

# THE NATIONAL BALLAST SURVEY



## Introduction

Since ancient times, ballast has provided ships with greater stability and better maneuverability. The addition and removal of materials such as sand, gravel, shale, and water allows a ship to maintain a constant level above water regardless of the amount of cargo is onboard.

Solid ballast was used until the early twentieth century. The shipping industry grew rapidly at this time. Bigger ships were built, and more ballast was needed. Solid ballast, along with plants, animals and microbes, was often taken from the intertidal or shallow areas near berthing areas of the ships. The more ballast a ship contained, the longer it took to load and unload the ship's ballast. An alternative to traditional ballast was needed. Eventually, ships began to use water, which took much less time to unload than sand and gravel, but also carried organisms found in the water.

Unfortunately, the convenience of ballast water was accompanied by potentially negative side effects. Water taken on as ballast contains microbes, plants and animals, including eggs, larvae and juveniles of larger species. These organisms may survive the voyage to the next port of call. When the ballast water is discharged, animals, microbes, and plants that have survived the voyage are discharged into a new environment. The non-native species often arrive without predators or diseases that limit their population. They are able to outcompete indigenous populations and take food and habitat space from native species, devastating native populations. The introduced species can also fill a niche by becoming a predator for a species previously unencumbered by others.

Non-native species can affect both the environment and the economy. Because the new species have the potential to devastate native populations, they can also devastate economies dependent on native species. Diseases introduced by the new species can affect native populations as well as humans. Diseases such as cholera have been known to survive voyages between ports. In order to curb the negative effects that accompany ballast water, more regulations will be needed. One step towards effective regulation of ballast came with the establishment of the National Ballast Survey.

## What is the National Ballast Survey?

The National Ballast Survey (NABS) was created as a result of the 1996 National Invasive Species Act (NISA). NISA called for the United States Coast Guard to work in conjunction with the Smithsonian Environmental Research Center to create a clearinghouse for data concerning ballast water management and exotic

species invasions. NISA also set aside funding for research on invasive species management and prevention and new methods of ballast water treatment.

NISA has established voluntary guidelines for ballast water management practices (including discharge and retention of ballast water) for all ships arriving having a last port of call outside of the Exclusive Economic Zone (EEZ), which consists of all waters within 200 miles of a country and its islands. These guidelines require ships to give detailed information about the management of ballast on board, including the amount of ballast water carried, sources of ballast water, the amount treated, and the amount discharged. This process is meant to gather information that will help to create an accurate picture of ballast water delivery patterns and management practices of ships entering United States ports from outside the EEZ. The National Ballast Survey also keeps track of rates of compliance with the voluntary guidelines, as well as the mandatory guidelines. Measuring the level of compliance with voluntary guidelines helps assess the need for mandatory guidelines.

## What Type of Information does NABS gather about Incoming Ships?

The information gathered by NABS consists of several pieces of core information about each ship. These include last port of call, next port of call, and vessel name. In addition to general information gathered on a ship, specific information about each tank of ballast water onboard is recorded. This information includes the volume of the tank, the method used to treat the ballast water (if any), the source of the water, and the salinity and temperature of the water. For detailed information visit the web site <http://invasions.si.edu/ballast.htm>.

## How Accurate is the NABS data?

Currently, it is mandatory that ships arriving from outside the EEZ submit forms regarding their ballast water management practices. Despite this fact, only 20.8% of the ships arriving in United States ports submitted their ballast water treatment forms during the period beginning July 1, 1999 and ending June 30, 2000 (National Ballast Information Clearinghouse Interim Report [October 2000]). Of these ships, only 21.4% reported any type of at-sea ballast water management, such as the flow-through method or the empty-refill exchange method, two popular types ballast water management. The small percentage of ships cooperating with the voluntary guidelines does not provide an accurate

cross section of the ballast water management activities of ships entering the US. An accurate conclusion regarding foreign species invasion management cannot be provided with the amount of data present.

**What does the NABS data tell us?**

The small amount of data available shows that the majority of the discharge in New England ports comes from bulk carriers (ships designed to carry many types of cargo at one time). Figure 1 shows the amount of ballast discharged into New England ports by each type of ship between July 1, 1999 and March 31, 2001. It is also shown that the majority of ships entering New England ports are tankers (ships designed to carry liquid cargo). Figure 2 shows the distribution of ship types arriving in New England ports between July 1, 1999 and March 31, 2001.

Figure 1. The bar graph shows the volume of ballast discharged by different types of ships arriving in New England between July 1, 1999 and March 31, 2001.

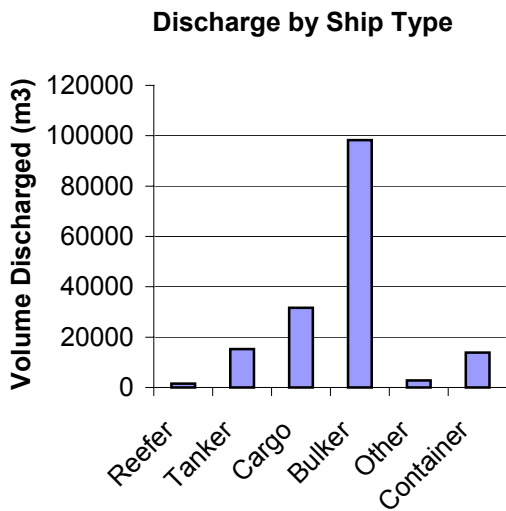
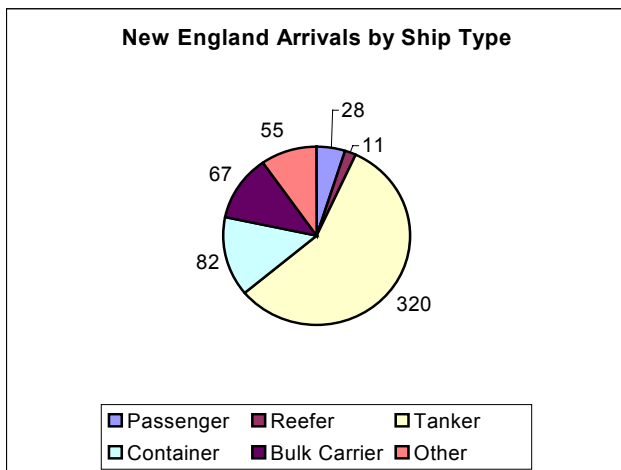


Figure 2. The pie chart shows the relative proportions of ship types (the number of each type is given) arriving in New England ports between July 1, 1999 and March 31, 2001.



The single largest source of ballast water (31.3%) discharged in New England ports is not from a single port of call, but from the Northeast Atlantic Ocean. The second largest source of discharge is Mo I Rana, Norway (18.7%). The rest of the ballast comes from more than 30 separate sources.

The small amount of data present does not provide good news with regards to voluntary ballast water management practices (this, of course, does not include the ships that do not exchange any water. These are automatically in compliance with guidelines). Only one third of the water discharged reported to NABS as having been discharged in New England ports has undergone any sort of at-sea exchange, leaving the majority of the water full of animal and plant life that could potentially invade new ecosystems.

**Conclusions**

Voluntary ballast water treatment is only a small step towards stemming the tide of exotic species invasions. The safety of at-sea ballast water exchange is often more of a concern than the introduction of one more invasive species. Regulations are still being created, and the regulatory process itself is in many aspects still in the development phase. More research on alternative ballast water management technology (such as ultraviolet radiation) and a higher level of compliance with voluntary guidelines will be necessary before any concrete results can be seen in the areas of invasive species management and prevention.

**References and Suggested Further Readings:**

Barrett-O’Leary, Marilyn, 2001. *International Conference On Marine Bioinvasions April 9-11, 2001*. This report contains abstracts from the International Conference on Marine Bioinvasions held in New Orleans, Louisiana.

Carlton, James, Donald Reid and Henry van Leeuwen, 1995. *The Role of Shipping In the Introduction of Nonindigenous Aquatic Organisms to the Coastal Waters of the United States (other than the Great Lakes) and an Analysis of Control Options*. Springfield, VA: National Technical Information Service, 1995.

National Research Council (Committee on Ships' Ballast Operations), 1996. *Stemming the Tide: Controlling Introductions of Nonindigenous Species by Ships' Ballast Water*. Washington, DC: National Academy Press.

Pederson, Judith (ed), 2000. *Marine Bioinvasions: Proceedings of the First National Conference January 24-27, 1999*. Cambridge, MA: Massachusetts Institute of Technology.

This report contains papers presented at the First National Conference on Marine Bioinvasions. The individual papers give information on many different problems concerning aquatic foreign species invasions.

National Research Council, 1996. *Controlling Introductions of Nonindigenous Species by Ships' Ballast Water*. Washington D.C.: National Academy Press.

Ruiz, G.M., A.W. Miller, R.A. Everett, B. Steves, K. Lion, C. Whitcraft, A. Arnwine, E. Colinetti, M. Sigala,

D. Lipski. "National Ballast Information Clearinghouse Interim Report (October 2000)."  
<http://invasions.si.edu/NABS1stAnnualReport.pdf>.

Useful Links:

Waterborne Commerce Statistics Center  
[www.wrsc.usace.army.mil/ndc/wcsc.htm](http://www.wrsc.usace.army.mil/ndc/wcsc.htm)

Smithsonian Environmental Research Center  
[www.serc.si.edu](http://www.serc.si.edu)

United States Coast Guard Survey Results  
<http://www.uscg.mil/hq/g-m/mso/mso4/surveyresults.html>