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Report to Executive Agency Officials

October 2002

INVASIVE SPECIES

Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem

GAO-03-1

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Highlights

Highlights of GAO-03-1, a report to Executive Agency Officials

INVASIVE SPECIES

Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem

Why GAO Did This Study

Harmful invasive species—nonnative plants and animals that are spreading throughout the United States—have caused billions of dollars in damage to natural areas, businesses, and consumers. In 2001, the federal government issued a National Invasive Species Management Plan to focus attention on invasive species and coordinate a national control effort involving the 20 or so federal agencies that are responsible for managing them. This report discusses the economic impacts of invasive species, implementation of the management plan, and coordination of U.S. and Canadian efforts to control invasive species, including those introduced to the Great Lakes via the ballast water of ships.

What GAO Recommends

GAO recommends that the National Invasive Species Council (1) incorporate data on the economic impacts of invasive species in developing the federal government's budget; (2) add performance-oriented goals and objectives to its updated plan; (3) give high priority to an oversight strategy for measuring progress against results-oriented goals; and (4) examine whether the council is being hampered in its implementation of the plan by the lack of specific legislation. Agencies generally agreed with GAO's recommendations.

www.gao.gov/cgi-bin/getrpt?GAO-03-01. To view the full report, including the scope and methodology, click on the link above. For more information, contact David Wood at (202) 512-6878 or Woodd@gao.gov.

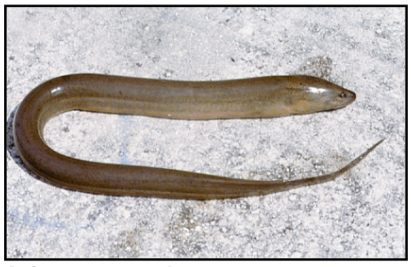
What GAO Found

Existing literature on the economic impacts of invasive species is of limited usefulness to decision makers, although it indicates that the effects of invasive species are significant. Most economic estimates do not consider all of the relevant effects of nonnative species or the future risks that they pose. New initiatives may prompt more comprehensive analysis that could help decision makers make better resource allocations.

While the National Invasive Species Management Plan calls for many actions that are likely to contribute to preventing and controlling invasive species in the United States, it does not clearly articulate specific long-term goals toward which the government should strive. In addition, the federal government has made little progress in implementing the actions called for by the plan.

Even with high levels of compliance, U.S. regulations have not eliminated the introduction of invasive species into the Great Lakes via the ballast water of ships. The United States and Canada are working on strengthening the existing control system, but developing stronger regulations and the technology needed to meet them will take many years. The continued introduction of invasive species could have high economic and ecological costs for the Great Lakes.

Four Invasive Species That Harm the Environment and the Economy



Asian swamp eel
Source: USGS

Mute swan
Source: USGS

Zebra mussels attached to pipe
Source: Michigan Sea Grant

Eurasian ruffe
Source: USGS

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Abbreviations

APHIS	Animal and Plant Health Inspection Service
CDC	Centers for Disease Control
EPA	Environmental Protection Agency
FICMNEW	Federal Interagency Committee for the Management of Noxious and Exotic Weeds
GAO	General Accounting Office
IMO	International Maritime Organization
NANPCA	Nonindigenous Aquatic Nuisance Species Prevention and Control Act
NISA	National Invasive Species Act
OMB	Office of Management and Budget
OTA	Office of Technology Assessment
USDA	United States Department of Agriculture
USGS	U.S. Geological Survey

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United States General Accounting Office
Washington, D.C. 20548

October 22, 2002

The Honorable Ann M. Veneman
Secretary of Agriculture

The Honorable Gale A. Norton
Secretary of the Interior

The Honorable Donald L. Evans
Secretary of Commerce

Invasive species—harmful, nonnative plants, animals, and microorganisms—are found throughout the United States, causing damage to crops, rangelands, waterways, and other ecosystems that is estimated in the billions of dollars annually. Some have termed invasive species "biological pollutants." Unlike some chemical pollutants that can degrade over time, biological pollutants have the potential to persist, multiply, and spread.[1] In addition to their economic costs, invasive species can have a devastating effect on natural areas, where they have strangled native plants, taken over wetland habitats, crowded out native species, and deprived waterfowl and other species of food sources. Conservation biologists rank invasive species as the second most serious threat to endangered species after habitat destruction. Overall, scientists, academicians, and industry leaders are recognizing invasive species as one of the most serious environmental threats of the twenty-first century. We have issued two prior reports on this subject: one on funding to address invasive species and the other on the government's approach for quickly responding to invasions by new species.[2]

[1] A concept basic to invasiveness is that these species have been introduced into an environment in which they did not evolve; thus, they usually have no natural enemies to limit their spread.

[2] U.S. General Accounting Office, *Invasive Species: Federal and Selected State Funding to Address Harmful Nonnative Species*, GAO/RCED-00-219 (Washington, D.C.: Aug. 2000) and *Invasive Species: Obstacles Hinder Federal Rapid Response to Growing Threat*, GAO-01-724 (Washington, D.C.: July 2001).

In February 1999, in response to the challenges faced by state and federal agencies to minimize the spread of invasive species, President Clinton issued Executive Order 13112. The order directs federal agencies to take actions that will prevent the introduction of invasive species; provide for their control; and minimize their impact on the economy, the environment, and human health. The order established the National Invasive Species Council, which now comprises the heads of 10 federal departments and agencies, to provide national leadership and coordination in federal invasive species activities and to issue a national invasive species management plan.[3] The order also directed the Secretary of the Interior to establish an advisory committee to provide information and advice to the council.

The problem of invasive species is an international one. Organisms are brought, intentionally or unintentionally, from one country to another. They may also spread on their own across international borders. Because of the international aspects of the issue, as well as the seriousness of the problem for both Canada and the United States, we undertook a review of federal invasive species management in cooperation with the Office of the Auditor General of Canada. One issue of particular importance to both countries is preventing aquatic invasive species from entering the Great Lakes in the ballast water of ships.[4] We and the Auditor General are issuing simultaneous but separate reports. The Office of the Auditor General's *Report of the Commissioner of the Environment and Sustainable Development to the House of Commons* contains a chapter on Canada's invasive species management efforts.

The objectives of our review were to (1) assess the usefulness of analyses that have estimated the economic impact of invasive species in the United States to federal decision makers responsible for preventing and controlling their spread; (2) assess the National Invasive Species Management Plan, including the extent to which the plan has been implemented; (3) provide the views of experts on the adequacy of

[3] Council members include the Secretaries of State, Defense, Treasury, Agriculture, Commerce, Transportation, Health and Human Services, and the Interior, and the administrators of the Environmental Protection Agency and the U.S. Agency for International Development. The Secretaries of Agriculture, Commerce, and the Interior are the cochairs of the council.

[4] Ballast water is deliberately pumped into tanks within a ship to control or maintain the trim, draft, stability, or stresses of the vessel. Because ballast water is pumped from oceans or rivers, it can contain living aquatic organisms found in those locations.

U.S. and Canadian federal government efforts to prevent the introduction of invasive species into the Great Lakes via the ballast water of ships; and (4) describe how the United States and Canada are coordinating invasive species management efforts.

Among the efforts we undertook to analyze these issues was a survey of all 32 members of the Invasive Species Advisory Committee. About 74 percent of the committee members responded to our survey and 68 percent completed it. We also observed meetings of the committee. See appendix I for further details on our scope and methodology.

Results in Brief

The scope of existing studies on the economic impact of invasive species in the United States range from narrow to comprehensive, and most are of limited use for guiding decision makers formulating federal policies on prevention and control. Narrowly focused estimates include analyses of past damages that are limited to a certain commercial activities such as agricultural crop production and simple accountings of the money spent to combat a particular invasive species. These estimates typically do not examine economic damage done to natural ecosystems, the expected costs and benefits of alternative control measures, or the impact of possible invasions by other species in the future. On the other hand, more comprehensive—and rare—analyses are those that examine the past and prospective economic impact of invasive species on commercial activities and natural ecosystems and the potential costs of preventing or controlling them. In general, the more comprehensive the approach used to assess the economic impacts of invasive species, the greater its potential usefulness to decision makers for identifying potential invasive species, prioritizing their economic threat, and allocating resources to minimize overall damages. Recent initiatives by federal agencies to integrate information on the likelihood of invasion, the likelihood of economic damage to commercial activities and natural ecosystems, and the likely effectiveness of control methods should help support more informed decisions about managing invasive species. However, according to agency officials, efforts to produce more comprehensive and complex studies that address the range of factors are hampered by a lack of necessary data and of targeted resources.

The National Invasive Species Council's 2001 management plan, *Meeting the Invasive Species Challenge*, lacks a clear long-term outcome and quantifiable measures of performance. While the actions called for in the plan are likely to contribute to controlling invasive species, it is unclear

how implementing them will move the United States toward a specific outcome, such as a lower number of new invasive species or reduced spread of established species by a certain amount. Federal officials recognize that there are deficiencies in the plan and are working toward improvements. At present, the only available performance measure that can be used to assess overall progress is the percentage of planned actions that have been completed by the due dates set in the plan. By this measure, implementation has been slow. As of September 2002, the departments and agencies composing the council had completed less than 20 percent of the actions that the plan had called for by that date, although they have begun work on others. A large majority of the members of the Invasive Species Advisory Committee who responded to our survey believe that the pace of implementation is inadequate. There are numerous reasons for the slow progress, including delays in establishing teams that will be responsible for guiding implementation of the planned actions, the low priority given to implementation by the council, and the lack of funding and staff responsible for doing the work. Some stakeholders expressed the view that the low priority and associated lack of progress may be due to the fact that the Congress did not create the council or direct it to implement the plan. However, even if the actions in the plan were more fully implemented their effect would be uncertain because they typically do not call for quantifiable improvements in invasive species management or control.

According to experts and agency officials we consulted, current efforts by the United States and Canada are not adequate to prevent the introduction of invasive species into the Great Lakes via the ballast water of ships. Beginning in 1993, U.S. federal regulations required ships that enter the Great Lakes from more than 200 nautical miles off the U.S. coast to exchange their ballast water in the open ocean (that is, in waters deeper than 2,000 meters and farther than 200 nautical miles from the U.S. coast), retain the ballast water on board, or use an alternative, environmentally sound, method of ballast water management. The purpose of the exchange is to flush the ballast tanks of living organisms or kill them with salt water. Canada has had voluntary guidelines calling for a similar ballast water exchange since 1989. The U.S. Coast Guard inspects all ships entering the Great Lakes and, according to the agency, 88 percent of the ships entering with ballast water from 1994 through 2001 had exchanged it in compliance with U.S. regulations. The Coast Guard has not approved alternative treatment methods; therefore, those that did not exchange their ballast were prohibited from emptying their tanks while in the Great Lakes. Nevertheless, aquatic invasive species are still entering the Great Lakes and establishing themselves in the ecosystem. According to the experts we

consulted, at least two factors contribute to the failure of the existing regulations to prevent introductions. First, about 70 percent of the ships that enter the Great Lakes are classified by the Coast Guard as having no ballast on board and are, therefore, exempt from open-ocean exchange requirements. However, these ships may in fact have thousands of gallons of residual ballast water and sediment containing potentially invasive organisms in their drained tanks that may be mixed with water later taken from, and then discharged into, the Great Lakes. Second, for those ships that have ballast, open-ocean exchange does not effectively remove or kill all organisms in the ballast tanks. Although the United States and Canada believe they should do more to protect the Great Lakes from ballast water discharges, their plans for doing so depend on the development of standards and technologies that will take a decade or more. In the meantime, the continued introduction of invasive species could have major economic and ecological consequences.

The United States and Canada participate in a wide variety of bilateral and multilateral efforts to share information, conduct research, and coordinate their efforts to reduce the threat of invasive species. However, the two countries have not developed a comprehensive strategy for joint prevention and management efforts. The long history of coordination between the United States and Canada has focused on such areas as agricultural research and shared boundary waters. There are numerous bilateral and multilateral organizations of which the United States and Canada are a part that recognize invasive species as an important issue and provide a forum for increased planning and coordination between the two countries. In general, however, efforts to date have addressed specific pathways, species, or geographic areas in a reactive way, rather than as part of a coordinated approach. The National Invasive Species Council has recognized the need for the United States to work with Canada (and Mexico) in a more comprehensive manner and has taken initial steps to develop a North American strategy, as called for by the national management plan. It is too early to tell, however, what form such a strategy will take.

We are making several recommendations to the National Invasive Species Council as a whole, and to the member departments and agencies individually, aimed at improving the nation's management of invasive species. The council and member agencies generally agreed with these recommendations.

Background

Invasive Species Threaten the Economy and the Environment

As we have reported in the past, the impact of invasive species in the United States is widespread, and their consequences for the economy and the environment are profound.[5] They affect people's livelihoods and pose a significant risk to industries such as agriculture, ranching, and fisheries. The cost to control invasive species and the cost of damages they inflict, or could inflict, on property or natural resources are estimated to total billions of dollars annually. For example, according to the U.S. Department of Agriculture (USDA), the Formosan termite causes at least $1 billion annually in damages and control costs in 11 states (in 2001 dollars). USDA also estimates that, if not managed, fruit flies could cause more than $1.8 billion in damage each year (in 2001 dollars).

According to the National Invasive Species Council, hundreds, and perhaps thousands, of nonnative species have established populations in the United States. Invasive species continue to be introduced in new locations, with recent examples including the northern snakehead fish in Maryland and the emerald ash borer in Michigan. Many scientists believe that invasive species are a significant threat to biodiversity and are major or contributing causes of population declines for almost half the endangered species in the United States. Invasive species can alter entire ecosystems by disrupting food chains, preying on critical native species such as pollinators, increasing the frequency of fires, or—as in the case of some plants—simply overshadowing and smothering native plants. Invasive species may arrive unintentionally as contaminants of bulk commodities such as food, in packing materials and shipping containers, or in ships' ballast water. Others may be introduced intentionally; kudzu, for example—a rapidly growing invasive vine that thrives in the southeastern United States—was intentionally introduced from Japan as an ornamental plant and was used by USDA in the 1930s to control soil erosion. Other invasive species are imported as crops, livestock, aquaculture species, or pets, and later escape or are released into the environment. (See fig. 1 for details on the mute swan, intentionally introduced to adorn parks and private bird collections.)

[5] GAO/RCED-00-219.

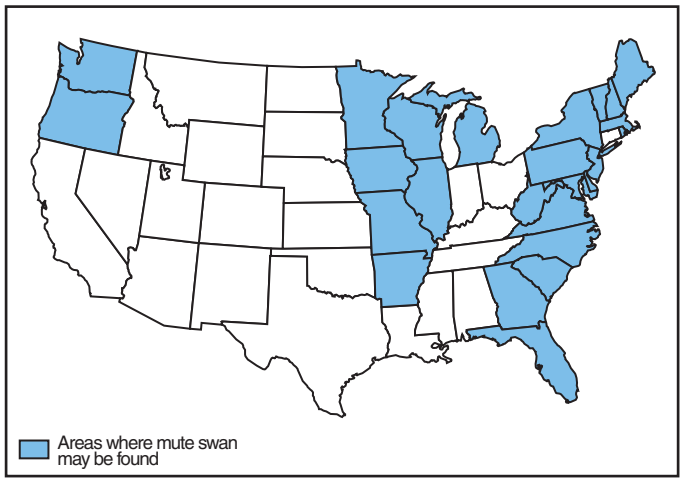
Figure 1: Profile of the Mute Swan

Migration Path: The mute swan, a native of Eurasia, entered North America from the mid-1800s through the early 1900s. Mute swans were imported to adorn large estates and city parks, and for zoos and aviculture collections. Currently, over 22,000 mute swans occupy coastal and freshwater habitats along the Atlantic coast from New Hampshire to Florida and in the Great Lakes area, Washington State, southern Ontario, and British Columbia. In April 2001, the U.S. Geological Survey reported that since 1962 the population of mute swans in the Chesapeake Bay area of Maryland and Virginia had grown from 5 to about 4,500.

Ecological and Human Effects: Mute swans feed primarily on submerged aquatic vegetation, such as widgeon grass and red grass, which has reduced the availability of food sources for some native wildlife. In some cases, concentrations of mute swans have overgrazed grasses, eliminating habitats for crabs, fish, and other wetland-dependent species. Mute swans also exhibit aggression toward other waterfowl, sometimes displacing native species from their breeding and feeding habitats and attacking, injuring, or killing other birds. Mute swans have also attacked humans. In the Chesapeake, the mute swan competes with the less aggressive native tundra swan.

Economic Impacts: We found no data concerning the economic impact of mute swans.

Control Measures: In the Chesapeake Bay region, recommended control methods include restricting the importation of new mute swans, spoiling the eggs of nesting swans and replacing the eggs in the nest as away of keeping the swan from laying new ones (addling), and capturing and euthanizing existing mute swans. In the 1990s, a Montana population of mute swans was effectively eradicated to regenerate the native trumpeter swan population in Yellowstone National Park.



Sources: GAO analysis; photo, U.S. Geological Survey.

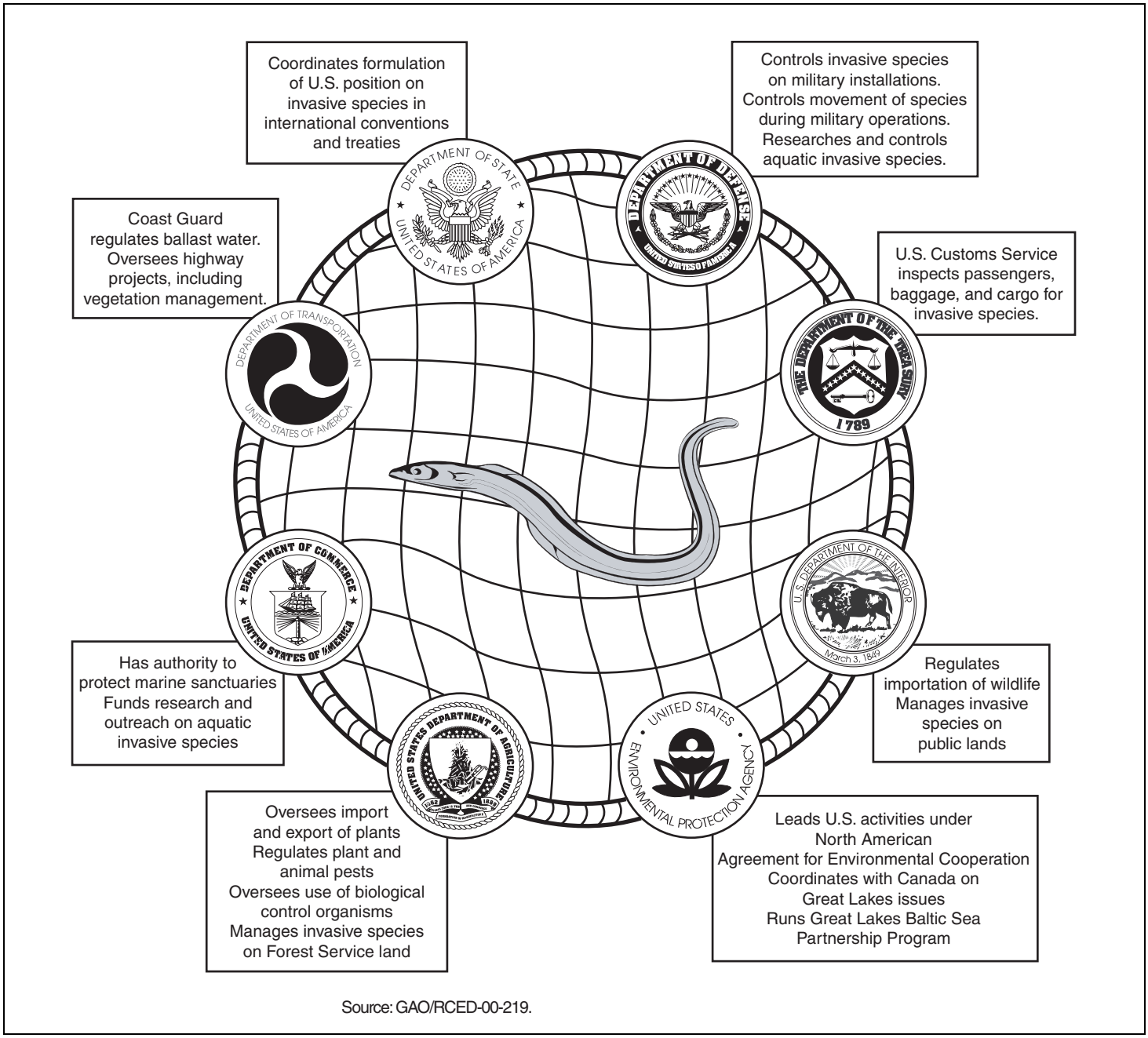
Not all nonnative species, however, cause harm. Many nonnative species, such as cattle, wheat, soybeans, many fruits, and ornamental plants (such as tulips and chrysanthemums), have been largely beneficial and their propagation controllable. Various terms have been applied to invasive species, including "alien," "exotic," "nonindigenous," and "nonnative." In this report, we use the definition provided by Executive Order 13112, which states that an invasive species is an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. An alien species is one that is not native to a particular ecosystem. (We used this definition, as well as other factors, in selecting species to profile in this report.)

The Federal Government Conducts a Variety of Invasive Species Activities

More than 20 federal agencies in 10 departments—including USDA, Commerce, Defense, and the Interior—have responsibility for some aspect of invasive species management. (See fig. 2.) States also have a significant management role, but the extent of their involvement varies considerably. USDA has the largest federal role because of its responsibility to (1) conduct port-of-entry inspections and quarantine goods coming into the country, (2) manage more than 190 million acres of national forests and grasslands, (3) conduct research, and (4) provide technical assistance to the private sector and in large agricultural pest control projects. We reported that in fiscal year 2000, seven of the departments obligated more than $624 million for activities related to invasive species management.[6] According to the council, appropriations to those departments for such activities increased in fiscal year 2001 to approximately $1.05 billion, of which USDA received almost $975 million.

[6] See GAO/RCED-00-219. The Department of the Treasury's Customs Service, the Department of Health and Human Services, and the U.S. Agency for International Development also have expenditures related to invasive species but were not included in our report.

Figure 2: Key Federal Departments and Their Responsibilities for Invasive Species



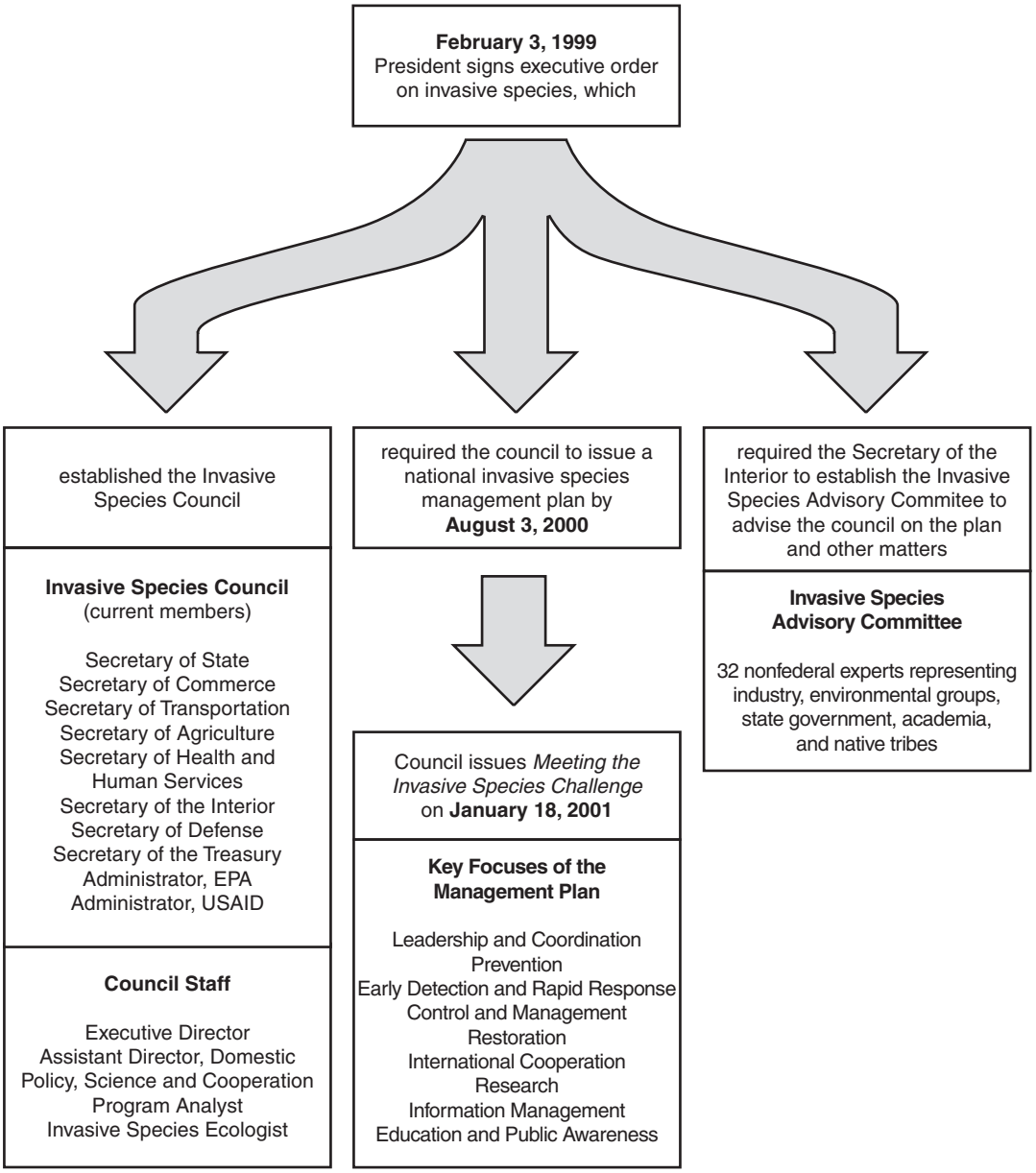
Source: GAO/RCED-00-219.

In February 1999, invasive species prevention and control efforts received heightened attention with the issuance of Executive Order 13112. The executive order established the National Invasive Species Council, which is now made up of the secretaries and administrators of 10 federal departments and agencies.[7] The executive order required the Secretary of the Interior to establish an advisory committee to provide information and advice to the council. Accordingly, in November 1999, the secretary established the Invasive Species Advisory Committee, composed of 32 nonfederal members representing a range of interests relevant to invasive species, including academia, environmental organizations, industry, trade associations, Native American tribes, and state government.

The executive order also required that the council develop a national invasive species management plan using a public process and revise it biennially. Among other things, the executive order called for the plan to (1) recommend performance-oriented goals and objectives and specific measures of success, (2) recommend measures to minimize the risk of new introductions of invasive species, and (3) review existing and prospective approaches and authorities for preventing the introduction and spread of invasive species. The council and its staff worked with members of the advisory committee and other interested parties to produce draft management plans for public comment. In January 2001, the council issued the final plan, which identifies nine categories of planned actions to aid in the prevention, control, and management of invasive species in an effort to minimize their economic, environmental, and human health impacts. (See fig. 3.) The council's plan calls for member departments to implement a total of 86 discrete actions, each with an associated due date or start date. Examples of the actions include establishing and coordinating long- and short-term capacities for basic and applied research on invasive species and gathering and disseminating information on the council's Web site.

[7] The Secretary of Health and Human Services and the Administrator of the U.S. Agency of International Development were not specifically named as members of the council by the executive order, but were invited to join as permitted by the executive order. The Secretary and Administrator joined the council in February 2001.

Figure 3: National Invasive Species Council and Management Plan



Source: National Invasive Species Council.

The United States and Canada Face Many Difficult Issues Related to Managing Invasive Species

The United States and Canada have a mutual interest in limiting the introduction or spread of invasive species across their borders. The two countries share more than 5,500 miles of terrestrial and aquatic border that provide potential pathways for invasive species. Each country is the other's largest trading partner, sending and receiving a variety of goods, such as crops, livestock, wood, and horticultural products, that can harbor invasive species. Therefore, species that enter one of the two countries have opportunities to spread into the other.

The Great Lakes—a shared U.S. and Canadian resource—have been subject to invasion by nonnative species since the settlement of the region. At least 160 nonnative aquatic organisms have become established in the lakes since the 1800s, most of which have come from Europe, Asia, and the Atlantic coast. More than one-third of the organisms have been introduced in the past 30 years, a trend coinciding with the opening of the St. Lawrence Seaway in 1959 and other changes in ship operations. Ballast water in ships is considered a major pathway for the transfer of invasive aquatic organisms to the Great Lakes. Ballast is essential to the safe operation of ships because it enables them to maintain their stability and control how high or low they ride in the water. Ships take on or discharge ballast water over the course of a voyage to counteract the loading or unloading of cargo, and in response to sea conditions. The ballast that ships pump aboard in ports and harbors may be fresh, brackish, or salt water. These waters may contain various organisms that could then be carried to other ports around the world where they might be discharged and survive.

Canada adopted voluntary ballast water management guidelines in 1989 in response to the 1988 discovery of nonnative zebra mussels in Lake St. Clair. The Canadian guidelines were superceded by new guidelines in 2000 and encourage ships' masters entering the Great Lakes and other waters under Canadian jurisdiction to employ management practices—such as exchanging ballast water in the open ocean—to minimize the probability of future introductions of harmful aquatic organisms. They also direct ships' masters to provide ballast water details to Canadian authorities.[8] The United States followed the Canadian lead and passed the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990.[9] This legislation directed the Secretary of Transportation to issue voluntary ballast water guidelines and regulations for the Great Lakes. Joint United States and Canadian voluntary guidelines, which closely tracked the 1989 Canadian guidelines, went into effect in March 1991. The U.S. Coast Guard issued the first set of mandatory ballast water regulations for the Great Lakes in April 1993.[10] The National Invasive Species Act of 1996 amended the 1990 act and required the Secretary of Transportation to issue voluntary ballast water guidelines for the rest of the United States.

More Comprehensive Analysis of the Economic Impacts of Invasive Species Would Better Inform Decision Makers

The scope of existing analyses of the economic impact of invasive species in the United States range from narrow to comprehensive. Narrowly focused analyses include estimates of past damages that are limited to commercial activities such as agricultural crop production and simple accountings of the money spent to combat a particular invasive species. These estimates typically do not include the economic impact of these species on natural ecosystems, the expected costs and benefits of alternative measures for preventing their entry or controlling their spread, or the impacts of possible invasions by other species in the future. On the other hand, more comprehensive—and rare—analyses are those that examine the past and prospective economic impact of invasive species to

[8] See *Voluntary Guidelines for the Control of Ballast Water Discharges from Ships Proceeding to the St. Lawrence River*, which were superceded in 2000 by the *Guidelines for the Control of Ballast Water Discharge from Ships in Waters Under Canadian Jurisdiction* and amended in 2001. Even though the guidelines are voluntary, the Canadian Coast Guard can impose a fine under the Canada Shipping Act for an operator who knowingly provides false information to a vessel traffic regulator.

[9] P.L. 101-646 (1990), as amended by the National Invasive Species Act of 1996, P.L. No. 104-332 (1996), codified at 16 U.S.C. §§ 4701-4751.

[10] 33 C.F.R. §§ 151.1500–151.1516.

both commercial activities and natural ecosystems and the potential costs of preventing or controlling them. Few analyses have been done that examine the likelihood that new species will invade new locations and that estimate their costs. Although the estimates we reviewed may have served the purpose for which they were intended, the narrow scope of many of them may limit their usefulness to decision makers formulating federal policies on prevention and control. In general, the more comprehensive the approach used to assess the economic impacts of invasive species, the more likely its usefulness to decision makers for identifying potential invasive species, prioritizing their economic threats, and allocating resources to minimize overall damages. Federal agencies recognize the value of this type of analysis and have recently taken steps to use it more often. According to officials from several agencies, however, efforts to improve economic impact analyses are hampered by a lack of data on invasive species and a lack of economists assigned to assessing their economic impacts on commercial activities and natural ecosystems.

The Narrow Scope of Many Analyses May Limit Their Usefulness to Decision Makers

The narrow scope of many analyses of the economic impacts of invasive species may limit their usefulness to decision makers developing policies and allocating resources to address the problem.[11] First, many of the analyses we reviewed do not address the economic impact of invasive species on natural area ecosystems. Instead, they reflect the impacts of invasive species on commercial activities such as agricultural and timber production and fisheries. This reflects the fact that most of the management and control of invasive species in the United States has focused on those species that damage agricultural crops and livestock. For example, the Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW) studied the economic impact of weeds on the U.S. economy and found the estimated value of losses from invasive weed species to be about $15 billion per year.[12, 13] However, the committee reported that the economic impact on most nonagricultural sites was not available. Focusing solely on the impact of invasive species on commercially valuable activities ignores the potential impact of invasive species on ecosystems as a whole, possibly understating the impact of these species.[14] Consistent with that point, according to the Environmental Protection Agency, the true cost of invasive species is underestimated if estimates of damages do not include lost ecosystem services, such as water purification and aesthetic values.[15]

[11] While we examined estimates of the impact of invasive species with respect to their scope and methodology, we did not attempt to verify the accuracy of the estimates of economic impact.

[12] Federal Interagency Committee for the Management of Noxious and Exotic Weeds, *Invasive Plants: Changing the Landscape of America*, *Fact Book*, Washington, D.C.: FICMNEW, 1998.

[13] All dollars in this section were adjusted to 2001 dollars unless otherwise noted.

[14] Economic damages to natural ecosystems are measured in terms of individuals' willingness to pay for the goods and services provided by an ecosystem. For example, the gain in value associated with a specific improvement in environmental quality, such as a day of birding in a natural ecosystem that has been freed of invasive species, is measured by an increase in people's willingness to pay for this experience.

[15] Lee and Chapman, *Nonindigenous Species–An Emerging Issue for the EPA*, *Vol. 2*, U.S. EPA, May 2001, available on the Web from http://www.epa.gov/owow/invasive_species/workshop/nisvol2.pdf.

Second, many of the existing analyses do not fully account for the expected costs and benefits that are associated with different control methods for invasive species. Two frequently cited summations of the aggregate impacts of invasive species in the United States were based on estimates of this type. The first, by the U.S. Office of Technology Assessment (OTA), estimated that by 1991 at least 4,500 nonnative species had become established in the United States, of which about 600 had caused severe harm. The OTA was able to obtain data showing that the economic impact of 79 of these species totaled about $118 billion between 1906 and 1991 and impact included damage to agricultural crops, industrial activities, and human health.[16] The second effort was by researchers at Cornell University who estimated in 1999 that approximately 50,000 nonnative plant and animal species are known to have entered the United States—although not all have established harmful populations—and that the overall cost of the harmful species is about $137 billion annually.[17] However, the estimates that these aggregate studies relied on typically did not include an analysis of whether control measures are desirable given their costs or what the most cost-effective methods for preventing or controlling particular invasive species would be. (Many of the estimates included in these aggregate studies also lack information on the impact of invasive species on natural area ecosystems.)

It is not unusual for analyses to lack information for the assessment of the cost-effectiveness of prevention and control measures. The most complete data on invasive species damages, and prevention and control costs and effectiveness are available for known pests that the USDA has identified as serious threats to agriculture on the basis of past invasions. These include diseases and pests such as the virus that causes foot-and-mouth disease, citrus canker, and the Mediterranean fruit fly. Yet, even for these pests, relatively little is known about the likely success of alternative methods for preventing their entry or controlling their spread. For example, an official in charge of risk analysis for USDA's Animal and Plant Health Inspection Service (APHIS) told us that there is a general lack of information on the

[16] U.S. Congress, Office of Technology Assessment, *Harmful Non-Indigenous Species in the United States*, OTA-F-565, Sept. 1993, available on the Web from http://www.wws.princeton.edu/~ota/disk1/1993/9325_n.html.

[17] Pimentel et al., "Environmental and Economic Costs Associated with Non-Indigenous Species in the United States," *BioScience*, Jan. 2000. This estimate has not been adjusted for inflation. The researchers combined dollar estimates representing different years from different studies without adjusting them for inflation.

likely success of different measures—short of outright bans on the importation of some products—that could be used to prevent the importation of invasive species into the country. He said that even for a pest such as the one that causes foot-and-mouth disease, for which the potential costs of an outbreak have been studied, data are not available on the cost-effectiveness of many prevention methods. Prevention methods could range from a ban of all products that might carry the disease from all countries known to harbor it to less stringent restrictions that allow more trade but that might provide less protection. For invasive species that have previously entered the United States and caused damages, there is also little information available on the likelihood that they will do so again at particular times and by particular pathways. Even less information of this nature is available for non-agricultural pests. More comprehensive analyses that include such information may help decision makers allocate limited resources among different prevention and control efforts.

A third way in which the narrow scope of many estimates may limit their usefulness is that they focus on the impact of species that are known to cause problems but do not provide decision makers with information on the likelihood that new species will invade and cause damage. The typical estimate includes data on the damages already caused by species or the money spent to control them. The OTA and Cornell estimates mentioned above are largely based on these types of estimates. Other examples include USDA's report that it cost about $26 million between 1996 and 2000 to remove trees infested with Asian long-horned beetle in New York and Illinois[18] and the estimate by North Dakota State University researchers in 1996 that three species of knapweed cause about $48 million per year in damage to Montana's economy.[19] Data such as these can be used to estimate the continued effects of a species in the same location or the potential effects in a new location. For example, researchers used data on the effects that the European green crab had had on East Coast fisheries to estimate that this invasive species could damage native oyster, clam and crab fisheries on the West Coast by as much as $54 million per year.[20] (See fig. 4 for more information on the European green crab.)

[18] USDA, APHIS, Pest Risk Assessments: Pest Risk Assessment for Importation of Solid Wood Packing Materials into the United States, App. B: Case Histories of Previous Introductions of Forest Pests, Aug. 2000, available on the Web from http://www.aphis.usda.gov/ppq/pra/swpm/.

[19] Hirsch and Leitch, "The Impact of Knapweed on Montana's Economy," Agricultural Economics Report No. 355, Department of Agricultural Economics, North Dakota State University, July 1996.

[20] Lafferty and Kuris, "Biological Control of Marine Pests," *Ecology*, 77(7), Oct. 1996.

However, experts in biological invasions caution that it is difficult to extrapolate from a past invasion event to introductions of new species that have not occurred. According to an official with the Department of the Interior, decision makers need guidance on which potential invasive species pose the greatest threat to the United States and how to best design policies for combating them. Some researchers suggest that the best way of protecting ourselves from invasive species is to try to predict new arrivals of potentially invasive species, study the basic biology of probable new arrivals, and work on biological controls for them as part of a program for early detection and rapid response.[21] One environmental scientist has suggested that one of the best ways to predict the introduction of and damage from species new to the United States is to study recent introductions of species into other countries that have ecosystems similar to those in this country.[22] While USDA and others have done some studies of this type, particularly for agricultural pests, the preponderance of economic analysis has focused on species that have already invaded the United States rather than on new species that could invade in the future.

[21] Lafferty and Kuris.

[22] Quinn, "Workshop on development of regional invasive species information hubs in North America and Southern Africa," *Aliens* newsletter, World Conservation Union, No. 13, 2001, available on the Web from http://www.issg.org/aliens_newsletter/Aliens13.pdf.

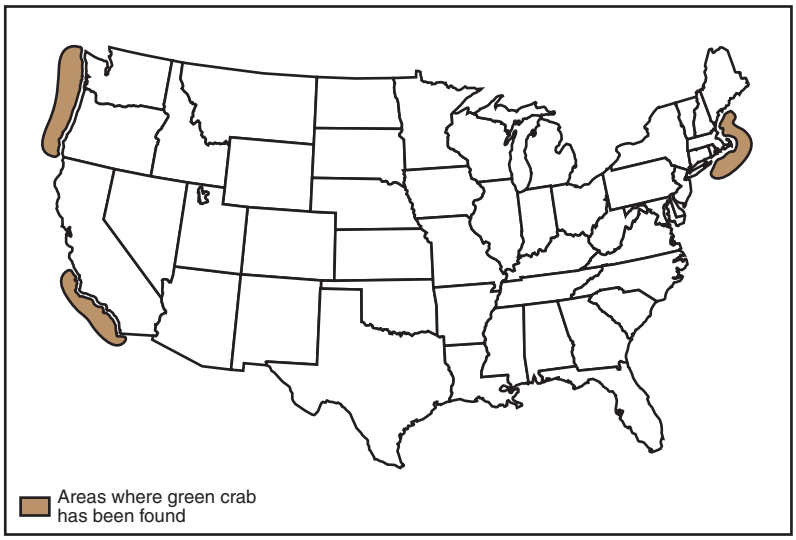
Figure 4: Profile of the European Green Crab

Migration Path: The European green crab, a native of Europe and northern Africa, was first discovered along the Atlantic coast of the United States between New Jersey and Cape Cod in 1817. It appeared in the Chesapeake Bay region in 1879 and most recently off the coasts of California, Oregon, and Washington State in 1998. Green crabs are transported in a number of ways, including in ships' ballast water, by attaching themselves to ships' hulls, through live seafood trade, and by water currents.

Ecological Effects: European green crabs are predatory and feed on many types of organisms, including clams, oysters, mussels, and other small crustaceans. They are generally quicker and more dexterous than native crabs and can out-compete other crabs for food and habitat. The green crab is also host to the acanthocephalan worm, which develops in various species of crustaceans. Fish, birds, and domestic and wild mammals ingest the crabs containing adult worms, and the worms establish themselves as parasites in the host's digestive tract. In Alaska, the dangers posed by aquatic invasive species such as the green crab have prompted the Department of Fish and Game to release a plan outlining a program to prevent the spread of future aquatic invasive species.

Economic Impacts: While the full range of economic impacts has not been estimated, the European green crab may have a significant impact on the clam, oyster, and mussel industries, as well as on crab fishing. The Congressional Research Service estimates the potential economic damage to shellfish production on the West Coast at about $44 million per year.

Control Measures: European green crab control measures include trapping and removing the crabs from the coastal marine ecosystem. Biological and chemical methods have also been proposed, but research for the implementation of these methods has not been done.



Sources: GAO analysis; photo, U.S. Geological Survey.

More Comprehensive Analyses Are Potentially More Useful to Decision Makers

While most of the analyses that we reviewed have limitations in their scope that lessen their usefulness to decision makers, some used a more comprehensive approach. Some analyses accounted more fully for the expected costs and benefits to producers and consumers of different control measures. For example, to further improve analysis of the expected costs and benefits of control measures, the Risk Assessment and Management Committee under the Aquatic Nuisance Species Task Force expanded the scope of existing federal risk assessment processes and methodologies to include the socioeconomic impacts of invasive species.[23] In a case study covering, in part, the effects of importing the Asian black carp, U.S. Geological Survey (USGS) researchers balanced the potential for economic gains from intentionally introducing this species—it eats snails that may harbor parasites in fishponds and zebra mussels in the wild—against the potential for economic and environmental damage if it became established in the wild.[24] Risks were estimated by expert judgment. Based upon the outcome of the assessment, the Aquatic Nuisance Species Task Force decided that establishment of this species would create an unacceptable level of potential harm. The U.S. Fish and Wildlife Service has proposed amending its regulations to add the Asian black carp to a list of injurious fish, crustacean, and mollusk species that are not allowed to be imported into the United States.[25]

[23] National Science and Technology Council, Committee on Environment and Natural Resources, *Ecological Risk Assessment in the Federal Government*, CENR/5-99/001, Chapter 4: Nonindigenous Species, May 1999, available on the Web from http://www.nnic.noaa.gov/CENR/ecorisk.pdf.

[24] Nico and Williams, "Risk Assessment on Black Carp," USGS, Report to the Risk Assessment and Management Committee of the Aquatic Nuisance Species Task Force, Oct. 1996.

[25] 67 Fed. Reg. 49280 (July 30, 2002).

Researchers also recently discussed how the benefits from integrating risk assessment and benefit cost analysis into the regulatory process can provide decision makers with more information than is available when only a single dimension of information is considered. These two dimensions of information give decision makers an opportunity to evaluate the tradeoffs that they face when they choose among alternative regulatory measures.[26] The researchers addressed the question of the tradeoff between banning the imports of commodities that may harbor invasive species and enjoying the benefits of those commodities. As an example, they analyzed a partial ban on imports of Mexican avocados and found that, based on the assessment of invasion risk alone, the ban seemed to have greater benefits than costs.[27] However, when they incorporated into their analysis the costs to U.S. consumers that the ban would impose in terms of reduced availability of low-cost avocados, they found that less stringent regulations would likely be more desirable than the ban.

As another example, the same researchers demonstrated the benefit of integrating benefit cost analysis and risk assessment simultaneously into the evaluation of risk management options for the invasive fungus that causes Karnal bunt disease in wheat. In this case, they illustrated how analyses that estimate invasion risks and costs and benefits for control programs for this species but do not adjust benefit estimates of the control program components for risk may not help decision makers choose control policies with the greatest overall benefit. USDA had estimated that the Karnal bunt fungus could cause more than $500 million per year in damages to the U.S. wheat industry by reducing the amount of wheat suitable for export and had adopted a program to control the spread of the fungus.[28] However, researchers found that the USDA's estimate was incomplete, in part because it focused on reducing the probability of an outbreak of the disease by adopting multiple quarantine options but did not examine whether each option was an economically efficient quarantine policy. When the researchers examined these options individually, they were able to identify the most efficient options, that is, those imposing the least cost on producers. According to these researchers, by not adopting

[26] Orden, Narrod, and Glauber, "Least Trade Restrictive Sanitary and Phytosanitary Policies: The Analytic Framework Is There, the Specific Answers Are Not," Oct. 2000, available on the Web from http://www.usda.gov/agency/oce/oracba/papers/orden.htm.

[27] 60 Fed. Reg. 34832 (July 3, 1995).

[28] 62 Fed. Reg. 24753 (May 6, 1997).

only the most efficient options, the costs of the agency's program for controlling the spread of the fungus exceeded the program's benefit. The researchers suggest that failure to look at the expected marginal benefits and costs of various quarantine options may have led to the adoption of an unnecessarily costly quarantine policy.

Another way in which some estimates have been more comprehensive is by including an examination of the impact of invasive species on more than just commercial commodities. For example, in estimating the effect of gypsy moth caterpillars on forest trees, researchers estimated that benefits from programs that would slow their spread would be between $1 billion and $4.8 billion in present value, depending on their rate of spread and the control programs adopted, in increased timber production, recreational opportunities, residential and scenic land values, water quality and other amenities, over 25 years.[29] In another example, researchers used an economic model based on property values to estimate damages to lakefront properties in New Hampshire from milfoil, an invasive aquatic weed that causes serious economic, recreational, and ecological damage. Their estimates showed that between 1990 and 1995, property values on milfoil-infested lakes were about 16 percent lower than similar properties on uninfested lakes.[30] According to an official with the Department of Commerce, the state of New Hampshire adopted a program to control this invasive weed on the basis of this study.

Finally, some analysts are taking more comprehensive approaches by analyzing the likelihood that species will be introduced, become established, and cause harm in particular geographic areas or via particular pathways. For example, a researcher has built upon earlier USDA work on pest risk assessment to evaluate the likelihood of establishment of Eurasian poplar leaf rust. [31] The researcher combined information on the

[29] Leuschner et al., "Potential Benefits of Slowing the Gypsy Moth's Spread," *Southern Journal of Applied Forestry*, 20(2), 1996.

[30] Halstead et al., "An Hedonic Analysis of the Effects of an Exotic Invader *(Myriophyllum heterophyllum)* on New Hampshire Lakefront Properties," paper presented at the Annual Conference of the Northeastern Agricultural and Resource Economics Association, Bar Harbor, Maine, June 2000.

[31] Cohen, "Evaluating the Risks of Importation of Exotic Pests Using Geospatial Analysis and a Pest Risk Assessment Model," Proceedings of the First International Conference on Geospatial Information in Agriculture and Forestry, Lake Buena Vista, Florida, June 1998, available on the Web from http://www.aphis.usda.gov/ppd/evaluating.pdf, (building on Orr et al., "Generic NonIndigenous Pest Risk Assessment Process," USDA, APHIS, Nov. 1993).

incidence of the disease and the location of susceptible plant hosts in the United States with data on past invasions of this species in similar ecosystems abroad, to assess the likely danger to geographic areas in the United States.

In another example, USDA examined the likelihood that the Eurasian pine shoot beetle would enter and spread via various pathways and which pathways would impose the greatest risk of harm.[32] This beetle emerged as a new and potentially serious pest of timber in the upper midwestern United States in 1992. Potential losses from the beetle were large, and the state of Michigan proposed 25 mitigation measures that would have included large expenditures on pesticide sprays. USDA's analysis, which included a risk assessment of the likely pathways by which the beetle might spread, showed that 99.8 percent of the risk of spread occurred by one pathway in a 2-week period during the timber's processing. Using this information, the timber industry took appropriate control measures during this 2-week period to effectively manage the risk at low cost and without the need for regulation.

Recent Actions May Prompt More Comprehensive Analyses

Recent federal actions may help to prompt further improvements in the economic impact analysis available to decision makers. Among other things, Executive Order 13112 calls on federal agencies to prevent the introduction of invasive species, and to detect, respond rapidly to, and control them in a cost-effective and environmentally sound manner. The executive order also directs agencies to determine that the benefits of any actions they take that are likely to cause or promote the introduction or spread of invasive species clearly outweigh the potential harm caused by the species and to take measures to minimize the risk of harm in conjunction with these actions. Implementing the order will thus require agencies to undertake more comprehensive studies of risks, costs, and benefits.

[32] Ahl, "The Role of Risk Analysis in Integrated Pest Management," in K. Smith, *Reducing Environmental and Health Risks from Agricultural Chemicals; Policy Considerations*, available on the Web from http://ers.usda.gov/publications/mp1542/MP1542e.PDF.

In addition, the federal Aquatic Nuisance Species Task Force has developed a process to evaluate the risk of introducing nonnative organisms into a new environment and, if needed, determine the correct management steps to mitigate that risk.[33] The task force has also developed guidelines to provide direction to assist states in the development of their own management plans for aquatic nuisance species.[34] The guidance, formally adopted by the task force in 2000, emphasizes a need for feasible, cost-effective, comprehensive plans that can be developed quickly, and can be used to focus on the most pressing species problems that can be effectively managed. As an example of how these efforts have been used, the U.S. Fish and Wildlife Service, USDA's Animal and Plant Health Inspection Service, and the National Oceanic and Atmospheric Administration, in conjunction with state authorities, have prevented the spread of the aquatic weed caulerpa in U.S. coastal waters.[35]

[33] The task force was established pursuant to the Nonindigenous Aquatic Nuisance Control and Prevention Act of 1990 to coordinate government efforts related to nonindigenous aquatic species in the U.S.with regional, state, and local entities. It is cochaired by the Fish and Wildlife Service and the National Oceanic and Atmospheric Administration. "Generic Nonindigenous Aquatic Organisms Risk Analysis Review Process," report to the Aquatic Nuisance Species Task Force, Oct. 1996, available on the Web from http://www.anstaskforce.gov/gennasrev.htm.

[34] Aquatic Nuisance Species Task Force, "Guidance for State and Interstate Aquatic Nuisance Species Management Plans," Nov. 2000, available on the Web from http://www.anstaskforce.gov/state_guidance.htm.

[35] Keppner and Caplen, "*A Prevention Program for the Mediterranean Strain of Caulerpa taxifolia*," submitted to the Aquatic Nuisance Species Task Force, Aug. 1999, available on the Web from http://www.anstaskforce.gov/Caulerpa.htm.

USDA has also taken recent steps to refine its risk assessment practices. Over the years, in making decisions about allowing the importation of certain agricultural commodities from countries known to harbor potentially serious plant pests, USDA occasionally used analysis that led to partial rather than outright bans of those commodities in recognition of both risks of invasion and the benefits that consumers would obtain from access to that commodity.[36] An impetus for doing more of this type of analysis was international trade agreements that call for the United States and others to use the least restrictive measures to protect against invasive pests. In other words, the trade agreements prohibit countries from imposing outright bans of certain agricultural commodities if biological and economic data show that partial bans would be just as effective. Partly in response to these agreements, USDA's Animal and Plant Health Inspection Service issued for the first time in August 2001 guidelines for the agency to use when assessing the risks posed by diseases and pests.[37] These guidelines state that risk assessments should consider the probable biological and economic consequences of the entry and establishment of invasive species, as well as the likelihood that those species will enter. However, according to the chief of APHIS Risk Assessment Systems, agency assessments done in the past frequently focused on the likelihood that species will enter and become established and, because of a lack of credible data, were less focused on their biological and economic consequences.

Moreover, USDA recently established a task team to improve the ways in which risk assessment is incorporated into the department's analyses of the economic impacts of invasive species. Agency officials said that this effort would better enable federal decision makers to adhere to Executive Order 13112's emphasis on a risk-based approach to dealing with invasive species. In addition, the officials said that the information generated by the task team would also help the National Invasive Species Council implement the national management plan, which calls for a risk-based approach to preventing potential invasive species from becoming established.[38]

[36] National Plant Board, *Preventing the Introduction of Plant Pathogens: The Role and Application of the "Systems Approach"* (draft document), Feb. 2002, available on the Web from http://www.aphis.usda.gov/ppq/systemsapproach/.

[37] Risk Assessment Review Standards, USDA Animal and Plant Health Inspection Service, Aug. 2001.

[38] National Invasive Species Council, *Meeting the Invasive Species Challenge: Management Plan*, 2001.

Officials from the National Invasive Species Council staff and departments within the council agreed that improved economic analysis would help the federal government develop an overall budget for invasive species programs. However, they cautioned that the capacity of the federal government to do this work is limited. Specifically, there are limits to the data available on the biology of invasive species and the impacts they have—particularly on natural ecosystems—and the effectiveness of control methods. The officials also stated that there are not enough resources devoted to analyzing the impacts of invasive species.

The National Management Plan Lacks a Clear Long-Term Outcome, and Its Implementation Has Been Slow

While the National Invasive Species Council's 2001 management plan, *Meeting the Invasive Species Challenge*, calls for actions that are likely to help control invasive species, it lacks a clear long-term outcome and quantifiable performance criteria against which to evaluate the overall success of the plan. Federal officials recognize that there are deficiencies in the plan and are working toward improving it. At present, however, the only available performance measure that can be used to assess overall progress is the percentage of planned actions that have been completed by the due dates set in the plan. By this measure, implementation has been slow. Specifically, the council departments have completed less than 20 percent of the planned actions that were called for by September 2002, although they have begun work on others. A large majority of the members of the invasive species advisory committee who responded to our survey believe that the pace of implementation is inadequate. In addition, some of the actions that agencies have reported to the council are not clearly linked to coordinated implementation of the management plan. Our survey and other evidence indicate numerous reasons for the slow progress, including delays in establishing implementation teams that will be responsible for carrying out the planned actions, the low priority given to implementation by the council, and the lack of funding and shortage of staff responsible for doing the work. Another factor contributing to slow progress was the need to transition to a new administration. However, while the national management plan calls for many actions that would likely contribute to preventing and controlling invasive species, even if the actions in the plan were more fully implemented their effect would be uncertain because they typically do not call for quantifiable improvements in invasive species management or control.

National Invasive Species Management Plan Does Not Clearly Define a Long-Term Outcome or Contain Performance Measures

The national management plan does not clearly define a long-term outcome or measures of success as are called for by sound management principles. The executive order states that the management plan shall "detail and recommend performance-oriented goals and objectives and specific measures of success for federal agency efforts concerning invasive species." Consistent with that requirement, the council and its advisory committee adopted as one of their guiding principles that efforts to manage invasive species are most effective when they have goals and objectives that are clearly defined and prioritized. Both the executive order and this guiding principle are also consistent with the Government Performance and Results Act of 1993, which emphasizes setting measurable goals and holding agencies accountable by evaluating performance against those goals.[39]

However, the council did not articulate in the plan a long-term outcome or condition toward which the federal government should strive. For example, the plan does not contain overall performance-oriented goals and objectives, such as reducing the introduction of new species by a certain percentage or halting the spread of established species on public lands. Instead, the plan contains an extensive list of actions that, while likely to contribute to preventing and controlling invasive species, are not clearly part of a comprehensive strategy.

Similarly, many of the actions in the plan call for the federal departments to take certain steps rather than achieve specific results and do not have measurable outcomes. For example, the plan calls for the council, starting in January 2001, to work with relevant organizations to "expand opportunities to share information, technologies, and technical capacity on the control and management of invasive species with other countries." Another action item calls for the council to have outlined by June 2001 a plan for a campaign to encourage U.S. travelers to voluntarily reduce the risk of spreading invasive species overseas. Other actions call for the council to support international conferences and seminars. We believe that these types of actions are more process-oriented than outcome-oriented. Taken individually, the actions may be useful, but it will be difficult to judge whether or not they are successful and have contributed to an overall goal.

[39] P.L. 103-62 (1993).

Respondents to our survey also raised concerns about the lack of measurability in the plan. While the majority of respondents (17 of 23) said that the plan is focused on the most important issues, 9 criticized it for a lack of specificity or a clear mechanism for measuring effectiveness or holding departments accountable for implementing it. Of these, several commented that it is unclear how we will know when actions are implemented and completed. Others noted that there are no consequences for the council, staff, or agencies if they miss deadlines. Other stakeholders made similar comments to us. For example, one person who was involved in the development of the management plan told us that it represents a "fundamentally misguided approach" and that it contains no coherent goal or measures of success. He said that the plan should have measures of success such as a reduction in the rate of introduction or spread of species. Another stakeholder said that the plan is unclear with regard to what actions would be enough to help solve the problem and echoed concerns about the difficulty measuring success. Eight respondents to our survey, however, made more positive comments about the degree of specificity in the plan, stating that the plan was clear, measurable, and achievable and that it had very specific actions with deadlines for agencies to implement.

The council acknowledged in the plan itself that many of the details of the actions called for would require further development in the implementation phase. The Department of the Interior's Deputy Assistant Secretary for Performance and Management told us that the plan was developed with little input from people trained in performance management processes. In addition, the Executive Director of the council staff told us that, in her opinion, given the scope of this first-time effort, it would have been unrealistic and difficult to also agree on specific measurable goals. She also said that in many areas, the federal government does not have the data on invasive species conditions needed to set long-term goals and develop better performance measures. She said that many of the actions called for in the management plan are designed to help develop needed data. In their comments on our draft report, EPA and the Department of the Interior also noted that it would be difficult to apply performance measures to invasive species management activities.

The executive order calls for the council to revise the plan by January 2003. However, the Executive Director of the council told us that the council and the advisory committee had agreed not to begin revising the management plan until after the council prepares a progress report on the plan. That report is also due to the Office of Management and Budget (OMB) in January 2003.

The council is in the process of working with OMB on implementing one of the planned actions that should help to establish a desired outcome and relevant performance measures. The plan called for a crosscut budget proposal for federal agency expenditures concerning invasive species beginning in fiscal year 2003. The council and OMB are hoping to have a proposal ready for the fiscal year 2004 budget cycle. According to the Department of the Interior official responsible for this project on behalf of the council, the proposal will represent the beginnings of a strategic plan for the federal government's invasive species activities. It will be performance-oriented with common long-term goals, intermediate goals, and definitions for the relevant departments. OMB will identify performance measures with help from a task team of federal stakeholders and will initially focus on early detection and rapid response, control, and prevention. According to the council, the proposal for fiscal year 2004 will not represent the totality of invasive species expenditures or efforts but will primarily focus on the activities of the Departments of the Interior, Agriculture, and Commerce.

National Invasive Species Council Departments Have Completed a Small Percentage of Actions in the Management Plan

While the council has not reported on implementation of the plan, we estimate that, as of September 2002, council departments had completed less than 20 percent of the actions that the plan had called for by that date. The departments have started work on other planned actions, including some that have a deadline after September 2002 and that the council believes are a high priority. When asked to assess implementation of the plan, 18 of the 21 advisory committee members who responded to that question said that the council was making inadequate or very inadequate progress. Survey comments and other evidence indicate various reasons for the lack of progress. Delays in implementing the plan will hamper agency efforts to prevent and control invasive species as intended by the executive order.

Lack of Departmental Reporting Hinders Measurement of Progress

It has been difficult to quantitatively measure the council's progress in implementing the management plan because only 6 of the 10 member departments had submitted reports summarizing the steps they had taken to implement the plan. The plan calls for departments to submit such reports annually beginning in October 2001. Council staff aggregated the reports that were submitted into one summary of activities. These annual reports would be used to carry out yet another requirement of the executive order and management plan that calls for the council to revise the plan by January 2003.

Several survey respondents commented that it was difficult for them to evaluate the council's progress in implementing the plan because information from the council had been inadequate. For example, some respondents wrote that the level of interaction between them and the council was not sufficient, and that feedback to the advisory committee from the council on implementation progress has been poor.

The management plan also calls for the council to establish a "transparent oversight mechanism" that engages public involvement. The purpose of the oversight mechanism would be for use by federal agencies in complying with the executive order and reporting on its implementation, which includes the management plan. The plan called for the mechanism to be in place by April 2001, but according to the council staff, work has not yet begun.

The Council Has Completed Less Than 20 Percent of Planned Actions

Our review of the council's summary of department actions, which focused on the 65 planned actions with due dates through September 2002 (an additional 21 planned actions have due dates after September 2002, for a total of 86), revealed that less than 20 percent of the actions due by September 2002 were complete.[40] Several actions completed on time related to the development of the council's Web site, which is found at www.invasivespecies.gov. Another completed action concerned a series of regional workshops on invasive species for policymakers that the council, led by the Department of State, cohosted with countries such as Brazil, Costa Rica, Denmark, Thailand, and Zambia. Also in accord with the plan, the National Oceanic and Atmospheric Administration, the Coast Guard, the Department of the Interior, and EPA have sponsored research related to ballast water management.

Departments and the council staff have also started work on over 60 percent of the other planned actions, including some that have a due date beyond September 2002. For example, departmental representatives and the council staff are working with the President's Council on Environmental Quality on guidance to federal agencies on how to consider the issue of invasive species as they prepare analyses required by the National Environmental Policy Act. However, the guidance is not expected to be ready until early 2003, past its August 2001 target date. USDA has begun work on additional regulations to further reduce the risk of species

[40] The plan called for several of the actions to start by a certain date, while most were to be completed by a certain date.

introductions via solid wood packing materials, but the department did not meet the management plan's January 2002 deadline. (See fig. 5 for information on the Asian long-horned beetle, an invasive species that entered the United States in solid wood packing material.) Council departments have begun work on a national public awareness campaign—cataloging existing public awareness programs and conducting a survey of public attitudes toward invasive species—and are seeking budget approval for starting the campaign in fiscal year 2004. They missed the June 2002 completion date called for in the plan. Among those actions that the council is working on that are not due until after September 2002 is a risk-based comprehensive screening system for evaluating first-time intentionally introduced nonnative species, which is due by December 2003. According to council staff, the complexities of implementing a screening system dictate that the departments work on this now. According to council staff, work is also underway on a coordinated rapid response program due by July 2003.

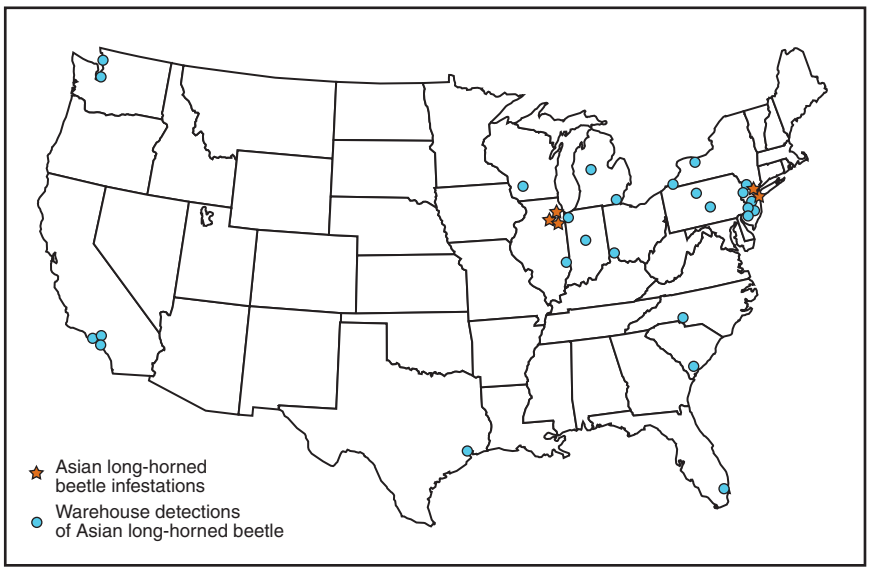
Figure 5: Profile of the Asian Long-Horned Beetle

Migration Path: Native to China, Japan, and Korea, the Asian long-horned beetle made its way from China to the United States in 1996 inside wood packing material. In the United States, the first beetle infestation occurred in New York; despite the Department of Agriculture's (USDA) nationwide Asian long-horned beetle pest alert campaign, the beetle was seen 2 years later in Chicago. Since 1998, no other Asian long-horned beetle infestation has been discovered, although the beetles have been seen in packing material at warehouse storage facilities.

Ecological Effects: The Asian long-horned beetle attacks horse chestnut trees, a variety of maples, and other hardwood trees. Adult females lay up 90 eggs, which hatch into worm-like larvae that bore into the trunks, branches, and heartwood of trees. USDA reports that if the Asian long-horned beetle establishes itself in the United States, it could cause more damage than Dutch elm disease, chestnut blight, and gypsy moths combined, potentially destroying millions of acres of hardwood forest.

Economic Impacts: The beetle could damage the U.S. lumber, maple syrup, nursery, commercial fruit, and tourism industries. If left uncontrolled, the USDA estimates the Asian long-horned beetle and other Chinese wood-boring insects could cause as much as $138 billion per year in damage to the U.S. economy.

Control Measures: The most effective method of eradicating the Asian long-horned beetle is to cut down, chip, and burn infested trees and replace them with nonhost species. The insecticide imidacloprid is increasingly being used with other methods to protect trees and eradicate the pest. USDA's Animal and Plant Health Inspection Service and the cities of New York and Chicago have invested over $30 million in efforts to eradicate the beetle and protect the 6.7 million trees in New York City and Chicago.



Sources: GAO analysis; photo, USDA Animal and Plant Health Inspection Service.

There are also actions in the plan that the council has not started to work on. For example, the council has not acted on the item in the plan that called for draft legislation by January 2002 to authorize tax incentives and otherwise encourage participation of private landowners in restoration programs. Nor has the council moved to ensure that a clearly defined process and procedures be in place by July 2001 to help resolve jurisdictional and other disputes regarding invasive species issues. Two respondents to our survey commented on the lack of council progress toward a resolution process, citing the need for it in cases such as one where federal agencies are taking contradictory actions with respect to an invasive rangeland grass (see fig. 6 for more on buffelgrass). In its comments on our draft report, EPA emphasized the significance of this deficiency and noted that there are other situations where a resolution process is needed, such as fish stocking to enhance recreational fisheries and using genetically modified organisms in aquaculture and agriculture.

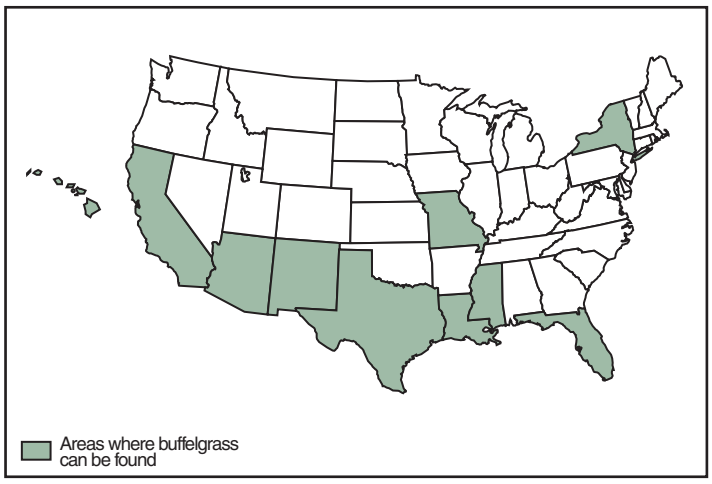
Figure 6: Profile of Buffelgrass

Migration Path: Buffelgrass is a perennial grass native to Africa and India. It was introduced into the United States in 1948 as forage grass for livestock in South Texas because it can tolerate drought and in Hawaii because it can control erosion. Buffelgrass seeds are spread by the wind and transported in the fur of animals.

Ecological Effects: This invader forms dense thickets that displace native species and, because of its flammability, can introduce fire into ecosystems where fire does not normally play a role. In Hawaii, buffelgrass is replacing the native grass, pili, which was used in making hula skirts. In many areas of South Texas, buffelgrass has displaced much of the native vegetation, including the endangered South Texas ambrosia, an herbaceous perennial plant. When wildfires occur, native plants often die when burned; buffelgrass, however, readily sprouts new seedlings within days. These seedlings rapidly become fields of buffelgrass, which is difficult to eradicate. Since buffelgrass invaded Arizona's Sonoran Desert, fires there have increased in frequency and size.

Economic Impacts: We found no estimates of the economic impacts of buffelgrass.

Control Measures: Experts are doubtful that buffelgrass can be controlled for the following reasons: (1) it withstands cutting and grazing, which have been shown to actually increase plant growth; (2) its long, dense root mass inhibits efforts to dig it up; and (3) neither herbicides nor burning kills the plants. Controversy is mounting over the benefits of buffelgrass use and its ecological effects. While the USDA's Agricultural Research Service is involved in developing a cold-weather strain to extend the range of buffelgrass for livestock, the Department of the Interior's Fish and Wildlife Service and National Park Service are concerned about the spread of existing buffelgrass because of its ability to spread, fuel fire, and out-compete native plants.



Sources: GAO analysis; photo, U.S. Geological Survey.

The majority of the advisory committee members responding to our survey noted the lack of progress made by the council agencies. Eighteen of the 21 members who responded to a question about implementation said that that the council was making inadequate or very inadequate progress. One noted that the only clear achievement to date is the council's Web site.

Some of the Agencies' Actions Are Not Clearly Linked to Coordinated Implementation of the Management Plan

In our view, while it is apparent that the agencies are taking various actions to address invasive species issues, the actions the agencies have reported to the council often do not represent coordinated progress toward implementation of the plan or management of the problem. The executive order and the management plan both emphasized the need for coordination among agencies. As evidence of that emphasis, a majority of the actions in the management plan are to be carried out by multiple agencies. However, the actions that the agencies reported to the council often did not appear to be directly linked to each other or be directly responsive to the specific actions called for by the management plan. In our survey, several advisory committee members also commented that coordination has been inadequate.

For example, the management plan called for the council to implement by January 2002 a process for identifying high-priority invasive species that are likely to be introduced unintentionally and for which effective mitigation tools are necessary. One agency noted to the council that it had contracted with professional societies to provide a list of the most harmful insect, weed, and disease plant pests that are not yet present in the country or present but not widely distributed. It also noted that it has a risk assessment procedure for identifying pests that may be introduced with commodities such as agricultural products. A second agency noted that it had held a workshop to identify potentially invasive species that might enter the nation's waters from Eastern Europe. A third agency indicated that it is providing training for firefighters to reduce the spread of weeds from one fire site to another. While these activities are related to the planned action, they do not indicate that the agencies are working together through the council to implement a process for identifying high priority species as called for by the plan.

The Executive Director of the council acknowledged that some of the actions reported by agencies did not seem to directly link to the management plan, although such information was useful for overall coordination purposes. She said that in the future implementation teams would help the agencies focus on those actions that are directly linked to the management plan. The Executive Director and one of the Assistant

Directors of the council told us that they believe that increased coordination has been an important accomplishment and that agency officials are now routinely talking with each other about invasive species management issues. In comments on our draft report, the Department of the Interior also noted that coordination and communication among the agencies has increased.

Slow Progress on Management Plan Is Due to a Combination of Factors

Our survey and other evidence indicate that the slow progress in implementing the management plan has been caused by a combination of factors, including delays in forming teams responsible for developing specific implementation plans, the lack of priority given to the plan by the council as a whole and by the departments individually, and insufficient funding specifically targeted to support the plan. Progress was also slowed by the need to transition from the previous administration to the current administration.

Delays Forming Implementation Teams

In October 2000, before issuing the management plan, the advisory committee and council staff agreed that implementation teams made up of federal and nonfederal stakeholders were needed to put the management plan into action. The advisory committee members and council staff agreed that the teams should be under the auspices of the advisory committee and be closely aligned to the major sections of the management plan. Specifically, the teams would be responsible for "delivery" of the planned actions. For example, a prevention team would be responsible for guiding implementation of the actions relevant to prevention. However, for various reasons, most implementation teams were not formed until June 2002. Specifically:

- The Executive Director of the council told us that she did not believe it would have been appropriate to form the implementation teams until after the management plan was issued in January 2001.

- The change in administration then delayed action on implementing the plan by about 6 months because it took time for cabinet secretaries—the members of the council—and other political appointees to be nominated and confirmed; departments were ready to move forward with forming the implementation teams in the fall of 2001.

- By that time, the first term of all of the advisory committee members was approaching its end in November 2001 and because the advisory committee members were to be an integral part of the implementation

teams, the Executive Director told us it did not make sense to form the teams until the next advisory committee was convened.

- Appointment of the second set of advisory committee members was delayed until April 2002 for a number of reasons, including the temporary loss of e-mail and regular mail delivery at the Department of the Interior.[41]

- The second advisory committee held its first meeting in May 2002, and committee members and council staff decided that the implementation teams should not meet until after the advisory committee members had a chance to review the teams' responsibilities and membership and discuss them at greater length at their next scheduled meeting in June 2002.

- In June 2002, nine implementation teams were created that largely mirror sections of the management plan (all but two of the teams will comprise federal and nonfederal members).

The Executive Director of the council told us the decision to create implementation teams of federal and nonfederal members under the auspices of the advisory committee was in part in recognition of the importance of getting consensus from key stakeholders early in the implementation process. She told us that she recognizes that there are potential problems with the teams comprising a disparate group of federal and nonfederal stakeholders. Specifically, logistical problems in getting the teams together and disputes within the teams could delay the federal departments in taking action to implement the plan. She said that the council would have to monitor the teams closely to determine whether or not they are effective.

The delay in establishing the implementation teams has hindered the agencies in achieving an important objective of both the executive order and the management plan—coordinated action. Several respondents to our survey commented that they had not seen adequate increases in the amount of coordination, and some pointed to the delays in forming the

[41] To avoid the problem of the advisory committee becoming temporarily inactive, the Executive Director told us that the council has modified the terms of the advisory committee members so that half have 2-year terms and half have 3-year terms. As a result, the committee will operate continuously.

teams as a cause. One respondent thought that federal departments and agencies were continuing to pursue their own mandates and programs with only a cursory regard for the framework and coordination that the council attempts to provide. The Executive Director of the council told us that she expected coordination to improve as the implementation teams become established.

In our view, the relationship of the advisory committee to the implementation teams has slowed progress on the plan and could continue to do so. While we understand why the council decided to form the implementation teams under the auspices of the advisory committee—to foster consensus among key stakeholders early in the implementation process—we believe that this decision may slow federal action. Specifically, it may be difficult for teams of federal and nonfederal stakeholders to put forth the concerted effort needed to implement the management plan. We are also concerned that it will be difficult to hold the departments accountable for carrying out the plan if they are relying upon the actions of teams with federal and nonfederal members.

Lack of Priority from the Council and Its Member Departments

About one-half of the respondents to our survey criticized the council and the departments for not giving the plan a higher priority. For example, several noted that it did not appear that the council had positioned itself to take a leadership role in implementing the plan or that the plan was not a high priority on the agendas of the leaders of the council's member departments. In addition, numerous survey respondents said that the individual departments needed to give the plan higher priority by providing better support in staff and resources.

Our review of agencies' performance plans (prepared pursuant to the Government Performance and Results Act) also indicates that implementing the management plan is not a high priority for individual agencies. We reviewed the performance plans of the three cochair departments on the council (the departments of Agriculture, Commerce, and the Interior), as well as those of the Department of Transportation, the Environmental Protection Agency, and agencies within the Department of the Interior (National Park Service, Bureau of Land Management, Fish and Wildlife Service, and Geological Survey). While most of the agencies' performance plans describe activities intended to control or manage invasive species—and are therefore consistent with the national management plan—none of the plans specifically identified as a measure of performance implementing actions called for by the council's plan. As one official from the Environmental Protection Agency told us, activities that

are not in the agency's performance plan do not receive a high priority. Nevertheless, the Department of the Interior official responsible for pulling together the crosscut budget for invasive species programs told us that he believes that process—because of its emphasis on performance measures—will help departments link the management plan to their performance plans.

With regard to the notion that the council was not giving the plan a high priority, three of the 23 advisory committee members who responded to our survey commented on the absence of specific legislative authority establishing the council. One stated "the council needs to be approved legislatively so that they are their own entity with better options to act." Another said "Congress or the President needs to make this a priority through legislation or funding. . . . Agencies need to be told this is a priority and given funding to accomplish their goals." Because executive orders such as the one that established the council do not provide any additional authority to agencies, the Executive Director of the council noted that legislative authority for the council, depending on how it was structured, could be useful in implementing the management plan. Officials from USDA, the Department of Defense, and EPA who are departmental liaisons to the council also told us that legislative authority, if properly written, would make it easier for council departments to implement the management plan. The Congress has recently considered legislation that would give the council certain responsibilities; namely to provide input into decisions about allocating funds to local governments and other organizations for controlling invasive plants. However, the Executive Director of the council told us that such a requirement would be unworkable if the legislation did not also formally establish the council and a future administration decided to discontinue the executive order that created the council.

The management plan calls for the council to conduct an evaluation by January 2002 of the current legal authorities relevant to invasive species. The council has not completed the evaluation. According to the plan, the evaluation is to include an analysis of whether and how existing authorities may be better utilized and could be used to develop recommendations for changes in legal authority. However, it does not state that the analysis should address whether the council itself is hampered in its mission by not having specific legislative authority that would allow it to direct its members to implement the national management plan.

Insufficient Funding and Staff

In the management plan, the council stated that many of the actions could be completed or at least initiated with current resources but that without significant additional resources for existing and new programs it would not be possible to accomplish the goals of the plan within the specified timeframes. The council also noted in its comments on the draft report that it believes the timeframes in the plan are optimistic given current resources. Two of the actions in the plan called for federal agencies to request additional funding for separate management functions through the annual appropriations process beginning in fiscal year 2003. According to a summary prepared by the council, the President's budget request for invasive species activities in fiscal year 2003 was at least 23 percent more than was requested in fiscal year 2002 (although slightly less than Congress appropriated in fiscal year 2002).[42] The council went on to say in the plan that estimates of the additional support required would depend on the details of implementation schedules developed by federal agencies and stakeholders. As we described above, however, the council and the advisory committee have only recently created the teams that will be responsible for working out the detailed plans for implementation. Therefore, it is unclear what additional resources are needed and whether the requested appropriations will be adequate to implement the plan.

In response to several of the questions in our survey, advisory committee members cited the lack of funding as a key reason for poor implementation of the council's management plan. (We did not independently assess the adequacy of funding.) Of the 18 who said that the council was inadequately implementing the plan, 9 said that funding was insufficient. A typical comment was that the council members need to make a better case to get Congress to support funding for an invasive species line item. Over 70 percent of the respondents to another question said that they knew of instances where federal agencies do not have the resources to carry out actions in the national management plan. While several respondents gave details on specific examples of where they believe federal agencies have underfunded invasive species programs, four others said that none of the agencies have the resources to implement the management plan in its entirety.

[42] The council's budget summary did not include data for all relevant agencies. Missing were data from the Army Corps of Engineers, the Environmental Protection Agency, and the Bureau of Reclamation.

In addition, 19 of the 21 respondents to one question said that the council had inadequate staff resources to serve the needs of the council. (The council has had a staff of five to seven people in the last 2 years.) One respondent said that the "level of funding now is token only and serves to support the most minimal staffing one can imagine for a national effort of this scale. It's embarrassing." Many of the respondents said that the council's staff are working hard and doing the best that they can. However, respondents also commented that the staff is overwhelmed, faced with substantial obstacles, and is not sufficient to support both the council and advisory committee. Several respondents emphasized that the council staff should be larger to more effectively push for implementation of the management plan.

Transition to New Administration

Finally, the Executive Director of the council staff told us that, in her opinion, progress on the management plan was slowed by the transition to a new administration. High-level political appointments are often vacant for months during the transition from one administration to another. A senior official from the Department of the Interior pointed out in July 2002 that many key managers relevant to the crosscutting budget proposal had been in office only a few months because of the time required to nominate and approve political appointees.

The Current Regulations Concerning Ballast Water Management Are Not Keeping Invasive Species Out of the Great Lakes

According to experts and agency officials we consulted, current efforts by the United States and Canada are not adequate to prevent the introduction of nonnative aquatic organisms into the Great Lakes via ballast water of ships, and they need to be improved. Compliance with regulations is high but nonnative aquatic organisms are still entering and establishing themselves in the Great Lakes ecosystem. U.S. and Canadian agency officials believe that they should do more to protect the Great Lakes from ballast water discharges. However, several time-intensive steps must be taken before the world's commercial fleet is equipped with effective treatment technologies. In the meantime, the continued introduction of nonnative aquatic organisms could have a major economic and ecological impact on the Great Lakes.

Compliance with U.S. Regulations Is High, but Nonnative Aquatic Organisms Are Still Entering the Great Lakes

Since 1993, U.S. regulations have governed how vessels entering the Great Lakes from outside the Exclusive Economic Zone, a zone extending 200 nautical miles from the shore, must manage their ballast water.[43] To be allowed to discharge ballast water into the Great Lakes, ships must exchange their ballast water before entering the zone and in water deeper than 2,000 meters.[44] Exchanging ballast water before arriving in the Great Lakes is intended to serve two purposes: to flush aquatic organisms taken on in foreign ports from the ballast tanks and to kill with salt water any remaining organisms that happen to require fresh or brackish water. If a ship bound for the Great Lakes has not exchanged its ballast water in the open ocean it may hold the ballast in its tanks for the duration of the voyage through the lakes. Under some circumstances—such as bad weather making an open-ocean exchange unsafe—the Coast Guard may approve a ship master's request to do the exchange in an alternative exchange zone in the Gulf of St. Lawrence.

[43] These requirements also apply to ships traveling in the Hudson River north of the George Washington Bridge in New York. The National Invasive Species Act also tasked the Secretary of Transportation with promulgating voluntary national ballast water guidelines. On May 17, 1999, the Coast Guard promulgated interim voluntary guidelines, including ballast water exchange, applicable to vessels entering U.S. waters from outside the Exclusive Economic Zone and calling on U.S. ports other than those in the Great Lakes or on the Hudson River. The guidelines became final December 21, 2001. They also require that arriving ships report information on their ballast water, although they do not impose penalties for nonreporting.

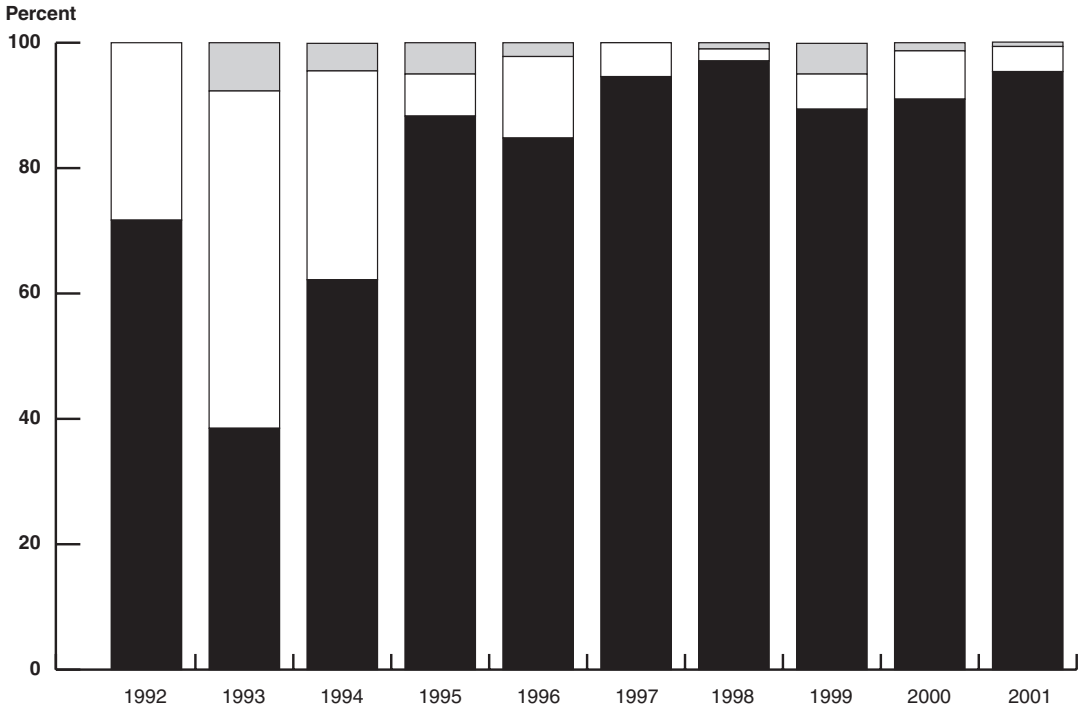
[44] The National Invasive Species Act currently allows vessels to use alternative environmentally sound ballast water management methods but requires that they be "as effective as ballast water exchange" in preventing and controlling the influx of aquatic organisms; under the regulations, the Coast Guard Commandant must first approve their use. To date, no alternative methods have been approved.

The U.S. Coast Guard, the Saint Lawrence Seaway Development Corporation, and the Canadian St. Lawrence Seaway Management Corporation inspect ships as they enter and travel through the St. Lawrence Seaway. The Coast Guard also inspects ships at U.S. ports throughout the Great Lakes. Data from the Coast Guard show that the percentage of ships entering the Great Lakes after exchanging their ballast water has steadily increased since the regulations took effect in 1993 and averaged over 93 percent from 1998 through 2001. (See fig. 7.) Representatives of the Coast Guard and the seaway corporations told us that the high exchange rate indicates that the current regulations for the Great Lakes are being effectively enforced.[45] Experts have concluded, however, that numerous nonnative aquatic organisms have entered the Great Lakes via ballast water and established populations since the regulations were promulgated. (See fig. 8.) Two such species are the fish-hook water flea (*Cercopagis pengoi*), discovered in 1998, and an amphipod (a small crustacean) known as *Echigogammarus ischnus*, discovered in 1995.[46]

[45] In contrast, compliance with the mandatory reporting requirements that apply to the rest of the country has been low. A Coast Guard official testified before the Congress on May15, 2002, that the consistently low rate of reporting makes it impossible to accurately assess compliance and effectiveness. Congress mandated that the voluntary ballast management guidelines become mandatory if the Secretary of Transportation determines that compliance is low.

[46] As with an earlier shipborne invader known as the spiny water flea (*Bythotrephes cederstroemi*), scientists are studying the fish-hook water flea's impact on zooplankton biomass. Zooplankton is a common item in young fishes' diets and the fish-hook water flea has the potential to disrupt fish populations by preying on their food supply. In addition, the fish-hook water flea clumps together into large mats that tangle fishing lines, which could adversely affect the commercial and recreational fishing industries. The amphipod *Echigogammarus ischnus* was first discovered in the Detroit River in 1995, where it occupied a habitat typical of the native amphipod *Gammarus fasciatus*, suggesting the possibility of competition between the two species.

Figure 7: Rates of Compliance with Ballast Water Exchange Requirement for Ships Entering the Great Lakes, 1993-2001



Note: In addition to performing an open-ocean exchange, a vessel can comply with ballast water management regulations by retaining its ballast water on board or, with prior approval from the Commandant of the Coast Guard, use an environmentally sound alternative method of ballast water management.

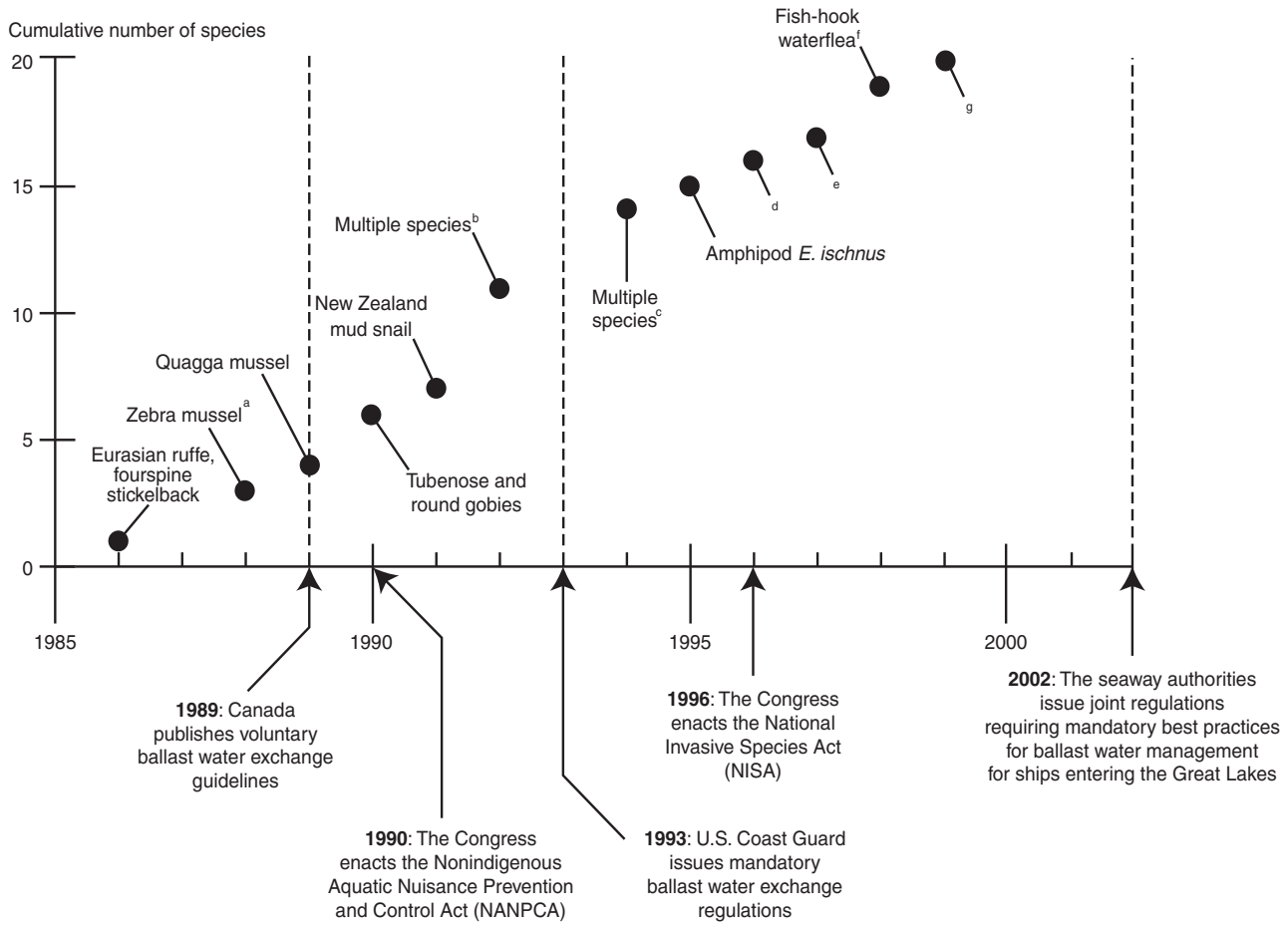
[a] In this chart, compliant vessels are those that exchanged their ballast water in the open ocean and those that met the 30 parts per thousand salinity requirement.

[b] In this chart, noncompliant vessels are those that did not meet the 30 parts per thousand salinity requirement and/or did not exchange their ballast water in the open ocean. Noncompliant vessels are not allowed to discharge ballast water into the Great Lakes.

[c] The Coast Guard considers vessels that pass the salinity requirement but have performed an exchange in waters less than 2,000 meters deep or less than 200 nautical miles from the shore to be technically noncompliant. A technically noncompliant vessel receives one warning before the Coast Guard issues a retention letter.

Source: U.S. Coast Guard.

Figure 8: Discovery of Nonnative Aquatic Species Introduced into the Great Lakes and Major Legislation and Regulatory Decisions, 1985-2002



[a] The crustacean Bosmina maritime, in addition to the zebra mussel

[b] The flatworms Dactylogyrus amphibothrium, Dactylogyrus hemiaphibothrium, and Neascus brevicaudatus, and the protist Trypanosoma acerinae

[c] The protist Sphaeromyxa sevastopoli and the flatworms Scolex pleuronectis and Ichthyocotylurus pileatus

[d] The crustacean Heteropsyllus cf. nunni

[e] The protist Acineta nitocrae

[f] The crustacean Schizopera borutsky, in addition to the water flea

[g] The crustacean Nitrocra incerta

Source: Igor A. Grigorovich, Robert I. Colautti, Edward L. Mills, Kristen Holeck, Hugh J. MacIsaac, Nonindigenous Animals of the Lawrentian Great Lakes: Tracking and Predicting Ballast Mediated Introductions, Great Lakes Institute for Environmental Research, University of Windsor, Windsor, Ontario, Canada,2002 (in review).

Experts have cited several reasons for the continued introductions of nonnative aquatic organisms into the Great Lakes despite the ballast water regulations. First, the Coast Guard has not applied the ballast water exchange regulations to ships with little or no pumpable ballast water in their tanks; approximately 70 percent of ships entering the Great Lakes during 1999 through 2001 were in this category. These ships, however, may still have thousands of gallons of residual ballast and sediment in their tanks. This could harbor potentially invasive organisms from previous ports of call and could be discharged to the Great Lakes during subsequent ballast discharges.

Second, there are also concerns that exchanging a particular percentage of ballast water does not remove an equivalent percentage of organisms from the tank. The Environmental Protection Agency and the Aquatic Nuisance Species Task Force reported that ballast water exchange with open-ocean water flushed 25 to 90 percent and 39 to 99.9 percent, respectively, of the organisms studied. Researchers explain this range by pointing out that organisms in sediment at the bottom of the tanks may not be flushed out by an exchange.

Third, there is some uncertainty regarding what percentage of the water in the tanks is actually flushed out during a typical ballast water exchange. When determining whether tanks have been flushed and refilled in the open ocean, the Coast Guard tests the new ballast water to see if it has a salt concentration of at least 30 parts per thousand.[47] However, given uncertainties about the salinity of a ship's original ballast water and evaporative losses that occur during transit, it is not clear from a basic salinity test what percentage of the original ballast water—and the potentially invasive aquatic organisms it may contain—has been removed.

Fourth, there is growing concern that freshwater organisms may be able to survive the saline environment created by mid-ocean exchange. Certain organisms have a stage in their life cycle during which they are "resting eggs" or "cysts" and may be tolerant of salt water. Once discharged into the Great Lakes freshwater system, these organisms can regain viability. There are also examples of species—including alewives and the sea lamprey—that normally spend part of their lives in salt water and part in freshwater,

[47] The salinity of seawater varies in various parts of the ocean from 30 to 39 parts per thousand, but is fairly close to 35.5 parts per thousand in the middle of the North Atlantic.

but have been able to thrive despite being "locked" into the freshwater of the Great Lakes.

In an effort to reduce the further introduction of nonnative species, the Saint Lawrence Seaway Development Corporation and its Canadian counterpart, the St. Lawrence Seaway Management Corporation, amended their joint regulations in February 2002 to require all commercial ships entering the Seaway system to comply with Great Lakes shipping industry codes for ballast water management.[48] These codes contain "best management practices" that are intended to reduce the number of organisms in ballast tanks. Such practices include not taking on ballast at night—when marine organisms are more likely to be near the surface—and regularly cleaning tanks.

Regulatory Decisions, Technological Developments, and Ship Modifications Needed to Significantly Reduce Ballast Water Invasions Will Take Many Years

According to experts we consulted, it will take many years to solve the problem of nonnative aquatic organisms arriving in ballast water. The Coast Guard is now working to develop new regulations that would include a performance standard for ballast water—that is, a measurement of how "clean" ballast water should be before discharge within U.S. waters. In May 2001, the Coast Guard requested comments on how to establish a ballast water treatment standard and offered for consideration four conceptual approaches. The agency received numerous comments showing a wide range of opinion. As a result, it issued an advanced notice of proposed rulemaking and another request for comments in March 2002 on the development of a ballast water treatment goal and an interim ballast water treatment standard. The Coast Guard is expecting to have a final rule ready for interdepartmental review by the fall of 2004 that will contain ballast water treatment goals and a standard that would apply not only to ships entering the Great Lakes but also to all ships entering U.S. ports from outside the Exclusive Economic Zone.

Once the Coast Guard sets a new performance standard for how clean ballast water should be, firms and other entities will have a goal to use as the basis for developing and measuring treatment technologies. Government, industry, academia, and other nongovernment interests are investigating several technologies, including filtration, hydrocyclonic separation, and chemical and physical biocides such as ozone,

[48] 67 Fed. Reg. 8885 (Feb. 27, 2002).

chlorination, ultraviolet radiation, heat treatment, and vacuum. Each technology has its strengths and weaknesses. One major hurdle facing any technological solution is how to treat large volumes of water being pumped at very high flow rates. Container vessels and cruise ships, which carry a smaller volume of ballast water, may require different technologies than larger container vessels. As a result, it is likely that no single technology will address the problem adequately. To facilitate technology development, the Coast Guard and the Department of Transportation's Maritime Administration are developing programs to provide incentives for ship owners to actively participate in projects designed to test treatment technologies.

To help with technology development, the National Invasive Species Act created a ballast water demonstration program that funds select proposals to develop and demonstrate new ballast water technologies. Under this program, the National Oceanic and Atmospheric Administration and the U.S. Fish and Wildlife Service have funded 20 ballast water technology demonstration projects at a total cost of $3.5 million since 1998. Other programs also support research, such as the National Sea Grant College Program, which has funded nine projects totaling $1.5 million. In addition, the National Oceanic and Atmospheric Administration, through the National Sea Grant College Program, and the U.S. Fish and Wildlife Service announced on June 6, 2002, that they expect to make $2.1 million available in fiscal year 2002 to support projects to improve ballast water treatment and management. In conjunction with this program, the Department of Transportation's Maritime Administration expects to make available several ships of its Ready Reserve Force Fleet to act as test platforms for ballast water technology demonstration projects. In fiscal years 2001 and 2002, Congress appropriated $550,000 to the Coast Guard for research and development related to ballast water management. In addition, EPA and the Coast Guard expect to contribute $210,000 to fund a 3-year study on the transfer of aquatic organisms in ballast water. Nonfederal researchers in industry and academia are also studying the content of ballast water and prospective treatment technologies. For example, a Canadian shipping company funded the installation of a treatment system on one of its ocean-going ships and allowed the Michigan Department of Environmental Quality to perform testing on the system.

Once effective technologies are developed, another hurdle will be installing the technologies on the world fleet.[49] New ships can be designed to incorporate a treatment system. Existing ships, on the other hand, were not designed to carry ballast water technologies and may have to go through an expensive retrofitting process. With each passing year without an effective technology, every new ship put into service is one more that may need to be retrofitted in the future.

[49] A recent study analyzing the market for future treatment technologies reported that there are over 47,000 vessels in the world fleet where ballast water treatment technologies could be applicable.

Public and private interests in the Great Lakes have expressed dissatisfaction with the progress in developing a solution to the problem of nonnative aquatic organism transfers through ballast water. An industry representative told us that she and other stakeholders were frustrated with the Coast Guard's decision to make a second request for public comment on a treatment standard; she said they were anticipating that the agency would publish a proposal rather than another request for information. More broadly, in a July 6, 2001, letter to the U.S. Secretary of State and the Canadian Minster of Foreign Affairs, the International Joint Commission and the Great Lakes Fishery Commission stated their belief that the two governments were not adequately protecting the Great Lakes from further introductions of aquatic invasive species.[50] They also noted that there is a growing sense of frustration within all levels of government, the public, academia, industry, and environmental groups throughout the Great Lakes basin and a consensus that the ballast water issue must be addressed now. The two commissions suggested that the re-authorization of the National Invasive Species Act is a clear opportunity to provide funding towards implementing research aimed at developing binational ballast water standards.[51] The International Joint Commission recommended in its 2002 11th Biennial Report that the U.S. and Canadian governments fund research recommended by expert regional, national, binational panels, task forces, and committees.[52]

[50] The Boundary Waters Treaty of 1909 established the International Joint Commission. The treaty established the commission to, among other things, advise the U.S.and Canadian governments concerning transboundary water quality issues. The commission has six members; three appointed by the President of the United States, with the advice and approval of the Senate, and three appointed by the Governor in council of Canada, on the advice of the Prime Minister. The Great Lakes Fishery Commission was created in 1955 by the Convention on Great Lakes Fisheries between the U.S.and Canada.

[51] The National Invasive Species Act is due for re-authorization in 2002. House and Senate re-authorization bills, H.R. 5396 and S. 2964, respectively, were introduced on September 18, 2002.

[52] The commission also recommended that the governments of the United States and Canada develop uniform protocols for performance testing of ballast water and ensure that all ships built after a certain date have treatment technology incorporated into their construction to be allowed entry into the Great Lakes.

In an effort to prevent the introduction of nonnative aquatic organisms into their waters, several Great Lake states have considered adopting ballast water legislation that would be more stringent than current federal regulations. For example, the legislatures in Illinois, Minnesota, and New York are currently considering ballast water legislation that would, among other things, require ships to "sterilize" their ballast water—a standard that would exceed even those for drinking water. The Michigan legislature also debated a proposal that would have required ships to sterilize ballast water before discharge. The stringency of that proposed legislation was a result of one Michigan legislator's frustration with the federal government's slow progress in implementing an effective national plan to protect the Great Lakes from invasions through ballast water. The bill that passed into law in Michigan, however, has requirements similar to those in the federal program.[53]

Citing inadequacies in the United States' regulatory program, an environmental organization petitioned EPA in 1999 on behalf of 15 nongovernmental, state, and tribal organizations to address ballast water discharges under the Clean Water Act. The petition asked the agency to eliminate the exemption that currently excludes ballast water discharges from regulation under its National Pollutant Discharge Elimination System program.[54] Eighteen members of Congress followed the petition with a letter also requesting that the agency examine whether the Clean Water Act could be used to provide effective regulation of nonnative aquatic organisms in ballast water. In its September 10, 2001, draft response to the petition and the congressional letter, the agency concluded that the exemption should not be lifted because regulation of ballast water discharges under the Clean Water Act would be more problematic than the process already in place under the National Invasive Species Act. The agency asserted that issuing uniform discharge requirements would require significant federal and state agency resources and would not necessarily provide protection greater than the National Invasive Species Act. The agency also stated that the using the Clean Water Act would likely subject ship operators to multiple and potentially different state and federal regulatory regimes.

[53] Several states outside the Great Lakes have passed ballast water legislation, including California, Hawaii, Maryland, Oregon, Rhode Island, and Washington. None of these laws require sterilization.

[54] 40 C.F.R. § 122.3(a). This program regulates pollutant discharges to the nation's waters.

On the international level, the United States is also an active member of the International Maritime Organization (IMO), a specialized United Nations agency that is also addressing ballast water management.[55] In 1997, the organization adopted "Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens." The IMO requests that all maritime nations adopt and use these voluntary guidelines that call for, among other things, open-ocean ballast water exchange. Member nations are also working toward an international convention to address ballast water management. According to a State Department official who is a member of the U.S. delegation to the IMO, the organization is developing a new convention for possible adoption in the fall of 2003. The State Department official told us that the convention would probably include ballast water exchange as an interim method and would likely include provisions for modifying the performance standard over time to correspond with and spur improvements in technology. Even if a convention were available for signature in the fall of 2003, it would take some years for it to enter into force and for effective treatment technologies to be installed on the world fleet. Recognizing the time needed to develop and install new technologies, the Coast Guard has suggested to the Marine Environment Protection Committee that the date by which ships must meet a new performance standard be 10 years after the organization adopts a convention (in this case, 2013).

[55] The IMO is an organization of 160 member countries with observers from governmental, industry, environmental, public interest, and labor organizations. To achieve its objectives, the IMO has promoted the adoption of some 30 conventions and protocols, and has adopted well over 700 codes and recommendations concerning maritime safety, the prevention of pollution, and related matters.

The Continued Introduction of Nonnative Aquatic Organisms Via Ballast Water Could Have Major Economic and Ecological Effects on the Great Lakes

Although no estimates have been made, using the past as a guide, the continued introduction of nonnative aquatic organisms into the Great Lakes could have significant economic and ecological impacts on the Great Lakes basin.[56] In a May 2001 report, the International Joint Commission noted that the past and ongoing economic impacts of invasive species introductions to the Great Lakes region represent hundreds of millions of dollars annually.[57] As a result, experts dread the introduction of the "next zebra mussel." The zebra mussel was introduced to the Great Lakes in 1988 and is continuing to wreak havoc on the ecosystem and surrounding economies. Zebra mussel control measures alone are estimated to have cost municipalities and industries $69 million from 1989 through 1995. (See fig. 9 for more on the zebra mussel.)

[56] The Coast Guard has estimated the impact of ballast water regulations on the shipping industry but has not done a comprehensive analysis of the benefits that the regulations would yield or the costs of inaction. The only specific economic impact cited by the Coast Guard as justification for the regulations was the cost of the zebra mussel infestation.

[57] Great Lakes Water Quality Board, Report to the International Joint Commission, *Alien Invasive Species and Biological Pollution of the Great Lakes Ecosystem* (Windsor, Ontario: May 2001).

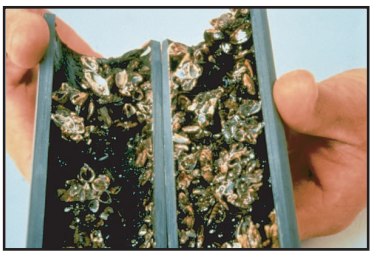
Figure 9: Profile of the Zebra Musse

Migration Path: Zebra mussels are indigenous to the Aral, Caspian, Azov, and Black Seas. They were dispersed throughout Europe by barges over 200 years ago. Scientists believe zebra mussels were transported to the United States in the ballast water of transatlantic ships. Zebra mussels spread by attaching themselves to ships, barges, recreational boats, and personal watercraft. They were first discovered in Lake St. Clair in the Great Lakes region in 1988. Since then, zebra mussels have spread throughout 20 states in the eastern United States.

Ecological Effects: Zebra mussels reproduce very quickly: females can release as many as 5 million eggs per year. Zebra mussels attach themselves to any submerged hard surface, including the shells of native mussels. By attaching themselves to native species in great numbers, zebra mussels interfere with the natives' growth, feeding, movement, respiration, and reproduction. According to the Bureau of Oceans and International Environmental and Scientific Affairs, zebra mussel invasions will reduce native mussel species by as much as 50 percent in the next decade, causing the extinction of up to 140 species.

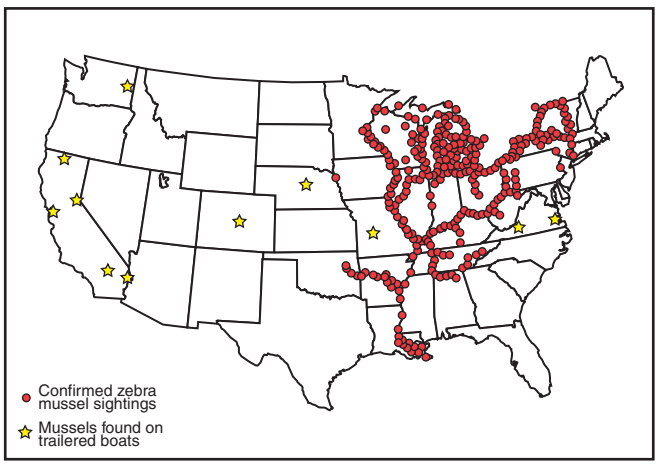
Economic Impact: Zebra mussels have devastating economic impacts on municipal and residential drinking water delivery systems, power plant intakes, and industrial facilities that use raw surface water. Water intake pipes are often encrusted with thousands of zebra mussels that restrict or stop water flow and increase sedimentation and corrosion on the pipes. (See photo) Maintaining pipes clogged with zebra mussels costs the American power industry up to $60 million per year. In 2001, the total cost of the zebra mussel invasion over the next 10 years, including impacts on industry, recreation, and fisheries, was estimated at $3.1 billion.

Control Measures: Zebra mussel control methods are both preventive and reactive. Preventive methods include using special coatings, chemicals, and thermal treatment. Reactive methods for removing attached zebra mussels include manual scraping, high pressure water-jetting, carbon dioxide pellet blasting, and freezing.



Pipe clogged with zebra mussels.

1988



2001

Sources: GAO analysis; photo, Michigan Sea Grant; map, U.S. Geological Survey.

Such fears appear to be well founded because scientists predict that additional invasions will occur if effective safeguards are not placed on the discharge of ballast water from ocean-going ships. We have discussed two species and listed others that have been introduced since ballast water regulations were implemented. (See fig. 10.) In addition, scientists have identified 17 species from the Ponto-Caspian region (Caspian, Black, and Azov Seas) of Eastern Europe alone that have a high invasion potential, are likely to survive an incomplete ballast-water exchange, and are considered probable future immigrants to the Great Lakes.

The continued introduction of nonnative aquatic organisms could further damage a U.S. and Canadian Great Lakes sport and commercial fishing industry that is valued at almost $4.5 billion annually and supports approximately 81,000 jobs. Aggressive fish that have invaded the lakes in the past (such as the sea lamprey, the Eurasian ruffe, and the round goby) have harmed native fish by directly preying either on them or on their food supply. Two of the potential species from the Ponto-Caspian region, the amphipods *Corophium curvispinum* and *Corophium sowinskyi*, could significantly alter biological communities along shorelines and food chains in North American river systems. Invasive species can also carry parasites and pathogens that could affect existing fish populations. For instance, fish pathologists fear that continued introductions of species such as the Eurasian ruffe may facilitate the introduction of new and potentially harmful parasites and pathogens, such as viral hemorrhagic septicemia, a serious disease of rainbow trout in Europe that could affect North American fish populations.

Ballast water is also known to carry human pathogens, although the risks they pose to human health has not been determined. One study performed during the 1997 and 1998 shipping seasons sampled ballast water in ships passing through the St. Lawrence Seaway en route to ports in the Great Lakes.[58] Human pathogens, such as fecal coliform, fecal streptococci, *Clostridium perfringens*, *Escherichia coli*, and *Vibrio cholerae*, as well as multiple species of *Cryptosporidium*, *Salmonella*, and *Giardia*, were detected in the samples. According to the Coast Guard, these organisms are also found in bodies of water that are influenced by human development.

[58] Knight et al., *Detection and Enumeration of Fecal Indicators and Pathogens in the Ballast Water of Transoceanic Cargo Vessels Entering the Great Lakes*, 1999.

There Is a Growing Interest in Coordination between the United States and Canada, but a Comprehensive Approach Has Yet to Be Developed

The United States and Canada participate in a variety of bilateral and multilateral efforts to share information, conduct research, and coordinate efforts to reduce the threat of invasive species. The two countries' long history of coordination has focused on particular segments of the issue such as shared boundary waters and agricultural research, and stakeholders have called for a more comprehensive strategy for joint prevention and management efforts. The National Invasive Species Council recognized the need for the United States to work with Canada (and Mexico) in a more comprehensive manner and has taken initial steps to develop a North American strategy as called for by the national management plan. It is too early to tell, however, what form a North American strategy will take or how existing organizations will be integrated.

Coordination Between the Two Governments Has Focused on Specific Issues or Geographic Regions

Historically, coordination between the United States and Canada has focused on specific pathways, species, or geographic areas rather than on a comprehensive coordinated approach. Primary examples of this coordination concern shared boundary waters and agriculture.

Shared Boundary Waters

One mechanism for coordination is the International Joint Commission, which was established by the Boundary Waters Treaty of 1909. The treaty established the commission to advise the U.S. and Canadian governments concerning issues along the boundary and approve certain projects in boundary and transboundary waters that affect water levels and flows across the boundary. The commission has focused much of its attention on the Great Lakes. The purpose of the 1978 Great Lakes Water Quality Agreement between the United States and Canada is to "restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem." The International Joint Commission's role with respect to the agreement includes evaluating and assessing the two countries' programs and providing a report at least every 2 years that presents its findings, advice, and recommendations. Recent reports have contained recommendations to the governments on how to reduce the flow of invasive species through ballast water.[59]

Protection of the Great Lakes fisheries against the nonnative sea lamprey was a motivating factor behind the creation of the Great Lakes Fishery Commission in 1955 in the Convention on Great Lakes Fisheries between the U.S. and Canada. The fishery commission, which is jointly funded by the two countries, has been largely successful in controlling, although not eradicating, the sea lamprey. Another primary objective of the fishery commission is to formulate a research program or programs to determine the need for measures to make possible the maximum sustained productivity of fish of common concern. One of the commission's goals is to ensure that no nonnative fishes will be unintentionally introduced into the Great Lakes. The commission has stated that it will intensify its work with partners to address those vectors for invasive species, such as ship ballast water, that pose the greatest threat to the lakes.

[59] According to EPA, in 1998, the United States and Canada called upon the International Joint Commission to help the two countries develop and implement new and improved binational approaches to manage and protect major shared watersheds. Aquatic invasive species would be covered by this long-term initiative.

Another mechanism that has promoted coordination between the United States and Canada is the establishment of regional panels to address aquatic invasive species. The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 authorized the establishment of the Great Lakes Panel on Aquatic Nuisance Species, which comprises U.S. and Canadian public- and private-sector representatives.[60] Its activities include identifying Great Lakes priorities for aquatic nuisance species, coordinating information and education efforts, making recommendations to the federal government, and advising the public about control efforts. Two other U.S. panels recently established under the National Invasive Species Act of 1996 in the West and the Northeast also include Canadian members.

As noted earlier, the United States and Canada are also working together on managing ballast water coming into the Great Lakes through the St. Lawrence Seaway. Cooperative efforts by the two countries were most recently demonstrated by the joint decision of the United States' Saint Lawrence Seaway Development Corporation and Canada's St. Lawrence Seaway Management Corporation to require all ships entering the seaway to follow established best management practices.

Agricultural Research and Pest Control

There has also been a long history of coordination between the U.S. and Canada in the area of agricultural research and pest control. As we reported in July 2002, for over 30 years the two countries and Mexico have held regular meetings on animal health issues to make North America's import requirements consistent and, more recently, to coordinate preventive actions and emergency response activities in the event of an outbreak of the nonnative foot-and-mouth disease.[61] In 2000, the three countries held joint exercises to test their foot-and-mouth disease communication and response plans and to assess their response systems. As a result of this exercise, the three governments signed a memorandum of understanding to formally establish the North American Animal Health Committee. According to USDA, the United States and Canada have also worked very closely in the past several years on jointly assessing the threat from two other foreign animal diseases—bovine spongiform encephalopathy (also known as "mad cow disease") and chronic wasting

[60] The Great Lakes Panel is made up of U.S. and Canadian federal officials and representatives from the eight Great Lakes states and the province of Ontario.

[61] U.S. General Accounting Office, *Foot and Mouth Disease: To Protect U.S. Livestock, USDA Must Remain Vigilant and Resolve Outstanding Issues*, GAO-02-808 (Washington, D.C.: July 2002).

disease. Another emerging animal and public health issue that the United States and Canada have worked together on is the West Nile virus, which is transported by migratory birds and by insects such as mosquitoes. (See fig. 10 for more details on the virus.)

Figure 10: Profile of West Nile Virus

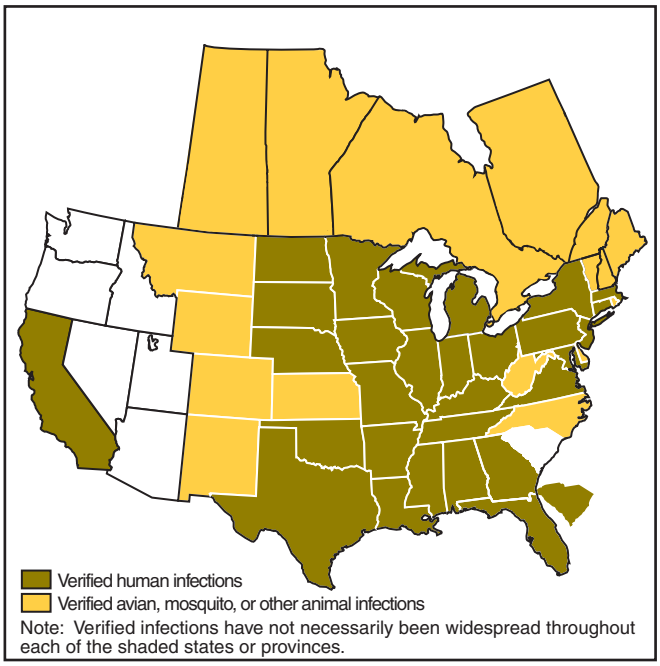
Migration Path: West Nile virus is found in host vertebrate such as birds. The virus is spread when blood-feeding arthropods such as mosquitoes, sand flies, and ticks bite infected birds and transmit the disease to susceptible mammals or other birds. West Nile virus was first identified in 1937 in the West Nile district of Uganda, Africa. The virus has been found in western Asia, the Middle East, and the Mediterranean region of Europe; it was discovered in the United States in 1999. Migrating birds may play a role in spreading the disease. In the United States, infected birds and mosquitoes spread the virus.

Ecological and Human Effects: The recent emergence of West Nile virus in North America presents a threat to human and animal health. The most serious manifestation of West Nile virus infection is fatal encephalitis (inflammation of the brain) in humans, horses, and certain domestic and wild birds. Between 1999 and the end of 2001 the United States recorded 149 severe human disease cases, including 18 deaths. Between January 1 and October 15, 2002, 2977 human cases were reported including 162 deaths.

Economic Impacts: We did not find estimates of the economic impacts of West Nile virus.

Control Measures: There are two ways to reduce the likelihood of contracting the virus: using personal protective measures to reduce contact with mosquitoes and instituting public health measures to reduce the population of infected mosquitoes in the environment. Personal protection measures include reducing time outdoors, wearing long-sleeved shirts and long pants, and applying mosquito repellent to exposed skin. Public health measures include eliminating larval habitats and spraying insecticides to kill larvae and adult mosquitoes. A working group consisting of representatives from the Centers for Disease Control and Prevention, the U.S. Geological Survey's National Wildlife Center, and the U.S. Department of Agriculture, in conjunction with state agencies, is gathering and analyzing surveillance data to define the extent to which the virus is distributed in mosquito and bird populations in states along the Atlantic and Gulf Coasts.

1999



As of Sept. 13, 2002

Sources: GAO analysis; maps, Health Canada and U.S. Centers for Disease Control.

To further strengthen communication and collaboration on invasive species and trade-related matters, USDA's Animal and Plant Health Inspection Service established an office in Ottawa, Canada, in 2000. The office oversees a preclearance program throughout Canada that conducts inspections, treatments and/or other mitigation measures in Canada to identify and/or mitigate the risk of exotic pest introductions via agricultural commodities before the commodities are cleared through the U.S. Customs Service.

Another vehicle for coordination in the agriculture sector is the North American Plant Protection Organization, created as a regional plant protection organization under the International Plant Protection Convention of 1951. The convention called for the governments to establish regional plant protection organizations responsible for coordinating activities under the convention, such as the development and promotion of the use of international phytosanitary certificates.[62] For example, through the plant protection organization, the United States, Canada, and Mexico worked together to develop a standard for treating solid wood packing materials. According to USDA, the United States and Canada are also working together to develop an international standard for evaluating the environmental impact of invasive species. This standard, which the USDA expects to be adopted by the International Plant Protection Convention in 2003, would provide a common framework for assessing the invasive potential of pests and thereby ensure a more rigorous but common approach to dealing with them.

Stakeholders Have Called for Increased Coordination between the United States and Canada

While there are numerous examples of coordination between the United States and Canada on invasive species control, some stakeholders in this issue believe that not enough is being done. For example, in June 1999, the Great Lakes Panel on Aquatic Nuisance Species wrote that there was a lack of inter-jurisdictional consistency in laws, regulations, and policies directed at aquatic nuisance species prevention and control efforts, and that improvements were needed to ensure a more efficient and effective regional prevention and control program.

As noted previously, the International Joint Commission stated its belief that the two governments were not adequately protecting the Great Lakes

[62] The term "phytosanitary" refers to measures taken to prevent the introduction and/or spread of plant pests.

from further introduction of aquatic invasive species and it made several recommendations regarding a binational approach to better management. In addition, according to EPA, there are numerous locations where there is a need for continuing regional cooperation to address aquatic invasive species in binational waterways, including the St. Croix River of New Brunswick and Maine; Lake Champlain of Quebec, Vermont, and New York; the Red River of North Dakota, Minnesota, and Manitoba; the Souris River of Saskatchewan, Manitoba, and North Dakota; and the Georgia Basin-Puget Sound of British Columbia and Washington. For example, in the Red River watershed of North Dakota, a proposed water diversion could introduce nonnative species into new locations. An official from EPA's Office of International Affairs told us that, in his opinion, having an overarching policy with respect to aquatic invasive species along the border would help better address these situations more quickly or avoid them completely.

The National Invasive Species Council's Assistant Director for International Policy, Science, and Cooperation told us that she believes that the United States could expand two existing interagency organizations—the Federal Interagency Committee for the Management of Noxious and Exotic Weeds and the Aquatic Nuisance Species Task Force—to include Canadian representation, or that Canada should be encouraged to develop similar organizations.[63] She said this would make it much easier to establish dialogue between officials with similar responsibilities. The council's Assistant Director also said she thought that the National Oceanic and Atmospheric Administration's Sea Grant Program could be more effectively used to support educational programs developed and implemented in the United States and Canada. She noted that because tourists frequently cross the border to and from Canada it is important to address this pathway with a common education strategy. In this same vein, while we reported in August 2002 that the United States, Canada, and Mexico have worked to coordinate animal health measures, we also noted that there are differences in the countries' policies and practices with regard to foot-and-mouth disease that could contribute to the risk that travelers may bring foreign animal disease across our mutual borders.

[63] The task force does have Canadian representation in an "invited observer" status.

The National Invasive Species Council Has Taken Initial Steps Toward Developing a North American Strategy, but its Form Is Not Yet Known

The National Invasive Species Council recognized the need for the United States to work with Canada (and Mexico) in a more comprehensive manner. The management plan called for the council to outline an approach to a North American invasive species strategy by December 2001. The strategy was to be built upon existing tripartite agreements and regional organizations. The plan also called for the council to initiate discussions with Canada and Mexico for further development and adoption of the strategy. The council has taken initial steps but has not completed this planned action.

The council established the North America Strategy task team in January 2002. It comprises federal and nonfederal stakeholders, and is cochaired by the Department of State, the Environmental Protection Agency, and the Fish and Wildlife Service. In March 2002, the Department of State sent a cable to United States embassy staff in Canada and Mexico requesting that they notify officials in those two countries of the federal government's desire to develop a North American strategy. According to one U.S. official involved in this project, Canadian representatives have responded positively to the idea.

In the time since it sent the memorandum, however, the team has done little to develop the strategy. The council staff and the advisory committee placed the team into a holding pattern in May 2002 when they decided that all of the implementation teams needed to be reviewed by the advisory committee. According to one of the cochairs of the team, among other things that the team will need to do is identify the objectives of the U.S. participation in the various North American organizations and determine what actions are being taken.

Two other multilateral organizations provide opportunities for a more comprehensive approach to an invasive species strategy across North American borders but do not have significant resources dedicated to the issue. The North American Commission on Environmental Cooperation, which is governed by a council composed of the Administrator of the United States Environmental Protection Agency, the Minister of the Environment in Canada, and the Secretary of the Environment and Natural Resources in Mexico, provides an opportunity for the United States and Canada to research and develop strategic plans for common ecosystems such as northern forests, grasslands, and aquatic ecosystems.[64] One objective in its 2001 draft Strategy for the Conservation of Biodiversity in North America, is to promote the development of concerted efforts to combat invasive species in North America. In March 2001, participants at a workshop sponsored by the commission recommended five priority areas for cooperation in North America on invasive species. Because of limited resources, however, the commission has decided to proceed with just one of those areas—identifying invasive species and invasion pathways that are a concern of two or more countries (within North America)—and determine priorities for bi- or tri-lateral cooperation.

The Trilateral Committee for Wildlife and Ecosystem Conservation and Management is composed of the wildlife agencies from the United States, Canada, and Mexico, and also has the ability to look at approaches for managing invasive species more broadly.[65] The committee has not analyzed invasive species in depth, although the issue was on its meeting agenda in April 2002 in order to set it as a topic for discussion at a later meeting. According to a State Department official who attended the meeting, the committee decided to add invasive species to the portfolio of the "working table" on biodiversity information.

[64] This organization was created under the auspices of the North American Agreement on Environmental Cooperation, which complements the environmental provisions of the North American Free Trade Agreement.

[65] Member agencies are the U.S. Fish and Wildlife Service, the Canadian Wildlife Service, and Mexico's Ministry of Environment and Natural Resources.

Conclusions

While the available data are often inadequate to thoroughly describe the costs and risks associated with invasive species, it is apparent that their impacts on our environment and, thus, our economy are significant. At the same time, because of limitations in both the quantity and quality of economic impact analysis, it may not be readily apparent to decision makers in the federal government how they should most effectively allocate limited resources to prevent and manage invasive species. It is encouraging that the National Invasive Species Council and OMB are working on a crosscut budget that the federal government can use to plan resource allocations to and among departments. Such decisions would be better informed by information and data on the risk that nonnative species will enter the country, become established, spread, and cause harm. The ballast water management situation is a prime example. The federal government faces decisions about dedicating resources to fund ballast water technology research or standard setting, and ultimately about imposing more protective regulations. Decision makers could weigh the costs of those activities against the potential costs of the next zebra mussel or sea lamprey to arrive in U.S. waters, if such data were readily available.

Moving ahead with a comprehensive management plan to combat invasive species is clearly in the national interest. It also poses a daunting challenge. Success in this effort will depend in no small part on crafting a plan that calls for clearly defined, measurable outcomes and has a mechanism in place to hold departments accountable for carrying it out. The National Invasive Species Council now has the opportunity to improve upon its management plan in a revision due in 2003. Successful implementation of the plan depends in part on the members of the council making it a priority within their own departments and agencies and, recognizing the enormity of the task ahead, developing estimates of the resources needed. Statements from various stakeholders suggest it is possible that federal agencies could better coordinate their efforts to implement the management plan if the Congress established the council in legislation. The management plan states that the council will conduct an analysis of legislative authorities relevant to invasive species. We believe that the evaluation should also examine the question of whether the lack of legislative authority establishing the council is hampering the council in its efforts to implement the national management plan.

Recommendations for Executive Action

To better manage the threats posed by invasive species in the United States, we recommend that the cochairs of the National Invasive Species Council—the Secretaries of Agriculture, Commerce, and the Interior—direct council members to:

- Include within the revision to the National Invasive Species Management Plan a goal of incorporating information on the economic impacts and relative risks of different invasive species or pathways when formulating a crosscuting invasive species management budget for the federal government. Such a goal may require a commitment from the council to ensure that adequate resources are dedicated within the federal government to expand the capacity for conducting appropriate economic analysis.

- Ensure that the updated version of the national management plan, due in January 2003, contains performance-oriented goals and objectives and specific measures of success.

- Give a high priority to completing planned action #1, which calls for establishing a transparent oversight mechanism for use by federal agencies in complying with Executive Order 13112 and reporting on implementation of the management plan.

- Include in its planned evaluation of current legal authorities an examination of whether the lack of legislative authority establishing the National Invasive Species Council and specifically directing its members to implement the national management plan hampers the council's efforts to implement the plan.

To better ensure the implementation of the national management plan, we recommend that the members of the National Invasive Species Council who are responsible for taking actions called for in the plan recognize their responsibilities in either their departmental- or agency-level annual performance plans. The annual performance plans and performance reports should describe what steps the departments or their agencies will take or have taken to implement the actions that are specifically called for in the national management plan. For the existing (2001 version) of the national management plan, the member departments to which this applies include the Departments of Agriculture, Commerce, Interior, Defense, State, and Transportation, and the Environmental Protection Agency.

Agency Comments and Our Evaluation

We provided copies of our draft report to the Departments of Agriculture, Commerce, Defense, Treasury, State, Transportation, and the Interior; the Environmental Protection Agency; the U.S. Trade Representative; and the National Invasive Species Council. We received written comments from the Department of the Interior, the Department of State, the Environmental Protection Agency, and the National Invasive Species Council. We received oral comments from the Departments of Transportation, Agriculture, and the Treasury. The written comments from the Department of the Interior, the Department of Agriculture, the National Invasive Species Council, and EPA are in appendixes II through V.

The Department of the Interior concurred with the recommendations in the report and said that it would work with the other cochairs of the National Invasive Species Council to implement the recommendations in a timely manner consistent with current budget and authority. While agreeing with the recommendations, the department expressed the view that our draft report did not adequately acknowledge the extensive invasive species activities that federal agencies are doing outside of what is called for by the national management plan. We agree that federal agencies are engaged in other invasive species management activities and have described many of them in prior reports. A principle objective of this review, however, was to assess the implementation of the national management plan, and not all federal activities. The department also commented that it believes that the Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, and the Maritime Administration are demonstrating substantial progress in developing technologies to treat ballast water. We agree that progress is being made, but continue to believe that much important work remains to be done. To illustrate this, we reported the Coast Guard's estimate that it may be at least 10 years before ships must meet a new performance standard for ballast water treatment, a step critical to real progress. The department suggested several other minor changes that we have incorporated where appropriate.

The Department of State commented that it did not fully concur with our finding that the slow progress on the national management plan is due to lack of priority given to the plan by the Council and departments. The department claimed that it places a high priority on accomplishing the goals of the management plan, and it itemized numerous activities in support of that statement. We do not disagree with the department's claims. However, we did not evaluate the efforts or progress of one department versus another; instead, we evaluated implementation of the management

plan overall. The letter from the Department of State also included comments from the International Joint Commission. The commission suggested that we include a recommendation that the federal government work with Canada to develop an effective approach to immediately improve the management of all ballast waters coming into the Great Lakes. Our report describes the current and expected situation with respect to ballast water in the Great Lakes. We believe that the decision to take more immediate action to solve the problem is a policy decision best left to the Congress or the administration. The commission also suggested that we ask the Congress to consider completing reauthorization of the National Invasive Species Act. While we recognize the importance of the commission's suggestion, we did not evaluate the current proposal to reauthorize the act. The department and the commission also offered minor corrections, which we have made.

The National Invasive Species Council concurred with our recommendations but made several clarifying comments. In particular, it noted that the management plan's deadlines were optimistic and suggested that we should have evaluated whether the deadlines were realistic or attainable. We believe that an assessment of its deadlines is an appropriate task for the council when it revises the management plan. In addition, the council commented that the report undervalued the progress being made toward coordination and cooperation among federal agencies and gave examples of such activity. We acknowledge that coordination between departments has increased as a result of the creation of the council and the management plan, and we have added language to support this point. Nevertheless, the report provides support for the position that improvement can still be made in this area. Finally, the council made other minor comments that we have incorporated where appropriate.

The Environmental Protection Agency commented that our recommendations were reasonable and believes that their implementation would enhance the federal government's response to dealing with the problem of invasive species. The agency also noted that the report is well written and helpful in assessing the progress made in coping with invasive species. The agency also made several clarifying comments that we have incorporated where appropriate. The agency questioned whether we should have based our conclusions about the pace of implementation of the management plan solely on the results of our survey of the members of the first term of the advisory committee, given the small size of the population and their possible biases. We did not draw our conclusions about the pace of implementation solely, or even primarily,

from the survey. Our statement that less than 20 percent of the plan has been implemented is based on our analysis of information from the National Invasive Species Council staff and the council's member departments. EPA also noted that the report's section on ballast water focused on the Great Lakes and pointed out that work is being done and needs to be done in other parts of the country. We agree that ballast water is an important issue in other parts of the country. However, our objective, as part of our coordinated review with the Canadian Office of the Auditor General, was to focus on the Great Lakes. Finally, EPA made a number of technical clarifications that we have incorporated, where appropriate, in the report.

The invasive species coordinator for the Department of Agriculture said that our comments on the implementation of the national management plan were fair and on target. This official also provided two minor clarifying comments that we have incorporated.

The Department of Transportation's Director for Performance Planning in the Office of Budget and Program Performance provided oral comments on the draft. He told us that the department disagreed with our draft recommendation calling for the members of the National Invasive Species Council to incorporate the national management plan into their annual performance plans. He said that the department does not believe that it is appropriate to include performance goals with respect to invasive species in its performance plan because managing invasive species is not one of its core missions. In addition, he told us that the agencies within the department that have a more direct role with respect to invasive species, such as the Coast Guard, Maritime Administration, and Federal Highway Administration, are at liberty to include invasive species management goals in their annual performance plans. In response to this comment, we modified the wording of the recommendation to specify that the national management plan should be addressed in the most appropriate annual performance plan, whether at the departmental level or the agency level. The department also commented that there are many mechanisms other than ballast water by which invasive species are introduced into the environment. We agree, and noted some of them in the report. However, our objective specifically focused on the issue of ballast water in the Great Lakes.

A representative with the Office of Planning in the Department of the Treasury's U.S. Customs Service told us that because the current national management plan does not call for the Customs Service to undertake

significant activity on invasive species, it does not believe that it is appropriate for it to address the management plan in its annual performance plan as called for in our recommendation. We acknowledge that the current plan does not have action items directed to the Customs Service, and we modified our recommendation to clarify its applicability to those member agencies that are specifically responsible for action items in the existing (2001) national management plan. If future versions of the plan specify action items for other agencies, we would encourage them to follow the same practice with regard to their department- or agency-level annual performance plans. The Customs Service made no technical comments.

We are sending copies of this report to the other members of the National Invasive Species Council: the Secretaries of State, Defense, Transportation, Health and Human Services, and Treasury, and the Administrators of the Environmental Protection Agency and the U.S. Agency for International Development. We are also sending copies of this report to the Chairmen and Ranking Minority Members of the following congressional committees: the Senate Committee on Agriculture, Nutrition, and Forestry; the Senate Committee on Commerce, Science, and Transportation; the Senate Committee on Environment and Public Works; the Senate Committee on Energy and Natural Resources; the Senate Committee on Foreign Relations; the Senate Committee on Appropriations; the House Committee on Agriculture; the House Committee on Resources; the House Committee on Science; the House Committee on Transportation and Infrastructure; the House Committee on Energy and Commerce; the House Committee on International Relations; and the House Committee on

Appropriations. We will make copies available others upon request. This report is also available on our Web site at www.gao.gov. If you have any questions concerning this report, I can be reached at (202) 512-6878. Major contributors to this report include Trish McClure, Ross Campbell, Patrick Sigl, Don Cowan, Anne Stevens, and Amy E. Webbink.

David G. Wood
Director, Natural Resources
and Environment

Scope and Methodology

To determine the usefulness to decision makers of economic impact studies for invasive species in the United States, we reviewed economics and other policy literature that analyzes invasive species' effects on the U.S. economy and ecosystems. We also reviewed the literature that describes and evaluates U.S. regulatory policies for invasive species. We paid particular attention to the literature that evaluates how well cost-benefit analyses of invasive species' effects, and of regulatory policies to control them, have been adjusted to reflect uncertainties and risks associated with these assessments. To further determine the usefulness of the existing studies, we selected and interviewed experts, including some authors of studies, and government officials involved in both authoring and using the economic impact studies. We identified these experts through our literature search.

To assess the National Invasive Species Management Plan, including the extent to which the United States government has implemented it, we first analyzed the content of the plan in relation to the requirements spelled out in Executive Order 13112. In particular, we analyzed the extent to which it contained "performance-oriented goals and objectives and specific measures of success for federal agency efforts concerning invasive species." The plan contains 57 enumerated actions. However, several of those actions have distinct subparts. In consultation with council staff, we agreed that there are a total of 86 distinct actions called for by the plan. To evaluate the extent to which the plan has been implemented, we focused primarily on those actions that had a start or completion date of September 2002 or earlier. There are 65 actions in that category. To determine whether actions had been completed, were in progress, or had not been started, we relied on the National Invasive Species Council's summary of agency progress, materials provided to us by agency officials, and interviews with council staff and agency officials. For those actions that had been started but not completed, we did not attempt to characterize the extent to which they had been completed. In only a few instances did we attempt to determine when incomplete actions would be complete.

To assist in our evaluation of the plan and our assessment of its implementation, we surveyed the 32 people serving on the Invasive Species Advisory Committee for a 2-year term beginning in December 1999. We had several reasons for surveying this group: (1) they participated in developing the national management plan; (2) they represented a wide range of interests relevant to the invasive species issue; and (3) by virtue of their professions and their involvement with the committee, they were likely to have information and opinions on how the management plan was being

implemented. The Secretary of the Interior reappointed 15 of these 32 people for another term on the advisory committee beginning in April 2002.

One of the members of the original advisory committee told us that he had resigned from the committee partway through his term and did not believe that he was informed enough about events surrounding the council, the committee, or the management plan to respond to our survey. Therefore, for the purposes of calculating a response rate, we are using 31 as the size of our survey population. Twenty-one of the 31 members of the committee completed our survey, while 2 others completed a small portion of the survey. Therefore, while the response rate was 74 percent, the completion rate was 68 percent. Thirteen of the 15 people reappointed to the committee responded to the survey.

The survey instrument contained questions that asked for either numerical or open-ended answers. The survey, including a tally of the numerical answers, is in appendix IV. Because we did not take a sample of the committee members, the numerical answers are presented as a straight percentage of the total number of respondents. There are no error rates associated with the results. We did not reprint the open-ended answers in the report because they are too numerous and lengthy.

To determine the experts' views on the adequacy of U.S. and Canadian efforts to control the introduction of invasive aquatic species into the Great Lakes via the ballast water of ships, we selected and interviewed experts from various stakeholder interests. We identified experts through a literature search and by soliciting the names of other expert contacts throughout our review. In the end, we contacted experts from U.S. federal agencies, academic institutions, and the shipping industry. We also met with staff from two binational agencies—the International Joint Commission and the Great Lakes Fishery Commission—and with representatives of the Great Lakes Commission. In addition, we attended a conference on aquatic nuisance species to obtain opinions from a range of stakeholders on ballast water and associated shipping vectors.

To describe the current management of ballast water in the Great Lakes, we researched U.S. and Canadian legislation, regulations, and guidelines. In order to determine the compliance rate and effectiveness of the current regulatory regime for the Great Lakes, we obtained compliance and other data from the Coast Guard Marine Safety Detachment and the Saint Lawrence Seaway Development Corporation in Massena, New York. The Saint Lawrence Seaway Development Corporation also showed us the

U.S. ballast water inspection procedures on a vessel docked in Montreal, Canada, and bound for the Great Lakes. We also reviewed studies on the introduction of nonnative aquatic organisms traced to ballast water, paying particular attention to those that have invaded after the ballast water regulations for vessels entering the Great Lakes took effect in 1993. We interviewed both United States and Canadian scientists on the significance of the continued invasions since 1993.

For the international perspective on ballast water management, we reviewed the history and development of the current International Maritime Organization policies and guidelines. We also met with members of the U.S. delegation to the organization to determine the status of negotiations on a future international agreement related to ballast water. These officials represent the United States on the Marine Environmental Protection Committee and lead the correspondence group that is tasked with developing a performance standard for the future International Maritime Organization Convention on ballast water management.

To describe coordination between the United States and Canada, we interviewed officials from departments in the National Invasive Species Council to determine if their departments were involved in any significant efforts to coordinate with Canadian officials on invasive species management. From these discussions, we learned that coordination efforts on a binational (or in some cases trinational) level have focused primarily on shared boundary waters and agriculture. We obtained further information from the relevant departments on the nature of those coordination efforts. To learn more about how nonfederal organizations can play a role in coordinating the work of the two countries, we interviewed and obtained documents from officials representing the International Joint Commission, the Great Lakes Fishery Commission, the Great Lakes Commission, and the North American Commission on Environmental Cooperation. We also obtained documentation that described relevant work being done by the International Plant Protection Organization, the North American Plant Protection Organization, the North American Animal Health Committee, and the Trilateral Committee for Wildlife and Ecosystem Conservation and Management. Finally, we relied on previous GAO work on foot-and-mouth disease.

In choosing invasive species to profile, we judgmentally selected species that (1) illustrate problems in a variety of environments (aquatic, terrestrial, managed, and natural areas), (2) are drawn from a wide variety of taxonomic groups (vertebrate, invertebrate, virus, and plant),

(3) include some that are well known by the public and others that are not, and (4) provide a selection whose distribution collectively covers a large portion of the United States. We collected and reviewed data on the species from federal agencies, academic institutions, and previous GAO reports. We obtained photographs of species from the U.S. Geological Survey and USDA.

We conducted our review from November 2001 through September 2002 in accordance with generally accepted government auditing standards.

Survey of Charter Members of the Invasive Species Advisory Committee

United States General Accounting Office

GAO
Accountability * Integrity * Reliability

Survey of Charter Members of the Invasive Species Advisory Committee

Introduction

Welcome to the Survey of Charter Members of the Invasive Species Advisory Committee. To complete the survey, please click on the "Next Section" button in the center of the screen.

Please Note: You may need to use the scroll bar on the right hand side of the screen to read all the information on a page. The U. S. General Accounting Office (GAO), an independent agency of Congress, is studying the federal government's implementation of the National Invasive Species Council's 2001 National Invasive Species Management Plan. As part of our study, we are sending this survey to the original members of the Invasive Species Advisory Committee in order to ascertain their perceptions on the extent to which Management Plan action items are being successfully implemented, inquire whether legal or resource issues impede plan implementation, solicit suggestions for funding priorities and any other ideas that would advance implementation of the plan. We wish to emphasize that the questions in this survey are not intended to gather information on all of the invasive species activities of federal agencies; the questions address the National Invasive Species Council and agencies' implementation of the plan. GAO will take steps to prevent the disclosure of individually identifiable data from this survey. No information on how individual advisory committee members answered questions will be included in our report. Any discussion of individual answers or comments will omit any information that could identify the respondent.

Thank you for your time and assistance.

Navigating Through the Questionnaire

To complete the survey, you may move from screen to screen using either

-- the buttons at the bottom of each screen,

-- the menu bar on the left side of the screen, or

-- the arrow buttons on the navigation bar at the bottom of the screen.

You may exit the survey at any time by pressing the "Exit" button at the bottom of the screen (or on the navigation bar). You may log in again later to re- open your survey and then continue entering more responses or changing previous responses. The survey will start at the page where you left off. You may print your responses as you go through each section by pressing the "Print" button at the bottom of the screen. Press the question mark button at the bottom- right of the screen to display more information on using these navigation tools.

1

Instructions

The final question in the last section (Question 11) asks you to indicate that you have completed this questionnaire. Your answers will not be used unless you have completed this question.

Contacts

If you have any questions or are experiencing difficulties responding to the questionnaire, please contact:

Ross Campbell
e-mail: campbellr@gao.gov
Phone: (202) 512-6550

Patrick Sigl
e-mail: siglp@gao.gov
Phone: (202) 512-3792

We urge you to complete the questionnaire. We cannot develop information useful to Congress without your frank and honest answers.

Thank you very much for your time.

National Invasive Species Management Plan

For the following questions, please mark the number that most closely represents your opinion.

1. To what extent do you think the National Invasive Species Management Plan's action items are focused on the most important invasive species issues? *(Check only one answer.)*

Note: Responses to questions that can be shown numerically are indicated in italics below. Narrative answers are not shown. N = 21.

1. * Very great extent *4*
2. * Great extent *12*
3. * Moderate extent *4*
4. * Some extent *1*
5. * Little or no extent
6. * No opinion

2. In your opinion, what are the main strengths and weaknesses of the management plan and the action items?

   (Among the issues that you might consider is whether the plan and its action items are focused on the most important issues, are clear, specific, measurable, break new ground, and are achievable within stated timeframes and with available resources.)

   (There is no space limit to your responses.)

   Management Plan Strengths

   Management Plan Weaknesses

   Action Item Strengths

   Action Item Weaknesses

3. In your opinion, to what extent did the National Invasive Species Council consider the benefits and costs associated with preventing and/or controlling the spread of invasive species in developing the national management plan's blueprint for action? *(Check only one answer.)*

   1. * Very great extent ***2***
   2. * Great extent ***8***
   3. * Moderate extent ***5***
   4. * Some extent ***5***
   5. * Little or no extent ***1***
   6. * No opinion ***0***

If you answered very great extent, great extent, or moderate extent, do you know what specific information (reports, studies, advice, etc.) the Council relied on? *(Check only one answer.)*

1. * Yes - If yes, please specify below. ***12***
2. * No ***3***

Specific information the Council relied on:

National Invasive Species Council

4. Do you believe that the National Invasive Species Council, defined as the Secretaries of the departments that comprise the Council, is making adequate progress in bringing about the implementation of the action items in the Management Plan? *(Check only one answer.)*

1. * More than adequate ***0***
2. * Generally adequate ***3***
3. * Generally inadequate ***9***
4. * Very inadequate ***9***
5. * Don't know/No opinion

If the National Invasive Species Council is, in your judgment, less than generally adequate (that is, if you rated it 3 or 4 on the scale above) in bringing about the implementation of action items, please describe the problem(s) and recommend what may be done to solve it (them).

5. Do you believe that the staff of the National Invasive Species Council has adequate resources to serve the needs of the Council? *(Resources could include funding, staff, support from federal agencies, etc.)* *(Check only one answer.)*

1. * More than adequate ***0***
2. * Generally adequate ***2***
3. * Generally inadequate ***15***
4. * Very inadequate ***4***
5. * Don't know/
6. * No opinion

If the staff of the National Invasive Species Council does not, in your judgment, have generally adequate resources to serve the needs of the Council (that is, if you rated it 3 or 4 on the scale above), what additional resources do you believe are needed?

6. If you have any other comments to make about the National Invasive Species Council or about the Council's staff, please enter them below.

Federal Agencies

7. The National Management Plan specifies which federal agencies are responsible for implementing many of the action items. Do you know of any instances where federal agencies do not have the **legal authority** to carry out the action items for which they are responsible? *(Check only one answer.)*

1. * Yes - If yes, please specify below. *4*
2. * No *8*
3. * Do not know *9*

Instances where federal agencies do not have the legal authority to carry out the action items:

8. Do you know of any instances where federal agencies do not have the **resources** to carry out action items in the National Management Plan? *(Check only one answer.)*

1. * Yes - If yes, please specify below. *15*
2. * No *2*
3. * Do not know *4*

Instances where federal agencies do not have the resources to carry out the action items:

General Questions

9. The federal government is involved in many aspects of invasive species management. Please rank (1, 2, 3, etc.) the following activities according to the funding priority you believe each should receive.

Note: Of the 21 respondents who answered this question, 6 gave the same ranking to 2 or more of the activities. For example, several gave a ranking of 1 to both prevention and early detection/rapid response. The following average ranking is based on the answers given by the 15 respondents who gave each of the activities a different ranking.

Prevention - *(Enter rank.)* ***1***

Early detection and rapid response - *(Enter rank.)* ***2***

Control, management, and restoration - *(Enter rank.)* ***4***

Research and monitoring - *(Enter rank.)* ***5***

International measures - *(Enter rank.)* ***6***

Public outreach and partnership efforts - *(Enter rank.)* ***3***

Other - *(Please specify and enter rank.)*

Note: Three respondents provided entries for the "other" category. They were: dedicated coordination function; program effectiveness evaluation; and screening, risk assessment, and pathway analysis methodologies.

If you would like to comment on your rankings for question 9, please do so in the space below.

10. Are there any emerging invasive **species** or related issues that you believe have not yet received adequate public attention but may prove to have significant ecological or economic impacts? *(Check only one answer.)*

1. * Yes - If yes, please specify below. ***11***
2. * No ***5***
3. * Do not know ***5***

Emerging invasive species that you believe have not yet received adequate public attention but may prove to have significant ecological or economic impacts:

11. **If you have completed the survey, please check the "Completed" box below.** *(Check only one answer.)*

1. * Completed
2. * Not completed

Thank you for your participation.

When you have completed this survey, please press the **Exit** button below to submit your responses.

7

Comments from the Department of the Interior

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

OCT 15 2002

Mr. David G. Wood
Director, Natural Resources and Environment
United States General Accounting Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Wood:

Thank you for the opportunity to respond to the draft report entitled, "Invasive Species: Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem" (GAO-03-01). The Department concurs with the recommendations of this report and will work with the other Co-Chairs of the National Invasive Species Council to implement the recommendations in a timely manner consistent with current budget and authority. Our efforts to develop a budget crosscut on Invasive Species for FY 2004 should further support the report's recommendations.

Our specific response to each of the draft report recommendations is provided in the enclosure. If you have further questions, please contact A. Gordon Brown, DOI Invasive Species Coordinator, at (202) 513-7245.

Sincerely,

for

P. Lynn Scarlett
Assistant Secretary for Policy,
Management and Budget

Enclosure

Department of the Interior
Comments on GAO Draft Report entitled,
"Invasive Species: Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem"
(GAO-03-01)

General Comments:

The recommendations of the report are directed to the National Invasive Species Council (Council) co-chairs. Since the Department of the Interior is a co-chair of the Council, the Department will work cooperatively with the other co-chairs, in the Departments of Agriculture and Commerce, to address the report's recommendations.

The Department supports development of a budget crosscut on invasive species for FY 2004 and later requests by the Council departments. We believe this will lead to development of a performance-based strategic plan for most of the Executive Branch agencies.

Specific Comments:

Fish and Wildlife Service clarified an error of fact on Page 21 - "In addition, the Federal Aquatic Nuisance Species Task Force has developed a process to evaluate the risk of introducing non-native organisms into a new environment and, if needed, determine the correct management steps to mitigate that risk. The task force has used this process to provide guidance to states for designing their own management plans for aquatic nuisance species."

The second sentence of this statement is incorrect in that the risk assessment process is separate from the State management planning process. The second sentence should be modified to read: "The Task Force has also developed guidelines to provide direction to assist States in the development of their own management plans for aquatic nuisance species."

Recommendation #1: that the co-chairs of the Invasive Species Council—the Secretaries of Agriculture, Commerce, and the Interior—include within the revision of the National Invasive Species Management Plan, a goal of incorporating information on economic impacts and relative risks of different invasive species or pathways when formulating a budget crosscut.

The Department of the Interior, in consultation with the other co-chairs, will work to expand the capacity for conducting appropriate economic analysis on invasive species and their impacts.

Recommendation #2: that the co-chairs of the Invasive Species Council—the Secretaries of Agriculture, Commerce, and the Interior—ensure that the next edition of the national management plan contains performance-oriented goals and objectives and specific measures of success.

The Department of the Interior is working to advance activity-based costing as a model of performance budgeting and management for its own programs. A pilot program of performance-oriented goals and objectives with specific measures of success will be implemented in January 2004 for the National Invasive Species Council. This information will be used to build a more

complete budget crosscut proposal on invasive species for FY 2005, including shared goals, strategies and performance measures.

Recommendation #3: that the co-chairs of the Invasive Species Council—the Secretaries of Agriculture, Commerce, and the Interior—give a high priority to completing planned action #1, a Federal oversight mechanism for compliance with EO 13112 and management plan implementation.

The Department of the Interior will cooperate with the other co-chairs to jointly provide leadership on this issue and solicit consensus views on any proposal from the Invasive Species Advisory Committee.

Recommendation #4: that the co-chairs of the Invasive Species Council—the Secretaries of Agriculture, Commerce, and the Interior—include in its planned evaluation of current legal authorities an examination of the importance of legislative authority to National Invasive Species Council implementation of the national management plan.

The Department of the Interior will work with the other co-chairs to assess legislative authority for a national invasive species management plan.

Comments supplied by the bureaus:

Fish and Wildlife Service

Page 33 - "One respondent thought that federal departments and agencies were continuing to pursue their own mandates and programs with only a cursory regard for the framework and coordination that the council attempts to provide."

The National Invasive Species Management Plan (ISMP) is a critical document helping to focus department and agency invasive species activities; however, Federal agencies are also guided by other policies and legislation that direct their activities. Many of these activities are conducted by the agencies and are not reflected in the actions outlined in the ISMP. The GAO report gives a critical review of the Federal government's efforts to implement the ISMP with minimal acknowledgment of these extensive activities that balance invasive species workloads to meet both existing responsibilities and new activities outlined in the ISMP. In addition, we point out that the Council has made great strides in coordinating agency activities and increasing communication among agencies and departments about their invasive species activities.

Page 34 - "In our view, the relationship of the advisory committee to the implementation teams has slowed progress on the plan and could continue to do so. While we understand why the council decided to form the implementation teams under the auspices of the advisory committee - to foster consensus among key stakeholders early in the implementation process - we believe that this decision may slow Federal action. Specifically, it may be difficult for teams of Federal and non-federal stakeholders to put forth the concerted effort needed to implement the management plan."

While we agree that progress might have been made more quickly without input from the Advisory Committee, we support the Council's decision to proceed with a partnering process that incorporates input from the stakeholder Advisory Committee.

Page 37 - "The current regulatory approach to ballast water management is not keeping invasive species out of the Great Lakes".

While we agree that ballast water continues to be a major pathway for introductions of aquatic invasive species, we believe that the progress being made on monitoring and compliance by the Coast Guard to develop and implement regulations is timely and reflects the time-consuming nature of the regulatory process. We also believe that the efforts by the Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, and the Maritime Administration are demonstrating substantial progress to develop technologies to treat ballast water to remove invasive species.

Page 54 - "The National Invasive Species Council's Assistant Director for International Policy, Science, and Cooperation told us that she believes that the United States could expand two existing interagency organizations - the Federal Interagency Committee for the Management of Noxious and Exotic Weeds and the Aquatic Nuisance Species Task Force - to include Canadian representation. . ."

The Aquatic Nuisance Species Task Force (ANS) has Canadian representation in an "invited observer" status. In addition, the ANS Task Force has actively recruited Canadian representation in the efforts of its numerous committees. For example, three of the Regional Panels of the Task Force (Northeast, Great Lakes, and Western) have Canadian representatives serving on the committees.

National Park Service

The draft report dwells on the need for more comprehensive data and analysis of risks and of economic and ecological costs of invasive species. We recognize that others may need this information, but we would like to point out that lack of information is not a major hindrance to our efforts to control invasive species.

We have a major Inventory and Monitoring Program in the National Park Service and some of the funds allocated for weed management are used for inventory and monitoring. We know where our weeds are and we know why we are controlling them. We do not wait for more information to implement an effective program. Our greatest need is for more funds for operational work.

Further, quantification of the costs of invasive species will tend to favor management of invasive species in situations where the costs can be easily given monetary value. Costs to agriculture are easily quantified in monetary terms whereas costs to natural areas are difficult to quantify. Therefore, generation of this data will tend to favor funding of control for invasive species that affect agriculture, at the expense of natural areas control efforts. Those who advise decision makers must assure that the decision makers are aware of the values of resources and natural processes that cannot be easily quantified.

The draft report points to a need for better performance management. We would welcome increased emphasis on performance management, but we want performance managers to understand the difficulty and complexity of applying performance measures to land management situations involving the interaction of multiple biological communities and diverse populations of existing and new organisms. A simple example will demonstrate this.

Suppose a land management agency has one million acres of weeds. If they treat one percent of the infested acres per year, or 10,000 acres, it would seem that they should be able to reduce the number of infested acres to zero in one hundred years. This is far from true.

Some weeds spread slowly while other spread very rapidly. For large scale planning purposes, weed scientists often assume an average spread or rate of increase of 15 percent per year. Therefore, if you begin with one million infested acres and treat 10,000 acres, at the end of the year you will have an infested area of 1 million minus 10,000 acres treated, plus 148,000 newly infested acres (990,000 x 0.15) for a total of 1,138,000 acres. This is the situation faced by most Federal land managers today. Presently, our objectives are to slow the spread of weeds and to try to target the most critical species and acres.

Further, we are never finished with the 10,000 acres treated. They must be periodically monitored and may require periodic retreatment. In many cases, planting the sites with native species, a costly and difficult process, would offset the need for retreatment. The agency will reach a point where the monitoring of treated acres and retreatment will require 100 percent of its weed management budget.

Finally, we would like to make one technical comment. The draft report suggests that we should develop biological controls for potential invaders before they arrive in North America so those biological controls will be available for rapid responses. This would be extremely expensive, especially when you consider that some of the potential invaders may never reach our shores or may be intercepted at the ports of entry. More importantly, biological controls, even if they are available, are not an effective tool for rapid responses. Biological controls work very slowly and can reduce but not exterminate established populations. They would have little or no impact on incipient populations.

We appreciate the opportunity to offer our perspectives on the draft report.

Comments from the Department of State

United States Department of State

Washington, D.C. 20520

OCT 16 2002

Dear Ms. Westin:

We appreciate the opportunity to review your draft report, "INVASIVE SPECIES: Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem," GAO-03-25, GAO Job Code 360158.

The Department's comments are enclosed for incorporation as an appendix to the GAO final report, along with comments from the International Joint Commision (IJC). Please find technical comments attached as well.

If you have any questions regarding this response, please contact Dana Roth, Office of Ecology and Terrestrial Conservation, Bureau of Oceans and International Environmental Scientific Affairs on (202) 736-7426.

Sincerely,

Christopher B. Burnham
Assistant Secretary of
Resource Management and
Chief Financial Officer

Enclosure:

As stated.

cc: GAO/NRE - Mr. Wood
State/OIG - Mr. Berman
State/OES - Ms. Stephens

Ms. Susan S. Westin,
Managing Director,
International Affairs and Trade,
U.S. General Accounting Office.

Department of State Comments on GAO Draft Report

INVASIVE SPECIES: Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem, (GAO-03-25, GAO Code 360158)

The Department of State and the International Joint Commission (IJC) appreciate the opportunity to comment on the draft report INVASIVE SPECIES: Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem, and both noted the comprehensiveness of the report. IJC's comments follow those of the Department of State.

The Department of State places a high priority on accomplishing the goals of the National Invasive Species Management Plan, and this priority is reflected in the attention the Department has devoted to the invasive species issue and the progress we have made, as outlined below. At least in relation to the Department's activities, we therefore do not fully concur with the finding of the GAO report that attributes slow progress on the management plan to lack of priority given to the plan by the Council and departments (e.g., p.32).

- Over the last four years, the Department of State has increased resources to work on the invasive species issue. Currently, there is an American Association for the Advancement of Science Fellow employed full-time in OES/ETC who works almost exclusively on this issue.
- The Department coordinates the inter-agency process for the Convention on Biological Diversity that addresses invasive alien species. The agencies have worked with the Department over many hours to develop a strong work program, and many agencies were actively engaged on this issue at this international meeting.
- The Department has funded several regional workshops with the Global Invasive Species Programme to help build cooperation to address this global problem. The Department with other USG agencies has helped facilitate the development of strategic plans to address the invasive species problem in several regions, including South and Southeast Asia, Southern Africa, Nordic-Baltic (which the Department has funded a follow-up workshop on information systems for invasive species), and South America. ("Recommendations" statements from our most recent workshops are attached, for your interest.)
- The Department is actively participating in the International Maritime Organization negotiations on development of ballast water standards (which is ongoing, Oct. 2002).
- The Department actively participates in the various relevant task teams set out in the National Invasive Species Management Plan and in the Advisory Committee meetings.
- The Department co-chairs the North America strategy task team, and participates in other North American fora that address invasive alien species.

• The Department takes an active role in raising awareness of the invasive species issue in bilateral and multilateral negotiations.

The following comments were provided by IJC:

The report highlights the sensitivity of the Great Lakes ecosystem to invasive species yet fails to recommend any action to protect this resource. Suggest that in its recommendations the GAO consider adding comment under action for executive.

In the face of the continuing invasion of the Great Lakes by invasive species, take action, in coordination with the government of Canada, to develop an effective approach to immediately improve the management of all ballast waters coming into the Great Lakes

Add an action for Congress

To continue strong support for invasive species control, promptly complete action on reauthorization of NISA.

Attachment: Final Recommendations, Arising from 2001 – 2002 Regional Workshops on Invasive Alien Species

Comments from the National Invasive Species Council through the Department of the Interior

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

OCT 15 2002

To: David G. Wood, Director of Natural Resources and Environment
U.S. General Accounting Office

Through: **Dr. Jim Tate**, Science Advisor to the Secretary
U.S. Department of the Interior
Mr. Tim Keeney, Deputy Assistant Secretary for Oceans and Atmosphere, U.S. Department of Commerce
Dr. Jim Butler, Deputy Assistant Secretary for Marketing and Regulatory Programs, U.S. Department of Agriculture

From: Lori Williams, Executive Director, National Invasive Species Council

Subject: Council Comments on GAO report, Invasive Species:
Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem (GAO-03-01) - DRAFT

Attached are the comments of the National Invasive Species Council on the subject GAO report. This draft has also been sent to the Council member departments for their comment and approval. The co-chair departments are also providing separate comments to GAO.

I can be reached at 202-513-7243 should you need to discuss these comments further.

National Invasive Species Council Comments on the Draft GAO Report entitled, Invasive Species: Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem (GAO-03-01)

Comments on Recommendations

The Council concurs with the recommendation that the upcoming revision of the National Invasive Species Management Plan (Plan) the goal of incorporating information on the economic impacts and relative risks of different invasive species or pathways in the formulation of an invasive species crosscut budget. The Council notes that the current Plan (see, action items #44 and 46(a) under Research) calls for additional research on the economic impacts of invasive species, and increased emphasis on risk analysis (see action items #14, 15 and 19 under Prevention). The Council also concurs with the note of caution that determining in advance what species are likely to be invasive through unintentional introductions could be problematic, as stated in the Department of Commerce comments on this section.

The Council agrees that better performance measures should, and will, be included in the revised version of the Plan. However, it is important to note that the Management Plan was this nation's first attempt to draft a comprehensive blueprint on how to deal with invasive species issues across 23 Federal agencies and coordinate with state, local and private entities. The Plan has and continues to be used as a model for planning efforts by numerous states and other nations, including Canada. The Council is including performance measures in the current draft of the invasive species crosscut budget. It is also important to recognize that for many invasive species, baseline data may be lacking. Additionally, some activities essential to dealing with invasive species issues, including some elements of prevention (how do you confirm the absence of a species?), education and outreach, and research may not be easy to measure, at least in the near term. Despite these important caveats, the Council is supports including realistic and attainable performance measures as part of the revised Plan.

The Council concurs that action item #1 of the Plan establishing a transparent oversight mechanism for use by Federal agencies in complying with Executive Order 13112, be given a high priority.

The Council concurs that an evaluation of whether there should be statutory authority for the Council should be conducted.

It is appropriate for the Council's individual members to respond to the final recommendation concerning their individual annual performance plans. The Council stands ready to assist in this effort. The Council notes that each member department and agency operates on different timelines regarding their performance and strategic plan.

1

General Comments

Although the Council agrees that progress to date on completing action items in the Plan has been disappointing and is taking steps to accelerate progress, it is important to realize that the deadlines in the Plan were optimistic, given current resources and funding. As noted in the comments of the Department of Commerce, the report fails to evaluate whether the original deadlines contained in the Plan were realistic and attainable. The report underestimates progress under the report in the following ways:

1) It sites as progress, only those items (except in a few noted cases) that have been competed. This is despite the fact that GAO gathered a significant amount of information from the Council staff and the departments about progress toward completion of 40 to 50 percent of the action items -- in addition to those completed. Many of the items in the Plan represent ambitious, broad goals requiring multi-agency planning, implementation, and sign-off -- and reporting on progress toward those goals is important. For example, progress toward achieving a common monitoring protocol for invasive plants represent a significant step, despite the need to complete work on other taxa.

2) Progress toward an action item under the Plan by departments and agencies -- either individually or as a group -- is significant progress; regardless of if complete coordination has occurred or if a specific Council task team has been formulated. This especially applies to those where one or more lead agencies are identified in the Plan. Now that implementation task teams have been formulated, they are utilizing and building upon the work has already done by individual agencies or departments. Prior progress achieved individually or collectively will significantly expedite future progress on action items that have been the focus of departmental and agency efforts. For instance, the Pathways task team is using lists of pathways already developed or being developed by a number of agencies as initial input for completing action item #20.

3) The status of the implementation teams (by Federal agency officials) was built upon the scoping teams' work, and the entire process should be considered in the evaluation. This will be explained in more detail in the specific comments. In the scoping process, Federal members of the teams (representing all Council member departments and agencies, not the Council staff or liaisons) met and approved draft procedures, identified key stakeholders, set priorities for work. They also decided individually whether it was important to include nonFederal stakeholders in the formulation of their group. This was done in advance of the formulation and approval of joint Federal/nonFederal subcommittees and task teams under the Invasive Species Advisory Committee. Current implementation teams have relied upon this work to a great extent.

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There seems to be a misunderstanding about the role and function of the Plan implementation task teams and subcommittees. It should be noted that specific actions under the Plan (in almost all cases) must be implemented by those specific agencies and departments with budgetary and regulatory authority or appropriate an authorized program. Those specific departments and agencies must carry out the actual implementation of details involved with each action item with responsibility. Therefore, the role of the implementation teams is to provide general, overall guidance, ensure all the key action agencies are identified, set priorities among the many items in the Plan and provide for coordination with outside groups and stakeholders, if appropriate.

In general, the report undervalues progress toward increased coordination and cooperation among Federal agencies and departments on invasive species. The Council has assisted with coordination of legislative issues and briefings related to invasive species. As noted, the current effort to draft an invasive species crosscut budget proposal for FY04 has resulted in significant coordination efforts on budget and performance management issues, especially among the three Co-chair departments. The report fails to note monthly meetings devoted to coordination among the ten Council member liaisons. Working closely with the State department, the Council assisted with coordination and formulation of international positions regarding the International Plant Protection Convention, and the Convention on Biological Diversity, among others. Further examples are contained in the specific comments below, and in the comments of individual member departments.

Specific Comments

P. 6 – It is important to clarify whether the report is referring to non-native, or invasive species.

P. 11 – The Council does not have a Risk Analysis Specialist or a Website Coordinator currently on the staff, nor has either been identified as a future position. Richard Orr assisted with risk analysis while he was on detail with the Council and is included in the Plan as a Council staff member. The National Agricultural Library manages our website on a day-to-day basis. Along with his other duties, Chris Dionigi (Domestic Policy Assistant Director) currently manages the website for the Council. The Council Co-chairs are currently evaluating the Council's staffing needs.

P. 13 – Note in discussion of economic impacts that action items 44(a) and 46(a) call for increased research at the national and international level on the economic impacts of invasive species.

P. 23 – The Council believes that the Plan is a very positive, initial overall blueprint for Federal action to deal with invasive species. It contains important elements that need to be implemented to address this serious problem. Future revisions of the Plan should, and will, include more specific performance criteria and address the perceived deficiencies in the Plan, which will improve the Plan overall.

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P. 24 – Including a specific performance measure regarding reducing the introduction of new species by a certain percentage would be problematic at this time. We do not have baseline data indicating the number of introductions now occurring. This example demonstrates the challenge of measuring exact performance for prevention activities.

P. 24 –The draft report appears to emphasize the response of nine (as opposed to the majority of 17) respondents who said that the plan is focused on the most important issues? This response seems to indicate a strong degree of support by ISAC members for the Plan. In addition, the Council believes all the members of ISAC are "prominent" in there fields and therefore are chosen to serve on ISAC.

P. 25 – The second paragraph quote of the Executive Director is incomplete and misleading. The important factors are that this was the first attempt to draft a comprehensive, Federal blueprint for managing and dealing with a wide range of taxa of invasive species for 23 Federal agencies. Given the scope of this first-time effort, it was unrealistic and difficult to also agree on specific measurable goals. (The current DAS for DOI was not present during the drafting or approval of the Plan. His statement is accurate, however it is important to note that the Plan underwent full departmental and OMB review as well as public notice and comment. Budget and performance management staff were not excluded from the process.)

P. 25 – The crosscut proposal for FY04 represents a very significant effort; however as a first attempt, it will not represent the totality of invasive species expenditures or efforts. It will emphasize certain efforts and primarily focus on the activities of the three Council Co-chairs.

P. 26 – The Council has provided extensive information about the progress of departments and agencies in addressing action items in the Plan. Council staff has also provided oral updates at most ISAC meetings. GAO staff observed many of the ISAC meetings, during which, they were provided with much of this information. A written, overall summary of progress is due to be completed in the next month.

P. 31 – Work sited here is being utilized by Council implementation task teams, and is part of the crosscut budget discussions. Progress by individual agencies is crucial to progress under the Plan . [See text of general comments]

P. 31 – The Executive Director did not say that it was improper to 'debate the agencies'. The Director stated that while some of the agency reports did not seem to directly link to specific action items, many if not most of the agency actions were accurate and helpful progress reports. In the Director's view, it is difficult and counterproductive for Council staff to second-guess agencies have the expertise in these areas and believe their actions are relative to the Plan. In addition, the reporting of invasive species activities (even if not directly linked to the Plan) is important for overall coordination purposes, and useful to the Council.

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P. 32 – The Executive Director did not say that there was "no reason to form implementation teams" until after the Plan was finalized. The Council departments and OMB had not approved the final Plan, and all comments had not been incorporated. It would have been inappropriate to formulate teams to implement a Plan that had not been approved or finalized.

P. 32 – The timeline is missing an important bullet and many actions that took place before the expiration of the terms of the last ISAC. Also, ISAC as a body did not expire. The charter for ISAC was renewed, and therefore the Committee itself continued to exist. What expired were the terms of the former ISAC members. Now terms are staggered among members to avoid future problems (This action has already been taken).

The missing bullet concerns the request by Council Federal officials to consider whether, how and who should formulate Plan implementation teams. This process began in June and July of 2001, well before ISAC terms expired. Those Federal officials from the Council who were interested met to discuss each of the teams proposed at the Shepherdstown meeting. (See the "Scoping" memorandum and draft terms of reference provided by Council staff to GAO.) At the scooping meetings, Federal officials agreed upon draft terms of reference (or operating procedures), discussed lead agencies, set initial priorities, and decided (at each scooping meeting for each team) whether non-Federal members should be included and thus the team should be formulated under ISAC. In most cases, Federal members were designated after these meetings. In all cases, the scoping meetings concluded non-Federal participation was desirable.

P. 33 – By the time scooping was completed for all the teams in the fall, the process for choosing new ISAC members had begun. This did result in a delay of further meetings as suggested until the new ISAC was formulated and met in May and June 2002. The teams that have met thus far have relied greatly on the earlier work done by the Federal scooping meetings.

Final bullet should read, "all but two of the teams (International and Budget) include both Federal and non-Federal members."

As clarified above, the Executive Director did not state that there was any single decision made at one time to include non-Federal members on all implementation teams. In addition, Federal members made decisions during scoping; and by ISAC members for each individual team. The importance of getting consensus and participation by key stakeholders has been a critical factor in the decision making process.

P. 34 – Please see the Council's General Comments about the misunderstanding of the role of the implementation teams. The ISAC does not have the authority in their Charter or otherwise to make decisions about implementing the plan at the Federal level. Those specific decisions are made by the appropriate agencies and departments with the legislative, budgetary and regulatory authority to take such actions. The implementation teams might more properly be termed "implementation guidance teams" and are not

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charged with making the type of decisions GAO references in this paragraph as inappropriate and outside the scope of ISAC's charter.

The Council agrees that the delays have been unfortunate, but believes strongly in the value of getting stakeholder input, assistance and expert guidance in determining how many elements of the Plan should be implemented. Invasive species is not solely, or even primarily a Federal problem. Solutions cannot be solely Federal and would be successful if implemented in a vacuum. The Council supports looking carefully at the Plan action items to be implemented, and determining the best mechanism on a case-by case basis rather than excluding non-Federal members from all Plan implementation guidance teams.

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Comments from the Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 11 2002

Mr. David C. Wood
Director, Natural Resources and Environment
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Wood:

Thank you for the opportunity to comment on the General Accounting Office (GAO) draft report entitled, *Invasive Species: Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem* (GAO-03-01), received on September 25, 2002.

As requested in your recent letter to Administrator Whitman, we are pleased to provide EPA's comments on the draft report. These were developed by our intra-agency Non-indigenous Species Work Group, comprised of representatives from our programs as well as our regional offices. The work group is very familiar with the invasive species problem and has been involved in the development of the Management Plan (hereinafter referred to as "the Plan") pursuant to the Executive Order 13112 on Invasive Species.

While the recommendations in the report seem reasonable, the conclusions are based on a survey of only 23 respondents. Nonetheless, we believe adoption of the recommendations would enhance the federal government's approach to dealing with the problem of invasive species. The draft report is especially noteworthy because it: (1) highlights why existing analyses of the economic impacts of invasives are of limited use to decision-makers; (2) describes why good models must be developed to predict the spread of invasives as well as their ecosystem and economic impacts; (3) highlights how few resources agencies are allocating to invasives' activities; and (4) highlights major limitations of the National Invasive Species Management Plan, including the fact that it isn't a strategic plan with measurable goals and environmental outcomes, but is instead an inventory of planned agency actions.

Although the report is a curious mix of economic theory, ballast water, and a review of the National Invasive Species Council (NISC), we found it to be well-written and helpful in assessing the progress made in coping with invasive species. We believe the report could be strengthened, however, if it focused more on the NISC and the Plan. In particular, we suggest that the report focus on four questions: (1) is the NISC being managed efficiently given the various limitations; (2) do the members have sufficient resources (budget and full-time equivalents) to achieve their action items; (3) what progress has been made to achieve their action items; and (4) is the extent of progress commensurate with available resources?

In addition to these general comments, there are several issues that we want to bring to your attention.

1. We believe that members of the Invasive Species Advisory Committee (ISAC) should not serve on federal committees intended to implement the Plan. While EPA salutes the excellent job the NISC and its staff have done to reach out to constituent groups and stakeholders, mixing federal with non-federal staff on implementation committees has, in our opinion, led to some confusion and delays in implementing the Plan. It is the federal government that is responsible for implementing the Executive Order and not a Federal Advisory Committee (FACA). A FACA can only advise and should not be responsible for implementation.

2. As previously stated, we believe that GAO's somewhat critical view of the Plan and the concern over the lack of progress in implementing the Plan are based on a survey of only 23 respondents. Further, these respondents were or are members of the ISAC and likely do not have unbiased perspectives. While it is true that the pace of implementation has not been as fast as the immigration of new invasives, we wonder if it is suitable to base the conclusions on such a small sample. The tone of the GAO report might be different if more of the federal agency staff and state resource managers were surveyed.

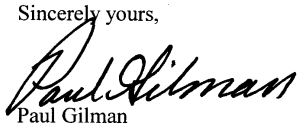
3. While the concept of performance measures is laudable, in most cases they will have to be regional and species specific. An example with vector control might be "to reduce the rate of new introduction into San Francisco Bay by 50% by 2010." But these standards would not apply to other west coast ports, which have different invasion rates, susceptibility, etc. Also, in many cases (except perhaps with agricultural pests), we do not have the baseline information to determine if we have achieved the standard. As written, the draft report comes across somewhat voluble regarding performance standards. We believe the document should recognize the difficulties of identifying and measuring performance standards in ecological systems being stressed by a highly stochastic stressor.

4. We believe the ballast water section is very "Great Lakes centric." We realize that there has been much attention given to the Great Lakes, but there is also work being done in marine and estuarine waters. The effects of invasive species on these ecosystems should be expanded, and the need for research, prevention, and control in this area should receive more emphasis. The Smithsonian Environmental Research Center maintains a clearinghouse of information related to biological invasions from ballast water discharges.

In addition to these general comments, we have enclosed detailed comments on specific portions of the text that should provide additional clarification of EPA's position on key issues raised by the draft report.

We appreciate the opportunity to respond to this draft report. Should you have questions or would like additional information, please contact Mr. Michael Slimak on 202-564-3324 or slimak.michael@epa.gov.

Sincerely yours,



Paul Gilman
Science Advisor to the Agency

Enclosure

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