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INVASIVE SPECIES

Progress and Challenges in Preventing Introduction into U.S. Waters Via the Ballast Water in Ships

Statement of Robin M. Nazzaro, Director
Natural Resources and Environment





Highlights of [GAO-05-1026T](#), a testimony before the Subcommittee on Regulatory Affairs, Committee on Government Reform, United States House of Representatives

Why GAO Did This Study

Numerous invasive species have been introduced into U.S. waters via ballast water discharged from ships and have caused serious economic and ecologic damage. GAO reported in 2002 that at least 160 nonnative aquatic species had become established in the Great Lakes since the 1800s—one-third of which were introduced in the past 30 years by ballast water and other sources. The effects of such species are not trivial; the zebra mussel alone is estimated to have caused \$750 million to \$1 billion in costs between 1989 and 2000. Species introductions via ballast water are not confined to the Great Lakes, however. The environment and economy of the Chesapeake Bay, San Francisco Bay, Puget Sound, and other U.S. waters have also been adversely affected.

The federal government has been taking steps since 1990 to implement programs to prevent the introduction of invasive species from ships' ballast water discharges. However, species introductions are continuing.

This testimony discusses the legislative and regulatory history of ballast water management and identifies some of the issues that pose challenges for the federal government's program for preventing the introduction of invasive species via ships' ballast water.

www.gao.gov/cgi-bin/getrpt?GAO-05-1026T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Robin Nazzaro, (202) 512-3841 or nazzaror@gao.gov.

INVASIVE SPECIES

Progress and Challenges in Preventing Introduction into U.S. Waters Via the Ballast Water in Ships

What GAO Found

Congress recognized ballast water as a serious problem in 1990 with passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act, legislation intended to help reduce the number of species introductions in the Great Lakes. A reauthorization of this law in 1996, the National Invasive Species Act, elevated ballast water management to a national level. As directed by the legislation, the federal government has promulgated several regulations requiring certain ships to take steps, such as exchanging their ballast water in the open ocean to flush it of potentially harmful organisms, to reduce the likelihood of species invasions via ballast water. Initially these regulations applied only to certain ships entering the Great Lakes; now they apply to certain ships entering all U.S. ports. In addition to these domestic developments, the United Nation's International Maritime Organization has recently adopted a convention on ballast water management that could affect the global fleet.

Since 1998, Coast Guard data show that compliance with existing ballast water exchange requirements has generally been high. However, key agencies and stakeholders recognize that the current ballast water exchange program is not a viable long-term approach to minimizing the risks posed by ballast water discharges. The primary reasons for this are that:

- many ships are exempt from current ballast water exchange requirements,
- the Coast Guard has not established alternate discharge zones that could be used by ships unable to conduct ballast water exchange for various reasons, and
- ballast water exchange is not always effective at removing or killing potentially invasive species.

Developers are pursuing technologies to provide more reliable alternatives to ballast water exchange, some of which show promise. However, development of such technologies and their eventual use to meet ballast water regulatory requirements face many challenges including the daunting technological task of developing large scale water treatment systems that ships can accommodate, and the lack of a federal discharge standard that would provide a target for developers to aim for in terms of treatment efficiency. As a result, ballast water exchange is still the only approved method for treating ballast water despite the concerns with this method's effectiveness. Consequently, U.S. waters remain vulnerable to the introduction of invasive species via ships' ballast water. State governments and others have expressed frustration over the seemingly slow progress the federal government has made on more effectively protecting U.S. waters from future species invasions via ballast water. As a result, several states have passed legislation that authorizes procedures for managing ballast water that are stricter than federal regulations.

Madam Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss actions to address the introduction of harmful invasive species via the ballast water in ships. Numerous harmful species have been introduced into U.S. waters via ballast water and have caused serious economic and ecologic damage. As you know, many of these species are now permanent residents in U.S. ecosystems and have significantly altered the structure of these systems, or promise to do so in the future. We reported in 2002 that at least 160 nonnative aquatic species had become established in the Great Lakes since the 1800s, more than one-third of which had been introduced in the prior 30 years. Ballast water is considered a major, although not the only, source of those introductions.¹ This problem is not confined to the Great Lakes, however. The environment and economy of the Chesapeake Bay, San Francisco Bay, Puget Sound, and other coastal areas have also been affected by species transported in ballast water. The effects are not trivial; the zebra mussel alone is estimated to have caused \$750 million to \$1 billion in costs between 1989 and 2000.²

Today, I am going to provide some information on the legislative and regulatory history of ballast water management and discuss some issues that pose challenges for the federal government's program for preventing the introduction of invasive species into U.S. waters from ships' ballast water discharges, including an update on concerns that we identified in our 2002 report.

To update our work from 2002, we examined relevant statutes, regulations, and agency policies and documents. We also gathered recent data on compliance with current regulations. In addition, we interviewed agency officials and representatives of the shipping industry, technology developers, state agencies, environmental organizations, and academic researchers. We conducted our work from March through August 2005 in accordance with generally accepted government auditing standards.

¹GAO, *Invasive Species: Clearer Focus and Greater Commitment Needed to Effectively Manage the Problem*, [GAO-03-1](#) (Washington, D.C.: Oct. 22, 2002), 12.

²Carlton, J.T., *Introduced Species in U.S. Coastal Waters: Environmental Impacts and Management Priorities*, (Arlington, VA: Pew Oceans Commission, 2001).

Summary

In summary, ballast water as a potential source of invasive species has been a legislative concern since 1990, first with passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act, and again with an amendment in 1996 that expanded management of the problem. The Coast Guard has promulgated several guidelines and regulations since 1991 concerning certain ballast water management activities. Initially these activities were only required of certain ships traveling into the Great Lakes and the Hudson River. Now, such activities are required of certain ships entering all U.S. ports. Also during this period, the international shipping community—via the International Maritime Organization—has been working on reaching agreement on ballast water management standards to apply to all shipping worldwide. The organization recently adopted a convention on this issue, although the convention has not been ratified by enough countries for it to enter into force.

We reported in 2002 that despite such steps—and generally high compliance rates with existing ballast water management regulations—U.S. waters were still vulnerable to species invasions. In particular, we reported that some ships were not required to conduct ballast water exchange and that exchange was not necessarily effective at removing potentially invasive species from ships' ballast water. At the time, key agencies and stakeholders recognized that ballast water exchange was not a viable long-term approach to minimizing the risks posed by ballast water discharges. This sentiment continues today.

A key element of an improved management program for preventing species invasions is the development of a discharge standard for ballast water. When we reported in 2002, the Coast Guard was working on a discharge standard that would set a limit on the amount of potentially harmful organisms that could be discharged by ships into U.S. waters. In addition, developers were researching technologies that could be used to more effectively “clean” ballast water discharges than ballast water exchange. However, at the time, it was not clear what type of technological approach would prove successful at treating ballast water. While progress has been made on both of these issues since our report, the bottom line remains the same. Specifically, the Coast Guard has yet to issue a discharge standard and there are no technologies that have been approved for treating ballast water. Without such a standard or technology, ballast water exchange is still the only available treatment method for reducing the amount of potentially invasive species in ships' ballast water. Thus, U.S. waters remain vulnerable to invasive species carried in ballast water. In the absence of a stronger federal program for protecting U.S. waters against species invasions, several states including

Michigan, have passed legislation addressing various aspects of the problem.

Background

Species of plants, animals, and microscopic organisms are transported from their native environments around the world to new locations in many different ways, both intentionally and unintentionally. When they arrive in a new location, most of these species do not survive because environmental conditions are not favorable. However, some of the newly arrived species do survive and, unfortunately, a portion of these flourish to the point that they begin to dominate native species and are thus labeled as “invasive.” These invasive, nonnative species can seriously damage ecosystems, businesses, and recreation.

Ballast water is one of many pathways by which nonnative and invasive species have arrived in the United States. Ships are designed to sail safely with their hulls submerged to a certain depth in the water. If a ship is not filled to capacity with cargo, it needs to fill its ballast tanks with water to maintain proper depth and balance during its travels. As a ship takes on cargo at ports of call, it must then discharge some of its ballast water to compensate for the weight of the cargo. When ships are fully loaded with cargo, their ballast tanks may be pumped down to the point where only residual water (also referred to as non-pumpable ballast water) is left. Ship masters may also manipulate the amount of water in their ballast tanks to account for different sea conditions. Different classes of ships have different ballast capacities, ranging from tens of thousands to millions of gallons of water.

Ships generally fill and discharge their ballast tanks when they are in port, and the water and associated sediment they take in is likely to contain living organisms or their eggs. Because the ballast water may be fresh, brackish, or salty depending on where it is obtained, the organisms in the water will also vary accordingly. Worldwide, ships discharge an estimated 3 billion to 5 billion metric tons of ballast water each year, and it is estimated that several thousand different species may be transported globally in ballast tanks on any given day. Well-known examples of invasive species brought to the United States in ballast tanks include the zebra mussel, round goby, Japanese shore crab, Asian clam, and Black Sea jellyfish. Collectively, these and other aquatic species transported in ballast water have caused billions of dollars in damage to our economy and unmeasured damage to the environment. For example, we reported in 2002 that the Great Lakes commercial and recreational fishing industry—which is worth about \$4.5 billion annually—was being damaged or

threatened by the sea lamprey, round goby, Eurasian ruffe, and two invertebrates from eastern Europe, just to name a few.

While the Great Lakes feature prominently in today's hearing, many other waters around the United States have also been invaded by harmful species. Notably, invasive species are found in virtually all of our coastal bays and estuaries—resources that are typically enormously productive and support multibillion dollar commercial fisheries and recreation industries. Given the pace and expansion of global trade, the movement of additional invasive species to these and other ecosystems can only be expected to continue.

History of Ballast Water Management

The federal government has been taking steps to address the introduction of potentially invasive species via the ballast water in ships for well over a decade. Congress recognized ballast water as a serious problem in 1990 with the passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act, legislation intended to help reduce the number of species introduced into U.S. waters, focusing on the Great Lakes. Congress reauthorized appropriations for and amended that law in 1996, making it more national in scope. In 1999, the President issued an executive order to better address invasive species in general, including those transported in ballast water. In addition to these domestic developments, members of the United Nation's International Maritime Organization have adopted a convention on ballast water management that, if ratified by a sufficient number of countries, could affect the global fleet.

Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990

Ballast water as a conduit for invasive species was first legislatively recognized in 1990 with the passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA).³ This law was a response to the introduction of the zebra mussel in the Great Lakes and findings that the discharge of ballast water results in unintentional introductions of nonindigenous species. The zebra mussel reproduces rapidly, and soon after its introduction clogged municipal and industrial water pipes, out-competed native mussels for food and habitat, and cost millions of dollars in economic losses and remedial actions.

³Pub. L. 101-646, 104 Stat. 4761 (1990), codified at 16 U.S.C. §§4701-4751.

Specifically, NANPCA called for regulations to prevent the introduction and spread of aquatic invasive species into the Great Lakes through the ballast water of ships.⁴ Among other things, it specifically called for the regulations to require ships carrying ballast water and entering a Great Lakes port after operating beyond the Exclusive Economic Zone (EEZ)—a zone generally extending 200 nautical miles from a country’s shores—to take one of the following actions:

- Carry out what is known as ballast water exchange beyond the EEZ before entering a Great Lakes port;
- Exchange ballast water in other waters where the exchange does not threaten introduction of aquatic invasive species to the Great Lakes or other U.S. waters; or
- Use an environmentally sound alternative method of removing potentially invasive organisms if the Secretary determines that such method is as effective as ballast water exchange in preventing and controlling aquatic invasive species infestations.

Exchanging ballast water in the ocean serves two purposes—to physically flush aquatic organisms from ships’ tanks and to kill remaining organisms that require fresh or brackish water with highly saline ocean water.

After first issuing guidelines that became effective in March 1991, the Coast Guard replaced them with ballast water management regulations in April 1993 for ships carrying ballast water and entering the Great Lakes from outside of the EEZ.⁵ In 1992, Congress amended NANPCA and called for the promulgation of regulations for ships entering the Hudson River north of the George Washington Bridge; in December 1994, the Coast Guard extended its regulations to these ships.⁶ The regulations required ships with pumpable ballast water to:

⁴The law called for regulations to be issued by the Secretary of the department in which the Coast Guard was operating. At the time, the Coast Guard was within the Department of Transportation; it is now within the Department of Homeland Security. Throughout this report, unless otherwise indicated, we use the term “Secretary” to refer to the Secretary of the department in which the Coast Guard is operating.

⁵58 *Fed. Reg.* 18,330 (Apr. 8, 1993).

⁶59 *Fed. Reg.* 67,632 (Dec. 30, 1994).

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- exchange ballast water beyond the EEZ at a minimum depth of 2,000 meters before entering the Great Lakes or Hudson River;⁷
 - utilize another environmentally sound ballast water management method approved by the Coast Guard; or
 - retain the ballast water on board.

The Coast Guard did not approve any alternative method and, therefore, ships that did not exchange their ballast water beyond the EEZ were required to retain it on board. The Coast Guard also required these ships to submit reports attesting to, among other things, their ballast water management actions.

NANPCA also established the Aquatic Nuisance Species Task Force (ANSTF), consisting of representatives from the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency (EPA), the Coast Guard, the Army Corps of Engineers, and other agencies deemed appropriate, as well as ex-officio members from the Great Lakes Commission and other nonfederal groups or agencies.⁸ NANPCA required the task force and the Secretary to cooperate in conducting a number of studies within 18 months of enactment of the act on such issues as:

- The environmental effects of ballast water exchange on native species in U.S. waters;
- Alternate areas, if any, where ballast water exchange does not pose a threat of infestation or spread of aquatic invasive species in the Great Lakes and other U.S. waters;
- The need for controls on ships entering U.S. waters other than the Great Lakes to minimize the risk of unintentional introduction and dispersal of aquatic invasive species in those waters; and,

⁷The Coast Guard later removed the depth requirement. See 64 *Fed. Reg.* 26,672 (July 28, 2004).

⁸The general mission of the task force is to develop and implement a program for the waters of the United States to prevent introduction and dispersal of aquatic invasive species; to monitor, control, and study such species; and to disseminate related information. This mission is not confined to species transported in ballast water.

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- Whether aquatic invasive species threaten the ecological characteristics and economic uses of U.S. waters other than the Great Lakes.

National Invasive Species Act of 1996

Recognizing that many water bodies around the country in addition to the Great Lakes had been invaded by harmful, nonindigenous aquatic species, Congress reauthorized appropriations for and amended NANPCA with the passage of the National Invasive Species Act of 1996 (NISA).⁹ NISA expanded upon NANCPA and called for voluntary national guidelines for ships equipped with ballast water tanks that operate in waters of the United States. NISA required the voluntary guidelines to direct ships to manage ballast water in a manner similar to the mandatory requirements for ships sailing to the Great Lakes by conducting ballast water exchange beyond the EEZ, exchanging their ballast water in an alternative discharge zone recommended by the ANSTF, or using an alternative treatment method approved by the Secretary. The law also required that the guidelines direct ships to carry out other management practices that were deemed necessary to reduce the probability of transferring species from ship operations other than ballast discharge and from ballasting practices of ships that enter U.S. waters with no ballast water on board. In addition, the law required that the guidelines provide that ships keep records and submit them to the Secretary to enable the Secretary to determine compliance with the guidelines.

The Coast Guard issued an interim rule in May 1999 and promulgated a final rule in November 2001 setting forth national voluntary guidelines under NISA.¹⁰ The guidelines encouraged ships carrying ballast water taken on in areas less than 200 nautical miles from any shore or in waters less than 2,000 meters deep to employ at least one of the following ballast water management practices: exchange their ballast water outside of the EEZ in waters at least 2,000 meters deep before entering U.S. waters, retain it on board, use an approved alternative ballast water management

⁹Pub. L. No. 104-332, 110 Stat. 4073 (1996).

¹⁰64 *Fed. Reg.* 26,672 (May 17, 1999); 66 *Fed. Reg.* 58,381 (Nov. 21, 2001). The voluntary guidelines also encourage ships with ballast tanks operating in U.S. waters to take other actions including: avoiding discharge or uptake of ballast water in areas within or affecting marine sanctuaries, preserves, parks, or coral reefs; minimizing or avoiding uptake in areas near sewage outfalls, near dredging operations, in darkness, where sediment may be stirred up by propellers, or where tidal flushing is known to be poor or times when a tidal stream is known to be more turbid; rinsing anchors and chains; and regularly removing fouling organisms from hulls, piping, and tanks.

method, discharge the ballast water to an approved reception facility, or under extraordinary conditions conduct an exchange in an area agreed to by the Captain of the Port.¹¹ The voluntary guidelines also encouraged all ships equipped with ballast water tanks and operating in U.S. waters to take various precautions to minimize the uptake and release of harmful aquatic organisms, pathogens and sediments. Such precautions may include regularly cleaning ballast tanks to remove sediment and minimizing or avoiding the uptake of ballast water in areas known to have infestations of harmful organisms and pathogens such as toxic algal blooms. In issuing the voluntary guidelines, the Coast Guard said that it was considering the results of a study on alternate discharge exchange zones but had not decided whether to allow ballast water exchanges in any of the possible locations the task force identified.

NISA also required a report to Congress on, among other things, compliance with the voluntary ballast water exchange and reporting guidelines no later than 3 years after their issuance. In addition, NISA required that the guidelines be revised, or additional regulations promulgated, no later than 3 years after the issuance of the guidelines and at least every 3 years thereafter, as necessary. Importantly, NISA required the promulgation of regulations making the guidelines mandatory if the Secretary determined that reporting or the rate of ship compliance was not adequate. As required by NISA, the Coast Guard issued its report to Congress in June 2002, but was not able to evaluate compliance with the voluntary guidelines because the rate of reporting was so poor. (From July 1, 1999, to June 30, 2001, less than one-third of all vessels required to report ballast water management information met the requirement.) Accordingly, as authorized by NISA, the Coast Guard published a proposed rule for a national mandatory program for ballast water management for all ships operating in U.S. waters in July 2003 and a final rule in July 2004.¹² In addition, the Coast Guard promulgated another rule, effective August 13, 2004, establishing penalties for, among other things,

¹¹The Captain of the Port, in American waters, is a U.S. Coast Guard officer who is responsible for Coast Guard law enforcement activities in his area of responsibility. A Captain of the Port enforces regulations for the protection and security of vessels, harbors, and waterfront facilities; anchorages; bridges; safety and security zones; and ports and waterways.

¹²68 *Fed. Reg.* 44,691 (July 30, 2002) and 69 *Fed. Reg.* 44,952 (July 28, 2004). The final rule removed the provision contained in the voluntary guidelines that suggested ballast water exchange be conducted in waters at least 2,000 meters deep.

ship owners who do not file the required reports on their ballast water operations.¹³

Finally, a key provision in NISA recognized the need to stimulate development of ballast water treatment technologies. Specifically, NISA called for the establishment of a grant program to provide funds to nonfederal entities to develop, test, and demonstrate ballast water treatment technologies. The Secretary of the Interior was authorized to enter into cooperative agreements with other federal agencies and nonfederal entities to conduct the program. NOAA and the U.S. Fish and Wildlife Service created the Ballast Water Technology Demonstration Program that provides grants to entities pursuing technologies that could be used to treat ballast water.

National Invasive Species Council

Addressing concerns with the introduction of potentially harmful organisms via ballast water also falls under the purview of the National Invasive Species Council. The council was created in 1999 under Executive Order 13112, which broadly addressed all types of invasive species. The council consists of the heads of the principal departments and agencies with invasive species responsibilities. The order directed the council to develop a plan for managing invasive species across agencies and to do so through a public process in consultation with federal agencies and stakeholders.

The council issued a national invasive species management plan in January 2001 containing 57 primary action items calling for about 168 separate actions to be taken by a variety of federal agencies. Two actions in the plan relate to ballast water. First, because ballast water exchange was recognized as only an interim measure to address nonnative species introductions via ballast water, the plan called for NOAA, the Coast Guard, Interior, and EPA to sponsor research to develop new technologies for ballast water management by July 2001. Second, the plan called for the Coast Guard to issue standards for approving the use of ballast water management technologies as alternative ballast water management methods by January 2002. NANPCA and NISA require that, in order for an alternative ballast water management method to be used, the Secretary must first approve the method as being “at least as effective as ballast water exchange in preventing and controlling infestations of aquatic

¹³69 *Fed. Reg.* 32,864 (June 14, 2004).

nuisance species,” however, standards for approving alternative measures had yet to be developed.

The effect of the National Invasive Species Council and the national management plan on efforts to address species introductions via ballast water appears to be minimal. While research on technologies has been supported by the Ballast Water Technology Demonstration Program, which is managed by NOAA and the Fish and Wildlife Service, this program began in 1998 in response to NISA—before the management plan was written or before the council was even created. Little action has been taken on developing standards for approving ballast water treatment technologies even though its completion date was January 2002.

The council has focused on ballast water in its “cross-cut budget” for invasive species that it began in 2002 (for the fiscal year 2004 budget), although its influence on ballast water management also appears limited. The cross-cut budget effort is intended to encourage agencies to, among other things, develop shared goals and strategies, and to promote cooperation and coordination on invasive species issues. As a part of the cross-cut budget, agencies have developed three performance measures for ballast water management. For fiscal year 2005, agencies were to (1) sponsor eight ballast water technology projects, (2) develop and implement a standardized program to test and certify the performance capabilities of ballast water treatment systems, and (3) conduct a pilot scale verification trial of a full-scale treatment system to validate the standardized program. However, these measures call for agencies to take certain actions as opposed to achieving some desired outcome. This is similar to what we observed in our 2002 report about the actions in the national management plan. In addition, we note that the Coast Guard is not included in the cross-cut budget for ballast water despite being the primary regulatory agency for managing this issue.

International Maritime Organization Convention on Ballast Water

While Congress, the Coast Guard, and other federal agencies have sought to reduce the threats posed by ballast water through domestic regulation, the United Nation's International Maritime Organization (IMO) has worked for over 10 years toward a global solution to the problem.¹⁴ In February 2004, IMO member countries adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments.¹⁵ The convention calls for ballast water exchange as an interim measure. This would be followed by the imposition of a treatment standard that would place limits on the number of organisms that ships could discharge in their ballast. To enter into force, the convention must be ratified by at least 30 countries constituting at least 35 percent of the gross tonnage of the world's merchant shipping. As of August 2005, eight countries had signed the convention but only one—the Maldives—had ratified it.¹⁶

The convention's ballast water performance standard would require ships conducting ballast water management to discharge less than 10 viable organisms greater than or equal to 50 microns in size per cubic meter of water and less than 10 viable organisms less than 50 but greater than 10 microns in size per milliliter of water.¹⁷ In addition, the ballast water performance standard would set limits on the discharge of several disease causing pathogens including cholera and E. coli. The dates by which ships would need to meet the ballast water performance standard, if the convention enters into force, would depend upon when the ship was built and what its ballast water capacity is. For example, the ships first required to meet the standard would be those built in 2009 or later with a ballast capacity of less than 5,000 cubic meters. Ships built before 2009 with a

¹⁴The IMO is an organization of 160 member countries with observers from governmental, industry, environmental, public interest, and labor organizations that is concerned with the safety of shipping and cleaner oceans. 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.

¹⁵The adoption of a convention marks the conclusion of only the first stage of a long process. Before the convention comes into force, that is before it becomes binding upon governments that have ratified it, it has to be accepted formally by individual governments.

¹⁶The seven are Argentina, Australia, Brazil, Finland, the Netherlands, Spain, and the Syrian Arabic Republic.

¹⁷A micron is one millionth of a meter in length. A milliliter is one thousandth of a liter. To provide some context on the number of organisms this would allow, large ships may carry over 60,000 cubic meters of ballast water. This means that under the IMO standard, a ship discharging that amount of ballast water could legally discharge up to 600,000 organisms measuring more than 50 microns and 600 billion organisms measuring less than 50 microns.

ballast capacity between 1,500 cubic meters and 5,000 cubic meters would have to meet the standard by 2014. Regardless of age or size, all ships subject to the convention would need to meet the standard by 2016.

Major Issues with Current Ballast Water Management Program

The federal government has continued to take steps to strengthen controls over ballast water as a conduit for potentially harmful organisms. Since 1998, Coast Guard data show that compliance with conducting ballast water exchange, when required, has generally been high. However, key agencies and stakeholders recognize that the recently adopted mandatory national program for ballast water exchange is not a viable long-term approach to minimizing the risks posed by ballast water discharges. Major limitations with this approach include the fact that despite relatively high compliance rates with the regulations, U.S. waters remain vulnerable to species invasions because many ships are still not required to conduct ballast water exchange. In addition, the ANSTF has not recommended alternate areas for ballast water exchange and thus, the Coast Guard has not established alternate discharge zones that could be used by ships. And lastly, ballast water exchange is not always effective at removing or killing potentially harmful species.

Compliance with Existing Ballast Water Exchange Is Generally High

With the Coast Guard's mandatory ballast water management regulation for ships traveling into U.S. waters after operating beyond the EEZ and carrying ballast water taken on less than 200 nautical miles from shore—effective September 2004—more ships are generally required to conduct ballast water exchange or retain their ballast water than before. We noted in 2002 that compliance with ballast water exchange requirements for ships entering the Great Lakes was high, and the Coast Guard maintains that it remains high. According to the Coast Guard, from 1998 through 2004, 93 percent of the ships entering the Great Lakes with pumpable ballast water were in compliance with the exchange requirement. More recently, data show that about 70 percent of those arriving from outside the EEZ to ports other than the Great Lakes conducted an exchange. Most notably, reporting on ballast water management activities has increased dramatically. According to the Coast Guard, reporting increased from approximately 800 reports per month in January 2004 to over 8,000 per month since September 2004; this reflects reporting from about 75 percent of ships arriving from outside the EEZ. The Coast Guard attributes the increase in reporting to an effort beginning in 2004 to encourage ship masters to file reports electronically and to the new regulations that allow the Coast Guard to levy penalties for non-reporting. According to data provided by the Coast Guard, nearly five percent of ships arriving at U.S.

ports between January 2005 and July 2005 were inspected for compliance with ballast water regulations. On the basis of its inspections, the Coast Guard reports a 96.5 percent compliance rate with the mandatory ballast water management regulations. During the first two quarters of 2005, inspections revealed 124 deficiencies that range from problems with ballast water management reporting to illegal discharge of ballast water in U.S. waters. As a result of these findings, Coast Guard took nine enforcement actions.

Many Ships with Potentially Harmful Organisms in Their Ballast Water Are Not Required to Conduct Ballast Water Exchange or Retain Their Ballast Water

Although the Coast Guard believes that compliance with ballast water management regulations is high, U.S. waters may still not be adequately protected because many ships are not required to conduct ballast water exchange even though they may discharge ballast water in U.S. waters.

NOBOBs. Ships with no ballast water in their tanks (referred to as “no ballast on board” ships or NOBOBs) are not required to conduct ballast water exchange or retain their ballast water.¹⁸ While the term “NOBOB” indicates that a ship has no ballast on board, these ships may, in fact, still be carrying thousands of gallons of residual ballast water and tons of sediment that cannot be easily pumped out because of the design of their tanks and pumps. This water and sediment could harbor potentially invasive organisms from previous ports of call that could be discharged to U.S. waters during subsequent ballast discharges. NOBOBs are a particular concern in the Great Lakes, where greater than 80 percent of ships entering from outside the EEZ fall into this category. While still a concern for other U.S. ports, it appears that a significantly smaller portion (about 20 percent) of ships arriving at U.S. ports other than the Great Lakes from beyond the EEZ claimed NOBOB status. Officials responsible for gathering and managing data on ship arrivals estimate that about 5 percent of those NOBOB ships take on ballast water and discharge it in U.S. waters.

When the Coast Guard conducted an environmental assessment of its new national mandatory ballast water exchange regulations in 2003, it did not review the potential threat that NOBOB ships pose to future species invasions, although it received comments raising concerns about this omission. In response to comments on its 2004 rule, the agency noted that

¹⁸Since 2004, NOBOBs have been required to comply with other ballast water management practices listed at 33 CFR §151.2035(a), which includes practices such as rinsing anchors and chains and avoiding ballast water uptake near sewage outfalls.

NOBOBs were required to submit ballast water reporting forms, that it would continue to explore the issue of NOBOBs, and that these vessels may be included in a future rulemaking. In May 2005, the Coast Guard convened a public workshop in Cleveland to discuss and obtain comments on NOBOBs, particularly as they affect the Great Lakes. Following the public meeting, the Coast Guard held a closed meeting for an invited group of government officials and technology experts. The overall purpose of the closed meeting was to discuss technological approaches that are now available or soon to be available to address the potentially invasive organisms in NOBOB ships. The agency has not published any record of the closed meeting.

The Coast Guard just issued a notice, published in the Federal Register on August 31, 2005, containing a voluntary management practice for NOBOBs that enter the Great Lakes and have not conducted ballast water exchange.¹⁹ This practice indicates that such ships should conduct salt water flushing of their empty ballast tanks in an area 200 nautical miles from any shore, whenever possible. Salt water flushing is defined as “the addition of mid-ocean water to empty ballast water tanks; the mixing of the flush water with residual water and sediment through the motion of the vessel; and the discharge of the mixed water, such that the resultant residual water remaining in the tank has as high a salinity as possible, and preferably is greater than 30 parts per thousand.” Scientists believe that this process will either flush out residual organisms from the ballast tanks or kill remaining organisms with highly saline ocean water. The effectiveness of this process, however, has not been demonstrated. A Coast Guard official in the ballast water program explained that issuance of voluntary best management practices were favored over regulations because of the relative speed with which they can be issued.

Coastal Traffic. Ships traveling along U.S. coasts that do not travel farther than 200 nautical miles from any shore are also not required to conduct ballast water exchange or to retain their ballast water. One such group of ships includes those that travel within the EEZ from one U.S. port to another, such as from the Gulf of Mexico to the Chesapeake Bay. However, these ships may act as a vector for unwanted organisms between ports. The second group of ships falling in this category includes those that come from foreign ports but do not travel more than 200 nautical miles from any shore. These can include ships arriving from the

¹⁹70 Fed. Reg. 51,831 (Aug. 31, 2005).

Caribbean, Central America, South America, Panama Canal, and Canada. The Coast Guard regulations explicitly exempt ships traveling within 200 nautical miles of any shore from conducting ballast water exchange. However, these ships also represent a possible conduit for invasive species. Approximately 65 percent of ships arriving at U.S. ports from outside the EEZ—over 28,000 in 2003—do not travel more than 200 nautical miles from shore.²⁰

Key stakeholders have raised concerns about this gap in regulatory coverage over coastal traffic. For example, in commenting on the Coast Guard's proposed regulations for national mandatory ballast water exchange, NOAA, the Fish and Wildlife Service, the states of Washington and Pennsylvania, the Northeast Aquatic Nuisance Species Task Force, a state port association, and environmental advocacy organizations expressed concern that coastal traffic was not addressed by the rulemaking. The Coast Guard has also acknowledged this gap. Specifically, the agency noted in its July 2003 assessment of the potential impacts of its new regulations on mandatory ballast water exchange and in its environmental assessment of the final regulations, that discharges from coastal shipping could result in the introduction or spread of invasive species within regions of the United States.²¹ However, the agency did not quantify the additional risks posed by coastal traffic nor did it discuss what should be done to mitigate those risks.

No Alternate Exchange Zones Have Been Designated

Several of the issues described above revolve around the requirement that ballast water exchange be done at least 200 nautical miles from shore. However, Congress recognized that there might be areas within the 200-nautical mile limit of the EEZ in which ballast water exchange might not

²⁰*Shipping Traffic Analysis and Cost Assessment for Ballast Water Exchange En Route to the United States—an analysis revisited*, U.S. Department of Homeland Security, September 2004.

²¹*Regulatory Evaluation: Mandatory Ballast Water Management Program for U.S. Waters, Notice of Proposed Rulemaking USCG-2003-14273*, prepared by Standards Evaluation and Analysis Division, U.S. Coast Guard, Washington, DC, July 15, 2003; Programmatic Environmental Assessment for Ballast Water Management Program for U.S. Waters, prepared for Commandant, United States Coast Guard, Washington, DC, submitted by Battelle, Duxbury, MA, February 2004.

be harmful.²² Congress required the Aquatic Nuisance Species Task Force to conduct a study to identify any possible areas within the waters of the United States and the EEZ where ballast water exchange would not pose a threat of infestation or spread of aquatic invasive species. NANPCA, as amended by NISA, called upon the Coast Guard regulations and guidelines to allow or encourage ships to exchange ballast water in alternate locations, based on the Task Force's recommendations. The required study on alternate exchange areas was delivered to NOAA and EPA—members of the task force—in November 1998. According to the study, it was impossible to guarantee that organisms in ballast water would not be transported by winds or currents toward suitable shoreside habitats when discharged within 200 nautical miles of shore.²³ The study also noted that suitable discharge areas varied depending upon winds and currents at a particular time. However, in looking at conditions around the United States, the study identified many locations where it appeared that ballast water exchange could safely occur less than 200 nautical miles from shore.

Ultimately, the Task Force did not recommend alternate discharge areas and the Coast Guard has not authorized ballast water exchange in any such areas under its regulations. In its 2004 final rule for the mandatory national ballast management program, the Coast Guard stated that it was examining the possibility of establishing alternate ballast water exchange zones and that information obtained at an October 2003 workshop, and future workshops, could provide a sound, scientific basis for establishing ballast water exchange zones within the EEZ. In 2004, the Massachusetts Institute of Technology published the proceedings from the October 2003 workshop.²⁴ The workshop attendees—which included stakeholders from the marine industry, scientific community, policy makers, regulators, and

²²In addition, under NISA, ships are allowed to claim a safety exemption from conducting an exchange and these ships, other than those entering the Great Lakes after operating beyond the EEZ, are not prevented from subsequently discharging ballast water in U.S. waters.

²³*Ballast Exchange Study: Consideration of Back-up Exchange Zones and Environmental Effects of Ballast Exchange and Ballast Release*, Alfred M. Beeton, James T. Carlton, Bridget A. Holohan, Glen H. Wheless, Arnoldo Valle-Levinson, Lisa A. Drake, Gregory Ruiz, Linda McCann, William Walton, Annette Frese, Paul Fofonoff, Scott Godwin, Jason Toft, Lisa Hartman, and Elizabeth von Holle, a project of the Cooperative Institute for Limnology and Ecosystems Research, Ann Arbor, Michigan, a report to the National Sea Grant Program, National Oceanic and Atmospheric Administration and the Environmental Protection Agency, November 1998.

²⁴The area of focus was from Cape Hatteras in North Carolina through the northern ports of the Canadian Maritime Provinces.

nongovernmental organizations—developed a consensus statement regarding proposed alternate exchange zones along the northeastern coastline of the United States and Canada. The group proposed that alternate ballast water exchange areas, where there is consensus, be adopted as a working policy statement by both the United States and Canada for coastal vessel traffic until other treatment methods are available. In their statement, the attendees focused more on the depth of waters than on the distance from shore, noting that the continental shelf marks a location that helps determine whether organisms are likely to float toward shore or away from shore.

However, the Coast Guard reports that it has no plans to consider the use of alternate discharge zones. The ballast water program manager told us that designating alternate zones would take a significant amount of environmental analysis and a lengthy rulemaking process. She also said that alternate discharge zones will not be needed once other treatment technologies are installed on ships.

While the United States has not identified alternate locations for conducting ballast water exchange, the IMO and other countries have proposed allowing, or already allow, ballast exchange to occur in locations closer than 200 nautical miles from shore. The IMO convention, should it take effect as adopted, states that all ships conducting ballast water exchange should, whenever possible, do so at least 200 nautical miles from the nearest land and in water at least 200 meters deep. However, the convention recognizes that exchange at that distance may not be possible; if not, exchange should be conducted as far from the nearest land as possible, and in all cases at least 50 nautical miles from the nearest land and in water at least 200 meters deep. Australia requires that exchange be done outside 12 nautical miles in water exceeding 200 meters in depth.

The Canadian government proposed regulations in June 2005 that would allow transoceanic ships, unable to exchange ballast water more than 200 nautical miles from shore where the water is at least 2,000 meters deep because it would compromise the stability of the ship or the safety of the ship or of persons on board, to make the exchange in one of five alternate discharge zones that Canada's Department of Fisheries and Oceans determined could receive ballast water with little risk. For non-transoceanic ships that do not travel at least 200 nautical miles from shore and in waters at least 2,000 meters deep (for example, ships arriving from U.S. ports that travel near the coast), the proposed regulations would require ships to exchange ballast water at least 50 nautical miles from shore where the water is at least 500 meters deep. If that were not

practical or possible, the ships would be allowed to use an alternate discharge zone. The minimum allowable depth in the alternative areas would be from 300 to 1,000 meters.

Concerns Persist Over the Effectiveness of Ballast Water Exchange

In 2002, we reported on numerous concerns about the effectiveness of ballast water exchange in removing potentially harmful organisms. There are two presumptions behind ballast water exchange as a method for ballast water treatment. First, it is presumed that the exchange will physically remove the water and organisms from ballast tanks. Second, ballast water exchange presumes that there are significant differences in the salinity of the original ballast water, mid-ocean water, and the ecosystem into which the water is ultimately discharged, such as the Great Lakes. If the original ballast water were fresh, organisms in that water would, in theory, not survive in the salt water taken on in mid-ocean. Similarly, any mid-ocean organisms taken on during the exchange would not survive in the fresh water of a destination port. Evidence has shown, however, that these presumptions are not always borne out. For one thing, ballast pumps are not always able to remove all of the original water, sediment, and associated organisms. In addition, elevated levels of salinity do not necessarily kill all forms of potentially invasive organisms. Therefore, scientists believe that viable organisms can survive ballast water exchange and possibly become invasive when discharged to a new environment. The National Research Council highlighted the need for alternatives to ballast water exchange by stating in its 1996 report on ballast water management, “while changing ballast may be an acceptable and effective control method under certain circumstances, it is neither universally applicable nor totally effective, and alternative strategies are needed.”²⁵ We noted in our 2002 report that despite the high compliance rate with mandatory ballast water exchange in the Great Lakes, invasive organisms, such as the fish-hook water flea discovered in 1998, were still entering the ecosystem.

²⁵*Stemming the Tide: Controlling Introductions of Nonindigenous Species by Ships' Ballast Water*, (Washington, D.C.: National Academy Press, 1996), 2.

Technologies Are Being Developed to Treat Ballast Water, but Challenges Remain Before They Can Be Used

Developers are pursuing technologies for use in treating ballast water, some of which show promise that a technical solution can be used to provide more reliable removal of potentially invasive species. However, the development of such technologies and their eventual use to meet regulatory requirements face many challenges, including the daunting technological challenges posed by the need for shipboard treatment systems and the lack of a discharge standard that would provide a target for developers to aim for in terms of treatment efficiency.

Some Promising Ballast Water Treatment Technologies Exist

Researchers and technology companies have been investigating the potential capabilities of many different ballast water treatment options, such as subjecting the water to filtration, cyclonic separation, ultraviolet radiation, chlorine, heat, ozone, or some combination of these methods. NOAA's Ballast Water Technology Demonstration Program has assisted in this regard by providing over \$12 million in grants to 54 research projects since 1998. Related to this issue, the International Maritime Organization convention on ballast water required an assessment of the state of treatment technology to determine whether appropriate technologies are available to achieve the standard proposed in the convention. Toward this end, the United States and five other member countries submitted assessments of the state of treatment technology development. The United States' assessment was based on a study conducted by the Department of Transportation's Volpe National Transportation Systems Center. The center assessed about a dozen potential ballast water technologies and identified four basic approaches that it believed are sufficiently well developed to indicate that effective and practicable systems will be available to treat ballast water to some measurable performance standard. These technologies are (1) heat, (2) chlorine dioxide, (3) separation followed by ultraviolet radiation, and (4) separation followed by advanced oxidation treatment.

On the basis of this assessment, the United States took the position that developers of treatment technologies have made enough progress to suggest that the first proposed deadline in the convention could be met; namely, that ships built on or after 2009 and with a ballast water capacity of under 5,000 cubic meters could have treatment systems that could meet the discharge standards. However, the United States also stated that it was too early to tell whether treatment systems would be available for other categories of ships that will need them at a later date. After reviewing and discussing the evidence on the status of technology development provided by the United States and other member countries, the IMO's Marine Environment Protection Committee's technology review group

recommended that there was no need to consider amending the schedule for implementing the convention due to a lack of progress on technology, although it recommended that the committee reexamine the status of technology in October 2006.

Development and Use of Ballast Water Treatment Technologies Face Many Challenges

Several challenges hamper development and use of ballast water treatment technologies. First, development of such technologies is a daunting task given the many operational constraints under which the technologies must operate. Beyond this hurdle, there is no discharge standard for how clean ballast water must be to help developers determine how effective their technologies need to be. Related to this, there is also no process for testing and approving technologies to determine how effective they are in removing potentially harmful organisms from ballast water. Coast Guard and other agencies have some actions underway on these issues, but they have not committed to firm schedules for completion.

Difficult Treatment Environment

The challenges of developing technologies to “treat” or remove potentially invasive species from ballast water are numerous. On the one hand, treating ballast water is not unlike treating household and industrial wastewater—now a rather routine treatment process. Like wastewater treatment facilities, ballast water treatment technology will need to be safe for the environment and crew, and achieve a specific level of pollutant removal (in the case of ballast water—removal of potentially invasive species). On the other hand, shipboard ballast water treatment systems will have to meet additional challenges that land-based wastewater treatment facilities do not, such as: (1) treating large volumes of water at very high flow rates and (2) removing or killing a much broader range of biological organisms—including unknown organisms. Importantly, the treatment systems must be able to operate in a manner that does not compromise ship safety. In addition, to make any treatment option palatable to the shipping industry, the systems must not displace an unacceptable amount of valuable cargo space. Consequently, the technologies must be dramatically smaller in scale than those currently used in the wastewater industry while still achieving a high level of removal or “kill” rates. Further complicating matters, because ships differ in their structural designs, it is unlikely that one type of treatment technology will be appropriate for all types of ships. And, depending on how regulations are written, ships may need to be retrofitted to incorporate treatment technology—a potentially complex and expensive proposition.

No Discharge Standard for How “Clean” Ballast Water Must Be

When we reported in 2002, a key part of the Coast Guard’s effort to move forward on dealing more effectively with the ballast water problem was its work to develop a discharge standard for ballast water—that is, a standard for determining how “clean” ballast water should be before it could be discharged into U.S. waters.²⁶ According to many stakeholders we have spoken with, one reason for the apparent slow progress on developing treatment technology is the lack of a discharge standard. Identifying a standard is necessary to provide a target for companies that develop treatment technologies. The lack of a discharge standard makes it uncertain what level of “cleanliness” treatment technologies will have to achieve. Companies may be hesitant to pursue research and development of a potential treatment technology not knowing what the standard may ultimately be—they stand to lose significant amounts of money if a standard turns in an unanticipated direction that they are unable to accommodate with their technology. In addition, until the shipping industry is required to meet some discharge standard, there is no incentive for ship owners to purchase ballast water treatment technology.

In 2002, the Secretary of Transportation reported to Congress that he expected to have a final rule on a ballast water management standard in the fall of 2004. The Coast Guard has been working with the EPA and other agencies to prepare a proposed regulation that will contain a discharge standard as well as an assessment of the environmental impacts of five possible discharge standards. The five alternatives being analyzed are: (1) taking “no action,” which would mean continuing with ballast water exchange, (2) requiring that ballast water be sterilized before discharge, (3) matching the proposed IMO discharge standard, (4) allowing one-tenth the number of organisms allowed by the proposed IMO standard, and (5) allowing one-hundredth the number of organisms in the proposed IMO standard. In December 2004, the Coast Guard announced that it expected to propose a discharge standard by December 2005, however, the agency has since retracted that plan and was not able to give us a new date.

No Process for Approving Treatment Technologies

Complicating the development of technology is the lack of a process to approve ballast water treatment systems for use on ships. In August 2004,

²⁶The United States District Court for the Northern District of California has held that EPA exceeded its authority under the Clean Water Act by excluding discharges incidental to the normal operation of a vessel from Clean Water Act permit requirements. See *Northwest Environmental Advocates v. EPA*, 2005 WL 756614. Court proceedings are still ongoing as to the appropriate remedies.

the Coast Guard published a Federal Register notice requesting comments by December 3, 2004, on how to establish a program to approve alternative ballast water management methods.²⁷ The agency stated in the notice its intention to promulgate the new program in the near future, but it has yet to do so. In the meantime, the Coast Guard, EPA, and the Navy have collaborated on preparing laboratory facilities in Key West, Florida that will be used to verify the performance of ballast water treatment technologies. According to the Coast Guard, the agencies will begin to test the new facilities in a few weeks. On a parallel track, NOAA's Ballast Water Technology Demonstration Program hopes to help address this gap as well by establishing a Research, Development, Test and Evaluation facility. This facility would be directed to establish standardization and quality control in experiments on ballast water technology. Current plans are to devote nearly \$1 million to this facility over a 4-year period beginning in fiscal year 2006; depending on funding availability, operation of the facility could be continued. In addition, EPA's Environmental Technology Verification program is working to develop testing protocols in order to verify treatment technologies for eventual approval.

New Incentive Program

In 2004, the Coast Guard implemented a new program intended to encourage ship owners to test potential treatment technologies on their ships. With the Shipboard Technology Evaluation Program (STEP), the agency hopes to encourage ship owners to install experimental treatment technologies by agreeing that vessels accepted into the program may be granted an exemption from future ballast water discharge standards for up to the life of the vessel of the system. Notably, the program approves the use of a system on a single ship; it does not approve the use of that system for other ships. To be accepted into the program, the experimental technology needs to be capable of removing or killing at least 98 percent of organisms larger than 50 microns. To date, only two ship owners have applied to this program, but the Coast Guard has not yet accepted their applications. The Coast Guard has recognized that the application process is complex and plans to clarify it in hope of attracting more applicants.

Representatives of technology developers, shipping interests, and other stakeholders have offered several reasons for the low participation in the program. According to the stakeholders we spoke with, the primary reason is the lack of a defined discharge standard, rather than any particular aspect of the STEP program itself. The lack of a discharge

²⁷69 *Fed. Reg.* 47,453 (Aug. 5, 2004).

standard, as well as the fact that use of ballast water treatment technology is not currently required, has made it difficult for technology developers to gather the venture capital needed to proceed aggressively on technology development since use of such technology is not required. Consequently, few technologies are ready to be installed and tested on board ships. One representative of a technology firm believes the Coast Guard should expand the size of the STEP program to provide more incentive to shipping companies and technology developers that want to test variations of technologies or test their technology on different types of ships. Currently, the agency is limiting the number of applicants to about 5 or 6 per year and expects each application to cover just one ship. Another stakeholder echoed this point, saying that the program requires ship owners to go to great lengths for the benefit of getting one ship approved. One representative of a shipping association speculated that, although the STEP program is open to foreign companies, another possible reason for low participation is that foreign ships may spend little time in the United States.

Lack of Resources

Stakeholders to the technology development issue told us that technology development has also been hampered by a lack of resources. I have already noted that without a discharge standard or requirements for use of treatment technologies, it is difficult for companies to expend significant resources on development. In addition, as technology development progresses, the scale of testing required will increase and move beyond what can be done in a laboratory. At this point, developers will need to conduct “operational” testing on-board ships. However, estimates for shipboard studies exceed \$1 million. Given the disincentives to pursuing technology development in this time of uncertainty, technology development will likely remain a problem.

States Are Moving Forward With Programs Because of Frustration with Lack of Federal Progress

As we reported in 2002, some states have expressed frustration with the federal government’s progress on establishing a more protective federal program for managing the risks associated with ballast water discharges. Since then, several coastal and Great Lakes states have enacted legislation that is more stringent than current federal regulations. As you know, in June 2005, the governor of Michigan signed a bill into law that will require all oceangoing vessels to obtain a state permit before discharging ballast water into state waters. The state will issue the permit only if the applicant can demonstrate that the vessel will not discharge aquatic nuisance species or, if it will, that the operator of the vessel will use environmentally sound technology and methods as determined by the

state department that can be used to prevent the discharge of aquatic invasive species. This requirement takes effect January 1, 2007.

Similarly, owing to concerns with possible species introductions via currently unregulated coastal shipping, California, Oregon, and Washington have enacted laws to regulate coastal traffic. The states' laws provide for additional measures that ships must currently take or will have to take in the future before entering state waters. All three states provide for safety exemptions.

- *California.* California law required the State Lands Commission to adopt new regulations governing ballast water management practices for ships of 300 gross tons or more arriving at a California port or place from outside of the Pacific Coast Region by January 1, 2005. The California State Lands Commission has proposed, but not yet finalized, these regulations. Upon implementation of the regulations, California law will require the ships to employ at least one of the following ballast water management practices: (1) exchange its ballast water more than 200 miles from land and at least 2,000 meters deep before entering the state's coastal waters; (2) retain its ballast water; (3) discharge water at the same location where the ballast water originated; (4) use an alternative, environmentally sound method; (5) discharge the ballast water to a reception facility approved by the commission; or (6) under extraordinary circumstances, exchange ballast water within an area agreed upon by the commission and the Coast Guard. The proposed California regulation would require ships carrying ballast water from within the Pacific Coast Region to conduct any ballast water exchange in waters that are more than 50 miles from land and at least 200 meters deep.
- *Oregon.* Oregon law prohibits certain ships from discharging ballast water in Oregon waters unless the ship has conducted a ballast water exchange more than 200 miles from any shore, or at least 50 miles from land and at a depth of at least 200 meters if its ballast water was taken onboard at a North American coastal port. Oregon exempts ships that: (1) discharge ballast water only at the location where the ballast water originated; (2) retain their ballast water; (3) traverse only internal state waters; (4) traverse only the territorial sea of the U.S. and do not enter or depart an Oregon port or navigate state waters; (5) discharge ballast water that has been treated to remove organisms in a manner that is approved by the Coast Guard; or (6) discharge ballast water that originated solely from waters located between 40 degrees latitude north and 50 degrees latitude

north on the west coast.²⁸

- *Washington.* Washington's ballast water law applies to self-propelled ships in commerce of 300 gross tons or more and prohibits discharging ballast water into state waters unless a ship has conducted an exchange of ballast water 50 miles or more offshore, or further offshore if required by the Coast Guard. Some ships are exempt from this requirement, including ships that retain their ballast water or that discharge ballast water or sediments only at the location where ballast water was taken on. The coordinator of Washington's aquatic nuisance species program told us that during the legislative process, shipping industry representatives and oceanographic experts concurred that the 50-mile boundary for exchange was both feasible for the ships and protective against invasive species. After July 1, 2007, discharge of ballast water in state waters will be authorized only if there has been an exchange at least 50 miles offshore or if the vessel has treated its ballast water to meet standards set by the Washington Department of Fish and Wildlife.

Madam Chairman, this concludes my prepared statement. I would be happy to respond to any questions you or other Members of the Subcommittee may have.

²⁸The southern border of Oregon is at latitude 42 degrees north, while the northern border is at 46 degrees north.

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