MINUTE ITEM

This Calendar Item No. 52 was approved as Minute Item No. 52 by the California State Lands Commission by a vote of 3 to 0 at its 2-21-03 meeting.

Minute Item
52

A Statewide

S Statewide

02/21/03
W9777.234
M. Falkner

CALIFORNIA STATE LANDS COMMISSION (PARTY):

Regular Calendar Item 52: Commission listened to staff report on the Ballast Water Program. Commissioners also listened to comments from public. Item was approved as presented.

CALENDAR ITEM
52

A Statewide

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02/21/03
W9777.234
M. Falkner

CONSIDER REPORT TO THE LEGISLATURE ON THE BALLAST WATER MANAGEMENT AND CONTROL PROGRAM

In 1999, the Legislature adopted AB 703, establishing California's ballast water management and control program. Its purpose is to curtail the introduction of nonindigenous species released into State waters with ballast water discharged from vessels arriving from outside the United States Exclusive Economic Zone.

As part of the program, Section 71212 of the Public Resources Code (P.R.C.) requires the California State Lands Commission to submit a report to the Legislature. The report is to include, but not be limited to, all of the following:

(a) A summary of the information provided in ballast water discharge report forms submitted to the Commission, including the volumes of ballast water exchanged, volumes discharged into state waters, types of ballast water treatment, and locations at which ballast water was loaded and discharged;

(b) Monitoring and inspection information collected by the Commission pursuant to this program, including a summary of compliance rates, categorized by geographic area and other groupings as information allows;

(c) An analysis of the monitoring and inspection information, including recommendations for actions to be undertaken to improve the effectiveness of the monitoring and inspection program;

(d) An evaluation of the effectiveness of the measures taken to reduce or eliminate the discharge of nonindigenous species from vessels, including recommendations regarding action that should be taken to improve the effectiveness of those measures; and

(e) A summary of the research completed during the two-year period that precedes the release of the report, and ongoing research, on the release of nonindigenous species by vessels, including, but no limited to, the research under this program.

Attached as Exhibit A is the report prepared by the Commission's Marine Facilities Division in compliance with Public Resources Code Section 71212. The Commission's Staff proposes that the Commission accept the attached report and direct that it be submitted to the Legislature.

STATUTORY AND OTHER REGULATIONS:

A. Public Resources Code Sections 71200 through 71271

PERMIT STREAMLINING ACT:

N/A.

OTHER PERTINENT INFORMATION:

Pursuant to the Commission's delegation of authority and the State CEQA Guidelines (14 Cal. Code Regs. 10561), the Commission Staff has determined that this activity is exempt from the requirements of the CEQA because the activity is not a "project" as defined by the CEQA and the State CEQA Guidelines.

Authority: Public Resources Code Sections 21084 and 14 Cal. Code Regs. 15300.

EXHIBITS:

A. "REPORT ON THE CALIFORNIA BALLAST WATER MANAGEMENT PROGRAM"

IT IS RECOMMENDED THAT THE COMMISSION:

1. FIND THAT THE ACTIVITY IS EXEMPT FROM THE REQUIREMENTS OF CEQA PURSUANT TO TITLE 14, CALIFORNIA CODE OF REGULATIONS, SECTION 15061 BECAUSE THE ACTIVITY IS NOT A PROJECT AS DEFINED BY PUBLIC RESOURCES CODE SECTION 21065 AND TITLE 14, CALIFORNIA CODE OF REGULATIONS, SECTION 15378

2. RECEIVE EXHIBIT A AS THE CALIFORNIA STATE LANDS COMMISSION'S REPORT TO THE LEGISLATURE ON THE STATE'S BALLAST WATER MANAGEMENT PROGRAM.

3. DIRECT STAFF TO SUBMIT THE REPORT ATTACHED AS EXHIBIT A TO THE LEGISLATURE IN COMPLIANCE WITH SECTION 71212 OF THE PUBLIC RESOURCES CODE.

REPORT ON THE

CALIFORNIA BALLAST WATER MANAGEMENT PROGRAM

Produced for the
California State Legislature

By
Maurya B. Falkner
California State Lands Commission
Marine Facilities Division

February 2003

000261
CALENDAR PAGE

000283
MINUTE PAGE

EXECUTIVE SUMMARY

AB 703 established the California Ballast Water Management for Control of Nonindigenous Species Act during the 1999 legislative session to address the introduction of nonindigenous aquatic species. This report summarizes the ballast water management activities in California during the first 2.5 years of the Program (January 2000 through June 2002) and makes recommendations for amendments to the Act based on the effectiveness of the State's program.

The introduction of nonindigenous aquatic species (NAS) into coastal marine and estuarine waters comes from a variety of sources. One of the most widespread mechanisms by which NAS introductions occur is through transport of ballast water in ships. Ballast water is taken on and released by a vessel during loading and unloading operations, to maintain trim and stability. This ballast water includes many species not native to the arrival port. Ships discharge their ballast water in U.S. ports that was obtained from all over the world, including many ports with untreated sewage and other contaminants.

The California Ballast Water Management and Control Program requires all vessels calling on ports or places in California after operating outside the U.S. Exclusive Economic Zone, to manage their ballast water and report those management activities to the California State Lands Commission (CSLC).

The statewide compliance with ballast water reporting was 92% for the period 1 January 2000 to 30 June 2002. Of the vessels reporting, 96% indicated that they complied with the mandatory management requirements, either through retaining ballast water on board or by exchanging ballast water prior to discharge. Approximately, 20.5 million metric tons (MT) of discharged ballast water was reported statewide. Of this total, 16.9 million MT (83%) was reported to have undergone some exchange, and 3.5 million MT (17%) was reported unexchanged. CSLC Inspectors conducted 3884 vessel inspections on 2019 different vessels. The majority of those vessels inspected were

found to comply with the Act. Funding for the Program is through the assessment of a fee for each qualifying voyage, which is collected by the Board of Equalization (BOE). Compliance with fee submission currently exceeds 95%.

RECOMMENDATIONS FOR FUTURE ACTIONS

1. *Continue the State's mandatory program through legislative reauthorization.* The success of the California Ballast Water Management Program as evidenced by high compliance with filing the ballast water reporting form (92%), submittal of the required fee (>95%), low occurrence of vessels discharging unexchanged ballast water (5%) and the uncertainty over a timeline for the development of a federal mandatory ballast water management program strongly suggest the continuation of California's mandatory ballast water program.

2. *Broaden the State's program to include coastwise (i.e., domestic) traffic.* The transfer of ballast water from domestic sources is an important issue in California and can lead to unwanted biological invasions through the discharges of large volumes of ballast water at ports throughout the state. Coastal traffic should be included under the State's program incorporating report form and fee submission, ballast water management requirements, alternative treatment, civil penalties and liabilities. Some adjustments will be necessary regarding ballast water management requirements for these vessels and is being addressed at the regional level by the Pacific Ballast Water Group (PBWG), of which CSLC is a member. CSLC should continue to work with the PBWG on development of a consistent regional management program for coastal traffic.

3. *Broaden the ballast water reporting requirements to include reporting for each port of arrival.* Under the current law, qualifying vessels are required to submit a form before they leave their first port of call in California. Information on the form should include any expected discharges at additional port calls in the State.

Extending the ballast water reporting requirement to include all ports of call, will improve the overall data quality and address important gaps in the current program.

4. *Remove selected exemptions listed under Section 71202.* The following exemptions currently allowed under the law should be removed: a) Crude oil tankers engaged in TAPS trade – there is no biological basis for exempting these vessels from the Act; b) passenger vessels equipped with functional treatment systems – vessel type should not influence legislative requirements on ballast water management, furthermore due to the uncertainties associated with existing treatment technologies, regulatory oversight is required; and c) vessels that discharge ballast water or sediments only at the location where the ballast water or sediments originated – due to the variable voyage routing of the worldwide fleet and the less than 100% efficacy of mid-ocean exchange, vessels operating in California waters are not able to meet the conditions for this exemption. Removal of these exemptions will further improve the overall data quality and reduce the confusion among the maritime industry regarding who should report.

5. *Improve the accuracy of ballast water reporting data.* It has been noted by the staff of the CSLC, the Smithsonian Environmental Research Center (SERC), and Oregon's Ballast Water Program, that data submitted on report forms are highly variable with regards to completeness and accuracy. CSLC staff should work with the U.S. Coast Guard (USCG) and other West Coast states regarding changes to the current reporting form. CSLC has established a dialogue with the state of Oregon and the USCG regarding changes to and simplification of the required ballast water reporting form. CSLC should review and adopt changes proposed by these groups. Additionally, efforts in the areas of education and outreach should be expanded. Working with the USCG, instructions on how to correctly fill out the form should be developed and include descriptions of common errors and how to avoid them. Formal training of CSLC staff, port staff, ship agents, operators, and crew should be developed.

6. *Continue the "fee-based" program to fund the State's Exotic Species Control Fund.* The State's fee-based program has been cited as an important reason for the success of the Program (Vinograd & Sytsma, 2002; Ruiz et al., 2001). The Fund provides resources to enforce the Act, track vessel activity, manage ballast water, conduct biological surveys, and evaluate alternative treatment technologies.

7. *Utilize enforcement components to improve compliance.* Although the California program is often cited by other State and Federal agencies as highly successful, violations of the law continue. Recurring problems include: lack of report form submission (~10% monthly), late filing of report forms (~10% monthly), inaccurate or incomplete filing of report forms (~5% monthly), no management plan on board, and the discharge of unexchanged ballast water (5%). Although it is expected that the adoption of the aforementioned recommendations will improve compliance, enforcement action should be taken as required. Additionally, language providing the CSLC with enforcement authority should be included in any reauthorization bill.

8. Expand and coordinate research efforts with other Federal and State agencies. Research should be clearly specified in any reauthorization bill. Wherever possible the California program should work with other West Coast states, the Federal government and the international community to standardize ballast water management programs.

9. *Establish interim and final ballast water treatment technology performance standards.* It has been argued that identifying a solution to ballast water mediated NAS introductions is hampered by the lack of a standard for treatment technology. A timeline for developing regulations on treatment technology standards should be developed through legislation.

10. Support research promoting technology development. Working with federal regulators, technology developers and the maritime industry, California can

significantly advance technology development, through the establishment of a Test and Evaluation Center.

11. Continue biological surveys to monitor the success of the program.
Monitoring of NAS in receiving waters is required to evaluate the efficacy of the state law at reducing the rate of introductions through ship-mediated vectors. Utilizing available data, a long-term coastwise biological monitoring program should be developed. Requirements for reporting the results of the monitoring program should be included in the reauthorization bill.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i
RECOMMENDATIONS FOR FUTURE ACTIONS ii
LIST OF FIGURES AND TABLES vii
ABBREVIATIONS viii
PURPOSE OF REPORT 1
INTRODUCTION AND BACKGROUND 2
Impacts of Nonindigenous Aquatic Species 3
Ballast Water Management Options 5
Ballast Water Regulations 7
PROGRAM RESULTS 10
ASSESSING COMPLIANCE VIA BALLAST WATER REPORTING FORM 10
Compliance with Ballast Water Reporting Requirements 11
1. Statewide Vessel Traffic. 11
2. Statewide Compliance 12
3. Port Zone Compliance 12
Compliance with Mandatory Ballast Water Management Requirements 13
1. Statewide Management Compliance 14
2. Port Zone Management Compliance 14
Compliance Based on Percent Exchange by Volume 15
Statewide Compliance 15
VERIFYING COMPLIANCE THROUGH INSPECTIONS 15
FEE SUBMISSION 16
SUMMARY OF COLLABORATIVE RESEARCH 17
RESEARCH ON ALTERNATIVE TREATMENT TECHNOLOGY 18
WEST COAST DEMONSTRATION PROJECT 22
Sea Princess Project 23
R. J. Pfeiffer Project 24
ADVANCED APPROVAL PROGRAM 26
OUTREACH AND EDUCATION 26
RESEARCH NEEDS 27
CONCLUSIONS 29
REFERENCES 34
FIGURES AND TABLES 38
APPENDIX A 55
APPENDIX B 67
APPENDIX C 71
APPENDIX D 73

LIST OF FIGURES AND TABLES

Figure 1. Local Port Zone designations in California

Figure 2. Qualifying Voyage arrival designations for ships calling on ports in California.

Figure 3. Qualifying Voyage arrivals by California port

Figure 4. Vessels calling on California ports by type between 1 January 2000 and 30 June 2002

Figure 5. Statewide monthly reporting rates by foreign arrival from January 2000 to June 2002

Figure 6. Ballast water discharge intention of vessels entering California ports as reported to CSLC from 1 January 2000 to 30 June 2002

Figure 7. Ballast Water Inspection Data Sheet

Figure 8. Marine Facilities Division Inspection Report

Table 1. Average ballast water capacity of various types of ships based on ballast water reporting forms submitted to CSLC

Table 2. Compliance with mandatory ballast water reporting requirements, by Port Zone

Table 3. Reported ballast water management practices by Port Zone and Year

Table 4. Compliance with mandatory management of ballast water from January 2000 through June 2002

Table 5. Reported ballast water discharge amounts in metric tons (MT) by Port Zone and Vessel Type for the period 1 January 2000 to 30 June 2002

Table 6. Ballast water inspections conducted by Port Zone

Table 7. Program budget by agency

Table 8. Fee data for the Ballast Water Management Fee Program for the period 1 January 2000 to 30 June 2002

000258
CALENDAR PAGE

000290
MINUTE PAGE

ABBREVIATIONS

Act	Ballast Water Management for Control of Nonindigenous Species Act
BOE	Board of Equalization
CAPA	California Association of Port Authorities
CDFG	California Department of Fish and Game
CSLC	California State Lands Commission
EEZ	U.S. Exclusive Economic Zone
EPA	U.S. Environmental Protection Agency
IMO	United Nation's International Maritime Organization
LA-LB	Los Angeles-Long Beach Port Complex
MT	Metric tons
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act
NAS	Nonindigenous aquatic species
NISA	National Invasive Species Act
PBWG	Pacific Ballast Water Group
SERC	Smithsonian Environmental Research Center
SWRCB	State Water Resources Control Board
TAG	Technical Advisory Group
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
UV	Ultraviolet irradiation

PURPOSE OF REPORT

This report documents the efficacy of the first 2.5 years of the California Ballast Water Management for Control of Nonindigenous Species Act (Act), which was established by Assembly Bill 703 (Chapter 849 of the Statutes of 1999) (Appendix A). California Ballast Water Management Program was initiated to address the introduction of nonindigenous species via discharge of ballast water from ships. The Program reflects the Legislature's recognition of the potential of nonindigenous species to cause economic and environmental damage to the State.

The Act applies to all U.S. and foreign vessels that enter California water after operating outside the U.S. Exclusive Economic Zone (EEZ). Vessels are prohibited from discharging ballast water into State waters unless the master, operator or person in charge has carried out a mid-ocean ballast water exchange procedure, or is using an environmentally sound alternative shipboard treatment technology approved by the California State Lands Commission (CSLC). Qualifying vessels must report the time and place ballast water was taken on and released during the voyage. Ballast water management procedures must be reported to the CSLC prior to departing the first port of call in California. Ballast water reporting forms required by CSLC are the same as the forms used by the US Coast Guard (USCG) (Appendix C). Qualifying vessels are also subject to monitoring and inspection by CSLC.

The Legislature, sensitive to the uncertainties surrounding the development of an effective ballast water management program for the State, included a sunset date of January 1, 2004 in the Act. The Act required the responsible agencies to prepare reports that summarize their activities and provide recommendations to the Legislature to improve the effectiveness of the State's Act. Agency reports are due to the Legislature in advance of the sunset date, providing the Legislature with the best available information with which to craft California's ballast water management program.

The CSLC report summarizes ballast water management activities in California during the first 2.5 years of the Program (January 2000 through June 2002) and makes recommendations for amendments to the Act based upon compliance of the shipping industry with the Act, advances in ballast treatment technologies and the effectiveness of mid-ocean exchange, the prospects for development of a national mandatory ballast water management program, and the ballast water management efforts of other West Coast states and provinces.

INTRODUCTION AND BACKGROUND

Nonindigenous aquatic species (also known as introduced, invasive, exotic, alien or aquatic nuisance species) are defined as "any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organisms transferred from one country into another" (Stemming the Tide, 1996). The introduction of nonindigenous aquatic species (NAS) into coastal marine and estuarine waters comes from a variety of sources, including aquaculture activities, aquarium trade, public aquaria, release by individuals, commercial, military, and recreational vessels, research institutions, and seafood commodity distribution (Elston, 1997). One of the most widespread mechanisms by which NAS introductions occur is through transport of ballast water in ships. Ballasting performs many functions including: reducing transverse stresses on the hull; providing for stability; aiding propulsion and maneuverability by controlling the submergence of the propeller and rudder and reducing the amount of exposed hull surface; and, compensating for weight lost from fuel and water consumption (Stemming the Tide, 1996).

Ballast water, necessary for ship safety, is usually taken on at the departure port and discharged into the arrival port. When ships unload cargo, they need to counteract the weight imbalance for the ship to travel safely. When ships load cargo, they subsequently discharge this water. Ballast is generally carried in a variety of different compartments. These tanks are usually designated ballast tanks, although some

vessels use their cargo holds to carry ballast. Tank and total volumes of ballast water depends on the design and type of ship (Table 1).

Impacts of Nonindigenous Aquatic Species

Ballast water includes many species non-native to the arrival port. Ships discharge in U.S. ports, their ballast water that was obtained from all over the world, including many ports with untreated sewage and other contaminants. A recent study conducted on oil tankers arriving in Prince William Sound, Alaska found an average of 12,637 total organisms per cubic meter in the 169 vessels that were surveyed (Hines et al., 2000).

The risk of introduction of NAS has significantly increased in recent times because vessels are faster and carry a tremendous amount of ballast water relative to ships just a few decades ago (EPA, 2002). For example, in the Great Lakes there were 90 known introductions during the 150 years between 1810 and 1959. In only 30 years between 1960 and 1990, there were 43 known introductions (Mills et al., 1993). This pattern is mirrored in the San Francisco Bay Estuary, where research indicates that prior to 1960 one new species became established about every 55 weeks. Since 1960, this has increased to one every 14 weeks (Cohen & Carlton, 1998). Once introduced, invasive species are likely to become a permanent part of an ecosystem that can cause ongoing economic and environmental impacts.

The freshwater zebra mussel (*Dreissena polymorpha*), probably the best-known NAS is native to the Black Sea in southeastern Europe and was accidentally introduced to the Great Lakes in the 1980's via ballast water. It is now estimated to have infested over 50% of U.S. freshwater waterways. The mussels clog water systems, foul boat hulls, and accumulate in immense numbers on recreational beaches. Economic impacts to the Great Lakes primarily associated with physically clearing the mussels from power stations and other industrial cooling water pipes is $5 billion annually (Pimentel et al., 1999). Of equal concern is the deleterious effect that the population explosion of the zebra mussel has had on the ecology of the Great Lakes, impacting numerous native species.

An example of a West Coast invader is the Asian clam (*Potamocorbula amurensi*). The Asian clam was probably introduced via ballast water from Southeast Asia at the beginning of the 20th century, and is now found in 36 of the continental states. It was first identified in San Francisco Bay in 1986 and took only two years to spread throughout the bay forming a monoculture and displacing the former biological community. Like the zebra mussel, the Asian clam is extremely efficient at filtering nutrients out of the water and therefore affects habitat nutrient dynamics. Few studies have been done on the ecological impacts of the Asian clam, however it is suspected of causing the collapse of some fisheries in the area (Carlton et al., 1990). Additionally, there has been considerable economic impact due to fouling of raw water systems, particularly power stations. The annual cost for control and repair efforts resulting from the Asian clam at these stations has been estimated at approximately $1 billion (Isom, 1986).

Introduction of marine species via ballast water is also of concern to the aquaculture industry. Aquaculture is the practice of raising aquatic organisms, such as clams, oysters, mussels, trout, salmon, etc. rather than harvesting them in their natural state. California and Washington states have a combined total aquaculture production of over $100 million annually. Mollusks account for nearly $33 million, while fishes and algae accounted for the remainder (USDA, 2000). The NAS, European green crab (*Carcinus maenas*) first identified on the East Coast in the early 1800's, now ranges up the entire West Coast of the United States. This species preys on native crabs, clams, and small oysters, causing considerable damage to commercial shellfish beds. The economic impact nationwide is estimated to be $44 million annually (Lafferty and Kuris, 1996).

Ballast water has been documented to contain a number of pathogens causing economic impacts and public health concerns. In 1991, a strain of *Vibrio cholera* was found in the ballast water of three ships near Mobile, Alabama. Sometime thereafter, the bacterium was found in local oysters (McCarthy and Khambaty, 1994). A recent study of ballast water from vessel visiting the Chesapeake Bay showed *V. cholera* in planktonic samples collected from all ships (Ruiz et al., 2000). Ballast water and

sediments can harbor toxic dinoflagellates (microscopic algae), which cause paralytic shellfish poisoning (Hallegraeff, 1998).

Modern vessels transport NAS not only in their ballast water, but also on their hulls, sea chests, chains, propellers, and the like. Though ballast water is generally considered the most widespread mechanism by which ships transport NAS, the importance of hull fouling is being considered of equal importance to ballast water. One example was the introduction, into the San Francisco Bay Estuary, of the shipworm, *Teredo navalis*. This species entered San Francisco Bay attached to the wooden hull of a ship in the early 20th Century. Within 3 years the worm caused an estimated $615 million (in 1992 dollars) of structural damage to maritime facilities, and current costs to control this worm is estimated at $220 million per year (Cohen & Carlton, 1995). At the recent 11th International Congress on Marine Corrosion and Biofouling held in San Diego (CQD Journal 2002), researchers are finding that hull fouling may represent a similar or perhaps worst threat of NAS, though all agreed that more research is needed on this pressing problem.

Though modern steel hulled ships are less susceptible to boring organisms than wooden hulled ships, the phase-out of highly toxic anti-fouling paints is expected to result in an increase in hull fouling. Slow moving vessels and floating dry docks are particularly susceptible to hull fouling (Godwin, 2002).

For some ship-mediated invasions, it is difficult to determine whether they occurred as a result of ballast water discharges or hull fouling. Often these invasions are by benthic invertebrates that have a planktonic larval stage (Stemming the Tide, 1996). Unfortunately, little work has been conducted that addresses the diversity or survivability of organisms on the hulls of modern vessels.

Ballast Water Management Options

Because of the difficulty in controlling NAS once established, the best and most cost-effective method of addressing the problem of invasive species is to prevent new

introductions. Currently, the mostly commonly used tool for ballast water management is mid-ocean ballast water exchange. The intent of mid-ocean exchange is to replace water taken on in near shore environments with mid-ocean water. Mid-ocean ballast water exchange is currently the most utilized management method because most vessels can conduct an exchange without vessel retrofitting. Ballast water exchange is also relatively inexpensive and can be done while the vessel is underway (URS Corporation/Dames and Moore, 2000). However, ballast water exchange can result in dangerous vessel instability, putting the safety of the vessel and crew at risk (Stemming the Tide, 1996). Additionally, the efficacy of exchange in reducing the risk of NAS introductions is limited by a number of physical and biological factors including: ship construction and operation; tolerance of organisms; and ecological concerns. In one study (Ruiz et al., 1998), the efficacy of flow-through ballast water exchange was highly variable, with data suggesting that 70 – 90% of coastal plankton were removed through exchange compared to control tanks.

Additional complications arise when ballast exchange is used as a management tool for coastal traffic. There are concerns that exchanging ballast within 200 nautical miles of the coastline could inoculate the coastline with aquatic nuisance species. Additionally, some ships are unable to undergo a complete exchange during the short voyage time common of coastal voyages (e.g. vessels traveling from San Francisco to Columbia River ports). Therefore, most experts view ballast water exchange as a short-term solution until effective alternative treatment technologies are identified.

Effective shipboard treatment technologies to remove or inactivate potentially harmful NAS are under development. However, the development of effective technologies faces a challenging problem. Treatment technologies must address a variety of water quality parameters, vessel operational conditions, and species. Development of effective treatment technology is further complicated by the variability of ships, shipping routes and ports. The identification of a single treatment technology for all species, ships, and port conditions is unlikely. Rather a suite of treatment technologies will undoubtedly need to be developed to treat ballast water (discussed later). Currently,

not enough conclusive information is available to recommend any single treatment option or a combination of treatment options for certification in California.

The final option is the discharge of ballast water to shore-based treatment facilities or barges that can subsequently transfer ballast water to the shore-based facility. Unfortunately, these shore-based treatment facilities are not currently available. A conceptual study sponsored by the California Association of Port Authorities (CAPA) suggested that although technically feasible, due to the developmental infancy of treatment options, shore-based treatment of ballast water carried significant investment costs (URS Corporation/Dames & Moore, 2000). More detailed, port-specific or vessel-specific studies are needed. The San Francisco Estuary Institute, the City and County of San Francisco, and the East Bay Municipal Utility District in Oakland are continuing to study this option. Shore-based systems could be considered for smaller terminals, those with limited, but dedicated vessel calls, and as an option for older vessels nearing the end of their service life.

Ballast Water Regulations

Shipping is an international industry regulated by a variety of governmental organizations. At the international level, the United Nation's International Maritime Organization (IMO) adopted Resolution (50) 31 "International Guidelines for Preventing the Introduction of Unwanted Aquatic Organisms and Pathogens from Ships' Ballast Water and Sediment Discharges" in November 1993. The Resolution recommends the exchange of coastal ballast water in water at least 2,000 meters deep, along with other operational procedures related to the uptake and discharge of ballast water and sediment (IMO, 1991). In 1989, the Canadian Coast Guard adopted "Voluntary Guidelines for the Control of Ballast Water Discharges from Ships Proceeding via the St. Lawrence Seaway to the Great Lakes", which recommends vessels bound for ports along the St. Lawrence Seaway, and in the Great Lakes exchange their ballast at sea. New Zealand has had voluntary guidelines in place since 1992, while Australia adopted mandatory ballast water management rules in July 2001.

At the national level, the United States, after the discovery of the zebra mussel in the Great Lakes, passed the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) of 1990. The Act set voluntary ballast water guidelines, which became mandatory in 1993 for vessels arriving from oversea ports and entering the Great Lakes. In 1994, the mandatory regulations were extended to the upper Hudson River (Federal Register, 1993).

Congress expanded NANPCA in 1996 and passed the National Invasive Species Act (NISA), which set voluntary ballast water management guidelines and mandatory ballast water reporting requirements for vessels entering the U.S. after operating outside the EEZ (Federal Register, 1998). NISA required the USCG report to Congress on the effectiveness of the program. The USCG submitted a report to Congress in June 2002 that assessed the effectiveness of the voluntary guidelines and mandatory reporting in preventing the introduction and spread of NAS in U.S. waters. This report documents a low nationwide compliance with the mandatory reporting requirements and the voluntary management guidelines (Ruiz et al., 2001).

Recognizing the threat of new invasions from ballast water and the absence of a mandatory national ballast water management program, the California State Legislature passed Assembly Bill 703 during the 1999 regular session, to regulate ballast water discharges. On October 8, 1999, the Governor signed the bill, creating the Ballast Water Management for Control of Nonindigenous Species Act (Act), which became effective on January 1, 2000. The Act was modeled loosely on the USCG program. The Act established a statewide multi-agency program with the intent to control the introduction and spread of NAS in the waters of the State. Responsible agencies identified in the Act include the CSLC, California Department of Fish and Game (CDFG), State Water Resources Control Board (SWRCB), and the Board of Equalization (BOE). Each agency is required to work in cooperation with the others in developing reports and conducting research into the extent of current invasions, and potential long-term solutions to the problem of NAS introductions (Appendix A).

The Act applies to all U.S. and foreign vessels that enter California waters after operating outside the EEZ. Unlike the federal law, the California Act prohibits vessels from discharging ballast water into State waters unless the master, operator or person in charge has carried out a mid-ocean ballast water exchange procedure or is using an environmentally sound alternative shipboard treatment technology approved by the California State Lands Commission. Vessels also have the option of discharging ballast water to an approved shore based treatment facility.

The Act only applies to those vessels that enter California waters after operating outside the EEZ, ignoring the importance that coastal shipping plays in transporting NAS. Coastal shipping has been linked to the spread of NAS within the region. Examples include the transport of the Asian copepod (*Pseudodiaptomus inopinus*) and Japanese eelgrass (*Zostera japonica*) in ballast waters from the Columbia River and from Pacific Northwest bays to San Francisco Bay (Cohen & Carlton, 1995). Similarly, coastal shipping may transport introduced NAS now found in San Francisco Estuary to other ports along the west coast. Coastal port-to-port exchange of ballast water may increase the potential for NAS establishment because of the similar conditions (salinity, temperature) found among West Coast ports.

Recognizing the risk of port-to-port NAS introductions, Washington and Oregon passed legislation applicable to coastal shipping in 2000 and 2001, respectively. Unfortunately, their programs have significantly different requirements for coastal traffic. Washington requires coastal traffic to exchange ballast water at least 50 nautical miles offshore prior to discharging in Washington waters (WDFW, 2002). Oregon also requires coastal traffic to exchange ballast water outside Oregon waters, though no distance from shore or water depth is mandated. The difference between the two state programs has led to frustration and confusion by the maritime industry. Consistency among the West Coast states would help ensure compliance by the maritime industry.

Coastal ballast water management is currently being addressed at the regional level. The Pacific Ballast Water Group (PBWG), of which CSLC is a member, hosted a

technical workshop in March 2002 on near shore physical oceanography to identify processes that could influence the efficacy of ballast water exchange in coastal shipping. The physical oceanographers identified alternative exclusion zones that could provide the basis for the development of a regional ballast water management plan. In January 2003, a follow-up meeting was held in cooperation with California Sea Grant (West Coast Ballast Outreach Project 2003) to consider the results of the physical oceanography workshop as a basis for a uniform, coast wide approach to ballast water management along the West Coast of North America. Participants, representing the maritime industry, regulators and scientist, concluded that although information gaps exist, these gaps did not preclude the development of a regional plan. Furthermore, the participants agreed that the development of a regional plan must include a comprehensive monitoring effort to determine the effectiveness of the plan and measure potential impacts to coastal communities.

PROGRAM RESULTS

ASSESSING COMPLIANCE VIA BALLAST WATER REPORTING FORM

Under the Act, the master, owner, operator, agent or person in charge of a vessel is required to submit a ballast water reporting form before they depart their first California port of call. The CSLC is required to compile the information obtained from the submitted reports to assess compliance with the requirements of the Act. The CSLC created a state database to be used to measure: (1) rates of compliance with the ballast water reporting requirement; (2) rates of compliance with the mandatory management guidelines for ballast water; (3) patterns of ballast water delivery and management according to vessel class by geographic area.

The CSLC relies on three primary sources of data. These include (1) ballast water information reported directly to the CSLC by arriving vessels; (2) transportation statistics collected from the two state Marine Exchanges, individual ports, and shipping agents; and (3) verification inspections of vessels, arriving from outside the EEZ, conducted statewide by the CSLC.

Compliance with the reporting requirements, and compliance with the mandatory guidelines, was assessed at two different geographic scales: statewide and local port system (CSLC designated port zone; Fig. 1).

Figure 2 defines which traffic patterns were included in the analysis by CSLC, identifying the different shipping routes a vessel might follow before arriving at a California port and which ones were included when estimating compliance with mandatory reporting requirements, as outlined in the Act. The following rules were used to distinguish "qualifying vessel" (QV) arrivals from "non-qualifying vessel" arrivals (which were not included in this analysis): (1) all arrivals to California waters from countries other than the United States are designated as QV arrivals. (2) Arrivals to California from a U.S. island state or protectorate (e.g. Hawaii, Guam, and Puerto Rico) are considered QV arrivals since they depart the EEZ during transit. (3) Vessels that leave the Atlantic or Gulf of Mexico coasts, transverse the Panama Canal, and arrive in California are also considered QV arrivals. (4) Vessels that leave Alaskan ports and arrive in California are also considered QV arrivals since they depart the EEZ during transit.

Compliance with Ballast Water Reporting Requirements

1. Statewide Vessel Traffic.

The extent of vessel traffic to California as measured by the cumulative number of QV arrivals, varied considerably among ports (Fig. 3). The Los Angeles-Long Beach Port Complex (LA-LB) led the state in QV arrivals, accounting for 73 percent of the arrivals from 1 January 2000 to 30 June 2002. Oakland represented 8.5 percent of total arrivals, while San Diego, Port Hueneme, and Carquinez accounted for 4.0, 4.3, and 3.7 percent of the arrivals, respectively. The remaining Ports (Redwood, Richmond, Sacramento, San Francisco, Stockton, Carquinez, and Humboldt) combined received 6.5 percent of the traffic.

Statewide 50 percent of the vessel calls were by container vessels, 14 percent were tanker vessels and 12% were bulk vessels. General cargo, auto carriers and passenger vessels made up the remaining 24% of the vessel calls (Fig. 4).

2. Statewide Compliance

Under Section 71205(a) the agent, along with the master, owner, operator, or person in charge is responsible for submitting the ballast water reporting form for each voyage prior to the vessel leaving their first port of call in California. Letters were sent to nearly 80 shipping agents in December 1999 explaining their responsibility under the new Act. Despite these initial outreach letters and subsequent focused letters of concern, compliance during the first half of 2000 was unsatisfactory (~60%). In May 2000, enforcement letters were sent to nine ship agents for violations of Section 71205(a). Meetings were held with the shipping agents and at their request; CSLC initiated a monthly electronic notification system. The warning letters, subsequent meetings and the implementation of a monthly notification system have resulted in better compliance, making further enforcement action unnecessary (Fig. 5). The statewide compliance with ballast water reporting was 92% for the period 1 January 2000 to 30 June 2002. The CSLC received 6491 reports during 2000, 5666 during 2001 and 2618 during the first half of 2002, representing 92 percent, 94 percent, and 93 percent compliance (respectively) (Table 2).

3. Port Zone Compliance

At the Port Zone level, LA-LB received the greatest percentage of the state's ballast water reporting forms (10810 forms, 73% of total) between 1 January 2000 and 30 June 2002) (Table 2). The overall high compliance and low variability among Port Zones is likely a result of the CSLC's efforts to ensure compliance by initiating an outreach program and a monthly electronic notification system, as well as the potential for civil action as a result of non-compliance.

Compliance with Mandatory Ballast Water Management Requirements

Under Section 71204(a), the master, operator, or person in charge of a vessel shall follow one of the prescribed ballast water management practices for ballast water carried into the waters of the state from areas outside the EEZ. The required management practices include:

- Exchanging ballast water in areas at least 200 miles from any shore and at least 2,000 meters deep;
- Exchanging ballast water in an alternative ballast exchange zone approved by the CSLC;
- Retaining ballast water on board;
- Utilizing an alternative environmentally sound, CSLC approved, method of treatment; or
- Discharging ballast water to an approved reception facility.

Exchange, under Section 71200, includes flow-through exchange, which requires three full volumes of mid-ocean water pumped through the ballast tanks, and empty-refill exchange, which requires that the ballast tank be emptied completely, and then refilled with mid-ocean water.

Under Section 71205(c)(1), the master, operator, or person in charge of a vessel is required to provide specific information for discharged ballast water including (a) whether or not ballast water was exchanged or otherwise treated, and (b) specific details of ballast water management on a per-tank basis, providing the volume, exchange method, and calculated percent of water exchanged. Therefore, there are two measures for the rate of compliance with the mandatory management practices. First, compliance can be evaluated as the proportion of arriving vessels reporting exchange of all water discharged. Since the management practices include retention of unexchanged or untreated ballast water, vessels that hold ballast water on board are considered to be in compliance. Second, compliance can be evaluated as the proportion of discharged ballast water by volume (across all ships) reported to have exchanged versus untreated ballast water.

The CSLC database was designed to measure percent exchange and exchange method for each tank (per vessel), examination of the ballast water reporting forms submitted by vessels revealed many errors in the ships' report. Confusion appears to exist among ships' crews regarding how to determine and report the percent of water exchanged. Additionally, some reports did not indicate whether the performed exchanged was empty-refill or flow-through. Consequently, it was not always possible to determine the exact volume exchanged or the method of exchange utilized. For example, during the first year of the Program, 14% of the forms filed with CSLC inaccurately or incompletely documented the vessel's ballast water management practices. CSLC subsequently intensified its outreach and education program utilizing field inspectors. This increased outreach effort has resulted in a steady decline in inaccurate or incomplete form submittal. Currently, only 5% of the forms received are categorized as "Discharged with Unknown Exchange". Therefore, for the purposes of this analysis, for discharging vessels, the extent of exchange was categorized as either "Discharged with No Exchange" or "Discharged with Some Exchange".

1. Statewide Management Compliance

Most (73%) of the reporting vessels indicated no intention to discharge ballast water (Fig. 6). Of the 14775 ballast water reports received between 1 January 2000 and 30 June 2002, only 4040 or 27% declared discharging ballast water within California; 4% declared that no exchange had been conducted, while 23% of the reporting vessels declared some level of exchange. Therefore, of the vessels reported, 96% indicated that they complied with the mandatory management requirements, either through retaining ballast water on board or by exchanging ballast water prior to discharge.

2. Port Zone Management Compliance

At the Port Zone level, LA-LB received the greatest percentage of the state's ballast water reporting forms (10810 forms, 73% of total) between 1 January 2000 and 30 June 2002) (Table 2). Oakland received 994 forms (6.7%), San Diego received 810 forms (5.5%), San Francisco received 643 forms (4.4%), and Richmond received 219 (1.5%). The percent of reporting vessels that declared no discharge of ballast water varied from

27% in Sacramento to 91% in Port Hueneme (Table 3). In LA-LB, 3163 vessels reported discharge, of which 14% had no mid-ocean exchange and 86% has some exchange prior to discharge (Table 4). This pattern was similar in Oakland (211 discharging vessels, 67% with some exchange), San Diego (114 discharging vessels, 88% with some exchange) and San Francisco (196 discharging vessels, 71% with some exchange). However, the pattern was reversed for Richmond (51 discharging vessels, 43% with no exchange) and may be a result of Richmond's extensive bulk vessel traffic.

Compliance Based on Percent Exchange by Volume

Reports submitted by vessels identify on a per tank basis the percentage exchange conducted for each tank discharged. As mentioned previously, confusion appears to exist among ships' crews regarding how to determine and report the percent of water exchanged. Several reports did not indicate whether the exchange was conducted using the empty-refill or flow-through method. Moreover, the current reporting forms do not require that vessels submit information on individual tank capacities. As in the proceeding section, for discharging vessels, the extent of exchange was categorized as either "Discharged with No Exchange", or "Discharged with Some Exchange".

Statewide Compliance

Approximately, 20.5 million metric tons (MT) of discharged ballast water was reported statewide (Table 4). Of this total, 16.9 million MT (83%) was reported to have undergone some exchange, and 3.5 million MT (17%) was reported unexchanged (Table 4). Although container vessels make up 50% of the vessel calls in California, bulk carriers, which make up only 12% of the vessels calls, discharged the greatest volume of ballast water statewide (Table 5).

VERIFYING COMPLIANCE THROUGH INSPECTIONS

Under Section 71206, the CSLC assesses compliance of any vessel subject to the Act through a vessel inspection program. CSLC operates two Field Offices under the Marine Facilities Division, one in Southern California and the other in Northern California. Inspectors have boarded and inspected approximately 25% (3884) of the

qualifying voyages between 1 January 2000 and 30 June 2002 (Table 6). Inspections have boarded 2019 different vessels. Each vessel is boarded, paperwork is evaluated, tanks are sampled for compliance and educational material is provided to the ship crew. A Ballast Water Inspection Data Sheet (Fig. 7) is completed for each vessel inspection and a Report (Fig. 8) summarizing the results of the inspection, is provided to the vessel crew. The majority of vessels inspected between 1 January 2000 and 30 June 2002 are found to comply with the Act. Violations noted are primarily associated with administrative components of the Act (incomplete ballast water management plans, no IMO guidelines on board, etc.). Approximately 13% of the violations noted during inspections are associated with operational components of the Act, which includes discharging unexchanged ballast water into California waters (Table 6).

FEE SUBMISSION

The Act created the Exotic Species Control Fund to support each agency's program (Section 71215). The amount of the fee is based on agency budgets approved by the State's Legislature and totals $7.62 million over four years (Table 7). Budgets cover the CSLC's ballast water inspection and monitoring program, biological surveys to determine the extent of NAS introductions in state waters, conducted by CDFG, and the evaluation of alternatives to mid-ocean exchange, conducted by SWRCB. Funding for the Program is through the assessment of a fee for each qualifying voyage, which is collected by the BOE (Appendix B). CSLC was given the authority to establish the fee amount. In January 2000, a Technical Advisory Group (TAG) was formed made up of members of the maritime industry and state agencies. The TAG has proved beneficial in determining an appropriate fee amount and addressing issues related specifically to the implementation of the California Act. The TAG meets regularly to assess the effectiveness of the Program and the status of the Fund. Currently the fee is $200/voyage.

The BOE is responsible for the collection and deposition of fees in the "Exotic Species Control Fund". During the first year of the program, 5857 billings were issued with

compliance exceeding 90% (Table 8). In 2001, a return (self-reporting) process was initiated by BOE to reduce the overall number of billings, though not the amount of revenue collected. With the assistance of industry representatives, a return form was developed allowing the larger owner/operator/agents to self-report their vessel voyages. Eight major shipping companies have opted to utilize the self-reporting format since July 2001. An additional 30 more accounts could benefit from the return process, in lieu of individual billings for each of their voyages. While the number of operator/owner combinations continues to grow and adds some complexity to the registration and billing process, things are running smoothly. This is evidenced by a compliance rate approaching 98%.

SUMMARY OF COLLABORATIVE RESEARCH

In January 2001, CSLC and the USCG formalized a Cooperative Agreement to streamline the respective programs. The goals are to reduce duplicative inspections; data share at the regional and national level; and cooperate in research programs addressing new verification techniques and ballast water treatment technology. In January 2002, CSLC and the USCG began coordinating evaluations of ballast water treatment systems under a Draft Advanced Approval Program (described later).

Since the enactment of the Act, the CSLC has worked with the maritime industry and scientists from Dakota Technologies, the Smithsonian Environmental Research Center (SERC), and San Francisco State University (SFSU) to evaluate various properties of ballast water on commercial vessels.

CSLC staff is also active members in several ballast water related groups including:

- The Ballast Water and Shipping Committee of the Aquatic Nuisance Species Task Force,
- Ballast Outreach Advisory Team, California Sea Grant Extension,
- Oregon's Ballast Water Management Task Force, and
- The Pacific Ballast Water Working Group.

Participants work toward consistent ballast water management regulations on a national and regional level while sharing data and feasible treatment technologies.

RESEARCH ON ALTERNATIVE TREATMENT TECHNOLOGY

Under Section 71202(1), CSLC was given the authority to approve environmentally sound, alternative treatment technologies designed to remove or inactivate organisms entrained in ballast water. The following summarizes the status of alternative ballast water treatment technology.

Treating ballast water to remove or inactivate potentially harmful invasive species is a challenging problem. Treatment technologies must address variable water quality parameters (temperature, salinity, nutrients, suspended solids, etc.), high flow-rates, large volumes, a diversity of organisms, and ballast water residence times (time water is held in tanks). Effective treatment technology is further complicated by the variability of ships, shipping routes and ports. The identification of a single treatment technology for all species, ships, and port conditions is unlikely. Rather a suite of treatment technologies will undoubtedly need to be developed to treat ballast water.

Shipboard treatment systems are the most flexible for managing ballast water. However, shore-based systems should be considered for smaller terminals, those with limited, but dedicated vessel calls, and as an option for older vessels nearing the end of their service life.

A number of candidate treatment technologies have been identified as possible solutions to preventing or reducing the introduction of NAS via ballast water discharges. Three recent publications have listed and described many of these options (Stemming the Tide 1996, IWACO 2001, Great Lakes Ballast Water Initiative 2002). Many of these technologies borrow from the wastewater treatment industry and include mechanical, physical and chemical processes. They range from filtration and cyclonic separation to ultraviolet irradiation (UV), ultrasound, electro-ionization, deoxygenating, heat, ozone, and chemical biocides.

The increasing awareness of the problem of organism transfer via ships' ballast has encouraged research into some of these treatment technologies. In most cases, these are the efforts of private concerns that have taken the initiative on this issue. A general lack of experience among these small developers, with regards to maritime operations, and vessel specific needs is common. Additionally, many technology promoters have little experience with the scientific method and principles of experimental design. Issues related to biological efficacy, environmental soundness, vessel and crew safety, engineering integration, operational and maintenance requirements and costs are unresolved. A nationally led, defined and integrated program is needed to provide developers an opportunity to test and refine their systems.

Treatment systems currently being evaluated in California include the Optimar Ballast System, installed on four vessels (three passenger and one container vessel), two of which are involved in California's West Coast Demonstration Project (described below). The Optimar system is a two-staged treatment system. The first stage includes an in-line cyclonic separator designed to remove material heavier than seawater. This stage is used during ballasting operations where separated particles can be discharged back into the source waters. The second stage treatment uses ultraviolet irradiation that has been shown to kill or deactivate biological organisms, including bacteria and viruses. This second stage treatment is performed during ballast and deballasting operations.

Early experimental work by the Northeast-Midwest Institute led to important improvements in the Optimar system including a redesign of the ultraviolet treatment unit that increases the number of lamps and the retention time of water moving through the unit. Both these changes purportedly increase the ultraviolet irradiation intensity. This "next generation" system has been installed on three of the above-mentioned vessels. Two of these vessels are part of California's West Coast Demonstration Project (*Sea Princess* and *R.J. Pfeiffer*).

California is also working with developers on two chemical biocides. Both chemicals (Acrolein™ by Baker Perkolite and SeaKleen™ by Vitamar, Inc.) have shown high kill rates at relatively low concentrations under laboratory and limited scale shipboard studies. Questions regarding environmental soundness and regulatory constraints, crew safety, integration with existing ship operations, costs, and verification have yet to be addressed. Additional work addressing these questions is being developed.

Carnival Cruise Lines is conducting preliminary experimental work on an electro-ionization system (MEP, Inc.) that produces various ionized gases including chlorine, oxygen and nitrogen to kill organisms in ballast water. A limited shipboard test of the system was conducted in March 2002 with encouraging results. Questions regarding the systems' biological efficacy over a wide range of organisms, environmental soundness, integration with vessel and crew, and costs remain unanswered. Carnival Cruise Lines intends to pursue these questions and apply for submission into California's Advanced Approval Program.

Holland America Lines is approaching the issue of NAS somewhat differently. Passenger vessels produce large volumes of graywater daily, generally more than they require as ballast on any given voyage. Graywater is generated from showers, galleys, laundry and other non-sewage sources. Holland America Lines has installed an immersed membrane bioreactor system (ZENON Environmental Inc.) on several of their vessels to treat graywater. The previously land-based system uses bio-oxidation and membrane ultra filtration to treat up to 187,562 gallons per day. Holland America Lines proposed to use this treated graywater as ballast, theoretically eliminating the risks associated with NAS discharge when ballast water is released. This solution is limited in its application; most commercial cargo vessels do not produce enough graywater to be used as ballast; however, this may become one effective solution for the passenger vessel industry.

Additional research that California is following with interest includes work being conducted on self-cleaning filtration systems by Ms. Allegra Cangelosi at the Northeast-Midwest Institute. These systems can remove the majority of larger organisms, but are

not effective on bacteria and viruses. This improved system may enhance NAS reduction if combined with other treatment systems (e.g., ultraviolet irradiation, chemical biocides).

Dr. William Cooper at the Univ. of North Carolina and his colleagues are evaluating an ozone treatment system onboard a crude oil tanker. The ozonation system consists of a central ozone generator and gas compressor. Tanks can be ozonated individually or in groups. Preliminary results showed on average, 99% removal of bacteria, its performance with respect to higher organisms at the field scale is yet unresolved. Issues regarding crew safety, corrosion, vessel integration, and costs need additional research. Additional research to address some of these questions is scheduled to continue this summer.

Tamburri et al., (2001) reported on the potential benefits of deoxygenation of ballast water on reducing survivability of NAS with added anticorrosion benefits; an important issue to the maritime industry. The proposed treatment would utilize nitrogen gas to deoxygenate ballast water, reducing corrosion in ballast tanks while killing many potential NAS. Shipboard research by Dr. Tamburri (Univ. of Maryland) and his team is planned for later this year.

Shore based research is also underway around the country. Dr. T.D. Waite at the Univ. of Miami, with funding from the USCG, is evaluating the effects of various water quality parameters on self-cleaning screens, ultraviolet irradiation and cyclonic separation. Dr. F Dobbs at Old Dominion Univ. and Dr. R. Herwig from Univ. of Washington are both looking more closely at ultraviolet irradiation. These projects have helped us understand the effects of water quality parameters on treatment effectiveness.

Additionally, several others entities around the world are trying to identify effective technologies. Some of the technologies mentioned have been tested under laboratory conditions; others are at an experimental shipboard testing phase, while only a few have undergone full scale testing aboard an operational vessel, albeit all have been of

short duration and to date, appear to be much less than 100% effective. Most of the shipboard systems are still considered experimental, undergoing additional refinement and evaluation. Their effectiveness at removing or eliminating the threat of invasive species is still unclear.

There are fundamental scientific, engineering and operational questions still needing to be addressed on these systems. As such, there is not enough conclusive information to recommend any single treatment option or a combination of treatment options for certification in California.

The maritime industry in California appears very interested in advancing treatment technology and is willing to cooperate with regulators and developers to this end. However, development of effective technologies is slow. Two factors cited for this slow progress is: the absence of interim and final treatment standards and the lack of adequate funding to advance promising technology. The majority of the maritime industry is understandably unwilling to invest the large capital required in yet unproven treatment systems without assurances that the alternative is likely to meet regulatory requirements now and for the reasonably foreseeable future.

WEST COAST DEMONSTRATION PROJECT

In August 2000, the CSLC was awarded a $150,000.00 grant from the U.S. Fish and Wildlife Service (USFWS), to implement the West Coast Demonstration Project. The proposal calls for the CSLC to identify a volunteer vessel and contract with a marine engineering firm to conduct full-scale engineering analysis and designs for the retrofit of an on-board, ballast water treatment system. CSLC has financially assisted the vessel owner by providing a portion of the cost of the ballast water treatment system, and in conjunction with the SWRCB, evaluate the effectiveness of the particular system under operational conditions. In December 2001, the Port of Oakland agreed to match the USFWS funds, doubling the funds available for this project.

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Three vessels (*R.J. Pfeiffer*, *Sea Princess*, and *Polar Endeavor*) were initially considered for participation in the Demonstration Project. Due to concerns, regarding overall capital costs and intrinsic safety, Polar Tankers, Inc. owner of the *Polar Endeavor*, declined to participate in the Project. The two remaining ships, the *R.J. Pfeiffer* of Matson Navigation Corp. and the *Sea Princess* of Princess Cruises, have installed the Optimar Ballast System (Hyde Marine, Inc.) discussed later. This system was selected because it has undergone limited testing and evaluation with good preliminary results and was requested by the ship owners.

The operational effectiveness of each vessel's treatment system is being evaluated in partnership with the SWRCB. The SWRCB is supporting this portion of the project using funds appropriated from the California Exotic Species Control Fund. The SWRCB has developed a Research Team utilizing the scientific expertise from San Jose State University Foundation and San Francisco State University. The Research Team has developed an overall experimental design, along with sampling and analysis protocols. The protocol development is being carried out in consultation with USCG and Department of Transportation, Volpe National Transportation Systems Center staff.

Sea Princess Project

The *Sea Princess* was retrofitted with the treatment system in late summer 2001. In 2001, a scientific team aboard *Sea Princess* conducted two at-sea evaluations of the ballast water treatment system and found no difference between treated and untreated ballast water. Several potential explanations for the limitations to system performance were identified, including corrosion, contamination and vibration. Double bottom tanks have been used for the holding of gray water and treated black water while the ship was operating close to shore in Alaskan operations. Modifications were made to the gray water and treated black water holding tanks, piping and pumps to isolate waste streams from the ballast system to avoid contamination. The carbon steel piping in the ballast treatment system was changed to galvanized steel to eliminate the corrosion problem. Some minor modifications were made to the UV chamber to minimize the effects of vibration.

Beginning on 24 September 2002, the Research Team boarded the *Sea Princess* to again conduct an evaluation of the effectiveness of the modified ballast water treatment system. The system worked well operationally and initial indications from the team are that the results look promising. A final report is expected in early 2003.

R. J. Pfeiffer Project

Installation of the equipment was accomplished in the first quarter of 2002 and plans were made to conduct evaluation tests in April 2002. Prior to testing, a representative from the equipment manufacturer (Optimar) was requested to ride the ship to assist in fine-tuning the equipment and verify operation of all components. This was done in April, and it was during this period that vibration problems were encountered when attempts were made to operate the system at sea. It was discovered that the vibration frequencies encountered on the *R. J. Pfeiffer* caused the quartz tubes around the UV lamps to break. This, in turn, allowed salt water to leak out of the head of the UV unit, flooding the lamp electrical connections with salt water and causing an electrical short. The manufacturer concluded at that point that some redesign was required to make the unit suitable for operation in the environment of an engine room with vibration characteristics encountered on a slow speed diesel propulsion plant.

A redesign of the UV unit was commenced immediately by Optimar to provide better support of the lamps and quartz tubes, more clearance around the tubes, and watertight connections between the cables and lamps to protect the electrical components in the event of water leakage. By early June, new heads for the UV chamber had been manufactured and installed, the baffle plates around the tubes had been cut back to provide more clearance, and new connections between the lamps and cables had been installed to make them watertight. During the months of June and early July, the ship's crew operated the system periodically in an effort to establish reliability prior to scheduling the initial evaluation cruise. As time went on, it became apparent that the modifications had not been successful in eliminating all of the problems, and the UV unit was still experiencing lamp failures and erratic readouts on UV intensity levels.

The first evaluation trip had been rescheduled to July 12, and delayed again until July 25, and then to August as problems kept occurring. A representative from the manufacturer was again requested to ride the ship, which he did in late July. During the course of that trip, he concluded that the 16-lamp, low pressure UV chamber that had been installed was not a suitable unit for this application. It was proposed that a single lamp, medium pressure unit would be better suited to this environment. Similar units have been used on offshore platforms in the North Sea for several years, and it was the opinion of the manufacturer that this more rugged design was essential to withstand the vibrations encountered on a ship such as the *R. J. Pfeiffer*. It must be noted that previous experience with the multi- lamp unit has been limited to passenger ships where great efforts are made to reduce vibration levels for passenger comfort. The type of propulsion system, location of the UV unit in the engine room and isolation mounting of other machinery components will all have an effect on the vibration levels that the ballast water treatment system components will experience.

The 16-lamp, low-pressure unit was originally proposed by Optimar to provide higher UV intensities with less power. To get equivalent intensity with the single lamp, medium pressure unit will require 7.3 kilowatts of power. The generating capacity on the *R.J. Pfeiffer* is more than adequate to handle this increased power requirement. It is anticipated that the more rugged, single bulb design will result in a substantial reduction in maintenance time and costs, which will offset any increase in power required.

The schedules of the Matson ships have been disrupted as a result of the dispute between the Pacific Maritime Association and International Longshore and Warehouse Union. Based on the resumption of regularly scheduled service, installation of the new UV chamber by late November 2002 would allow the ship to test out the new equipment during December, and permit evaluation cruises to be conducted early in 2003 if all systems prove operational. The CSLC and U.S Coast Guard are currently conducting a

joint evaluation of the *R. J. Pfeiffer's* treatment system under the Advanced Approval Program.

ADVANCED APPROVAL PROGRAM

In January 2001, CSLC and the USCG formalized a Cooperative Agreement to streamline the respective programs. The CSLC goals are to reduce duplicative inspections; data share at the regional and national level; and cooperate in research programs addressing ballast water treatment technology and management verification techniques. In January 2002, CSLC and the USCG began coordinating the evaluations of ballast water treatment systems under a Draft Advanced Approval Program (Appendix D). This Program audits the engineering, operational, and biological efficacy of a shipboard experimental treatment system.

The Advanced Approval Program is a joint pilot program between CSLC and the USCG. With CSLC acting as lead, the two agencies intend to conduct an audit of a treatment system on a specific vessel, evaluating the biological efficacy, as well as the engineering and operational components of the system. The Program is designed to provide an incentive to ship owners and operators to install experimental or prototype treatment systems with demonstrated potential for effective destruction of NAS. The CSLC and vessel owner will enter into an agreement whereby valuable experimental data accrues to the State and the public at large and the vessel owner receives advanced approval for the system installed for a period still to be negotiated.

OUTREACH AND EDUCATION

Communication among the maritime industry, CSLC and other regulating entities has been vital to the success of the California program. In January 2000, a TAG was formed made up of members of the maritime industry and state agencies. Though the original purpose of the TAG was to assist the CSLC in establishing an appropriate and fair fee, it has proved invaluable as a forum for discussing issues related to ballast water management in general and the implementation of the California Act in particular. The

TAG meets regularly to assess the effectiveness of the Program and the status of the Fund.

In July 2000, the staff initiated a monthly email procedure to notify the maritime industry of vessels that have not submitted the required ballast water report forms. Currently, 46 agents receive monthly electronic updates. This procedure has been well received by the maritime industry, resulting in compliance exceeding 94%. This close relationship and ability to communicate directly and immediately with the maritime industry has resulted in better and more accurate data submissions. However, this monthly notification procedure is extremely personnel resource intensive.

Staff has initiated several outreach and educational programs over the past two and a half years to improve communication among the stakeholders. CSLC staff is active in public and industry sponsored workshops and public speaking engagements. Since the Program's inception, CSLC has hosted or participated in over 30 workshops and conferences on the management of ballast water. Additionally, an updated ballast water web page is found on the CSLC web site. Information on the Act, new regulations, and synopsis of meetings and notification of upcoming events, as well as links to other related web pages could be accessed easily.

RESEARCH NEEDS

Ballast Water Treatment Technology - Current efforts to develop the suite of treatment systems are small scale. The efforts by developers to advance their technologies should be applauded, however leadership at the federal and state level is needed. The effort to develop effective technologies should be one of integrated phases.

- Phase 1 - R&D on basic and innovative technology
- Phase 2 - Prototype development
- Phase 3 - Shipboard applications
- Phase 4 - Certification and Implementation

Phase 1 should include government guided private and institutional research, with the eventual goal of eliminating the introduction of NAS on all vessels through standardized technology. Guided research will eventually insure a level playing field for the regulated community. The USCG, NOAA, and SERC are already involved in the formative stages of solutions to this problem. California should continue its relationship with these entities to ensure continuity at the state, national and international level.

Phase 2 is one of focused research and engineering that takes promising systems through to working prototypes. A center similar to the Ohmsett National Oil Spill Response Test Facility in New Jersey could be established providing an environmentally safe place to conduct objective testing to improve technologies to control NAS introductions via ballast water discharges. California has an opportunity to establish a "Test and Evaluation Center", in consultation with the USCG. The cost to establish this Center in California would be about $2-3 million, with annual operating costs estimated at approximately $1 million.

Phase 3 is one of fitting and refining these prototypes through shipboard trials over extended periods and broad ranges of operating conditions. The narrow range of conditions that can be achieved in land-based tests cannot be broadly generalized to all real-world shipboard situations. Thus, it will be very useful to have a shipboard component at the Test and Evaluation Center. When combined with the Test and Evaluation Center, the estimated cost to conduct shipboard trials is estimated at $500,000 annually.

Phase 4 is the certification of a suite of effective treatment technologies. Once these are certified effective for use, installations on a large-scale can/will follow. Under an existing Memorandum of Agreement between the Environmental Protection Agency and the U.S. Coast Guard, a process to test and verify the capabilities of ballast water treatment systems is being developed. California should continue its relationship with the USCG to ensure continuity at the state, national and international level.

Other Ship-Mediated Vectors - Ballast water is not the only pathway for NAS introduction. Additional research is needed on other pathways of NAS movement into California. Hull fouling, sea chests, underwater hull openings, and anchor chains are examples of potential vectors. SERC scientists intend to evaluate the extent and composition of fouling organisms on exterior hulls of container ships arriving to the Port of Oakland. Additional research is needed. Examination of the relative risk of introductions via these pathways is needed to focus prevention and control efforts.

Monitoring of NAS – Continued monitoring of NAS in California waters is required to evaluate the effectiveness of the State's Program at reducing the rate of NAS introductions. Monitoring of coastal and estuarine waters of the state, including an inventory of the location and range of NAS populations should be conducted every 3-5 years, building on existing data where possible. The studies should also evaluate the potential impacts of alternative discharge zones for coastal traffic and the identification of no discharge zones.

CONCLUSIONS

The potential economic and ecological impact of NAS introductions is enormous. These introductions are second only to habitat destruction in threatening endangered species nationwide. Additionally, ships' ballast water often contains bacteria and viruses that may pose a threat to public health. Control of NAS has gigantic economic impacts to municipalities, tourisms and aquaculture. The California legislature recognized the threat of NAS and passed a mandatory ballast water control and management program.

As a result of extensive outreach by CSLC staff, the development of a Technical Advisory Group, the implementation of a monthly electronic notification system, and the potential for civil penalty action, compliance with the California Act has consistently been high (>90%). The Program's success and the continued lack of a federal mandatory program, supports the extension of the California ballast water program with some revisions (Recommendation #1).

Compliance has been good, but there are some factors that prevent the Program from reaching its goal: the prevention and spread of nonindigenous aquatic species into California waters. Confusion exists about which vessels should report, when they should report and how they should report ballast water management activities.

California's ballast water management requirements currently exclude an important component of vessel traffic in California. The current Act only applies to those vessels that enter California waters after operating outside the EEZ, ignoring the importance that coastal shipping plays in transporting NAS. Coastal shipping has been linked to the spread of NAS within the region. Vessels engaged in coastal trade should be included under the State Program (including report form and fee submission, ballast water management requirements, alternative treatment technology, and civil penalties and liabilities) (Recommendation #2). Due to shipping routes of most coastal vessels, mid-ocean exchange, as currently defined may not be operationally feasible. Therefore, some adjustments should be considered regarding any ballast water management requirements for coastal traffic under future California legislation. CSLC should continue to work with the PBWG and others on the development of a consistent regional management program for coastal traffic. The adoption of this recommendation would lead to an increase in the cost of the CSLC Program and would be associated with increased staff requirements for: data entry, compilation, and analysis; and additional vessel inspections and monitoring.

Currently, qualifying vessels are required to submit ballast water reports before they depart from the first port of call in California. Vessels are also required to include information on any future expected discharges at additional ports of call in the State. Under the current reporting requirement, many ships report discharges only for their first port of entry. Extending the ballast water reporting requirement to include all vessel classes, at all ports of call, will remove any uncertainty about who reports and improve the overall data quality, while addressing important gaps in the current program (Recommendation #3 & 4). The adoption of this recommendation is not expected to

increase the cost of the CSLC Program above those anticipated with the adoption of Recommendation 2.

Data submitted on reports are highly variable. Many vessels fail to completely or accurately fill out the ballast water reporting forms. As a result, it is often impossible to reliably determine compliance with mandatory ballast water management requirements. This problem has been noted in the USCG and the Oregon State Programs (Ruiz et al., 2001, Vinograd & Sytsma, 2002). Improved coordination among federal and state regulators involved in ballast water management is needed. Efforts in education and outreach should be expanded. CSLC should work with the USCG toward this end (Recommendation #5). Little if any additional cost is anticipated for the CSLC Program with the adoption of this recommendation.

The California legislature made provisions for a fee to provide funding to develop and implement the State program and support research necessary to carry out the requirements of the Act. The Fee is paid by each qualifying voyage at its first port call in California. Although there was significant resistance to this component of the Act, subsequent compliance by the international maritime industry has been outstanding, exceeding 95%. Furthermore, the State's fee-based program has been cited as an important reason for the programs overwhelming success (Vinograd & Sytsma, 2002). The Exotic Species Control Fund should continue to be funded (Recommendation #6).

CSLC has worked to coordinate with other states and the Federal government on ballast water management issues. Wherever possible California should continue to work with the scientific community, other West Coast states, the Federal government, and the international community to standardize ballast water management programs. This coordination will result in improved support and compliance by the maritime industry and enhance the understanding and development of solutions to NAS introductions (Recommendation #8).

Under the California Act, vessels are required to manage their ballast water prior to its discharge. Management options include complete retention of ballast water, mid-ocean exchange prior to discharge, or the use of alternative treatment technologies. Mid-ocean exchange is currently the most widely used management option, but studies indicate it to be of limited usefulness. Most experts view mid-ocean exchange as a short-term solution, with the final solution being a combination of treatment technologies and management options.

Technology development is underway but its progress has been slow. Lack of treatment standards has been identified as a key obstacle to further development of treatment technologies. Technology developers argue that standards are necessary to set objectives for their equipment and the shipping industry is reluctant to expend the necessary capital to install systems that may not meet a near-future standard. California, in consultation with the scientific community, and state and federal regulators, should establish, through legislation a timeline for the development of regulations on treatment technology standards (Recommendation # 9). Adoption of this recommendation is expected to increase the cost of the CSLC Program, in the form of additional staff to develop and implement regulations.

Though several promising technologies are being evaluated (e.g. deoxygenation, chemical biocides, ultraviolet irradiation and ozone), not enough information is available to recommend any for widespread use in California. The development of effective technologies requires a coordinated, well-funded research program based on basic R&D, prototype development, shipboard applications and certification, and implementation components. California has an opportunity to advance technology development by supporting the establishment of a test and evaluation center that provides the industry, developers and regulators an opportunity to take promising technologies to working prototypes. Additionally, California should support research that takes these prototypes through to shipboard trials over extended periods and operating conditions. Funds necessary to support such a research program could be obtained through three mechanisms: general funds, grants, or through the existing fees

assessed on ships (Recommendation #10). Depending on what funding source is used to adopt this recommendation, the cost to the CSLC Program could range from $0- $2.0 million annually.

Development of effective and practicable treatment technologies that can be used by the great variety of vessels that carry ballast water will likely take a number of years, and even when technologies become available for a particular class of vessels there may be significant lag periods before all such vessels can be fitted by existing work shipyard capacity. Thus, ballast water exchange should be preserved as a management option as long as necessary.

Monitoring of NAS in receiving waters is required to evaluate the effectiveness of the Act at reducing the rate of NAS introductions. An initial survey of NAS in California waters has established a baseline for further evaluations. Periodic monitoring of California waters should be continued (Recommendation # 11). Adoption of this recommendation is expected to increase the cost of the CDFG program.

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Control Fund.

(e) Notwithstanding any other provision of law, all penalties and payments collected for violations of any requirements of this division shall be deposited into the Exotic Species Control Fund.

CHAPTER 5. CIVIL PENALTIES

71216. (a) Except as provided in subdivision (b) or (c), any person who intentionally or negligently fails to comply with the requirements of this division may be liable for an administrative civil penalty in an amount which shall not exceed five thousand dollars ($5,000) for each violation. Each day of a continuing violation constitutes a separate violation.

(b) Any person who fails to comply with the reporting requirements set forth in Section 71205 may be liable for an administrative civil penalty in an amount which shall not exceed five hundred dollars ($500) per violation. Each day of a continuing violation constitutes a separate violation.

(c) Any person who, knowingly and with intent to deceive, falsifies a ballast water control report form may be liable for an administrative civil penalty in an amount which shall not exceed five thousand dollars ($5,000) per violation. Each day of a continuing violation constitutes a separate violation.

(d) The employees designated by the Executive Officer of the State Lands Commission may enforce the requirements of this division.

(e) Any violation of this division may be referred by the Executive Officer of the State Lands Commission to the administrator for oil spill response, as appointed by the Governor pursuant to Section 8670.4 of the Government Code, for the purpose of imposing administrative civil penalties.

(f) The administrator may issue a complaint to any person on whom civil liability may be imposed pursuant to this division. Any hearing required shall be conducted pursuant to Section 8670.68 of the Government Code.

CHAPTER 6. REPEAL

71271. This division shall remain in effect only until January 1, 2004, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2004, deletes or extends that date.

APPENDIX B

BALLAST WATER MANAGEMENT FEE

(ASSEMBLY BILL 2380)

BILL NUMBER: AB 2380 CHAPTERED BILL TEXT

CHAPTER 110
FILED WITH SECRETARY OF STATE JULY 10, 2000
APPROVED BY GOVERNOR JULY 7, 2000
PASSED THE SENATE JUNE 29, 2000
PASSED THE ASSEMBLY APRIL 27, 2000
AMENDED IN ASSEMBLY APRIL 24, 2000

INTRODUCED BY Assembly Member Lempert

FEBRUARY 24, 2000

An act to add and repeal Part 22.5 (commencing with Section 44000) to Division 2 of the Revenue and Taxation Code, relating to ballast water, and declaring the urgency thereof, to take effect immediately.

LEGISLATIVE COUNSEL'S DIGEST

AB 2380, Lempert. Ballast water management fee.

Existing law authorizes the State Lands Commission to impose a fee on owners or operators of vessels for the purpose of funding a program for the management of ballast water use. The State Board of Equalization is authorized to collect the fee and deposit it to the Exotic Species Control Fund.

This bill would provide the administrative authority to the board to establish procedures for collecting the ballast water management fees.

The provisions of this bill would be repealed on January 1, 2004.

This bill would declare that it is to take effect immediately as an urgency statute.

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1. Part 22.5 (commencing with Section 44000) is added to Division 2 of the Revenue and Taxation Code, to read:

PART 22.5.

44000. This part shall be known, and may be cited, as the Ballast

Water Management Fee Law.

44001. For purposes of this part, "board" means the State Board of Equalization.

44002. The collection and administration of the fee imposed by Chapter 4 (commencing with Section 71215) of Division 36 of the Public Resources Code shall be governed by the definitions specified in Section 71200 of the Public Resources Code, unless expressly superseded by the definitions contained in this part or Part 30 (commencing with Section 55001) of Division 2.

44003. The fee imposed on owners or operators of vessels pursuant to Section 71215 of the Public Resources Code shall be administered and collected by the board in accordance with this part and Part 30 (commencing with Section 55001) of Division 2.

44004. Every person, as defined in Section 55002, who is subject to the fees imposed by Chapter 4 (commencing with Section 71215) of Division 36 of the Public Resources Code shall register with the board on forms or in a manner provided by the board.

44005. Except as authorized in Section 44005, the fee imposed on owners or operators of vessels pursuant to Section 71215 of the Public Resources Code is due and payable to the board 30 days from the date of assessment by the board or the board's agent.

44006. In order to facilitate the administration of this part and in lieu of issuing an assessment for the fee, the board may authorize the feepayer to file a return for a monthly, quarterly, or other period set by the board. The return shall identify each vessel voyage and each port of call in California for which a ballast water report is required to be filed with the State Lands Commission, pursuant to Section 71205 of the Public Resources Code, during the period covered by the return. If the board authorizes the filing of a return, the fees must be a paid to the board by the end of the calendar month following the end of the return reporting period.

44007. All fees, interest, and penalties imposed and all fees required to be paid to the state pursuant to Section 71215 of the Public Resources Code shall be paid in the form of remittances payable to the board. The board shall transmit the payments to the Treasurer to be deposited in the State Treasury to the credit of the Exotic Species Control Fund.

44008. This part shall remain in effect only until January 1, 2004, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2004, deletes or extends that date; provided, however, this part shall remain applicable for the collection of assessments, the liability for which accrued prior to January 1, 2004; the making of any refunds and the effecting of any credits; the disposition of money collected; and the commencement of any action or proceeding pursuant to this part.

SEC. 2. This act is an urgency statute necessary for the immediate

preservation of the public peace, health, or safety within the meaning of Article IV of the Constitution and shall go into immediate effect. The facts constituting the necessity are:

Because the current ballast water management fee provisions lack the administrative authority contained in this act to collect fees, and because those provisions became operative on January 1, 2000, it is necessary that this act take effect immediately.

APPENDIX C

BALLAST WATER REPORTING FORM

BALLAST WATER REPORTING FORM

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

1. VESSEL INFORMATION 2. VOYAGE INFORMATION 3. BALLAST WATER USAGE AND CAPACITY

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

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

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

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

If no ballast treatment conducted, state reason why not:

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

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

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

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

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

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

APPENDIX D

DRAFT ADVANCED APPROVAL APPLICATION

ADVANCE APPROVAL APPLICATION REQUIREMENTS

Information for the Applicant
The California State Lands Commission Advance Approval program for onboard ballast water treatment systems is designed to provide incentive to ship owners and operators to install experimental or prototype treatment systems with demonstrated potential for effective destruction of nonindigenous aquatic species. The Commission and the applicant enter into an agreement whereby valuable experimental data accrues to the State and the public at large and the applicant receives Advance Approval for the system installed, until the sunset of the California law on January 1, 2004. Due to the regulatory nature of the terms of the agreement therefore require that the application meet a detailed set of specifications to enable a thorough evaluation by the State prior to approval.

The Commission is coordinating the evaluation of Advance Approval applications with the U. S. Coast Guard.

Your participation in the Advance Approval program requires that you follow several steps detailed below. The Commission will conduct an initial check to see whether all the required elements of the application have been completed. The Commission will notify you with a Notice of Completeness, which will, if necessary identify and explain the deficiencies of your application. You may then address such deficiencies and the application may be resubmitted without prejudice.

If the Notice of Completeness indicates a positive finding, then the next, more detailed and technical, phase of the review begins. All aspects of the study plan and its supporting documentation and data will be assessed. Additional information, specific to your treatment system and experimental test program may be requested.

A letter of Agreement, which will delineate the regulatory provisions of the Advance Approval Program and the obligations of all parties, will be sent to the applicant.

Primary Requirements

1. Letter(s) of Commitment: ship owner, ship operator, proprietors of treatment system, test team
2. Environmental compliance documentation
3. Documentation of small scale experiments demonstrating efficacy of the applicant's treatment system
4. Study Plan
5. Letter of Agreement

1. **Letter(s) of Commitment** - must be prepared by the ship owner, ship operator, the manufacturer or developer of the treatment system, and the principal investigators conducting the tests, stating their intents to carry out all components of the study plan for which they are responsible. The Letter(s) must be submitted with the Application Package.

2. **Environmental Compliance Documentation** - stating that the residual concentrations of any primary treatment chemicals or chemicals that occur as disinfection by-products meet all applicable local, state, federal, and tribal requirements. The California State Lands Commission will request copies of required environmental permits only after Advance Approval has been granted by the Commission and before installation and operation of a treatment system onboard. The applicant must address, if pertinent, the following environmental management topics or explain why it is not necessary to do so.

   2.1 Conditioning of treated water prior to discharge
   2.2 Management of treatment waste streams

3. **Documentation of Small Scale Experiments Demonstrating Efficacy of the Applicants's Treatment System**

The documentation for each experiment must include particulars similar to those listed below for the onboard system study plan, i.e., description of the test team's organization, schematic and description of the treatment system, and experimental design and test protocol documentation. The Review Panel will also expect to see descriptions of process testing methods and conditions.

   3.1 Laboratory experiments (bench scale)
   3.2 Shore side experiments (intermediate scale)
   3.3 Data submission requirements

The applicant shall submit all relevant data relating to each experiment, including the raw data, analytical methods employed, measures of confidence and deviation and interpretation of results.

4. **Study Plan**

   4.1 Test Organization and Staff

Overview of team structure and management, including lines of authority (e.g., owner representative, test director). An organizational chart is strongly recommended. All test team personnel and their organizations (including test director and other managers, technical staff, and support

staff). The role of each in the development and execution of the test must be clear.

4.1.1 Ship owner and operator

Name of line and ship, owner identity and address, charter type and duration, key shipboard personnel, particularly engineering staff.

4.1.2 System vendor(s)

For each company: name, location, relevant component, name of field service representative(s) involved with test.

4.1.3 Test team and affiliations

4.1.3.1 Management

4.1.3.2 Technical staff

4.1.3.3 Laboratories

4.1.3.4 Support staff

4.1.4 Public funding sources

4.2 Description of Ballast Water Treatment System

4.2.1 Test Bed, Location, and Conditions

Provide ship type/size/build year/general arrangements, route(s), home port, flag state, classification society, nationalities of officers and crew (particularly engineering staff), characterization of local waters at both intake and discharge points. Description of existing ballasting/deballasting system. All compartments involved in any aspect of testing, including location of treatment system, ballast tank(s) and cargo hold(s) to be tested, and other compartments used for laboratory procedures, storage of equipment and materials, and administrative tasks. Description of arrangements for shipping of samples.

4.2.2 System Overview

Describe location and arrangement of treatment system and its integration with existing equipment, all relevant piping modifications, system start-up and operating procedures. The following sections require detailed descriptions of individual components, specified in generic terms only in this portion of the text. The Appendix for Section 3.2 is a compendium of treatment technologies including definitions of terms, cataloging of component types, and typical design and performance

specifications. The Appendix is an important element of the document, as it shows the specific expectations of the Review Panel in regard to the technical description of the treatment system.

4.2.3 Primary treatment stage, e.g., filtering or separation.

Describe principles of operation, unit construction, materials and standards, performance specifications and limitations, and the expectations of performance in this particular application. Provide name and contact data of the vending company and its field representative supporting the test program.

4.2.4 Secondary treatment stage, e.g., ultraviolet radiation, ozonation, biocide.

Describe principles of operation, unit construction, materials and standards, performance specifications and limitations, and the expectations of performance in this particular application. Provide name and contact data of the vending company and its field representative supporting the test program.

4.2.5 Powering and other engineering matters

4.2.6 Controls and monitoring

4.3 Experimental Design and Protocols

4.3.1 General Description

Statement of experimental hypothesis and important descriptors of the test, including kill method, target taxa (biota, life stages, and physiological state) and reasons for choosing them, test location, source water, and environmental factors. State the general approach to testing the treatment system's effectiveness and comparing it to that of ballast water exchange. Include specifics of the experimental design's accommodations for the particulars of the test bed (e.g., isolating effects of onboard machinery and accounting for biological conditions in the ship's ballast tanks and piping) and the type of statistical experimental design used in testing.

4.3.2 Goals for treatment effectiveness by target taxa

4.3.2.1 Treatment effectiveness on target taxa

List the claimed treatment effectiveness by taxa and specific species and resting stages, where applicable, including:
➢ Nekton ➢ Zooplankton

➢ Phytoplankton ➢ Viruses and Bacteria ➢ Other

4.3.2.2 Comparison with ballast water exchange

State your expectations for the effectiveness of ballast water exchange with regard to nekton, zooplankton, phytoplankton, viruses and bacteria, other

4.3.3 Design

4.3.3.1 Sample collection for each treatment and control.

Provide chart or flow diagram of outlining the treatments and controls, number of replicate tanks, samples and time points encompassed in a test

4.3.3.2 Description of the number of tests.

Describe replicate tests (tests at same location and environmental conditions) and comparative tests (tests at different locations or environmental conditions).

4.3.3.3 Range of operational and environmental conditions

Describe the range of seasons, organic matter content, turbidity, pH, salinity, etc. likely to be encountered in operation and how the experiment accounts for these variables.

4.3.3.4 Measurement of treatment system performance

Fully describe the statistical tests, use of controls, replicates for each target taxa.

4.3.3.5 Experimental comparison of treatment system to BWE

4.3.3.6 Long term monitoring of treatment system performance

Provide information on life cycle management (maintenance, testing, and repair through anticipated service life), and periodic sampling and effectiveness testing.

4.3.3.7 Reporting procedures

Describe data storage, data analysis, instrumentation maintenance and calibration records, and quality assurance information.

4.3.4 Sample collection and analytical protocols

4.3.4.1 Sample collection and handling.

Detail the sampling gear, cleaning and maintenance procedures, sample storage and transport, subsampling/splitting procedures, etc.

4.3.4.2 Laboratory procedures

Describe analytical procedures for chemical and biological assays, i.e., how mortality is to be determined.

4.3.5 Data acquisition and management protocols

4.3.5.1 Data confidence

4.3.5.2 Analysis, including power analysis

4.3.5.3 Software and presentation

4.3.6 Quality assurance and control

Provide the important elements of a QA/QC plan, including the employment of analytical duplicates, blanks, reproducibility of analytical procedures, analysis of accuracy and precision.

4.3.7 Schedule and milestones

Provide at least a rough schedule for system installation, system testing, experimental test activities, and submission of reports.

4.4 Engineering and Vessel Operations Matters

4.4.1 Treatment system configuration

Provide engineering drawings showing existing onboard equipment arrangements, piping, and power, showing new treatment equipment and ancillary components, and identifying all involved machinery compartments, ballast tanks, cargo holds, and any other compartments affected by the treatment system or to be used by the test team for execution of any phase of the experiment. The submission should include Process Flow Diagrams (PFDs), (identifying all components and streams, including ship systems interfacing the treatment system {ballast pumps, tanks, etc.}), and Piping and Instrumentation Diagrams (P&IDs) showing:

- Equipment types, sizes, ratings, MOCs
- Valve types, sizes, MOCs
- Line sizes, MOCs, connection types
- Design flowrates
- Sample taps
- Instruments, control elements, interlocks, control approaches, etc.

Also provide ballast/deballast system specifications, likely ballast loading arrangements, the procedures followed by ship's crew, and whether any procedural changes are necessitated by the use of your treatment system.

4.4.2 Ship operations interface and crew labor impacts

Describe the human operational requirements for the treatment system and the approximate burden, in man-hours, for the crew.

4.4.3 Maintenance and reliability

Describe the maintenance requirements of all system components, including approximate crew man-hours, and the reliability history of similar or equal components in marine or other applications.

4.5 Environment, Safety, and Human Health

4.5.1 Environmental matters

The Commission requires that the application include "documentation stating that the residual concentrations of any primary treatment chemicals or chemicals that occur as disinfection by-products meet all applicable local, state, federal, and tribal requirements". This requirement applies to residual byproducts in the treated ballast water and to any other waste stream resulting from the treatment process. Please include any permit materials that have been prepared.

4.5.1.1 Conditioning of treated ballast water

Describe effect of treatment on ship's ballast water, in particular the nature of any treatment byproducts and the water's suitability for discharge into coastal waters. Describe any actions necessary to "condition" treated water in order that it meet applicable clean water regulations prior to discharge.

4.5.1.2 Waste stream management

Identify and characterize any treatment system sidestreams (e.g., filtered material, centrifugal concentrate, waste or residual chemicals) and describe actions planned to properly manage and dispose of such waste.

4.5.2 Human health and safety (please include health and safety plan if available)

4.5.2.1 Exposure to treatment system media

Describe any potential exposure of test team or ship's crew to the active components of the treatment system, e.g., UV radiation, chemical biocide. Identify planned actions for eliminating or minimizing such exposure, monitoring for such exposure, and treating such exposure.

4.5.2.2 Safety impacts of treatment system

Ergonomics, escape arrangements, pumping and damage control arrangements, added weight and moment.

5. Letter of Agreement

EXAMPLE OF TIMELINE FOR ADVANCED APPROVAL PROCESS

Following is an example timeline for the approval of an experimental ballast water treatment system. For illustrative purposes, the timeline incorporates the development of a standard and regulations during the test period.

Date	Action
Submit (S)	Application package submitted and reviewed for completeness.
S + 30 days	Application package accepted/rejected for review. If complete, application package submitted to independent review panel.
S + 90 days	Application approved / denied. Final approval pending agreement on study plan.
S + 120 days (A)	Study plan negotiated and agreed-upon by Commission, Coast Guard and the Applicant. This date is considered the Approval Date (A). Treatment system considered meeting regulatory requirements for (???) years from this date.
Install (I)	Experimental system installed and adjusted; preliminary organization for study completed. Experimental work begins.
I + 3 months	First progress report submitted to Commission
I + 6 months	Second progress report submitted to Commission
I + 9 months	Third Progress report submitted to Commission
I + 12 months	Annual Report submitted to Commission Study continues according to schedule, with quarterly and annual reports submitted to the Commission
Standard/Reg	First State standard established for ballast water treatment. Operation of experimental system continues under study plan.
A + (???) years	Vessel must meet existing standards and regulations.

Vinograd, J and M. Sytsma. December 2002. *Draft Report on the Oregon Ballast Water Management Program in 2002.* Center for Lakes and Reservoirs. Portland State University.

Washington Department of Fish and Wildlife (WDFW). 2002. Website: <www.dfw.wa.state.gov>

West Coast Ballast Outreach Project. 2003. Website: <http://ballast-outreach-ucsgep.ucdavis.edu/Conferences>

FIGURES AND TABLES

CALENDAR PAGE 000308
MINUTE PAGE 000390

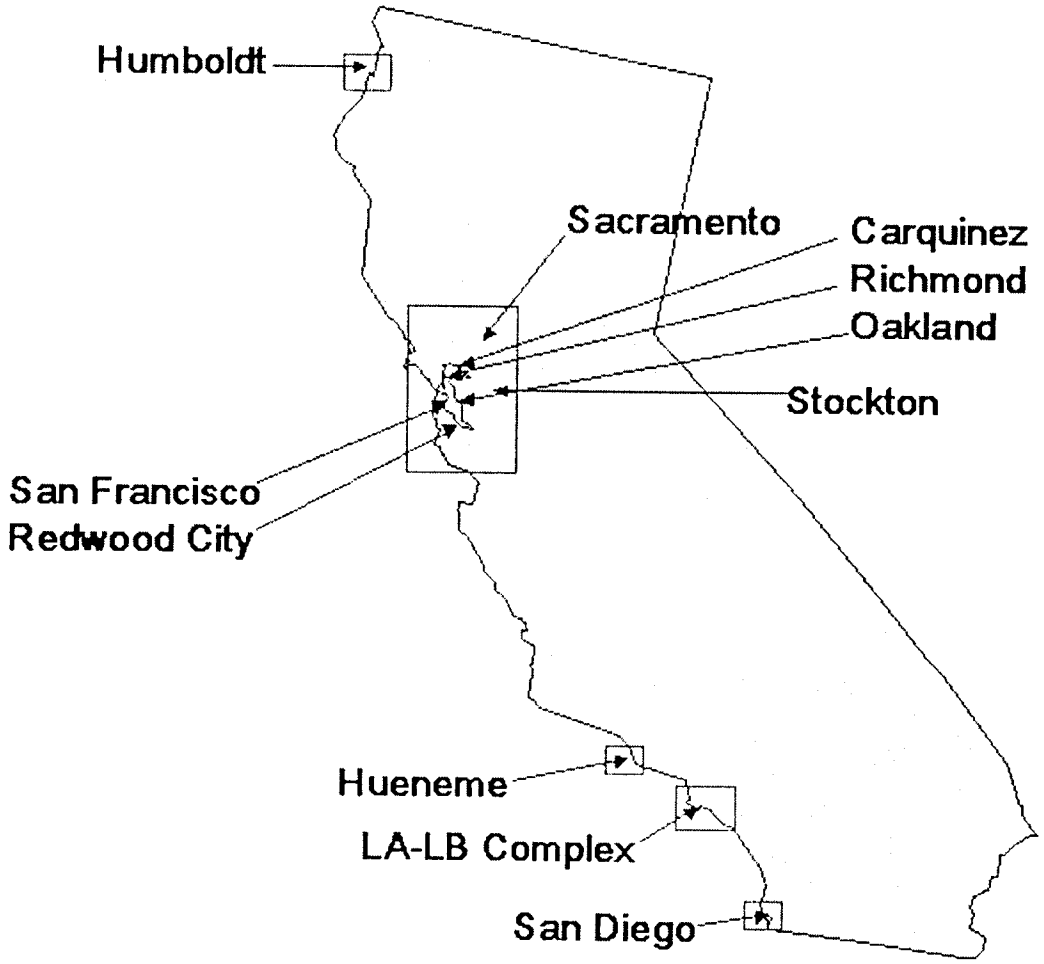

Figure 1. Local Port Zone designations in California

CALENDAR PAGE 000309
MINUTE PAGE 000381

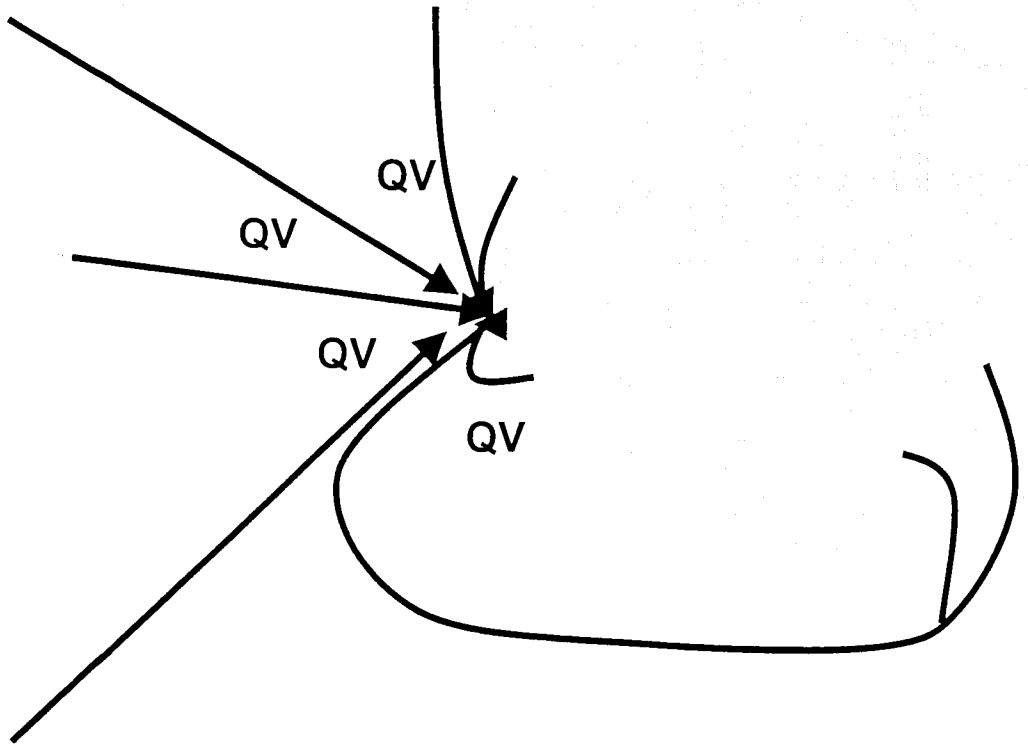

Figure 2. Qualifying Voyage (QV) arrival designations for ships calling on Ports in California.

CALENDAR PAGE 000310
MINUTE PAGE 000822

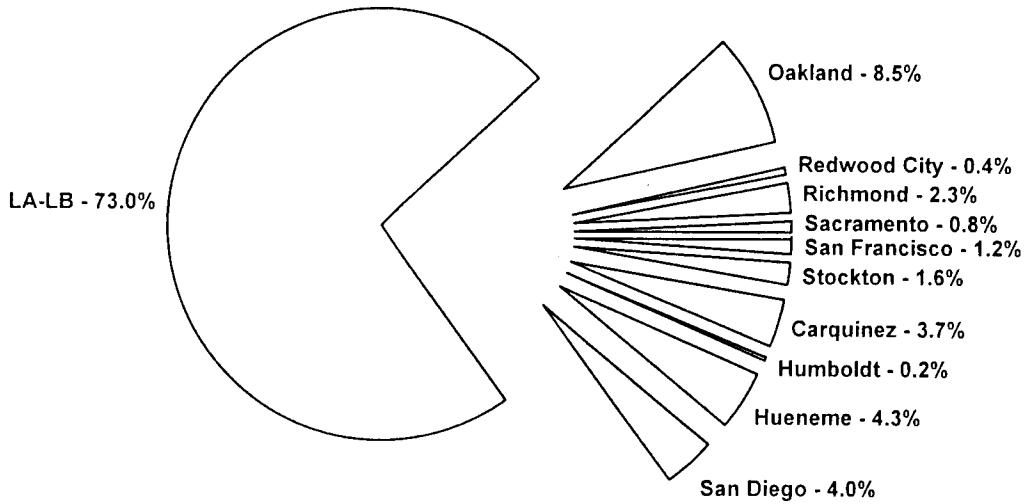

Figure 3. Qualifying Voyage arrivals by California Port.

CALENDAR PAGE 000311
MINUTE PAGE 000333

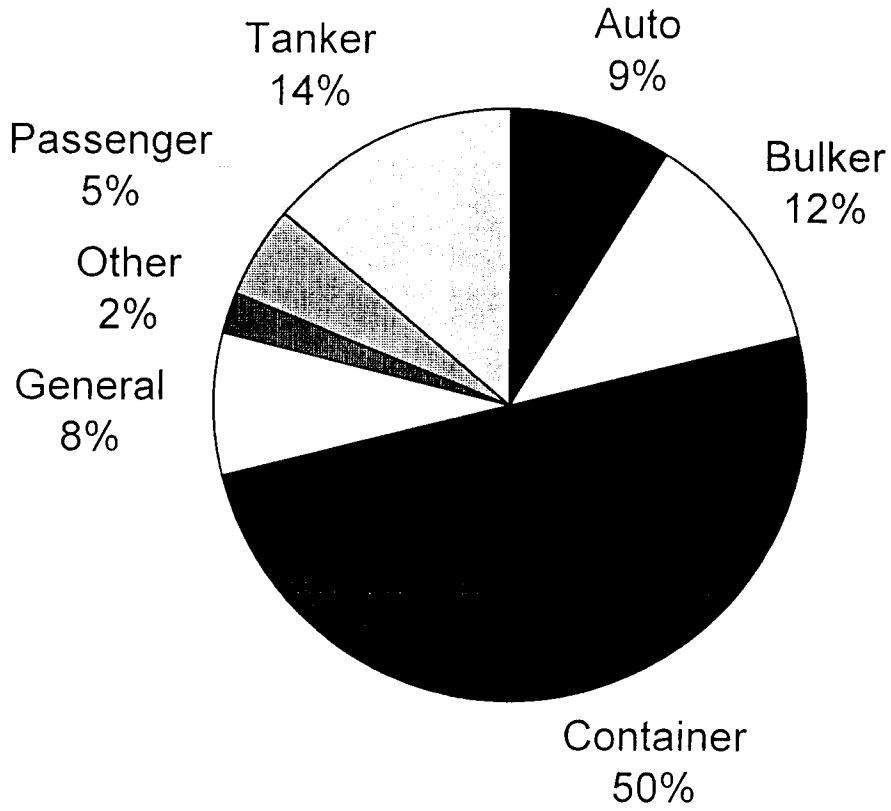

Figure 4. Vessels calling on California ports by type between 1 January 2000 and 30 June 2002.

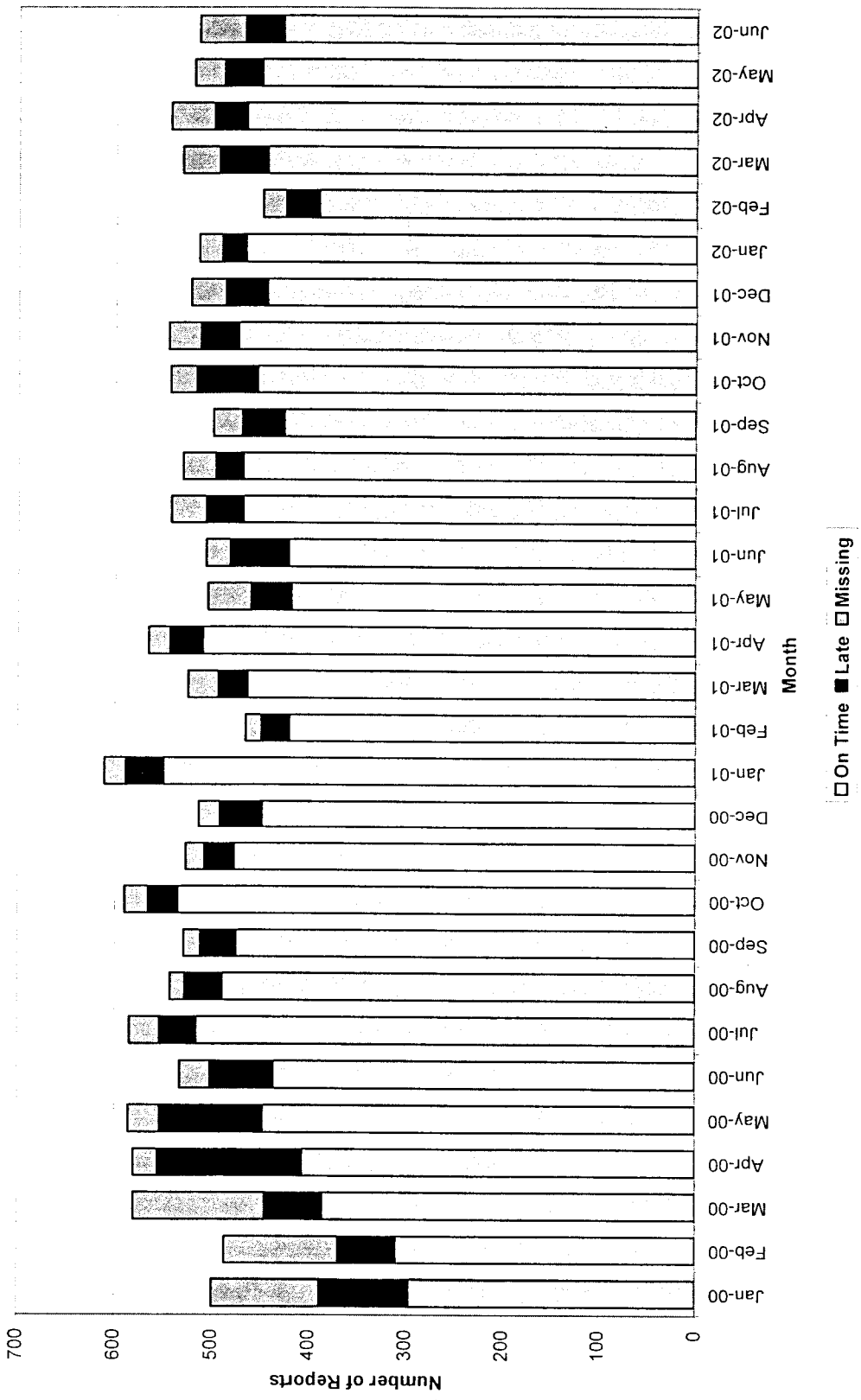

Figure 5. Statewide monthly reporting rates by foreign arrival from January 2000 to June 2002.

000312
CALENDAR PAGE
000331
MINUTE PAGE

CALENDAR PAGE 000313
MINUTE PAGE 000335

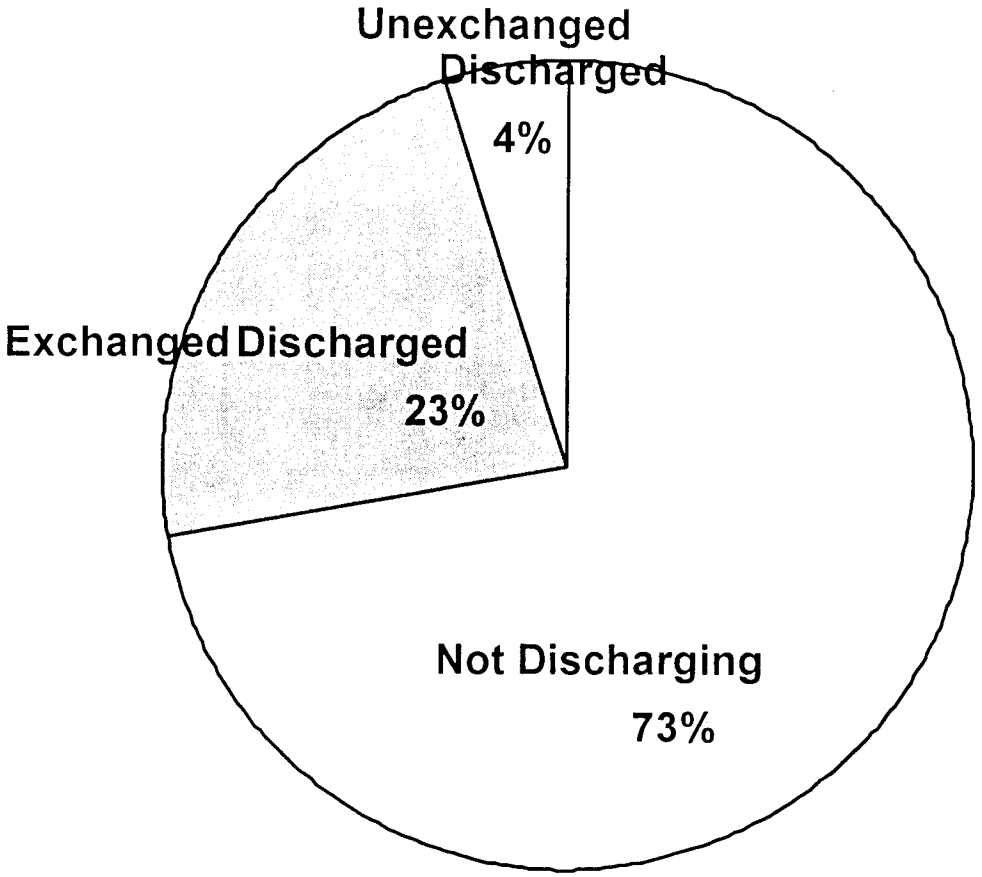

Figure 6. Ballast water discharge intention of vessels entering California ports, as reported to CSLC from 1 January 2000 to 30 June 2002.

Figure 7. Ballast Water Inspection Data Sheet

Arrival Date:	Arrival Time:	Inspection Date:	Inspection Time:
Location: (Harbor or Port)			Berth:
Vessel:			Call Sign:
IMO #:			Flag:
Responsible Officer (PIC):			Voyage #:
Agent:			
Owner:			
Operator:			
Type: [Cont] [Bulk] [Tank] [Gen] [Auto] [Other]			[Load] [Discharge]
Cargo:		Gross Tonnage:	
Last Port:		Next Port	
BW on board (volume):		Units:	# of tanks in ballast:
Total BW capacity (volume):		Units:	Total # of BW tanks:
# of BW Pumps:	Pumping Rates:	Exchange Method:	Exchange Duration:

CONTINUE ON CALENDAR PAGE

	Yes	No
Violations noted:	[ ]	[ ]
Ballasting:	[ ]	[ ]
Deballasting: (this voyage)	[ ]	[ ]
No. of tanks to deballast:		
Exchange conducted:	[ ]	[ ]
No. of tanks exchanged: (same as no. deballasting?)		

	Yes	No
BW Mgmt Plan on board & followed?	[ ]	[ ]
IMO BW Guidelines on board?	[ ]	[ ]
No. underwent Alternative Method		
Alt. Method used:		

Access to Tanks?

Below Deck		Above Deck
Top Plate	Sound Tube	Vent
Ullage trunk	Tap	Other

LIST SAMPLED TANKS

(Vessels not deballasting in State waters are not required to provide information in block 5 of BW Report Form)

Tank No. & Type	BW Source		BW Exchange		%	BW Discharge		Sample Information	
	Location	Volume	Location	Volume	Exchange	Location	Volume	(U, M, B)	Salinity
AMBIENT WATER SAMPLE									

Tank Codes: Forepeak -**FP**, Aftpeak -**AP**, Double Bottom -**DB**, Wing -**W**, Top -**T**, Side -**S**, Bottom -**B**, Cargo Hold -**CH**, Other -**O**

Comments: _____

Inspector: _____

Travel Time: _____ Inspection Time: _____

Figure 8. Inspection Report

STATE OF CALIFORNIA — GRAY DAVIS, *Governor*

CALIFORNIA STATE LANDS COMMISSION
200 Oceangate, Suite 900
Long Beach, CA 90802-4335

Contact Phone: **(562) 499-6348**
Contact FAX: **(562) 499-6355**
WWW.SLC.CA.GOV

PAUL D. THAYER, *Executive Officer*
(916) 574-1800 FAX (916) 574-1810
California Relay Service From TDD Phone **1-800-735-2922**
from Voice Phone **1-800-735-2929**

Ballast Water Management Program
Contact Phone: **(562) 499-6312**
Contact Fax: **(562) 499-6444**
E-Mail: **bwform@slc.ca.gov**

Date: _____ Page _____ of _____

INSPECTION REPORT

☐ Marine Terminal ☐ Facility ☐ Monitoring ☐ Ballast Water ☐ Annual ☐ Spot

Terminal/Facility:	**W9997.**	**Vessel:**

California State Lands Commission conducted a monitor or inspection as indicated above for compliance with requirements under 33 CFR, §§154, 155, and 156, CCR – Title 2, DIV 3, Chap. 1, Art. 5 and Public Resource Code (PRC) DIV 36, Chap. 1, §71200 - 71214

[ ] No violations noted **[ ] Violations noted as follows:**

_____
_____
_____
_____
_____
_____
_____

_____ _____
(Name – SLC Inspector) (Signature – SLC Inspector)

Copies Received By:

_____ _____
(Print Name) (Print Name

_____ _____
(Signature) (Signature)

_____ _____
(Title) (Title)

Table 1. Average ballast water capacity of various types of ships based on ballast water reporting forms submitted to CSLC.

SHIP TYPE	AVERAGE (gallons/ship)
Bulk Carrier	5,386,000.00
Container vessel	3,441,000.00
Passenger vessel	766,500.00
Tank vessel	6,371,000.00

Table 2. Compliance with mandatory ballast reporting requirements, by Port Zone. Year 3 data covers the period 1 January 2002 to 30 June 2002

PORT ZONE	#Vessel Arrivals Yr 1	#BWR Forms Yr 1	%Reporting Yr 1	#Vessel Arrivals Yr 2	#BWR Forms Yr 2	%Reporting Yr 2	#Vessel Arrivals Yr 3	#BWR Forms Yr 3	%Reporting Yr 3	Total Vessel Arrivals	Total BWR Forms	%Reporting Rate Cumulative
Humboldt	28	21	75%	18	18	100%	12	10	83%	58	49	84%
Sacramento	50	41	82%	45	43	96%	23	23	100%	118	107	91%
Stockton	99	88	89%	95	92	97%	51	48	94%	245	228	93%
Carquinez	136	116	85%	116	101	87%	57	38	67%	309	255	83%
Richmond	131	116	89%	83	73	88%	32	30	94%	246	219	89%
Oakland	563	496	88%	337	318	94%	194	180	93%	1094	994	91%
San Francisco	268	259	97%	277	272	98%	116	112	97%	661	643	97%
Redwood	29	22	76%	25	24	96%	12	12	100%	66	58	88%
Hueneme	254	238	94%	290	268	92%	110	96	87%	654	602	92%
LA-LB	5173	4766	92%	4377	4106	94%	2089	1938	93%	11639	10810	93%
San Diego	343	328	96%	359	351	98%	132	131	99%	834	810	97%
Total	**7074**	**6491**	**92%**	**6022**	**5666**	**94%**	**2828**	**2618**	**93%**	**15924**	**14775**	**93%**

CALENDAR PAGE 000317
MINUTE PAGE 000339

Table 3. Reported ballast water management practices by Port Zone and Year.

Port Zone	#Retaining Yr 2000	#Discharging Yr 2000	% Retaining Yr 2000	#Retaining Yr 2001	#Discharging Yr 2001	% Retaining Yr 2001	#Retaining Yr 2002	#Discharging Yr 2002	% Retaining Yr 2002	# Retaining Cumulative	# Discharging Cumulative	% Retaining Cumulative	% Discharging Cumulative
Humboldt	5	16	24%	9	9	50%	4	6	40%	18	31	37%	63%
Sacramento	7	34	17%	14	29	33%	8	15	35%	29	78	27%	73%
Stockton	69	19	78%	76	16	83%	35	13	73%	180	48	79%	21%
Carquinez	77	39	66%	81	29	74%	25	13	66%	183	81	69%	31%
Richmond	95	21	82%	55	18	75%	18	12	60%	168	51	77%	23%
Oakland	391	105	79%	260	58	82%	132	48	73%	783	211	79%	21%
San Francisco	164	95	63%	193	79	71%	91	22	81%	448	196	70%	30%
Redwood	18	4	82%	17	7	71%	10	2	83%	45	13	78%	22%
Hueneme	214	24	90%	244	24	91%	90	6	94%	548	54	91%	9%
LA-LB	3336	1430	70%	2938	1168	72%	1373	565	71%	7647	3163	71%	29%
San Diego	275	53	84%	307	44	87%	114	17	87%	696	114	86%	14%
Total	**4651**	**1840**	**72%**	**4194**	**1481**	**74%**	**1900**	**719**	**73%**	**10745**	**4040**	**73%**	**27%**

CALENDAR PAGE 000318
MINUTE PAGE

CALENDAR PAGE 000319
MINUTE PAGE 000941

Table 4. Compliance with mandatory management of ballast water during period from January 2000 to June 2002.

Port Zone	No Exchange (MT)	No Exchange [%]	Some Exchange (MT)	Some Exchange [%]	By Port Totals (MT)
Humboldt	11,484	5%	198,987	95%	210,471
Sacramento	41,176	6%	673,248	94%	714,424
Stockton	38,497	10%	343,932	90%	382,429
Carquinez	135,264	13%	888,421	87%	1,023,685
Richmond	239,249	43%	317,839	57%	557,088
Oakland	554,190	33%	1,108,967	67%	1,663,157
San Francisco	531,967	29%	1,312,203	71%	1,844,170
Redwood city	33,117	27%	88,844	73%	121,961
Hueneme	2,859	7%	41,093	93%	43,952
LA-LB	1,954,115	14%	11,690,594	86%	13,644,709
San Diego	41,319	12%	299,648	88%	340,967
Statewide Total	**3,583,237**	**17%**	**16,963,776**	**83%**	**20,547,013**

MT = Metric Ton. Each metric ton is equal to ~ 258 gallons of water.

CALENDAR PAGE 000320

MINUTE PAGE 000342

Table 5. Reported ballast water discharge amounts (MT) by Port Zone and Vessel Type for the period 1 January 2000 to 30 June 2002.

Vessel Type	Humboldt	Sacramento	Stockton	Carquinez	Richmond	Oakland	San Francisco	Redwood	Hueneme	LA-LB	San Diego	Total Discharged By Type
Auto	0	0	0	14,395	0	20,923	959	0	21,076	80,737	7,064	145,154
Bulk	125,241	593,293	340,458	780,569	289,982	353,280	129,895	95,416	10,501	6,544,089	243,102	9,505,826
Container	1,381	12,958	0	2,929	5,613	1,238,926	30,853	0	2,219	5,014,004	7,663	6,316,546
General	83,849	108,173	12,926	12,499	21,593	14,738	24,380	15,295	10,081	367,260	46,881	717,676
Other	0	0	0	1,803	0	44,949	807	11,250	74	106,650	605	166,138
Passenger	0	0	0	0	0	0	17,364	0	0	408,687	28,161	454,211
Tank	0	0	29,045	215,401	239,900	399	1,639,913	0	0	1,109,313	7,491	3,241,463
Total Discharged by Port	**210,471**	**714,424**	**382,429**	**1,027,597**	**557,089**	**1,673,214**	**1,844,171**	**121,961**	**43,952**	**13,630,740**	**340,967**	**20,547,013**

CALENDAR PAGE 000321
MINUTE PAGE 000343

Table 6. Ballast Water Inspections by Port Zone.

Port Zone	Year 2000				Year 2001				Year 2002				Cumulative Totals	
	#Inspections	#Violations	#Administrative Violations	#Operational Violations	#Inspections	#Violations	#Administrative Violations	#Operational Violations	#Inspections	#Violations	#Administrative Violations	#Operational Violations	#Inspections	#Violations
Humboldt	8	3	3	0	4	0	0	0	4	0	0	0	**16**	**3**
Sacramento	18	9	8	1	9	1	0	1	6	2	2	0	**33**	**12**
Stockton	25	16	16	0	23	7	7	0	19	3	3	0	**67**	**26**
Carquinez	62	13	12	1	60	5	5	0	39	1	1	0	**161**	**19**
Richmond	49	4	3	1	38	5	4	1	20	1	1	0	**107**	**10**
Oakland	138	17	14	3	124	5	5	0	85	0	0	0	**347**	**22**
San Francisco	24	7	6	1	9	1	1	0	8	1	1	0	**41**	**9**
Redwood City	8	7	6	1	8	2	2	0	3	1	0	1	**19**	**10**
Hueneme	47	6	6	0	53	6	6	0	26	0	0	0	**126**	**12**
LA-LB	1227	221	194	27	1051	89	85	4	548	64	38	26	**2826**	**374**
San Diego	66	22	21	1	55	12	12	0	20	1	0	1	**141**	**35**
Total	**1672**	**325**	**289**	**36**	**1434**	**133**	**127**	**6**	**778**	**74**	**46**	**28**	**3884**	**532**

Table 7. Total Program Budget by Agency

AGENCY	PY's	PROGRAM TOTALS
CSLC	5.2	$2,422,000.00
BOE	4.7	$1,834,000.00
CDFG	2.8	$2,655,500.00
SWRCB	0.9	$ 749,000.00
TOTALS	**13.6**	**$7,660,500.00**

Table 8 – Ballast Water Management Fee Program

Summary of Voyages					Revenue Summary		
Period of Activity	Voyages Billed	Voyages Reported (Note 1)	Total Voyages	Fees Billed	Fees Reported (Note 1)	Total Fees	Payments Received for Period (Note 2)
January-00	447		447	$ 267,600		$ 267,600	$ 258,900
February-00	511		511	306,534		306,534	305,185
March-00	508		508	304,800		304,800	302,757
April-00	494		494	292,000		292,000	287,302
May-00	493		493	197,200		197,200	195,444
June-00	475		475	190,200		190,200	188,646
July-00	483		483	193,200		193,200	193,243
August-00	489		489	195,600		195,600	195,328
September-00	463		463	185,200		185,200	188,060
October-00	533		533	213,200		213,200	215,275
November-00	486		486	194,400		194,400	198,584
December-00	475		475	189,644		189,644	190,454
Yearly Total	**5,857**		**5,857**	**$2,729,578**		**$2,729,578**	**$2,719,178**
January-01	490		490	196,000		196,000	197,253
February-01	414		414	165,600		165,600	166,232
March-01	490		490	196,000		196,000	198,225
April-01	500		500	200,000		200,000	202,135
May-01	477		477	190,800		190,800	192,005
June-01	402	66	468	164,000	26,400	190,400	192,078
July-01	389	74	463	158,400	29,600	188,000	192,744
August-01	397	75	472	162,400	30,000	192,400	191,795
September-01	377	72	449	154,000	28,800	182,800	179,395
October-01	411	72	483	166,400	28,800	195,200	198,536
November-01	392	75	467	160,000	30,000	190,000	187,947
December-01	399	76	475	159,600	30,400	190,000	190,673
Yearly Total	**5,138**	**510**	**5,648**	**$2,073,200**	**$204,000**	**$2,277,200**	**$2,289,018**
January-02	367	69	436	146,800	27,600	174,400	176,326
February-02	346	67	413	138,400	26,800	165,200	162,856
March-02	385	78	463	154,000	31,200	185,200	179,869
April-02	378	88	466	156,400	35,200	191,600	180,608
May-02 (see Note 3)	355	73	428	142,000	29,200	171,200	165,433
June-02 (see Note 3)	350	90	440	140,000	36,000	176,000	163,067
Yearly Total (to date)	**2,181**	**465**	**2,646**	**$877,600**	**$186,000**	**$1,063,600**	**$1,028,159**
TOTAL	**13,176**	**975**	**14,151**	**$ 5,680,378**	**$390,000**	**$ 6,070,378**	**$ 6,036,355**

Note 1: Returns are due at the end of the month following the period of activity. Note 2: As a result of penalties and accrued interest for any one period, actual cash received may exceed amoung originally billed. Note 3: Amounts may be understated as additional revenues will be credited to the return and billing revenues for the month, upon completion of the return and payment reconcilliation process.

APPENDIX A

BALLAST WATER MANAGEMENT FOR CONTROL

OF NONINDIGENOUS

SPECIES CONTROL ACT

(ASSEMBLY BILL 703)

AB 703 Assembly Bill – CHAPTERED

BILL NUMBER: AB 703CHAPTERED BILL TEXT

CHAPTER 849
FILED WITH SECRETARY OF STATE OCTOBER 10, 1999
APPROVED BY GOVERNOR OCTOBER 8, 1999
PASSED THE ASSEMBLY SEPTEMBER 9, 1999
PASSED THE SENATE SEPTEMBER 8, 1999
AMENDED IN SENATE SEPTEMBER 7, 1999
AMENDED IN SENATE AUGUST 18, 1999
AMENDED IN SENATE AUGUST 17, 1999
AMENDED IN SENATE JULY 6, 1999
AMENDED IN ASSEMBLY MAY 28, 1999
AMENDED IN ASSEMBLY APRIL 27, 1999
AMENDED IN ASSEMBLY APRIL 5, 1999

INTRODUCED BY Assembly Member Lempert
(Coauthors: Assembly Members Aroner and Corbett)
(Coauthor: Senator Alpert)

FEBRUARY 24, 1999

An act to add and repeal Division 36 (commencing with Section 71200) of the Public Resources Code, relating to ballast water.

LEGISLATIVE COUNSEL'S DIGEST

AB 703, Lempert. Ballast water.

Existing law requires the Department of Fish and Game to adopt the International Maritime Organization's "Guidelines for Preventing the Introduction of Unwanted Aquatic Organisms and Pathogens from Ships' Ballast Water and Sediment Discharges" as the policy of the state to prevent the introduction and spread of aquatic nuisance species into any river, estuary, bay, or coastal area through the exchange of ballast water of vessels prior to entering those waters and to adopt a ballast water control report form to monitor compliance with those guidelines.

This bill, with certain exceptions, would require the master, operator, or person in charge of a vessel to employ prescribed ballast water management practices for ballast water carried into the waters of the state from areas outside the exclusive economic zone, as defined. The bill would require those persons to take certain actions to minimize the uptake and release of nonindigenous species. The bill would require the master, owner, operator, agent, or person in charge of a vessel carrying ballast water into waters of the

state after operating outside the exclusive economic zone to provide the State Lands Commission, and maintain on board the vessel, specified information.

The bill would require the State Lands Commission to take samples of ballast water and sediment and to take other action to assess the compliance of any vessel with prescribed requirements. The bill would prohibit, unless required by federal law, any state agency from imposing requirements different from those contained in the bill relating to the discharge of ballast water for the purpose of limiting the introduction of nonindigenous species prior to January 1, 2004. The bill would, on or before December 1, 2002, require the State Water Resources Control Board to evaluate alternatives for managing ballast water, as specified. The bill would require the Department of Fish and Game to conduct a study relating to resident nonindigenous species populations, as prescribed. The bill would, on or before September 1, 2002, require the State Lands Commission to submit to the Legislature, and make available to the public, a report relating to ballast water. The bill would require the state board, the State Lands Commission, and the Department of Fish and Game to conduct prescribed research.

The bill would subject a person who fails to comply with the ballast water management program required to be undertaken by the bill with prescribed civil penalties. The bill would require the State Lands Commission to establish fees not to exceed $1,000 per vessel, as specified. The bill would require the money generated by the imposition of the fees and the penalties to be deposited in the Exotic Species Control Fund, which the bill would create. The money in the fund, upon appropriation by the Legislature, would be available to carry out the ballast water management program, as described above.

The provisions of this bill would be repealed on January 1, 2004.

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1. Division 36 (commencing with Section 71200) is added to the Public Resources Code, to read:

DIVISION 36. BALLAST WATER MANAGEMENT FOR CONTROL OF NONINDIGENOUS SPECIES

CHAPTER 1. GENERAL PROVISIONS

71200. Unless the context otherwise requires, the following definitions govern the construction of this division:

(a) "Ballast tank" means any tank or hold on a vessel used for

carrying ballast water, whether or not the tank or hold was designed for that purpose.

(b) "Ballast water" means any water and suspended matter taken on board a vessel to control or maintain trim, draft, stability, or stresses of the vessel, without regard to the manner in which it is carried.

(c) "EEZ" means exclusive economic zone, which extends from the baseline of the territorial sea of the United States seaward 200 miles.

(d) "Exchange" means to replace the water in a ballast tank using either of the following methods:

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

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

(e) "Mid-ocean waters" means waters that are more than 200 nautical miles from land and at least 2,000 meters (6,560 feet, 1,093 fathoms) deep.

(f) "Nonindigenous species" means any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organism transferred from one country into another.

(g) "Person" means any individual, trust, firm, joint stock company, or corporation, including, but not limited to, a government corporation, partnership, or association.

(h) "Sediments" means any matter settled out of ballast water within a vessel.

(i) "Waters of the state" means any surface waters, including saline waters, that are within the boundaries of the state.

(j) "Voyage" means any transit by a vessel destined for any California port from a port or place outside the EEZ, including intermediate stops at a port or place within the EEZ. For the purposes of this division, a transit by a vessel from a United States port to any other United States port, if at any time the vessel operates outside the EEZ or equivalent zone of Canada, is also a voyage.

71201. (a) This division applies to all vessels, United States and foreign, carrying ballast water into the waters of the state after operating outside the EEZ, except those vessels described in Section 71202.

(b) This division applies to all ballast water and associated

sediments taken on a vessel in areas less than 200 nautical miles from any shore, or with water that is less than 2,000 meters (6,560 feet, 1,093 fathoms) deep.

71201.5. This division does not authorize the discharge of oil or noxious liquid substances in a manner prohibited by state, federal or international laws or regulations. Ballast water carried in any tank containing a residue of oil, noxious liquid substances, or any other pollutant shall be discharged in accordance with the applicable requirements.

71202. This division does not apply to any of the following vessels:

(a) A crude oil tanker engaged in the coastwise trade, as implemented by the United States Coast Guard in accordance with the National Invasive Species Act of 1996.

(b) A passenger vessel equipped with a functioning treatment system designed to kill nonindigenous species in the ballast water if both of the following apply:

(1) The State Lands Commission has determined that the system is at least as effective as ballast water exchange at reducing the risk of transfer of nonindigenous species in the ballast water of passenger vessels.

(2) The master, operator, or person in charge of the vessel operates, or ensures the operation of, the treatment system as designed.

(c) A vessel of the United States Department of Defense or United States Coast Guard subject to the requirements of Section 1103 of the National Invasive Species Act of 1996, or any vessel of the armed forces, as defined in Section 1322(a)(14) of Title 33 of the United States Code that is subject to the "Uniform National Discharge Standards for Vessels of the Armed Forces" pursuant to Section 1322 (n) of Title 33 of the United States Code.

(d) A vessel that discharges ballast water or sediments only at the location where the ballast water or sediments originated, if the ballast water or sediments do not mix with ballast water or sediments from areas other than mid-ocean waters.

(e) A vessel in innocent passage, which is a foreign vessel merely traversing the territorial sea of the United States and not entering or departing a United States port, or not navigating the internal waters of the United States. However, it is the intent of the Legislature that a vessel described in this subdivision does not discharge ballast water into the waters of the state, or into waters that may impact waters of the state, unless the vessel meets the requirements of Section 71204.

CHAPTER 2. BALLAST WATER MANAGEMENT REQUIREMENTS

71203. (a) The master, operator, or person in charge of a vessel is responsible for the safety of the vessel, its crew, and its passengers.

(b) (1) The master, operator, or person in charge of a vessel is not required by this division to conduct a ballast water management practice, including exchange, if the master determines that the practice would threaten the safety of the vessel, its crew, or its passengers because of adverse weather, vessel design limitations, equipment failure, or any other extraordinary conditions.

(2) If a determination described in paragraph (1) is made, it is the intent of the Legislature that the master, operator, or person in charge of the vessel consider taking all feasible measures that do not compromise the safety of the vessel to minimize the discharge of ballast water containing nonindigenous species into the waters of the state, or waters that may impact waters of the state.

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

71204. (a) Subject to Section 71203, the master, operator, or person in charge of a vessel shall employ at least one of the following ballast water management practices for ballast water carried into the waters of the state from areas outside the EEZ:

(1) Exchange ballast water outside the EEZ, from an area not less than 200 nautical miles from any shore, and in waters more than 2,000 meters (6,560 feet, 1,093 fathoms) deep, before entering the waters of the state.

(2) Retain the ballast water on board the vessel.

(3) Use an alternative environmentally sound method of ballast water management that has been approved by the State Lands Commission before the vessel begins the voyage, and that is at least as effective as ballast water exchange in removing or killing nonindigenous species.

(4) Discharge ballast water to an approved reception facility.

(5) Under extraordinary conditions, conduct a ballast water exchange within an area agreed to by the State Lands Commission at the time of the request.

(b) Subject to Section 71203, the master, owner, operator, or person in charge of all vessels equipped with ballast water tanks that operate in the waters of the state shall do all of the following to minimize the uptake and the release of nonindigenous species:

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

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

(A) Areas known to have infestations or populations of harmful organisms and pathogens.

(B) Areas near a sewage outfall.

(C) Areas near dredging operations.

(D) Areas where tidal flushing is known to be poor or times when a tidal stream is known to be more turbid.

(E) In darkness when bottom-dwelling organisms may rise up in the water column.

(F) Where propellers may stir up the sediment.

(3) (A) Clean the ballast tanks regularly to remove sediments.

(B) Clean the ballast tanks in mid-ocean waters or under controlled arrangements in port, or at drydock.

(C) Dispose of sediments in accordance with local, state, and federal law.

(4) Discharge only the minimal amount of ballast water essential for vessel operations while in the waters of the state.

(5) Rinse anchors and anchor chains when retrieving the anchor to remove organisms and sediments at their place of origin.

(6) Remove fouling organisms from hull, piping, and tanks on a regular basis and dispose of any removed substances in accordance with local, state, and federal law.

(7) Maintain a ballast water management plan that was prepared specifically for the vessel.

(8) Train the master, operator, person in charge, and crew, on the application of ballast water and sediment management and treatment procedures.

71205. (a) (1) The master, owner, operator, agent, or person in charge of a vessel carrying ballast water into the waters of the state after operating outside the EEZ shall provide the information described in subdivision (c) in electronic or written form to the State Lands Commission before the vessel departs from the first port of call in California.

(2) The information described in subdivision (c) shall be submitted using the form developed by the United States Coast Guard pursuant to the National Invasive Species Act of 1996.

(b) If the information submitted in accordance with this section changes, an amended form shall be submitted to the State Lands Commission before the vessel departs the waters of the state.

(c) (1) The master, owner, operator, or person in charge of a vessel carrying ballast water into the waters of the state after operating outside the EEZ, shall maintain on board the vessel, in written form, records that include all of the following information:

(A) Vessel information, including all of the following:

(i) Name.

(ii) International Maritime Organization number or official number if the International Maritime Organization number has not been

assigned.

(iii) Vessel type.

(iv) Owner or operator.

(v) Gross tonnage.

(vi) Call sign.

(vii) Port of Registry.

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

(C) Ballast water information, including the total ballast water capacity, total volume of ballast water onboard, total number of ballast water tanks, and total number of ballast water tanks in ballast, using units of measurements such as metric tons (MT), cubic meters (m3), long tons (LT), and short tons (ST).

(D) Ballast Water Management, including all of the following information:

(i) The total number of ballast tanks or holds, the contents of which are to be discharged into the waters of the state or to a reception facility.

(ii) If an alternative ballast water management method is used, the number of tanks that were managed using an alternative method, as well as the type of method used.

(iii) Whether the vessel has a ballast water management plan and International Maritime Organization guidelines on board, and whether the ballast water management plan is used.

(E) Information on ballast water tanks, the contents of which are to be discharged into the waters of the state or to a reception facility, including all of the following:

(i) The origin of ballast water, including the date and location of intake, volume, and temperature. If a tank has been exchanged, the identity of the loading port of the ballast water that was discharged during the exchange.

(ii) The date, location, volume, method, thoroughness measured by percentage exchanged if exchange is conducted, and sea height at time of exchange if exchange conducted, of any ballast water exchanged or otherwise managed.

(iii) The expected date, location, volume, and salinity of any ballast water to be discharged into the waters of the state or a reception facility.

(F) Discharge of sediment and, if sediment is to be discharged within the state, the location of the facility where the disposal will take place.

(G) Certification of accurate information, which shall include the printed name, title, and signature of the master, owner, operator, person in charge, or responsible officer attesting to the accuracy of the information provided and certifying compliance with the

requirements of this division.

(H) Changes to previously submitted information.

(2) The master, owner, operator, or person in charge of a vessel subject to this subdivision shall retain a signed copy of the information described in this subdivision on board the vessel for two years.

71206. (a) The State Lands Commission, in coordination with the United States Coast Guard, shall take samples of ballast water and sediment, examine documents, and make other appropriate inquiries to assess the compliance of any vessel subject to this division.

(b) The master, owner, operator, or person in charge of a vessel subject to this division shall make available to the State Lands Commission, upon request of that commission, the records required by Section 71205.

(c) The State Lands Commission, in coordination with the United States Coast Guard, shall compile the information obtained from submitted reports. The information shall be used, in conjunction with existing information relating to the number of vessel arrivals, to assess vessel reporting rates and compliance with the requirements of this division.

71207. (a) This division describes the state program to regulate discharges of ballast water from vessels in order to limit the introduction of nonindigenous species. Unless required by federal law, a state agency, board, commission, or department shall not, prior to January 1, 2004, impose any requirements that are different from those set forth in this division.

(b) Nothing in this division restricts state agencies from enforcing the provisions of this division.

(c) Any person violating this division is subject to civil liability in accordance with Chapter 5 (commencing with Section 71216).

(e) The State Lands Commission may require any vessel operating in violation of this division to depart the waters of the state and exchange, treat or otherwise manage the ballast water at a location determined by the commission, unless the master determines that the departure or exchange would threaten the safety or stability of the vessel, its crew, or its passengers because of adverse weather, vessel architecture design, equipment failure, or any other extraordinary condition.

CHAPTER 3. RESEARCH AND PROGRAM EVALUATION

71210. (a) The State Water Resources Control Board, in consultation with the Department of Fish and Game, the State Lands Commission, the United States Coast Guard, the regulated industry, and other stakeholders, shall evaluate alternatives for treating and

otherwise managing ballast water for the purpose of eliminating the discharge of nonindigenous species into the waters of the state or into waters that impact the waters of the state. Whenever possible, the evaluation shall utilize appropriate existing data.

(b) The evaluation shall be completed and submitted to the Legislature and available to the public, on or before December 31, 2002, and shall include, but not be limited to, a description of recommended best available technologies that reflect the greatest degree of reduction in the release of nonindigenous species that is economically feasible, the relative effectiveness of those technologies in minimizing the discharge of nonindigenous species, and the costs of implementing those technologies.

71211. (a) The Department of Fish and Game, in consultation with the State Water Resources Control Board, the State Lands Commission, and the United States Coast Guard, shall conduct a study to establish baseline conditions in the coastal and estuarine waters of the state, which includes an inventory of the location and geographic range of resident nonindigenous species populations. Whenever possible, the study shall utilize appropriate existing data.

(b) The study shall be submitted to the Legislature, and available to the public, on or before December 31, 2002. Information generated by this study shall be of the type and in a format useful for subsequent studies and reports undertaken for any of the following purposes:

(1) The determination of alternative discharge zones.

(2) The identification of environmentally sensitive areas to be avoided for uptake or discharge of ballast water.

(3) The long-term effectiveness of discharge control measures.

(4) The assessment of potential risk zones where uptake shall be prohibited.

71212. Notwithstanding Section 7550.5 of the Government Code, on or before September 1, 2002, the State Lands Commission, in consultation with the State Water Resources Control Board, the Department of Fish and Game, and the United States Coast Guard, shall submit to the Legislature, and make available to the public, a report that includes, but is not limited to, all of the following:

(a) A summary of the information provided in the ballast water discharge report forms submitted to the State Lands Commission, including the volumes of ballast water exchanged, volumes discharged into state waters, types of ballast water treatment, and locations at which ballast water was loaded and discharged.

(b) Monitoring and inspection information collected by the State Lands Commission pursuant to this division, including a summary of compliance rates, categorized by geographic area and other groupings as information allows.

(c) An analysis of the monitoring and inspection information,

including recommendations for actions to be undertaken to improve the effectiveness of the monitoring and inspection program.

(d) An evaluation of the effectiveness of the measures taken to reduce or eliminate the discharge of nonindigenous species from vessels, including recommendations regarding action that should be taken to improve the effectiveness of those measures.

(e) A summary of the research completed during the two-year period that precedes the release of the report, and ongoing research, on the release of nonindigenous species by vessels, including, but not limited to, the research described in Section 71213.

71213. The State Water Resources Control Board, the State Lands Commission, and the Department of Fish and Game shall conduct any research determined necessary to carry out the requirements of this division. The research may relate to the transport and release of nonindigenous species by vessels, the methods of sampling and monitoring of the nonindigenous species transported or released by vessels, the rate or risk of release or establishment of nonindigenous species in the waters of the state and resulting impacts, and the means by which to reduce or eliminate such a release or establishment. The research shall focus on assessing or developing methodologies for treating or otherwise managing ballast water to reduce or eliminate the discharge or establishment of nonindigenous species.

CHAPTER 4. EXOTIC SPECIES CONTROL FUND

71215. (a) The Exotic Species Control Fund is hereby created. The money in the fund, upon appropriation by the Legislature, shall be used to carry out this division.

(b) (1) The State Lands Commission shall establish a reasonable and appropriate fee to carry out this division in an amount not to exceed one thousand dollars ($1,000) per vessel voyage. This amount may be adjusted for inflation every two years.

(2) In establishing fees, the State Lands Commission may establish lower levels of fees and the maximum amount of fees for individual shipping companies or vessels. Any fee schedule established, including the level of fees and the maximum amount of fees, shall take into account the impact of the fees on vessels operating from California in the Hawaii or Alaska trades, the frequency of calls by particular vessels to California ports within a year, the ballast water practices of the vessels, and other relevant considerations.

(c) The fee shall be collected by the State Board of Equalization from the owner or operator of each vessel that enters a California port with ballast water loaded from outside the EEZ.

(d) Notwithstanding any other provision of law, all fees imposed pursuant to this section shall be deposited into the Exotic Species