UNITED STATES COAST GUARD

REPORT TO CONGRESS ON THE VOLUNTARY NATIONAL GUIDELINES FOR BALLAST WATER MANAGEMENT

NOVEMBER 2001

THE SECRETARY OF TRANSPORTATION

WASHINGTON, D.C. 20590

June 3, 2002

The Honorable Richard B. Cheney
President of the Senate
Washington, DC 20510

Dear Mr. President:

Section 1101(d) of the National Invasive Species Act (NISA)(Pub. L. 104-332) directs the Secretary of Transportation (Secretary), after consultation with interested and affected parties to prepare and submit to the Congress, not sooner than 24 months, or later than 30 months from the date of issuance of voluntary national guidelines to prevent the introduction and spread of non-indigenous species in waters of the United States by ballast water operations and other operations of vessels equipped with ballast water tanks, a report to assess the compliance with those guidelines and to establish the rate of compliance based on that assessment. The U.S. Coast Guard implemented these guidelines through Title 33 Code of Federal Regulations (CFR) Part 151 Subpart D Ballast Water Management for Control of Non-indigenous Species in Waters of the United States on July 1, 1999.

Section 1102(f)(2) of NISA directs the Secretary of Transportation, in consultation and cooperation with the Aquatic Nuisance Species Task Force and the Smithsonian Institution (acting through the Smithsonian Environmental Research Center), to prepare and submit to the Task Force and Congress, on a biennial basis, a report that synthesizes and analyzes data relating to ballast water delivery management and invasions of aquatic nuisance species resulting from ballast water. The first such report was submitted to Congress on March 1, 1999.

Due to the overlapping nature and content of the reports required by these two sections of NISA, as well as their coinciding due dates, the attached report which assesses the adequacy and effectiveness of voluntary ballast water management guidelines, responds simultaneously to both sections.

In the report, we discuss a variety of future actions that we at the Department, through the Coast Guard, plan to take, many of which include promulgating regulations. The four key projects involve very complex issues, particularly when it comes to evaluating the environmental and economic impacts of any promulgated regulations. In light of this fact, we have already taken steps to make EPA a cooperating agency, under the Council on Environmental Quality's guidelines for implementing the National Environmental Policy Act (NEPA). By doing so, we will be able to draw on EPA's expertise, allowing us to shorten the timelines the Coast Guard has already established for these rules.

I am including timeline estimates for the four key projects that relate to the "Future Actions" section of this report. Please note that these dates reflect when the Coast Guard

anticipates having regulatory documents ready for DOT and Inter-Departmental review, and not the actual publication date. Barring any additional or unforeseen regulatory activities particularly with regard to homeland security, the estimates are as follows:

Incorporating penalties for a vessel's failure to submit ballast water management reports: NPRM in winter of 2002; Final Rule in Fall of 2003.

Transitioning from a voluntary national ballast water management program to a mandatory program: NPRM in fall of 2003; Final Rule in Summer of 2004.

Establishing a standard to serve as the benchmark for all ballast water management options: NPRM in winter of 2003; Final Rule in Fall of 2004.

Developing a protocol for Coast Guard approval of installation of experimental technologies on board vessels: Interim Rule in winter of 2002.

An identical letter has been sent to the Speaker of the House of Representatives.

Sincerely yours,

Norman Y. Mineta

Attachment

THE SECRETARY OF TRANSPORTATION

WASHINGTON, D.C. 20590

June 3, 2002

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Speaker of the House of
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Washington, DC 20515

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Executive Summary

Introduction

Spurred by the negative environmental and social impacts of the zebra mussel invasion of the Great Lakes, and evidence of an increasing number of biological invasions of other aquatic ecosystems by nonindigenous species, Congress enacted the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA)(Pub. L. 101-646) and the National Invasive Species Act of 1996 (NISA)(Pub. L. 104-332), to prevent and control infestations of the U.S. coastal and inland waters by nonindigenous aquatic nuisance species (ANS).

As directed by these two laws, the Secretary of Transportation (Secretary), acting through the U.S. Coast Guard, established mandatory ballast water management (BWM) regulations for the Great Lakes ecosystem, and voluntary guidelines for the remainder of U.S. waters.

Section 1101 (d) of NISA directed the Secretary to assess and report the effectiveness of the voluntary guidelines to Congress and if necessary, take appropriate regulatory actions to ensure the legislative intent is realized. This report is provided to meet this requirement.

Sources of Data and Information Presented in this Report

The primary data used in this report are from the National Ballast Survey (NABS), which was developed and implemented by the Coast Guard and the National Ballast Information Clearinghouse (NBIC). The NBIC was collaboratively established by the Coast Guard and Smithsonian Environmental Research Center to collect and analyze information and data regarding compliance with ballast water reporting requirements, and patterns of ballast water delivery and management throughout the country.

Section 1101(e)(3) of NISA directed the federal Aquatic Nuisance Task Force to develop and submit to the Secretary criteria for determining the adequacy and effectiveness of the program of voluntary guidelines. The Task Force concluded that for the voluntary guidelines to be considered operationally "adequate" it would need to achieve a level of compliance on par with a program subject to full enforcement and suggested using the mandatory Great Lakes program, as a benchmark.

To fulfill Congress's direction to consult with interested and affected parties prior to preparing and submitting this report, the Coast Guard held a series of regional public meetings to provide all parties the opportunity to comment and make recommendations on the Coast Guard's BWM program. Through notice in the Federal Register, the Coast Guard also requested written comments.

Assessment of the Effectiveness of the National Voluntary Ballast Water Management Guidelines

Analysis of the information received by the NBIC under the voluntary guidelines indicates that:

1. Only 30.4 % of regulated ships submitted reports during the first 24 months that reporting requirements were in effect. Over the two-year period, the monthly

compliance rate increased gradually from about 20% initially to a final rate of about 40%.

2. About one half (51.2%) of the reporting ships that discharged ballast water performed some degree of ballast water exchange. Over the two-year period, there was little change in the proportion of the reporting vessels that conducted an exchange of ballast water. The reasons for not performing ballast water exchange were varied and included constraints posed by the vessel's itinerary, as well as ship and crew safety concerns.

Having (1) reviewed the data collected and the analysis conducted by the NBIC, and (2) assessed these under the Task Force's criteria for determining the adequacy and effectiveness of such a program, it is the Secretary's determination that the consistently low rate of vessel reporting makes it impossible to accurately assess compliance with the voluntary BWM guidelines.

Although the limited data regarding shipboard BWM practices makes it impossible to accurately assess the guidelines' effectiveness in reducing the introduction and spread of ANS by vessels, the comments received from a range of interested and affected parties since the program's implementation clearly indicate there is broad support for a mandatory national BWM program based on the practices contained in the voluntary guidelines.

Therefore, due to the low reporting, the resulting inability to make valid program assessments, and broad support for a mandatory national program, the Secretary, as directed by NISA, will issue regulations making the requirements of the voluntary program mandatory and provide the necessary enforcement.

Future Actions

Balancing the ecological, social and economic concerns of the affected parties, the Coast Guard will implement a robust national BWM program that maximizes the use of existing BWM techniques by all vessels, while fostering the development of new ballast water treatment (BWT) technologies. To accomplish this, the following initial steps will be taken by the Coast Guard.

1. Develop regulations to require ***all*** vessels equipped with ballast tanks that enter U.S. waters after operating beyond the Exclusive Economic Zone (EEZ), ***or*** are engaged solely in voyages between U.S. ports, to perform appropriate record keeping and reporting.

2. Issue regulations requiring vessels equipped with ballast tanks that enter the waters of the United States after operating beyond the EEZ to conduct active BWM.

3. Enforce the sanctions established in section 1101(g) of NISA for failing to comply with the program's requirements. The "safety exemption" provided for in section 1101(k) of NISA will remain a central tenant in implementation and enforcement of the BWM program, but its use will be monitored and verified to thwart abuse.

4. Continue its efforts to establish a quantitative BWT performance standard; protocols for testing, verifying and reporting on BWT technologies; and a program to facilitate experimental shipboard installation and operation of promising BWT technologies.

Section I *Introduction*

LEGISLATIVE HISTORY AND AUTHORITY

Spurred by the negative environmental and social impacts of the zebra mussel invasion of the Great Lakes, and evidence of an increasing number of biological invasions of other aquatic ecosystems by nonindigenous species, Congress enacted the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA)(Pub. L. 101-646). To prevent and control infestations of the United States coastal and inland waters by the zebra mussel and other nonindigenous aquatic nuisance species (ANS), NANPCA directed a suite of federal actions, including the development of a mandatory ballast water management (BWM) program for the Great Lakes ecosystem.

Responding to mounting evidence of continuing biological invasions in aquatic ecosystems other than the Great Lakes, Congress passed the National Invasive Species Act of 1996 (NISA)(Pub. L. 104-332), reauthorizing and amending NANPCA, and extending the program of BWM to prevent introductions of ANS to the remainder of U.S. waters.

Section 1101 of NISA directed the Secretary of Transportation (Secretary) to:

1. Establish a regime of voluntary national BWM guidelines to prevent, to the maximum extent practicable, the introduction and spread of nonindigenous species in waters of the U.S. by vessels equipped with ballast water tanks;

2. Assess and report the effectiveness of the guidelines to Congress; and

3. Make the provisions of the program mandatory if voluntary compliance was found to be insufficient to meet its stated objectives.

This report is provided to meet the requirements of section 1101 (d) of NISA.

REGULATORY DEVELOPMENT ACTIONS

The Coast Guard established NANPCA's mandatory BWM program for the Great Lakes on May 10, 1993. These rules, first published in Federal Register April 8, 1993 (58 FR 18334), were later expanded to include the Hudson River north of the George Washington Bridge (59 FR 67632, Dec. 30 1994) and are contained in 33 CFR 151 subpart C.

To fulfill NISA's mandate to increase protection of aquatic related resources and infrastructure through a voluntary BWM regime, the Coast Guard published an Interim Rule in the Federal Register (64 FR 26682, May 17, 1999). These regulations, in effect as of July 1, 1999, and applicable to U.S. waters outside of the Great Lakes ecosystem:

1. Request operators of vessels entering these waters after having operated beyond the Exclusive Economic Zone (EEZ) of the United States to follow a suite of specified BWM practices;

2. Require operators of these vessels to submit a report of their BWM activities to the National Ballast Information Clearinghouse; and

3. Promote good husbandry and BWM practices for operators of all vessels in waters of the United States.

The details of these BWM guidelines, which became a Final Rule on November 21, 2001, are contained in 33 CFR 151 subpart D and included as Appendix A to this report.

BALLAST WATER TREATMENT

Along with establishing and implementing the mandatory and voluntary BWM regimes called for by Congress, the Coast Guard, working with a variety of other organizations and individuals, has taken a lead role in facilitating the development of ballast water treatment (BWT) technologies. Central to this are ongoing efforts to establish:

1. A quantitative BWT performance standard;

2. In cooperation with the U.S. Environmental Protection Agency's Environmental Technology Verification (ETV) program, protocols for testing, verifying and reporting on BWT technologies; and

3. A program that will provide incentive for the experimental shipboard installation and operation of promising BWT technologies.

In conjunction with these initiatives, the Coast Guard:

1. Published a notice and request for comments (66 FR 21807, May 1, 2001) on four possible approaches to setting standards for BWT, and posed questions related to setting, implementing and enforcing such standards;

2. Prepared an advance notice of proposed rulemaking requesting comments on options for a BWT goal and interim standard;

3. Signed a Memorandum of Agreement with the ETV on June 12, 2001, establishing a formal engineering test program to accelerate the development and commercialization of ballast water treatment technologies; and

4. Published a notice and request for comments (66 FR 28213, May 22, 2001) on how a program of experimental BWT installation and testing might be structured so as to encourage participation by ship owners and operators.

REPORT REQUIREMENTS AND FOLLOW-ON ACTIONS

Sections 1101 (d) and (e) of NISA provide specific guidance for both the preparation of this report, and for follow-on actions based on the report's possible findings. Using criteria developed by the Aquatic Nuisance Species Task Force (Task Force) and after consulting with interested and affected parties, the Secretary is to provide Congress with an assessment of the compliance by vessels with the guidelines and regulations issued under NISA.

(Note: The Task Force is an intergovernmental organization of seven federal members and 11 ex-officio members, co-chaired by the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration, which was established by NANPCA to coordinate governmental efforts related to nonindigenous aquatic species in the United States with those of the private sector and other North American interests.)

Along with establishing the rate of compliance, the review must include an evaluation of the effectiveness of the voluntary guidelines and regulations in reducing the introduction and spread of aquatic nuisance species by vessels. Should the review indicate that the legislative intent is not being realized, the Secretary is directed to utilize the best scientific information available as a basis to revise the guidelines and regulations.

Congress anticipated that the Secretary might find voluntary compliance with the guidelines inadequate, or the rate of reporting inadequate for a valid assessment of such compliance to be made. In either of those events, NISA requires the Secretary to make the practices in the voluntary guidelines mandatory and to provide for their enforcement. NISA provides the associated penalty provisions and stipulates that the regulations cannot be promulgated sooner than 180 days after the issuance of the report to Congress.

INTERNATIONAL COORDINATION

NISA calls for the U.S. government to engage in foreign negotiations to address ANS. These discussions are taking place at the International Maritime Organization (IMO) Marine Environment Protection Committee where the Coast Guard led U.S. delegation continues to exhibit a leadership role in drafting an environmentally and economically sound treaty. The major obstacle to concluding an international agreement remains the absence of a BWT standard, and the technologies to meet that standard.

In the interim, the IMO has adopted Resolution A.868(20) "Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens" which requests all vessels to implement the Guidelines' practices. The U.S. BWM actions are fully consistent with this IMO resolution.

Section II *Sources of Data and Information Presented in this Report*

NATIONAL BALLAST INFORMATION CLEARINGHOUSE

Section 1102 (f) of NISA directs the Secretary of Transportation and the Smithsonian Environmental Research Center (SERC) to collaboratively create and operate the National Ballast Information Clearinghouse (NBIC) for the collection and analysis of information and data regarding compliance with ballast water reporting requirements, BWM practices, and ecological surveys of aquatic nuisance species in U. S. waters. The NBIC is physically located at the SERC, in Edgewater, MD, and financially supported by the Coast Guard, via a cooperative agreement with the Smithsonian Institution.

NATIONAL BALLAST SURVEY

To enable analyses and assessments of BWM and delivery patterns by commercial vessels, as well as meet NISA's report requirements, the Coast Guard and the NBIC developed and implemented the National Ballast Survey (NABS). On March 1, 1999 the Secretary submitted to Congress the "National Ballast Water Information Clearinghouse: Function, Design and Implementation – Progress Report I", the body of which is a complete description of the approach, rationale, and methodologies behind this nationwide survey.

The NABS was designed explicitly to create a national ballast water database to be used to analyze:

1. Rates of compliance with BWM reporting and the voluntary management guidelines;

2. Patterns and year-to-year changes in ballast water delivery and management practices by vessel classes, geographic regions, and seasons; and

3. The accuracy of the submitted data through the use of multiple, independent data sources.

The NABS permits a comprehensive analysis of ballast water delivery patterns throughout the country. This report's policy recommendations are based to a great extent on the various NBIC analyses and interpretations of BWM patterns.

Using the NABS data for the two year period July 1, 1999 – June 30, 2001, the NBIC estimated rates of ballast water reporting and ballast water exchange (BWE). BWE was analyzed both in terms of the number of vessels performing a mid-ocean exchange of

ballast water, and the amount of discharged ballast water that has been subjected to the mid-ocean exchange process.

CRITERIA FOR EFFECTIVENESS

Section 1101(e)(3) of NISA directed the Task Force to develop and submit to the Secretary the criteria for determining the adequacy and effectiveness of the program of voluntary guidelines. A Task Force committee that included a cross section of government, industry, and non-government interests completed this work and its final report was forwarded to the Coast Guard in July 2001.

While recognizing the challenges posed when trying to implement a management practice (mid-ocean BWE), which in itself is less than 100% effective in achieving its goal, the report recommended that the highest possible rate of compliance should be sought since anything less than 100% compliance would facilitate the continued importation and release of nonindigenous species.

The Task Force concluded that for the voluntary regime to be considered operationally "adequate" it would need to achieve a level of compliance on par with a program subject to full enforcement, and suggested using as a benchmark the mandatory Great Lakes program, which has a near 100% level of compliance as verified by the Coast Guard's shipboard inspections.

PUBLIC INPUT

During the development and implementation of the voluntary guidelines, the Coast Guard made a practice of consulting with a variety of government, industry, non-government and public interests in an effort to obtain their suggestions on how to best structure and execute a national BWM program.

NISA directed the Secretary to consult with interested and affected parties prior to submitting this report on the national BWM program to Congress. In fulfilling this obligation, Coast Guard held a series of regional public meetings to provide all parties the opportunity to comment on all aspects of the Coast Guard's BWM program and make recommendations for changes. These meetings took place in Oakland, CA, Houston, TX, Ann Arbor, MI, and Washington, DC between August 28 and September 18, 2001.

All of the meetings followed a consistent format of (1) opening remarks and establishment of meeting procedures; (2) an overview of the Coast Guard's current BWM program and questions from the audience about the program; and (3) public comment for the record followed by closing remarks.

Attendance, while less than anticipated with only 65 total

participants, was diverse. The shipping industry was best-represented at all four meetings, accounting for approximately 60% of participants, with Coast Guard personnel, other federal and state agencies, and environmental groups making up the remainder.

The notice in the Federal Register announcing the public meetings also allowed written comments to be submitted to the Coast Guard up to a closing date of September 30, 2001, and provided a list of questions the agency was particularly interested in. Sixteen sets of comments were received at the docket (USCG 2001-10062), with 80% from representatives of maritime transportation related industries.

Section III *Assessment of the Effectiveness of the National Voluntary Ballast Water Management Guidelines*

EFFECTIVENESS OF BALLAST WATER EXCHANGE

While NABS provides a detailed quantitative assessment of compliance with the voluntary practice of mid-ocean exchange, it is important to recognize this is only one measure of the guidelines' effectiveness. NABS is designed to measure the rate of implementation for this management strategy, but it does not measure the actual effect on reducing the rate of invasions.

It seems intuitive that performing BWE will reduce the supply of organisms that arrive to U.S. ports in ballast water, which will result in fewer invasions overall. There is a good deal of support for this logic.

Studies have shown that BWE is not 100% effective, as not all organisms are removed by exchange. Therefore the ultimate effectiveness of this management strategy depends upon both (a) the degree of implementation and (b) the relationship between the supply of organisms and invasion rates. While the former lends itself to relatively straightforward quantitative measurement, the latter remains a critical topic of ongoing research by scientists studying biological invasions.

However, the Task Force recommended that adequacy of the voluntary program be assessed with respect to compliance with the mandatory Great Lakes program, which also relies on BWE. Therefore, for purposes of assessing adequacy, degree of implementation is more relevant than the biological effectiveness of BWE itself.

PUBLIC VIEWS

There were three recurring themes at each of the public meetings that can reasonably be characterized as consensus views of the participants.

1. The perceived limitations of the voluntary guidelines, particularly the absence of penalties, have led to a number of individual state ballast water laws and regulations. A strong and enforceable national BWM program that adequately addresses state, regional, and national environmental and economic interests is preferable to a patchwork of state programs.

2. The voluntary program is ineffective at realizing high rates of complete BWE by vessels. The Coast Guard should institute a national program of mandatory BWM practices as soon as

possible, basing this program initially on the practices in the voluntary regime.

3. The Coast Guard should institute this mandatory program while simultaneously continuing its efforts to develop a BWT standard that could then drive the development of alternative treatment technologies.

The written comments submitted in response to the Federal Register notice generally reiterated the consensus views at the public meetings. The following additional non-consensus recommendations and concerns were identified for Coast Guard consideration

1. While it will be necessary to take into account a variety of vessel characteristics (i.e. age, design, operating conditions, etc.), BWM should be required of all vessels, including those engaged solely in voyages between U.S. ports.

2. In establishing any BWM program, the safety of the vessel, its crew, or its passengers, as well as the unimpeded operation of the vessel, should remain overarching considerations. Appropriate provisions should be included to prevent jeopardizing safety. Enforcement procedures must be in place to validate the veracity of a vessel's claims that it was unable to fully comply with the BWM requirements because of safety concerns.

3. Complying with the current operating definition of mid-ocean BWE requires a ship to exchange its ballast water of coastal origins with mid-ocean water (water from an area at least 200 miles from the nearest shore and with a water depth of at least 2000 meters). Experience shows that this definition severely reduces the number of ships that are able to conduct an exchange without significantly altering their route and adding substantial costs and delays to their voyages. A graphic representation of this dilemma is presented in Figure (1). The unshaded areas are those where a "mid-ocean BWE" can be performed. Vessels trading between Central/South America and the U.S., and those between Alaska/Canada and the U.S. are seldom in a position to perform an exchange. This issue is also discussed in the "Results" section of Appendix B.

4. Shipping interests believe that any BWM program must not require extended deviations from an intended voyage in order to comply. Environmental interests recognize the problems these deviations entail and advocate the identification of

"alternative exchange zones" - geographic areas closer to shore and with shallower waters where an exchange would be considered environmentally sound (i.e. taking into account regional hydrographic, temperature, and salinity variations). Both sides agree that the development of alternative treatment methods that are more effective both biologically and economically than BWE is the desired end state.

5. The IMO is considering adopting a definition of BWE that requires a water depth of 500 meters instead of the U.S. criteria of 2000 meters. While there is no clear scientific evidence that the IMO criteria is less protective than the U.S., there is no agreement that it should become part of the U.S. definition. There is consensus that all efforts should be made to arrive at a single international definition based on sound scientific reasoning

NBIC REPORT

In cooperation with the Coast Guard, the NBIC prepared the report titled "Status and Trends of Ballast Water Management in the U.S.: First Biennial Report of the National Ballast Information Clearinghouse, November 2001". This document (Appendix B) analyzes the BWM information self-reported by ships to the Coast Guard during the period of July 1, 1999 through June 30, 2001 and reaches the following conclusions regarding compliance with the ballast water reporting and management practices by vessels operating outside of the Great Lakes ecosystem.

1. Only 30.4 % of regulated ships submitted reports during the first 24 months that reporting requirements were in effect. Over the two-year period, the monthly compliance rate increased gradually from about 20% to about 40%.

2. About one half (51.2%) of the reporting ships that discharged ballast water performed some degree of ballast water exchange. Over the two-year period, there was little change in the proportion of the reporting vessels that conducted a mid-ocean exchange prior to discharging ballast water. The reasons for not performing BWE were varied and included constraints posed by the vessel's itinerary, as well as ship and crew safety concerns. These are detailed further in Table 5 to Appendix B of this report.

The NBIC looked at compliance with the federal program in California, compared to other areas of the country, and can show that reporting in the federal program went up significantly when the California State program (which included penalties) took effect:

They found that:

1. The percentage of federally regulated ships that submitted reports upon entering ports in California increased from 55% for the first year to 65% for the second. This reflects the implementation at the state level of an identical BWM reporting requirement, but with penalties for non-reporting. While the initial monthly reporting rate in California for the federal program was below 50%, it increased markedly with implementation of the state program, going from 44% in December 1999 to 65% in January 2000, the month the program took effect. A similar increase in reporting was not observed at the same time in any other geographic area of the country.

2. Approximately 65 % of the ships that reported discharging ballast water in California waters performed some degree of ballast water exchange in both the first and second years.

COMPARISON WITH GREAT LAKES PROGRAM

For comparison purposes, the Coast Guard examined compliance with the mandatory federal program for the Great Lakes ecosystem for the period July 1999 through June 2001and found that:

1. 100% of regulated ships submitted reports prior to entering the Great Lakes ecosystem;

2. 93% of regulated ships performed the necessary level of active BWE prior to their arrival; and

7% of regulated ships did not perform the necessary level of active BWM prior to their arrival. These were required to take appropriate alternative actions to meet the regulations prior to being allowed to enter.

CONCLUSIONS

NISA directs the Secretary to determine if the level of reporting by vessels is adequate to assess the compliance with the guidelines. Having (1) reviewed the data collected during the first two years of the program of voluntary BWM guidelines, along with the analysis conducted by the NBIC, and (2) assessed these under the Task Force's criteria for determining the adequacy and effectiveness of such a program, it is the Secretary's determination that the consistently low rate of vessel reporting makes it impossible to accurately assess compliance with the voluntary BWM guidelines.

The resultant lack of data regarding shipboard BWM practices also makes it impossible to accurately assess the guidelines' effectiveness in reducing the introduction and spread of ANS by vessels.

In this situation of low reporting and the resulting inability to make valid program assessments, NISA directs the Secretary to issue regulations making the requirements of the voluntary program mandatory and provide the necessary enforcement.

Comments received from a range of interested and affected parties since the program's implementation indicate there is clearly broad support for a mandatory national BWM program based on the practices contained in the guidelines.

The Coast Guard is currently working on developing such a mandatory program, as required by NISA and supported by stakeholders.

Section IV *Future Actions*

BALLAST WATER PROGRAM

As mentioned previously in this report, Section 1101(f) of NISA leaves little doubt that the next regulatory actions with regard to BWM are to make the voluntary guidelines mandatory and provide for their enforcement. Balancing the ecological, social, safety and economic concerns of the affected parties, the Coast Guard will implement a robust national BWM program that maximizes the use of existing BWM techniques by all vessels, while fostering the development of new BWT technologies. To accomplish this, the following initial steps will be taken.

BALLAST WATER MANAGEMENT REPORT

The current BWM regime primarily focuses on vessels arriving from outside of the U.S. EEZ with ballast water onboard. In order to more fully understand and respond appropriately to the threat posed by ballast water, the BWM program must also consider:

1. Those vessels that arrive from outside of the U.S. fully loaded with cargo, but eventually take on ballast in U.S. waters and move it to other U.S. waters in conjunction with their cargo operations; and

2. Those vessels that operate solely between U.S. ports.

With this in mind, the Coast Guard will develop regulations to require ***all*** vessels equipped with ballast tanks that enter U.S. waters after operating beyond the EEZ, ***or*** are engaged solely in voyages between U.S. ports, to perform appropriate record keeping and reporting.

MANDATORY BALLAST WATER MANAGEMENT PRACTICES

To reduce the amount of unmanaged ballast water exchanged into the coastal areas of the U.S., the Coast Guard will issue regulations requiring vessels equipped with ballast tanks that enter the waters of the United States after operating beyond the EEZ to:

1. Conduct an exchange of ballast water;

2. Discharge ballast water to an approved reception facility;

3. Retain the ballast water on board the vessel;

4. Use an alternate environmentally sound method of ballast water management approved by the Coast Guard; or

5. Under extraordinary conditions, conduct a ballast water exchange within a geographic area agreed to by the Coast Guard.

The above will be in addition to the general precautionary practices requested of vessel operators. These are consistent with IMO's BWM guidelines and can be performed by virtually any vessel.

While these provisions would apply generally, the Coast Guard will also consider whether limited exceptions are appropriate for vessels that are constrained by their routes and the current definition of BWE as discussed below under "Ballast Water Exchange Defined."

PENALTIES

Section 1101(g) of NISA establishes the sanctions for failing to comply with the program's requirements. These include civil and criminal penalties, as well as revocation of clearance.

Recognizing that BWE may not be feasible during a voyage for a variety of reasons, section 1101(k) states "The master of a vessel is not required to conduct a ballast water exchange if the master decides that the exchange would threaten the safety or stability of the vessel, its crew, or its passengers because of adverse weather, vessel architectural design, equipment failure, or any other extraordinary conditions." This exemption will remain a central tenet in implementation and enforcement of the BWM program. To thwart abuse of this exemption, the Coast Guard will monitor and verify the appropriateness of its use.

BALLAST WATER EXCHANGE DEFINED

These regulations will include a definition of ballast water exchange that clarifies where and how BWE should be conducted. Of particular concern is how to deal with the fact that a large percentage of ship voyages do not go into waters 200 miles from shore or with a depth of at least 2000 meters. In addition, many vessels that transit such waters do not do so for a sufficient period of time to conduct a complete exchange. Requiring ships to deviate from their routes and schedules would likely have significant direct costs, as well as unintended secondary logistical effects in the nation's supply chain.

BALLAST WATER TREATMENT TECHNOLOGY

Recognizing the shortcomings of BWE as a management method, the Coast Guard will continue to focus its efforts on establishing a quantitative BWT performance standard; protocols for testing, verifying and reporting on BWT technologies; and facilitating experimental shipboard installation and operation of promising BWT technologies. The Coast Guard recognizes that success in this area requires cooperation with other federal and state agencies, as well as industry and environmental interests, and is committed to engaging them in reaching mutually beneficial and satisfactory solutions to this difficult challenge.

Figure 1 - Areas Where Ballast Water Exchange Can Be Conducted

Unshaded areas are those where a mid-ocean ballast water exchange can be performed.

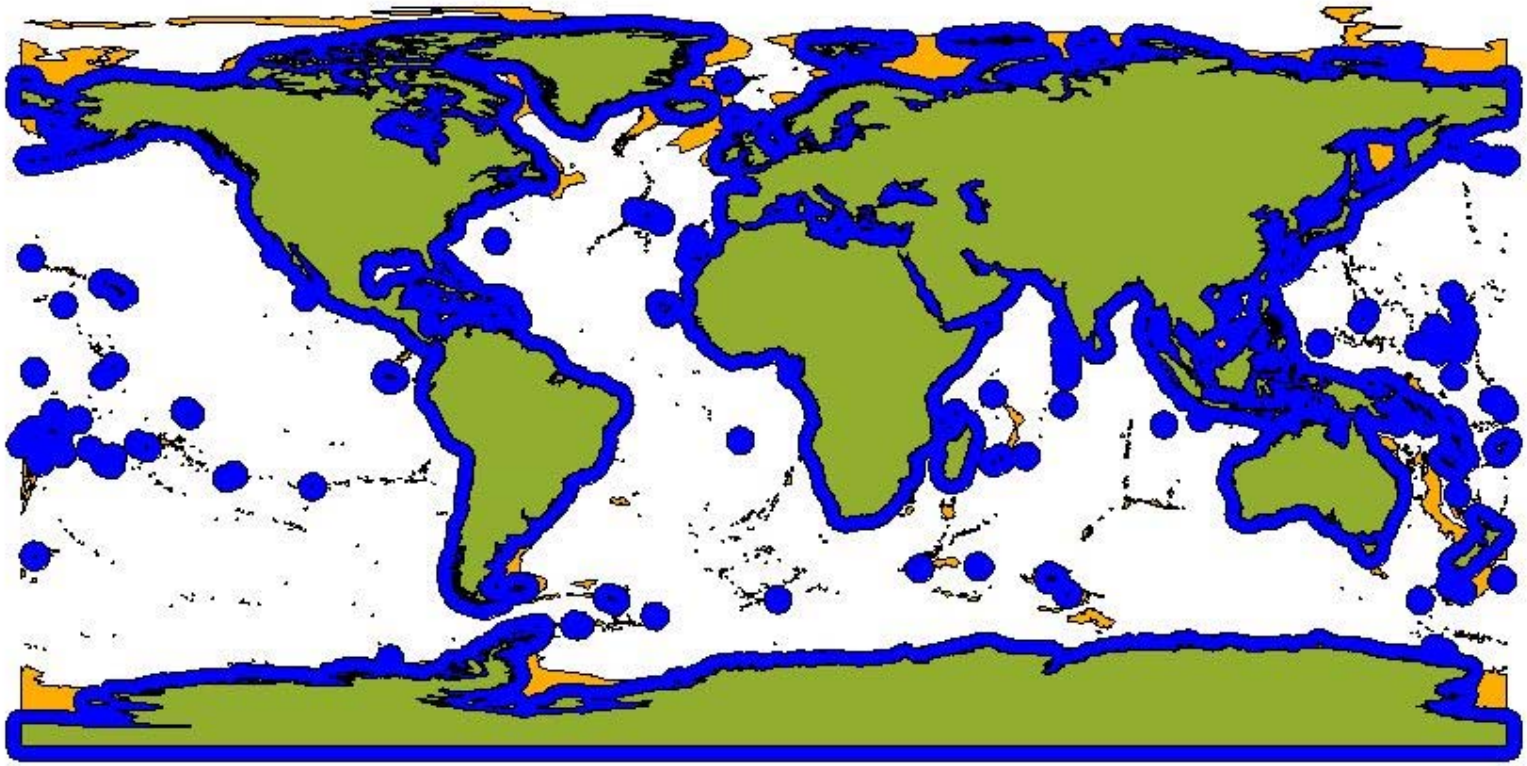

Table 1 - List of Acronyms

ANS	Aquatic Nuisance Species
BWE	Ballast Water Exchange
BWM	Ballast Water Management
BWT	Ballast Water Treatment
EEZ	Exclusive Economic Zone
ETV	Environmental Technology Verification
IMO	International Maritime Organization
NABS	National Ballast Survey
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990
NBIC	National Ballast Information Clearinghouse
NISA	National Invasive Species Act of 1996
SERC	Smithsonian Environmental Research Center
Secretary	Secretary of Transportation
Task Force	Aquatic Nuisance Species Task Force

APPENDIX A

33 CFR Part 151 Subpart D--Ballast Water Management for Control of Nonindigenous Species in waters of the United States.

Sec.
151.2000 What is the purpose of this subpart?
151.2005 To which vessels does this subpart apply?
151.2010 Which vessels are exempt from the mandatory requirements?
151.2015 Is a vessel in innocent passage exempt from the mandatory requirements?
151.2020 To what ballast water does this subpart apply?
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151.2040 What are the mandatory requirements for vessels equipped with ballast tanks that enter the waters of the United States after operating beyond the Exclusive Economic Zone (EEZ)?
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151.2045 What are the mandatory recordkeeping requirements for vessels equipped with ballast tanks that enter the waters of the United States after operating beyond the Exclusive Economic Zone (EEZ)?
151.2050 What methods are used to monitor compliance with this subpart?
151.2055 Where are the Alternate Exchange Zones Located? (Reserved)
151.2060 What must each application for approval of an alternative compliance technology contain?(Reserved)
151.2065 What is the standard of adequate compliance determined by the ANSTF for this subpart? (Reserved)
Appendix to Subpart D of Part --Ballast Water Reporting
Form and Instructions for Ballast Water Reporting Form

Subpart D--Ballast Water Management for Control of Nonindigenous Species in Waters of the United States

Authority: 16 U.S.C. 4711; 49 CFR 1.46.

<u>§ 151.2000 What is the purpose of this subpart</u>?

This subpart implements the provisions of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA) (16 U.S.C. 4701-4751), as amended by the National Invasive Species Act of 1996 (NISA).

<u>§ 151.2005 To which vessels does this subpart apply</u>?

(a) Sections 151.2000 through 151.2035(a) of this subpart apply to all vessels, U.S. and foreign, equipped with ballast tanks that operate in the waters of the United States.

(b) In addition, §§151.2035(b) through 151.2065 apply to all vessels, U.S. and foreign, equipped with ballast tanks, that enter the waters of the United States after operating beyond the Exclusive Economic Zone, except those vessels exempted in §151.2010 and §151.2015.

<u>§ 151.2010 Which vessels are exempt from the mandatory requirements</u>?

Four types of vessels are exempt from the requirements in §§ 151.2040 and 151.2045:

(a) A crude oil tanker engaged in the coastwise trade.

(b) A passenger vessel equipped with a functioning treatment system designed to kill aquatic organisms in the ballast water. The treatment system must be utilized for ballast water discharged into the waters of the United States and it must operate as designed.

(c) A Department of Defense or Coast Guard vessel subject to the requirements of section 1103 of the Act, or any vessel of the Armed Forces, as defined in the Federal Water Pollution Control Act(33 U.S.C. 1322(a)) that is subject to the "Uniform National Discharge Standards for Vessels of the Armed Forces" (33 U.S.C. 1322(n)).
(d) A vessel that will discharge ballast water or sediments only at the same location where the ballast water or sediments originated. The ballast water or sediments must not mix with ballast water or sediments other than those taken on in areas more than 200 nautical miles from any shore and in waters more than 2,000 meters (6,560 feet, 1,093 fathoms) deep.

§ 151.2015 Is a vessel in innocent passage exempt from the mandatory requirements?
A foreign vessel merely traversing the territorial sea of the United States (i.e., not entering or departing a U.S. port, or not navigating the internal waters of the U.S.) is exempt from the requirements of §§ 151.2040 and 151.2045, however such vessels are requested not to discharge ballast water into the waters of the United States unless they have followed the voluntary guidelines of § 151.2035.

§ 151.2025 What definitions apply to this subpart?
(a) Unless otherwise stated in this section, the definitions in 33 CFR 151.1504, 33 CFR 160.203, and the United Nations Convention on the Law of the Sea apply to this part.
(b) As used in this part--

ANSTF means the Aquatic Nuisance Species Task Force mandated under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA).

Captain of the Port (COTP) means the Coast Guard officer designated as the COTP, or a person designated by that officer, for the COTP zone covering the first U.S. port of destination. These COTP zones are listed in 33 CFR part 3.

Exchange means to replace the water in a ballast tank using one of the following methods:

(1) Flow through exchange means to flush out ballast water by pumping in mid-ocean water at the bottom of the tank and continuously overflowing the tank from the top until three full volumes of water has been changed--to minimize the number of original organisms remaining in the tank.

(2) Empty/refill exchange means to pump out the ballast water taken on in ports, estuarine, or territorial waters until the tank is empty, then refilling it with mid-ocean water; masters/operators should pump out as close to 100 percent of the ballast water as is safe to do so.

IMO guidelines mean the Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens (IMO Resolution A.868 (20), adopted November 1997).

NANCPA means the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990.

NBIC means the National Ballast Water Information Clearinghouse operated by the Coast Guard and the Smithsonian Environmental Research Center as mandated under NISA.

NISA means the National Invasive Species Act of 1996, which reauthorized and amended NANCPA.

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the Virgin Islands, and the Trust Territory of the Pacific Islands.

Voyage means any transit by a vessel destined for any United States port from a port or place outside of the EEZ, including intermediate stops at a port or place within the EEZ. For the purpose of this rule, a transit by a vessel from a United States port to any other United States port, if at any time the vessel operates outside the EEZ or equivalent zone of Canada, is also considered a voyage.

Waters of the United States means waters subject to the jurisdiction of the United States as defined in 33 CFR §2.05-30, including the navigable waters of the United States. For this regulation, the navigable waters include the territorial sea as extended to 12 nautical miles from the baseline, pursuant to Presidential Proclamation No. 5928 of December 27, 1988.

§ 151.2030 Who is responsible for determining when to use the safety exemption?

(a) The master, operator, or person-in-charge of a vessel is responsible for the safety of the vessel, its crew, and its passengers.

(b) The master, operator, or person-in-charge of a vessel is not required to conduct a ballast water management practice (including exchange), if the master decides that the practice would threaten the safety of the vessel, its crew, or its passengers because of adverse weather, vessel design limitations, equipment failure, or any other extraordinary conditions. If the master uses this section, and the--

(1) Vessel is on a voyage to the Great Lakes or Hudson River, the vessel must comply with the requirements of §151.1514 of subpart C of this part (Ballast water management alternatives under extraordinary conditions); or

(2) Vessel is on a voyage to any port other than the Great Lakes or Hudson River, the vessel shall not be required to perform a ballast water management practice which the master has found to threaten the safety of the vessel, its crew, or its passengers because of adverse weather, vessel design limitations, equipment failure, or any other extraordinary conditions.

(c) Nothing in this subpart relieves the master, operator, or person-in-charge of a vessel, of the responsibility for ensuring the safety and stability of the vessel or the safety of the crew and passengers, or any other responsibility.

§ 151.2035 What are the voluntary ballast water management guidelines?

(a) Masters, owners, operators, or persons-in-charge of all vessels equipped with ballast water tanks that operate in the waters of the United States are requested to take the following voluntary precautions to minimize the uptake and the release of harmful aquatic organisms, pathogens, and sediments:

(1) Avoid the discharge or uptake of ballast water in areas within or that may directly affect marine sanctuaries, marine preserves, marine parks, or coral reefs.

(2) Minimize or avoid uptake of ballast water in the following areas and situations:

- (i) Areas known to have infestations or populations of harmful organisms and pathogens (e.g., toxic algal blooms).
- (ii) Areas near sewage outfalls.
- (iii) Areas near dredging operations.
- (iv) Areas where tidal flushing is known to be poor or times when a tidal stream is known to be more turbid.
- (v) In darkness when bottom-dwelling organisms may rise up in the water column.
- (vi) Where propellers may stir up the sediment.

(3) Clean the ballast tanks regularly to remove sediments. Clean the tanks in mid-ocean or under controlled arrangements in port, or at dry dock. Dispose of your sediments in accordance with local, State, and Federal regulations.

(4) Discharge only the minimal amount of ballast water essential for vessel operations while in the waters of the United States.
(5) Rinse anchors and anchor chains when you retrieve the anchor to remove organisms and sediments at their place of origin.
(6) Remove fouling organisms from hull, piping, and tanks on a regular basis and dispose of any removed substances in accordance with local, State and Federal regulations.
(7) Maintain a ballast water management plan that was developed specifically for the vessel.
(8) Train the master, operator, person-in-charge, and crew, on the application of ballast water and sediment management and treatment procedures.

(b) In addition to the provisions of §151.2035(a), you (the master, operator, or person-in-charge of a vessel) are requested to employ at least one of the following ballast water management practices, if you carry ballast water, that was taken on in areas less than 200 nautical miles from any shore or in waters less than 2000 meters deep, into the waters of the United States after operating beyond the EEZ:

(1) Exchange ballast water on the waters beyond the EEZ, from an area more than 200 nautical miles from any shore, and in waters more than 2,000 meters (6,560 feet, 1,093 fathoms) deep, before entering waters of the United States.
(2) Retain the ballast water on board the vessel.
(3) Use an alternative environmentally sound method of ballast water management that has been approved by the Coast Guard before the vessel begins the voyage. Submit the requests for approval of alternative ballast water management methods to the Commandant (G-MSO-4), U.S. Coast Guard Headquarters, 2100 Second Street SW., Washington, DC 20593-0001. The phone number is 202-267-0500.
(4) Discharge ballast water to an approved reception facility.
(5) Under extraordinary conditions, conduct a ballast water exchange within an area agreed to by the COTP at the time of the request.

<u>§151.2040 What are the mandatory requirements for vessels equipped with ballast tanks that enter the waters of the United States after operating beyond the Exclusive Economic Zone (EEZ)</u>?

(a) The master, owner, operator, person-in-charge of a vessel bound for the Great Lakes or Hudson River, which has operated beyond the EEZ during any part of its voyage, regardless of intermediate ports of calls within the waters of the United States or Canada, must comply with paragraphs (c through f) of this section, all of § 151.2045, and with the provisions of subpart C of this part.

(b) A vessel engaged in the foreign export of Alaskan North Slope Crude Oil must comply with paragraphs (c) through (f) of this section, all of § 151.2045, and with the provisions of 15 CFR 754.2(j)(1)(iii). That section (15 CFR 754.2(j)(1)(iii)) requires a mandatory program of deep water ballast exchange (i.e., at least 2,000 meters water depth and recordkeeping), unless doing so would endanger the safety of the vessel or crew.

(c) The master, owner, operator, agent, or person-in-charge of a vessel entering the waters of the United States after operating beyond the EEZ, unless specifically exempted by §§151.2010 or 151.2015, must provide the information required by §151.2045 in electronic or written form to the Commandant, U.S. Coast Guard or the appropriate COTP as follows:

(1) For a United States or Canadian Flag vessel bound for the Great Lakes. You must fax the required information to the COTP Buffalo, Massena Detachment (315-764-3283), at least 24 hours before the vessel arrives in Montreal, Quebec.

(2) For a foreign flagged vessel bound for the Great Lakes. You must—

(i) Fax the required information to the COTP Buffalo, Massena Detachment (315-764-3283), at least 24 hours before the vessel arrives in Montreal, Quebec; or

(ii) Complete the ballast water information section of the St. Lawrence Seaway required "Pre-entry Information from Foreign Flagged Vessels Form" and submit it in accordance with the applicable Seaway Notice.

(3) For a vessel bound for the Hudson River north of the George Washington Bridge. You must telefax the information to the COTP New York at 718-354-4249 before the vessel enters the waters of the United States (12 miles from the baseline).

(4) For a vessel not addressed in paragraphs (c)(1), (c)(2), and (c)(3) of this section. Before the vessel arrives at the first port of call in the waters of the United States, you must-

(i) Mail the information to U.S. Coast Guard, c/o Smithsonian Environmental Research Center (SERC), P.O. Box 28, Edgewater, MD 21037-0028; or

(ii) Transmit the information electronically to the NBIC at http://invasions.si.edu/ballast.htm or e-mail it to ballast@serc.si.edu; or

(iii) Fax the information to the Commandant, U.S. Coast Guard, c/o the NBIC at 301-261-4319.

(iv) A single report that includes the ballast discharge information for all U.S. ports that will be entered during this voyage will be accepted unless the vessel exits the EEZ during transits.

(d) If the information submitted in accordance with paragraph (c) of this section changes, you must submit an amended form before the vessel departs the waters of the United States.

(e) This subpart does not authorize the discharge of oil or noxious liquid substances (NLS) in a manner prohibited by United States or international laws or regulations. Ballast water carried in any tank containing a residue of oil, NLS, or any other pollutant must be discharged in accordance with the applicable regulations.

(f) This subpart does not affect or supersede any requirement or prohibition pertaining to the discharge of ballast water into the waters of the United States under the Federal Water Pollution Control Act (33 U.S.C. 1251 to 1376).

<u>§151.2041 Equivalent Reporting Methods for vessels other than those entering the Great Lakes or Hudson River</u>

(a) For ships required to report under §151.2040(c)(4) the Chief, Environmental Standards Division (G-MSO-4), acting for the Assistant Commandant for Marine Safety and Environmental Protection (G-M) may, upon receipt of a written request, consider and approve alternative methods of reporting if:

(1) Such methods are at least as effective as that required by §151.2040(c)(4); and

(2) Compliance with the requirement is economically or physically impractical.

(b)The Chief, Environmental Standards Division (G-MSO-4) will take approval or disapproval action on the request submitted in accordance with paragraph (a) of this section within 30 days of receipt of the request.

APPENDIX A

§151.2045 What are the mandatory recordkeeping requirements for vessels equipped with ballast tanks that enter the waters of the United States after operating beyond the Exclusive Economic Zone (EEZ)?

(a) The master, owner, operator, or person in charge of a vessel entering the waters of the United States after operating beyond the EEZ, unless specifically exempted by §§151.2010 or 151.2015 must keep written, records that include the following information (Note: Ballast tank is any tank or hold that carries ballast water regardless of design):

(1) Vessel information. Include the—
- (i) Name;
- (ii) International Maritime Organization (IMO) Number (official number if IMO number not issued);
- (iii) Vessel type;
- (iv) Owner or operator;
- (v) Gross tonnage;
- (vi) Call sign; and
- (vii) Port of Registry (Flag).

(2) Voyage information. Include the date and port of arrival, vessel agent, last port and country of call, and next port and country of call.

(3) Total ballast water information. Include the total ballast water capacity, total volume of ballast water on board, total number of ballast water tanks, and total number of ballast water tanks in ballast. Use units of measurements such as metric tons (MT), cubic meters (m^3), long tons (LT), and short tons (ST).

(4) Ballast Water Management. Include the total number of ballast tanks/holds that are to be discharged into the waters of the United States or to a reception facility. If an alternative ballast water management method is used, please note the number of tanks that were managed using an alternative method, as well as the type of method used. Indicate whether the vessel has a ballast water management plan and IMO guidelines on board, and whether the ballast water management plan is used.

(5) Information on ballast water tanks that are to be discharged into the waters of the United States or to a reception facility. Include the following:
- (i) The origin of ballast water. This includes date(s), location(s), volume(s) and temperature(s) [If a tank has been exchanged, list the loading port of the ballast water that was discharged during the exchange.].
- (ii) The date(s), location(s), volume(s), method, thoroughness (percentage exchanged if exchange conducted), sea height at time of exchange if exchange conducted, of any ballast water exchanged or otherwise managed.
- (iii) The expected date, location, volume, and salinity of any ballast water to be discharged into the waters of the United States or a reception facility.

(6) Discharge of Sediment. If sediment is to be discharged within the jurisdiction of the United States include the location of the facility where the disposal will take place.

(7) Certification of Accurate Information. Include the master, owner, operator, person in charge, or responsible officer's printed name, title, and signature attesting to the accuracy of the information provided and certifying compliance with the requirements of this subpart.

(8) Change to Previously Submitted Information.

(i) Indicate whether the information is a change to information previously submitted for this voyage.
(ii) The master, owner, operator, or person in charge of a vessel subject to this section, must retain a signed copy of this information on board the vessel for 2 years.
(iii) The information required of this subpart may be used to satisfy the ballast water recordkeeping requirements for vessels subject to § 151.2040(a) and (b).
(iv) A sample form and the instructions for completing the form are in the appendix to this subpart. If you complete the "Ballast Water Reporting Form" contained in the IMO Guidelines or complete the ballast water information section of the St. Lawrence Seaway required "Pre-entry Information Flagged Vessels Form," then you have met the requirements of this section.

§ 151.2050 What methods are used to monitor compliance with this subpart?
(a) The COTP may take samples of ballast water and sediment, examine documents, and make other appropriate inquiries to assess the compliance of any vessel subject to this subpart.
(b) The master, owner, operator, or person in charge of a vessel subject to this section, shall make available to the COTP the records required by § 151.2045 upon request.
(c) The NBIC will compile the data obtained from submitted reports. This data will be used, in conjunction with existing databases on the number of vessel arrivals, to assess vessel reporting rates.
§ 151.2055 Where are the alternate exchange zones located?
(Reserved)
§ 151.2060 What must each application for approval of an alternative compliance technology contain?
(Reserved)
§ 151.2065 What is the standard of adequate compliance determined by the ANSTF for this subpart?
(Reserved)

Appendix to Subpart D of Part 151--Ballast Water Reporting Form and Instructions for Ballast Water Reporting Form

INSTRUCTIONS FOR BALLAST WATER REPORTING FORM

(Please write in English and PRINT legibly.)

Is this an Amended Ballast Reporting Form?: Check Yes or No. Amendments should be submitted if there are any differences between actual ballast discharges and discharge information reported in a prior form. Please mark "Yes" if this form amends a previously submitted ballast reporting form.

SECTION 1. VESSEL INFORMATION

Vessel Name: Print the name of the vessel clearly.

IMO Number: Fill in identification number of the vessel used by the International Maritime Organization.

Owner: Write in the name of the registered owner(s) of the vessel. If under charter, enter Operator name.

Type: List specific vessel type. Use the following abbreviations: bulk (**bc**), roro (**rr**), container (**cs**), tanker (**ts**), passenger (**pa**), oil/bulk ore (**ob**), general cargo (**gc**), reefer (**rf**). Write out any additional vessel types.

GT: What is the Gross Tonnage of the vessel?

Call Sign: Write in the official call sign.

Flag: Fill in the full name of the country under whose authority the ship is operating. No abbreviations please.

SECTION 2. VOYAGE INFORMATION

Arrival Port: Write in the name of your first port of call after entering the U.S. EEZ or St. Lawrence Seaway. No abbreviations. **Arrival Date:** Fill in the arrival date to the above port. Please use European date format (DDMMYY).

Agent: List agent used for current port.

Last Port: Fill in the last port at which the vessel called immediately before entering the U.S. EEZ. No abbreviations please.

Country of Last Port: Fill in the last country at which the vessel called immediately before entering the U.S. EEZ. No abbreviations please.

Next Port: Fill in the port at which the vessel will call immediately after departing the current port ("Current Port"="Arrival Port" above). No abbreviations please.
Country of Next Port: Fill in the country of "Next Port" at which the vessel will call immediately after current port. No abbreviations please.

SECTION 3. BALLAST WATER

Total Ballast Water on Board:
Volume: What was the total volume of ballast water on board upon arrival into the waters of U.S. EEZ? Do not count potable water.

Units: Please include volume units (m^3, MT, LT, ST).
Number of Tanks in Ballast: Count the number of ballast tanks and holds with ballast as vessel enters waters inside the United States EEZ.

Total Ballast Water Capacity:
Volume: What is the maximum volume of ballast water used when no cargo is on board?
Units: Please include volume units (m^3, MT, LT, ST).
Total Number of Tanks on Ship: Count all tanks and holds that can carry ballast water (do not include tanks that carry potable water).

SECTION 4. BALLAST WATER MANAGEMENT

Total No. of tanks to be discharged: Count only tanks and holds with ballast to be discharged into waters inside the United States EEZ or into an approved reception facility. Count all tanks and holds separately (e.g., port and starboard tanks should be counted separately).

Of tanks to be discharged, how many Underwent Exchange: Count all tanks that are to be discharged into waters of the United States or into an approved reception facility.

Of tanks to be discharged, how many Underwent Alternative Management: Count all tanks that are to be discharged into waters of the United States or an approved reception facility.

Please specify alternative method(s) used, if any: Specifically, describe methods used for ballast management.

If no ballast treatment conducted, state reason why not: This applies to all tanks and holds being discharged into waters of the United States or into an approved reception facility.

Ballast Management Plan on board?: Is there a written document on board, specific to your vessel, describing the procedure for ballast management? This should include safety and exchange procedures (usually provided by vessel's owner or operator). Check Yes or No.

Management Plan implemented?: Do you follow the above management plan? Check Yes or No.

IMO Ballast Water Guidelines on board?: Is there a copy of the International Maritime Organization (IMO) Ballast Water Guidelines on board this vessel (i.e. "Guidelines for the Control and Management of Ship's Ballast Water to Minimize the Transfer Aquatic Organisms and Pathogens", [Res. A.868(20)])? Check Yes or No.

SECTION 5. BALLAST WATER HISTORY

(Record all tanks to be deballasted in port state of arrival: If none, go to #6)

Tanks/Holds: Please list all tanks and holds that you have discharged or plan to discharge into waters of the United States or
into an approved reception facility (write out, or use codes listed below table). Follow each tank across the page listing all source(s), exchange events, and/or discharge events separately. List each tank on a separate line. Port and starboard tanks with identical ballast water histories may be included on same line. Please use an additional page if necessary, being careful to include ship name, date, and IMO number at the top of each. For tanks with multiple sources: list 3 largest sources from last 30 days on separate lines. If more than 3 sources, include a 4th line for the respective tank(s) that indicated "Multiple" in port column and list the remaining tank volume not included in the 3 largest sources (i.e., total tank volume minus volume of the 3 largest sources). See example #1 on sample ballast reporting form.

-BW SOURCES-

Date: Record date of ballast water uptake. Use European format (DDMMYY).

Port or latitude/longitude: Record location of ballast water uptake, no abbreviations for ports.

Volume: Record total volume of ballast water uptake, with volume units.

Temp: Record water temperature at time of ballast water uptake, in degrees Celsius (include units).

-BW MANAGEMENT PRACTICES-

Date: Date of ballast water management practice. If exchanges occurred over multiple days, list the day when exchanges were completed. Use European format (DDMMYY).

Endpoint or latitude/longitude: Report location of ballast water management practice. If an exchange occurred over an extended distance, list the end point latitude and longitude.

Volume: Report total volume of ballast water moved (i.e., gravitated and pumped into tanks, discharged to reception facility) during management practice , with units.

% Exch.: (Note: for effective flow through exchange, this value should be at least 300%).

$$\%\ Exchange = \frac{\text{Total Volume added by Refill or Flow Through}}{\text{Capacity of Ballast Tank or Hold}} \times (100\%)$$

Method: Indicate management method using code (ER = empty/refill, FT = flow through, ALT = alternative method).

Sea Ht . (m): Estimate the sea height in meters at the time of the ballast water exchange if this method was used. (Note: this is the combined height of the wind-seas and swell, and does not refer to water depth).

-BW DISCHARGES-

Date: Date of ballast water discharge. Use European format (DDMMYY).

Port or latitude/longitude: Report location of ballast water discharge, no abbreviations for ports.

Volume: Report volume of ballast water discharged, with units.

Salinity: Document salinity of ballast water at the time of discharge, with units (i.e., specific gravity (sg) or parts per thousand (ppt)).

SECTION 6. TITLE AND SIGNATURE

Responsible officer's name and title (printed) and signature: Print name and title, include signature.

APPENDIX A

BALLAST WATER REPORTING FORM

IS THIS AN AMENDED BALLAST REPORTING FORM? YES ☐ NO ☐

1. VESSEL INFORMATION	2. VOYAGE INFORMATION		3. BALLAST WATER USAGE AND CAPACITY
Vessel Name:	Arrival Port:		***Specify Units Below (m^3, MT, LT, ST)***
IMO Number:	Arrival Date:		Total Ballast Water on Board:
Owner:	Agent:		Volume / Units / No. of Tanks in Ballast
Type:	Last Port:	Country of Last Port:	
GT:			Total Ballast Water Capacity:
Call Sign:	Next Port:	Country of Next Port:	Volume / Units / Total No. of Tanks on Ship
Flag:			

4. BALLAST WATER MANAGEMENT Total No. Ballast Water Tanks to be discharged: ☐

Of tanks to be discharged, how many: Underwent Exchange: ☐ Underwent Alternative Management: ☐

Please specify alternative method(s) used, if any: _____

If no ballast treatment conducted, state reason why not: _____

Ballast management plan on board? YES ☐ NO ☐ Management plan implemented? YES ☐ NO ☐

IMO ballast water guidelines on board [res. A.868(20)]? YES ☐ NO ☐

5. BALLAST WATER HISTORY: Record all tanks to be deballasted in port state of arrival; IF NONE, GO TO #6 ***(Use additional sheets as needed)***

Tanks/ Holds (List multiple sources/tanks separately)	BW SOURCES				BW MANAGEMENT PRACTICES						BW DISCHARGES			
	DATE DD/MM/YY	PORT or LAT. LONG.	VOLUME (units)	TEMP (units)	DATE DD/MM/YY	ENDPOINT LAT. LONG.	VOLUME (units)	% Exch	METHOD (ER/FT/ ALT)	SEA HT. (m)	DATE DD/MM/YY	PORT or LAT. LONG.	VOLUME (units)	SALINITY (units)

Ballast Water Tank Codes: Forepeak = FP, Aftpeak = AP, Double Bottom = DB, Wing = WT, Topside = TS, Cargo Hold = CH, Other = O

6. RESPONSIBLE OFFICER'S NAME AND TITLE, PRINTED AND SIGNATURE:

_____

Reflects changes to Subpart D contained in Final Rule

Where to send this form.

Vessels bound for Great Lakes:

United States or Canadian Flag vessel bound for the Great Lakes

Fax the form to the COTP Buffalo, Massena Detachment **315-764-3283** at least 24 hours before the vessel arrives in Montreal, Quebec.

Any other Flag vessel bound for the Great Lakes

Fax the form to the COTP Buffalo, Massena Detachment **315-764-3283** at least 24 hours before the vessel arrives in Montreal, Quebec, or;

Complete the ballast water information section of the St. Lawrence Seaway required "Pre-entry Information from Foreign Flagged Vessels Form" and submit it in accordance with the applicable Seaway Notice.

Vessels bound for the Hudson River North Of George Washington Bridge

Vessel bound for the Hudson River north of the George Washington Bridge

Fax the form to the COTP New York at **718-354-4249** before the vessel enters the waters of the United States (12 miles from the baseline).

Vessels bound for all other United States Ports

Vessel bound for all ports within the waters of the United States other than the Great Lakes or Hudson River north of the George Washington Bridge

Before the vessel arrives at the first port of call in the waters of the United States send the form by one of the three following methods:

- Mail the form to the **U.S. Coast Guard, c/o Smithsonian Environmental Research Center (SERC), P.O. Box 28, Edgewater, MD 21037-0028**;
- Transmit the form electronically to the National Ballast Information Clearinghouse (NBIC) at http://invasions.si.edu/ballast.htm or e-mail it to ballast@serc.si.edu; or
- Fax the form to the Commandant, U.S. Coast Guard, c/o the NBIC at **301-261-4319.**

If any information changes, send an amended form before the vessel departs the waters of the United States.

An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The Coast Guard estimates that the average burden for this report is 35 minutes. You may submit any comments concerning the accuracy of this burden estimate or any suggestions for reducing the burden to: Commandant (G-MSO), U.S. Coast Guard, 2100 Second St. SW, Washington, DC 20593-0001, or Office of Management and Budget, Paperwork Reduction Project (2115-0598), Washington, DC 20503.

APPENDIX B

STATUS AND TRENDS OF BALLAST WATER MANAGEMENT IN THE UNITED STATES

FIRST BIENNIAL REPORT OF THE NATIONAL BALLAST INFORMATION CLEARINGHOUSE

Submitted to United States Coast Guard

16 November 2001

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LIST OF ABBREVIATIONS

BOB	Ballast On Board
CFR	Code of Federal Regulations
COTPZ	Captain of the Port Zone
EEZ	Exclusive Economic Zone
IMO	International Maritime Organization
MARAD	Maritime Administration
MSIS	U.S. Coast Guard Marine Safety Inspection Survey
mt	metric ton
NABS	National Ballast Survey
NIS	Nonindigenous Species
NISA	The National Invasive Species Act of 1996, P.L 104-332
NOBOB	No Ballast On Board
SERC	Smithsonian Environmental Research Center
USCG	United States Coast Guard

EXECUTIVE SUMMARY

BACKGROUND

1. Biological invasions by non-native, invasive species are having significant ecological, economic, and human health impacts. Importantly, the rate of new invasions appears to be increasing.

2. For coastal marine ecosystems, the ballast water of ships is known to be an important mechanism for the transfer of non-native species, which are entrained unintentionally at one port and released at another.

3. Under the National Invasive Species Act of 1996 (NISA), Congress requires ships entering U. S. waters from outside the Exclusive Economic Zone (EEZ) to report ballast water management practices, including the retention of ballast water on board. (This reporting requirement excludes ships arriving to the Great Lakes ecosystem, as these are addressed separately by existing regulations.)

4. NISA also requests the masters of these ships to follow a suite of voluntary ballast water management guidelines to reduce the risk of introducing foreign organisms to the waters of the U. S. via discharged ballast water. The guidelines include the following actions:
   (a) exchanging ballast water obtained from harbors or other coastal areas outside of the U.S. EEZ for mid-ocean water (obtained from areas at least 200 miles from any shore and with at least 2,000 meters of depth) prior to its release in U.S. coastal waters;
   (b) retention (i.e. no discharge) of unexchanged ballast water that is derived from overseas coastal areas;
   (c) use of an alternative ballast water management practice determined by the U.S. Coast Guard to be at least as effective as ballast water exchange in preventing invasions by nonindigenous species.

5. Ships are required to submit reports on ballast water management and discharge to the National Ballast Information Clearinghouse (hereafter Clearinghouse), a collaborative effort of the U. S. Coast Guard and the Smithsonian Environmental Research Center for the collection, management, and analysis of nationwide data on ballast water management and coastal invasions, pursuant 33 CFR §151.2045.

6. To determine the rate of compliance with the <u>reporting requirement</u>, the Clearinghouse compares the submitted reports with data on ship arrivals from the database of U. S. Foreign Waterborne Transportation Statistics maintained by the Department of Transportation's Maritime Administration (MARAD). The MARAD database is composed of data collected by the U. S. Customs Service and the Army Corps of Engineers.

7. To determine the rate of compliance with the <u>voluntary ballast water management guidelines</u>, the Clearinghouse analyzes the submitted data and estimates: (a) the number of vessels reporting discharge of ballast water according to ballast management practices (i.e., no exchange, discharge with some exchange, alternative treatment, or retention of ballast water) and, (b) the volume and proportion of discharged ballast water that underwent the various management practices.

8. To verify the accuracy of information reported by vessels, and to further educate the shipping industry about ballast water management requirements and guidelines under 33 CFR §151.2045, the U.S. Coast Guard implemented independent Verification Surveys aboard randomly selected arriving vessels. These surveys were carried out as a pilot program over the past 24 months.

9. This biennial report is prepared to inform the U.S. Coast Guard, the Secretary of Transportation, and the U.S. Congress of the current status and trends for nationwide ballast water reporting, delivery, and management.

RESULTS

A. Compliance with Reporting

10. Nationwide compliance with reporting was low over the first 24 months (1 July 1999 – 30 June 2001) that mandatory reporting was in effect. Only 30.4% of the vessels that entered U. S. waters from outside the EEZ filed reports with the Clearinghouse, as required by the U.S. Coast Guard.

11. Compliance with reporting varied greatly among geographic regions, during the first 24 months. Compliance rates by region were as follows: Alaska – 20.8%; Caribbean – 16.6%; East Coast – 29.0%; Gulf Coast – 17.1%; West Coast – 66.5%; and Pacific Islands – 50.4% (calculated for Hawaiian ports only, as MARAD data do not include Guam).

12. Among individual Captain of the Port Zones (COTPZs) of the U.S. Coast Guard, compliance with reporting ranged from 87.9% in San Francisco, California to 10.1% in Providence, Rhode Island.

13. For the entire U.S., compliance with reporting did not improve substantially from the first year to the second (28.3% and 32.4%, respectively).

14. Among the three continental U.S. coastal regions, the Gulf Coast showed the least improvement in reporting compliance between years (0.5%) followed by the East Coast (5.2%).

15. On the West Coast (of the contiguous U. S.), compliance with the reporting requirement increased markedly (15.3%) between years, resulting primarily from an increase in California (which receives most ship arrivals). This increase was coincident with implementation of California state law, requiring submission of copies of the federal ballast water management reports to the State Lands Commission and authorizing monetary and criminal penalties for noncompliance.

B. Compliance with Voluntary Guidelines

16. Due to the poor nationwide reporting rate (30.4%), it remains difficult to estimate reliably the temporal and geographic patterns for (a) ballast water delivery and (b) use of the voluntary ballast water management practices.

17. Despite current low nationwide reporting, the National Ballast Survey and the Clearinghouse database were designed explicitly to provide fine-grained information on patterns of ballast water management and delivery by geographic location (port, coast, traffic pattern), time (month, year, and across years) and vessel type. Thus, the system is in place to evaluate and track management patterns across the country.

18. Here, we report some coarse patterns of ballast water management that emerge from the limited reports to date. However, as reporting rates rise and concomitant uncertainty diminishes, the NABS database will better describe the behavior of commercial vessels arriving to the U.S.

19. Of the 28,988 foreign arrivals that submitted reports from 1 July 1999 to 30 June 2001, 73.6% indicated no intention to discharge ballast water within U. S. territory, 12.9% declared no exchange of ballast water prior to discharge, and 13.0% of the reporting vessels declared some degree of ballast water exchange prior to discharge.

20. Thus, of the 7,652 vessels that reported discharge of ballast water in U.S. waters, about half (51.2%) indicated some degree of mid-ocean exchange and 48.8% indicated discharge with no prior exchange.

21. Nationwide, approximately 29.7% (11.1 million metric tons, or mt) of the ballast water from foreign arrivals was reported as discharged into the U. S. without undergoing any exchange.

22. Of the vessels that reported no intent to discharge ballast water upon arrival, most carried ballast water. Only 12.8% (3,712 of 21,336 vessels) was reported as No Ballast on Board, or NOBOB.

23. Compliance with the voluntary guidelines varied greatly among regions. For the West Coast, most ships that discharged ballast reported it had undergone exchange (72.3% of ships), and most ballast water discharged was reported to have undergone some exchange (85.2% of the total volume). In contrast, on the East Coast, most ships (70.4%) that discharged ballast water reported they had not undertaken exchange, although most of the discharged ballast water had reportedly undergone some exchange (53.3% of total volume).

24. Compliance with voluntary guidelines also varied considerably by port system, or COPTZ. For example: Portland, Oregon received the highest volume of ballast water, (6.60 million mt) of which 91.5% underwent some degree of mid-ocean exchange prior to discharge; Juneau, Alaska had the highest percent of reported discharged ballast water that had undergone some exchange (98.1% of 113,050 mt); and Portland, Maine had the lowest percent of reported discharge that had undergone any exchange (0% of 17,559 mt).

25. Analysis of the locations reported for completion of ballast exchange, using a geographic information system, indicates a significant proportion of the reported exchange occurred in coastal areas (< 200 mi offshore), rather than mid-ocean as requested.

C. Verification Surveys

26. The U.S. Coast Guard pilot program for Verification Surveys is currently being evaluated, to explore the best options to verify accuracy of reporting. The pilot program tested the feasibility of a stratified, random survey that was implemented by U.S. Coast Guard across all 30 COPTZs in the country. The pending analyses will be used to examine both opportunities and constraints associated with ship arrival schedules, availability of personnel for verification, and specific methods.

CONCLUSIONS

27. Nationwide compliance with the mandatory reporting requirement remains low (34.7% for the month of June 2001, and 30.4% for the cumulative two year period) and exhibits no marked improvement over the last 12 months.

28. On the West Coast, compliance with reporting increased over the first 12 months to approximately 75%, coinciding with initiation of state regulations in California that (a) impose penalties for non-compliance and (b) include an active boarding program that targets 20-30% of arrivals. Compliance has increased between the first and second year for California, as well as Washington and Oregon (which have also passed state regulations).

29. Despite increased reporting on the West Coast, this represents only a small fraction (14%) of the nationwide ship arrivals from outside of the EEZ, and reporting did not increase appreciably along the Gulf Coast and East Coast (38% and 30% of all arrivals, respectively).

30. At the present rate of improvement for reporting, full compliance with reporting will not occur for decades.

31. Many vessels that discharge ballast water in the U.S. are not implementing the voluntary ballast water management guidelines, based upon their reports. However, we cannot estimate accurately the full extent of non-compliance with ballast management guidelines due the very low rate of reporting by foreign arrivals to the U.S.

RECOMMENDATIONS

32. There exist currently numerous impediments preventing accurate measurement of the patterns of ballast water delivery and management in the U.S. Each of these should be the focus of specific action(s) by the U.S. Coast Guard to improve the current national assessment. Only with accurate estimates for ballast water discharge and management patterns can the U.S. Coast Guard (a) assess the effectiveness of regulations in changing ballast water management and (b) identify geographic areas, vessel traffic, or industry sectors for enhanced efforts, including education, to prevent introductions via ballast water.

33. **Of paramount importance, reporting must be improved to characterize the ballast water management of all vessels arriving to the U.S. ports.** This can be accomplished by one of two methods: (a) complete compliance with mandatory reporting by all vessel arrivals or (b) complete reporting by a representative sample of all vessels that results from a carefully designed stratified, random sampling program. The former approach is preferable, as it would yield the highest quality and quantity of data.

34. **The ballast water reporting requirement should be extended to include coastwise ship traffic, and ships should report ballast water management activities for all ports visited.** We believe there remains confusion about which vessels should report, and when they should report on ballast water management. Comprehensive (foreign and coastwise) reporting would remove any uncertainty about which traffic should report, improve overall data quality, and address important gaps in the current program:
    - Many ships enter the U.S. from outside of the EEZ and move coastwise. Although such traffic is meant to report the fate of any ballast water discharged in U.S. waters after entry, under the current reporting requirement, we believe many ships report discharge only for the first port of entry.
    - The transfer of coastal water itself is an important issue, resulting in discharge of large volumes at many ports (e.g., Valdez, Alaska and Chesapeake Bay), and can lead to unwanted biological invasions. Inadequate data exist currently about management and delivery of ballast water that originates within the U.S. (e.g., San Francisco Bay to Chesapeake Bay, Chesapeake Bay to New Orleans) upon which to make management and policy decisions.
    - The use of NOBOB (i.e., relatively empty) tanks for ballast operations upon arrival to the U.S can result in the discharge of residual organisms from foreign sources that could result in new invasions. The use and management of these tanks, comprising 38.9% of all ballast tanks for reporting ships, is not addressed in the current program. However, reporting at each port (with the current form) would measure the extent, pattern, and potential importance of this practice.

35. **Additional information is required from each ship to better measure ballast water management.** Specifically, the capacity of each ballast tank is needed for the Clearinghouse to calculate directly the percent ballast water exchange, which is erroneous (and therefore unusable) on many ships' reports. In addition, instructions for the reporting form could be improved to illustrate how to prevent common errors associated with reporting of data for ballast water volume and exchange.

There remains a need for implementation of Verification Surveys, which are designed specifically to verify the accuracy of reporting by vessels. Verification Surveys should be implemented, using a stratified, random sampling design across the entire country or at selected key ports. This approach is necessary to address accuracy for different geographic regions and vessel types over time.

37. **Fully implement use of the revised U.S. Coast Guard vessel tracking system (MSIS), to create a comprehensive database of key information for all vessel arrivals to each port.** The previous version of MSIS did not include standardized information on last port of call, restricting its utility for analyses by the Clearinghouse, and MARAD's data had significant gaps in some regions.

38. **To the maximum extent possible, encourage electronic submission of ballast water reporting by vessels.** This would serve to increase accuracy of data and reduce the time needed to make resulting data available. Further, electronic submission would reduce the effort required by the shipping industry.

APPENDIX B

INTRODUCTION

Biological invasions are fundamentally changing the structure and function of the earth's ecosystems. Invasions result from the transfer and establishment of species outside of their historical range. The extent of invasions has become increasingly clear over the past decade, and many communities are now dominated by invading or nonindigenous species (NIS) in terms of number of organisms, biomass, and ecological processes. At the present time, it is clear that invasions have caused dramatic shifts in food webs, chemical cycling, disease outbreaks, and extinction rates.

There is now great public concern about invasions, driven in large part by observed ecological effects as well as economic impacts, such as crop and fishery losses, associated with invasions. For example, recent estimates suggest the economic impacts of NIS in the U.S. alone exceed $100 billion per year. Although the impacts of most invasions remain unexplored, there is no doubt that biological invasions have become a major force of ecological change, as well as economic and human health impacts, operating on a global scale.

Recent studies suggest that invasion rates are continuing to increase. For example, the rate of known marine invasions in North America has increased exponentially over the past two hundred years. Furthermore, this pattern appears very robust across various habitats, taxonomic groups, and global regions. This apparent increase in invasion rate, combined with significant impacts, has further elevated public and scientific concerns about invasions in recent years.

In response to the increasing number of invasions, management strategies and policies are being advanced at state, regional, national and international levels. For example, the U.S. Congress has enacted two laws since 1990, and President Clinton signed an Executive Order, to limit the rate and impact of invasions. The Convention on Biological Diversity recognizes biological invasions as a significant threat to biological diversity and is exploring approaches to reduce this threat. Furthermore, many state and local policies are being implemented within the U.S. and elsewhere. Much of this response has focused on steps to prevent future invasions, with some additional effort focused on control and management of established invasions.

In coastal marine ecosystems, commercial shipping is considered to be the largest single transfer mechanism, or vector, for NIS. Historically, species have been transferred unintentionally on the hulls and in ballast of ships, resulting in hundreds to thousands of invasions worldwide. Today, ballast water of ships appears to be the leading source of invasions for coastal habitats in the U.S. and elsewhere. Ballast water is clean water taken on in one port, used for stability and trim during voyages, and discharged to various extents at future ports of call. In 1991, the U.S. alone received >70 million metric tons of ballast water from foreign ports. The use of ballast water by ships results unintentionally in the entrainment and dispersal of species around the globe.

To reduce the risk of invasions associated with ballast water, vessel masters are being asked to manage their ships' ballast water, using practices that prevent the transport of organisms. The International Maritime Organization (IMO) has issued voluntary guidelines, including the use of open-ocean ballast water exchange, to limit transfer of coastal organisms in ballast water. In essence, ships are asked to flush out their ballast tanks at sea, reducing the concentration of coastal organisms, which have the greatest chance of becoming established at future ports of call. Many member countries have requested or required ships to comply with these guidelines. In addition, alternative treatment methods are at various stages of development and testing throughout the world.

The U.S. Congress has passed two laws that include guidelines and regulations for management of ships' ballast water. Here, we report on the status and trends of ballast water management, as directed by the most recent of these laws.

National Ballast Information Clearinghouse

The National Invasive Species Act of 1996 (NISA) directed the United States Coast Guard (USCG) in conjunction with the Smithsonian Environmental Research Center (SERC) to develop a National Ballast Information Clearinghouse (hereafter Clearinghouse). The Clearinghouse, located at SERC, plays a central role in the organization and analysis of national data concerning the transfer and invasion of nonindigenous species associated with the ballast water of ships.

Under NISA, Congress directed the Secretary of Transportation to promulgate regulations that (a) require vessel masters to report their ballast management practices when entering U. S. waters from beyond the 200 mile Exclusive Economic Zone (EEZ), and (b) describe a suite of voluntary ballast water management practices for use by such vessels. The voluntary guidelines include holding ballast water on board and open-ocean exchange (flushing) of ballast tanks that will be discharged in U.S. waters. The management practices are intended both to minimize the transfer of NIS in ballast water of ships and to reduce the risk of exotic species invasions associated with the release of ballast water.

A key element of NISA involves tracking the effectiveness of voluntary guidelines, as measured by (a) the level of compliance with voluntary guidelines, (b) changes in the rate and patterns of ballast water delivery, and (c) reduction in the rate of ballast-mediated invasions. The Clearinghouse was created to provide these analyses on a national scale.

National Ballast Survey

The Clearinghouse and the USCG have implemented the National Ballast Survey (NABS), to measure ballast water management and delivery patterns for commercial vessels that arrive to U.S. ports from outside the nation's EEZ.

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The NABS was designed explicitly to create a national database on ballast water to be used to measure: (1) rates of compliance with the ballast water reporting requirement; (2) rates of compliance with the voluntary management guidelines for holding or exchanging ballast water; (3) patterns of ballast water delivery and management (including exchange) according to vessel class for geographic region and season of arrival; (4) among-year changes in ballast water management by vessel class and geographic region; and (5) accuracy of data through use of multiple, independent data sources.

The NABS relies on three primary sources of data. These include:

1. Ballast water information reported directly to the Clearinghouse by arriving vessels;
2. Foreign waterborne Transportation statistics collected by the U.S. Customs Service and the U.S. Army Corps of Engineers. The Department of Transportation's Maritime Administration (MARAD) compiles these data on vessel arrivals to U.S. ports. For selected port systems where MARAD data were incomplete, Maritime Exchange data were required.
3. Verification surveys of vessels, arriving from outside the EEZ, conducted nationwide by the USCG.

Each of the data sets serves a specific and important function in the NABS. Use of these data can be viewed as a step-wise process:

- The ship-generated reports (data source 1, above) were intended to create a large, comprehensive data set that includes ballast water history for most vessels arriving to each U.S. port from outside of the EEZ.
- The MARAD data of arrivals at each port can identify all vessels, arriving from outside the EEZ, that are missing in the first data set, providing a measure of under-reporting and thus of compliance with NISA's mandatory reporting requirement.
- The Verification Survey is meant to provide "ground-truthing" for a subset of all arrivals to (1) estimate the accuracy of the first data set and (2) make statistical comparisons of ballast delivery patterns by vessel class, geographic region, and size.

Figure 1 summarizes the functional aspects of the National Ballast Survey. Data are submitted to the Clearinghouse from the multiple sources and entered into a relational database. The database is then queried, and the results are used to describe ship arrival and ballast water management patterns. Every two years, a biennial report of these patterns is to be submitted to the U.S. Coast Guard and Secretary of Transportation, and is used inform the U.S. Congress on implementation of NISA.

Other Clearinghouse Components: Marine Invasions Database and Research Directory

The NABS is only one component of the Clearinghouse. The Clearinghouse functions more generally as a centralized source of national information on marine invasions and on ballast water invasions issues. The following areas are being actively pursued.

- *The National Ballast Survey (NABS)* - Measurement of spatial and temporal patterns of ballast delivery / management for the U.S.;

- *The National Marine and Estuarine Invasions Database* - Measurement of patterns and rates of coastal marine invasions for the U.S.;
- *Regional databases on invasion ecology* – Characterization of patterns and rates of invasion for selected bays and estuaries (e.g., Chesapeake Bay, San Francisco Bay, Puget Sound, Tampa Bay, Prince William Sound, Coos Bay, etc.).
- *The Aquatic Invasions Research Directory* - Creation of an internet-based, searchable database containing regularly updated international information on people, research, technology, policy, and management issues relevant to ballast water and aquatic invasions.
- *The Ballast Water Exchange Verification Project* Testing and development of *in-situ* and laboratory-based technologies for improved verification of ballast water exchange.

Purpose of Biennial Report

The overall goal of this report is to assess (a) compliance with the ballast water reporting requirement and (b) implementation of voluntary guidelines for ballast water management for the first two-year reporting period of NABS (1 July 1999 – 30 June 2001). The biennial report is meant to inform the U.S. Coast Guard, the Secretary of Transportation, and the U.S. Congress of the current status and trends for nationwide ballast water management and delivery. In addition, the report also provides conclusions about the overall implementation of the national program and recommendations to address critical gaps that currently exist.

APPROACH: ASSESSING COMPLIANCE

Compliance with Ballast Water Reporting

Compliance with the reporting requirement, and compliance with the voluntary guidelines, were assessed at three different geographic scales: national, regional (major coasts), and local port system (U.S. Coast Guard Captain of the Port Zone, COTPZ; Figure 2). Prior to all analyses, data received by the Clearinghouse underwent standard protocols to detect and remove erroneous records, including duplicate reports and numerical outliers beyond the realm of possibility. Further information on these procedures is available upon request.

Figure 3 defines which traffic patterns were included in the present analyses by NABS, illustrating (a) the variety of different shipping routes a vessel might follow before arriving at a U.S. or Canadian port and (b) which ones were included when estimating compliance with mandatory reporting requirements, as outlined in NISA. The following rules were applied to differentiate “foreign” arrivals (those included in the analyses) from “domestic” or “coastwise” arrivals (those excluded), under direction by the U.S. Coast Guard:

(1) All arrivals to the Pacific coast, Atlantic coast or Gulf of Mexico coast from countries other than the United States or Canada are designated as "foreign" arrivals.
(2) Arrivals to or from U.S. island states or protectorates (e.g., Hawaii, Guam, and Puerto Rico) to or from any of the three mainland coasts are considered "foreign" arrivals since they depart the EEZ during transit.
(3) Vessels that leave the Pacific coast of North America, traverse the Panama Canal, and arrive at the Atlantic or Gulf of Mexico coasts (and vice versa) are deemed "foreign" arrivals.
(4) Since there are no available records to verify whether a coast-wise transit leaves the EEZ, all within coast transits, as well as those between the Atlantic and Gulf coasts were categorized as "domestic" arrivals.
(5) For inter-island passage, only vessels that transited from a foreign country's island to a U.S. state or protectorate were considered "foreign" arrivals.
(6) Arrivals to the Great Lakes are excluded from the present analysis. These vessels are required to undertake ballast water exchange, and a separate program of the U.S. Coast Guard evaluates compliance for these vessels.

The analysis of compliance with reporting requires knowledge of actual arrivals, allowing the detection of non-reporting ships. For this analysis, we relied upon arrivals data from the Maritime Administration. To validate use of these data, we compared their quality to that of other sources of arrival information. Below, we present briefly the results of this comparison, providing a strong rationale for use of the Maritime Administration data.

Sources of Data on Vessel Arrivals

The Department of Transportation's Maritime Administration (MARAD) compiles vessel arrival data that are collected by the U. S. Customs Service and the U. S. Army Corps of Engineers. To evaluate the completeness and utility of MARAD's vessel arrival information, comparisons were made with two other databases 1) USCG Port State Control data from Advance Notice of Arrivals submitted to the COTPZs (creating the USCG or MSIS database) and 2) Maritime Exchange data from selected port systems (Baltimore, Boston, and San Francisco).

Comparison Between USCG and MARAD Databases

For 1998, the total number of vessel arrival reports recorded by the USCG was 85,319. Removal of all records listed as "Not Arrived-No Action Scheduled" reduced the number to 64,129 arrivals for the entire United States. For the same year, MARAD reported 92,379 total vessel arrivals. Removal from the MARAD data of vessels smaller than 300 gross tons, to reflect the same vessel sizes as targeted by the USCG, resulted in a total of 71,226 arrivals. The overall agreement between the two data sets (64,129 vs. 71,226) is good, with a difference of just 10%.

The MARAD data set includes standardized identification of "Last Port of Call" and "Arrival Port", data that are essential for tracking shipping patterns for the purposes of the NABS, but which are not consistently entered in the USCG database. The MARAD database thus divides vessel traffic into "Foreign" and "Domestic" arrivals, while there is no easy and reliable way to distinguish foreign from domestic arrivals using the USCG database. With the exception of mainland to island and island to mainland transits, all U.S. to Canada and Canada to U.S. arrivals outside the Great Lakes were designated as "domestic" arrivals in accordance with rules applied to ballast water reports as described in Introduction.

Comparison of MARAD and Maritime Exchange Data

To further test the completeness of the MARAD database, MARAD data were compared with data compiled by the independent Maritime Exchanges of Baltimore, Boston, and San Francisco (Table 1). In general, the agreement between the MARAD and Maritime Exchange estimates of the number of vessels arriving from foreign ports was quite good. For the Port of Baltimore, the data for 1997 and 1998 show nearly identical results. In the comparison with Maritime Exchange data for Boston and San Francisco between 1995 and 1997, MARAD reported somewhat higher numbers of foreign arrivals.

According to MARAD, vessel arrival data have become increasingly more accurate since 1997 (e.g., many fewer "unknown" entries for the ship type data field). The average number of MARAD reports deviated from Maritime Exchange data across all three ports by less than 9.6%. It is not clear how the quality of reporting varies between individual Maritime Exchange offices.

Selection of MARAD Data as the Baseline for Determining Reporting Compliance

The close agreement between the Maritime Exchange and MARAD data for foreign arrivals indicates that the MARAD "foreign arrival" designation is probably a close approximation of the vessel traffic that actually arrives from outside the EEZ. Moreover, the minor differences in total vessel arrivals reported by MARAD and the USCG further suggest that MARAD provides a good overall estimate of total ship arrivals to the U. S. When the extent of reporting, information content, and ease of accessibility were compared for MARAD, USCG, and Maritime Exchange databases, the MARAD database was deemed the most serviceable for use in the National Ballast Survey.

Constraints with MARAD Data and Adjustments

Although MARAD data were generally very good throughout the country, they were not available for a limited number of ports or limited time periods. This was especially problematic for Alaska, Hawaii, and Guam. To preclude over-estimation of reporting rates, the corresponding ballast water reporting forms were excluded from regional and national estimates of reporting compliance for particular months for Alaska and Hawaii

(so indicated in figures), and compliance with reporting simply could not be estimated for Guam during this period.

For a few other ports, we were able to obtain arrivals data that were missing from MARAD through Maritime Exchanges. Specifically, we obtained arrivals for two months each in Los Angeles and New York from the local sources. In addition, we obtained and used data from local sources to correct inconsistencies (i.e., missing data) within the MARAD data for San Francisco Bay. (Note: While the Maritime Exchanges can provide very useful and high quality data, it is important to recognize that their geographic scope is often limited to a particular port system, and many regions of the country simply do not have these or other local entities that comprehensively track vessel arrivals.)

Compliance with Voluntary Exchange Guidelines

Although some gaps in the MARAD data limited use of all data in measuring compliance with mandatory reporting, all submitted ballast water reporting forms were used to determine the extent to which voluntary ballast water management guidelines were followed.

RESULTS

Compliance with Ballast Water Reporting Requirement

1. Nationwide Vessel Traffic.
The extent of vessel traffic to the U.S. as measured by the cumulative number of foreign MARAD arrivals, varied considerably among coastal regions (Fig. 4). The East Coast and Gulf Coast led the nation in foreign arrivals, accounting for 38% and 30% (respectively) of the 95,471 arrivals from 1 July 1999 to 30 June 2001. The West Coast represented only 14% of total arrivals, the Caribbean accounted for 16% of arrivals, whereas Alaska and Hawaii combined received only 2% of the traffic.

2. Nationwide Compliance.
The nationwide compliance with required ballast water reporting was 30.4% for the period 1 July 1999 to 30 June 2001 (Table 2). The Clearinghouse received 13,266 reports during year 1 and 15,722 during year 2, representing 28.3% and 32.4% compliance (respectively). Thus, less than 1/3 of all vessels required to report ballast water management information upon entry to the United States met this requirement, and there was relatively little improvement between years. When examined on a monthly basis (Figure 5), nationwide reporting rates also show a very slow increase in reporting compliance over the 24 months, occurring mostly in January 2000 (as discussed below).

3. Regional Compliance.
Among the major mainland coasts, the West Coast (made up of California, Oregon, and Washington) had the highest regional compliance with the reporting requirement for the two-year period: 66.5% of arrivals submitted reports (Figure 6a, Table 2). In contrast, compliance with reporting was only 29.0% for the East Coast and 17.1% for the Gulf Coast during the same period. Hawaii, Alaska, and the Caribbean had 50.4%, 20.8%, 16.6% compliance respectively (Fig. 6b, Table 2).

The rate of compliance for each coast increased from year 1 to year 2 (Fig.6a,b; Table 2), except for the Caribbean, which experienced decreased compliance (-3.7%). The West Coast had the greatest net increase (15.3%). The net increases for the remaining coastal regions were: Alaska (14.9%), Hawaii (7.9%), East Coast (5.2%), and the Gulf Coast (0.5%).

Monthly reporting rates for each coast also reflected the same patterns over time, showing the greatest improvement for the West Coast (Figs. 6a,b). To better characterize changes in reporting over time, we used linear regressions to measure the rate of change in reporting for the three major coasts, allowing us to estimate the number of years required for each coast to reach 100% compliance. The projected time periods necessary for complete compliance by mainland coasts were: 3.3 years on the West Coast ($y=1.27x+50.7$, $r^2=0.56$), 14.8 years on the East Coast ($y=0.43x+23.6$, $r^2=0.79$), and 58.3 years on the Gulf Coast ($y=0.12x+15.6$, $r^2=0.18$).

Although the overall performance for the West Coast, and the projected time to complete reporting is encouraging, this represents only a small amount (14%) of the total nationwide traffic. Most arrivals occur on the East and Gulf Coasts, for which reporting compliance lagged behind the West Coast and show only slight improvement over the past 24 months.

4. COTPZ Compliance
As with the nation and most regions, compliance with the reporting requirement was highly variable among COTPZs (Table 2). Reporting for COTPZs ranged from 10.1% to 87.9%, equaling or exceeding 50% in only 6 cases: San Francisco, Los Angeles, Seattle, Portland (OR), Honolulu, and Valdez. The relative high reporting and compliance rates for San Francisco and Los Angeles COTPZs may result from state law requiring ballast water reporting and authorizing penalties for noncompliance, effective as of 1 January 2000. It is noteworthy that compliance with reporting was relatively high (38-46%) in California at the start of NABS, compared to the other western states. This may have resulted from increased attention and the passage in October 1999 of a state law with the pending threat of penalty; furthermore, compliance increased markedly in January, when the law went into effect and penalties were possible for failure to report.

The high compliance of the Seattle COTPZ zone (64.5%) and Portland COTPZ (50.3%) may also result from state legislative activity. Washington State passed a law

concerning ballast water that went into effect in 2001, and Oregon just recently passed a similar measure. In addition, relatively high compliance in Valdez (50.0%) may be associated with a targeted federal law requiring ballast water exchange for oil tankers in that port, as the number of arrivals recorded by MARAD was low and tankers comprised a relatively large fraction of the total for this period. However, MARAD reporting in Alaska was incomplete in the first three months of 2001, possibly influencing the compliance rates measured there.

Interestingly, compliance remains low in Maryland (34.8% in year 2), which passed a similar state law, but has not yet begun to impose penalties for failure to report. It will be instructive to examine compliance over time for states that implement state ballast water laws, particularly during the time periods surrounding the initiation of penalties for failure to report.

Compliance with Voluntary Exchange Guidelines

Under 33 CFR §151.2045, vessel masters were required to report specific information for discharged ballast water originating outside of the EEZ, including (a) whether or not ballast water was exchanged or otherwise treated, and (b) specific details of ballast water management on a per-tank basis, providing the volume, exchange method, and calculated percent of water exchanged. There are thus two possible measures for the rate of implementation of the voluntary guidelines for ballast water management operations. First, implementation of guidelines can be evaluated as the proportion of arriving vessels reporting exchange of all water discharged, or compliance on a *per capita* (ship) basis. Since the guidelines include retention of unexchanged or untreated ballast water, vessels that hold ballast water on board are considered to be in compliance with the voluntary guidelines. Second, implementation can be evaluated as the proportion of discharged ballast water by volume (across all ships) reported to have been exchanged, or the overall effect on the discharge of treated versus untreated ballast water (across the aggregate of reporting vessels).

The voluntary guidelines (33 CFR §151.2035(b)) request that vessel masters carrying ballast water into the waters of the U. S. after operating beyond the EEZ employ at least one of a suite of ballast water management practices. These include exchanging ballast water in areas at least 200 miles from any shore and at least 2,000 meters deep, or in an alternative ballast exchange zone approved by the COPTZ; retaining ballast water on board; using an alternative environmentally sound, USCG approved method of treatment; or discharging ballast water to an approved reception facility. Exchange, under 33 CFR §151.2025, includes flow-through exchange, in which three full volumes of open-ocean water are pumped through a ballast tank, and empty-refill exchange, in which a ballast tank is emptied completely and then refilled with mid-ocean water. Thus, for exchanged ballast water, full compliance with these voluntary guidelines includes water that has been exchanged 100% (one full tank volume) by empty-refill or 300% (three full tank volumes) by flow-through methods, or otherwise treated, or retained on board.

Although the Clearinghouse database was designed explicitly to measure percent exchange and exchange method for each tank (per vessel), examination of the ballast water management reports submitted by vessels revealed many errors in the ships' reports. It appears that widespread confusion existed among ships crews regarding how to determine and report the percent of water exchanged. Furthermore, many reports did not indicate (as requested) whether the performed exchange was empty-refill or flow-through. Consequently, it was often not possible to determine whether a reported complete exchange was accomplished by pumping one or three full volumes of open-ocean water through a tank, or the method of exchange employed. Therefore, for discharging vessels, the extent of exchange was categorized as "Discharge with No Exchange", "Discharge with Some Exchange" and "Discharge with Unknown Exchange" (see below for further discussion of limitations to precise calculation and reporting of percent exchange).

Caution: Ideally, with a high level of reporting, the ballast water management reports submitted by vessels could be used to estimate the amount of treated and untreated (exchanged or otherwise) water discharged in the U. S. However, compliance with the reporting requirement was so low, only 30.4%, that reporting vessels cannot be considered representative of the larger population of all arriving ships entering U. S. waters.

Compliance with Voluntary Guidelines by Ship

1. National Compliance

Most (73.6%) of the reporting vessels indicated no intention to discharge ballast water (Tables 3a,b). Of the 28,988 vessels filing reports, only 7,652, or 26.4%, declared discharge of foreign ballast water within U. S. territory: 12.9% declared that no exchange had been conducted, while 13.0% of the reporting vessels declared some exchange (and the residual did not specify). Therefore, of the vessels that reported, 86.6% indicated they had followed the voluntary guidelines, either through retaining ballast water on board or by exchanging ballast water prior to discharge.

Although most reporting vessels did not discharge ballast water, it is noteworthy that of the 7,652 vessels that did report an intention to discharge, only about one half of these vessels reported some mid-ocean exchange prior to ballast water discharge. This pattern remained relatively constant throughout the 2 year of reporting (Fig. 7).

2. Regional Compliance

By region, the percent of reporting vessels that declared no discharge varied from 90.6% in Hawaii (89.7% for the Pacific Islands if Guam is included) to 21.0% in Alaska (Tables 3a,b).

The West Coast reported the highest proportion of discharging vessels that underwent some exchange (73.9%) and the Caribbean reported the lowest proportion (20.3%), whereas the East and Gulf Coasts were intermediate (26.5% and 49.9% respectively; Fig. 8).

3. COTPZ Compliance

At the Captain of the Port Zone level, Los Angeles received the greatest percentage of the nation's ballast water reporting forms (6,099 forms, 21.0% of total) between 1 July 1999 and 30 June 2001. Miami received 3,878 forms (13.4%), and San Juan, Puerto Rico received 1,896 forms (6.5%). In Los Angeles 1,454 vessels reported discharge, of which 36.6% had no mid-ocean exchange and 61.6% had some exchange prior to discharge. This pattern was reversed in Miami (1,533 discharging vessels, 84.3% with no exchange, 15.1% with some exchange) and San Juan (433 discharging vessels, 79.4% with no exchange, 20.3% with some exchange) (Tables 3a, 3b). These results indicate very different ballast management practices and discharge patterns among the COTPZs that receive the greatest number of foreign arrivals.

Compliance Based on Percent Exchange by Volume

While the preceding approach provides an assessment of compliance on the basis of individual ships, from a biological perspective an important compliance measure is the proportion of discharged water that was exchanged. The ballast water reports submitted by vessels identify, on a per tank basis, the percent exchange accomplished for each tank discharged. However, it is clear from the ballast water reporting forms submitted that there is widespread confusion on how percent exchange is calculated and reported, despite detailed published instructions. Additionally, the current ballast water reporting form does not require that the capacity of all discharged ballast tanks be specified, precluding a crosscheck of reported percent exchange values. These constraints limited the resolution at which ballast water exchange could be analyzed and necessitated that ballast water exchange be categorized as "Discharge with No Exchange", "Discharge with Some Exchange", or "Discharge with Unknown Exchange".

1. Nationwide Compliance

Approximately 37.3 million metric tons (mt) of discharged ballast water was reported nationally (Table 4). Of this total, 25.6 million mt (68.7%) was reported to have undergone exchange, and 11.1 million mt (29.7 %) was reported as unexchanged (Table 4). Reported ballast water management practices and discharge patterns were relatively constant during the first 24 months of the mandatory reporting period (Fig. 9).

2. Regional Compliance

As with exchange practices on a per ship basis, the percent of the discharged volume that had undergone some exchange varied across the major regions (Fig. 10, Table 4). By

volume, the region with the highest proportion of discharged volume that underwent some degree of exchange was the West Coast. The lowest volumetric proportion of discharge that underwent some exchange was in Alaska (Fig. 10).

3. COTPZ Compliance

There were four COTPZs that reported discharging greater than 1 million mt tons of non-exchanged water: Anchorage (1.89 million mt), Los Angeles (1.33 million mt), Houston (1.19 million mt), and Miami (1.05 million mt). This non-exchanged ballast water discharge made up the majority of all discharge in Miami (88.4%), Anchorage (79.3%), and Houston (50.6%) (Table 4). Conversely, seven COTPZs discharged more than 1 million mt of ballast water that had undergone some degree of exchange. These COTPZs were: Portland, Oregon (5.62 million mt, 91.5% of discharge), Los Angeles (4.71 million mt, 76.9% of discharge), New Orleans (3.15 million mt, 77.7% of discharge), Seattle (2.59 million mt, 89.1% of discharge), San Francisco (1.81 million mt, 85.8% of discharge), Hampton Roads, Virginia (1.34 million mt, 76.7% of discharge), and Houston (1.10 million mt, 46.9% of discharge). Juneau, Alaska, and Wilmington, North Carolina had the highest percentages of discharged ballast water reported to have undergone some exchange (110,873 mt, 98.1% of discharge and 294,633 mt, 92.2% of the discharge, respectively). Conversely, over 90% of the ballast water discharged into Portland, Maine and Jacksonville had not undergone any exchange at all.

Reasons for Not Conducting a Mid-Ocean Exchange

If a ballast water exchange was not performed prior to discharge, ships' masters were asked to provide the reason(s), on the ballast water reporting form. The open-ended nature of the question resulted in a large number of unique responses, complicating an analysis of the reasons for not exchanging ballast water. However, pooling the responses by loose categories (Table 5) suggests that an overt concern for the safety of the vessel and crew was not the over-riding reason for the low rate of ballast water exchange. Of the 1,208 vessels that reported discharging ballast water without exchanging, only 56 vessels or 4.6% of the vessels cited "safety", or some variant of the term or phrase as a reason for not conducting an exchange. A frequent reason cited for not conducting ballast water exchange was that the ship's itinerary precluded such an operation. In many such cases, there may have been an insufficient period of time during the voyage to conduct a complete exchange, either because the voyage was too short to permit an exchange, or the ship's route did not include areas 200 miles from shore and 2,000 meters deep.

Geographic distribution of ballast water exchange

Vessel masters are required to report the latitude and longitude for the end points of ballast exchange operations. These data were used with geographic information system software to construct a map showing the spatial distribution and density of exchange operations on a global scale (Fig. 11). Bathymetric data describing ocean depths of less

than 2,000 meters were overlaid with ocean areas that were equal to or less than 200 nautical miles from land, creating a map of locations restricted by the mid-ocean exchange guidelines in NISA. The end-points of reported tank exchanges were then plotted on the map. The central regions of the Pacific and Atlantic oceans are clearly the sites of much of the exchanged ballast water discharged to U. S. waters, as requested in the voluntary guidelines. However, many points lie within the shaded, or restricted, areas, indicating that a portion of the ostensibly "exchanged" water that is discharged into the U. S. comes from locations in proximity to coasts. Perhaps the clearest examples of this can be seen in the Gulf of Mexico and along the Pacific coast of Mexico and Central America. Some of the incidences of exchanging ballast close to foreign coastlines may stem from a misunderstanding among ship's masters that the guidelines request that water be exchanged 200 miles or more from <u>any</u> coast, not just from the U. S. coast. The shipping routes to the Gulf of Mexico from Mexico, Central America, the Caribbean, and portions of South America are likely highly constrained with respect to where mid-ocean exchange can take place, as few locations may meet the specified distance and depth criteria for exchange.

Verification Surveys

The U.S. Coast Guard implemented a pilot program for Verification Surveys. The survey was designed to randomly target vessel arrivals for boarding, based upon COPTZ, covering the entire coastal U.S. For each of 30 COTPZ, the target was set at 24 boardings per year for each of five ship types (Bulk Carrier, Container, General Cargo, Tanker, and Other). Thus, if all boardings were conducted, this would provide a ground-truthing for 3,600 arrivals each year.

The results of the pilot program are currently being evaluated to consider the best strategies available to verify accuracy of reporting. Although the Verification Surveys likely provided an important outreach and training activity by U.S. Coast Guard, the actual number of boardings by USCG was variable in space and time, and sometimes fell short of the anticipated goal. The shortfall resulted from both an uneven distribution of vessel arrivals (spatially and temporally) and, in some cases, conflicting demands upon USCG personnel.

Non-discharged Ballast Tanks: Fate and Potential Importance?

Approximately 70% of vessels that reported on ballast water management indicated no intent to discharge ballast water (Tables 3a, 3b). However, most of these vessels carried ballast water upon arrival: 87.2% of all reporting arrivals carried ballast water, and only 12.8% indicated "No Ballast on Board" (NOBOB; Table 6). The fate of this ballast water remains unknown.

Ships are required to report the fate of all ballast water to be discharged in the U.S. that originates from outside the EEZ (i.e., foreign ballast water). Nearly all reporting ships submit their report at the port of first entry. At this time, ships are to indicate the

discharge of all foreign ballast water at the first port of entry, as well as all future ports, in the U.S. Should the actual pattern of discharge change from the projected plan, ships are required to submit an amended report to the Clearinghouse.

Many ships visit multiple U.S. ports after arrival from outside the EEZ, becoming coastwise traffic. In fact, nearly half (45.7%) of the 28,992 arrivals that reported ballast water management visited multiple U.S. ports upon arrival. However, ships rarely reported ballast water discharge to the Clearinghouse beyond the initial port of entry and amended forms were also rare. Although this may accurately represent ballast water discharge for these vessels, it may also result from confusion about the reporting requirement and underestimate actual ballast water discharge.

A related issue arises when considering empty ballast tanks that are used for ballast operations, including discharge, within the U.S. Although 12.8% of vessels are reported as NOBOB, 38.9% of all ballast tanks for reporting vessels were in NOBOB condition (Table 6). For vessels that reported at least one NOBOB tank, the average number of tanks/ship with and without ballast water were no different: 8.5 and 8.6, respectively (Table 7).

Although there are currently no guidelines in effect for ballast water management associated with NOBOB tanks, recent concerns have surfaced in the Great Lakes that use of NOBOB tanks after entry into U.S. waters may pose significant risks of introducing NIS. Specifically, although NOBOB tanks are relatively empty, they may still contain residual organisms that can be re-suspended and discharged by ballast operations. The extent to which vessels arriving to the U.S. from overseas use NOBOB tanks in subsequent ballast operations, either during coastwise movements or within the port of arrival, remains unknown.

CONCLUSIONS

Ballast Water Reporting

Nationwide compliance in reporting ballast water management by commercial ships was low and showed little improvement over the first 2-year period of mandatory reporting. For June 2001, the last month of the two-year period, the nationwide compliance with reporting was low, only 34.7% of arrivals subject to the reporting requirement.

Although compliance did improve markedly along the West Coast (composed of California, Oregon, and Washington) over the past 24 months, coinciding with initiation of state regulations, this represents only a small proportion (14%) of the nationwide vessel arrivals subject to reporting. In contrast, compliance in reporting for the East Coast and Gulf Coast, which together account for 68% of vessel arrivals required to report, showed little change during the same time period. Thus, at the present rate of improvement in reporting, full compliance will not occur for many decades.

There remain some significant gaps in the MARAD data for Hawaii, Alaska, and Guam, making it difficult to accurately assess compliance with reporting for these locations. Although this has little impact on the overall pattern for the country, as these coasts account for only a small fraction (2%) of the cumulative vessel arrivals, it does limit assessment of compliance for these regions at the present time.

Ballast Water Management

Despite our summary of existing reports, it is currently not possible to assess ballast water delivery and management patterns for the U.S., because the rate of under-reporting is so severe: Most (69.6%) of vessel arrivals required to report simply failed to do so. Thus, the ballast management of most ships remains unknown, and it cannot be assumed the 30.4% of arrivals that do report are in any way representative of the entire population. Of ships that did report, most (>70%) reported no discharge of ballast water and were therefore following the voluntary guidelines. Of those that reported discharge, approximately half of the vessels indicated no exchange had occurred prior to discharge.

Analysis of the geographic locations of the ballast exchange endpoints as recorded by the reporting vessels indicated that an appreciable proportion of the exchanges had occurred within 200 miles of coastlines. This may be due to misunderstanding on the part of vessel masters that exchange is requested to occur at least 200 miles away from any coast, not just the U. S. coast.

General

Overall, the low level of reporting remains a significant problem for (a) interpreting compliance with voluntary guidelines and (b) tracking the ballast water delivery and management patterns for the country. Reporting by ships must increase dramatically to meet these objectives. However, there exist some additional factors, which prevent the current program from achieving its goals, including:

- Ballast water reporting requirements currently exclude a large component of vessel traffic in the U.S. and (even if compliance improves) therefore provides an incomplete picture;
- No Verification Surveys are currently in effect to verify the accuracy of reporting;
- Ballast water reports submitted by the ships often contained errors in the estimation of ballast water exchange;
- Tracking of vessel arrivals by MARAD and the U.S. Coast Guard still has some significant gaps;
- Use of electronic data submission by ships remains low.

Each of these elements should be the focus of specific action by the U.S. Coast Guard to improve the current program, allowing it to meet the objectives outlined in NISA. Below, we provide recommendations for action in each area.

APPENDIX B

RECOMMENDATIONS

1. Improve Ballast Water Reporting by Ships to Provide Representative Data.

A significant problem remains in acquiring the data necessary to measure ballast water delivery and management patterns for the country. In the present program, this exists as a severe lack of reporting by most vessels expected to submit information.

To address this problem, the U.S. Coast Guard has two possible avenues. First, the U.S. Coast Guard could take steps to maximize compliance with mandatory reporting by all vessels subject to the requirement. Alternatively, the U.S. Coast Guard could require or obtain complete reporting on a representative subset of vessels.

The former approach is most preferable, as it would result in the highest quality and quantity of data. In contrast, the latter involves a representative sampling of vessels and would require a stratified, random subsample of all vessels by vessel class, geographic location, and time (season and year). Although this second approach is theoretically feasible, it may require a large sample size, given the relatively large amount of variation in ballast water management that we expect among vessels, locations, and seasons.

2. Extend the Ballast Water Reporting Requirement to include (a) Coastwise Traffic and (b) Better Reporting for each Port of Arrival.

For a variety of reasons, the current reporting requirement misses a significant amount of vessel traffic and ballast water delivery.

- Many ships enter the U.S. from outside of the EEZ and move coastwise. Although such traffic is meant to report the fate of any ballast water discharged in U.S. waters after entry, under the current reporting requirement, we believe many ships report discharge only for the first port of entry.

- The transfer of ballast water from coastal (i.e., domestic) sources is an important issue by itself, resulting in discharge of large volumes at many ports (e.g., Valdez, Alaska and Chesapeake Bay), and can lead to unwanted biological invasions. Relatively little is known about management and delivery of ballast water that originates within the U.S. (e.g., San Francisco Bay to Chesapeake Bay, Chesapeake Bay to New Orleans). This information gap precludes the formation of critical management and policy decisions.

- The use of NOBOB (i.e., relatively empty) tanks for ballast operations upon arrival to the U.S can result in the discharge of residual organisms from foreign sources (that can result in new invasions). The use and management of these tanks, comprising 38.9% of all ballast tanks for reporting ships, is not

addressed in the current program. However, comprehensive reporting for each port (with the current form) would measure the extent, pattern, and potential importance of this practice.

We believe there remains significant confusion about which vessels should report and when they should report. Comprehensive (foreign and coastwise) reporting would remove any uncertainty about which traffic should report, improve overall data quality, and address important gaps in the current program.

3. Implement Verification Surveys to Assess Accuracy of Reporting by Vessels.

There remains a need for Verification Surveys, designed specifically to assess the accuracy of reporting by vessels. As a minimum, this requires design and implementation of a random, stratified sampling of vessel arrivals across the country, to include different vessel classes, geographic locations (ports), and seasons. This is the basic design of the pilot program for a Verification Survey, implemented by the U.S. Coast Guard. Particular attention should be given to resources (i.e., dedicated staff) necessary to complete this survey, including (a) targeted use of Clearinghouse staff for surveys during selected time periods and (b) use of selected key ports to represent broader geographic regions.

4. **Obtain Data on Ballast Tank Capacities.**

Additional information is required from each ship to estimate ballast water management. Many errors exist on the ships' reports of "percent ballast water exchanged". As a result, we often cannot reliably estimate the percent of ballast water exchange performed on a "by tank" or "by vessel" basis. To correct this problem, we recommend two changes. First, the current reporting form should be modified, or some other mechanism implemented by U.S. Coast Guard, to obtain capacity for each ballast tank aboard reporting ships. Tank capacity is needed to calculate directly the percent ballast water exchange. Second, instructions on how to estimate percent ballast water exchange for the reporting form should be modified to include descriptions of common errors and how to avoid them.

5. Improve U.S. Coast Guard database for Vessel Arrivals.

Although vessel arrival data collected by MARAD provide good quality data for most ports, significant gaps existed for Hawaii, Alaska, and Guam. The U.S. Coast Guard routinely collects such data on arrivals via the Advanced Notice of Arrival, in which ships are required to report key information prior to arrival. Furthermore, the U.S. Coast Guard maintains these data in their own database. However, up until now, the U.S. Coast Guard data for each vessel arrival did not consistently include standardized identifications of the last port of call, making these data of limited utility for

Clearinghouse analyses. Specifically, the arrivals database could not be used to distinguish foreign versus coastwise traffic.

In October 2001, the U.S. Coast Guard database began to include standardized input to the critical field of "last port of call". Should this new system be implemented fully, it will create a valuable resource of data on all arrivals. We recommend that the U.S. Coast Guard encourage full implementation (i.e., entry of standardized last port of call data for all arrivals). Maritime exchanges often collect excellent arrivals data, offering an alternate source of information, but there exist only a limited number of exchanges and these cannot currently provide nationwide coverage for all arrivals. Thus, in our view, full implementation of the U.S. Coast Guard database offers the best opportunity to remove the existing gaps in the data on vessel arrivals.

6. Promote use of Electronic Reporting.

At the present time, most ships send reports to the Clearinghouse by FAX or mail. However, the use of electronic submission would greatly reduce the time required by ships to submit forms, since many fields of information remain unchanged at each submission. Electronic submission also would increase accuracy (removing problems associated with legibility), and reduce the effort in data entry and time needed to make the data accessible.

The Clearinghouse provides mechanisms for electronic submission, including (1) transmission of MS Excel™ or MS Word™ files via email and (2) use of an on-line form. Multiple modes for electronic submission have been in place on the Clearinghouse website (http://invasions.si.edu/ballast.htm) for the past 18 months.

We recommend that the U.S. Coast Guard promote and encourage, to the maximum extent possible, the electronic submission of data.

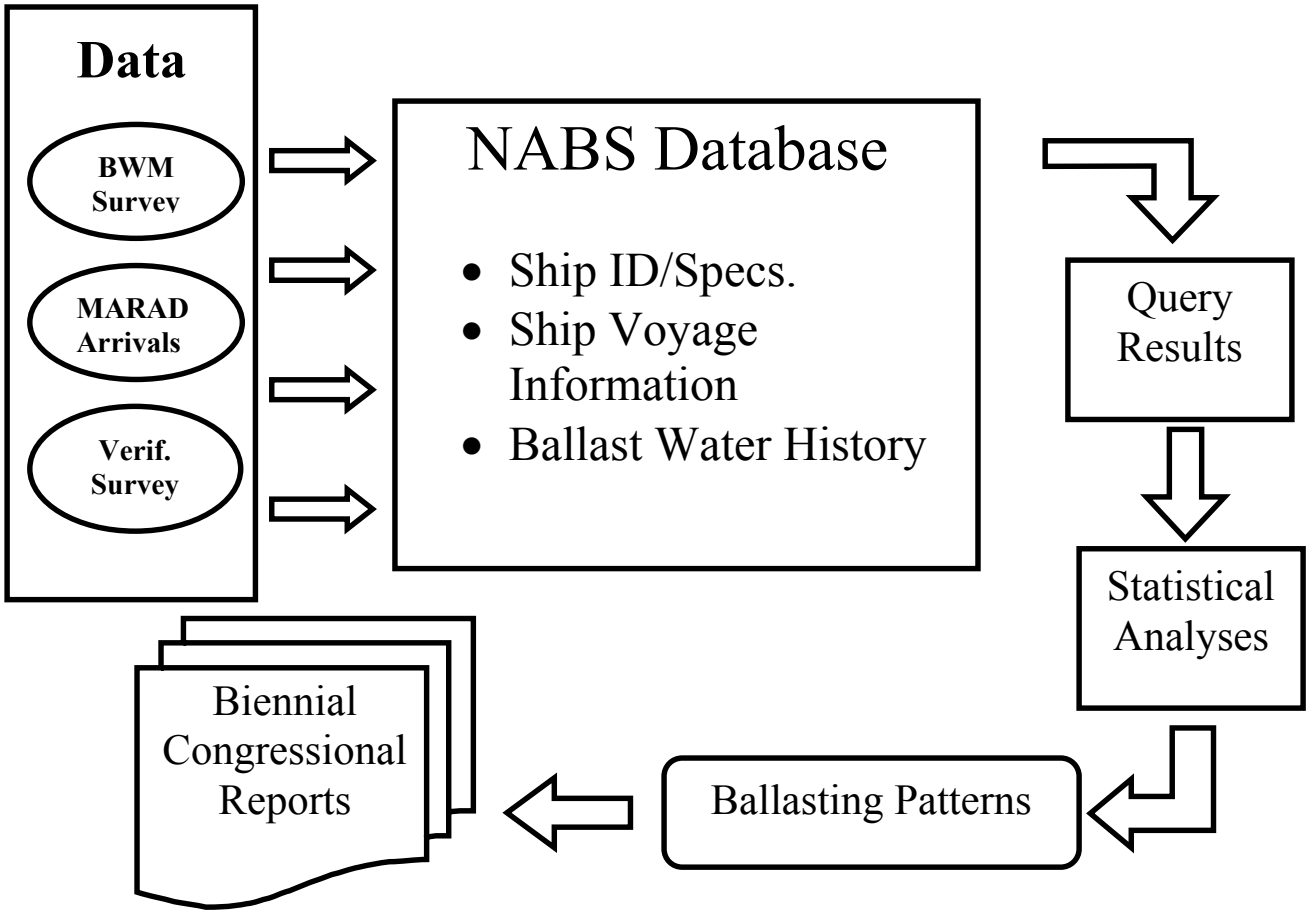

Figure 1. Flowchart describing the functional aspects of the National Ballast Survey (NABS).

Figure 2. Captain of the Port Zone (COTPZ) designations for all coastal marine ports of the United States.

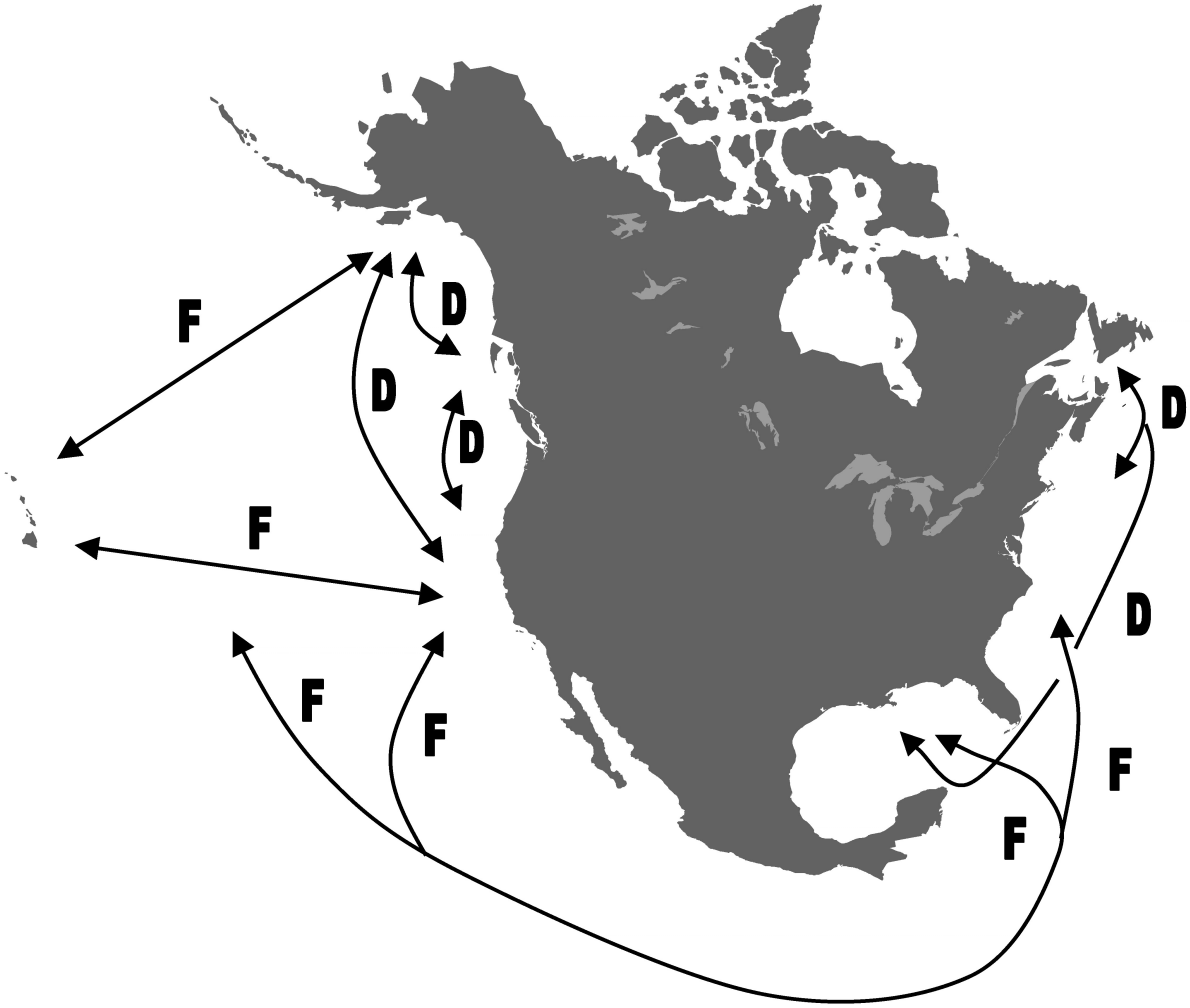

Figure 3. Foreign (F) and domestic (D) arrival designations for ships calling on ports of the United States and U.S. protectorates. Note: although not depicted on this map, transits between individual U.S. Caribbean islands were considered domestic while all other traffic to and from the Caribbean was deemed foreign.

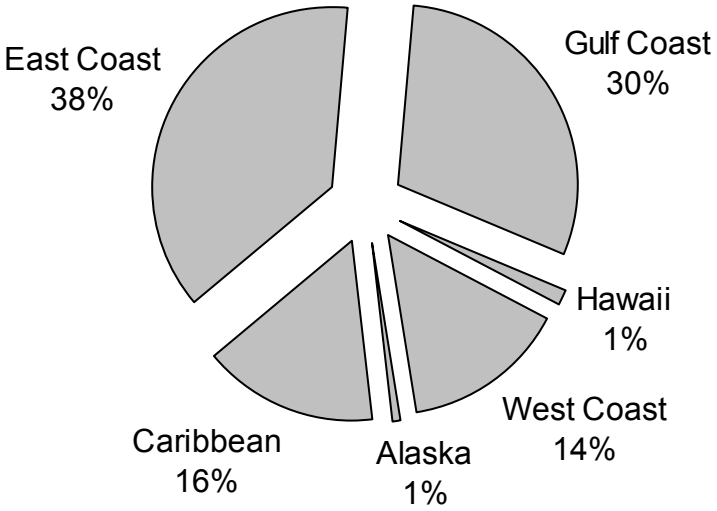

Figure 4. Percent foreign arrivals traffic by coast over two-year period from July 1999 to June 2001 (n= 95,471 arrivals). Data are from MARAD arrival reports from 1 July 1999 to 30 June 2001.

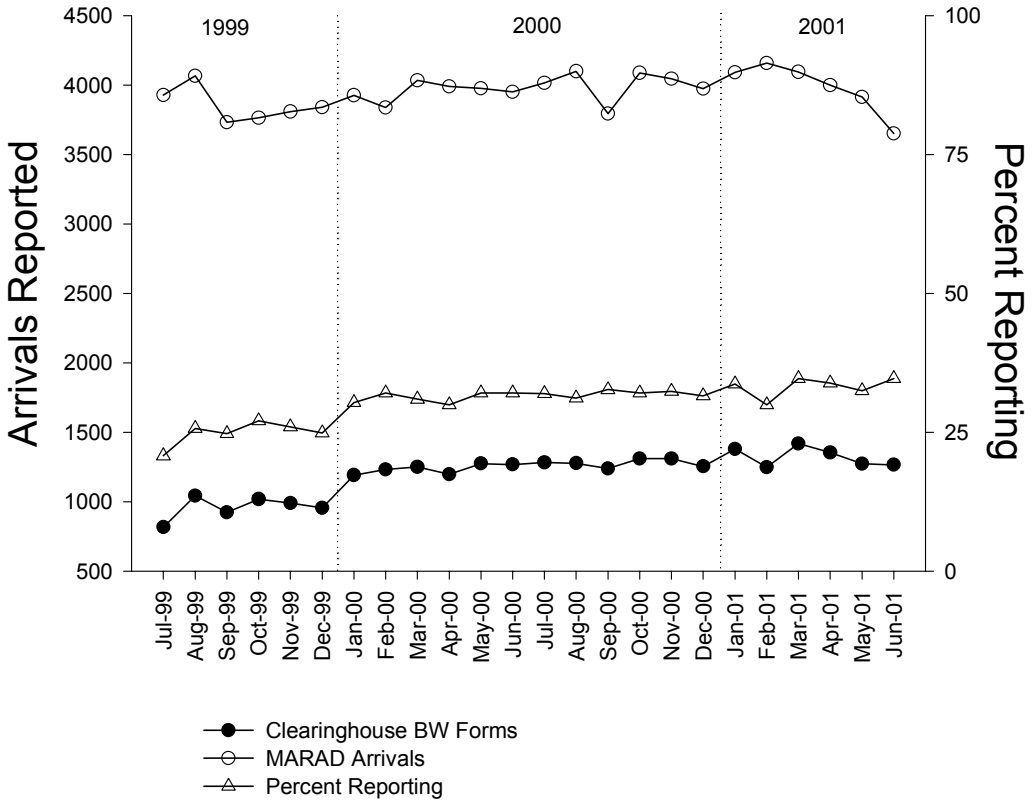

Figure 5. Monthly reporting rates for the nation by foreign arrivals from July 1999 to June 2001. Data are from National Ballast Survey (Clearinghouse) and Maritime Administration (MARAD) databases.

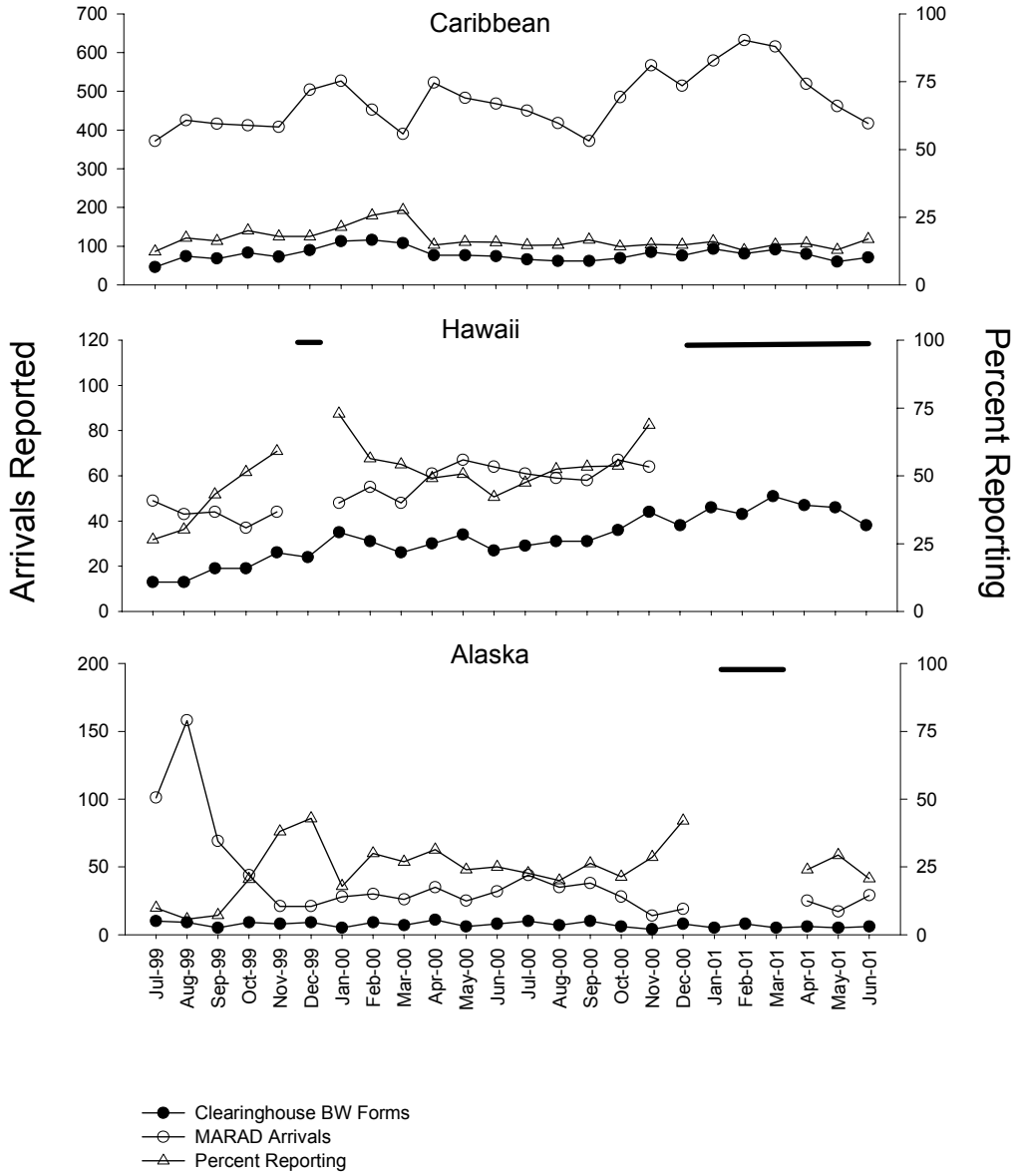

Figure 6a. Monthly reporting rates for East, Gulf of Mexico, and West coasts by foreign arrivals from July 1999 to June 2001. Data are from National Ballast Survey and Maritime Administration databases.

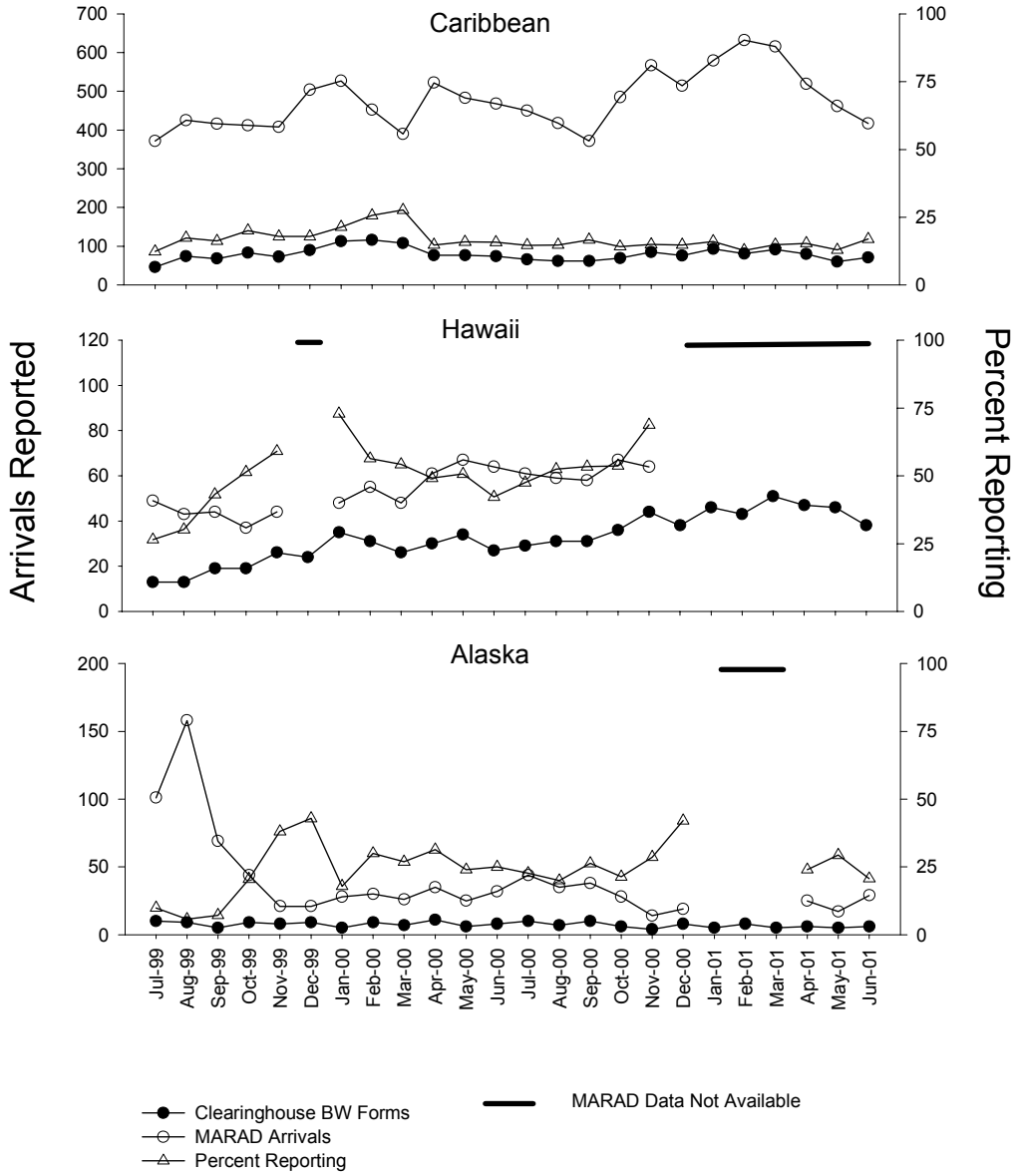

Figure 6b. Monthly reporting rates for the Caribbean, Hawaii, and Alaska coasts by foreign arrivals from July 1999 to June 2001. Data are from National Ballast Survey and Maritime Administration databases.

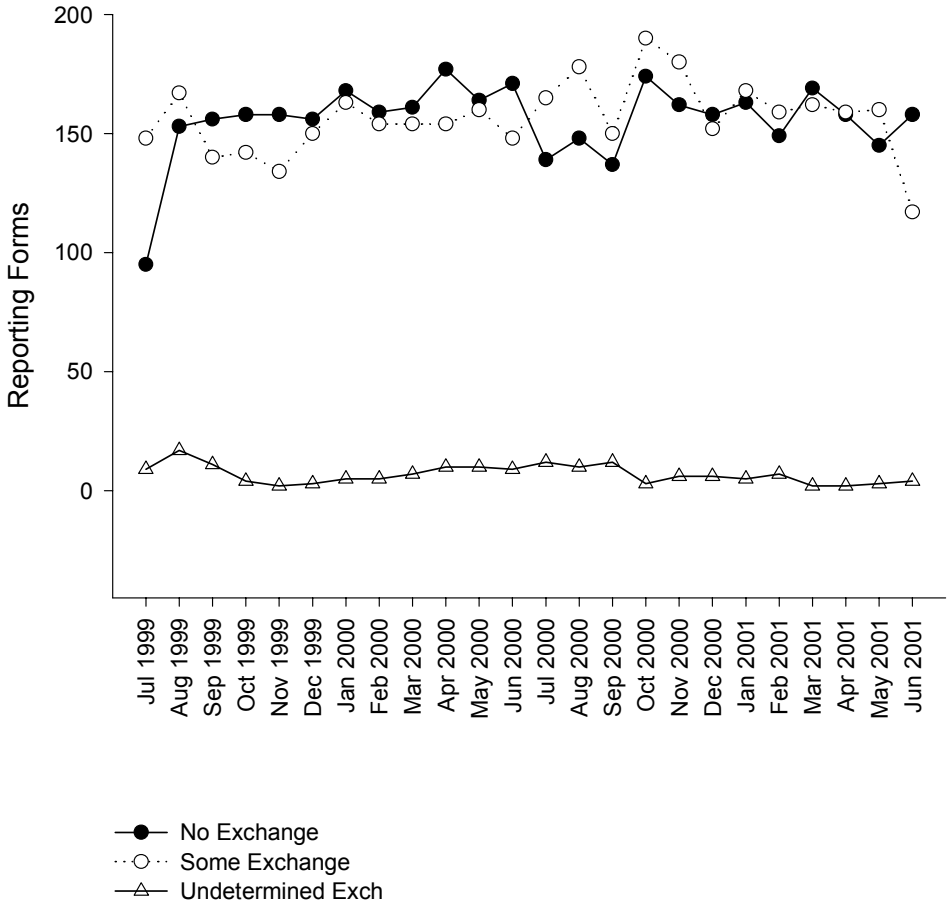

Figure 7. Nationwide monthly reported ballast water discharge by management strategy. Data from the National Ballast Survey database (July 1999 to June 2001).

APPENDIX B

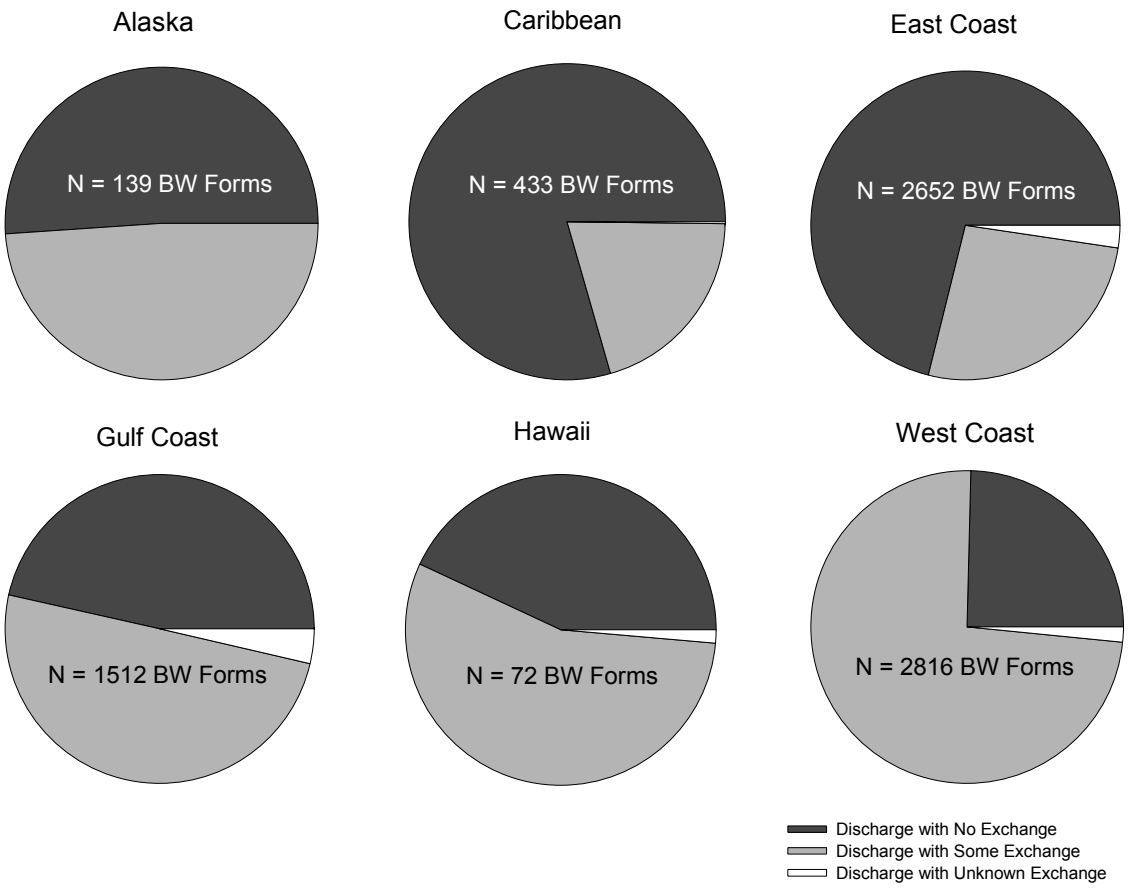

Figure 8. Proportion of ships discharging ballast water by coastal region and management strategy. Data from the National Ballast Survey database (July 1999 to June 2001).

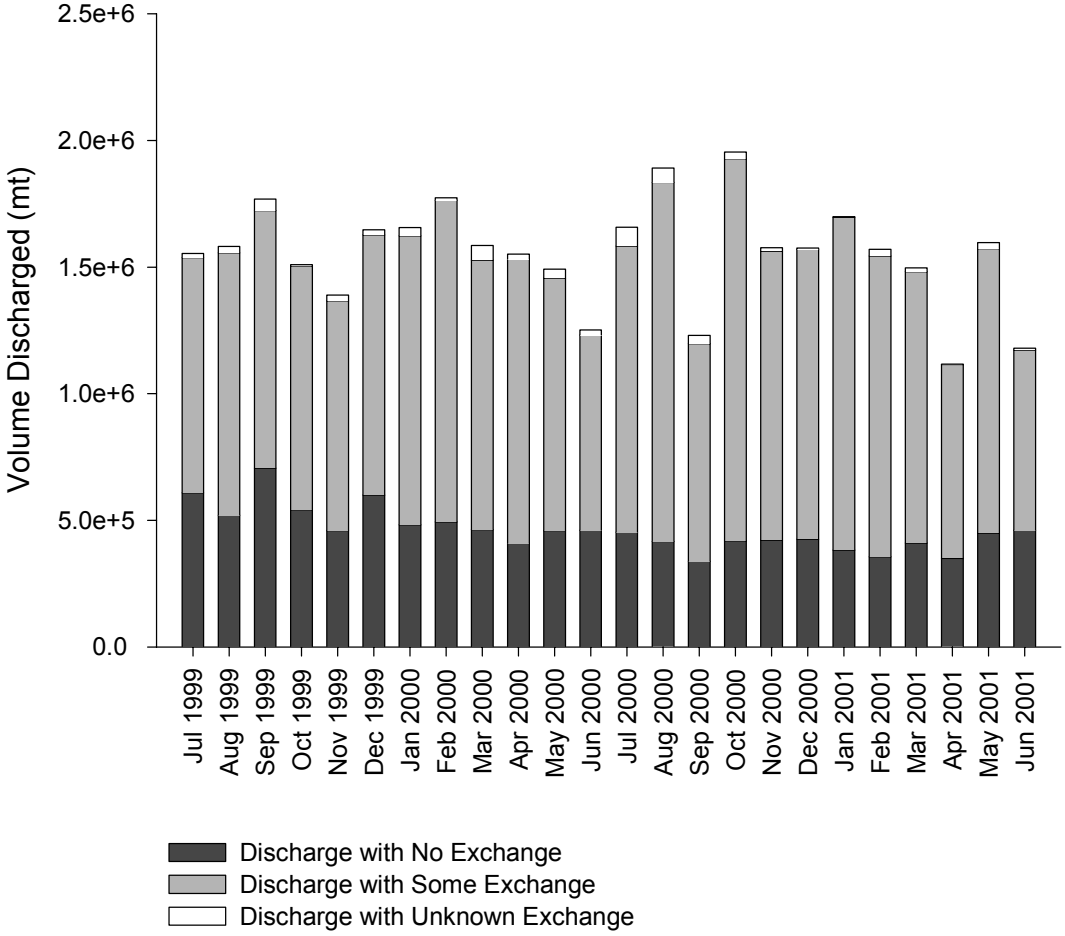

Figure 9. Nationwide monthly ballast water discharge volumes by management strategy. Data are from National Ballast Survey database (July 1999 to June 2001).

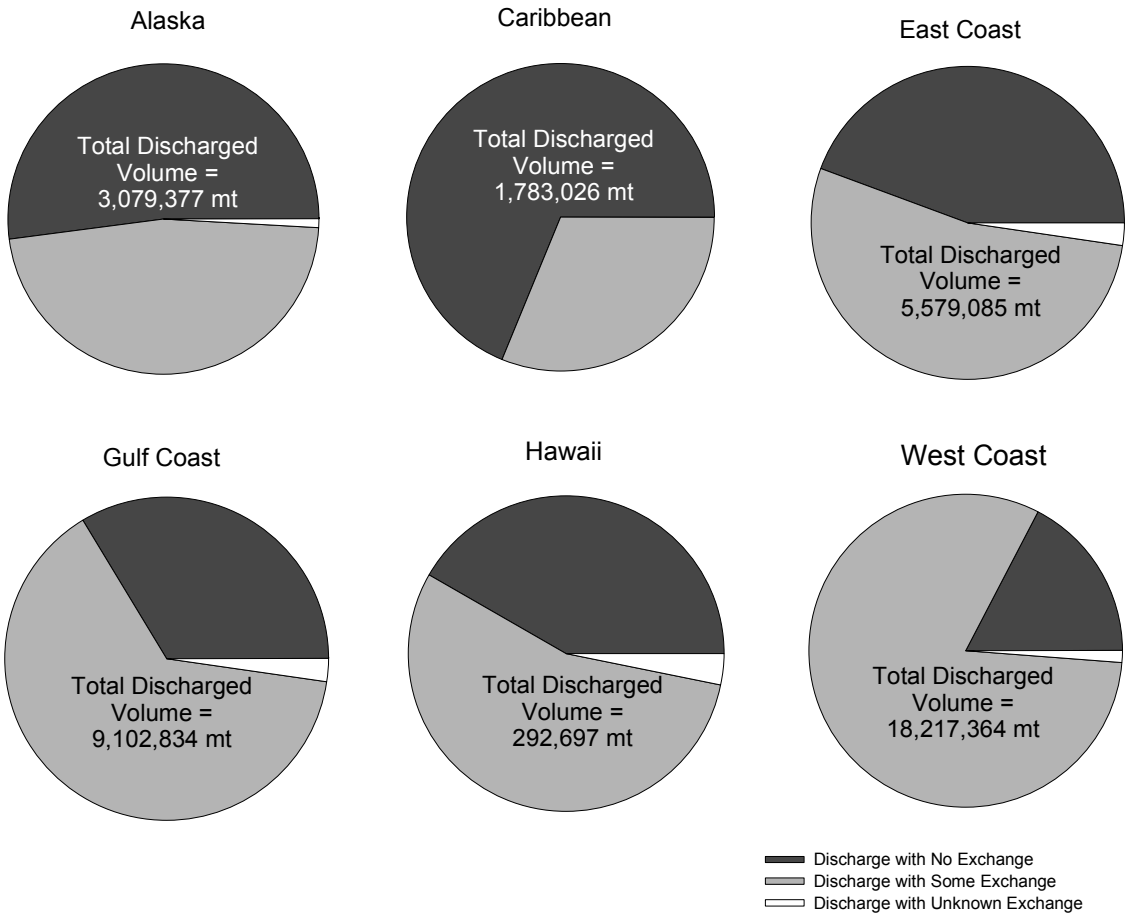

Figure 10. Proportion of ballast water discharged by coastal region and management strategy. Data from the National Ballast Survey database (July 1999 to June 2001).

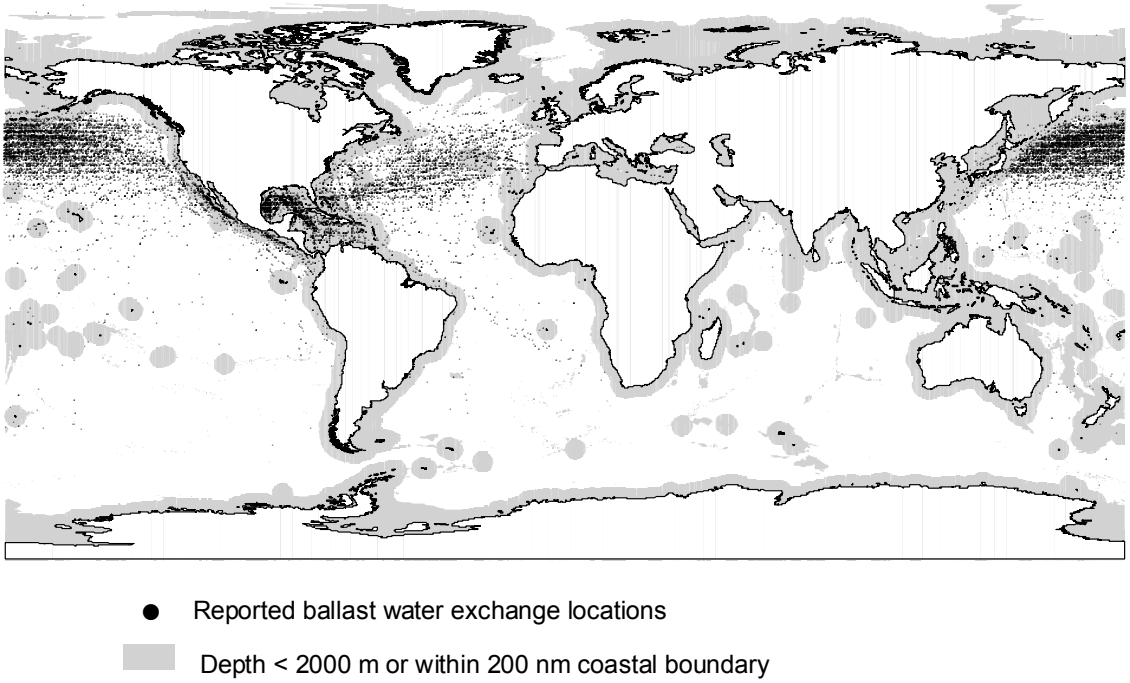

Figure 11. Reported ballast water exchange locations (end-points of exchange) for individual ballast tanks on vessels arriving to the United States between July 1999 and June 2001. Gray shading indicates zones within 200 nautical miles of coastlines and depths of less than 2,000 meters.

APPENDIX B

Table 1. Comparisons of foreign arrivals as quantified by MARAD and Maritime Exchange.

		No. Foreign Arrivals	
Port	**Year**	**Maritime Exchange**	**MARAD**
Baltimore	1998 (first quarter)	150	151 (+0.01%)
Baltimore	1997	644	649 (+0.07%)
Boston	1997	495	554 (+12%)
San Francisco	1996	642	757 (+17%)
San Francisco	1995	715	816 (+14%)

Table 2. Compliance with mandatory ballast reporting requirements, by coast and Captain of the Port Zone. Data from National Ballast Survey and MARAD databases (July 1999 to June 2001). Shaded rows show subtotals for broad coastal regions.

U. S. Coast	COTPZ	# BWR Forms Year 1	# MARAD Arrivals Year 1	% Reporting Rate Year 1	# BWR Forms Year 2	# MARAD Arrivals Year 2	% Reporting Rate Year 2	Total BWR Forms	Total MARAD Forms	% Reporting Rate Cumulative
Alaska	ANCMS	72	515	14.0%	66	213	31.0%	138	728	19.0%
Alaska	JUNMS	11	50	22.0%	13	41	31.7%	24	91	26.4%
Alaska	VALMS	13	25	52.0%	1	3	33.3%	14	28	50.0%
Alaska	Subtotal	96	590	16.3%	80	257	31.1%	176	847	20.8%
Carib	SJPMS	999	5,379	18.6%	897	6,031	14.9%	1,896	11,410	16.6%
East	BALMS	155	602	25.7%	219	629	34.8%	374	1,231	30.4%
East	BOSMS	112	439	25.5%	96	486	19.8%	208	925	22.5%
East	CHAMS	275	884	31.1%	360	923	39.0%	635	1,807	35.1%
East	HMRMS	125	488	25.6%	98	495	19.8%	223	983	22.7%
East	JACMS	518	2,144	24.2%	682	1,957	34.8%	1,200	4,101	29.3%
East	LISCP	30	75	40.0%	38	241	15.8%	68	316	21.5%
East	MIAMS	1,585	7,656	20.7%	2,293	7,545	30.4%	3,878	15,201	25.5%
East	NYCCP	823	2,380	34.6%	892	2,917	30.6%	1,715	5,297	32.4%
East	PHIMS	820	2,154	38.1%	731	2,086	35.0%	1,551	4,240	36.6%
East	POMMS	191	497	38.4%	178	381	46.7%	369	878	42.0%
East	PROMS	13	184	7.1%	17	112	15.2%	30	296	10.1%
East	SAVMS	175	654	26.8%	266	761	35.0%	441	1,415	31.2%
East	WNCMS	38	267	14.2%	56	240	23.3%	94	507	18.5%
East	Subtotal	4,860	18,424	26.4%	5,926	18,773	31.6%	10,786	37,197	29.0%
G of M	CORMS	213	1,147	18.6%	201	1,088	18.5%	414	2,235	18.5%
G of M	HOUCP	765	4,887	15.7%	870	4,963	17.5%	1,635	9,850	16.6%
G of M	MOBMS	184	1,496	12.3%	263	1,606	16.4%	447	3,102	14.4%
G of M	NEWMS	744	4,619	16.1%	752	5,030	15.0%	1,496	9,649	15.5%
G of M	PATMS	138	1,072	12.9%	169	1,213	13.9%	307	2,285	13.4%
G of M	TAMMS	348	992	35.1%	336	1,046	32.1%	684	2,038	33.6%
G of M	Subtotal	2,392	14,213	16.8%	2,591	14,946	17.3%	4,983	29,159	17.1%
Hawaii	HONMS	298	651	45.8%	481	896	53.7%	779	1,547	50.4%
Other	GUAD	93	N/A	N/A	100	N/A	N/A	193	N/A	N/A
West	LOSMS	2,792	4,301	64.9%	3,307	4,271	77.4%	6,099	8,572	71.2%
West	PORMS	442	942	46.9%	621	947	65.6%	1,063	1,889	56.3%
West	SDCMS	150	653	23.0%	228	674	33.8%	378	1,327	28.5%
West	SEAMS	556	1,050	53.0%	716	922	77.7%	1,272	1,972	64.5%
West	SFCMS	588	747	78.7%	775	804	96.4%	1,363	1,551	87.9%
West	Subtotal	4,528	7,693	58.9%	5,647	7,618	74.1%	10,175	15,311	66.5%
	Total	**13,266**	**46,950**	**28.3%**	**15,722**	**48,521**	**32.4%**	**28,988**	**95,471**	**30.4%**

Table 3a. Year 1 compliance with voluntary ballast water management guidelines, by coast and Captain of the Port Zone. Data from National Ballast Survey database (July 1999 to June 2000). Shaded rows show subtotals for broad coastal regions.

U. S. Coast	COTPZ	# BWR Forms Year 1	# Zero Discharge	% Zero Discharge	# Zero Exchange	% Zero Exchange	# Some Exchange	% Some Exchange	# Unknown Exchange	% Unknown Exchange
Alaska	ANCMS	72	14	19.4%	35	48.6%	23	31.9%	0	0.0%
Alaska	JUNMS	11	2	18.2%	0	0.0%	9	81.8%	0	0.0%
Alaska	VALMS	13	3	23.1%	2	15.4%	8	61.5%	0	0.0%
Alaska	Subtotal	96	19	19.8%	37	38.5%	40	41.7%	0	0.0%
Carib	SJPMS	999	737	73.8%	214	21.4%	48	4.8%	0	0.0%
East	BALMS	155	139	89.7%	2	1.3%	13	8.4%	1	0.6%
East	BOSMS	112	87	77.7%	20	17.9%	5	4.5%	0	0.0%
East	CHAMS	275	210	76.4%	29	10.5%	31	11.3%	5	1.8%
East	HMRMS	125	79	63.2%	14	11.2%	30	24.0%	2	1.6%
East	JACMS	518	350	67.6%	151	29.2%	13	2.5%	4	0.8%
East	LISCP	30	27	90.0%	2	6.7%	1	3.3%	0	0.0%
East	MIAMS	1,585	943	59.5%	552	34.8%	85	5.4%	5	0.3%
East	NYCCP	823	670	81.4%	73	8.9%	62	7.5%	18	2.2%
East	PHIMS	820	760	92.7%	12	1.5%	46	5.6%	2	0.2%
East	POMMS	191	178	93.2%	6	3.1%	6	3.1%	1	0.5%
East	PROMS	13	12	92.3%	1	7.7%	0	0.0%	0	0.0%
East	SAVMS	175	139	79.4%	6	3.4%	26	14.9%	4	2.3%
East	WNCMS	38	28	73.7%	3	7.9%	7	18.4%	0	0.0%
East	Subtotal	4,860	3,622	74.5%	871	17.9%	325	6.7%	42	0.9%
G of M	CORMS	213	164	77.0%	21	9.9%	25	11.7%	3	1.4%
G of M	HOUCP	765	521	68.1%	118	15.4%	116	15.2%	10	1.3%
G of M	MOBMS	184	142	77.2%	12	6.5%	29	15.8%	1	0.5%
G of M	NEWMS	744	462	62.1%	135	18.1%	141	19.0%	6	0.8%
G of M	PATMS	138	108	78.3%	9	6.5%	21	15.2%	0	0.0%
G of M	TAMMS	348	233	67.0%	77	22.1%	33	9.5%	5	1.4%
G of M	Subtotal	2,392	1,630	68.1%	372	15.6%	365	15.3%	25	1.0%
Hawaii	HONMS	298	258	86.6%	17	5.7%	23	7.7%	0	0.0%
Other	GUAD	93	82	88.2%	3	3.2%	8	8.6%	0	0.0%
West	LOSMS	2,792	2,033	72.8%	277	9.9%	465	16.7%	17	0.6%
West	PORMS	442	174	39.4%	19	4.3%	247	55.9%	2	0.5%
West	SDCMS	150	118	78.7%	8	5.3%	22	14.7%	2	1.3%
West	SEAMS	556	372	66.9%	17	3.1%	165	29.7%	2	0.4%
West	SFCMS	588	440	74.8%	40	6.8%	106	18.0%	2	0.3%
West	Subtotal	4,528	3,137	69.3%	361	8.0%	1,005	22.2%	25	0.6%
Total	**Year 1**	**13,266**	**9,485**	**71.5%**	**1,875**	**14.1%**	**1,814**	**13.7%**	**92**	**0.7%**

Table 3b. Year 2 compliance with voluntary ballast water management guidelines, by coast and Captain of the Port Zone. Data from National Ballast Survey database (July 2000 to June 2001). Shaded rows show subtotals for broad coastal regions.

U. S. Coast	COTPZ	# BWR Forms Year 1	# Zero Discharge	% Zero Discharge	# Zero Exchange	% Zero Exchange	# Some Exchange	% Some Exchange	# Unknown Exchange	% Unknown Exchange
Alaska	ANCMS	66	15	22.7%	34	51.5%	17	25.8%	0	0.0%
Alaska	JUNMS	13	3	23.1%	0	0.0%	10	76.9%	0	0.0%
Alaska	VALMS	1	0	0.0%	0	0.0%	1	100.0%	0	0.0%
Alaska	Subtotal	80	18	22.5%	34	42.5%	28	35.0%	0	0.0%
Carib	SJPMS	897	726	80.9%	130	14.5%	40	4.5%	1	0.1%
East	BALMS	219	201	91.8%	3	1.4%	15	6.8%	0	0.0%
East	BOSMS	96	94	97.9%	1	1.0%	1	1.0%	0	0.0%
East	CHAMS	360	315	87.5%	15	4.2%	30	8.3%	0	0.0%
East	HMRMS	98	63	64.3%	11	11.2%	23	23.5%	1	1.0%
East	JACMS	682	535	78.4%	128	18.8%	15	2.2%	4	0.6%
East	LISCP	38	35	92.1%	2	5.3%	1	2.6%	0	0.0%
East	MIAMS	2,293	1,402	61.1%	741	32.3%	147	6.4%	3	0.1%
East	NYCCP	892	764	85.7%	84	9.4%	37	4.1%	7	0.8%
East	PHIMS	731	671	91.8%	19	2.6%	39	5.3%	2	0.3%
East	POMMS	178	168	94.4%	4	2.2%	6	3.4%	0	0.0%
East	PROMS	17	17	100.0%	0	0.0%	0	0.0%	0	0.0%
East	SAVMS	266	212	79.7%	5	1.9%	46	17.3%	3	1.1%
East	WNCMS	56	35	62.5%	3	5.4%	17	30.4%	1	1.8%
East	Subtotal	5,926	4,512	76.1%	1,016	17.1%	377	6.4%	21	0.4%
G of M	CORMS	201	161	80.1%	28	13.9%	12	6.0%	0	0.0%
G of M	HOUCP	870	614	70.6%	90	10.3%	144	16.6%	22	2.5%
G of M	MOBMS	263	213	81.0%	10	3.8%	40	15.2%	0	0.0%
G of M	NEWMS	752	470	62.5%	120	16.0%	157	20.9%	5	0.7%
G of M	PATMS	169	141	83.4%	12	7.1%	13	7.7%	3	1.8%
G of M	TAMMS	336	242	72.0%	71	21.1%	23	6.8%	0	0.0%
G of M	Subtotal	2,591	1,841	71.1%	331	12.8%	389	15.0%	30	1.2%
Hawaii	HONMS	481	448	93.1%	15	3.1%	17	3.5%	1	0.2%
Other	GUAD	100	84	84.0%	2	2.0%	14	14.0%	0	0.0%
West	LOSMS	3,307	2,612	79.0%	252	7.6%	430	13.0%	13	0.4%
West	PORMS	621	264	42.5%	13	2.1%	340	54.8%	4	0.6%
West	SDCMS	228	199	87.3%	15	6.6%	13	5.7%	1	0.4%
West	SEAMS	716	503	70.3%	26	3.6%	187	26.1%	0	0.0%
West	SFCMS	775	644	83.1%	25	3.2%	105	13.5%	1	0.1%
West	Subtotal	5,647	4,222	74.8%	331	5.9%	1,075	19.0%	19	0.3%
Total	**Year 2**	**15,722**	**11,851**	**75.4%**	**1,859**	**11.8%**	**1,940**	**12.3%**	**72**	**0.5%**
Grand	**Total**	**28,988**	**21,336**	**73.6%**	**3,734**	**12.9%**	**3,754**	**13.0%**	**164**	**0.6%**

Table 4. Compliance with voluntary guidelines by volume for management of ballast water during period from July 1999 to June 2001. Shaded rows show subtotals for broad coastal regions.

US Coast	COTPZ	No Exchange [mt]	No Exchange [%]	Some Exchange [mt]	Some Exchange [%]	Unknown Exchange [mt]	Unknown Exchange [%]
Alaska	ANCMS	1,894,957	79.3%	493,655	20.7%	1,800	0.1%
Alaska	JUNMS	2,177	1.9%	110,873	98.1%	0	0.0%
Alaska	VALMS	222,062	38.6%	353,853	61.4%	0	0.0%
Alaska	Subtotal	2,119,196	68.8%	958,381	31.1%	1,800	0.1%
Carib	SJPMS	928,930	52.1%	837,495	47.0%	16,600	0.9%
East	BALMS	86,389	14.0%	508,524	82.5%	21,780	3.5%
East	BOSMS	48,207	85.7%	8,013	14.3%	0	0.0%
East	CHAMS	58,204	41.4%	74,315	52.9%	7,987	5.7%
East	HMRMS	370,686	21.3%	1,335,139	76.7%	35,190	2.0%
East	JACMS	274,989	90.0%	28,364	9.3%	2,184	0.7%
East	LISCP	4,276	88.6%	548	11.4%	0	0.0%
East	MIAMS	1,046,990	88.4%	133,511	11.3%	3,330	0.3%
East	NYCCP	150,048	53.8%	113,851	40.8%	15,243	5.5%
East	PHIMS	281,871	60.8%	163,756	35.3%	18,298	3.9%
East	POMMS	72,051	46.6%	71,651	46.4%	10,810	7.0%
East	PROMS	17,559	100.0%	0	0.0%	0	0.0%
East	SAVMS	40,938	13.8%	239,466	80.9%	15,457	5.2%
East	WNCMS	23,514	7.4%	294,633	92.2%	1,314	0.4%
East	Subtotal	2,475,722	44.4%	2,971,771	53.3%	131,593	2.4%
G of M	CORMS	453,238	60.1%	267,287	35.4%	34,064	4.5%
G of M	HOUCP	1,193,966	50.6%	1,105,637	46.9%	57,697	2.4%
G of M	MOBMS	106,493	19.1%	449,355	80.5%	2,289	0.4%
G of M	NEWMS	837,110	20.6%	3,154,942	77.7%	67,042	1.7%
G of M	PATMS	274,360	43.1%	336,925	53.0%	24,759	3.9%
G of M	TAMMS	196,920	26.7%	518,357	70.3%	22,393	3.0%
G of M	Subtotal	3,062,087	33.6%	5,832,503	64.1%	208,244	2.3%
Hawaii	HONMS	122,014	41.7%	161,256	55.1%	9,427	3.2%
Other	GUAD	11,733	31.1%	25,960	68.9%	0	0.0%
West	LOSMS	1,326,599	21.7%	4,705,304	76.9%	87,624	1.4%
West	PORMS	438,022	7.1%	5,621,938	91.5%	86,321	1.4%
West	SDCMS	18,001	12.7%	111,681	78.6%	12,354	8.7%
West	SEAMS	277,842	9.6%	2,588,297	89.1%	37,381	1.3%
West	SFCMS	296,831	14.1%	1,809,326	85.8%	3,160	0.1%
West	Subtotal	2,357,295	13.5%	14,836,546	85.2%	226,840	1.3%
	Total	**11,076,977**	**29.7%**	**25,623,912**	**68.7%**	**594,504**	**1.6%**

Table 5. Reasons provided by vessel masters for not exchanging ballast water to be discharged in U. S. waters. The categories were constructed by the Clearinghouse, and individual reports were assigned as best as possible. Reporting period was July 1999 to June 2001.

Reason Provided	Total BWR Forms [#]	% of Total
Clean Ballast	184	15.2%
Itinerary	159	13.2%
N/A	127	10.5%
Other/Undecipherable	650	53.8%
Safety	56	4.6%
Ship's Design	32	2.6%
TOTAL	**1,208**	**100%**

Table 6. Comparison of no ballast on board (NOBOB) and ballast on board (BOB) vessels and tanks based on total number of foreign arrivals and total tanks that arrived to U.S. ports between July1999 and June 2001.

Vessel Condition	Vessel No.	%	Vessel No.	%
NOBOB	3,712	12.8%	3,712	12.8%
BOB	25,280	87.2%	25,280	87.2%
Total	**28,992**	**100%**	**28,992**	**100%**

Table 7. Average number of NOBOB tanks and BOB tanks aboard 24,607 foreign arrivals that carried at least one NOBOB tank. Reporting period was from July 1999 to June 2001.

Tank Condition	Mean No. of Tanks	Standard Error
NOBOB tanks	8.6	0.05
BOB tanks	8.5	0.04
All Tanks	**17.2**	**0.05**