

**STATUS AND TRENDS OF BALLAST WATER MANAGEMENT
IN THE UNITED STATES**

**FOURTH BIENNIAL REPORT OF THE NATIONAL BALLAST
INFORMATION CLEARINGHOUSE
(January 2006 to December 2007)**

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LIST OF ABBREVIATIONS

BW	Ballast Water
BWE	Ballast Water Exchange
BWR	Ballast Water Report
CFR	Code of Federal Regulations
COTPZ	Captain of the Port Zone
EEZ	Exclusive Economic Zone
MARAD	Maritime Administration
MT	metric ton
NBIC	National Ballast Information Clearinghouse
NIS	Nonindigenous Species
NISA	National Invasive Species Act of 1996, P.L. 104-332
nm	nautical mile
NOBOB	No Ballast On Board
NVMC	National Vessel Movement Center
OMB	Office of Management and Budget
SERC	Smithsonian Environmental Research Center
USCG	United States Coast Guard

EXECUTIVE SUMMARY

The legislative mandate of the National Ballast Clearinghouse was outlined in the National Invasive Species Act of 1996 (P.L. 104-332):

(1) In general The Secretary shall develop and maintain, in consultation and cooperation with the Task Force and the Smithsonian Institution (acting through the Smithsonian Environmental Research Center), a clearinghouse of national data concerning—

(A) ballasting practices;

(B) compliance with the guidelines issued pursuant to section 4711 (c) of this title; and

(C) any other information obtained by the Task Force under subsection (b) of this section.

(2) Report

In consultation and cooperation with the Task Force and the Smithsonian Institution (acting through the Smithsonian Environmental Research Center), the Secretary shall prepare and submit to the Task Force and the Congress, on a biennial basis, a report that synthesizes and analyzes the data referred to in paragraph (1) relating to—

(A) ballast water delivery and management; and

(B) invasions of aquatic nuisance species resulting from ballast water.

BACKGROUND

1. Biological invasions by non-native, invasive species are having significant ecological and economic impacts on the waters of the United States. The rate of new invasions is increasing (Ruiz et al. 2000, 2011).
2. The discharge of ballast water (BW) from ships is a leading mechanism for the transfer of non-native species between coastal ecosystems. Organisms are entrained in BW taken up in one port and subsequently released in other ports.
3. 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 (NBIC). The primary purpose of the NBIC is to collect, manage, and analyze nationwide data on BW discharge and management and on coastal invasions.
4. Prior to the expanded reporting and recordkeeping regulations published in June 2004, only those ships carrying BW and entering the US after operating beyond the US Exclusive Economic Zone (EEZ) were required to submit a ballast water report (BWR). Following the implementation of these new requirements, all ships, both foreign and domestic (termed overseas and coastwise in this report), that are bound for ports or places of the US and are equipped with BW tanks, must submit a BWR, regardless of whether the ship operated outside the US EEZ. This includes those ships that declare “no ballast onboard” (NOBOB) and ships not discharging ballast. The reports must be submitted for all voyages where a ship enters a Captain of the Port Zone (COTPZ) to anchor or mooring, whether from another COTPZ or from outside the EEZ.

5. All ships equipped with BW tanks and bound for ports or places in the US are required to submit the Ballast Water Reporting Form (OMB Control Number 1625-0069) under the regulatory program. For all transits to US ports or places, except those in the Great Lakes or Hudson River after operating beyond the EEZ, BWRs are to be submitted to the NBIC at least 24 hours prior to arrival. Vessels transiting to the Great Lakes after operating beyond the US EEZ are to submit the report to either the Coast Guard Detachment in Massena, NY or the Saint Lawrence Seaway Development Corporation at least 24 hours before arriving to Montreal, Quebec. Likewise, those ships arriving from overseas and bound for the Hudson River north of the George Washington Bridge, must submit their reports to the Coast Guard Captain of the Port New York.
6. Expanded BW management requirements, mandated in the June 2004 final rule, require each ship transiting into US waters after operating beyond the US EEZ, which carries BW that was taken on within 200 nautical miles (nm) of any coast, to implement at least one of the following mandatory BW management practices:
 - **Perform complete mid-ocean ballast water exchange (BWE) on all tanks containing this BW before the BW from these tanks is discharged into US waters.**
 - **Retain this BW on board the ship while in US waters; or**
 - **Prior to the ship entering US waters, use an alternative environmentally sound and US Coast Guard approved method of BW management to treat this BW.**
7. Since July 1999, the NBIC and the USCG have managed a nationwide program to measure BW management and delivery patterns for commercial ships that arrive to US ports from outside the nation's EEZ. Expanded regulations and penalties went into effect in June 2004 and included mandatory reporting for coastwise voyages and mandatory BW management practices by all ships equipped with BW tanks that arrive to the US from outside the EEZ. The NBIC tracks and quantifies: (a) rates of reporting under mandatory BW reporting requirements, (b) rates of BW management under a mandatory program (formerly voluntary guidelines), (c) changes in the rate and patterns of BW delivery, and (d) reduction in the rate of ballast-mediated invasions.
8. To determine the rate of BW reporting, the NBIC compares the number of submitted BWRs with the overall number of qualifying overseas arrivals and coastwise arrivals, as reported by the USCG's National Vessel Movement Center (NVMC). From 1999 to 2003, this comparison was made with data from the Foreign Waterborne Transportation Statistics maintained by the Maritime Administration (MARAD). Due to differences in the program missions of the NBIC and the NVMC, estimated reporting compliance rates should be viewed primarily as relative measures across the geographic regions of the US rather than in absolute terms.

9. Currently no federal program tracks all coastwise ships arriving to ports in the inland waterways and Great Lakes. For this reason, it is not yet possible to calculate rates of BW reporting in some regions of the US.
10. To determine the mid-ocean BW exchange rate for ships that have operated outside the US EEZ, the NBIC analyzes the submitted data and estimates the following: (a) the number of ships reporting discharge of BW according to ballast management practices (i.e., no discharge, discharge with no exchange, and discharge with exchange) and (b) the volume and proportion of BW discharged according to the above management practices as well as volumes of water that were retained onboard.
11. The NBIC biennial report is prepared to provide the US Coast Guard a summary of the current status and trends for nationwide BW reporting, delivery, and management, as reflected in the database of ship reports.

RESULTS

Mandatory Reporting Requirement

1. During 2006-07 the NBIC received 242,426 BWRs. Of these, 182,457 were deemed bona fide forms of record. Submissions may be non-qualifying reports for a number of reasons. For example, reports for arrivals to overseas ports may be inadvertently submitted, or an identical form may be submitted repeatedly. Legitimate amended forms were also submitted, of which, only one was considered the form of record.
2. Nationwide, estimated compliance with reporting regulations by overseas arrivals increased slightly between 2005 and the 2006-07 reporting period (82.1% to 83.5%); however, the monthly reporting compliance during 2006-07 was slightly lower than in 2005. Similarly, coastwise reporting decreased from 94.3% in 2005 to 77.8% in the 2006-07 reporting period. Because of increased efficiency and accuracy with respect to the identification and quantification of arrivals and BWRs, reporting compliance rate estimates are expected to be somewhat more accurate in this than in previous reports.
3. Estimated reporting compliance by overseas arrivals at the COTPZ level ranged from 33.0% to 101.5%; however, approximately 82% of COTPZs showed greater than 70% reporting compliance. For coastwise arrivals, estimated reporting compliance ranged from 40.6% to 106.5%, but 70% of COTPZs showed compliance rates of 70% or greater.
4. No compliance rates could be calculated for coastwise arrivals in the Great Lakes or inland waterways due to the lack of a comprehensive, independent dataset for coastwise arrivals in these locations. This lack of a robust reference dataset is a significant impediment to understanding coastwise shipping in these regions.

Mandatory Ballast Management Regulations

5. Of the more than 83,000 valid BWRs analyzed for overseas arrivals during 2006-07, 76.9% reported no intention to discharge (-5.2% from 2004-05), 8.0% indicated discharge with no prior exchange (+1.5%), and the remaining 15.1% indicated discharge with prior BWE (+3.4%).
6. Nationwide, approximately 111.4 million metric tons (MT) of BW sourced overseas was reported discharged in 2006-07, 51.1% more than reported in 2004-05. Of this volume, 20.3 million MT was reported discharged without prior BW exchange and 91.1 million MT was reported discharged with prior BW exchange. The volume of coastwise BW discharged in 2006-07 was 280.2 million MT.

Ballast Water Report Submission, Receipt, Processing, and Analysis

7. The NBIC offers both electronic (e-mail attachments and online forms) and hard copy (fax) reporting options. During 2006-07, the percentage of BWRs submitted electronically was over 90% of all submissions.
8. The NBIC responds to every officially formatted BWR submission received via e-mail. Senders of electronically submitted BWRs are notified of data errors and omissions, and are provided with a list of remedies. When necessary, the NBIC requests the sender to submit a corrected (amended) form.

CONCLUSIONS

1. The national reporting compliance for overseas arrivals during 2006-07 was 83.5% and for coastwise arrivals was 77.8%, and there was $\geq 70\%$ reporting compliance in 82% (overseas) and 70% (coastwise) of COTPZs.
2. Although the majority of qualifying arrivals report no discharge (overseas = 76.9%; coastwise = 67.5%), BW discharge in excess of 390 million MT was reported nationally in 2006-07. Of this volume, 111.4 million MT were from overseas sources and 280 million MT were from coastwise (i.e., domestic) origin.
3. A significant jump in the rate of overseas BW discharge occurred in mid-2007, and is believed to be a function of rapidly increasing importation of bulk commodities (e.g., coal, iron ore, etc.) by China.
4. There were strong differences among coastal regions with respect to BW discharge and management. Geographic constraints imposed by transit type (i.e., relative position of port of call and last port of call) affect ships' ability to carry out open-ocean BW exchange in accordance with USCG requirements.

INTRODUCTION

Today ballast water (BW) from ships is a leading transfer mechanism by which marine organisms are moved around the globe. Depending on weather conditions and other critical safety and navigational concerns, a ship may actively shift, uptake, or discharge BW. Importantly, as ships take on BW, large quantities of marine organisms (e.g., zooplankton, phytoplankton, bacteria, and viruses) are entrained and enter ballast tanks. These organisms are then moved from one coastal ecosystem to another, both along coasts and across oceans. Nonindigenous species (NIS) can fundamentally change the structure and function of natural ecosystems. In the United States alone, estimated economic costs of biological invasions arguably exceed \$100 billion per year (Pimentel 2001). Moreover, the ecological and economic impacts of aquatic NIS in coastal marine and freshwater systems are increasing in the United States and globally.

As authorized by the National Invasive Species Act of 1996 (NISA, which reauthorized and amended the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA)), the United States Coast Guard (USCG) advanced a national program to minimize the rate of transfers and invasions in aquatic ecosystems that result from ships, including especially BW. Since 1999, this program has required mandatory reports on BW management and discharge by all ships arriving to US ports and places from outside the EEZ. This includes ships transiting from one US coast to another, and when crossing the US EEZ or the Canadian equivalent (e.g., transiting from the West Coast to the East Coast). Throughout this report these arrivals are designated as “overseas arrivals” (formerly “foreign arrivals,” see below). Conversely, ships that arrive to US ports and places from other locations in the US and Canada, without transiting outside US and Canadian EEZs, are termed “coastwise arrivals” (formerly “domestic arrivals”, see below).

The USCG originally promoted voluntary BW management for overseas arrivals and ballast of overseas origin, as a congressionally directed initial step to reduce the transfer of species in BW, but in 2004 promulgated regulations (33 CFR 151 subparts C and D) that require: 1) BW management reporting by both overseas and coastwise ship arrivals to US ports and places, and 2) mandatory BW management (i.e., holding ballast without discharge, open-ocean exchange, or alternative approved treatment) prior to discharge by overseas arrivals. Both the reporting and BW management regulations include penalties for non-compliance.

Tracking and analysis of BW management and delivery patterns are critical for 1) understanding the forces that drive invasions and 2) developing effective management strategies to reduce the risk of future invasions. In particular, there is a need to know how BW delivery is changing in space and time in response to our national policies. It is also critical to understand how changes in ships’ behavior (e.g., BW management and discharge patterns) affect the delivery and establishment of new organisms.

The National Ballast Information Clearinghouse (NBIC) was established, as called for in NISA, as a joint program between the USCG and the Smithsonian Environmental Research Center (SERC) to provide analysis of BW management and invasion patterns on a national scale. The mandatory BW management reports submitted by ships upon arrival (as above) are sent to the NBIC for analysis. The NBIC provides regular and ongoing analyses to the USCG to measure the effects of changes in ships’ reporting and ballast management practices across the Nation. As

called for by NISA, a biennial report is provided to the USCG by the NBIC. This is the fourth NBIC biennial report, and is based on data received from the period of January 2006 to December 2007.

ASSESSING THE EXTENTS AND RATES OF BALLAST WATER REPORTING AND MANAGEMENT TO THE US

Mandatory Ballast Water Reporting Requirement

In the present report (2006-2007) and the Third Biennial Report to the USCG (2004-2005), analyses of both foreign and domestic BW reported by commercial ships arriving to US ports and places of destination are provided. However, in this report the terms “foreign” and “domestic” have been replaced by “overseas” and “coastwise”. The new terms are deemed more descriptive because they differentiate the transit type from ship ownership, and because coastwise transits can carry and discharge water that does not originate in the United States. Similarly, the terms overseas and coastwise are used to describe the geographic origins of BW in this report.

Ballast Water Reporting Form Receipt, Processing, and Vessel Notification

The NBIC receives Ballast Water Reports (BWRs) from ships via four primary modes: surface mail, e-mail, fax, and online or web-based submissions. The number of forms submitted via the US Postal Service was negligible during 2006-07. Most reporting forms were submitted as e-mail attachments (mean forms/mo = 7695; 79% of total submissions). Faxes and online/web forms were submitted at rates of 1229/mo (13%) and 833/mo respectively (9%). During 2006-07, the number of fax submissions submitted per month declined, while the number of online/web forms and e-mail consistently increased.

With the exception of fax submissions, all other electronically-received BWRs trigger an initial notice of receipt at the time of submission. Following data processing and review by the NBIC, each BWR submitted via e-mail results in a response indicating whether the form meets the minimum BW reporting requirements, typically within 2 business days of initial submission. BWRs that fail to meet minimum reporting requirements (e.g., incomplete and inconsistent information or incorrect data types) receive a notification that highlights errors and suggests specific remedies, including a request for re-submission. All “error-free” BWRs receive notification of successful submission. Vessels also submit amended forms on their own volition, usually in response to a change in voyage or BW discharge activities. Additionally, the NBIC receives reports from non-qualifying arrivals as well as multiple submissions for qualifying arrivals. The above processes and activities result in more BWR submissions than actual qualifying arrivals. The NBIC applies extensive quality assurance and control measures to ensure that multiple and erroneous BWRs are removed such that each qualifying arrival has only one corresponding BWR of record. Only the qualifying subset of BWRs is retained and used to calculate summary statistics and to perform analyses.

Table 1 summarizes data on the total number of BWRs submitted to the NBIC during 2006-07, on the basis of Captain of the Port Zone (COTPZ). This table contains the raw number of report submissions, the number identified as either amended or non-qualifying forms, and the overall retention rate used for analysis. Because the NBIC routinely contacts ship operators to clarify

BWR requirements and procedures, often with requests to resubmit information, frequently more than one form is submitted for a single arrival. Of 242,426 BWRs received, 75.3% (182,457 BWRs) were deemed as qualifying and thus retained. Table 1 describes the number of reports to the US from overseas and coastwise arrivals, reporting the BWR retention rate by COTPZ (mean = 81.5%; range = 57.2 to 95.3%).

Compliance with Mandatory Ballast Water Reporting Requirement

The USCG regulatory program stipulates compliance with mandatory BW reporting requirements. Reporting compliance rates are estimated by comparing the number of bona fide BWRs received by the NBIC with the number of “qualifying” arrivals (advanced notices of arrival) as indicated by the USCG’s Advanced Notice of Arrivals database, information collected and maintained by the USCG National Vessel Movement Center (NVMC). These data track notices of arrival for ships calling on ports and places of destination in the United States. The NVMC was established by the Department of Transportation in connection with the United States Coast Guard (later in the Department of Homeland Security) to track all commercial ship movements to and within the United States. Since the two programs were created to serve different purposes and therefore have different reporting requirements, uniform comparisons for all geographic locations in the US are not possible. To establish appropriate comparisons, the NBIC applied a variety of quality control and quality assurance protocols to ensure that comparisons between the two data sources were valid (e.g., standardization of vessels and arrival locations for ships that report to both entities).

An important aspect of compliance estimation concerns the overlap of the NBIC and NVMC database entries, which is not complete due to differences in the ship populations that are required to submit reports to each respective entity. For this reason, only reporting compliance according to those subpopulations that are shared between the two data sets are estimated. For example, Offshore Supply Vessels are included in the NBIC reporting requirements but exempted from NVMC reporting. Table A-1 summarizes the geographic regions and ship types that are either exempted or known to be incomplete in one or both of the databases. For this reason, Tables 2 and 3 only include arrivals (overseas + coastwise = 100,861 + 65,656 = 166,517) that were reported to the NVMC and BWRs (overseas + coastwise = 84,180 + 51,077 = 135,257) that were reported to the NBIC, whereas Table 1 includes all 182,457 qualifying BWRs. Table A-1 indicates which data sets were used to generate each of the figures and tables in this report.

For the purposes of estimating reporting compliance rates (i.e., the number of BWRs received vs. qualified arrivals as reported to the NVMC), these exemptions (Table A-1) are always taken into consideration to avoid spurious results. Note: overlap between the NBIC and the NVMC reporting requirements is significantly less for coastwise than overseas arrivals, so estimates for the NBIC coastwise reporting compliance are based on a smaller proportion of forms than are overseas compliance estimates. At present there are no comprehensive data sources describing coastwise ship movements and arrivals within the inland waterways of the US. For this reason, BW reporting compliance rates cannot be reliably estimated for coastwise arrivals to the inland waterways or the Great Lakes at this time.

Tables 2 and 3 present data on the compliance rates of reporting at the COTPZ, coastal, and national levels for overseas and coastwise voyages. Nationwide, arrivals data from the NVMC database included 100,861 qualifying overseas arrivals and 65,656 coastwise arrivals during the 2006-2007 reporting period. A total of 84,180 qualifying overseas BWRs and 51,077 coastwise BWRs were compared to qualifying NVMC arrivals to estimate mandatory reporting rates for the nation. The nationwide overseas reporting compliance was estimated at 83.5% (range = 33.0 – 101.5%; excluding Sector Sault Ste. Marie) and coastwise reporting compliance was estimated at 77.8% (range = 40.6 – 106.5%). In some instances compliance rates of greater than 100% were calculated, possibly due to either under-reporting in the NVMC database or overestimation of qualifying BWRs in the NBIC database. Values that exceed 100% are indicative of some level of uncertainty in the estimation process, but are most pronounced when the number of reports received is small (e.g., SSMMS and VALMS); therefore they do not unduly leverage national reporting rates.

Figures 1 and 2 illustrate the estimated nationwide monthly reporting rates by overseas and coastwise ship arrivals. A strong seasonal pattern is apparent for coastwise traffic, with fewer reports submitted between the months of November and April. This pattern is likely driven by the seasonal nature of shipping inside the Great Lakes, which subsides during winter months (Fig. 2). By comparison, overseas traffic is much less variable across seasons, despite winter lows which are explained by the shorter month of February (Fig. 1).

Overseas Arrivals

Nationwide Vessel Traffic and Reporting Compliance

Table 2 summarizes the 100,861 qualifying overseas arrivals registered by the NVMC for the period from 1 January 2006 to 31 December 2007. The East Coast received the greatest proportion of arrivals (39.2%), followed by the Gulf of Mexico (26.2%), West Coast (15.8%), the Caribbean (14.3%), Hawaii (2.5%), Guam (0.9%), Alaska (0.5%) and the Great Lakes (0.5%).

Qualifying BWRs were submitted by 41,842 overseas arrivals in 2006, followed by 42,338 in 2007 (Table 2), as compared to 29,722 and 38,575 in 2004 and 2005 respectively. When evaluated with corresponding NVMC notices of arrival, the overall nationwide compliance rates for 2006 and 2007 were 82.6 and 84.4%. Monthly reporting compliance rates showed a slight upward trend during 2006, leveling off to a national monthly reporting rate of approximately 84% (Fig. 1).

Regional Reporting Compliance

Table 2 contains estimated rates of reporting for coastal regions and COTPZs by overseas arrivals. Rates of reporting to coastal regions ranged from 43.4% in the Great Lakes to 94.8% on the West Coast (mean COTPZ = 82.9%). A value of 400% was calculated for Sault St. Marie; however, the close proximity of the US and Canadian ports of Sault St. Marie in combination with the small number of BWRs make this estimate and those for Detroit, Duluth, and Lake Michigan especially uncertain. The 2006 reporting compliance in PATMS is elevated because one vessel reported 27 arrivals to Port Arthur, TX from Cayo Arcas, Mexico to the NBIC, while these were reported to the NVMC with a last port of call as Port Arthur, TX. The apparent over

reporting to SFCMS can similarly be explained by 8 tankers that reported 30 overseas arrivals to the NBIC, which were not present in the NVMC data.

Coastwise Arrivals

Nationwide Vessel Traffic and Reporting Compliance

Coastwise arrivals represent approximately 39.5% of all qualifying arrivals to US ports and places. The total number of qualifying coastwise arrivals to US ports and places, as reported to the NVMC, was 65,656 during the two-year period between 2006 and 2007. Coastwise arrivals were most frequent on the East Coast (48.1%), Gulf of Mexico (28.1%), and the West Coast (19.6%) (Table 3).

Where estimates were possible, the nationwide reporting rate for regions was 77.8% (mean COTPZ = 73.4%). Monthly reporting rates indicated a strong seasonal signal, with lower numbers of submissions during winter months; however, the percent reporting remained relatively constant during 2006-07 (Fig. 2).

Regional Reporting Compliance

Table 3 contains reporting compliance rates for the nation, coasts, and COTPZs during 2006 and 2007 by coastwise arrivals. It is important to note that US flagged ships involved in coastwise crude oil trade are statutorily exempt from reporting to the NBIC; as such, corresponding notices of arrival reported to the NVMC were excluded from compliance estimates. Coastwise shipping is extensive within the Great Lakes: of 16,250 total BWRs, 16,015 are reported by coastwise arrivals in 2006-07 (see Tables 1 and 2). However, current regulations do not require the submission of advanced notices of arrival to the NVMC from all coastwise shipping in the Great Lakes and inland waterways. Coastwise movements in the San Juan, Honolulu, and Guam COTPZs do not cross a COTPZ boundary and are not required to submit BWRs to the NBIC. Consequently, coastwise reporting compliance could not be reliably calculated in these regions. In general, estimated compliance values are affected by three sources of uncertainty: 1) the number of NVMC arrivals in a region may not be comprehensive, 2) some vessels that report to the NVMC but do not have the capability of carrying ballast water have not been identified, or 3) the NBIC process for identifying and removing non-qualifying BWRs is not strict or precise enough and thus sometimes retains forms at too high a rate. As described above for overseas arrivals, there was one instance of a COTPZ (SDCMS) where >100% reporting compliance was reported that resulted from a single vessel for which there were no records of coastwise arrival to the Pacific Area Lightering in NVMC, but which reported 83 times to the NBIC. The COTPZ with the lowest reporting compliance (MORMS) has many vessels that only report to NVMC; it is undetermined if those vessels are required to report to the NBIC.

Compliance with Mandatory Ballast Water Management Regulations

Ship masters are required to report specific information for discharged BW that originated from outside the United States' EEZ, including (a) whether or not BW was exchanged or otherwise treated, and (b) specific details of BW management on a per-tank basis, providing volume, management method, and calculated percent exchange if BW underwent open-ocean exchange. In June 2004 the USCG announced mandatory BW management requirements with accompanying penalties (see 33 CFR §151.2035(a) and (b)). With the expanded regulations and

penalties, certain ships are required to (c) conduct BW exchange in the open ocean at least 200 nm from any coast.

Overseas Arrivals

BW Management Reporting

Compliance with these BW management regulations was assessed by comparing the number of qualifying BWRs submitted by commercial ships during 2006-07 with the corresponding number of qualifying notices of arrival received by NVMC (see Table A-1 for details of analyses). For each report, arrivals were classified into one of three categories, based on BW discharge and management: a) No discharge, b) No ballast water exchange (No BWE) or, c) Ballast water exchange (BWE). “No discharge” and “BWE” represent active management efforts by ship operators, namely retaining BW rather than discharging or use of open-ocean exchange or an approved alternative ballast treatment system (e.g., four ships participating in the USCG Shipboard Technology Evaluation Program). Discharge was classified as “No BWE” if information on discharged volumes was absent or incomplete in the BWR. The frequency of arrivals and the volumes of BW discharge were calculated by BW management category. This assessment was carried out at both the national and coastal scales for the two-year reporting period (2006-07). The extent of alternative treatment was very low during 2006-07, both in terms of reported occurrences (i.e., number of BWRs) and by volume. For this reason, alternative treatment is not analyzed in this report.

The majority of overseas arrivals that submitted BWRs to the NBIC (2006-07) reported No Discharge, a pattern observed in all coastal regions. The frequency of No BWE discharge reports was greatest on the East Coast, followed by the Gulf of Mexico, and the Caribbean. The frequency of discharge with BWE was greater than discharge with No BWE in all coastal regions, with the exception of the East Coast where discharge status was about equal (Fig. 3). On a percentage basis, the mean BW management compliance (i.e., No Discharge or BWE) across coasts is estimated at 92.0% (range = 84 – 100%), based on the information reported to the NBIC.

Coastwise Arrivals

BW Management Reporting

As with overseas arrivals, most coastwise arrivals indicated No Discharge on BWRs in 2006-07. Although BWE is not mandatory for coastwise arrivals, many ships do report undergoing BWE prior to discharge. The majority of discharging ships reported discharge with No BWE, except on the West Coast where discharging ships reported BWE 45% more frequently than discharge with No BWE (Fig. 4). In the Great Lakes and inland waterways, discharge with prior BWE is almost never reported, presumably since BWE is neither required nor seen as a viable management option.

Overseas BW Discharge and Management Volumes

Nationwide Ballast Water Discharge and Management Compliance

When BW discharge volumes are considered (versus number of BWRs), a different picture emerges with respect to BW management in the United States during 2006-07. Note: all BW volumes reported are categorized as of overseas origin or coastwise origin, regardless of the particular arrival type reported on a BWR. Many ships that report a coastwise transit have

previously operated outside the US and carry water that was taken on in overseas locations. Thus, it is the origin of the water rather than the transit type of a ship that determines how volume and management are categorized.

Of the 111.3 million MT of overseas BW discharge reported for the nation, 91.0 million MT (81.7%) was reported as having undergone open ocean BWE. The remainder, 20.4 million MT (18.3%) was reported as discharged with No BWE. The mean monthly discharge of exchanged and unexchanged BW was 4.6 million MT (range = 3.6 to 7.0 million MT) in 2006-07 (Fig. 5). Interestingly, as monthly BW discharge volumes increased through time, the discharge amount reported with NO BWE remained more constant than the discharge volume reported with BWE. This overall increase in monthly BW discharge volumes cannot be attributed to increased rates of reporting though (see Fig. 1). Furthermore, there was a striking volumetric increase in reported overseas BW discharge volume to the US in mid-2007 (Fig. 5). When discharge by ship type was investigated, discharge by bulk carriers was shown to have increased significantly compared with other ship types. This suggests the observed increase is associated with a global jump in bulk carrier activity, in particular associated with the import of coal, iron ore, and cement by China as described by the Institute of Shipping Economics and Logistics (ISL 2009, www.isl.org).

Regional Ballast Water Discharge and Management Compliance

When overseas BW discharge was analyzed for coastal regions, the Gulf of Mexico was shown to receive the largest volume of discharge (44.8 million MT). Of the total BW discharged in the Gulf of Mexico, 8.6 million MT (19.2%) was reported as unexchanged discharge. This volume equates to 42.2% of all unexchanged overseas BW discharge to the nation. The West Coast received the second largest volume of overseas BW discharge (29.6 million MT), of which 1.3 million MT (4.5%) was unexchanged. The East Coast and Caribbean received comparable volumes of discharge, 16.4 million MT and 15.7 million MT respectively; however, 33.4% of discharge to the Caribbean was unexchanged compared with 19.8% on the East Coast. Alaska received 3.4 million MT of discharge, 51.0% of which was unexchanged. All other coastal regions of the US received less than 1.0 million MT of total overseas BW discharge. Figure 6 summarizes discharge and BW exchange status of all overseas BW discharged to coastal regions of the US.

Coastwise BW Discharge and Management Volumes

The monthly discharge of coastwise water was 2.5 times greater, on average, than overseas discharge during 2006-07. Coastwise discharge shows a far more pronounced pattern of seasonality than overseas discharge (Fig. 7). Winter discharge from December to March is predictably lower than other months. Only a fraction of coastwise discharge is reported to have undergone BWE, 21.3 million MT of 280.2 million MT total discharge (7.6%). Currently there is no federal regulation requiring the exchange of coastwise BW water discharged into the United States; however, very large volumes of BW are moved from place to place throughout the US, often between distinct biogeographical regions. Importantly, such water can contain high concentrations of planktonic biota.

Ballast water discharge volume comparisons among coastal regions highlight the vast quantities of coastwise BW that are released in the Great Lakes and the Gulf of Mexico, 122.8 million MT

and 97.8 million MT, respectively. The strong seasonality of coastwise BW discharge is almost certainly due to the strong seasonal shipping activity in the Great Lakes. The East and West Coasts received 26.8 million MT and 23.1 million MT of coastwise discharge. Of this discharge, 9.6% of East Coast volume was reported as exchanged before discharge. In contrast, on the West Coast, where state laws require BWE for coastwise BW discharge, 45.1% of said BW discharge underwent BWE. Figure 8 summarizes BW discharge and exchange status of coastwise BW discharged to coastal regions of the US.

CONCLUSIONS

1. The national reporting compliance for overseas arrivals during 2006-07 was 83.5%; however, most COTPZs (82%) reported at a 70% compliance rate or higher. Monthly reporting compliance by overseas arrivals increased from 79 to nearly 86%, with relatively small month-to-month fluctuations. Among US coastal regions, reporting compliance ranged from 43.4% in the Great Lakes to 94.8% on the West Coast.
2. Nationally, the reporting compliance rate by coastwise transits was 77.8% in 2006-07, with 70% of COTPZs reporting at $\geq 70\%$ compliance. Monthly reporting compliance by coastwise transits increased from 72 to 84% during this reporting period.
3. Although, there has been a slight increase in reporting compliance for overseas and an apparent decrease in reporting compliance for coastwise arrivals, when compared to the reporting compliance in 2005, this may in part reflect a change in the way the NBIC received and processed notices of arrival data from the NVMC in 2006-07 (i.e., en masse vs. piecemeal). This procedural change, along with some refinements to the procedures used for categorizing ship arrivals, likely resulted in a more comprehensive and accurate accounting of qualifying arrivals and reporting rate estimates during this reporting period.
4. The majority of ship arrivals do not report discharging any BW (i.e., 76.9% of overseas arrivals and 67.5% of coastwise arrivals).
5. Overseas arrivals reported 111.4 million MT of BW, with a mean of 4.6 million MT discharged monthly. The majority of this BW was discharged to the Gulf of Mexico (40.3%) and the West Coast (26.6%). Beginning in mid-2007, there was a substantial increase in BW discharge, specifically by bulk carriers.
6. Nationally, there were 280.2 million MT of coastwise BW discharged during 2006-07, with an average of 11.7 million MT discharged monthly. The Great Lakes received 43.8% and the Gulf of Mexico received 34.7% of the total coastwise BW discharged in 2006-2007.
7. There were clear geographic differences with respect to the extent of BW discharge and BWE in the United States. Large volumes of unexchanged overseas BW were discharged into the waters of the US, especially in the Gulf of Mexico and the Caribbean. The underlying reasons for these patterns have not been fully investigated; however, geographic constraints imposed by the last port of call and port of arrival (e.g., arrivals to the Gulf of Mexico from Mexico, Central and South America) likely affect the ability of ships to conduct

open-ocean BWE in accordance with USCG requirements. Similarly, short transits among Caribbean islands may preclude open-ocean exchange.

8. Substantial volumes of unexchanged coastwise BW were also moved among regions inside the US. Although not currently subject to BW exchange requirements by the USCG, the coastwise transport of water and its associated biota moves species among distinct biogeographic regions of the US. Furthermore, the movement and discharge of BW among US regions also runs the risk of spreading populations of nonindigenous species, originally introduced from overseas regions.
9. Increased outreach and communication efforts by the NBIC have increased the shipping industry's awareness of mandatory reporting requirements. This outreach, which included individualized notices of receipt and specific feedback to individual ships regarding reporting mistakes and suggested remedies, has resulted in a higher quality of BWR submissions (i.e., fewer reporting errors and data omissions). Nevertheless, further improvements to both overseas and coastwise BW management and discharge reporting may be possible with outreach that targets ships whose arrival records according to the NVMC differ strongly from the NBIC records of BWRs.

Table 1. Total BWRs received, retained, and processed from 01 Jan 2006 to 31 Dec 2007.

US Coastal Region	COTPZ	Retained 2006	Retained 2007	Retained Total	Retained Percent	Amended	Amended Percent	Non Qualifying	NQ Percent	Total BWRs
Alaska	ANCMS	849	884	1,733	82.4	369	17.5	1	0	2,103
Alaska	JUNMS	1,206	1,154	2,360	85.4	403	14.6	2	0.1	2,765
Alaska	VALMS	146	133	279	83.8	54	16.2	0	0	333
Alaska	(all)	2,201	2,171	4,372	84.1	826	15.9	3	0.1	5,201
Caribbean	SJPMS	4,808	4,841	9,649	86	1,562	13.9	11	0.1	11,222
Caribbean	(all)	4,808	4,841	9,649	86	1,562	13.9	11	0.1	11,222
East	BALMS	1,970	2,004	3,974	81.4	898	18.4	10	0.2	4,882
East	BOSMS	768	842	1,610	87	237	12.8	4	0.2	1,851
East	CFRMS	503	529	1,032	84.1	194	15.8	1	0.1	1,227
East	CHAMS	2,062	1,959	4,021	81.9	882	18	7	0.1	4,910
East	DEBMS	3,088	2,995	6,083	81.6	1,360	18.2	13	0.2	7,456
East	HMRMS	2,708	2,685	5,393	79.8	1,363	20.2	3	0	6,759
East	JACMS	2,854	2,796	5,650	80.7	1,349	19.3	5	0.1	7,004
East	LISCP	866	783	1,649	86.5	254	13.3	3	0.2	1,906
East	MIAMS	7,885	8,029	15,914	69.6	6,925	30.3	20	0.1	22,859
East	NCAMS	169	169	338	82.6	71	17.4	0	0	409
East	NNEMS	706	703	1,409	85.1	245	14.8	2	0.1	1,656
East	NYCCP	6,296	6,112	12,408	78.5	3,352	21.2	41	0.3	15,801
East	SAVMS	2,534	2,762	5,296	79.5	1,347	20.2	19	0.3	6,662
East	SNEMS	592	606	1,198	86	192	13.8	3	0.2	1,393
East	(all)	33,001	32,974	65,975	77.8	18,669	22	131	0.2	84,775
Gr Lakes	BUFMS	1,204	1,060	2,264	84	425	15.8	5	0.2	2,694
Gr Lakes	DETMS	2,006	1,905	3,911	88.5	482	10.9	26	0.6	4,419
Gr Lakes	DULMS	1,388	1,494	2,882	81.8	629	17.8	13	0.4	3,524
Gr Lakes	LkMichgn	2,106	2,142	4,248	87.7	580	12	18	0.4	4,846
Gr Lakes	SSMMS	1,508	1,437	2,945	85.9	477	13.9	8	0.2	3,430
Gr Lakes	(all)	8,212	8,038	16,250	85.9	2,593	13.7	70	0.4	18,913
Guam	GUAD	355	354	709	81	157	17.9	9	1	875
Guam	(all)	355	354	709	81	157	17.9	9	1	875
G of M	CORMS	1,851	1,960	3,811	77.2	1,113	22.6	10	0.2	4,934
G of M	HOUCP	7,690	7,828	15,518	76.6	4,693	23.2	57	0.3	20,268
G of M	KeyWest	413	341	754	83.5	147	16.3	2	0.2	903
G of M	MOBMS	2,516	2,619	5,135	82.6	1,073	17.3	11	0.2	6,219
G of M	MORMS	750	809	1,559	78	433	21.7	7	0.4	1,999
G of M	NEWMS	5,653	6,109	11,762	75.8	3,724	24	31	0.2	15,517
G of M	PATMS	2,986	3,076	6,062	81.6	1,346	18.1	18	0.2	7,426
G of M	STPMS	2,492	2,481	4,973	84.9	872	14.9	14	0.2	5,859
G of M	(all)	24,351	25,223	49,574	78.5	13,401	21.2	150	0.2	63,125
Hawaii	HONMS	1,186	1,253	2,439	81.4	497	16.6	59	2	2,995
Hawaii	(all)	1,186	1,253	2,439	81.4	497	16.6	59	2	2,995
Inland	LOMMS	288	260	548	94.8	27	4.7	3	0.5	578
Inland	OHVMS	580	551	1,131	95.3	54	4.5	2	0.2	1,187
Inland	PITMS	93	85	178	89.9	20	10.1	0	0	198
Inland	UPMMS	178	169	347	90.8	28	7.3	7	1.8	382
Inland	(all)	1,139	1,065	2,204	94	129	5.5	12	0.5	2,345
West	LOSMS	5,901	5,991	11,892	66.4	5,962	33.3	43	0.2	17,897
West	PORMS	1,651	1,842	3,493	68.3	1,589	31.1	32	0.6	5,114
West	SDCMS	665	780	1,445	74.4	493	25.4	5	0.3	1,943
West	SEAMS	3,023	3,104	6,127	71.8	2,392	28	18	0.2	8,537
West	SFCMS	3,712	3,891	7,603	57.2	5,661	42.6	31	0.2	13,295
West	(all)	14,952	15,608	30,560	65.3	16,097	34.4	129	0.3	46,786
Unknown in USA	Unknown	423	302	725	47.6	783	51.4	14	0.9	1,522
Non-US	Unknown	0	0	0	0	1,079	23.1	3588	76.9	4,667
Total	(all)	90,628	91,829	182,457	75.3	55,793	23	4176	1.7	242,426

Table 2. Percent BW reporting compliance by overseas arrivals. The number of BWRs received by the NBIC is compared with the number of qualifying arrivals as determined by early notices of arrival received by the NVMC in regions and by ship types that report to both organizations (see Table A-1 for reporting details). * Reporting percentages >100% are due to small sample sizes and do not leverage the overall reporting percentage. Reports to unknown locations are not included in totals.

US Coastal Region	COTPZ	COTPZ Name	NBIC 2006	NVMC 2006	Reporting Percent 2006	NBIC 2007	NVMC 2007	Reporting Percent 2007	Total NBIC	Total NVMC	Total Reporting Percent
Alaska	ANCMS	Western Alaska	195	240	81.2	207	215	96.3	402	455	88.4
Alaska	JUNMS	Southeast Alaska	10	16	62.5	12	16	75.0	22	32	68.8
Alaska	VALMS	Prince William Sound	5	6	83.3	4	3	133.3*	9	9	100.0
Alaska	(all)	(all)	210	262	80.2	223	234	95.3	433	496	87.3
Caribbean	SJPMS	San Juan	4,246	7,340	57.8	4,192	7,123	58.9	8,438	14,463	58.3
East	BALMS	Baltimore	587	644	91.1	551	606	90.9	1,138	1,250	91.0
East	BOSMS	Boston	268	285	94.0	327	335	97.6	595	620	96.0
East	CFRMS	Cape Fear River	143	189	75.7	152	174	87.4	295	363	81.3
East	CHAMS	Charleston	742	823	90.2	613	648	94.6	1,355	1,471	92.1
East	DEBMS	Delaware Bay	1,546	1,719	89.9	1,474	1,574	93.6	3,020	3,293	91.7
East	HMRMS	Hampton Roads	308	387	79.6	440	520	84.6	748	907	82.5
East	JACMS	Jacksonville	2,053	2,284	89.9	2,039	2,180	93.5	4,092	4,464	91.7
East	LISCP	Long Island Sound	199	241	82.6	165	208	79.3	364	449	81.1
East	MIAMS	Miami	6,471	8,708	74.3	6,646	8,755	75.9	13,117	17,463	75.1
East	NCAMS	North Carolina	72	74	97.3	51	62	82.3	123	136	90.4
East	NNEMS	Northern New England	277	328	84.5	271	337	80.4	548	665	82.4
East	NYCCP	New York	2,783	2,934	94.9	2,849	2,909	97.9	5,632	5,843	96.4
East	SAVMS	Savannah	952	1,040	91.5	990	1,076	92.0	1,942	2,116	91.8
East	SNEMS	Southeastern New England	210	249	84.3	203	226	89.8	413	475	86.9
East	(all)	(all)	16,611	19,905	83.5	16,771	19,610	85.5	33,382	39,515	84.5
Gr Lakes	BUFMS	Buffalo	57	158	36.1	41	139	29.5	98	297	33.0
Gr Lakes	DETMS	Detroit	26	56	46.4	23	47	48.9	49	103	47.6
Gr Lakes	DULMS	Duluth	5	15	33.3	20	35	57.1	25	50	50.0
Gr Lakes	LkMichgn	Lake Michigan	32	53	60.4	27	38	71.1	59	91	64.8
Gr Lakes	SSMMS	Sault Ste. Marie	3	0	Inf	1	1	100.0	4	1	400.0*
Gr Lakes	(all)	(all)	123	282	43.6	112	260	43.1	235	542	43.4
Guam	GUAD	Guam	278	467	59.5	309	471	65.6	587	938	62.6
G of M	CORMS	Corpus Christi	953	1,058	90.1	1,106	1,177	94.0	2,059	2,235	92.1
G of M	HOUCP	Houston-Galveston	4,472	4,956	90.2	4,333	4,687	92.4	8,805	9,643	91.3
G of M	KeyWest	Key West	109	118	92.4	93	104	89.4	202	222	91.0
G of M	MOBMS	Mobile	1,352	1,555	86.9	1,427	1,592	89.6	2,779	3,147	88.3
G of M	MORMS	Morgan City	328	374	87.7	302	405	74.6	630	779	80.9
G of M	NEWMS	New Orleans	2,593	2,818	92.0	2,873	3,063	93.8	5,466	5,881	92.9
G of M	PATMS	Port Arthur	1,220	1,207	101.1*	1,298	1,363	95.2	2,518	2,570	98.0
G of M	STPMS	St Petersburg	872	1,026	85.0	757	880	86.0	1,629	1,906	85.5
G of M	(all)	(all)	11,899	13,112	90.7	12,189	13,271	91.8	24,088	26,383	91.3
Hawaii	HONMS	Honolulu	889	1,243	71.5	986	1,302	75.7	1,875	2,545	73.7

Table 2 continued

US Coastal Region	COTPZ	COTPZ Name	NBIC 2006	NVMC 2006	Reporting Percent 2006	NBIC 2007	NVMC 2007	Reporting Percent 2007	Total NBIC	Total NVMC	Total Reporting Percent
West	LOSMS	Los Angeles-Long Beach	4,203	4,483	93.8	4,180	4,340	96.3	8,383	8,823	95.0
West	PORMS	Portland, Oregon	833	935	89.1	960	1,095	87.7	1,793	2,030	88.3
West	SDCMS	San Diego	425	458	92.8	465	490	94.9	890	948	93.9
West	SEAMS	Puget Sound	1,136	1,202	94.5	1,105	1,168	94.6	2,241	2,370	94.6
West	SFCMS	San Francisco Bay	989	984	100.5*	846	824	102.7*	1,835	1,808	101.5*
West	(all)	(all)	7,586	8,062	94.1	7,556	7,917	95.4	15,142	15,979	94.8
Unknown in USA	Unknown	Unknown	138	46	NA	95	9	NA	233	55	NA
National	(all)	(all)	41,842	50,673	82.6	42,338	50,188	84.4	84,180	100,861	83.5

Table 3. Percent BW reporting compliance by coastwise arrivals. The number of BWRs received by the NBIC is compared with the number of qualifying arrivals as determined by early notices of arrival received by the NVMC in regions and by ship types that report to both organizations (see Table A-1 for reporting details). *Reporting percentages >100% are due to small sample sizes and do not leverage the overall reporting percentage. Reports to unknown locations are not included in totals.

US Coastal Regions	COTPZ	COTPZ Name	NBIC 2006	NVMC 2006	Reporting Percent 2006	NBIC 2007	NVMC 2007	Reporting Percent 2007	Total NBIC	Total NVMC	Total Reporting Percent
Alaska	ANCMS	Western Alaska	394	660	59.7	408	640	63.8	802	1,300	61.7
Alaska	JUNMS	Southeast Alaska	500	685	73.0	517	631	81.9	1,017	1,316	77.3
Alaska	VALMS	Prince William	42	94	44.7	28	48	58.3	70	142	49.3
Alaska	(all)	(all)	936	1,439	65.0	953	1,319	72.3	1,889	2,758	68.5
East	BALMS	Baltimore	1,022	1,381	74.0	1,126	1,430	78.7	2,148	2,811	76.4
East	BOSMS	Boston	351	556	63.1	401	544	73.7	752	1,100	68.4
East	CFRMS	Cape Fear River	322	489	65.8	336	479	70.1	658	968	68.0
East	CHAMS	Charleston	1,220	1,682	72.5	1,265	1,655	76.4	2,485	3,337	74.5
East	DEBMS	Delaware Bay	701	1,041	67.3	698	939	74.3	1,399	1,980	70.7
East	HMRMS	Hampton Roads	1,910	2,521	75.8	1,980	2,539	78.0	3,890	5,060	76.9
East	JACMS	Jacksonville	671	962	69.8	639	895	71.4	1,310	1,857	70.5
East	LISCP	Long Island Sound	108	206	52.4	124	238	52.1	232	444	52.3
East	MIAMS	Miami	1,135	1,726	65.8	1,120	1,561	71.7	2,255	3,287	68.6
East	NCAMS	North Carolina	43	71	60.6	45	70	64.3	88	141	62.4
East	NNEMS	Northern New	321	476	67.4	326	446	73.1	647	922	70.2
East	NYCCP	New York	1,943	2,461	79.0	1,964	2,391	82.1	3,907	4,852	80.5
East	SAVMS	Savannah	1,504	2,031	74.1	1,685	2,137	78.8	3,189	4,168	76.5
East	SNEMS	Southeastern New	187	328	57.0	188	320	58.8	375	648	57.9
East	(all)	(all)	11,438	15,931	71.8	11,897	15,644	76.0	23,335	31,575	73.9
G of M	CORMS	Corpus Christi	537	783	68.6	534	745	71.7	1,071	1,528	70.1
G of M	HOUCP	Houston-Galveston	2,008	2,832	70.9	2,159	2,942	73.4	4,167	5,774	72.2
G of M	KeyWest	Key West	304	359	84.7	248	335	74.0	552	694	79.5
G of M	MOBMS	Mobile	530	773	68.6	576	767	75.1	1,106	1,540	71.8
G of M	MORMS	Morgan City	127	280	45.4	128	348	36.8	255	628	40.6
G of M	NEWMS	New Orleans	1,694	2,174	77.9	1,755	2,136	82.2	3,449	4,310	80.0
G of M	PATMS	Port Arthur	1,167	1,319	88.5	1,222	1,313	93.1	2,389	2,632	90.8
G of M	STPMS	St Petersburg	619	738	83.9	555	638	87.0	1,174	1,376	85.3
G of M	(all)	(all)	6,986	9,258	75.5	7,177	9,224	77.8	14,163	18,482	76.6
West	LOSMS	Los Angeles-Long	1,296	1,450	89.4	1,285	1,337	96.1	2,581	2,787	92.6
West	PORMS	Portland, Oregon	641	724	88.5	646	733	88.1	1,287	1,457	88.3
West	SDCMS	San Diego	218	217	100.5*	290	260	111.5*	508	477	106.5*
West	SEAMS	Puget Sound	1,301	1,654	78.7	1,365	1,595	85.6	2,666	3,249	82.1
West	SFCMS	San Francisco Bay	2,229	2,378	93.7	2,419	2,493	97.0	4,648	4,871	95.4
West	(all)	(all)	5,685	6,423	88.5	6,005	6,418	93.6	11,690	12,841	91.0
Unknown in USA	Unknown	Unknown	81	70	NA	44	68	NA	125	138	NA
National	(all)	(all)	25,045	33,051	75.8	26,032	32,605	79.8	51,077	65,656	77.8

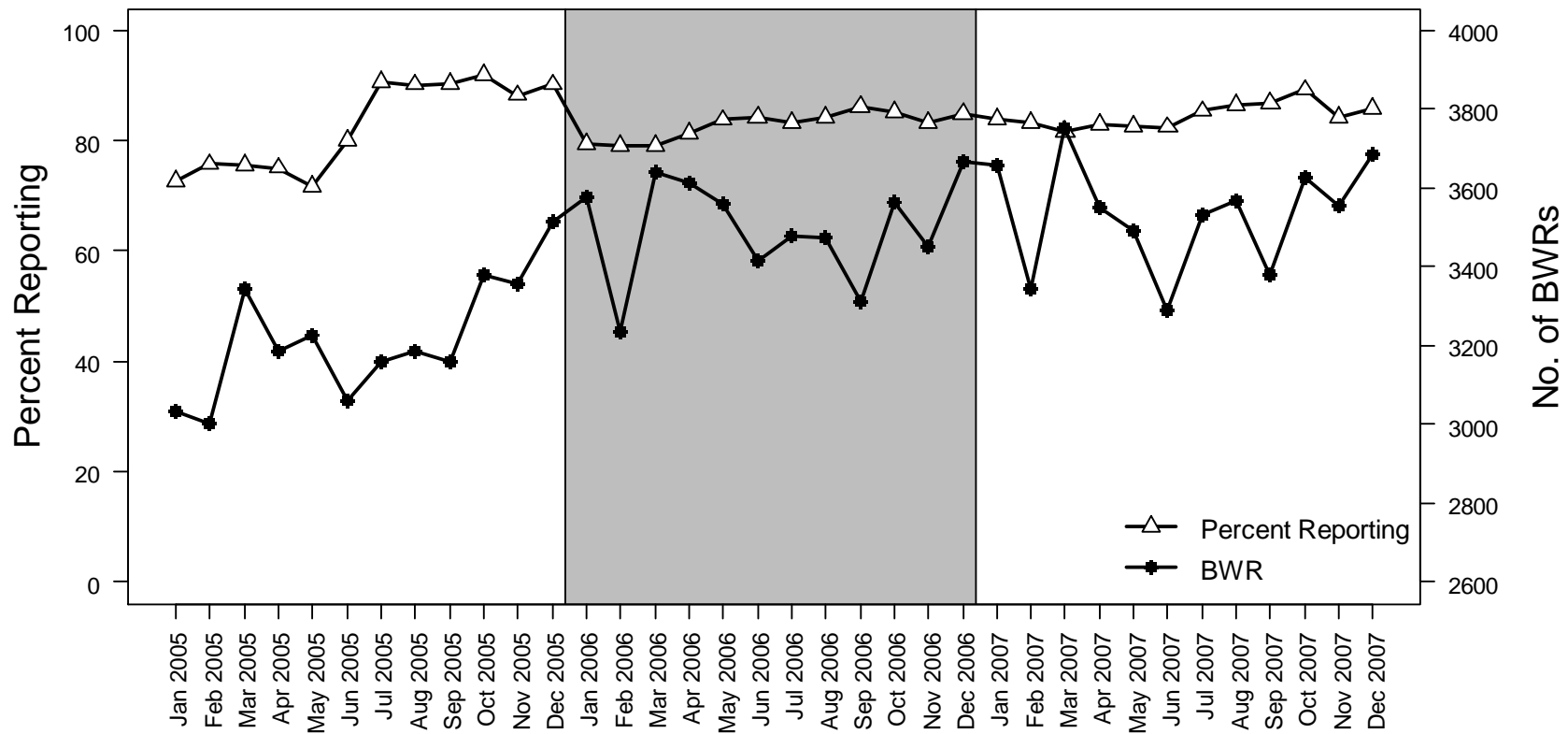


Figure 1. Number of BWRs received by the NBIC (2005-07) from overseas arrivals and percent reporting as compared to the corresponding number of qualifying overseas arrivals, as determined by early notices of arrival received by the NVMC in regions and by ship types that report to both organizations (see Table A-1 for reporting details).

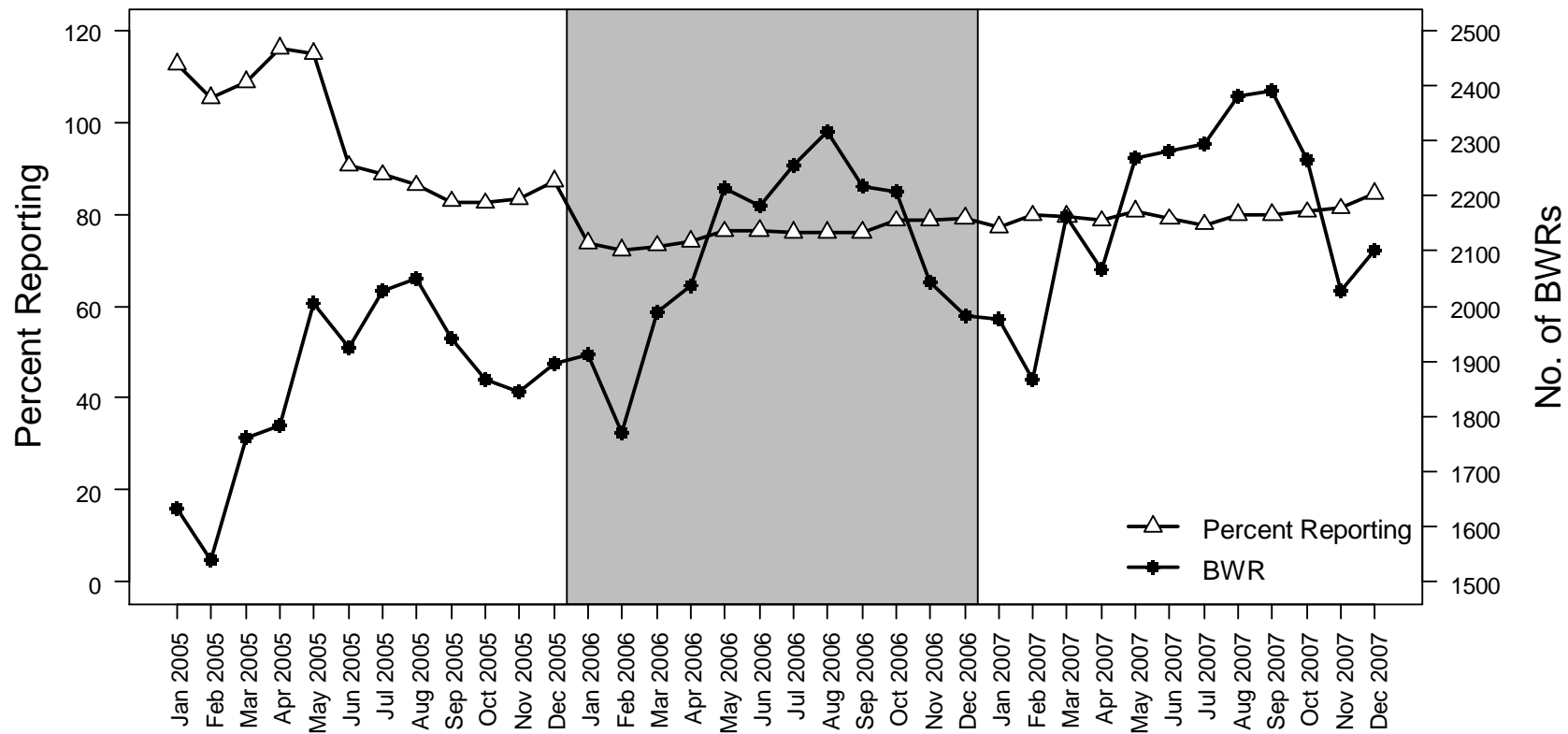


Figure 2. Number of BWRs received by the NBIC (2005-07) from coastwise arrivals and percent reporting as compared to the corresponding number of qualifying coastwise arrivals, as determined by early notices of arrival received by the NVMC in regions and by ship types that report to both organizations (see Table A-1 for reporting details).

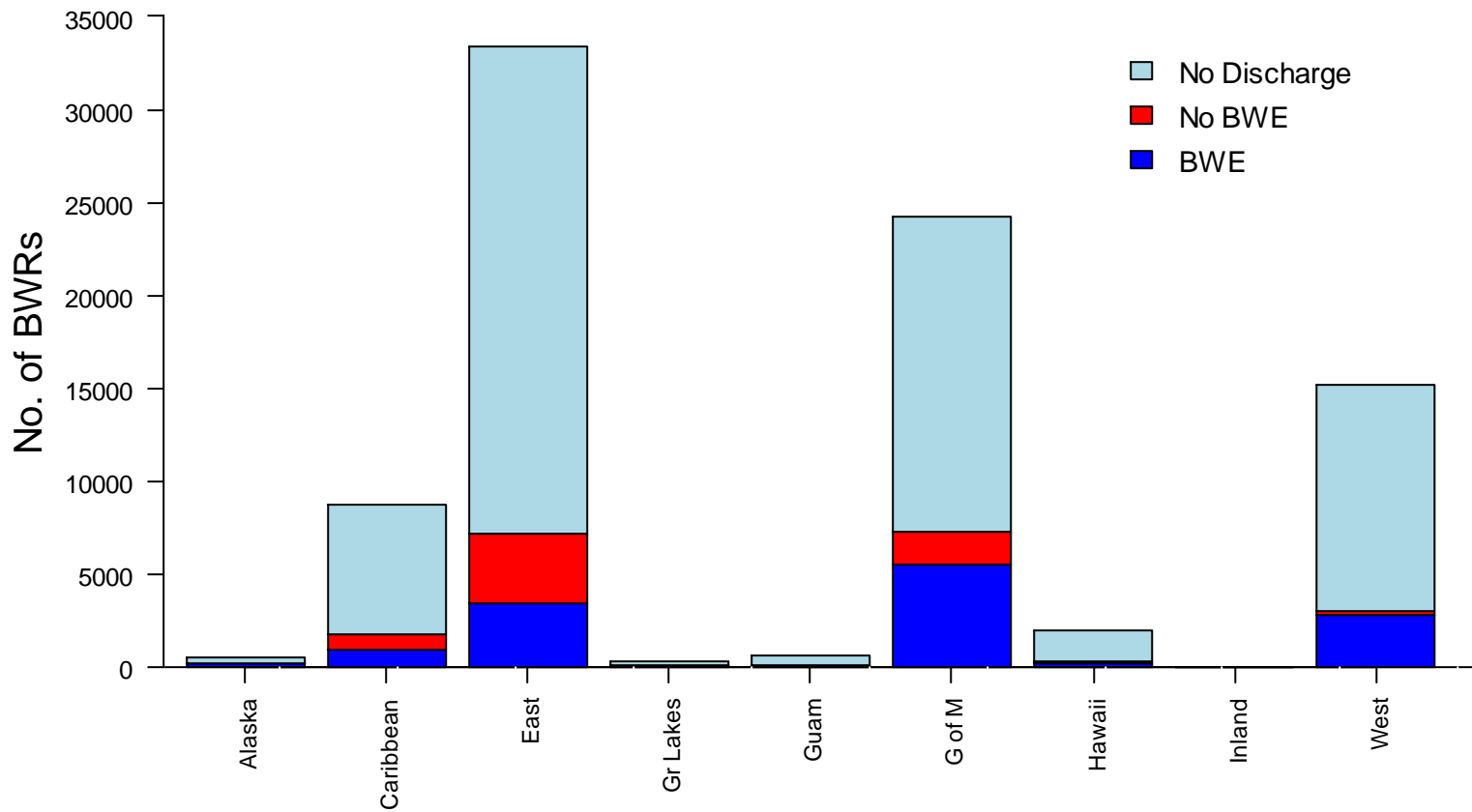


Figure 3. Discharge status of overseas arrivals designated according to number of BWRs received by the NBIC (2006-07) for each coastal region (see Table A-1 for reporting details).

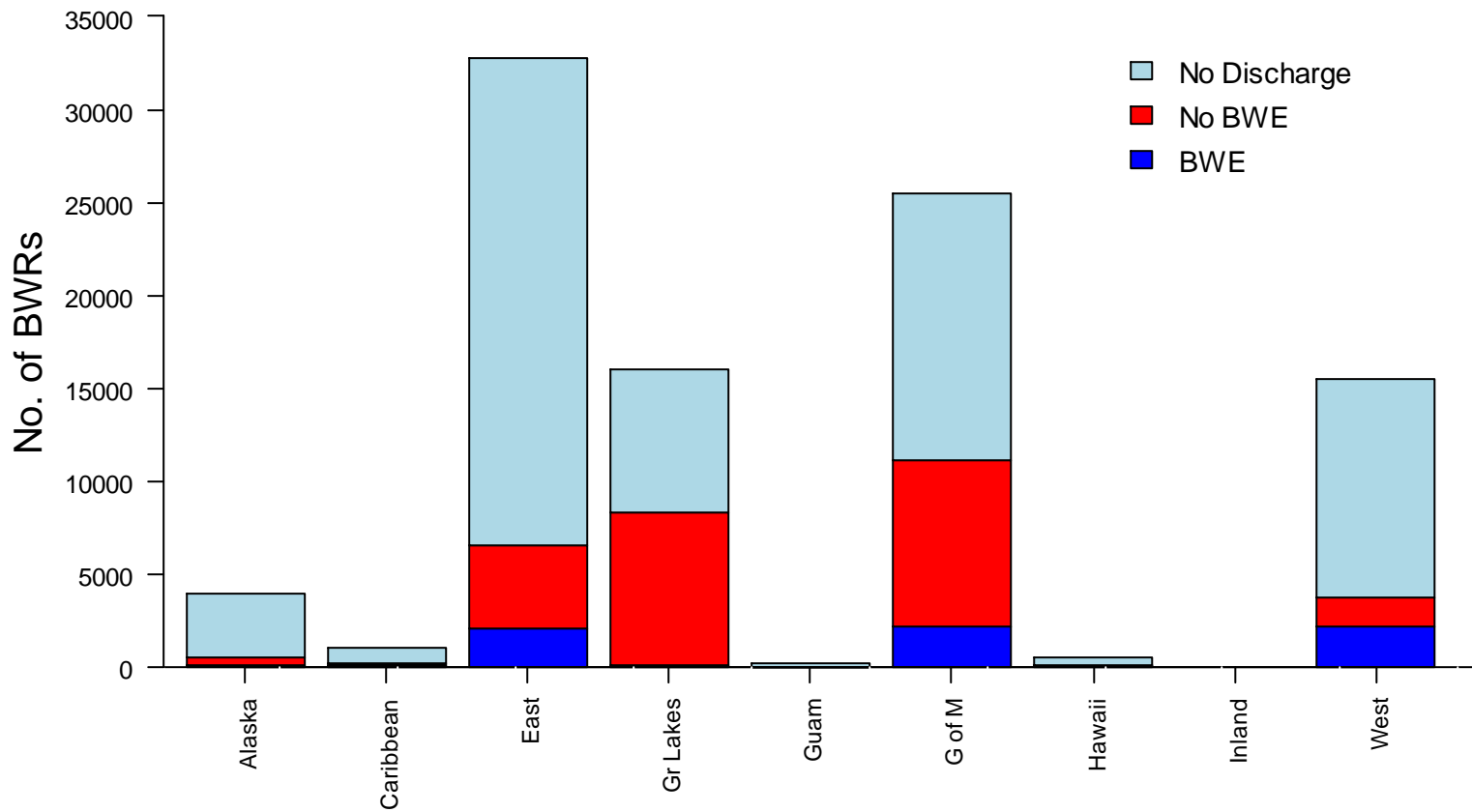


Figure 4. Discharge status of coastwise arrivals designated according to number of BWRs received by the NBIC (2006-07) for each coastal region (see Table A-1 for reporting details).

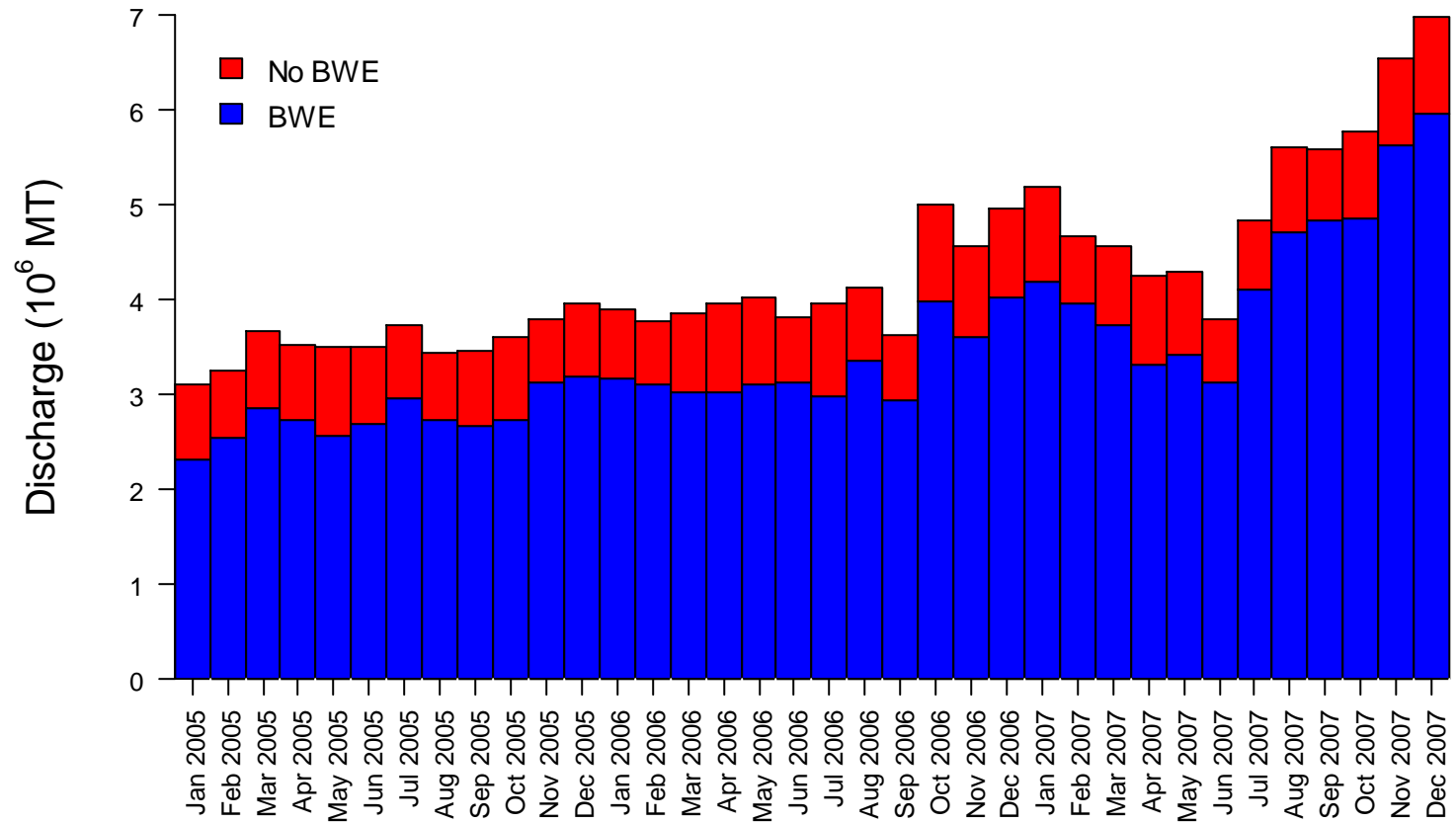


Figure 5. Monthly reported discharge of BW that originated from overseas (2005-07), by exchange status (see Table A-1 for reporting details).

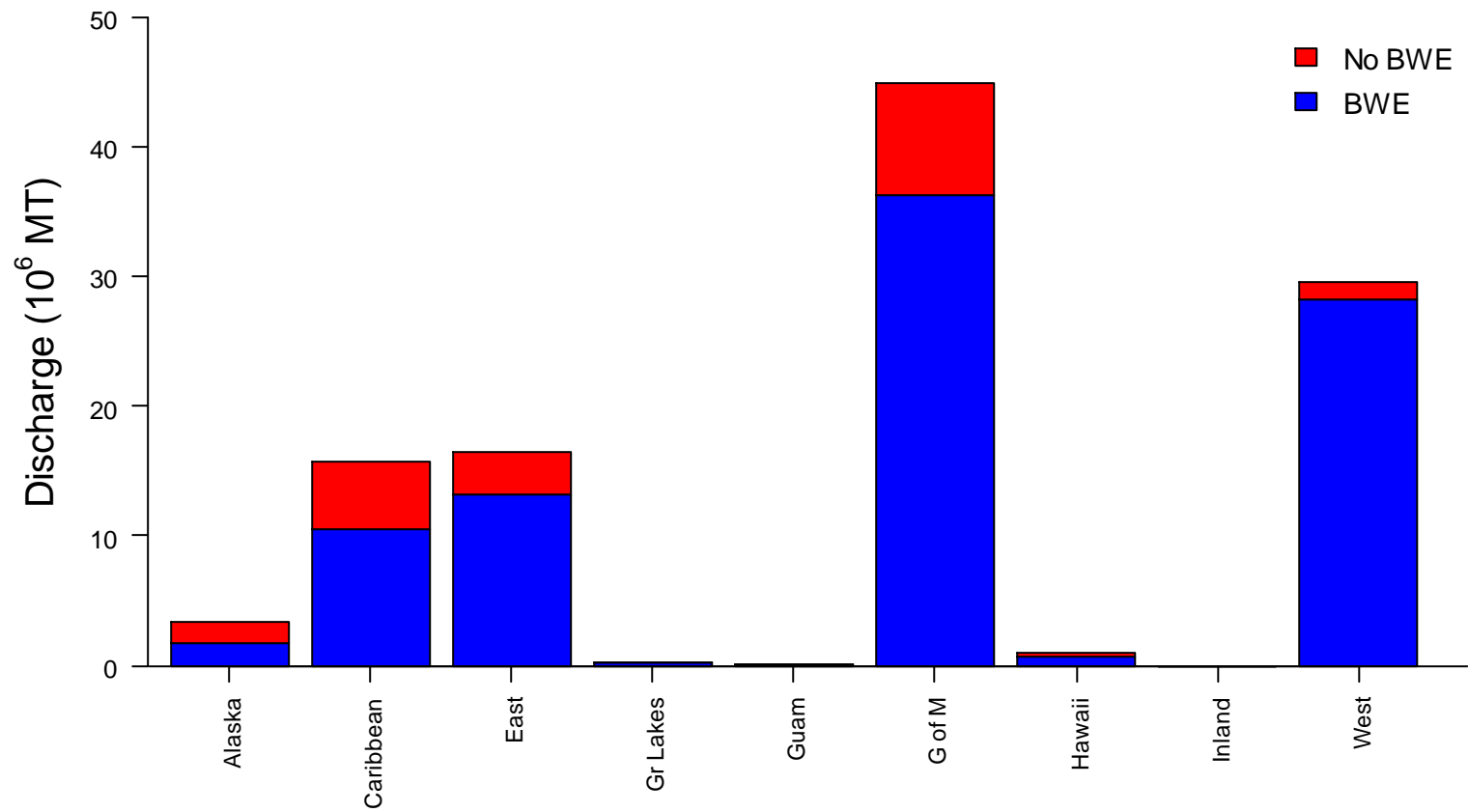


Figure 6. Total reported discharge of BW that originated from overseas (2006-07), by exchange status (see Table A-1 for reporting details).

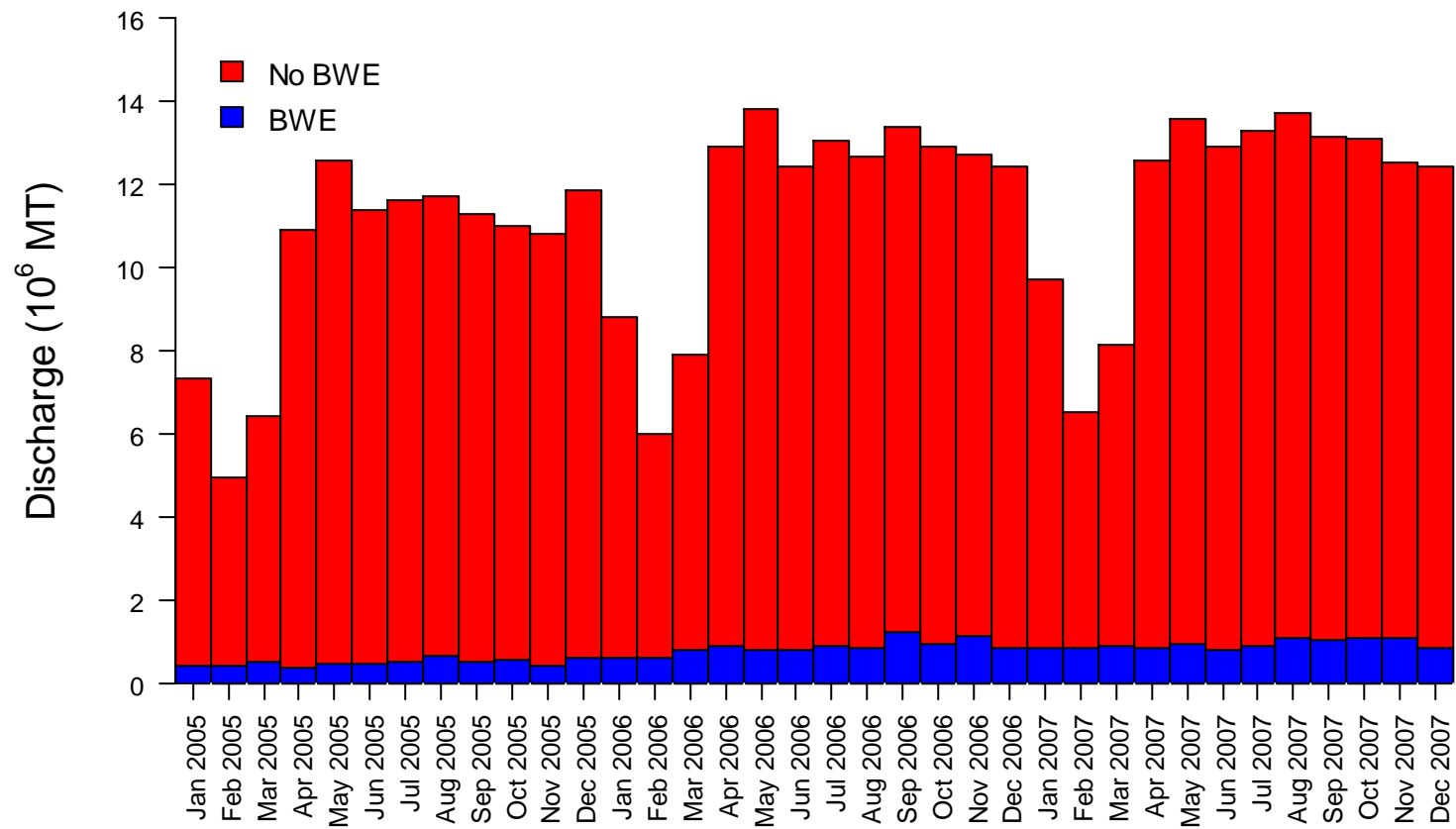


Figure 7. Monthly reported discharge of coastwise BW (2005-07), by exchange status (see Table A-1 for reporting details).

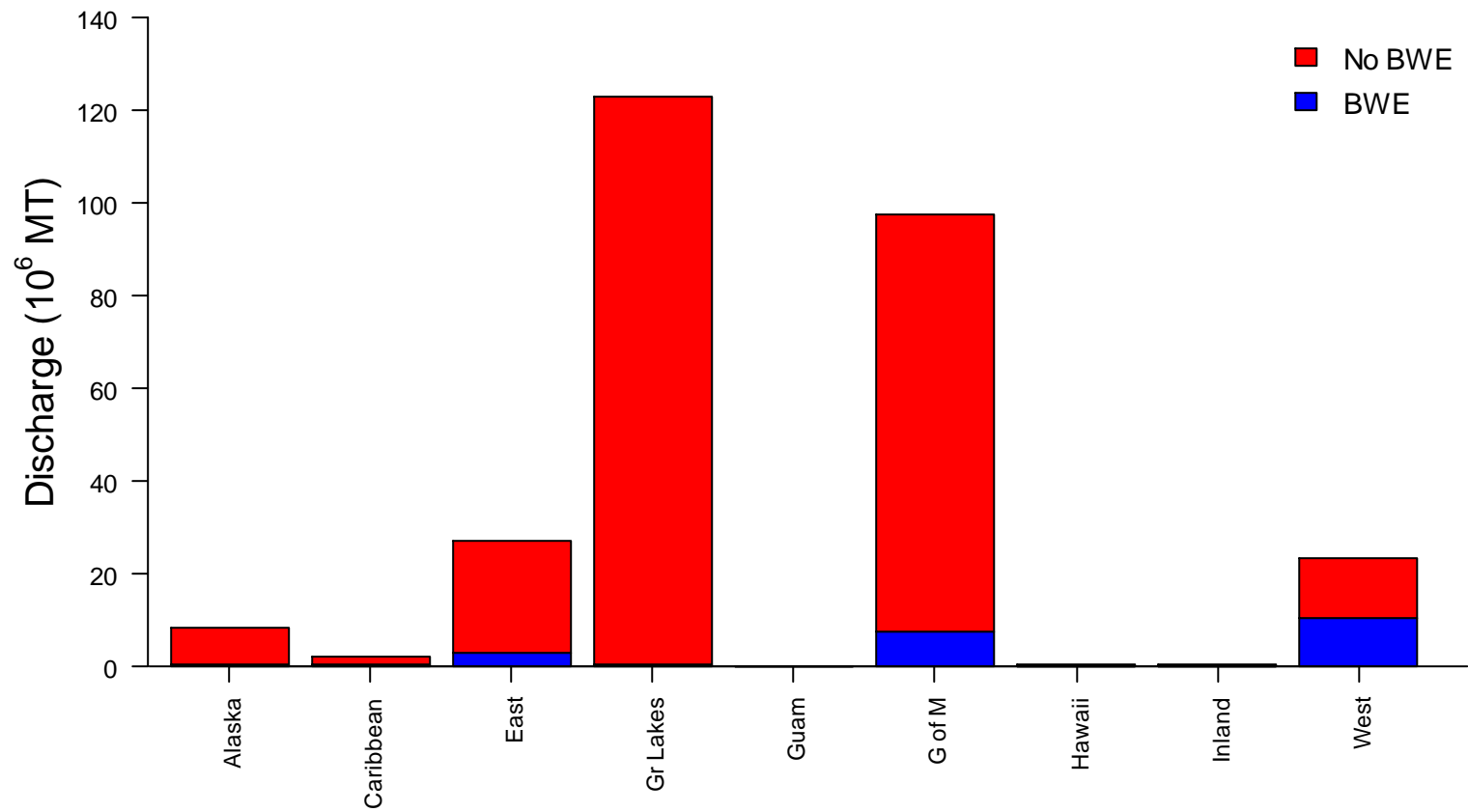


Figure 8. Total reported discharge of coastwise (2006-07), by exchange status (see Table A-1 for reporting details).

Table A-1. Regions and ship classes exempted (**E**) from reporting to the NBIC or NVMC or with incomplete reporting (**I**) to NVMC or NBIC. Exemptions are factored into analyses of reporting compliance (# BWRs) and BW management activities (volumes). Regions or ship classes excluded from analyses for a table or figure are designated by **X**. Vessel classes marked “**not evident**” are not required to report to NVMC, but were not evident in either database and were not explicitly excluded. *Submission of BWRs directly to the NBIC is not required under current regulations.

Region and Vessel Classes	NBIC – Reporting Exemptions	NVMC – Reporting Exemptions	NBIC – BW Analysis (Figs. 3,4,5,6,7,8; Table 1)	Reporting Compliance Analysis (Figs. 1,2; Tables 2,3)	
				NBIC	NVMC
REGIONS					
Alaska					
Caribbean					
East Coast					
Great Lakes (Coastwise)		I		X	X
Great Lakes (Overseas)	*				
Guam and Am. Samoa (Coastwise)		I		X	X
Guam and Am. Samoa (Overseas)					
Gulf of Mexico					
Hawaii					
Inland Rivers and Waterways (Coastwise)		I		X	X
Inland Rivers and Waterways (Overseas)	I	I		X	X
West Coast					
VESSEL CLASSES - OPERATIONS					
Crude oil tankers engaged in coastwise trade	E			X	X
Offshore supply ships		E		X	X
Oil spill recovery ships		E		X	X
Recreational ships		E		X	X
Tugs and barges traveling coastwise		E		X	X
Vessels ≤ 300 GRT		E		X	X
Vessels operating exclusively in a single COTPZ or between MORMS and NEWMS	E	E		X	X
Dept. of Defense and Coast Guard Vessels	E	E		(Not Evident)	(Not Evident)
Public ships		E		(Not Evident)	(Not Evident)
Vessels arriving under force majeure		E		(Not Evident)	(Not Evident)
Total Number of Forms or Arrivals Included			182,457	135,257	166,517