rapid Response to Introduction of IS:

Both the PPA and the animal quarantine laws provide authority to seize, quarantine, destroy, hold, and treat prohibited species that are imported into the United States or moved interstate.

Further, both the PPA and the animal quarantine laws authorize USDA to declare an extraordinary emergency and take action to seize, quarantine, and dispose of infected and exposed animals which have not moved interstate if a State is unwilling or unable to take appropriate action to prevent dissemination of a communicable disease of livestock or poultry. The FSA and VSTA contain no extraordinary emergency authority.

USDA's ability to respond quickly to invasive species may be affected by the need to comply with the National Environmental Policy Act (NEPA).

Control and Management of Invasive Species:

Authority for control of invasive species, both plant and animal, are authorized and limited by the same authorities used to prevent the introduction or dissemination of plant and animal diseases and pests. The Plant Protection Act grants specific authority to USDA to control grasshoppers and Mormon crickets on all Federal lands to protect rangeland. This authority allows treatment of private lands if necessary to protect rangeland.

The Plant Protection Act specifically authorizes USDA to develop integrated management plans for noxious weeds for the geographic region or ecological range where the noxious weed is found in the United States.

Restoration of Areas Following Control of Invasive Species:

There is no specific authority in the PPA, animal quarantine laws, FSA or VSTA, for restoration of areas following control of invasive species.

Research into Invasive Species:

The Plant Protection Act contains no specific research authority. APHIS can request the ARS to conduct such research under its authority.

There is some specific research authority in the animal quarantine laws, but that authority is focused on certain animals diseases and pests such as foot-and-mouth disease and cattle grubs.

2. National Forest Service

To prevent the introduction of IS

The Forest Service has broad authority to prevent the spread of IS onto National Forest System (NFS) lands. The agency also is authorized to assist other Federal, State, and private entities in preventing the spread of IS onto non-Federal lands under its cooperative authorities. For example, the Forest Service works closely with APHIS to develop risk assessments to prevent the introduction of pests into the United States. These authorities are described in more detail in the discussion relating to control and management of IS.

The Forest Service also has broad authority to conduct research relating to the prevention of introductions of invasive species. These authorities are described in the discussion relating to research of IS.

To respond rapidly to IS

The Forest Service is not authorized to interdict and quarantine an invasive species to deal with an incipient invasion. However, the agency works to identify and control new or incipient invasions of IS through its research and cooperative authorities. The Forest Service's ability to respond rapidly to IS is hampered by the absence of a flexible funding mechanism that would allow research and operations relating to newly-introduced IS presenting high risk threats to be accelerated within the year of introduction. Currently, funding for any new control or research and development activities, which are essential for early eradication and containment, are not appropriated for one to two fiscal years after the introduction occurs.

To Control and Manage IS (Both on Public and Private Lands)

The Secretary of Agriculture has broad authority to manage and protect resources on National Forest System (NFS) lands, including protecting those resources from the impacts of IS. The Secretary's primary authorities relating generally to the management of NFS lands and specifically to IS are described briefly below.

Organic Act

The authority of the Secretary of Agriculture to manage and protect resources on NFS lands arises from the Property Clause of the Constitution, U.S. Const. art. IV, § 3, cl. 2, which provides in part, "the Congress shall have Power to dispose of and make all needful rules and regulations respecting the Territory or other property belonging to the United States".

The Secretary's authority to make rules and regulations protecting National Forests is set forth in section 1 of the Organic Administration Act (16 U.S.C. 551). This provision provides broad authority to protect National Forests from "destruction by fire and depredations" and to issue regulations "as will insure the objects of such reservation, namely to regulate their occupancy and use and to preserve the forest thereon from destruction". To the extent that the use of lands adjacent to Federally owned land is

posing a threat to the Federal resources, the Supreme Court has construed the powers of the Federal Government under the Property Clause to prohibit such private activities. *United States v. Alford*, 274 U.S. 264 (1927). To the extent that IS on adjacent private lands threatens public land, the common law concept may be interpreted to allow the Federal government to abate such infestations.

Multiple-Use Sustained-Yield Act of 1960

The Forest Service manages National Forests for multiple uses under the Multiple-Use Sustained-Yield Act of 1960 (MUSY) (16 U.S.C. 528-531). MUSY provides in relevant part A “. . . that the national forests are established and shall be administered for outdoor recreations, range, timber, watershed, and wildlife and fish purposes” (16 U.S.C. 528).

Forest Planning

The Forest Service is required to develop and maintain a forest plan for each administrative unit of the National Forest System by section 6 of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by National Forest Management Act (16 U.S.C. 1604). Forest plans establish forest-wide and area specific management direction and may include management direction relating to the control of invasive species. Site specific project decisions must be consistent with applicable forest plan direction (or the plan must be amended to permit the activity). Project decisions are subject to compliance with National Environmental Policy Act (42 U.S.C. 4231 et. seq.), and other Federal environmental laws such as the Endangered Species Act, the Clean Water Act, and the Clean Air Act. Most project decisions also are subject to a notice and comment and administrative appeal process under section 322 of the Department of the Interior and Related Agencies Appropriation Act, 1993 (16 U.S.C. 1612 note) and 36 CFR 215, and are subject to judicial review.

Authority implemented by other Federal Agencies on National Forest System lands

Invasive species on National Forest System lands are regulated under a variety of statutes administered by other Federal agencies, including the Lacey Act, Plant Quarantine Act of 1912, Animal Damage Control Act of 1931, Federal Seed Act of 1939, Organic Act of 1944, Federal Plant Pest Act of 1957, Federal Noxious Weed Act of 1974, Nonindigenous Aquatic Nuisance Prevention and Control Act, and the Alien Species Prevention and Enforcement Act of 1992. The Forest Service works cooperatively with these other Federal agencies to implement these authorities on National Forest System lands.

Federal Noxious Weed Act of 1974

The Forest Service has specific authority to manage noxious weeds and other undesirable plant species under section 15 of the Federal Noxious Weed Act of 1974 (7 U.S.C. 2814). The Act requires the Forest Service and other Federal land management agencies to develop and establish a management program for control of undesirable plants, which are classified under State or Federal law as undesirable, noxious, harmful, injurious, or poisonous, on Federal lands under the agency’s jurisdiction (7 U.S.C. 2814(a)). The Act also requires the Federal land management agencies to enter into cooperative agreements to coordinate the management of undesirable plant species on Federal lands where similar programs are being implemented on state and private lands in the same area (7 U.S.C. 2814(c)). The

Secretaries of Agriculture and the Interior must coordinate their respective control, research, and educational efforts relating to noxious weeds. 7 U.S.C. 2814(f). USDA's Departmental Regulation 9500-10 sets forth Departmental policy relating to the management and coordination of noxious weeds activities among the agencies within USDA and other entities.

Public Rangelands Improvement Act of 1978; Federal Land Policy and Management Act of 1976

Several statutes provide funding for rangeland rehabilitation and range improvements on public rangelands, including activities designed to control or manage invasive plants. Section 5 of the Public Rangelands Improvement Act of 1978 (43 U.S.C. 1904(c)) authorizes funding for on-the-ground rangeland rehabilitation and range improvements on some of the rangelands managed by the Forest Service. Additionally, range betterment funds, provided under section 401 of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1751), can be used for variety of range rehabilitation and improvement activities, specifically including weed control, on certain NFS rangelands. The Act of April 24, 1950, pertaining to range improvements, states that of the moneys received from grazing fees, a portion can be used for the "eradication of poisonous plants and noxious weeds in order to protect or improve the future productivity of the range" (16 U.S.C. 580(h)).

Cooperative Forestry Assistance Act of 1978

Under cooperative authorities, the Secretary of Agriculture may assist other Federal, State, and private entities in controlling and managing IS on other Federal lands and non-Federal lands. The Secretary's primary cooperative authority for IS is section 8 of the Cooperative Forestry Assistance Act of 1978 (16 U.S.C. 2104). Section 8(b) authorizes the Secretary of Agriculture to conduct activities and provide technical assistance relating to insect infestations and disease conditions affecting trees on NFS lands, on other Federal lands (in cooperation with other Federal Departments) and on non-Federal lands (in cooperation with States officials, other entities, or individuals). These activities include in part: conducting surveys to detect and appraise insect infestation and disease condition; determining biological, chemical, and mechanical measures necessary to prevent, retard, control or suppress incipient, potential, threatening, or emergency insect infestations and disease conditions affecting trees; planning, organizing, directing and performance measures the Secretary determines necessary to prevent, retard, control or suppress incipient, potential, threatening, or emergency insect infestations and disease epidemics affecting trees; and providing technical assistance to maintain healthy forest and manage the use of pesticides (16 U.S.C. 2104(b)). Section 8(g) of the Act (16 U.S.C. 2104(g)) also authorizes the Secretary to provide financial assistance through the Forest Service to state entities and private forestry or other organizations to monitor forest health and protect forest lands.

Section 8 of the Act applies only to insect infestations and disease conditions affecting trees. The Act does not contain similar authority for insect infestations and disease conditions not affecting trees or for invasive plants.

Hawaii Tropical Forest Recovery Act

The extent of the Forest Service's cooperative authority for invasive plants is contained in section 3 of the Hawaii Tropical Forest Recovery Act (16 U.S.C. 4502(a)), which authorizes the Forest Service to provide assistance relating to invasive plants species to state officials, Federal agency, and various other private entities in States with tropical forests.

To restore areas

Restoration efforts following control of invasive species are authorized, and limited, by the same legal authorities that address the control and management of invasive species on National Forest System lands. The Forest Service lacks specific authority to provide technical and financial assistance to state and private entities relating to these types of restoration efforts.

In limited circumstances where the introduction of IS unto National Forest lands was the result of negligence that could be established in a civil judgment, there is authority for the Secretary to use the proceeds from any damage award or settlement for “rehabilitation work” (See 16 U.S.C. 579(c)).

To research IS

Forest and Rangeland Renewable Resources Research Act of 1978

The Forest and Rangeland Renewable Resources Research Act of 1978 is the Secretary of Agriculture’s primary authority to conduct research activities, including research relating to invasive species. The Act contains expansive authority to conduct research and technology development on, and with applications for, all U.S. lands related to the protection, conservation and sustainable use of natural resources. The Act also authorizes competitive grants to conduct research, and authorizes cooperative agreements with university, industry, and other partners as needed to compliment national program needs.

International Forestry Cooperation Act of 1990

Under section 602(b) of the International Forestry Cooperation Act of 1990 (16 U.S.C. 4501(b)), the Secretary may, in support of forestry and related natural resource activities outside the United States and its territories and possessions, provide assistance for the prevention and control of insects, diseases, and other damaging agents.

Under these authorities, the Forest Service delivers research and development products for vegetation management and protection; wildlife, fish, water and air sciences; resource valuation and use; and inventory and monitoring. Every aspect of invasive species program activities are addressed by the Forest Service Research & Development program. The Forest Service research authorities authorize activities that prevent, respond rapidly, control and manage to IS and, restore areas affected by IS.

3. Natural Resources Conservation Service (NRCS) Programs and Authorities

Program: Conservation Technical Assistance Program

Authority: *Soil Conservation and Domestic Allotment Act* (16 U.S.C. 590(a)-590(f))

Description: Technical assistance to land owners and users of private or other non-federal lands to plan and install measures (structures and land management practices) for soil erosion control and water conservation. Participation is voluntary.

Application to IS: Prevention (provide technical assistance to maintain healthy ecosystem to prevent incursion of IS and to use cropping systems that discourage introduction/spread of IS); Rapid Response (technical assistance on eradication of IS); Control and Manage (technical assistance for eradication/control of IS and for management of lands with IS to prevent spread); Restoration (technical

assistance for use of planning and installation of measures to protect landscape after eradication and to prevent recurrence of IS).

Program: Plant Materials Centers

Authority: *Soil Conservation and Domestic Allotment Act* (16 U.S.C. 590(a)-590(f))

Description: Development, testing, and distribution of plants and vegetation management technologies for use by land owners and users of private or other non-federal lands for soil erosion control, water conservation, and wildlife habitat. Participation is voluntary.

Application to IS: Prevention (provide technology and plants to maintain healthy ecosystem to prevent incursion of IS); Control and Manage (technical assistance for eradication/control of IS and for management of lands with IS to prevent spread); Restoration (technology transfer, technical assistance, and distribution of plants for use in planning and installation of vegetative cover to protect landscape after eradication and to prevent recurrence of IS).

Program: Environmental Quality Incentives Program

Authority: Sections 1240-1240H of the *Food Security Act of 1985* (16 U.S.C. 3839aa-3839aa-8).

Description: Technical, educational, and financial assistance to livestock and agricultural producers to, among other objectives, protect against threats to soil, water, and related natural resources. Participation is voluntary.

Application to IS: Prevention (technical, educational, and financial assistance to maintain healthy ecosystem to prevent incursion of IS); Control and Manage (technical, educational, and financial assistance for eradication/control of IS and for management of lands with IS to prevent spread); Restoration (technical, educational, and financial assistance for planning and installation of measures (structural and land management practices) to protect landscape after eradication and to prevent recurrence of IS).

Program: Wildlife Habitat Incentives Program

Authority: Section 387 of the *Federal Agriculture Improvement and Reform Act of 1996*, 16 U.S.C. 3836a

Description: Technical and financial assistance to landowners to develop wildlife habitat. Participation is voluntary.

Application to IS: Prevention (technical, educational, and financial assistance to maintain healthy ecosystem to prevent incursion of IS); Restoration (technical, educational, and financial assistance for planning and installation of habitat features to protect landscape after eradication and to prevent recurrence of IS).

Legal Authorities available to the Department of Commerce governing IS

Although there is some minimal activity under other authorities, *e.g.*, control of phragmites under essential fish habitat provisions of the Fisheries Conservation and Management Act and some activity under the Coastal Zone Management Act, the major legal authority for NOAA activities is the Nonindigenous Aquatic Nuisance Prevention and Control Act (P.L. 101-636, as amended (16 U.S.C. 4701-41)).

To prevent IS

Section 1202(j)(1) gives both NOAA and FWS regulatory authority to implement provisions of the Nonindigenous Act that include prevention. The construction is awkward, however, and it is uncertain as to what regulatory authority actually exists. When the ANSTF was petitioned to prohibit the importation of *Caulerpa taxifolia*, there were significant questions as to whether the regulatory authority would cover such an action. Instead the Task Force worked with the Department of Agriculture to get the species added to the Noxious Weed List.

To respond rapidly to introductions

Legal authority is lacking for rapid response measures.

To control and manage IS

The authority for control and management is adequate under § 1202, but authorization levels are not adequate. To put the problem in perspective, control activities for one aquatic species funded separately (the sea lamprey) total \$14 million per year. The total authorization for NOAA to implement the Act is \$1 million annually. That authorization is to cover not only control activity but also areas such as prevention and monitoring.

Restoration of areas following control of IS

There is no explicit authority for restoration related to invasive species, but other Acts give NOAA restoration authority.

To research IS

There are a number of research authorizations in the Act:

§ 1102(e) contains authority for competitive regional research grants, but funds have not been appropriated.

§ 1104(b) authorizes competitive research on ballast water management technology.

§ 1202(f) contains an authorization for competitive research under the Sea Grant program for all aspects of aquatic nuisance species.

§ 1202(i) together with § 1301(b)(3) contains an authorization of \$1,625,000 annually for the Great Lakes Environmental Research Laboratory to conduct aquatic nuisance species prevention and control research with \$500,000 of the total being made available for competitive research on Lake Champlain. Funds have never been appropriated for this provision, but NOAA has consistently used \$500,000-\$750,000 of GLERL's base funding for such research.

Although it is probably insignificant in the scheme of things, the fact that so much of the research funding is tied up in competitive grants can affect the ability to focus research on specific problems and to involve our own offices and laboratories (other than GLERL) in research projects.

Legal authorities available to the Department of the Interior governing IS

Preventing introduction of IS

Lacey Act (18 U.S.C. § 42)

The Lacey Act, administered by the U.S. Fish and Wildlife Service, prohibits importation into the United States or any United States territory or possession and shipment between the continental United States, the District of Columbia, Hawaii, the Commonwealth of Puerto Rico, and any possession of the United States 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.” Wildlife and wildlife resources are defined broadly to include all wild animals and “all types of aquatic and land vegetation upon which such wildlife resources are dependent.” *id.* § 42(a)(1). The statute gives the FWS the authority to export or destroy any injurious species at the expense of the importer, *id.* although permits may be issued to allow importation of otherwise injurious species for specific purposes, *id.* § 42(a)(3). Regulations listing species found to be injurious under the Lacey Act are found at 50 C.F.R. part 16.

Several restrictions within the Lacey Act, however, limit its ability to comprehensively address invasive species introductions. First, the Act is limited to animals. In fact, the statute does not apply to all animals, but only those specifically listed along with mammals, birds, fish, amphibians, reptiles, mollusks, and crustaceans generally. In addition, the statute only applies to “wild” birds and mammals; presumably any species that has been domesticated could not be regulated. The statute also excludes restrictions on any species that is regulated under the Plant Pest Act, explicitly stating that section 42 does not authorize “any action with respect to the importation of any plant pest as defined in the Federal Plant Pest Act, insofar as such importation is subject to regulation under that Act.” Thus any animal species whose importation is regulated under the Plant Pest Act cannot be regulated under the Lacey Act.

The “other” Lacey Act (16 U.S.C. § 3371 et seq.)

A separate provision also known as the Lacey Act also has implications for regulating introductions of invasive species. This law, administered by the Secretaries of the Interior, Commerce, and Agriculture, makes it unlawful for any person to import, export, transport, sell, receive, acquire, or purchase (or attempt to commit any such act) in interstate or foreign commerce any fish, wildlife, or plant taken, possessed, transported, or sold in violation of any federal, tribal, state, or foreign law. *Id.* § 3372(1), (2), (4). Thus, while the statute does not substantively grant authority to regulate the importation, transportation, exportation, or possession of any species, violation of another federal, state, tribal, or foreign law governing these activities would become a violation of federal law and subject to particular civil and criminal penalties. See *id.* §§ 3373, 3374. The Secretaries of the Interior and Commerce have the authority to regulate fish and wildlife, while the Secretary of Agriculture regulates importation and exportation of plants.

This statute also has restrictions, however, that limit its effectiveness to address invasive species introductions. As with 18 U.S.C. section 42, the definition of fish or wildlife limits application to “wild” animals. In addition, while the definition of fish or wildlife is broad (“any wild animal, whether alive or dead, including without limitation any wild mammal, bird, reptile, amphibian, fish, mollusk, . . . or other invertebrate”), the definition of plant is limited to “any wild member of the plant kingdom . . . which is indigenous to any State and which is either (A) listed on an appendix to the Convention on International Trade in Endangered Species of Wild Fauna and Flora, or (B) listed pursuant to any state law . . .” Thus

plants covered by the act are limited to those indigenous to the United States and listed as threatened under CITES or a state endangered species law; all other plants are not covered.

Endangered Species Act (16 U.S.C. § 1531 et seq.)

The Endangered Species Act, jointly administered by the Secretaries of the Interior and Commerce, is also a tool in regulating the introduction of invasive species. The Endangered Species Act requires importers and exporters of fish and wildlife (other than nonlisted shellfish and fish imported for the purpose of human or animal consumption or taken in U.S. waters or on the high seas for recreational purposes) and plants to file declarations (16 U.S.C. § 1538(d)). The act also limits importation and exportation of fish and wildlife (with similar exceptions) and plants to designated ports. *Id.* § 1538(f).

Nonindigenous Aquatic Nuisance Prevention and Control Act (16 U.S.C. § 4701 et seq.)

The Nonindigenous Aquatic Nuisance Prevention and Control Act also has potential to affect the introduction and dispersal of invasive species. Focused primarily on the spread of nonindigenous species through ballast water releases, it created a task force co-chaired by the Director of the U.S. Fish and Wildlife Service and the Undersecretary of Commerce for Oceans and Atmosphere to develop and implement a program to prevent the introduction and dispersal of aquatic nuisance species. The task force is to “establish and implement measures . . . to minimize the risk of introduction of aquatic nuisance species to waters of the United States.” *Id.* § 4722(c). An aquatic nuisance species is defined broadly to mean “a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent of such waters,” with nonindigenous species defined to include “any species or other viable biological material that enters an ecosystem beyond its historic range.” *Id.* § 4702. Thus aquatic nuisance species include any species that are not native to a particular region of the United States and are not limited to foreign species.

Rapid response to introductions

Land management authority of federal land-management agencies

As explained in more detail below, all land-management agencies within the Department of the Interior have the authority to manage the resources on their lands, including taking action to protect those resources from the adverse effects of invasive species. This authority arises from the Property Clause of the Constitution, U.S. Const. art. IV, § 3 (“The Congress shall have power to . . . make all needful rules and regulations respecting the Territory or other property belonging to the United States”), and the various “organic acts.”

Nonetheless, the ability to respond quickly to invasive species management issues may be affected by agencies’ responsibilities to comply with the National Environmental Policy Act (NEPA). 42 U.S.C. § 4321 *et. seq.* NEPA requires production of an Environmental Impact Statement (EIS) for any major federal action significantly affecting the environment. In addition, agencies often initially draft Environmental Assessments to determine whether a full EIS is required, all of which takes time and slows an agency’s ability to undertake management actions quickly. Where emergency circumstances make it necessary for an agency to take an action with significant environmental impacts without complying with full NEPA procedures, the agency can work out alternatives with the Council

on Environmental Quality. See 40 C.F.R. '1506.11. This may allow flexibility for an agency attempting to respond quickly to an invasive species control situation if the situation rises to the level of an emergency.

Control and management of IS

Land management authority of federal land-management agencies

All land-management agencies within the Department of the Interior have the authority to manage the resources on their lands, including taking action to protect those resources from the impacts of invasive species. This authority arises from the Property Clause of the Constitution, U.S. Const. art. IV, § 3 (“The Congress shall have power to . . . make all needful rules and regulations respecting the Territory or other property belonging to the United States”), and the various “organic acts.” Authorizing statutes that provide the primary land management authority for DOI agencies include the National Park Service’s Organic Act, 16 U.S.C. § 1 *et seq.* (regulation of the national park system shall be consistent with the purpose of conserving the natural and historic objects and the wildlife therein); the National Wildlife Refuge System Administration Act (16 U.S.C. §§ 668dd, 668ee, prohibiting an array of actions on areas within the national wildlife refuge system and authorizing the Fish and Wildlife Service to permit use of areas only when that use is compatible with the purpose for which the area was established); and the Federal Land Policy and Management Act (43 U.S.C. § 1701 *et seq.*, requiring that the public lands administered by the Bureau of Land Management be managed to prevent unnecessary or undue degradation).

Endangered Species Act (16 U.S.C. § 1531 et seq.)

The Endangered Species Act can also be a powerful management tool where an invasive plant or animal species is negatively affecting an endangered or threatened species. Section 7 of the ESA requires any federal agency to insure that any action authorized, funded, or carried out by the agency not jeopardize the continued existence of any endangered or threatened species or adversely modify any critical habitat of such species (16 U.S.C. § 1536(a)(2)). Thus, each federal agency must consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, depending on the species, for any action that may affect a listed species. If the action is likely to adversely affect a listed species, the appropriate Service issues a Biological Opinion, which may authorize take that is incidental to the action or, if the federal action would otherwise jeopardize the continued existence of the species, offer alternatives to the federal action that will avoid such jeopardy. *Id.* § 1536(b).

Any take of an endangered or threatened fish species unless otherwise authorized is unlawful under the statute. *Id.* § 1538. Thus, a federal agency will be held responsible for any take B unless authorized through an Incidental Take Statement B directly or indirectly caused by the authorization, funding, or other federal action associated with invasive species. The ESA treats threatened or endangered plants somewhat differently from fish and wildlife species. Section 9 prohibitions on take do not apply to plants, see *id.* § 1538(a)(2), but cautions can be provided in a Biological Opinion on prohibitions against removal or disturbance of plants. Thus, a federal agency will be held responsible for prohibited acts affecting both wildlife and plants that result from authorization, funding, or other federal action associated with invasive species. Section 7 consultation requirements apply, however, only to federal actions.

Nonindigenous Aquatic Nuisance Prevention and Control Act (16 U.S.C. § 4701 et seq.)

A task force, co-chaired by the Director of the U.S. Fish and Wildlife Service and the Undersecretary of Commerce for Oceans and Atmosphere, created under this statute is charged with developing and implementing a program to, among other things, monitor and control species that qualify as “aquatic nuisance species.” The task force or any other affected agency or entity may recommend when the task force initiate a control effort. The statute lays out criteria for determining when a control effort is warranted and requires development of a control program. Public notice and comment on the proposed program is required through the Federal Register.

Restoration of areas following control of IS

Restoration efforts following control of invasive species are authorized, and limited, by the same legal authorities that address control and management of invasive species on DOI lands.

Research into IS

Biological Resources Division, U.S. Geological Survey

The primary responsibility of the Biological Resources Division (BRD) within the U.S. Geological Survey is to assist resource and land managers (particularly those within DOI agencies) by providing sound biological information and assisting in applying that information to the managers’ needs. Thus the BRD’s mission is to “work with others to provide the scientific understanding and technologies needed to support the sound management and conservation of our nation’s biological resources.” Investigating the causes, effects, prevention, and management of invasive and non-indigenous organisms with an eye to developing effective management solutions is one of the BRD’s identified scientific programs.

Nonindigenous Aquatic Nuisance Prevention and Control Act (16 U.S.C. § 4701 et seq.)

The Nonindigenous Aquatic Nuisance Prevention and Control Act contains a number of provisions to promote research on invasive species that qualify under that act’s definition of “aquatic nuisance species,” including studies on the introduction of such species by vessels, and ecological and ballast water discharge surveys in particular water bodies. The statute also authorizes funding for research grants to universities and research institutions. The Aquatic Nuisance Species Task Force is likewise charged with developing a research program and authorized to allocate funds in the form of research grants.

4. International Agreements and Authorities

Convention on Biological Diversity (CBD)

Article 8 of the CBD on In-situ Conservation provides that each contracting party shall, as far as possible and as appropriate, prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species. The CBD entered into force December 29, 1993. The United States is not a party to the agreement.

The International Plant Protection Convention (IPPC)

The International Plant Protection Convention (IPPC) applies primarily to quarantine pests in international trade. It creates an international regime to prevent spread and introduction of plant and plant product pests, including invasive species, based on the use of sanitary and phytosanitary measures (standards and policies). Although the IPPC does not use the term “invasive species”, its provisions create rights and obligations among its member countries and its standards for quarantining pests are applicable against invasive species.

The WTO Agreement on the Application of Sanitary and Phytosanitary Measures

The agreement is a supplementary agreement to the World Trade Organization Agreement. It provides a uniform framework for phytosanitary measures for human, plant, and animal life or health. Sanitary and phytosanitary measures are defined as any measure whose goal is: 1) to protect human, animal, or plant health from the entry or spread of pests, diseases, or disease carrying organisms; 2) to prevent or limit other damage from the entry or spread of pests.

International Office of Epizootics (OIE)

The basic mission of the International Office of Epizootics (in French, the Office International des Epizooties, or OIE), which has a membership of over 150 member countries, is to prevent the spread of animal diseases. To this end, the OIE's major functions are to collect and disseminate information on the distribution and control of animal diseases, to coordinate research on contagious animal diseases, and to develop international standards for the safe movement of animals and animal products in international trade.

The World Trade Organization's (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) designated the OIE as the international forum for setting animal health standards for international trade. While the OIE has traditionally focused on diseases of livestock and on setting diagnostic standards (*e.g.*, for vaccines), it has more recently begun to address disease risks associated with wildlife and animal aquatic species. Considerable progress has already been achieved in establishing OIE standards for trade in aquatic species (*e.g.*, fish, crustaceans, and mollusks).

USDA's Animal and Plant Health Inspection Service (APHIS) plays an active role in the OIE's standard-setting activities. APHIS participates in the various OIE Commissions and Working Groups, where OIE positions, policies, and standards are developed and drafted. These include the International Animal Health Code Commission -- which develops health standards to ensure the safety of international trade in animals and animal products that trading partners must observe to avoid the transfer of agents pathogenic to animals or humans, the Foot-and-Mouth Disease and Other Epizootics Commission, the Fish Diseases Commission, the Ad-Hoc Working Group on Biotechnology, the Ad-Hoc Group on Transmissible Spongiform Encephalopathies, the Working Group on Wildlife Diseases, the Ad-Hoc Working Group on Animal Disease Categorization, and several others.

Though OIE does not use the term "invasive species," its basic mission is to promote global cooperation to prevent the introduction and spread of zoonotic diseases and other injurious organisms which may present a threat to the health of the livestock and animal resources of member countries. The scope of OIE is not limited to protecting domesticated livestock only, but encompasses animal health.

Appendix 4: Invasive Species Advisory Committee members and List of Working Group Co-chairs

Invasive Species Advisory Committee

Ted Batkin (Secretary)
California Citrus Research Board

Dennis Brinker
Jackson County Commissioner

Michael Buck
Hawaii Department of Land
and Natural Resources

Faith Campbell
American Lands Alliance

Allegra Cangelosi
Northeast Midwest Institute

James Carlton
Williams College

Gabriela Chavarria
National Fish and Wildlife Foundation

Barbara Cooksley
Rancher

Steven Dewey
Utah State University

Celestine Duncan (Vice Chair)
Weed Management Services

Ann Gibbs
Maine Department of Agriculture

Nelroy Jackson
Monsanto Company

Robert Kanter
Port of Long Beach

The Honorable Dirk Kempthorne
Governor of Idaho

William Lindow
Commercial fisherman

David Lodge (Chair)
University of Notre Dame

Ronald Lukens
Gulf States Marine Fisheries Commission

Fred Matt
Confederated Salish and Kootenai Tribes
of the Flathead Reservation

Kathy Metcalf
Chamber of Shipping of America

Marshall Meyers
Pet Industry Joint Advisory Council

Harold Mooney
Stanford University

Christian Oseto
Purdue University

Willie Reed
Michigan State University

Craig Regelbrugge
American Nursery and
Landscape Association

Sarah Reichard
University of Washington

Linda Sheehan
Center for Marine Conservation

Daniel Simberloff
University of Tennessee

Randall Stocker
University of Florida

W. William Weeks
The Nature Conservancy

David Wilcove
Environmental Defense Fund

Steven Williams
Kansas Department of Wildlife and Parks

Working Group Co-Chairs

Communication, Education, and Outreach Working Group

Federal

Jim Murray
U.S. Department of Commerce
National Oceanic and Atmospheric Administration

Non-Federal

Amy Ferriter
South Florida Water Management District

International Working Group

Federal

Brooks Yeager
U.S. Department of State

Non-Federal

Harold A. Mooney
Stanford University

Management Working Group

Federal

Gary Johnston
U.S. Department of the Interior
National Park Service

Non-Federal

Nate Dechoretz
California Department of Agriculture

Policy and Regulation Working Group

Federal

Keith Pitts
U.S. Department of Agriculture
Animal and Plant Health Inspection Service

Non-Federal

Marc Miller
Emory Law School

Research and Information Sharing Working Group

Federal

Steve Yaninek
U.S. Department of Agriculture
Cooperative State, Research, Education and
Extension Service

Non-Federal

David L. Thomas
Illinois Natural History Survey

Risk Analysis and Prevention Working Group

Federal

Borys Tkacz
U.S. Department of Agriculture
Forest Service

Non-Federal

William Pardee
Cornell University

Appendix 5: List of Acronyms Used

| | |
|---------|---|
| ANSTF | Aquatic Nuisance Species Task Force |
| APHIS | Animal and Plant Health Inspection Service |
| ARS | Agricultural Research Service |
| BLM | Bureau of Land Management |
| BOR | Bureau of Reclamation |
| CABI | Commonwealth Agriculture Bureau International |
| CBD | Convention on Biological Diversity |
| CDC | Centers for Disease Control |
| CENR | Committee on Environment and Natural Resources |
| CSREES | Cooperative State, Research Education and Extension Service |
| CWA | Clean Water Act |
| DHHS | Department of Health and Human Services |
| DHUD | Department of Housing and Urban Development |
| DOC | Department of Commerce |
| DOD | Department of Defense |
| DOE | Department of Energy |
| DOI | Department of the Interior |
| DOS | Department of State |
| DOT | Department of Transportation |
| EO | Executive Order (refers to Executive Order 13112) |
| EPA | Environmental Protection Agency |
| FEMA | Federal Emergency Management Administration |
| FICMNEW | Federal Committee on the Management of Noxious and Exotic Weeds |
| FIFRA | Federal Insecticide, Fungicide, and Rodenticide Act |
| FS | Forest Service |
| FSA | Federal Seed Act |
| FWS | U.S. Fish and Wildlife Service |
| FY | Fiscal Year |
| GAO | Government Accounting Office |
| GISP | Global Invasive Species Programme |
| IABIN | Inter-American Biodiversity Information Network |
| IMO | International Maritime Organization |
| IPPC | International Plant Protection Convention |
| NABIN | North American Biodiversity Information Network |
| NAL | National Agricultural Library |
| NASA | National Aeronautics and Space Administration |
| NEPA | National Environmental Protection Act |
| NISC | National Invasive Species Council |
| NOAA | National Oceanic and Atmospheric Administration |
| NPS | National Park Service |
| NSF | National Science Foundation |
| NWHC | National Wildlife Health Center |
| OIE | Office International Des Epizooties |

| | |
|--------|---|
| OMB | Office of Management and Budget |
| OTA | Office of Technology Assessment |
| PPA | Plant Protection Act |
| SPS | Sanitary and Phytosanitary Measures |
| TAGBCW | Technical Advisory Group for the Biological Control. of Weeds |
| USCG | U.S. Coast Guard |
| USDA | U.S. Department of Agriculture |
| USGS | U.S. Geological Survey |
| WTO | World Trade Organization |

Appendix 6: References

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