



Ballast Water Management Enforcement

June 30, 2022

Fiscal Year 2021 Report to Congress



**Homeland
Security**

United States Coast Guard

Foreword

June 30, 2022

I am pleased to present the following report, “Ballast Water Management Enforcement,” which has been prepared by the U.S. Coast Guard.

House Report 116-458 accompanying the Fiscal Year 2021 Department of Homeland Security Appropriations Act (P.L. 116-260) directs the Coast Guard to provide a report on current enforcement efforts on ballast water management and discharge and additional resources needed to expand enforcement, to include a requirement for owners and operators of vessels with ballast systems to conduct biological assessments and testing of ballast water discharge.



Pursuant to congressional requirements, this report is being provided to the following Members of Congress:

The Honorable Lucille Roybal-Allard
Chairwoman, House Appropriations Subcommittee on Homeland Security

The Honorable Chuck Fleischmann
Ranking Member, House Appropriations Subcommittee on Homeland Security

The Honorable Chris Murphy
Chair, Senate Appropriations Subcommittee on Homeland Security

The Honorable Shelley Moore Capito
Ranking Member, Senate Appropriations Subcommittee on Homeland Security

I am happy to answer any further questions that you may have, or your staff may contact my Senate Liaison Office at (202) 224-2913 or House Liaison Office at (202) 225-4775.

Sincerely,

A handwritten signature in blue ink, appearing to read "LL Fagan", written over a light blue horizontal line.

Linda L. Fagan
Admiral, U.S. Coast Guard
Commandant



Ballast Water Management Enforcement

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I. Legislative Requirement

This document responds to the language set forth in House Report 116-458 accompanying the Fiscal Year 2021 Department of Homeland Security (DHS) Appropriations Act (P.L. 116-260).

House Report 116-458 states:

Ballast Water.—The Committee is concerned by the spread of invasive species and other threats to marine and coastal ecosystems through ballast water discharge infecting reefs around Florida, the Caribbean Sea, and the Pacific Region. The Committee directs the Coast Guard to provide a report not later than 180 days after enactment of this Act on current enforcement efforts on ballast water management and discharge and additional resources needed to expand enforcement to include a requirement for owners and operators of vessels with ballast systems to conduct biological assessments and testing of ballast water discharge.

II. Background

The Coast Guard shares the stated concerns with the environmental and economic damage caused by invasive aquatic species and recognizes that vessel¹ ballast water (BW) discharge is one of the pathways for the introduction of invasive species into U.S. waters. The Coast Guard is committed to applying appropriate data-driven updates to its BW regulations and to using effective compliance measures to reduce the potential for invasive species to enter the maritime environment.

The Coast Guard is charged statutorily with protecting America's maritime environment and takes great pride in preserving and protecting the Nation's waters, making them cleaner, safer, and more secure. The Coast Guard provides leadership on BW management (BWM), both domestically and internationally, and remains committed to working diligently with all stakeholders to protect the waters of the United States from the introduction of invasive species.

Spurred by the negative environmental and societal impacts of the zebra mussel invasion of the Great Lakes, and by 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) (P.L. 101-646), and later the National Invasive Species Act of 1996 (NISA) (P.L. 104-332), which reauthorized and amended NANPCA. Together, these statutes are referred to as NANPCA/NISA, and their purpose is to prevent and control infestations of the U.S. coastal and inland waters by nonindigenous aquatic nuisance species (ANS)².

As directed by these two laws, the Secretary of Transportation³, acting through the Coast Guard, established mandatory BWM regulations for the Great Lakes ecosystem, including the Hudson River north of the George Washington Bridge, and voluntary guidelines for the remainder of U.S. waters, which later were used as the basis for national mandatory BW reporting requirements⁴ and the BWM practices⁵ established in 2004. Subsequently, the Coast Guard, under DHS, published the BW Discharge Standard Final Rule (Final Rule) in March 2012.⁶ The Final Rule includes requirements for BWM by ships in Title 33 of the Code of Federal Regulations (C.F.R.), and requirements for type approval of BWM systems (BWMS) used to achieve the discharge standard in Title 46 C.F.R. Additionally, the requirements in 33 C.F.R. §151, subparts C and D, establish BWM requirements for seagoing vessels operating in U.S. waters, (i.e., within 12 nautical miles (NM) of the baseline). The BWM requirements mandate using one or more of a suite of accepted options to manage BW:

- Use a Coast Guard-approved BWMS to meet the BW discharge standard.
- Use water exclusively from a U.S. Public Water System (PWS) as BW.

¹ For purposes of this report, the term “ship” is interchangeable with “vessel.”

² ANS are defined in P.L. 104-332 as: “a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural or recreational activities dependent on such waters.”

³ The U.S. Coast Guard operated under the U.S. Department of Transportation from 1967 until March 2003, at which time the Coast Guard began operations under DHS.

⁴ Final rule titled “Penalties for Non-submission of BW Management Reports.” 69 Federal Register (FR) 32864. June 14, 2004.

⁵ Final rule titled “Mandatory BW management program for U.S. Waters.” 69 FR 44952. July 28, 2004.

⁶ Final rule titled “Standards for living organisms in ships' BW discharged in U.S. Waters.” 77 FR 17253. March 23, 2012.

- Discharge untreated BW to a reception facility.
- Prohibit untreated BW discharge inside 12 NM.
- Temporarily use a Coast Guard accepted Alternate Management System (AMS).

The requirement to use one of these options was predicated on the implementation of a phased-in compliance scheme as follows:

- New ships constructed after (keel-laying date) December 1, 2013 - on delivery.
- Existing ships - first scheduled dry dock after:
 - January 1, 2014, for ships with BW capacity of 1500 - 5000 cubic meters;
 - January 1, 2016, for ships with BW capacity of less than 1500 or greater than 5000 cubic meters.

Prior to its compliance date, an existing ship entering U.S. waters from outside the Exclusive Economic Zone, or the Canadian equivalent, is required to comply with requirements to conduct a mid-ocean BW exchange (BWE) at least 200 NM from any shore. There are safety and route exemptions that result in some ships not being required to conduct BWE because of stability concerns, or coastal voyages that never exceed 200 NM from shore or do not do so for a sufficient time to conduct BWE. Section 1102(f)(1) of NANPCA/NISA directed the Secretary of Transportation to develop and maintain, in consultation and cooperation with the Aquatic Nuisance Species Task Force (ANSTF)⁷ and the Smithsonian Environmental Research Center (SERC), a clearinghouse of data concerning:

- Ballasting practices;
- Compliance with the guidelines issued pursuant to section 1101(c); and
- Any other information obtained by the ANSTF under subsection 1102(b).

Section 1101(c) of NANPCA/NISA contained the statutory directions to issue voluntary national guidelines on BWM practices by ships. These guidelines and the regulations that followed included requirements for ships to submit reports prior to arrival to a U.S. port or place, providing details about the ship, its BW, and its BWM to prevent the introduction and spread of ANS in U.S. waters. These BWM reports are required to be submitted to the National Ballast Information Clearinghouse (NBIC).⁸ Note that section 1101 of NANPCA/NISA was repealed by the Vessel Incidental Discharge Act (VIDA) in 2018, but continues to be in effect until such time as VIDA regulations promulgated by the Secretary of Homeland Security enter into force.

VIDA (P.L. 115-282), enacted on December 4, 2018, amended NANPCA/NISA section 1102(f) to add a subsection (4) requiring the Secretary (of the Department under which the Coast Guard is operating (DHS)) to submit a report to Congress annually, synthesizing and analyzing the data submitted to the NBIC for the preceding 2-year period to evaluate nationwide status and trends relating to a) BW delivery and management; and b) invasions of ANS resulting from BW. VIDA further directed the Secretary of Homeland Security to prepare each report in consultation and cooperation with the ANSTF and SERC. The first annual report was completed in February 2022 and is anticipated to be submitted to Congress in the summer of 2022.

⁷ Under NISA (Section 1201), the ANSTF is comprised of the Director of the U.S. Fish & Wildlife Service; the Under Secretary of Commerce for Oceans and Atmosphere; the Administrator of the Environmental Protection Agency (EPA); the Commandant of the U.S. Coast Guard; the Assistant Secretary of the Army (Civil Works); the Secretary of Agriculture; and the head of any other Federal agency that the Chairpersons deem appropriate. The Director and Under Secretary serve as co-chairpersons.

⁸ The SERC manages the NBIC database of information regarding BW management and discharge by vessels in the U.S. Webpage: <https://nbic.si.edu/>

III. Report

A. Compliance and Enforcement Efforts on BWM

1. Compliance and Enforcement Data for Calendar Year 2020

The Coast Guard verifies compliance on board vessels, through its existing safety and environmental compliance inspections, which generally occur once a year. The inspection begins with a check of the ship's documents, including the BWM plan, the NBIC Report, and the ship's BW recordkeeping. If a BWMS is on board, inspectors will check to ensure that it is functioning and that the crew knows how to maintain and use it. If there is evidence of noncompliance, the Coast Guard will issue deficiencies and enforcement actions such as Letters of Warning (LOW), Notices of Violation (NOV), and Civil Penalties (CP) for failure to comply with BWM regulations.

In 2020, the Coast Guard identified 128 BWM deficiencies on board foreign and domestic ships visiting ports in the United States (see Table 1 and Table 2 for more details). Most of the deficiencies resulted from ships arriving with inoperable BWMS. Incomplete BWM plans and failures to report BWM practices to the NBIC also ranked high among deficiencies recorded by Coast Guard Port State Control (PSC) examiners. In most of the cases where the discharge of BW could pose a threat to the marine environment, ships were required to modify their cargo plans to facilitate safe and compliant BW discharges.

While the overall number of deficiencies is trending down, Coast Guard enforcement actions taken against noncompliant companies have risen. Enforcement actions in the form of LOWs, NOVs, and CPs may be used by the Coast Guard to ensure compliance with the mandatory BW requirements to safeguard U.S. waters. In 2020, most enforcement actions were issued to vessel operators for the illegal discharge of untreated BW, failing to report inoperable BWMS to the nearest Captain of the Port (COTP) or District Commander, and failing to make complete, accurate, and timely BW reports to the NBIC (see Table 3 for a summary of enforcement actions in 2020).

Table 1: 2020 BW Deficiencies – Foreign Vessels

Type	Number
BWMS	45
BWM Plan	17
NBIC Reporting	14
Mandatory Practices	11
Discharge	9
Implementation Schedule	5
COTP Reporting	5
Training	1
Recordkeeping	1
Alternative Management Method	--
Sediments	--
Structural	--
Exchange	--
Total	108

Table 2: 2020 BW Deficiencies – Domestic Vessels

Type	Number
BWMS	11
Implementation Schedule	3
BWM Plan	2
Recordkeeping	2
Discharge	1
NBIC Reporting	1
Training	--
Alternative Management Method	--
Sediments	--
Mandatory Practices	--
COTP Reporting	--
Exchange	--
Structural	--
Total	20

Table 3: 2020 Enforcement Actions (Domestic and Foreign Vessels)

Type	Number
LOW	8
NOV	11
CP	4
Total	23

2. Findings & Trends

Compliance by vessels with the BW reporting requirement continued to be high for 2019 and 2020 as compared to 2017 and 2018.

The NBIC received 97,841 and 84,632 BWM reports of record in 2019 and 2020, respectively, for a national 2-year average of 91,237 reports per year. The decline in 2020 BWM reporting was associated with the Coronavirus Disease 2019 (COVID-19) pandemic. Overseas arrivals accounted for approximately 42 percent of arrivals in both years. The East and Gulf Coasts received the most reported overseas arrivals, with 2-year averages of 13,601/year and 13,570/year, followed in order by the West Coast (5,836/year), Caribbean territories (3,570/year), Pacific Islands (1,153/year), and Alaska (212/year). The drop in arrivals related to COVID-19 resulted in a decrease in the 2-year averages for all regions compared to 2017-2018. When compared to National Vessel Movement Center (NVMC) arrivals, these overseas reports reflect greater than 95 percent compliance with the BW reporting requirement, nationally, over the 2-year period 2019-2020. The West Coast (98.9 percent) and the Gulf Coast (96.4 percent) had the highest 2-year averages for compliance with reporting requirements, followed by the East Coast (95.3 percent), Alaska (90.9 percent), Hawaii (87.7 percent), Guam (86.7 percent), Caribbean territories (86.4 percent), and the Great Lakes (76.8 percent).

The comparison of 2019-2020 coastwise BWM reports to NVMC coastwise arrivals for applicable locations and vessel traffic reflects greater than 94 percent compliance with the reporting requirement nationally. The East, Gulf, and West Coasts received the most coastwise arrivals, with 2-year averages of 18,482/year, 15,034/year, and 8,655/year respectively.

Compliance with the reporting requirements during the 2019-2020 period was highest on the West Coast (95.4 percent), followed by the Gulf Coast (94.8 percent), the East Coast (94.1 percent), and Alaska (90.3 percent).

Total volume of BW discharged to the United States continued to increase for 2019 and 2020 as compared 2017 and 2018.

Vessels arriving to U.S. ports and places reported a cumulative discharge of 178.1 and 184.2 million cubic meters of overseas BW in 2019 and 2020, respectively, and 210.3 and 177.9 million cubic meters of coastwise BW in 2019 and 2020, respectively. This reflects an average yearly discharge increase of 13 percent for overseas discharges, as compared to the prior 2-year period (2017 and 2018). Additionally, cumulative coastwise discharge increased by 8.8 percent in 2019, then decreased by 15.3 percent in 2020, coinciding with COVID-19 shipping slowdowns. Although a small part of this increase can be accounted for by increases in reporting compliance, the majority represents a significant increase in BW discharge arising from larger ships and changes in trade patterns (e.g., increases in bulk grain and petroleum exports) resulting in an increase in the per capita discharge volume of both overseas and coastwise discharging arrivals. This was noticeable particularly in 2020, when overseas arrivals decreased because of the COVID-19 related economic slowdown, while the per capita discharge volume increased during this time, resulting in a peak in overseas discharges.

Of total coastwise discharge, the percentage discharged to coastal regions has increased from 48.1 percent in 2005 to 72.4 percent in 2019, and 72.9 percent in 2020. At the same time, the volume of coastwise discharge into the Great Lakes and Inland waterways has remained relatively stable, averaging 54.2 ± 1.5 million cubic meters per year (mean \pm standard error of the mean). This discharge is dominated by vessels operating on the Great Lakes and oscillates seasonally as shipping on the Great Lakes declines greatly during the winter.

Increases in national BW discharge continue to be driven by increases in BW discharge on the Gulf Coast. The percentage of BW discharge received by the Gulf Coast increased from 65 percent of reported overseas discharge in 2017, to more than 74 percent by 2020, while increasing from 50.9 percent to 57.9 percent of coastwise discharges during the same period.

Managed overseas BW discharge was high and increased; managed coastwise BW discharge increased at a slower rate for 2018 to 2020.

The proportion of discharging arrivals that managed their BW discharge by use of an approved method (BWE, BWMS, AMS, or PWS) was much greater for overseas vessel arrivals in 2019 and 2020—85 percent and 92 percent, respectively—than for coastwise arrivals by seagoing vessels in those same years—51.2 percent and 60.3 percent, respectively. The transition from BWE as the dominant type of BWM (dropping from 58.9 percent of overseas BW discharge in 2019 to 48.1 percent in 2020) with increasing use of BW treatment (BWT) (either BWMS or AMS) is of particular importance. Since 2018, the percentage (and volume) of overseas discharge reported as undergoing onboard BWT increased from 24.8 percent to 38.4 percent in 2019 and 55.7 percent in 2020. The long-term decrease in the percentage of coastwise BW discharge that was unmanaged continued, dropping from 56.1 percent in 2019 to 46.4 percent in 2020. The use of BWT by seagoing vessels to manage coastwise BW has continued to increase, rising from 24.6 percent in 2019 to 37.6 percent in 2020. The adoption of BWT appears to be driving much of the increase in management of coastwise BW, as well as related reductions in BWE (e.g., coastwise BW discharge by seagoing vessels using BWE decreased from 96.5 percent of managed discharge in

2015 to 43.3 percent in 2019, and 29.6 percent in 2020). While BWE is not required for coastwise BW discharge under current Coast Guard regulations, other regulatory authorities do require BWE (e.g., California regulations and the EPA Vessel General Permit require BWE beyond 50 NM by certain vessels on coastwise transits), and the Coast Guard requires reporting of all uptake and discharge of BW. Coastwise ship transits do not go beyond the Exclusive Economic Zone, and do not have the opportunity to conduct BWE beyond 200 NM, which is the requirement for BWE under the regulations in 33 C.F.R Part 151, subparts C and D.

The most common reason provided for discharge of unmanaged BW in the Gulf Coast and the Caribbean regions was the route exemption (e.g., the vessel did not transit at least 200 NM from shore for long enough to conduct BWE); on the East and West Coasts the most common reason claimed was absence of a mid-ocean source, and in Alaska and Hawaii safety exemptions were the most common responses. Unmanaged coastwise BW discharge is also prevalent throughout the United States, provided through regulatory, route, and safety exemptions. The disparity between managed overseas BW and managed coastwise BW will remain until BWM alternative methods for BWE become available for vessels carrying coastwise BW. BW carried by non-seagoing vessels (approximately 30 percent of all coastwise BW discharge), particularly those vessels that operate exclusively among the Great Lakes, will continue to be unmanaged until practicable methods are available for such vessels to meet BWM requirements. Under the 2012 Final Rule,⁹ non-seagoing vessels were exempted from the requirement to manage BW prior to discharge. The Coast Guard noted in the Final Rule its intent to expand the applicability of the regulation to non-seagoing vessels following additional analysis and research, particularly on the availability of technology that can be installed practicably, the cost of such technology, and the benefit of requiring such vessels to manage BW. Notably, VIDA includes a provision for the Great Lakes and Lake Champlain Invasive Species Program to investigate this issue.

Use of onboard BWMS continued to increase rapidly for 2018 to 2020.

The volume and percentage of overseas discharge reported as undergoing management by use of an onboard BWMS increased from 40.5 million cubic meters (24.8 percent) in 2018 to 68.3 million cubic meters (38.4 percent) in 2019 and reached 102.6 million cubic meters (55.7 percent) in 2020. Although at a slower pace, the use of onboard BWMS for coastwise discharge from seagoing vessels increased, from 24.6 million cubic meters (17.1 percent) in 2018 to 37.5 million cubic meters (24.6 percent) in 2019, and 48.4 million cubic meters (37.3 percent) in 2020. The number of unique vessels submitting BWM reports to the NBIC remained relatively stable in 2019 (10,463 vessels) and 2020 (10,621 vessels), yet the proportion of vessels with an onboard BWMS increased from 33.9 percent to 51.2 percent. The number of vessels with Coast Guard type-approved (CGTA) BWMSs installed increased from 454 to 4,106 from the end of 2018 through the end of 2020. The number of vessels with an AMS increased from 2,870 to 3,813 during this same 2-year period. These increases demonstrate a significant shift toward installing Coast Guard-approved BWMS (79.5 percent) rather than AMS (20.5 percent) during this period, compared to the prior 2-year period. Given the substantial increases in overseas BW discharge, and therefore increased invasion opportunity, the increasing use of onboard BWMS is particularly noteworthy.

⁹ Standards for Living Organisms in Ships' BW Discharged in U.S. Waters, 77 FR 17253 (March 23, 2012).

PWS water was used infrequently as a method of BWM (457 BWM reports and 0.2 percent of total volume); vessels using this method were in the Gulf of Mexico and on the East Coast using coastwise BW primarily. No vessels reported discharge to a BW treatment facility during the 2-year period.

Coast Guard continued to conduct BWM compliance and enforcement activities for 2018 to 2020.

In 2020, there was a noticeable decrease in vessel arrivals to the United States, which correlated to an overall decrease in the number of exams compared to prior years. In 2020, the Coast Guard conducted 7,383 PSC exams, which included the examination of vessels' compliance with BWM requirements. The number of exams decreased by 9.3 percent from 2018 to 2020, reflecting the impacts of the COVID-19 pandemic on international shipping. In 2020, the Coast Guard identified 108 BWM deficiencies onboard foreign vessels visiting ports in the United States, a 9-percent decrease from 2018, the most recent prior year for which data are available. The decrease in deficiencies correlate with a pandemic-caused decrease in inspections, as 1.46 percent of inspected vessels were found to have deficiencies in both 2018 and 2020. As in 2018, most of the deficiencies resulted from vessels arriving with inoperable BWMS (42 percent). Incomplete BWM plans (16 percent) and failures to report BWM practices to the NBIC (13 percent) also ranked high among deficiencies recorded by Coast Guard PSC Examiners.

In most cases where the discharge of BW could pose a threat to the marine environment, vessels were required to modify their cargo plans to facilitate safe and compliant BW discharges, leading to costly, unforeseen port scheduling conflicts. By incorporating BWMS into their company safety management system, vessel operators can maintain their crewmembers' BW training and competencies more effectively to help to ensure that the vessel is in compliance when it arrives to port. The Coast Guard will address training and education requirements in its VIDA implementing regulations. Enforcement actions may be used by the Coast Guard to ensure compliance with the mandatory BW requirements to safeguard the waters of the United States. In 2020, most enforcement actions were issued to vessel operators for the illegal discharge of untreated BW, failing to report inoperable systems to the nearest COTP or District Commander, and failing to make complete, accurate, and timely BW reports to the NBIC. LOW (8), NOV (11), and CP (4) actions were taken in 2020.

B. Florida, Caribbean Sea, and Pacific

Coast Guard BWM regulations under NANPCA/NISA do not provide separate requirements for these regions. However, they do include a statutory exemption for crude oil tankers engaged in coastwise trade, which generally applies to the West Coast, and is the basis for a Coast Guard BWM regulatory exemption in 33 C.F.R 151.2015(b).

There was one deficiency issued in 2020 in the Pacific Region for a vessel failing to report its inoperable BWMS to the nearest COTP or District Commander.

The number of deficiencies in 2020 for District 7 (Florida and the Caribbean region) are in the following chart.

Table 4: 2020 BW Deficiencies –District 7

Type	Number
NBIC Reporting	10
BWMS	8
Mandatory Practices	3
Implementation Schedule	3
BWM Plan	2
COTP Reporting	1
Discharge	--
Training	--
Recordkeeping	--
Alternative Management Method	--
Sediments	--
Structural	--
Exchange	--
Total	27

Additionally, the Coast Guard has participated in the Caribbean Coral Reef Partnership to investigate the causes and spread of Stony Coral Tissue Loss Disease (SCTLD) in Florida and the Caribbean Sea.

SCTLD was first detected in the vicinity of Miami, Florida, in 2014, and since has spread throughout the greater Caribbean region. The disease has devastated many species of stony coral in the region, including some considered threatened. While there is no definitive identification of a causal source, evidence suggests that one or more bacteria may be involved. The disease can be transmitted through water, as well as through direct contact between corals. Ship BW has been suggested as one possible mechanism for spread of the disease. The Coast Guard and EPA (participants of the Caribbean Coral Reef Partnership) were provided information regarding the rapid spread of SCTLD in 2019. On September 6, 2019, at the request of the National Oceanic and Atmospheric Administration, the Coast Guard's Office of Operating and Environmental Standards (OES) issued Marine Safety Information Bulletin (MSIB) - OES-MSIB: 07-19, advising mariners of the disease outbreak, reminding them of BWM regulations, and recommending voluntary BWE practices that would help to reduce the potential for spreading the disease via BW.

Following release of the MSIB, the NBIC conducted an analysis of BWM reports submitted by vessels arriving to ports in the region before and after the MSIB to see if there was a change in vessel BWM that might be attributed to the MSIB. Over the 12 months following the MSIB, the number of vessels discharging unmanaged BW within 12 NM was lower than the average number doing so for the 6 years prior to the MSIB. However, it is not possible to determine whether this resulted from ships following the guidance in the MSIB. There was not a correlating increase in the number or proportion of BWE events, which would have been expected if recommendations in the MSIB were being followed. The increase in the number of vessels using BWMS over the same period may account for some of the decrease in the number of vessels discharging unmanaged BW. Additionally, the global COVID-19 pandemic resulted in a noticeable decline in the number of vessel arrivals in the region during the year following issuance of the MSIB.

The report of the MSIB 07-19 follow-up analysis is available on the NBIC web page (<https://www.nbic.si.edu>) under “Selected Publications.”

Potential for Expansion of Enforcement Activities

VIDA requires the Coast Guard to promulgate new regulations for the implementation and enforcement of vessel discharges incidental to normal operations, including BW, within 2 years of EPA publication of national performance standards. The Coast Guard may not have existing regulatory authority to specifically require biological assessments or testing of BW from vessels, although Coast Guard personnel may take BW samples under existing enforcement authority in title 33 C.F.R §151.2075.

The Coast Guard is considering creation of a BW sampling and analysis program to support enforcement activities. However, there are numerous challenges to overcome. Onboard sampling and testing could be completed via vessels’ crews, third parties, or Coast Guard inspectors and examiners, but sampling and analysis methods for assessing compliance of BW with the current discharge standard do not exist. If this technology becomes commercially available, there may be a need for additional resources to perform compliance sampling.

The Coast Guard actively is seeking emerging technologies that would enable onboard sampling and analysis. Coast Guard research and development projects on BWM and data collection are progressing within limited budgeted resources and are coordinated with other Federal agencies in the Great Lakes region to ensure an aligned approach and to eliminate duplicated efforts.

SERC is engaged currently in research projects to conduct compliance-enhancing outreach with vessels to minimize errors in reporting. SERC also designs and carries out field-based measures and data analyses to evaluate the efficacy of BWM regulations, the effects of changes in vessel movement patterns, routes and management on invasion patterns, and other shipping-related marine invasion vectors.

The Naval Research Laboratory provides technical, scientific, and engineering support for the BWM Program. These include developing and refining methods for detecting bacteria in treated BW, technical support for type approval of BWMS, developing guidance for additives used in land-based type approval testing, technical and laboratory support to evaluate BWM compliance tools, vessel-specific risk assessments, and efficacy and performance of BWMS operating in cold water.

The U.S. Department of Transportation’s John A. Volpe National Transportation Systems Center provides program management and technical support to the BWM Program. This includes Shipboard Technology Evaluation Program shipboard test oversight and other technical support, AMS program technical and analytical support for application reviews, type approval of BWMS, economic and environmental analyses, and emerging technical issues.

IV. Conclusions

Over the past 30 years, regulations increased and enforcement actions rose for commercial ships in the United States. Prior to these regulations and enforcement activities, there were no requirements for BWM or reporting, and vessels discharged primarily unmanaged BW. Because of Coast Guard and EPA regulations, the situation today is very different. The majority of arriving vessels submit a BWM report to the NBIC, and 95 percent of overseas vessel arrivals comply, while coastwise arrivals complied 94 percent of the time during 2019 and 2020.

- Most vessel arrivals report BWM, including no discharge upon arrival, use of BWE, or use of BWT (AMS or CGTA).
- Of the total volume of overseas BW discharge reported in 2020, more than 95 percent was managed by either BWE or BWT.
- The total volume of overseas BW discharge reported as treated, using an onboard BWMS, increased from 1 percent to greater than 55 percent in the past 6 years (2015-2020), showing rapid adoption and use of BW treatment technologies.
- In 2020, most enforcement actions were issued to vessel operators for the illegal discharge of untreated BW, failing to report inoperable systems, and failing to make complete, accurate, and timely BW reports.
- The Coast Guard is considering the potential creation of a BW sampling analysis; however, there is not viable or commercially available technology for use on board vessels. Also, the Coast Guard may not have existing regulatory authority to specifically require biological assessments or testing of BW from vessels.

By virtue of its completeness (representing a near census of arriving vessels at the national level), the NBIC database of vessel BWM reports provides the capability to track trends and detect changes in compliance or BWM practices.

Despite the rapid expansion and use of BWM for overseas vessel arrivals, most BW discharge by coastwise vessel arrivals is reported as unmanaged, with the Great Lakes and the Gulf Coast regions receiving most of this unmanaged BW discharge. This pattern reflects the limited use of BWE by these vessels, which do not transit the open ocean (as required for BWE), or which are exempt from BWM by regulation (e.g., non-seagoing vessels). Under the current BWM regulations, vessels are not required to divert or delay voyages to transit beyond 200 NM for a long enough period to conduct BWE. Additionally, under another current exemption, some vessels do not conduct BWE because of safety reasons, either in general (e.g., vessel is not designed to enable safe BWE), or because of voyage circumstances (e.g., safe BWE is not possible because of sea conditions). Fewer geographic and safety limitations are expected as BWMSs are adopted by vessels operating on these routes.

While BWM has increased, the total volume of overseas and coastwise BW delivery to the United States also has increased, especially since 2005. In 2005, overseas BW delivery equaled 41.9 million cubic meters compared with 184.2 million cubic meters in 2020 (greater than a 339-percent increase). This increase is attributed to changes in Gulf Coast traffic with shifts in commerce patterns and the expansion of the Panama Canal, which provides greater capacity to handle more and larger ships. Total volumes of coastwise BW discharge in the United States

also have expanded, but to a lesser extent, from 120.3 million cubic meters in 2005 to 210.3 million cubic meters in 2019 (74.8-percent increase), before dropping in 2020 because of COVID-19 related shipping slowdowns.

The current upward trajectory in usage of BWT suggests that organism concentrations (numbers of living or viable organisms per unit volume of BW at discharge) will continue to decrease for overseas vessel BW discharge. It is also expected that increasing implementation of BWT will address many of the gaps that now exist for coastwise BW, further decreasing organism concentrations in discharges from these vessels. However, the increase in total BW discharge has some compensatory effect in total propagules delivered, since this is the product of the two (total BW volume x organisms concentration).

Overall, the Coast Guard BWM program is predicted to reduce new ANS invasions by reducing delivery of coastal organisms in BW. However, uncertainty remains about the residual risk (likelihood) of new invasions or secondary coastwise spread under different discharge standards (National Research Council 2011). The rate of each is expected to be ameliorated by BWM, but is also expected to be related to increases in BW volume discharge over time.

Appendix: Abbreviations

Abbreviation	Definition
AMS	Alternate Management System
ANS	Aquatic Nuisance Species
ANSTF	Aquatic Nuisance Species Task Force
BW	Ballast Water
BWE	Ballast Water Exchange
BWM	Ballast Water Management
BWMS	Ballast Water Management System
BWT	Ballast Water Treatment
C.F.R	Code of Federal Regulations
CGTA	Coast Guard Type-Approved
COTP	Captain of the Port
COVID-19	Coronavirus Disease 2019
CP	Civil Penalty
DHS	Department of Homeland Security
Final Rule	BW Discharge Standard Final Rule
FR	Federal Register
EPA	Environmental Protection Agency
LOW	Letter of Warning
MSIB	Marine Safety Information Bulletin
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990
NBIC	National Ballast Information Clearinghouse
NISA	National Invasive Species Act of 1996
NM	Nautical Mile
NOV	Notice of Violation
NVMC	National Vessel Movement Center
OES	(Coast Guard) Office of Operating and Environmental Standards
PSC	Port State Control
PWS	U.S. Public Water System
SCTLD	Stony Coral Tissue Loss Disease
SERC	Smithsonian Environmental Research Center
VIDA	Vessel Incidental Discharge Act