

**REPORT ON THE
CALIFORNIA MARINE INVASIVE
SPECIES PROGRAM**

**PRODUCED FOR THE
CALIFORNIA STATE LEGISLATURE**

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I. EXECUTIVE SUMMARY

The 1999 Ballast Water Management for Control of Non-indigenous Species Act (Assembly Bill 703) charged the California State Lands Commission (CSLC) with oversight of the state's first program to prevent non-indigenous species (NIS) introductions through the ballast water of commercial vessels. Upon the sunset of the Act, the Marine Invasive Species Act (AB 433) was passed in 2003, revising and widening the scope of the CSLC program to more effectively address the NIS threat. Under the new Act, the expanded Marine Invasive Species Program (MISP) continues to monitor compliance with the requirement to manage ballast water of foreign origin. In addition, the program has initiated administration of the following efforts:

- Adopt reporting and ballast water management requirements for all voyages in the Pacific Coast Region
- Develop a program that supports the development of ballast treatment and management technologies
- Initiate discussions and develop policy recommendations for ballast treatment system performance standards
- Evaluate the risk of commercial vessel fouling as a means of NIS introduction, and formulate recommendations to reduce this risk
- Coordinate and consult with sister agencies that administer other components of the Act (esp. Department of Fish and Game and Board of Equalization)

This report summarizes vessel ballast water activities as related to the Act from January 2003 through December 2004, vessel compliance during that timeframe, and the ongoing programmatic efforts of the MISP. Due to the expansion of the State's law effective January 1, 2004, direct comparison between Year 2003 and 2004 data is cautioned.

Vessel compliance with the requirement to report ballast management and discharge practices is very high, and has risen dramatically since the inception of the program. In 2003 97% of vessels submitted reports, up from approximately 60% observed during the first six months of the program in 2000. In 2004, even with the new requirement that voyages between Pacific Coast ports or places were required to submit reports, more than 98% complied.

Likewise, vessel-reported compliance with the requirement to manage ballast originating from waters outside the US EEZ continues to exceed 90%. Of the approximately 5.2 million metric tons of ballast water discharged in California during 2003, 94% was managed through mid-ocean exchange. In 2004, 7.8 million metric tons was reported to have been discharged in state waters, only 4% did not comply with the mid-ocean exchange requirements.

The vast majority of non-compliant ballast water discharges originated from Mexican and Central American waters. This pattern highlights the need for intense targeted compliance monitoring and enforcement action, as necessary by CSLC. Additionally, it

reinforces the need for the development of environmentally safe shipboard treatment systems, as well as the identification of alternative exchange zones within coastal waters.

Vessel inspections conducted by CSLC staff revealed similarly high compliance rates. During the 2003-2004 period, 2318 inspections were completed. Less than 5% of the noted violations were associated with operational aspects of the law, which includes improper ballast water management.

The high compliance rates are attributable to the multipronged outreach and communication activities undertaken by the CSLC. Inspectors distribute information verbally and in print to crews on regulations. Agents are notified monthly of their vessels' reporting compliance or non-compliance. Multi-agency, multi-interest advisory groups are continually convened and consulted regarding evolving policy considerations. These efforts serve to maintain well-informed stakeholders, build working relationships with affected parties, and ensure that regulations are wisely developed.

In addition to the regulatory directives, the Act included mandates to address gaps identified during the beginning years of the program that would improve the ability of the program to prevent NIS introductions. CSLC is active in research that will improve the effectiveness of monitoring and inspection by funding a project designed to develop a rigorous test for discerning exchanged ballast water from unexchanged ballast water on a vessel. CSLC is also active in research addressing the major vessel-borne invasion vectors. Beginning mid-2005, CSLC will be funding projects that evaluate alternative shipboard treatment technology, as well as the impact of hull fouling as a vector for NIS introductions.

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III. ABBREVIATIONS

ABRPI	Aquatic Bioinvasion Research and Policy
Act	Marine Invasive Species Act (AB 433)
BOE	Board of Equalization
BWEv	Ballast Water Exchange Verification
CSLC	California State Lands Commission
CDFG	California Department of Fish and Game
EEZ	United States Exclusive Economic Zone
Fund	Kapiloff Land Bank Fund
IMO	International Maritime Organization
MISP	Marine Invasive Species Program
LA-LB	Los Angeles-Long Beach Port Complex
MT	Metric Tons
NIS	Non-indigenous Species
NOAA	National Oceanic and Atmospheric Administration
OSPR	Office of Oil Spill Prevention and Response
POC	Particulate Organic Carbon
R & D	Research and Development
SERC	Smithsonian Environmental Research Center
STEP	Shipboard Treatment Evaluation Process
SWRCB	State Water Resources Control Board
TAG	Technical Advisory Group
ROV	Remotely Operated Vehicle
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
UV	Ultraviolet Irradiation
VOS	Venturi Oxygen Stripping
QV	Qualifying Voyage

IV. INTRODUCTION

Legislative Background and Report Purpose

Non-indigenous species (NIS) are organisms that have been transported by human activities into regions where they did not occur in historical time, and successfully reproduce in the wild at their new location (Carlton 2001). Once established, such species can create negative economic, ecological, and human health impacts in their new environs. For marine and estuarine environments, the ballast water of ships is considered one of the major pathways through which foreign species are transported and spread (Stemming the Tide, 1996).

In response to this threat, the California Legislature passed Assembly Bill (AB) 703, the Ballast Water Management for Control of Nonindigenous Species Act in 1999. The law required that vessels originating from outside the United States Economic Exclusive Zone (EEZ) carry out mid-ocean exchange or use an approved ballast water treatment method, before discharging in California state waters. The California State Lands Commission's (CSLC) Ballast Water Management Program was tasked with several specific responsibilities.

Receive and process ballast management reports submitted by all vessels arriving to California State waters from outside the EEZ.

Monitor ballast management and discharge activities of vessels through submitted reports

Inspect and sample vessels for compliance with the law

Assess vessel reporting rates and compliance with the law

The activities and analyses of the first 2.5 years of the program are detailed in the first biennial report of the California Ballast Water Management Program (Falkner 2003).

In recognition of the uncertainties surrounding the development of an effective ballast water management program for the State, AB 703 specified a sunset date of January 1, 2004. During the 2003 Legislative session, the act was revised and recast as AB 433, the Marine Invasive Species Act (Act). In the new Act, the ballast management requirements for the vessels originating outside of the EEZ remained largely similar to those of AB 703, with the exception that vessels engaged in coastwise crude oil trade were no longer exempted from the regulation.

Several recommendations identified during the administration of AB 703 and detailed in the program's first biennial report (Falkner 2003) were incorporated into the 2003 law. In accordance with the Act, the State program was renamed the Marine Invasive Species Program (MISP), and charged with several expanded responsibilities. Key among these were:

- Authorization to pursue criminal and/or civil penalties for violations to the law.

- Adopt ballast water management regulations for vessels originating from within the Pacific Coast Region.
- Adopt regulations for the evaluation and approval of experimental shipboard ballast treatment systems.
- Sponsor a pilot program that will evaluate the feasibility of ballast water treatment technologies.
- Recommend performance standards for ballast treatment systems, in consultation with an advisory panel.
- Evaluate the risk of non-ballast ship-based vectors for spreading NIS and recommend actions to prevent associated introductions, in consultation with a technical advisory group.

This report summarizes the activities of the State's Program for the period from January 2003 through December 2004. The data pertaining to Year 2003 reflects the requirements of AB 703, whereas Year 2004 data reflects the requirements as mandated under AB 433. Therefore, direct comparison between 2003 and 2004 results are cautioned. As mandated, this report includes an analysis of ballast practices reported by the industry, summarizes NIS research completed, evaluates the effectiveness of the program, and puts forth recommendations to improve effectiveness of the program. In addition, this report describes the process through which MISP seeks input from research, stakeholder, and government communities to guide management recommendations and rulemaking, in pursuit of preventing new vessel-borne introductions to the State of California.

Although the expanded/enhanced Program became effective January 1, 2004, the Act did not appropriate any funding for continuation of the program beyond December 31, 2003. Control language in Section 27 of the Budget Act of 2003 prohibited any deficiency/supplemental appropriation of funds related to legislation enacted without an appropriation. Funds were not available until passage of the 2004 Budget Act. The program was maintained on a minimal level, with consent of the Department of Finance, for data collection only, through a reimbursement agreement with the Department of Fish and Game using excess appropriation authority from the prior program. This delay in funding, postponed hiring of needed staff, which has had a negative effect on all time-certain mandates, including the submittal of this report to the Legislature.

Vehicles of Introduction – “Shipping Vectors”

Also known as “introduced”, “invasive”, “exotic”, “alien”, or “aquatic nuisance species”, non-indigenous species (NIS) in marine, estuarine and freshwater environments may be transported to new regions through numerous human activities. Intentional and unintentional introductions of fish and shellfish, aquaculture, illegal releases from the aquarium and pet industries, floating marine debris, bait shipping, and accidental release through research institutions are some of the mechanisms, or “vectors”, by which organisms are transferred (U.S. Commission on Ocean Policy 2004). In coastal environments, commercial shipping is the most important vector for invasion, in one study accounting for one half to three-quarters of introductions to North America

(Fofonoff et al. 2003). Vessels transport organisms through two primary sub-mechanisms: ballast water and fouling.

Ballast water is necessary for many functions related to the trim, stability, maneuverability, and propulsion of large seagoing vessels (Stemming The Tide 1996). Vessels may take on, discharge, or redistribute water during cargo loading and unloading, as they encounter rough seas, or as they transit through shallow coastal waterways. Typically, a vessel will take on ballast water after cargo is unloaded in one port to compensate for the weight imbalance, and later discharge water when cargo is loaded in another. As ballast is transferred from “source” to “destination” ports, so are the many organisms taken into its tanks along with the port water. In this fashion, it is estimated that some 7000 plus organisms are moved around the world on a daily basis (Carlton 1999).

Fouling organisms are associated with hard surfaces that are exposed to water. These include organisms that physically attach to vessel surfaces, such as barnacles, algae, and mussels, and also includes mobile organisms that associate with fouling communities, such as worms, juvenile crabs, and amphipods (small shrimp-like animals). Though much of the outer surface of vessel hulls are treated with toxic paints designed to discourage fouling growth, worn or unpainted areas, and areas protected from shear forces have been found to harbor fouling organisms (Coutts et al. 2003, Minchin and Gollasch 2003, see Smithsonian Environmental Research Center/Port of Oakland study, Section X of this Report). Vessels that spend long periods in port or move at slow speeds, such as barges and floating dry docks, appear to accumulate more extensive and diverse fouling communities (Godwin et al. 2004, Minchin and Gollasch 2003, Godwin 2003). In some circumstances, fouling organisms have been observed to be in spawning condition at arrival ports (Coutts et al. 2003, Apte et al. 2000).

NIS Impacts

The rate, and thus the risk, of invasion has increased significantly during recent decades. The rate of reported invasions in North America increased exponentially over the last 200 years (Ruiz et al. 2000a). In the San Francisco Bay Estuary alone, a new species is believed to become established every 14 weeks (Cohen and Carlton 1998). One of the primary factors contributing to this increase is the expansion of global trade, and the technologies, which enable commodities to be transported swiftly and efficiently throughout the world. Along with goods, organisms are moved over land, air, and sea in larger numbers to more widespread locations, and are better able to survive the shortening excursions (Ruiz and Carlton 2003).

Once established, NIS can have severe ecological, economic, and human health impacts to the receiving environment. The most infamous example is the zebra mussel (*Dreissena polymorpha*) introduced to the Great Lakes from the Black Sea. They attach to hard surfaces in dense populations that clog municipal water systems and electric generating plants, resulting in costs of approximately a billion dollars a year (Pimentel et al. 2004). In such high densities, the mussels filter vast amounts of tiny floating plants

and animals (plankton) from the water. Plankton support the foundations of aquatic food webs, and disruptions to this base appear to reverberate through the ecosystem. By dramatically reducing plankton concentrations and crowding out other species, zebra mussels have altered local ecological communities, causing localized extirpation of natives (e.g. Martel et al. 2001), and declines in recreationally valuable fish species (Cohen and Weinstein 1998). The Asian clam (*Potamocorbula amurensis*) spread throughout the San Francisco Bay and its tributaries two years after its introduction, and accounts for up to 95% of living biomass in some shallow portions of the bay floor (Nichols et al., 1990). Like its Great Lakes counterpart, the Asian clam fouls power plant structures, costing approximately a billion dollars per year during the early 80's for control and losses (Lovell and Stone 2005). The clam may also cause declines in fish populations by consuming plankton (Feyrer et al. 2003). The Chinese mitten crab, *Eriocheir siensis*, was first sighted in the San Francisco Bay in 1992, and quickly spread through the system, clogging pumping stations and riddling levies with burrows (Rudnick et al. 2000). Costs for control and research were \$1 million in 2000-2001 (Carlton 2001). The European green crab (*Carcinus maenas*), thought to have caused the crash of the Maine softshell clam fishery arrived in California during the mid-1990s (Grosholz and Ruiz 1995). There are fears that it will compete for food with the valuable Dungeness crab (*Cancer magister*) threatening the west coast fishery. The microorganisms that cause human Cholera (Ruiz et al. 2000b) and paralytic shellfish poisoning (Hallegraeff 1998) have also been found in the water and sediments in ballast tanks.

In addition to the known impacts of established NIS, the impacts posed by possible invasions are notable. Though the zebra mussel has not yet become established west of Oklahoma, it has been cited on trailered boats in California (USGS 2005). Based on its habitat preferences, the mussel has the potential for colonizing many California waterways, including the California, Los Angeles and Colorado River Aqueducts (Cohen and Weinstein 1998). The Chinese Mitten Crab is a secondary host for the Asian lung fluke *Paragonimus westermanii*, which may parasitize humans. Though as of 2000 no infected crabs have been found in California, there is significant risk of outbreak should the fluke or an infected crab arrive from overseas (California Sea Grant 2003).

Prevention through Ballast Water Management

Attempts to eradicate NIS after they have become widely distributed are typically unsuccessful and costly (Carlton 2001). Control is likewise extremely expensive. For example, approximately \$10 million is spent annually to control the sea lamprey (*Petromyzon marinus*) in the Great Lakes (Lovell and Stone 2005); \$2.3 million was spent to control the Mediterranean green seaweed (*Caulerpa taxifolia*) in southern California during 2000-2001, and \$2 million was spent in Washington to control Atlantic cordgrass (*Spartinia alterniflora*) between 1999-2001 (Carlton 2001). Prevention is therefore considered the most desirable way to address the issue.

For the vast majority of commercial vessels open-ocean ballast exchange more than 200 nm offshore is the primary method of ballast water management. Currently, it is the best compromise of efficacy, environmental safety, and economic practicality. The vast

majority of vessels are capable of conducting exchange, and the management practice does not require any special structural modification to most of the vessels in operation.

During exchange, the biologically rich water that is loaded while a vessel is in port or near the coast is exchanged with the comparatively depauperate waters of the open ocean. In addition, coastal organisms adapted to the conditions of bays, estuaries and shallow coasts are not expected to survive and/or be able to reproduce in the open sea (Cohen 1998). The reverse is expected for organisms of the open ocean. Scientific research indicates that offshore ballast exchange typically eliminates 70% - 95% of the organisms originally taken into a tank while at or near port (Zhang and Dickman 1999, Parsons 1998, Cohen 1998).

Ballast water exchange, however, is widely considered an interim ballast water management tool because of its variable efficiency, and due to several operational limitations. A proper exchange can take many hours to complete, and in some circumstances, may not be possible without compromising safety (i.e. adverse sea conditions, antiquated vessel design). Some vessels are regularly routed on short voyages, or voyages that remain within 50 nm of shore. In such cases, the exchange process may create a minor delay or require a vessel to deviate from the most direct route. In the future, a vessel would ideally utilize alternative ship- based or shore based treatment systems that reduce organisms in ballast water as well as, or better than open-ocean exchange. A review of several promising technologies, including several funded by the MISP, is described in more detail in Section X.

Regulations

The ballast water regulations and guidelines of the nations and U.S. states that regulate ballast water share several similar components. All allow ballast water exchange as an acceptable method of ballast water management, and provide some type of exemption should a vessel or its crew become endangered by the exchange process. All accept approved alternative ballast water treatments in anticipation that an effective technology is developed. All but the International Maritime Organization require the completion and submission of forms detailing ballast management and discharge practices.

International Regulations - The International Maritime Organization (IMO) adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments in February of 2004, which becomes effective one year after ratification by 30 countries representing 35% of the world shipping tonnage (International Maritime Organization). Vessels must conduct exchange at least 50 nm from shore in waters at least 200 meters deep, though it is preferred exchange be conducted 200 nm offshore. Following the year 2014, the convention specifies varying ballast management requirements and deadlines depending on vessel size and construction date. Vessels constructed before 2009 must manage ballast in a manner that is at least as effective as exchange, until 2014 or 2016 depending on vessel size. Thereafter, they must meet a stringent "Ballast Water Performance Standard" that specifies strict limits on the number of organisms or microbe colonies permissible per unit of ballast water. As of spring 2005, the United States had not signed onto the convention.

Canada, Australia & New Zealand - Canada adopted voluntary guidelines in 2001, and vessels are requested to conduct exchange in waters 200 nm offshore and 2000 meters or deeper. The ports of Vancouver, Nanaimo, and Fraser River make these voluntary guidelines mandatory, though vessels arriving from Alaska and U.S. west coast ports north of Cape Mendocino are exempted (Transport Canada 2001). Australia requires ballast water exchange outside of the 12 nm Australian limit in waters greater than 200 m deep, and ballast water from “high risk” areas are prohibited (Australian Quarantine and Inspection Service). In New Zealand, vessels must conduct mid-ocean exchange in waters at least 200 nm offshore and must obtain permission before discharging, even if ballast water has been exchanged. Absolutely no discharge is allowed if vessels contain water from the “high risk” ports of Tasmania and Port Philip Bay, both in Australia (New Zealand Ministry of Fisheries)

Federal Regulations - In September of 2004, the United States Coast Guard adopted mandatory ballast water management regulations for vessels entering from outside the EEZ. Exchange is required to be conducted more than 200 nm offshore, however, vessels that experience undue delay are exempted. There is no management requirement for vessels traveling “coastally”, or wholly within the 200 nm EEZ.

Mainland U.S. Pacific Coast - With the exception of Alaska, all U.S mainland Pacific states have adopted ballast water management regulations that are more comprehensive than the federal requirements. Oregon began requiring ballast water management in 2002. Vessels of foreign origination are required to conduct exchange at least 200 nm offshore. However, for vessels traveling within 200 nm and entering Oregon from areas north of 50° N, or south of 40° S, a “coastal” exchange of unspecified distance offshore is required (Flynn and Sytsma 2004). Legislation requiring coastal exchange at 50 nm offshore is currently under review in the Oregon Legislature. Washington’s Year-2000 exchange requirement for foreign vessels is identical to Oregon’s. Coastally transiting vessels are generally required to conduct exchange at least 50 nm offshore, with the exception that exchange is not required if the water is common to the state and has not been mixed with waters outside of the Columbia River system (Washington Department of Fish and Wildlife 2003).

California - California’s initial legislation, Assembly Bill 703 (AB 703), addressed the ballast water invasion threat at a time when national regulations were not mandatory. The Ballast Water Management for Control of Nonindigenous Species Act, passed in 1999, established a statewide multi-agency program to prevent and control NIS in state waters. In addition to the CSLC, the California Department of Fish and Game (CDFG), the State Water Resources Control Board (SWRCB) and the Board of Equalization (BOE) were charged to direct research, monitoring, policy development, and regulation, and to cooperatively consult with one another to address the problem (Falkner 2003). AB 703 required that vessels entering California from outside the EEZ manage ballast before discharging into state waters. Vessels were required to exchange ballast water 200 nm offshore or treat ballast water with an approved shipboard or shore-based treatment system. There was, however, no management requirement for vessels

transiting between ports wholly within the EEZ, despite evidence that “intra-coastal” transfer may facilitate the spread of NIS from a location where it is firmly established, San Francisco Bay for example, to an adjacent port where it is not (Lavoie et al. 1999, Cohen and Carlton 1995). 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 AB 703. In 2003 Assembly Bill 433 was passed, reauthorizing and enhancing the 1999 legislation to include many of the recommendations of the program’s first biennial report (Falkner 2003).

V. CALIFORNIA’S MARINE INVASIVE SPECIES PROGRAM

The California Legislature passed Assembly Bill 433 during the 2003 regular session, and was signed by the Governor in October 2003 (Appendix A). The bill reauthorized, enhanced, and renamed the State’s ballast water management program, creating the Marine Invasive Species Act (Act). The Act applies to all U.S. and foreign vessels, over 300 gross registered tons that arrive at a California port or place after operating outside of California waters. All vessels arriving at a California port or place must have a ballast water management plan and ballast tank logbook specific to the vessel. Each vessel is required to submit a ballast water reporting form upon departure from each port call in California waters detailing their ballast water management. However, only vessels arriving from outside the EEZ are required to manage their ballast water as prescribed in the Act. The Act does direct the CSLC to adopt regulations for vessels transiting within the Pacific Coast Region. The Rulemaking process is currently underway and will require coastal exchange at 50 nm offshore for such voyages. The effective date of the regulation is anticipated in Fall of 2005 (see Section X).

In addition to the regulatory directives, the Act included mandates to address gaps identified during the beginning years of the program that would improve the ability of the program to prevent NIS introductions. The Commission’s Marine Invasive Species Program (MISP) has formed several Technical Advisory Groups (TAG) that discuss policy and regulatory matters related to general NIS management and the implementation of legislative mandates. TAGs include representatives from the maritime industry, ports, state agencies, environmental organizations, and research institutions, and serve several critical outreach functions. They serve as a forum through which information and ideas can be exchanged, and ensure that rulemaking decisions consider the best available science as well as the concerns of affected stakeholders. TAG members also relay information to their respective constituencies, keeping them abreast of CSLC actions and activities.

Headquarters - The Marine Facilities Division of the CSLC administers the State’s Marine Invasive Species Program (MISP). The MISP staff are active members in several ballast water related groups including: the Ballast Outreach Advisory Team, Sea Grant Extension; Oregon’s Ballast Water Management Task Force; Aquatic Nuisance Species Task Force; and the Pacific Ballast Water Working Group. Wherever possible, staff works with the scientific community, other West Coast state representatives, Federal agencies, and the international maritime community to standardize ballast water management programs. This coordination and standardization has improved support

and compliance by the maritime industry, and has enhanced understanding and the development of solutions to NIS introductions.

Field Offices - The CSLC MISP Inspection Program consist of field offices located in Northern and Southern California and implements an extensive monitoring program to ensure compliance. All vessels are required to submit to compliance inspections, which include sample collection of ballast water and sediment, examination of documents, and any additional appropriate inquiries as needed. The Act specifies that field inspection of ballast water and sediments be conducted from at least 25 % of the arriving vessels, with enforcement administered through the imposition of administrative civil and criminal penalties. In addition to verifying compliance with the management requirements of the Act, the Inspection Program plays a key role in outreach and education for the maritime industry. See Section X on Education and Outreach.

Fee – Assembly Bill 703 created the Exotic Species Control Fund to support each agency’s program (Section 71215). Reauthorization of the State’s Program under AB 433 included the reauthorization and renaming of the Fund to the Marine Invasive Species Control Fund. The amount of the Fee is based on agency budgets approved by the State’s Legislature and totals \$16.1 million over 6 years. Budgets cover the CSLC’s ballast water inspection and monitoring program, the development and implementation of regulatory packages, research on alternative treatment technologies, hull fouling vectors, and performance standards. The budget also covers the biological surveys conducted by the California Department of Fish and Game to track the extent of NIS introductions in State waters, Fee assessment by the Board of Equalization, and consultation by State Water Resources Control Board. 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 the 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 \$500/voyage, but will be decreased to \$400/voyage in mid-2005.

Outreach and Education

Coastal Exchange Stakeholder Workshops - Two stakeholder workshops were held in 2002 and 2003 to address and inform coastal ballast water management in the Western Pacific Coast Region. A preliminary workshop took place in March of 2002 to gather information on the physical oceanography of the West coast. As a result of this workshop a draft report was produced, “West Coast Oceanography: Implications of Coastal Ballast Water Exchange.” The report outlined recommendations for coastal ballast water management with respect to the physical oceanography of the region.

The second workshop, “West Coast Coastal Exchange Workshop” held in January 2003, brought together marine biologists, oceanographers, regulatory agency staff, and representatives from the maritime industry. The objective of this second workshop was to consider information and recommendations from the 2002 workshop to develop plans for regional coastal ballast water management.

The 2003 workshop was mostly spent in breakout sessions with small working groups. The first day grouped individuals with similar interests to discuss and summarize the issues for the group they represented. These groups were: 1) the maritime industry, 2) government regulators, 3) marine scientists, and 4) environmental organizations.

During the second day of breakout sessions, each group was made up of individuals from different areas of expertise, and each was asked to develop a regional plan for coastal ballast water exchange on the West Coast. Consensus points from all three groups were very similar: 1) coastwise transport of ballast water represents a significant threat, particularly in direct estuary-to-estuary transfers, 2) although there are many unknowns, an interim coastal ballast water exchange program should move forward, and 3) the coastal ballast water exchange program should be a uniform regional program also consistent with federal and international regulations. As a result of these meetings and a subsequent stakeholder meeting in July 2004, CSLC submitted a Rulemaking package in February 2005 to the State's Office of Administrative Law, proposing to govern the ballast water management of vessels operating within the Pacific Coast Region (See Section XI, Moving Forward).

Outreach to Maritime Industry - One of the key components for the success of the program continues to be the close communication, coordination, and outreach that occurs between the CSLC, the maritime industry, and other state agencies. The CSLC facilitates this communication through several specific avenues including a monthly late form notification, vessel inspections, advisory groups, a web site, and through participation in public and scientific workshops, and public speaking engagements.

During the first year of the program, a dramatic increase in reporting compliance (submission of ballast water reporting forms) was observed following the initiation of a monthly notification system and issuance of warning letters (Falkner 2003). These activities have subsequently become an integral part of the program. Each month a list of ballast water reporting forms received by the CSLC is reconciled with a list of vessel arrivals reported by the Maritime Exchange. Qualifying voyages that appear on the Marine Exchange report but have not submitted reporting forms to the CSLC are flagged. On or about the fifth of every month, individual agents are then sent a master list of vessels under their purview, indicating which have punctually sent forms and which have not. If a delinquent form is not received within 60 days, a warning letter is sent to the agent.

Though this notification process is time intensive, it assures direct, periodic communication with more than 60 shipping agents and has been well received by the maritime industry. Agents also contact CSLC personnel directly with questions or concerns. Monthlies and warning notifications have resulted in reporting compliance rates that have increased from ~60% in early 2000, to 93% by June 2002, to over 98% 2004 (See Section VII).

CSLC inspectors serve as an important direct conduit of information to vessel crews, particularly in an industry where vessels often change ownership, routes, and crew composition. During vessel visits, inspectors verbally explain paperwork, reporting, and ballast management obligations, and point out where a vessel may be falling short of compliance. For vessels that call at a California port for the first time, inspectors distribute informational packets that include a summary of the California law, instructions on completing the ballast water form, and contacts for information on west coast ballast regulations.

The MISP has formed several technical advisory groups (TAGs) that discuss policy and regulatory matters related to general NIS management and the implementation of legislative mandates. TAGs include representatives from the maritime industry, ports, state agencies, and research institutions, and serve several critical outreach functions. They serve as a forum through which information and ideas can be exchanged, and ensure that rulemaking decisions consider the best available science as well as the concerns of affected stakeholders. TAG members also relay information to their respective constituencies, keeping them abreast of CSLC actions and activities. In January 2000, a general TAG was convened to discuss regulatory matters and continues to meet periodically. In 2005, two specialized advisory groups were assembled to formulate recommendations for ballast treatment performance standards and vessel hull fouling (see Section X).

Outreach to the Public - In May 2005, the Marine Invasive Species Program will participate in an Electronic Field Trip (EFT) hosted by the Smithsonian Environmental Research Center and Ball State University. The program will focus on coastal and estuarine invasions in general, with an emphasis on the introduction mechanisms, impacts, and management in San Francisco Bay. An estimated 15 million children, grades 3-8, will view the 90 minute Web-based broadcast from classrooms across the United States. They will also be able to actively participate over email, web polls, via telephone, and through live video feeds.

CSLC staff actively continues to facilitate communication among stakeholder groups through several additional vehicles. A website contains programmatic background information, downloadable forms and reports, and rulemaking and public hearing announcements. Attended events have ranged from those sponsored by industry, federal and state organizations. CSLC has also initiated or collaborated on numerous workshops, conferences, and speaking engagements, to further enhance outreach efforts.

VI. COMPLIANCE

Compliance with Ballast Water Reporting Requirements

Under the Act, the master, owner, operator, agent, or person in charge of a vessel is required to submit a ballast water reporting form upon departure from each port or place of call in California. The CSLC is required to compile the information obtained from the submitted reports to assess compliance with the requirements of the Act. Utilizing a state database created under AB 703, the CSLC can assess (1) rates of compliance

with reporting requirements; (2) rates of compliance with mandatory management guidelines for ballast water; (3) patterns of ballast water delivery and management according to vessel class by geographic area.

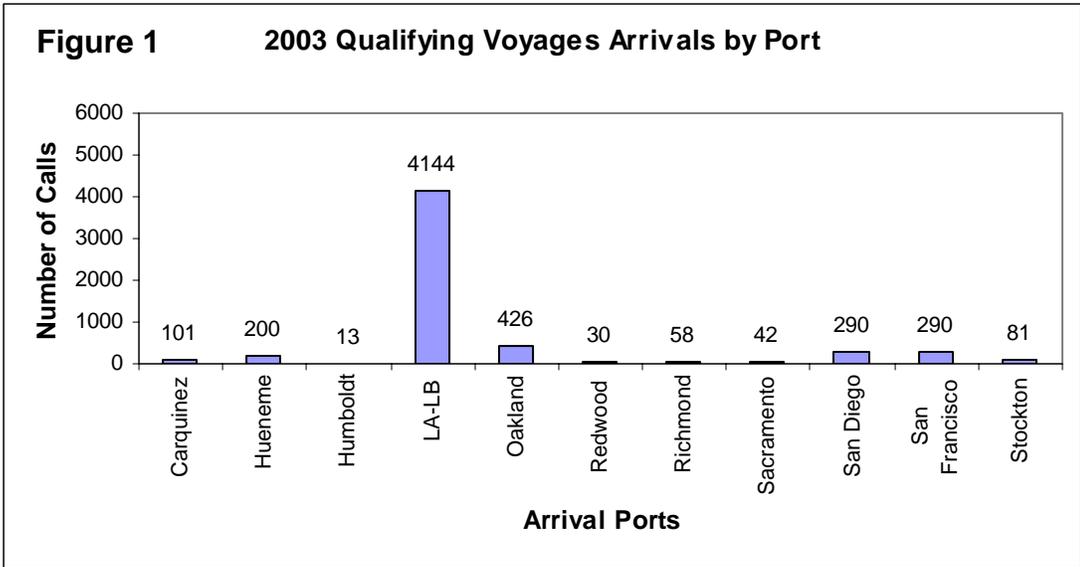
The CSLC relies on three primary sources of data. These include (1) ballast water information reported directly to the CSLC by vessels operating in California waters; (2) transportation statistics collected from the two state Marine Exchanges, individual ports, and shipping agents; and (3) verification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

Compliance with the reporting and ballast water management requirements was assessed at two different geographic scales: statewide and local port system. Under the original legislation (AB 703), CSLC identified 11 port zones, including San Diego, LA-LB Complex, Hueneme, Redwood City, San Francisco, Oakland, Richmond, Carquinez, Stockton, Sacramento, and Humboldt. As a result of the Program's reauthorization, CSLC included an additional four port zones, these include Avalon, El Segundo, Santa Barbara, and Monterey.

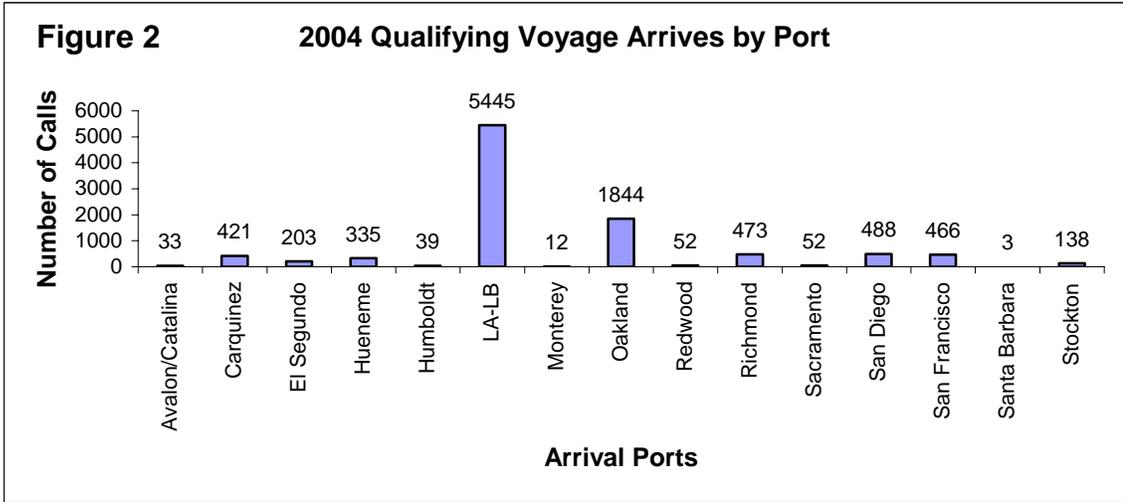
The determination of qualifying voyages (QV) differs between Year 2003 and Year 2004 as a result of the reauthorization of the state's program. For year 2003, QV arrivals included: (1) all arrivals to California waters from countries other than the United States; (2) arrivals to California from a U.S. island state or protectorate (e.g. Hawaii, Guam, and Puerto Rico), 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; and (4) vessels that leave Alaskan ports and arrive in California, since they depart the EEZ during transit. With the enactment of the AB 433, QV for reporting and Fee submittal were expanded to include all vessels greater than 300 gross registered tons, operating in California waters. However, a QV with regards to the mandated ballast water management requirements is nearly identical to those under AB 703. In addition, AB 433 no longer exempted tank vessels engaged in coastwise trade from program reporting or ballast water management requirements.

Statewide Vessel Traffic

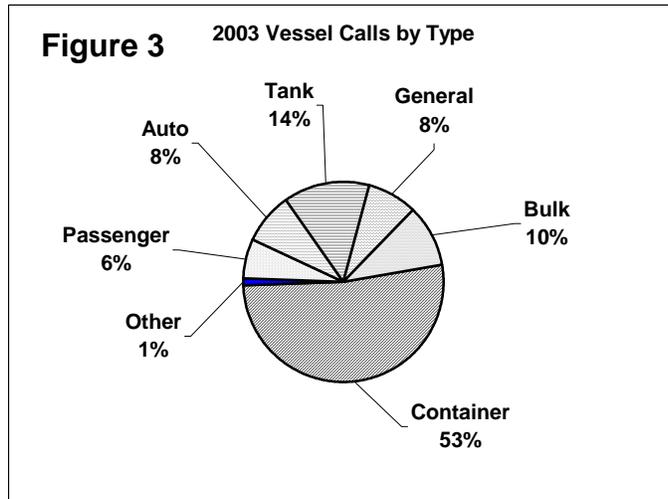
Year 2003 – The extent of vessel traffic to California as measured by the cumulative number of QV arrivals, varied considerably among port (Figure 1). The Los Angeles-Long Beach Port Complex (LA-LB) led the state in QV arrivals, accounting for 73% of the arrivals. Oakland represented 7.5% of the arrivals, while San Diego, San Francisco, and Hueneme accounted for 5.1, 5.1, and 3.5% of the arrivals, respectively. The remaining Ports (Carquinez, Humboldt, Redwood City, Richmond, Sacramento, and Stockton) combined received 5.8% of the traffic.



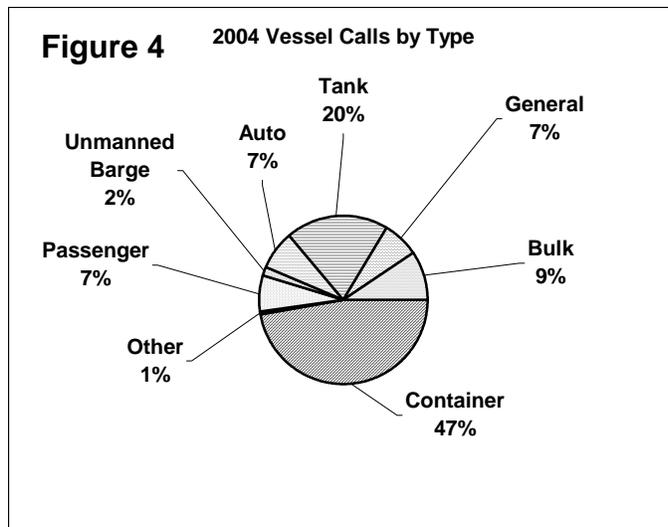
Year 2004 – As a result of the reauthorization and expansion of the Act the cumulative number of QV arrivals differed significantly from those recorded for Year 2003. Beginning in 2004, all vessels entering California ports or places were required to submit a reporting form outlining their ballast water management activities. The LA-LB continues to lead the state in QV arrivals, accounting for 54%, Oakland represents 18% of the arrivals, while Carquinez, Hueneme, Richmond, San Diego, and San Francisco accounted for 4.2, 3.3, 4.7, 4.9, and 4.7% of the arrivals, respectively (Figure 2). This increase in QV arrivals represents second (and sometimes third) port calls in California (e.g. Oakland, San Diego, and San Francisco) and the removal of the exemption for crude oil tankers engaged in coastwise trade (e.g. Carquinez, El Segundo, and Richmond).



Statewide, during 2003 over 50% of the vessel calls were by container vessel, 14% were tanker vessels, and 10% were bulk vessels (Figure 3).



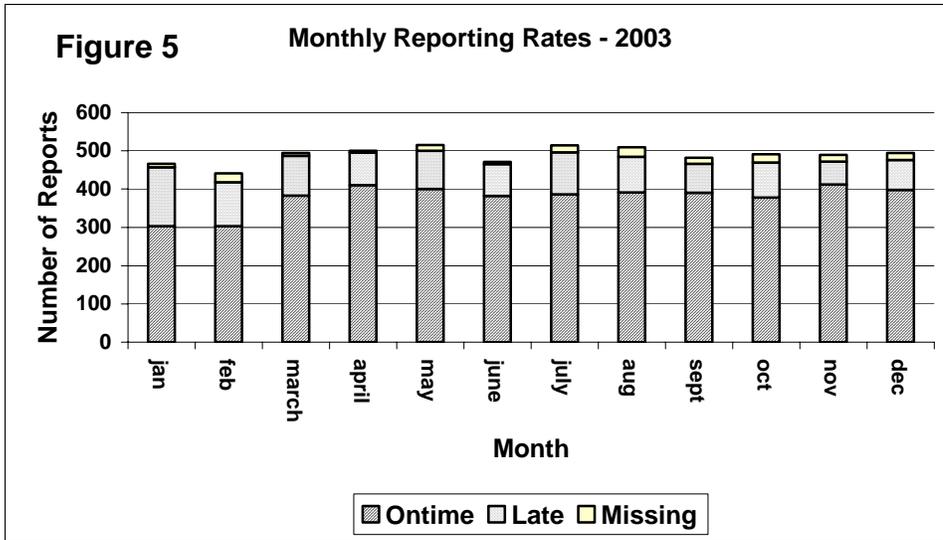
In 2004, with the expansion of the law and the removal of the exemption for crude oil tankers, tanker vessels accounted for 20% of all vessel calls (Figure 4).



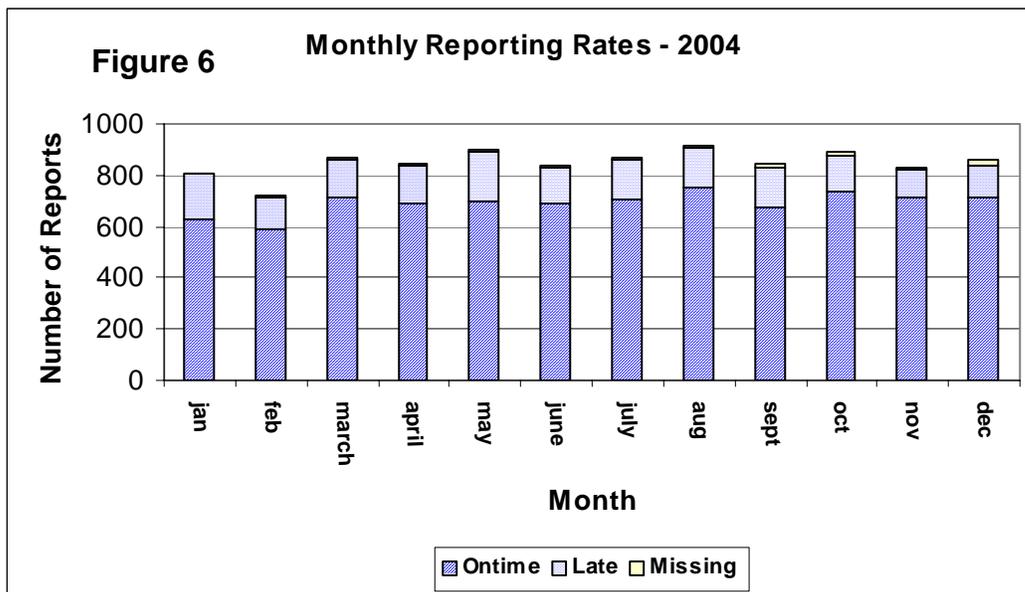
Statewide Reporting Compliance

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 upon departure for each vessel call in California waters. As a result of low compliance in early 2000 (~60%), CSLC initiated an electronic notification procedure for ship agents and owners. As a result, compliance has continued to improve (See Section VII, Outreach to Maritime Industry).

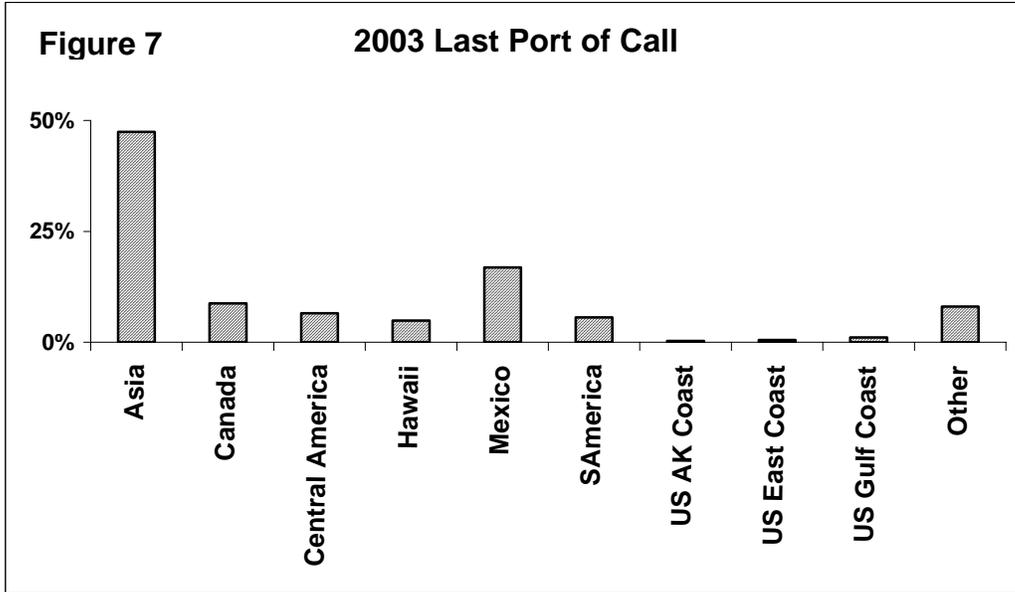
In 2003, overall compliance with ballast water reporting was 97%, with 77% submitted reports on time. The CSLC received 5685 reports for the year.



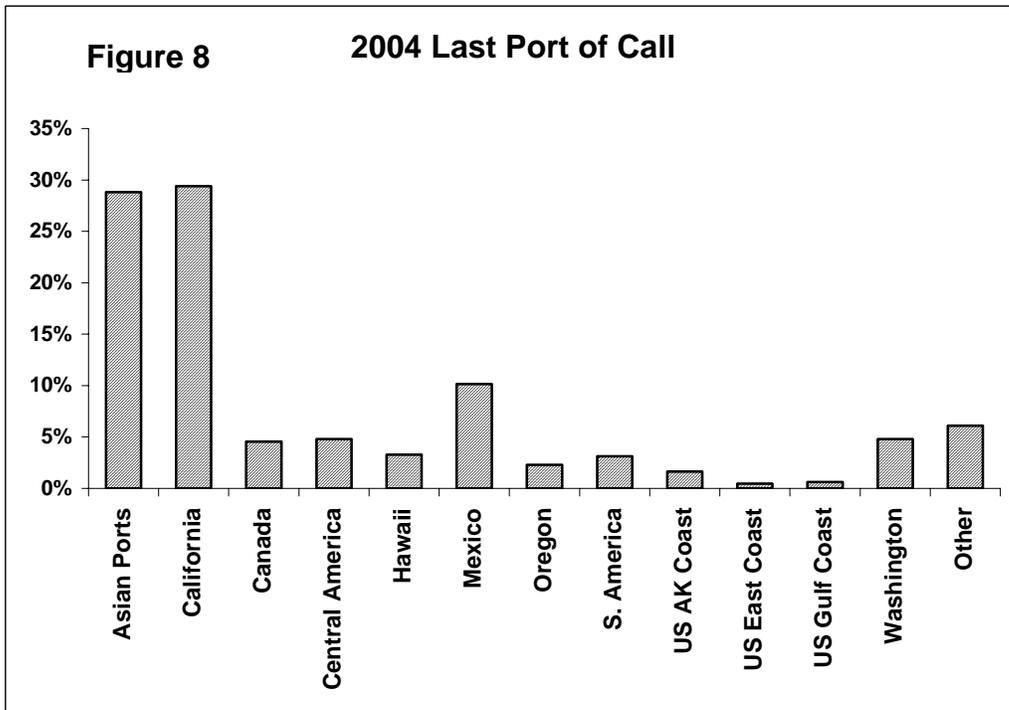
In 2004, even with the reauthorization and expanded reporting of the State's program, compliance continued to be very high, exceeding 98%, with 82% submitting reports on time (Figure 6). The CSLC received 10074 reporting forms for the year.



In 2003, according to ballast water reporting forms submitted to and received by CSLC, Nearly 50% of the vessel calls originated from Asian ports, followed by approximately 17% arriving from Mexican ports (Figure 7).



During 2004, all vessels were required to submit a reporting form for each port call in California. The change in QV to include domestic voyages is readily observed in the data. The percentage of arrivals originating from Asian ports dropped from over 50% in 2003 to less than 30% in 2004 (Figure 8). It also becomes apparent that a large proportion of vessels arrive to California ports from other California ports.



Compliance with Mandatory Ballast Water Management Requirements – Under Section 71204.2, the master, operator, or person in charge of a vessel arriving from

areas outside the EEZ, shall follow one of the prescribed ballast water management practices for ballast waters carried into the state:

- Exchange ballast water in areas at least 200 nm from any shore and in waters at least 2000 meters deep.
- Retain all ballast water on board the vessel.
- Discharge the ballast water at the same location it originated, provided that the ballast water was not mixed with ballast water taken on in an area other than mid-ocean waters.
- Use an alternative, environmentally sound, CSLC or USCG approved, method of treatment.
- Discharge the ballast water to an approved reception facility.

Two types of exchange are allowed under Section 71200. Flow-through exchange requires that three full volumes of mid-ocean water be pumped through the ballast tanks. Empty-refill exchange 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 exchanged or otherwise treated, and (b) 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.

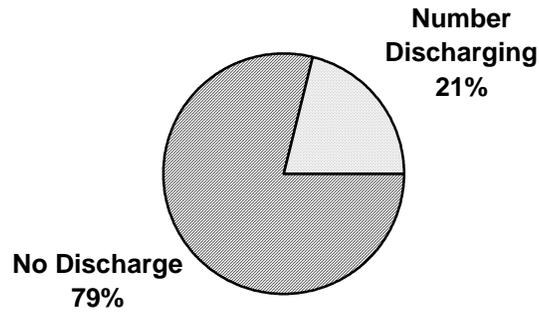
The CSLC database was designed to measure percent exchange and exchange method for each tank (per vessel). Examination of the ballast water reporting forms submitted by vessels initially revealed many errors in ships' reports. Intensive review of reporting forms and follow-up by MISP staff has resulting in a dramatic decrease in inaccurate or incomplete documentation of the vessel's ballast water management practices.

1. Statewide Management Compliance

Year 2003 – Under AB 703, only vessels arriving from outside the EEZ, were required to manage and report on their ballast water management activities. Of vessels reporting, 79% indicated no intention to discharge ballast water (Figure 9). Of the 5673 ballast water reports received during 2003, 21% declared discharging ballast water in California waters.

Figure 9

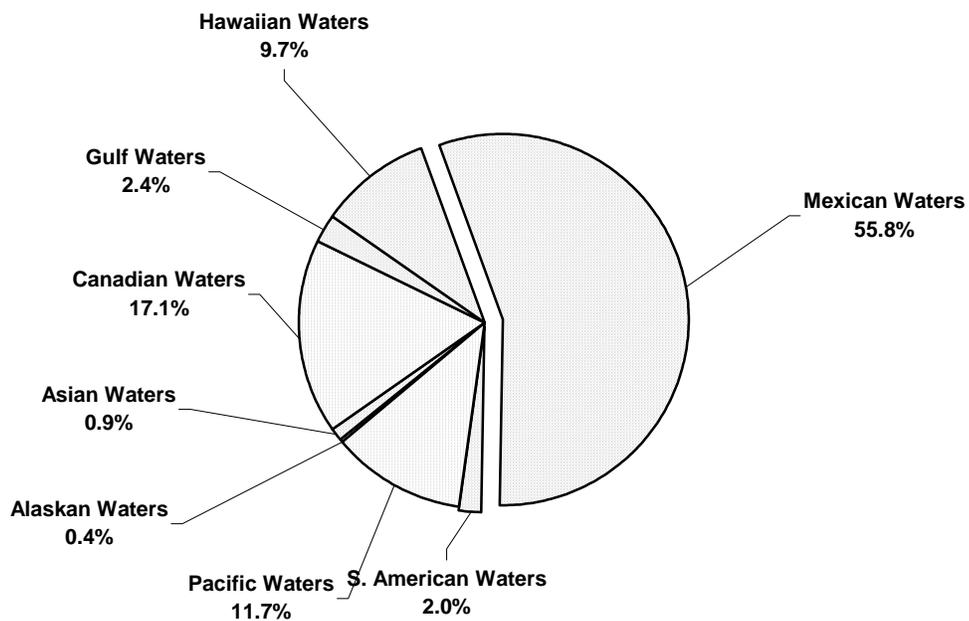
2003 Reported Management



Greater than 90% of the ballast water discharged complied with management requirements. Of the unexchanged ballast water discharged during 2003, nearly 60% originated from coastal waters off Mexico (Figure10).

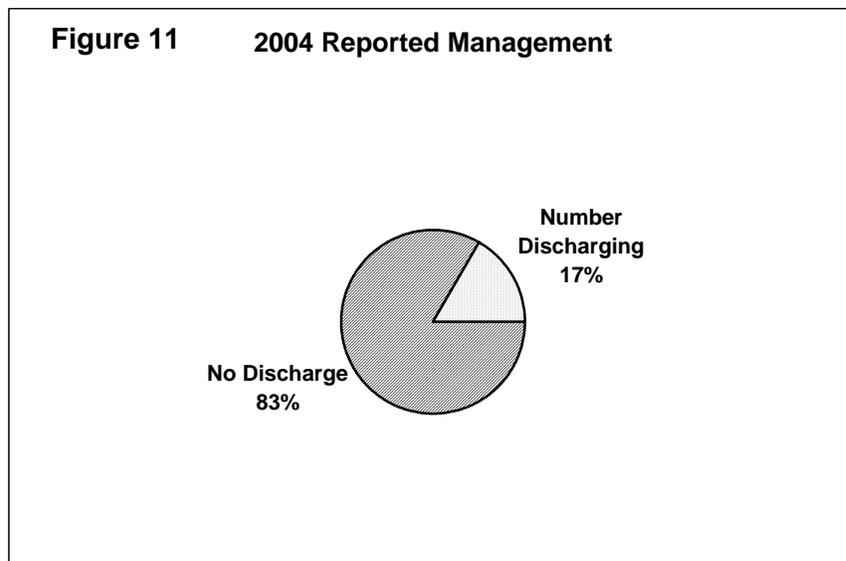
Figure 10

Source of Unexchanged BW - 2003

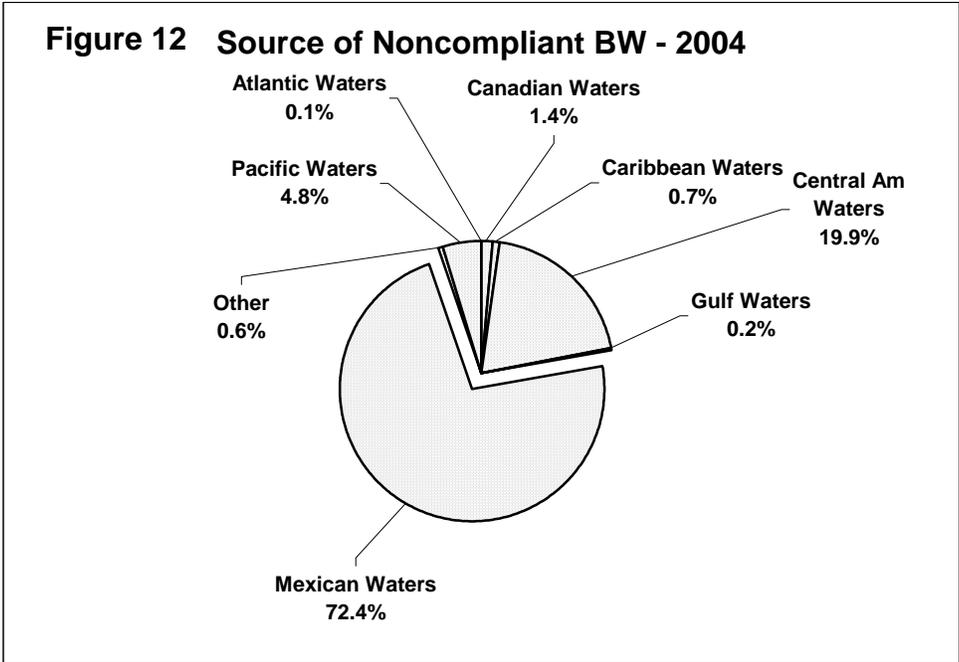


Year 2004 – As a result of the reauthorization and enhancement of the State’s ballast water program, all vessels greater than 300 gross registered tons operating in California waters, were required to submit a complete and accurate ballast water reporting form upon departure from each port or place in State waters. However, only those vessels entering California from outside the EEZ were required to manage their ballast water as described in Section 71204.2. Vessels, whose last port call was from Washington, Oregon, or another California port or place, are required to submit a ballast water reporting form, but are not yet subject to any ballast water management practices. For the purposes of this analysis, vessels managing ballast water in accordance with the Act are identified as “Compliant”. For example, a vessel entering California from Washington, and subsequently discharging Seattle ballast water is placed in this category. Only those vessels arriving from outside the EEZ, or carrying water that originated from outside the EEZ, who did not exchange that water prior to discharge in California waters, are categorized as “Non-Compliant”.

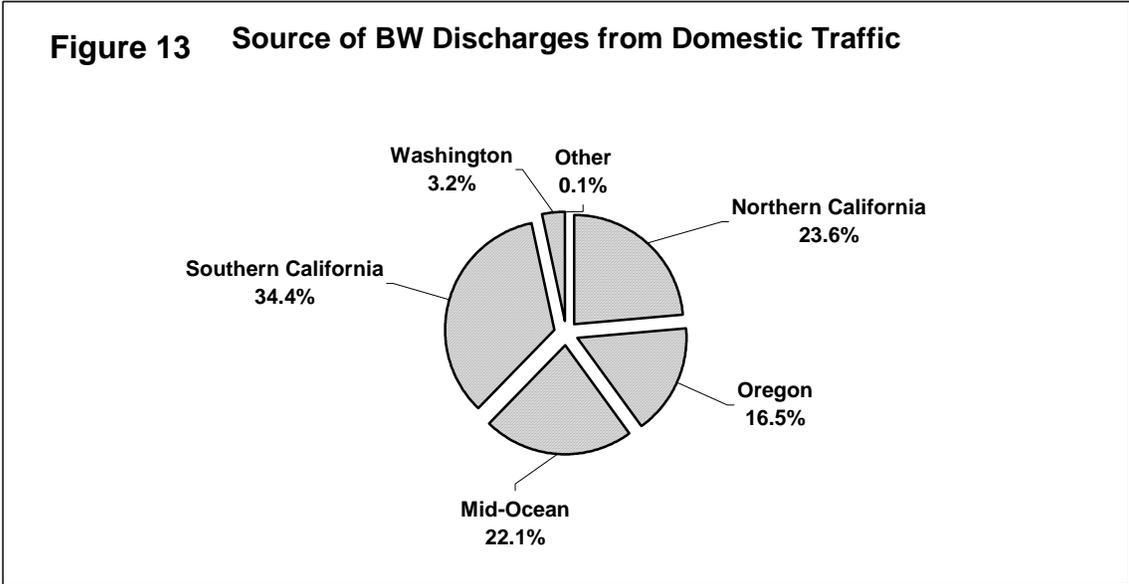
Figure 10 summarizes Year 2004 data. Of the 10074 reporting forms received for Year 2004, 83% retained all ballast water on board, while 17% reported discharges in State waters (Figure 11).



Over 95% of all ballast water discharged in State waters complied with the law. Of the unexchanged ballast water that was discharged during 2004, the majority originated from coastal Mexican waters (Figure 12).



For those vessels categorized as “Compliant” whose last port of call was another West Coast port (i.e., domestic traffic), the source of the ballast water discharged was further categorized. Figure 13 shows the results of this categorization. Over 50% of the water discharged by vessels whose last port of call was identified as another California port or place originated from California.



Further analysis of these data (Table 2) shows that for Southern California ports, the source of ballast water discharged from domestic traffic is distributed relatively evenly among Southern California, Northern California, and Mid-Ocean waters (~30%). For

Northern California ports, 34% of the water originated from Southern California, while ~20% each came from Northern California, Oregon, or Mid-ocean waters.

Table 2

Year-2004 Source of Discharged Ballast Water from Domestic Voyages (MT)

Receiving Waters	SoCal Water	NorCal Water	Oregon	Washington	Mid-Ocean	Other
SoCal Ports	342579	288669	61152	14802	251120	14649
NorCal Ports	639362	390662	412953	80556	376274	4644

2. Port Zone Management Compliance

Year 2003 – The percent of reporting vessels that declared no discharge of ballast water varied from 96% in Port Hueneme and San Diego to 31% in Humboldt (Table 3). In LA-LB, 942 vessels reported discharge, of which 6% had no mid-ocean exchange and 94% exchanged their ballast water prior to discharge in California (Table 4). A similar pattern was observed in Oakland (79% retained all ballast water, 96% was exchanged), Carquinez (18% discharging, 100% exchanged), and Sacramento (50% retaining, 98% exchanged). Overall, 6% of the ballast water volume, discharged statewide reported no exchange.

Table 3

Port	Year 2003			Year 2004		
	#Retaining	#Discharging	%Retaining 2003	#Retaining 2004	#Discharging 2004	%Retaining 2004
Avalon/Catalina	-	-	-	32	1	97
Carquinez	83	18	82	338	82	80
El Segundo	-	-	-	177	26	87
Hueneme	191	8	96	324	11	97
Humboldt	4	9	31	23	16	59
LA-LB	3182	952	77	4450	994	82
Monterey	-	-	-	11	1	92
Oakland	335	91	79	1607	236	87
Redwood	20	10	67	43	9	83
Richmond	49	9	84	341	130	72
Sacramento	21	21	50	27	25	52
San Diego	277	12	96	445	43	91
San Francisco	236	53	82	403	64	86
Santa Barbara	-	-	-	3	0	100
Stockton	62	19	77	115	23	83

Year 2004 - Tables 3 and 5 depict data for all vessel calls during 2004, including domestic voyages where no ballast water management practices are currently mandated. The percent of reporting vessels that declare no discharge varied from 100% in Santa Barbara to 52% in Sacramento. Overall, 4% of all ballast water discharged during 2004 reported no exchange and was non-compliant. Significantly less than the 17% reported during the first 2.5-years of the State's Program

1. Compliance Based on Percent Exchange by Volume

Approximately 15 million metric tons (MT) of discharged ballast water was reported statewide during 2003. Of this total, 4.8 million MT (94%) was reported to have undergone exchange (Table 4). During 2004, approximately 7.8 million MT of discharged ballast water was reported statewide. Of this total, 96% complied with the law (Table 5).

Table 4 Year 2003 Volume (MT) of ballast water discharged by Port

Port	Exchange (MT)	W/O Exchange (MT)	Total Discharged	% Compliance	% Non-Compliance
Carquinez	101110	15226	116336	87%	13%
Hueneme	2003	550	2553	78%	22%
Humboldt	44297	700	44997	98%	2%
LA-LB	3564877	216769	3781646	94%	6%
Oakland	259089	11600	270689	96%	4%
Redwood	74459	0	74459	100%	0%
Richmond	76389	32594	108983	70%	30%
Sacramento	176944	2803	179747	98%	2%
San Diego	5637	653	6290	90%	10%
San Francisco	361020	39077	400097	90%	10%
Stockton	184194	4237	188431	98%	2%
Statewide Totals	4850019	324209	5174228	94%	6%

Table 5 Year 2004 Volume (MT) of ballast water discharged by Port.

Port	Compliant (MT)	Not Compliant (MT)	Total Discharged	% Compliance	% Non-Compliance
Avalon	24123	0	24123	100%	0%
Carquinez	469037	20893	489930	96%	4%
El Segundo	66212	0	66212	100%	0%
Hueneme	7045	2587	9632	73%	27%
Humboldt	48699	1484	50183	97%	3%
LA-LB	3643580	215129	3858709	94%	6%
Monterey	6	0	6	100%	0%
Oakland	424965	3518	428483	99%	1%
Redwood	59998	20702	80700	74%	26%
Richmond	1129114	12222	1141336	99%	1%
Sacramento	1028443	15804	1044247	98%	2%
San Diego	38982	3015	41997	93%	7%
San Francisco	317584	30489	348073	91%	9%
Santa Barbara	23219	0	23219	100%	0%
Stockton	149398	23763	173161	86%	14%
Statewide Totals	7430405	349606	7780011	96%	4%

Compliance through Field Inspections

Under Section 71206, the CSLC assesses compliance of any vessel subject to the Act through a vessel inspection program. Currently, CSLC has two field offices, one in Southern California, and the other in Northern California. Inspectors boarded and

inspected 17% (962) qualifying voyages during Year 2003 and 14% (1356) qualifying during Year 2004 (Table 6).

A vessel targeted for inspection is boarded to verify the presence of a ship specific ballast water management plan, ballast water reporting forms for the previous two years and a ballast log showing tank activity. Ballast water tanks intended for discharge are sampled, and an Informational Package is provided to the crew. A Ballast Water Inspection Data Sheet is completed and signed by the CSLC Inspector and a report summarizing the results of the inspection is provided to the vessel crew. Additionally, if violations are noted, a letter is sent to the owner of the vessel, listing when and where the inspection took place, the violations noted, and a date by when they must respond with corrective action. The responses from vessel owners to these letters have been overwhelmingly successful.

The majority of vessels inspected during Year 2003 and Year 2004 are found to comply with the Act. The majority of noted violations are associated with administrative components of the law (incomplete ballast water management plan, inaccurate ballast report forms, incomplete ballast tank logs, etc.). Less than 5% of the violations noted during inspections are associated with operational components of the Act, which includes discharging unexchanged ballast water into California.

Table 6 Ballast Water Inspections by Port

Port	Year 2003				Year 2004			
	# Inspections	# Violations	# Admin	# Operational	# Inspections	# Violations	# Admin	# Operational
Carquinez	86	6	5	-	134	11	9	2
El Segundo	8	-	-	-	5	-	-	-
Hueneme	28	6	6	-	15	9	9	-
Humboldt	3	-	-	-	4	-	-	-
LA-LB	558	141	135	6	682	219	207	12
Oakland	137	3	3	-	265	32	32	-
Redwood	13	1	1	-	17	2	1	1
Richmond	41	2	1	1	127	9	7	2
Sacramento	10	-	-	-	12	3	3	-
San Diego	42	-	-	-	33	-	-	-
San Francisco	20	-	-	-	20	7	7	-
Stockton	16	-	-	-	42	10	9	1
Total	962	159	151	7	1356	302	284	18

Fee Submission

The Board of Equalization (BOE) receives daily reports from the Los Angeles/Long Beach Marine Exchange listing actual arrivals from the following ports: Los Angeles/Long Beach, Port Hueneme, San Diego, and El Segundo. In addition, the Board receives two daily reports from the San Francisco Marine Exchange. An electronic and paper record of this information is maintained for reference and use by the BOE staff. The reports are reviewed to determine which arrivals Qualifying Voyages and thus subject to the Fee. Additional analysis is necessary to assign the correct account numbers to these arrivals. Further, it must be determined if a notice of

determination (billing) should be mailed or if the arrival should be reported on the fee payer's monthly returns (where applicable). 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.

There are currently 2,508 ballast accounts representing 6,449 vessels registered with the BOE. On average, 120 new Ballast Registrations are added per month. In addition, an average of 115 account maintenance items (address changes, adding vessels to existing accounts, etc.) are processed per month. An average of 25 Ballast Accounts are closed out each month, and an average of 470 Ballast Water billings are mailed per month (Table 7). Compliance rate for fee submission exceeds 98%.

Table 7 – Marine Invasive Species Fee Program

Period of Activity	<u>Summary of Voyages</u>			<u>Revenue Summary</u>			
	Through December 2004			Through January 31, 2005			
	Voyages Reported Billed	Total Voyages (Note 1)	Total Voyages	Fees Billed	Fees Reported (Note 1)	Total Fees	Payments Received for Period (Note 2)
January-03	371	79	450	74,200	15,800	90,000	89,714
February-03	359	73	432	71,800	14,600	86,400	83,493
March-03	395	80	475	79,000	16,000	95,000	95,062
April-03	379	86	465	75,800	17,200	93,000	95,623
May-03	402	79	481	80,400	15,800	96,200	95,893
June-03	370	80	450	74,000	16,000	90,000	89,593
July-03	410	85	495	82,000	17,000	99,000	98,359
August-03	410	80	490	82,000	16,000	98,000	97,373
September-03	387	82	469	77,400	16,400	93,800	92,775
October-03	375	99	474	75,000	19,800	94,800	92,915
November-03	387	91	478	77,400	18,200	95,600	93,424
December-03	394	99	493	78,800	19,800	98,600	96,866
Yearly Total	4,639	1,013	5,652	\$ 927,800	\$ 202,600	\$1,130,400	\$1,121,090
January-04	466	88	554	93,200	17,600	110,800	107,247
February-04	413	87	500	206,500	43,500	250,000	244,419
March-04	501	98	599	250,500	49,000	299,500	293,589
April-04	470	94	564	235,000	47,000	282,000	263,753
May-04	514	112	626	257,000	56,000	313,000	294,698
June-04	480	92	572	240,000	46,000	286,000	264,513
July-04	458	96	554	251,000	48,000	299,000	283,863
August-04	472	90	562	256,500	45,000	301,500	291,378
September-04	405	92	497	202,500	46,000	248,500	266,637
October-04	500	97	597	250,000	48,500	298,500	289,467
November-04 (see Note 3)	479	89	568	239,500	44,500	284,000	273,500
December-04 (see Note 3)	461	88	549	230,500	44,000	274,500	265,032
Yearly Total	5,619	1,123	6,742	\$ 2,712,200	\$ 535,100	\$ 3,247,300	\$ 3,138,096
TOTAL	25,707	3,567	29,274	\$ 9,765,178	\$ 1,218,900	\$ 10,984,078	\$10,852,856

Notes

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 amount 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 reconciliation process.

VIII. COLLABORATIVE PROJECTS/RESEARCH/TECHNOLOGY DEVELOPMENT

Treatment Technologies

Though ballast water exchange is by far the most widely used ballast water management tool, the eventual goal is to manage ballast water through ship-based or shore-based treatment systems. As described in Section VI, exchange can expose vessels to some risk and may delay voyages. The efficiency of exchange is also quite variable, and can depend on a vessel's configuration or age. Though no alternative treatment technologies are available for widespread installation, several promising enterprises are under development.

Shore-Based Systems - Shore-based ballast water treatment is a management option, however, to date only feasibility studies have been conducted. One, sponsored by the California Association of Port Authorities, indicated that though the system was technically feasible, it might require significant financial investment (URS Corporation/Dames & Moore, 2000). The Valdez Marine Terminal in Prince William Sound currently has a treatment facility designed to remove hydrocarbons from oil tanker ballast tanks. However, because newer vessels are constructed with separate ballast water and cargo tanks, the facility is currently underutilized. There has been some discussion of investigating the feasibility of converting it for NIS removal. Additional shore-side feasibility studies are being conducted by private and non-profit entities.

Ship-Based Systems - The development of ship-based systems has been encouraged through government financial and regulatory incentives and several promising systems are in conceptual or experimental testing stages. These include systems that utilize de-oxygenation, UV irradiation, cyclonic separation, filtration, and chemical treatment. None however, are available for widespread application. The diverse expertise and considerations required for a successful treatment system has surfaced as a major challenge. Ship-based treatment systems must be engineered to conform to a vessel's structure, ensure crew safety, and must be able to withstand the vibrations and movements induced by the vessel's engine or rough seas. Numerous biological parameters must be measured to evaluate effectiveness, and the water quality regulations of receiving waters must be met.

As described in the Ballast Water Management Act of 1999, Section 71202(1) directs CSLC to evaluate and approve alternative treatment technologies designed to remove and or inactivate organisms in ballast water. The Marine Invasive Species Act of 2003 authorized the CSLC to sponsor a pilot program for the purpose of evaluating alternatives for treating and otherwise managing ballast water, and also authorizes the CSLC to sponsor other research related to the transport and release of non-indigenous species into California waters.

CSLC staff collaborates with other agencies and organizations to identify alternative methods for ballast water management. The following summarizes the status and

progress of alternative treatment technologies considered for funding or participation by the CSLC.

The Venturi Oxygen Stripping System and the Ecochlor Ballast Water Treatment System have each shown, through initial studies that shipboard applications may be effective. Further research is needed, and CSLC is considering funding at least one, possibly both of these proposed projects. A preliminary proposal from Phyre Technologies has also been received and reviewed by CSLC staff. Additional details are described below.

Venturi Oxygen Stripping system - Tamburri M., G. M. Ruiz, and P. D. McNulty. 2005. The Venturi Oxygen Stripping (VOS) system is a proposed shipboard treatment system, which treats ballast water by de-oxygenation. The system uses inert gas to displace oxygen in ballast tanks. A benefit of the VOS system is the ability to slow corrosion in ballast tanks. The potential of the VOS system as a shipboard treatment technology has been shown through a phased process that began in 2001 and is currently approaching phase IV. The project began with a proof-of-concept study. The second phase showed successful results from combined laboratory, dockside mesocosm, and dockside pilot scale experiments. Phase III began in September 2004 with installation of the VOS system onboard a bulk carrier designed to perform full scale controlled experiments during normal vessel operations. Researchers are preparing to initiate Phase IV, under the U.S. Coast Guard's Shipboard Treatment Evaluation Process (STEP) program. This phase is designed to evaluate continuous VOS treatment over several years onboard an operational vessel. It is this Phase IV proposal that was recently submitted and reviewed by CSLC staff for possible funding.

Ecochlor - Oviatt, C. et al. 2005. - Candace Oviatt and a research team at the University of Rhode Island are in the process of evaluating the Ecochlor Ballast Water Treatment system, which uses chlorine dioxide to treat NIS found in ballast water. Well-documented industrial and municipal land-based applications have shown that chlorine dioxide effectively treats living organisms. Initial studies took place in 2002 to test effectiveness on NIS; results show the Ecochlor system effectively treats zooplankton, phytoplankton, and bacteria. Under USCG STEP test guidelines, the next part of the project will be evaluation of the Ecochlor system onboard an operational vessel. In 2004, a proposal was submitted to CSLC requesting funds for a shipboard evaluation. Communication between CSLC staff and research staff continues to explore possible partnership in the upcoming shipboard evaluations of the Ecochlor system.

Phyre Technologies - Phyre Technologies Inc. March 2005. Early in 2005, CSLC staff began preliminary discussions with representatives of Phyre technologies to discuss the need for ballast water treatment technologies. Phyre Technologies proposes the development of a "High Efficiency Ballast Water Treatment" system that combines ultrasonication with a liquid-inert gas technology for de-oxygenation. Several positive points of this system include the capacity to treat large amounts of ballast in relatively short periods of time, the size of the proposed unit is small enough to fit inside most engine rooms and a coupled treatment process with ultrasonication would assist in

treating anaerobic organisms. The system is in preliminary stages of development with intentions to address the needs of regulatory agencies and the maritime industry. Representatives of Phyre Technologies have also begun similar discussions with the USCG's Research and Development Center.

West Coast Ballast Water Demonstration Project

In August 2000, the California State Lands Commission was awarded a \$150,000 grant from the U. S. Fish and Wildlife Service (USFWS) to implement the West Coast Regional Applied Ballast Management Research and Demonstration Project (West Coast Demonstration Project). The West Coast Demonstration Project was an inter-agency pilot project to acquire and distribute information regarding applied alternatives for ballast water management. In December 2000, the Port of Oakland agreed to match the USFWS funds, doubling the funds available for this project, making it possible to evaluate the efficacy of treatment systems onboard at least two vessels. The SWRCB received \$150,000 from the Exotic Species Control Fund to evaluate alternatives for treating and managing ballast water. Total funding provided by the USFWS, SWRCB and the Port of Oakland for the West Coast Demonstration Project combined to a total of \$450,000.

In 2001, the California State Lands Commission teamed up with the State Water Resources Control Board, and initiated the West Coast Demonstration Project. The project timeline and distribution of funds were considerably modified over the span of the project due to changes in the scope of work and necessary system adaptations. Once the project was underway, engineering complications with vessel retrofits extended the project timeline.

The West Coast Demonstration Project objectives were to: 1) provide well researched cost estimates and proven ballast water treatment options to the maritime industry, and 2) conduct applied research, in cooperation with the Port of Oakland, the State Water Resources Control Board, the U.S. Coast Guard, the maritime industry, and ballast water equipment vendors, on practical, cost effective methods of ballast water treatment that might later be implemented on a state, regional, national or international scale.

The OptiMar Ballast System (OptiMar system) manufactured by Hyde Marine/OptiMarin AS of Stavanger, Norway was installed and tested aboard the Sea Princess of Princess Cruises in the fall of 2001, and on the R.J. Pfeiffer of Matson Navigation Corp. in the fall of 2003. The OptiMar system treats ballast water with a two step process beginning with a cyclonic separation chamber (MicroKill Cyclonic Separator) to first dispose of larger particles and organisms before exposing the remaining 'clean' ballast water to ultraviolet irradiation (MicroKill UV unit) for treatment of smaller organisms. The system was designed to treat ballast water during flow through ballasting procedure versus empty refill ballast methods. This system was selected because it had undergone limited testing and evaluation with promising preliminary results, and was requested by both ship owners.

Sea Princess – The Sea Princess OptiMar system is comprised of two main components, the Model SKX 200 MicroKill Cyclonic Separator to remove particulate, and the LP 400-14-200 XF MicroKill UV unit. Three evaluation cruises were completed onboard the Sea Princess as the vessel traveled between Long Beach, California and Mexican ports in October/November 2001 and in October 2002. The first two Sea Princess cruises (SP1 & SP2) identified large uncontrollable tank variations that impaired quantitative evaluation of treatment efficacy. The measured efficacy of the OptiMar system was significantly enhanced after installation problems were addressed for the third Sea Princess cruise (SP3). Given several problems identified with system engineering and evaluation cruises for SP1 and SP2, the summary of efficacy testing and results focus on evaluation results for SP3.

RJ Pfeiffer – The OptiMar system originally installed onboard the RJ Pfeiffer in the first quarter of 2002 consisted of a low pressure MicroKill Model HRN 350 8” Cyclonic Separator piped in series with a MicroKill Model LP 400-16-200 XFZ Ultra-Violet unit similar to that installed onboard the Sea Princess. Propulsion vibrations from the engine caused quartz tubes to break inside the UV chamber, which resulted in electrical malfunction. Due to these problems, the first evaluation trip was rescheduled from early summer to early July, then late July, and finally August 2002 as problems with vibrations continued. After multiple adjustments to the system, a representative from the manufacturer concluded that the 16-lamp, low pressure UV chamber that had been installed was not a suitable unit for this application.

A new medium pressure system was designed and manufactured by OptiMar in late 2002 under warranty as a replacement for the original low-pressure unit. The MicroKill Model UV-7, 3kW-250 unit has a single UV lamp, and is considered a more rugged design able to withstand the vibrations encountered on a ship such as the RJ Pfeiffer. The new design was installed in February 2003, and the research team performed evaluation tests during July 2003 (Matson Navigation Company, Inc. 2004).

Shipboard efficacy testing – Analysis of the OptiMar system’s effectiveness was performed in partnership between the CSLC and the SWRCB. A collaborative research team composed of scientists from the California State University System, Moss Landing Marine Laboratories, and the Romberg Tiburon Center for Environmental Studies was contracted by CSLC and SWRCB to evaluate the efficacy of each vessel’s treatment system.

Each shipboard evaluation was focused to determine if the treatment removed or sterilized plankton entering and leaving the ship’s ballast tanks. For both vessels, efficacy tests focused specifically on comparisons between ‘control’ and ‘treatment’ samples. All tests were conducted under routine vessel operating conditions. All test cruises onboard the Sea Princess took place in coastal waters with no opportunity to conduct open-ocean exchange. Therefore, experiment methods onboard the Sea Princess focused on comparisons between ‘control’ and ‘treatment’ samples. The RJ Pfeiffer had a transit route between Honolulu and Oakland, providing ideal circumstances to compare ‘control’ and ‘treated’ samples with a third treatment, open-

ocean 'exchange' samples. The OptiMar System was installed on both vessels with in-line sampling ports along the ballast piping system that allowed water to be sampled before and after UV/Hydrocyclone exposure during the ballasting phase, as well as during the de-ballasting phase. All sampling took place from within the engine room, eliminating the need for direct access to individual tanks through deck lids or sounding pipes. No standardized test assays were available that could be applied to verify removal or sterilization of all biota. Working with the U.S. Coast Guard, an array of biochemical, physiological and microscopic techniques and test assays were applied to evaluate the most expected organismic groups. Project methods included laboratory tests for viruses, bacteria, phytoplankton, ATP/Particulate Organic Carbon, and zooplankton (Welschmeyer et al. 2004).

Efficacy Test Results – General results show that UV treatment resulted in greater sterilizing effects than measured in controls. However, it is important to note that prolonged (96 hours) tank containment resulted in reduced survivorship and biological concentrations in both controls and UV treatments. The collective measurements of plankton metabolism and survivorship showed that the final dispositions of ATP/POC bacterial colony growth, phytoplankton photochemical efficiency, and zooplankton survivorship were comparable in UV treatment tanks and open-ocean exchange tanks (Welschmeyer et al. 2004).

Engineering and Operational Findings – The West Coast Demonstration project identified several structural and operational issues to be considered in future installations of the OptiMar system. System modifications for both vessels were necessary to address corrosion, pipeline cross contamination, vibration frequencies, and associated problems with quartz tubing inside of the UV chamber.

Onboard the Sea Princess, initial operations of the OptiMar system revealed corrosion issues due to incompatible metals and gray water cross contamination. These problems were eliminated by replacing carbon steel with galvanized steel and by separating ballast water pipelines from gray water pipelines. Minor issues with the UV chamber caused by engine vibrations were observed and resolved by strengthened anchoring of the UV tubes (Wright 2004).

Prior to efficacy testing of the OptiMar system onboard the R.J. Pfeiffer, it was discovered that vibration frequencies during ship operations at sea were causing the quartz tubes around the UV lamps to break. This allowed salt water to leak out of the head of the UV unit, causing an electrical short. After several unsuccessful attempts to reduce the effects from vibration frequencies, the original 16-lamp UV-system was removed and replaced with a single-lamp system, designed to better withstand the vibrations encountered onboard the R.J. Pfeiffer. After several weeks of fine-tuning with the new UV system, all issues associated with engine vibrations and tube failures were resolved (Matson Navigation Company, Inc. 2004).

Project Conclusions – Installation and engineering problems addressed during the West Coast Demonstration project will offer insight for future treatment system designs and

vessel retrofits. The West Coast Demonstration project provided evidence that treatment system installation and operational issues will likely be vessel specific. Installation and design issues addressed onboard the Sea Princess were unique to issues addressed onboard the R.J. Pfeiffer. It is probable that future efforts to install treatment technology onboard a vessel will present unique challenges.

Once the OptiMar system was installed and functioning correctly, scientific testing suggests the system may be a feasible alternative to open ocean exchange in terms of treatment efficacy. Bacterial colony growth and plankton survivorship were found to be comparable in UV treatment tanks and open ocean exchange tanks. It is worth noting that in both control and treatment tanks, microbial and zooplankton samples decreased over time suggesting tank containment alone contributes to organism survivorship. Further studies are warranted in order to clarify and answer unresolved questions regarding experimental design, and tank effects versus treatment effects.

Conclusions produced during the span of this project not only offer valuable information, but also raise compelling questions for future studies. Many of these questions raised during the project are consistent with pre-existing unknowns from similar projects. How can 'tank effect' best be accounted for while developing sample designs? How can the internal variability found within tanks be addressed for future evaluation efforts? Were the in-line sampling ports installed along the ballast piping system most representative of ballast conditions before and after treatment?

Evaluation of ballast water management alternatives requires a broad range of technical considerations. The West Coast Demonstration project is one step forward in a highly comprehensive process. Future projects to evaluate ballast water management alternatives will now be able to incorporate lessons learned from the West Coast Demonstration project and as a result will further advance the evaluation process.

Ballast Water Exchange Verification

In October 2003, the Commission, acting as Trustee for the Kapiloff Land Bank Fund ("the Fund"), accepted funds in the amount of \$200,000 from Carnival Cruise Lines, a division of Carnival Corporation, and deposited in the Fund as settlement for certain questions regarding compliance with ballast water management requirements under Public Resources Code Sections 71200 *et seq.* ("the Act"). These funds were designated for projects relating to ballast water management under Public Resources code Section 71200 through 71271 and successor statutes.

Utilizing the aforementioned Kapiloff Land Bank Funds, CSLC has entered into an agreement with the Smithsonian Environmental Research Center (SERC) to test explicitly the application of Ballast Water Exchange verification (BWEv) methodology on vessel traffic arriving to ports along western North America. In previous experiments, the BWEv methodology showed strong potential for discriminating between near coastal or port water. A refined methodology could therefore be used to develop a rigorous test for discerning exchanged ballast water from unexchanged ballast water on a vessel. The proposed research is intended to "demonstrate" the application of the BWEv

methodology to a specific region, as well as expand the overall scope of our ongoing analyses and possible application on a global basis. This work builds upon significant national and international efforts to implement a reliable, affordable, and easy-to-use method for BWEv. The CSLC-SERC project will begin 15 May 2005 and conclude 15 December 2006. Sampling events will be scheduled to occur on a quarterly basis, beginning in June 2005.

Hull Fouling

With funding from the MISP, the Aquatic Bioinvasion Research and Policy Institute (ABRPI), which combine the SERC's marine expertise and Portland State University's freshwater expertise, will conduct a study to examine the potential for invasions to California through the fouling vector. Using data on vessel dimensions and arrivals, SERC will estimate the total vessel surface area on a variety of vessel types that 1) Arrive to port systems in California, Oregon, and Washington, and 2) Have the potential to be colonized by fouling organisms. The study will also include a pilot project that will utilize Remotely Operated Vehicle (ROV) collected videos, still images, and diver collected samples to estimate the amount and types of organisms attached to exposed surfaces. These complimentary analyses will move towards creating a broad understanding of the overall risk fouling poses for NIS introductions to California. The CSLC-ABRPI project will begin 15 June 2005 and conclude 31 July 2007.

IX. SUMMARY OF OTHER RESEARCH

In addition to research fully or partially funded by CSLC, two studies highly relevant to the prevention and management of NIS in California have been funded or directed by CSLC collaborators. Both were extensive, multi-agency, multi-institution enterprises, for which the MISP provided some assistance with logistics or document review. The first was three part study on local container vessels, funded by the Port of Oakland, evaluating the effectiveness of ballast exchange for removing planktonic organisms, and examining the biota that arrive to the port in ballast tanks and in fouling communities. The second, directed by the California Department of Fish and Game, sought to characterize the distribution of estuarine and coastal invasives in California.

Port of Oakland/SERC Studies

Biota Associated with Ballast Water of Container Ships Arriving to the Port of Oakland.
Ruiz, G. and G. Smith. Biological Study of Container Vessels at the Port of Oakland.
December 2004. Smithsonian Environmental Research Center.

Twenty different containerships, arriving in the Port of Oakland, were sampled for biota between 2001 and 2002. Sampling efforts were focused on tanks during summer months and tanks having shorter residence times so the diversity of taxa sampled was maximized. Ballast tanks were sampled for analysis of zooplankton, phytoplankton, and selected microorganisms.

Ninety-nine phytoplankton taxa and twenty-nine zooplankton taxa were identified during this study. The majority of phytoplankton taxa were found to exist along the California

coast, although for most it was unknown if they were native or non-native to California. Many of the twenty-nine zooplankton taxa identified were considered non-native to California coast.

Specific pathogens tested included viruses of fish and crustaceans, protists known to infect shellfish, bacteria and viruses that infect humans, and lastly, *Vibrio* bacteria known to infect humans and fish. None of these specific pathogens tested for were detected, however, several strains of *Vibrio* were identified as well as the fecal coliform bacteria *E. coli*.

The over-all abundance of coastal organisms identified was relatively low for in the containerships sampled. Further analysis would be necessary during other seasons and in different voyage durations to better determine abundance levels of coastal organisms found in containerships.

Ballast Water Exchange Efficacy: Results of Tests on Eight Container Ships. Ruiz, G. and G. Smith. Biological Study of Container Vessels at the Port of Oakland. December 2004. Smithsonian Environmental Research Center.

Experiments were conducted to study the effect of open-ocean ballast water exchange on eight different containership voyages. During each voyage, paired ballast tanks (one control and one exchanged) were sampled before and after ballast water exchange.

Results show an average 88% of initial source water was removed by open-ocean exchange, and ranged from 76% to 98%. Phytoplankton and zooplankton abundance levels declined in both control and exchanged tanks. Phytoplankton levels declined an average of 60% in control tanks and an average of 85% in exchanged tanks. Results from exchanged tanks show high variation in phytoplankton levels ranging from 66% to 98%. Abundance levels of total zooplankton in exchanged tanks were shown to decrease an average of 90%.

Considerable variation between voyages for phytoplankton and zooplankton suggest that voyage duration may play a role in exchange efficacy. Short-duration voyages seem to have the smallest levels of decline in control tanks relative to longer duration voyages. Because abundance generally declines with voyage duration, it is expected that ballast water exchange will have the most impact on short-duration voyages.

Analysis of Biofouling Organisms Associated with the Hulls of Container Ships Arriving to the Port of Oakland. Ruiz, G. and G. Smith. Biological Study of Container Vessels at the Port of Oakland. December 2004. Smithsonian Environmental Research Center.

A small pilot study examining fouling on nine container vessels was conducted during the spring of 2004 in the Port of Oakland. Diver surveys indicated that organisms were attached to the outer surfaces of all but one vessel. Most fouling occurred in areas that were sheltered from sheer forces, such as the rudder, stern tube, and bow thrusters, and on vessels that had been out of dry dock (removed from the water for service) the

longest (5-years). Fouling was absent from exposed portions of the hull that had been treated with anti-fouling paint. Overall, however, the fouling extent was much less than in similar studies, and the authors indicate that these results may be due to the brief time these vessels remained in port (less than 24 hours), and the high speeds at which they traveled (21 or 24 knots). The authors also caution that the small sample size precludes any broad generalization, and suggest that further investigation into hull husbandry practices and vessel routes in concert with biological surveys are needed to better characterize the spectrum of container vessels.

CDFG Invasive Species Survey

Under the 1999 legislation, the California Department of Fish and Game was the primary agency required to conduct a study to determine the location and geographic range of non-indigenous species in California estuaries and coastal areas. The study focused on areas where introduced species from ballast were most likely to occur. Biological sampling took place for infaunal and epifaunal areas, as well as for fish and plankton. Biological data collected during this study will provide the basis for a more comprehensive analysis of impacts from non-indigenous species and will serve as a baseline to determine effectiveness of future management efforts to control species introductions. It is likely that in the future, these data will also be used to determine alternative discharge zones, sensitive areas, and high-risk zones.

Under the legislation passed in 2003, ballast water control measures were expanded to include coastwise traffic. As such, it was determined that the initial baseline survey conducted by CDFG of ports and harbors would have to be expanded to include outer coastal habitats. In addition, the new legislation requires a monitoring program to determine if new introductions have occurred since the original baselines were established. To accomplish this monitoring effort, throughout the study timeline, comprehensive comparisons between historical and current data will occur at 3-year intervals. As the study is completed, findings and results will be posted on the Internet in a database searchable by various parameters such as species and location.

In 2000, the first stage of the study involved coordinating an extensive literature search with multiple biological surveys of California's ports, bays, and estuaries. The CDFG's office of Oil Spill Prevention and Response (OSPR) contracted with Moss Landing Marine Laboratories, Humboldt State University Foundation, and the San Francisco Estuary Institute to assist with field investigations and literature searches. Previous biological data were used where available and supplemental biological surveys took place in areas that had not been previously documented. Studies focused on the seven major port zones in California (San Diego, Los Angeles/Long Beach, Port Hueneme, Stockton, Sacramento, San Francisco Bay and Humboldt Bay) considered the most likely areas where non-indigenous introductions would occur. Additional sampling took place in areas with smaller ports and bays during the summer of 2001.

An initial summary report of the 2000-2001 survey was submitted by the CDFG to the California Legislature in December 2002. Study results show that all areas of the California coast have experienced some level of invasion by non-indigenous species.

Results were presented in several categories: total number of taxa, potential pathways of introduction, regions of origin of introduced species, and then harbor specific results. The study indicates that San Francisco Bay continues to be the most invaded, with other ports and harbors not far behind in terms of numbers of non-indigenous species. Many of these introductions are associated with ballast in ships, but the study indicates hull fouling, aquaculture, and intentional introductions are important pathways as well.

Over-all recommendations from the 2002 report suggest the need for more research in the interest of ballast water management decisions. In order to determine the level of effect from ballast control measures and monitor new introductions of non-indigenous species, the report recommends ongoing biological surveys, which, in fact, were required by the 2003 legislation and are currently underway. The report suggests further information on pathways of introduction to formulate management plans that are more effective with a better ability to identify and target those that are higher risk. Lastly, an increased level of taxonomic identification is described as essential in order to determine if species found are native or non-native to California.

The next phase of biological surveys is currently underway. Sampling for the supplemental survey to establish a baseline for the outer coast was begun in July of 2004 and will be completed in April 2005. The monitoring effort will begin in May of 2005 with a survey of San Francisco Bay followed by surveys in each of the ports, harbors, and estuaries covered in the 2000/2001 field work. In June 2004, OSPR contracted with Moss Landing Marine Laboratories as the principal investigator for these biological surveys of California coastal areas.

All biological data should be posted online in a database format by January 2007 and will be updated with results of monitoring studies in July 2008. A summary report of the comprehensive survey results will be submitted to the legislature in 2009, one year before the Act sunsets in 2010.

For further information, the CDFG report can be found online at:
<http://www.dfg.ca.gov/ospr/organizational/scientific/exotic/OSPR%20Report.pdf>

Title: A Survey of Non-Indigenous Aquatic Species in the Coastal and Estuarine Waters of California. Prepared by Marian Ashe for the Department of Fish & Game, with study design by Michael Sowby, and data compilation by Dr. Peter Ode.

X. MOVING FORWARD

Improving Compliance

Although California's Program continues to be very successful resulting in high compliance with all requirements of the Act, data indicate a persistent yet small percent of vessels violating the ballast water management mandates. Specifically, those vessels arriving from Mexican, Central and South American ports account for 85% of the volume of ballast water discharged that does not comply with the Law. Further analysis shows that many of these vessels are conducting some form of an exchange,

but not to the prescribed legal standards set in the Act (i.e., exchange at >200 nm from land). Because of this analysis, CSLC has refocused the intensive compliance monitoring of reporting forms, the education and outreach to vessels owner operators and as necessary pursue enforcement actions on offending vessels. Additionally, CSLC continues to aggressively explore and support research addressing shipboard treatment technologies and alternative exchange zones within coastal waters.

Regulations Governing Coastal Voyages

Current California law requires that vessels originating from places outside of the EEZ manage ballast water, however, there is no ballast management requirement for vessels that arrive to California ports from places within the EEZ. The transfer of NIS from an invaded port to an adjacent port poses a significant risk for introducing and spreading species throughout a region (Lavoie et al. 1999, Cohen and Carlton 1995). On the west coast in particular, a highly invaded area, such as the San Francisco Bay, can serve as a hub for NIS to spread to other Pacific Coast Region ports, such as Los Angeles or Portland. In recognition of this vulnerability, the Marine Invasive Species Act of 2004 directs the CSLC to adopt ballast management regulations for transits between ports within the Pacific Coast Region, defined as the region 200 nm offshore, from 154 degrees W longitude and north of 25 degrees N latitude, exclusive of the Gulf of California.

Based on recommendations from the two Coastal Exchange workshops, described in Section VII, Outreach and Education, the CSLC Technical Advisory Group came to the consensus for ballast water exchange at least 50 nm offshore for voyages within the Pacific Coast Region. The 50 nm limit incorporated several key issues of concern. Although ballast water exchange at distances more than 200 nm offshore is considered the most biologically prudent, vessels traveling within the Pacific Coast Region could be diverted more than 100 nm offshore from their normal route. For most voyages, the 50 nm distance would require no course deviation for some vessels and a minor deviation for many. Exchange at 50 nm avoids ballast discharge in coastal “retention zones” and at the mouths of estuaries, where currents and tides can carry organisms to shore or sweep them into bays and estuaries. The limit also lies beyond the boundaries of sensitive protected areas, such as National Marine Sanctuaries. Further, the maritime industry requested that California’s regulation be consistent with other U.S. state, federal and international regulations, in order to avoid confusion that would occur should vessels encounter a patchwork of varying regulations as they traveled across jurisdictions. The 50 nautical mile limit addressed this request, as Washington and the International Maritime Organization have similar requirements and Oregon is considering legislation that would mandate the same.

An exemption was included for voyages between ports within the San Francisco Bay/Delta region, and for voyages within the Los Angeles/Long Beach/EI Segundo Port complex. In the absence of such a designation, the 50 nm requirement would pose an operational and economic burden for vessels transiting between ports contained within a single port region. Scientific experts consulted agreed that, biologically, the designation was reasonable given the current knowledge of NIS dispersal within an

estuary, and given the logistical realities of vessel voyage patterns (Cohen pers com., Crooks pers com, Kimmerer pers com, Weisberg pers com.)

Rulemaking documents for the regulation were submitted to the Office of Administrative Law in April 2005 and the Notice of Proposed Rulemaking was published April 15. Following public hearings and consideration of public comments, the final regulation is anticipated to be approved in mid-2005 with an implementation date in late-2005.

Performance Standards Advisory Panel Description

The CSLC under Section 71204.9 is required, in consultation with SWRCB and in consideration of the advisory panel (Panel), to submit to the Legislature a report that recommends specific performance standards for the discharge of ballast water into the waters of the state. The performance standards will be based on best available technology economically achievable and be designed to protect the beneficial uses of state waters.

In late 2004, the CSLC invited participation from the stakeholder community to develop recommendations for performance standards. The Panel was first convened early in 2005 with meeting dates scheduled through June 2005. The Panel includes participants from the State Water Resources Control Board, the Regional Water Quality Control Board, the Department of Fish and Game, and the U.S. Fish and Wildlife Service, as well as representation from University experts, research groups, shipping agencies, ports, and environmental organizations.

Issues identified thus far include appropriate regulatory monitoring methods and impacts to coastal voyages versus oceanic voyages. Documents for review include but are not limited to publications on biological criteria, engineering feasibility, physical/biological/chemical characteristics of fresh and saline water, efficacy of reducing viable organisms under vessel operating conditions, economic costs of installation and operation of equipment, appropriate parameters for measuring treatment efficacy, and/or appropriate experimental designs for efficacy tests.

Panel recommendations will be provided to CSLC staff on or before July 1, 2005. CSLC is required to submit to the Legislature, a final report including recommendations for performance standards by January 31, 2006. In order to review and incorporate the USCG rulemaking information, due for public release in winter-2006, CSLC is recommending extension of the due date to January 31, 2007 (See Conclusions).

Non-Ballast, Ship-Mediated Invasion Vectors

Section 71207 directs the CSLC, in consultation with a technical advisory group, to analyze the risk of invasion through fouling on commercial vessels, and present management recommendations to prevent such introductions. The legislation further specifies that the advisory group will include (but may not be limited to) representatives from the shipping and port communities, the USCG, state resource agencies, federal resource agencies, and the scientific research community.

It came to the attention of the MISP that the California Sea Grant Extension was involved in a parallel effort preparing a white paper on the management of invasives through recreational vessel fouling. Recognizing the overlapping issues and goals of both programs, the SLC and Sea Grant began collaborations to solicit the multi-disciplinary input required to formulate appropriate and effective recommendations. Planning is underway for a jointly administered workshop on vessel hull fouling in May 2005. The workshop will examine management perspectives and experiences from other states and countries (Hawaii, New Zealand, Mexico), the risks and impacts from hull-borne invasives to the west coast, and options for prevention and management. Attendees will represent the commercial shipping and recreational boating communities, ports, vessel cleaning technology groups, state and federal resource agencies, environmental organizations, and scientific experts.

The SLC will hold two additional advisory meetings with a subset of the workshop attendees. These meetings are planned for September and December 2005, and will serve to solidify findings and recommendations with regard to commercial vessels. The final report will be completed for the state Legislature and public by March 1, 2006. CSLC will be funding the Aquatic Bioinvasion Research and Policy Institute (ABRPI) to conduct a study examining the potential for invasions to California through the fouling vector. The CSLC-ABRPI project will begin 15 June 2005 and concludes 31 July 2007, after the aforementioned report is due. CSLC is recommending extension of this due date to March 1, 2007 (See Conclusions).

XI. NEEDED RESEARCH

Ballast Water Treatment Technology Development

Efforts to identify effective treatment technologies continue to progress slowly. As stated in the previous Legislative Report (Falkner 2003), the effort to develop effective technologies should be one of integrated phases, including R&D on basic and innovative technologies, prototype development, shipboard applications, and certification and implementation. California should continue its relationship with the USCG, National Oceanic and Atmospheric Administration (NOAA), and SERC to ensure continuity at the state, national and international level.

Standardized Analysis of Shipboard Treatment Technologies

Evaluating the performance of ballast water treatment technologies onboard ships, under realistic operational conditions, is a requirement of most ballast water management programs. The evaluation of treatment systems is difficult and costly. Various approaches have been proposed making comparisons across technologies and even within the same technology difficult. The lack of standardization creates significant confusion about the criteria needed for evaluation and approaches to be used to determine compliance, allowing official approval for particular treatment systems. The USCG, Aquatic Bioinvasion Research and Policy Institute, and Pacific States Marine Fisheries Commission and CSLC are involved in the formative stages of this issue. California should continue its relationship with these entities to ensure continuity at the state, national, and international level.

XII. CONCLUSIONS AND RECOMMENDATIONS

Many of the recommendations provided in the CSLC 2003 Biennial Report (Falkner 2003) were considered by the Legislature and included in the reauthorization of the State's ballast water management program. Due to continued and expanded intensive outreach by CSLC staff, the utilization of Technical Advisory Groups and a monthly electronic notification system, along with daily interactions with maritime industry, and the potential for civil and criminal penalty action, compliance with the California Act has continued to improve (>95%). The Program's success and the relatively weak federal program, supports the continuation of the California Marine Invasive Species program (Recommendation #1).

CSLC has worked to coordinate with other states and the Federal government on ballast water and hull fouling 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 and hull fouling management programs. This coordination will result in improved support and compliance by the maritime industry and enhance the understanding and development of solutions to NIS introductions (Recommendation #2).

The California Act requires vessels arriving from outside the EEZ to manage their ballast water. Management options include retention of ballast water, mid-ocean exchange, or the use of an alternative treatment technology. Similar rules are being developed for vessels engaged in coastwise travel. Exchange is currently the most widely used management option, though studies show it to be of limited usefulness. Most experts view 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 continues to be slow. Lack of treatment standards was often cited as the primary obstacle to further development of effective technologies. In February 2004, the IMO adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments in which it included strict performance standards. The USCG is preparing a rulemaking package addressing performance standards, due in winter 2005-2006 and Federal legislation has been introduced attempting to address this issue. Likewise, the California Act mandated CSLC prepare a report, with recommendations for the Legislature on performance standards. This report is due January 31, 2006, before the USCG rule is publicly available. CSLC recommends the extension of the due-date for this report, until January 31, 2007 (Recommendation #3), in order to review and incorporate the USCG rule.

In addition to performance standards, standards for testing, evaluating and verifying shipboard treatment technologies needs to be established. Various groups are beginning work in this area. CSLC should continue to work with the scientific

community and the Federal government to develop standardized analysis of shipboard treatment technologies (Recommendation #4).

Ballast water is not the only pathway for NIS introduction. Hull fouling, sea chests, underwater hull openings, and anchor chains are all examples of other potential ship borne vectors. Additional research is needed. The California Act mandated CSLC prepare a report, with recommendations for the Legislature on the risk of invasion through fouling on commercial vessels, and present management recommendations to prevent such introductions. This report is due March 2006. CSLC will be funding the Aquatic Bioinvasion Research and Policy Institute (ABRPI) to conduct a study examining the potential for invasions to California through the fouling vector. The CSLC-ABRPI project will begin 15 June 2005 and concludes 31 July 2007, after the aforementioned report is due. Therefore, CSLC recommends the extension of the due-date for this report, until March 1, 2006 (Recommendation #5) in order to incorporate the preliminary results of the ABRPI project.

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APPENDIX A

MARINE INVASIVE SPECIES ACT

(Assembly Bill 433)

BILL NUMBER: AB 433 CHAPTERED
BILL TEXT

CHAPTER 491
FILED WITH SECRETARY OF STATE SEPTEMBER 24, 2003
APPROVED BY GOVERNOR SEPTEMBER 24, 2003
PASSED THE ASSEMBLY SEPTEMBER 8, 2003
PASSED THE SENATE SEPTEMBER 4, 2003
AMENDED IN SENATE AUGUST 18, 2003
AMENDED IN ASSEMBLY JUNE 3, 2003
AMENDED IN ASSEMBLY JUNE 2, 2003
AMENDED IN ASSEMBLY APRIL 21, 2003

INTRODUCED BY Assembly Member Nation

FEBRUARY 14, 2003

An act to amend Sections 71200, 71201, 71201.5, 71202, 71203, 71204, 71205, 71206, 71207, 71211, 71212, 71213, 71215, 71216, and 71271 of, to amend the headings of Chapter 4 (commencing with Section 71215) of, and Chapter 5 (commencing with Section 71216) of, Division 36 of, to add Sections 71201.7, 71204.2, 71204.3, 71204.5, 71204.7, 71204.9, 71210.5, and 71217 to, and to repeal and add Section 71210 of, the Public Resources Code, and to amend Sections 44000, 44005, 44007, and 44008 of the Revenue and Taxation Code, relating to vessels.

LEGISLATIVE COUNSEL'S DIGEST

AB 433, Nation. Vessels: release of nonindigenous species.

(1) Existing law generally requires 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, in order to minimize the uptake and release of nonindigenous species. Those persons are also required to maintain specified information on board the vessel and provide this information to the State Lands Commission. Existing law imposes civil penalties upon a person who fails to comply with the prescribed ballast water management practices.

Existing law requires the commission to take samples of ballast water and sediment and to take other actions to assess the compliance

of any vessel with these requirements. Existing law prohibits any state agency from imposing different requirements prior to January 1, 2004, unless otherwise required by federal law. Existing law requires the commission, the State Water Resources Control Board, and the Department of Fish and Game to conduct prescribed research and make related reports. Existing law requires the commission to establish fees not to exceed \$1,000 per vessel and requires that money, and money collected for civil penalties, to be deposited into the Exotic Species Control Fund. Existing law requires the State Board of Equalization to collect the vessel fees, pursuant to the Ballast Water Management Fee Law.

Existing law repeals these provisions as of January 1, 2004.

This bill would revise and recast the state's law pertaining to control of nonindigenous species and ballast water management, including revising and adding definitions. The bill would delete exemptions for specified vessels from compliance with the act and revise the qualification for the vessels subject to the act. The bill would impose additional requirements upon vessel masters, owners, operators, and persons in charge of vessels, to prevent the introduction of nonindigenous species into waters of the state or waters that may impact the waters of the state.

The bill would require the master, owner, operator, or person in charge of specified vessels to retain, and make available to the State Lands Commission, additional information, including a separate ballast water log to outline ballast water management activities for each ballast water tank on board the vessel.

The bill would require the State Lands Commission to take samples from at least 25% of arriving vessels subject to nonindigenous species control requirements.

The bill would prohibit prior to January 1, 2010, other state agencies, boards, commissions, or departments from imposing additional requirements on the discharge or release of ballast water and other vectors of nonindigenous species from vessels subject to the bill's requirements, unless that action is mandated by federal law.

The bill would require the State Lands Commission and the Department of Fish and Game, in consultation with other state and federal agencies and interested persons, to make specified studies and reports and to submit the studies and reports to the Legislature.

The bill would rename the Exotic Species Control Fund the Marine Invasive Species Control Fund, and the Ballast Water Management Fee Law the Marine Invasive Species Fee Collection Law.

The bill would expand the persons to whom civil liability may apply and would make specified violations of the act a misdemeanor, thereby imposing a state-mandated local program by creating a new

crime. The bill would provide an administrative procedure for imposing civil liability and appealing from that imposition. In lieu of the administrative procedure the bill would authorize the Attorney General, at the request of the State Lands Commission, to bring an action in superior court for injunctive relief or civil penalties, as specified.

The bill would delete the 2004 repeal date of the provisions, and extend it until January 1, 2010.

The bill would require the State Lands Commission to adopt any regulations necessary to implement the act, and other specified regulations regarding ballast water management.

(2) The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

This bill would provide that no reimbursement is required by this act for a specified reason.

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

SECTION 1. Section 71200 of the Public Resources Code is amended to read:

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) "Board" means the State Water Resources Control Board.

(d) "Coastal waters" means estuarine and ocean waters within 200 nautical miles of land or less than 2,000 meters (6,560 feet, 1,093 fathoms) deep, and rivers, lakes, or other water bodies navigably connected to the ocean.

(e) "Commission" means the State Lands Commission.

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

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

(1) "Flow through exchange," which means to flush out ballast water by pumping three full volumes of mid-ocean water through the

tank, continuously displacing water from the tank, to minimize the number of original coastal organisms remaining in the tank.

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

(h) "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.

(i) "Nonindigenous species" means any species, including, but not limited to, the seeds, eggs, spores, or other biological material capable of reproducing that species, or any other viable biological material that enters an ecosystem beyond its historic range, including any of those organisms transferred from one country into another.

(j) "Pacific Coast Region" means all coastal waters on the Pacific Coast of North America east of 154 degrees W longitude and north of 25 degrees N latitude, exclusive of the Gulf of California. The commission may modify these boundaries through regulation if the proponent for the boundary modification presents substantial scientific evidence that the proposed modification is equally or more effective at preventing the introduction of nonindigenous species through vessel vectors as the boundaries described herein.

(k) "Person" means any individual, trust, firm, joint stock company, business concern, or corporation, including, but not limited to, a government corporation, partnership, limited liability company, or association. "Person" also means any city, county, city and county, district, commission, the state, or any department, agency, or political subdivision of the state, any interstate body, or the United States and its agencies and instrumentalities, to the extent permitted by law.

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

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

(n) "Vessel" means a vessel of 300 gross registered tons or more.

(o) "Voyage" means any transit by a vessel destined for any California port or place from a port or place outside of the coastal waters of the state.

SEC. 2. Section 71201 of the Public Resources Code is amended to read:

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

(b) This division applies to all ballast water and associated sediments taken on a vessel.

(c) This division may be known, and may be cited, as the "Marine Invasive Species Act."

(d) The Legislature finds and declares that the purpose of this division is to move the state expeditiously toward elimination of the discharge of nonindigenous species into the waters of the state or into waters that may impact the waters of the state, based on the best available technology economically achievable. This division shall be implemented in accordance with this intent, except as expressly provided by this division.

SEC. 3. Section 71201.5 of the Public Resources Code is amended to read:

71201.5. This division does not authorize the discharge of oil, noxious liquids, or other pollutants, 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.

SEC. 4. Section 71201.7 is added to the Public Resources Code, to read:

71201.7. The commission shall adopt regulations necessary to implement this division, pursuant to Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.

SEC. 5. Section 71202 of the Public Resources Code is amended to read:

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

(a) A vessel of the armed forces, as defined in paragraph (14) of subsection (a) of Section 1322 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 subsection (n) of Section 1322 of Title 33 of the United States Code.

(b) 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, and that does not discharge ballast water into the waters of the state, or into waters that may impact waters of the state.

SEC. 6. Section 71203 of the Public Resources Code is amended to read:

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, the master, operator, or person in charge of the vessel shall take all feasible measures, based on the best available technologies economically achievable, 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.

SEC. 7. Section 71204 of the Public Resources Code is amended to read:

71204. Subject to Section 71203, the master, owner, operator, or person in charge of a vessel carrying, or capable of carrying, ballast water, that operates in the waters of the state shall do all of the following to minimize the uptake and the release of nonindigenous species:

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

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

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

(1) Areas known to have infestations or populations of nonindigenous organisms and pathogens.

(2) Areas near a sewage outfall.

(3) Areas for which the master, owner, operator, or person in charge of a vessel has been informed of the presence of toxic algal blooms.

(4) Areas where tidal flushing is known to be poor or in turbid waters.

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

(6) Areas where sediments have been disturbed, such as near dredging operations or where propellers may have recently stirred up the sediment.

(d) Clean the ballast tanks regularly in mid-ocean waters, or under controlled arrangements at port or in drydock, to remove

sediments, and dispose of the sediments in accordance with local, state, and federal law.

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

(f) 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.

(g) Provide access to the commission, upon request, for sampling of ballast intake and discharge.

(h) Maintain a ballast water management plan that was prepared specifically for the vessel and that shall, upon request, be made available to the commission for inspection and review. This plan shall be specific to each vessel and shall provide, at a minimum, a description of the ballast water management strategy for the vessel that is sufficiently detailed to allow a master or other appropriate ship's officer or crew member serving on that vessel to understand and follow the ballast water management strategy.

(i) Train the master, operator, person in charge, and those members of the crew who have responsibilities under the vessel's ballast water management plan, on the application of ballast water and sediment management and treatment procedures, as well as procedures described in this section, in order to minimize other releases of nonindigenous species from vessels.

SEC. 8. Section 71204.2 is added to the Public Resources Code, to read:

71204.2. Prior to and until the date of implementation of the regulations described in Section 71204.5, and subject to Section 71203, the master, operator, or person in charge of a vessel that arrives at a California port or place from a port or place outside of the EEZ shall employ at least one of the following ballast water management practices:

(a) Exchange the vessel's ballast water in mid-ocean waters, before entering the waters of the state.

(b) Retain all ballast water on board the vessel.

(c) (1) Discharge the ballast water at the same location where the ballast water originated, provided that the master, operator, or person in charge of the vessel can demonstrate that the ballast water to be discharged was not mixed with ballast water taken on in an area other than mid-ocean waters.

(2) For purposes of this subdivision, "same location" means an area within one nautical mile (6,000 feet) of the berth or within the recognized breakwater of a California port or place, at which the ballast water to be discharged was loaded.

(d) Use an alternative, environmentally sound method of ballast water management that, before the vessel begins the voyage, has been approved by the commission or the United States Coast Guard as being

at least as effective as exchange, using mid-ocean waters, in removing or killing nonindigenous species.

(e) Discharge the ballast water to a reception facility approved by the commission.

(f) Under extraordinary circumstances, perform a ballast water exchange within an area agreed to by the commission in consultation with the United States Coast Guard at or before the time of the request.

SEC. 9. Section 71204.3 is added to the Public Resources Code, to read:

71204.3. Commencing on the date of implementation of the regulations described in Section 71204.5, and subject to Section 71203, the master, operator, or person in charge of a vessel that arrives at a California port or place from a port or place outside of the Pacific Coast Region shall employ at least one of the following ballast water management practices:

(a) Exchange the vessel's ballast water in mid-ocean waters, before entering the coastal waters of the state.

(b) Retain all ballast water on board the vessel.

(c) (1) Discharge the ballast water at the same location where the ballast water originated, provided that the master, operator, or person in charge of the vessel can demonstrate that the ballast water to be discharged was not mixed with ballast water taken on in an area other than mid-ocean waters.

(2) For purposes of this subdivision, "same location" means an area within one nautical mile (6,000 feet) of the berth or within the recognized breakwater of a California port or place, at which the ballast water to be discharged was loaded.

(d) Use an alternative, environmentally sound method of ballast water management that, before the vessel begins the voyage, has been approved by the commission or the United States Coast Guard as being at least as effective as exchange, using mid-ocean waters, in removing or killing nonindigenous species.

(e) Discharge the ballast water to a reception facility approved by the commission.

(f) Under extraordinary circumstances, perform a ballast water exchange within an area agreed to by the commission in consultation with the United States Coast Guard at or before the time of the request.

SEC. 10. Section 71204.5 is added to the Public Resources Code, to read:

71204.5. (a) On or before January 1, 2005, the commission shall adopt regulations governing ballast water management practices for vessels arriving at a California port or place from a port or place within the Pacific Coast Region. The commission shall consider vessel design and voyage duration in developing these regulations.

The regulations shall be based on the best available technology economically achievable and shall be designed to protect the waters of the state. The regulations shall include, as appropriate, restrictions or prohibitions on discharge of ballast water containing nonindigenous species into areas in and outside estuaries and into ocean areas shown to have a capacity to retain organisms.

(b) Subject to Section 71203, and commencing no later than July 1, 2005, the master, operator, or person in charge of a vessel arriving at a California port or place from a port or place within the Pacific Coast Region shall comply with these regulations.

SEC. 11. Section 71204.7 is added to the Public Resources Code, to read:

71204.7. (a) On or before July 1, 2005, the commission, in consultation with the United States Coast Guard, shall adopt regulations governing the evaluation and approval of shipboard experimental ballast water treatment systems.

(b) The regulations shall include criteria for the development of a formal application package to use those systems.

(c) If an owner or operator of a vessel applies to install an experimental ballast water treatment system, and the commission approves that application, the commission may subsequently deem the system to be in compliance with any future treatment standard adopted, for a period not to exceed five years from the date that the standard is adopted.

(1) A system approval on a particular vessel may be extended for an additional period not to exceed five years, at the discretion of the commission. That extension may be renewed for additional periods not to exceed five years each, if the owner or operator demonstrates that the system is at least as effective as existing systems in its ability to kill, inactivate, or otherwise remove nonindigenous species from ballast water.

(2) The commission may rescind its approval of the system at any time if the commission, in consultation with the board and the United States Coast Guard, and after an opportunity for administrative appeal with the executive officer of the commission, determines that the system has not been operated in accordance with conditions in the agreed upon application package, or that there exists a serious deficiency in performance, human safety, or environmental soundness relative to anticipated performance.

(d) The commission may not approve an experimental ballast water treatment system unless the owner or operator demonstrates that the system has significant potential to improve upon the ability of existing systems to kill, inactivate, or otherwise remove nonindigenous species from ballast water.

SEC. 12. Section 71204.9 is added to the Public Resources Code, to read:

71204.9. (a) (1) On or before January 31, 2006, the commission, in consultation with the board and in consideration of the advisory panel recommendations described in subdivision (b), shall submit to the Legislature and make available to the public, a report that recommends specific performance standards for the discharge of ballast water into the waters of the state, or into waters that may impact waters of the state. The performance standards shall be based on the best available technology economically achievable and shall be designed to protect the beneficial uses of affected, and potentially affected, waters. If the commission, based on the best available information, and in consultation with the board and in consideration of the advisory panel recommendations, determines that it is technologically and economically achievable to prohibit the discharge of nonindigenous species, the commission shall include this recommendation in the report to the Legislature.

(2) As appropriate, the commission may recommend different performance standards for vessels arriving from mid-ocean waters, for vessels that travel exclusively within the Pacific Coast Region, for new or existing vessels, or for different vessel types. Each set of performance standards shall be based on the best available technology economically achievable for the described category of vessel.

(b) (1) The commission shall convene and consult with an advisory panel in developing the report required by subdivision (a). The advisory panel shall be comprised of persons concerned with performance standards for the discharge of treated ballast water. The advisory panel shall include, but not be limited to, representatives from one or more California regional water quality control boards, the Department of Fish and Game, the United States Coast Guard, the United States Environmental Protection Agency, and persons representing shipping, port, conservation, fishing, aquaculture, agriculture, and public water agency interests. The commission shall ensure that the advisory panel meets in a manner that facilitates the effective participation of both the public and panel members.

(2) The advisory panel shall make recommendations regarding the content, issuance, and implementation of the performance standards to the commission.

(3) (A) The advisory panel's meetings shall be open to the public.

(B) The commission shall provide notice of the advisory panel's meetings to any person who requests that notice in writing, as well as on the commission's Web site. The commission shall provide that notice at least 10 days before an advisory panel meeting and shall include a brief general description of the meeting's agenda and the name, address, and telephone number of a person who can provide

additional information before the meeting.

(4) The advisory panel shall submit its recommendations to the commission on or before July 1, 2005.

SEC. 13. Section 71205 of the Public Resources Code is amended to read:

71205. (a) (1) The master, owner, operator, agent, or person in charge of a vessel carrying, or capable of carrying, ballast water, that visits a California port or place, shall provide the information described in subdivision (c) in electronic or written form to the commission upon the vessel's departure from each port or place of call in California.

(2) The information described in subdivision (c) shall be submitted using a form developed by the United States Coast Guard.

(b) If the information submitted in accordance with this section changes, an amended form shall be submitted to the commission upon the vessel's departure from each port or place of call in California.

(c) (1) The master, owner, operator, or person in charge of the vessel shall maintain on board the vessel, in written or electronic 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, capacity of each ballast water tank, and total number of ballast water tanks in ballast, using measurements in metric tons (MT) and cubic meters (m³).

(D) Ballast water management information, including all of the following:

(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.

(iv) Whether the master, operator, or person in charge of the vessel has claimed a safety exemption pursuant to paragraph (1) of subdivision (b) of Section 71203 for the vessel voyage, and the reason for asserting the applicability of that paragraph.

(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 is 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.

(d) The master, owner, operator, or person in charge of a vessel subject to this division shall retain for two years a separate ballast water log outlining ballast water management activities for each ballast water tank on board the vessel and shall make the separate ballast water log available to the commission for inspection and review.

SEC. 14. Section 71206 of the Public Resources Code is amended to read:

71206. (a) The commission, in coordination with the United States Coast Guard, shall take samples of ballast water and sediment from at least 25 percent of the arriving vessels subject to this division, examine documents, and make other appropriate inquiries to assess

the compliance of any vessel subject to this division. The commission shall provide to the board copies of all sampling results.

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

(c) The 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.

SEC. 15. Section 71207 of the Public Resources Code is amended to read:

71207. (a) This division describes the state program to regulate the discharge or release of ballast water and other vectors of nonindigenous species from vessels regulated pursuant to this division. Prior to January 1, 2010, a state agency, board, commission, or department shall not impose a requirement, pertaining to the discharge or release of ballast water and other vectors of nonindigenous species from a vessel regulated pursuant to this division, that is different from the requirements set forth in this division, unless that action is mandated by federal law.

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

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

(d) The 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.

SEC. 16. Section 71210 of the Public Resources Code is repealed.

SEC. 17. Section 71210 is added to the Public Resources Code, to read:

71210. (a) The commission, in consultation with the board, the United States Coast Guard, and a technical advisory group made up of interested persons, including, but not limited to, shipping and port representatives, shall sponsor a pilot program for the purpose of evaluating alternatives for treating and otherwise managing ballast water. The goal of this effort shall be the reduction or elimination of the discharge of nonindigenous species into the coastal waters of the state or into waters that may

impact coastal waters of the state. Whenever possible, the pilot programs shall include funding from federal grants and appropriations, vendor funding, and state bond funds, including, but not limited to, bond funds from the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002. Priority shall be given to projects to test and evaluate treatment technologies that can be used to prevent the introduction and spread of nonindigenous aquatic species into coastal waters of the state by ship-mediated vectors.

(b) The commission shall provide biennial summaries to the Legislature and the public, beginning on or before January 31, 2005, of the results of the pilot programs conducted pursuant to this section. These summary reports shall include, but not be limited to, a description of the projects, the relative effectiveness of the technologies examined in minimizing the discharge of nonindigenous species, and the costs of implementing the technologies.

SEC. 18. Section 71210.5 is added to the Public Resources Code, to read:

71210.5. The commission, in consultation with the board, the United States Coast Guard, and a technical advisory group made up of interested persons including, but not limited to, shipping and port representatives, shall prepare an analysis of the vectors, other than ballast water, and relative risks of those vectors, for release of nonindigenous species from vessels. This analysis shall include, but not be limited to, the release of nonindigenous species from vessel hulls, sea chests, sea suction grids, other hull apertures, in-water propellers, chains, anchors, piping and tanks. The commission shall prepare a report summarizing the results of this analysis and recommending action to reduce the discharge of nonindigenous species from vessel vectors other than ballast water. The commission shall submit the report to the Legislature and make it available to the public on or before March 1, 2006.

SEC. 19. Section 71211 of the Public Resources Code is amended to read:

71211. (a) (1) The Department of Fish and Game, in consultation with the commission and the United States Coast Guard, shall collect data necessary to establish and maintain an inventory of the location and geographic range of nonindigenous species populations in the coastal and estuarine waters of the state that includes open coastal waters and bays and estuaries. In particular, data shall be collected that does both of the following:

(A) Supplements the existing baseline of nonindigenous species previously developed pursuant to this section, by adding data from investigations of intertidal and nearshore subtidal habitats along the open coast.

(B) Monitors the coastal and estuarine waters of the state,

including, but not limited to, habitats along the open coast, for new introductions of nonindigenous species or spread of existing nonindigenous species populations.

(2) Whenever possible, the study shall utilize appropriate, existing data, including data from previous studies made pursuant to this section. The Department of Fish and Game shall make the inventory and accompanying analysis available to the public through the Internet on or before January 1, 2007, and shall provide to the public an update of that inventory no later than July 1, 2008.

(b) (1) The Department of Fish and Game, in consultation with the commission and the United States Coast Guard, shall assess the effectiveness of the ballast water controls implemented pursuant to this division by comparing the status and establishment of nonindigenous species populations, as determined from the data collected pursuant to subdivision (a), with the baseline data collected pursuant to this division and submitted in a report to the Legislature in 2003.

(2) Whenever possible, this research shall utilize appropriate, existing data.

(3) The Department of Fish and Game shall submit a report presenting its assessment to the Legislature and the public on or before January 1, 2009.

(c) Information generated by the research conducted pursuant to this section 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 determination of potential risk zones where uptake or discharge of ballast water shall be prohibited.
- (5) The rate and risk of establishment of nonindigenous species in the coastal waters of the state, and resulting impacts.

SEC. 20. Section 71212 of the Public Resources Code is amended to read:

71212. On or before January 31, 2005, and updated biennially, the commission, in consultation with the 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 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 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.

SEC. 21. Section 71213 of the Public Resources Code is amended to read:

71213. The commission, the board, and the Department of Fish and Game, in consultation with interested stakeholders, shall identify and conduct any other 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 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.

SEC. 22. The heading of Chapter 4 (commencing with Section 71215) of Division 36 of the Public Resources Code is amended to read:

CHAPTER 4. MARINE INVASIVE SPECIES CONTROL FUND

SEC. 23. Section 71215 of the Public Resources Code is amended to read:

71215. (a) (1) The Marine Invasive Species Control Fund is hereby created. The money in the fund, upon appropriation by the Legislature, shall be used solely to carry out this division.

(2) All money accruing to the Exotic Species Control Fund shall be transferred to the Marine Invasive Species Control Fund.

(b) (1) The commission shall administer the fund in accordance with this chapter.

(2) The commission shall establish, through regulation, a reasonable and appropriate fee solely for the purposes of carrying out this division. The fee may not exceed one thousand dollars

(\$1,000) for each voyage, as described in subdivision (c). This amount may be adjusted for inflation every two years.

(3) In establishing fees, the commission shall consult with a technical advisory group made up of interested persons, including, but not limited to, shipping and port representatives.

(4) The 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 State Board of Equalization, in accordance with Part 22.5 (commencing with Section 44000) of Division 2 of the Revenue and Taxation Code, shall collect the fee from the owner or operator of each vessel that arrives at a California port or place from a port or place outside of California. That fee may not be assessed on any vessel arriving at a California port or place if that vessel comes directly from another California port or place and during that transit has not first arrived at a port or place outside California or moved outside the EEZ prior to arrival at the subsequent California port or place.

(d) Notwithstanding any other provision of law, all fees imposed pursuant to this section shall be deposited into the Marine Invasive Species 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 Marine Invasive Species Control Fund.

SEC. 24. The heading of Chapter 5 (commencing with Section 71216) of Division 36 of the Public Resources Code is amended to read:

CHAPTER 5. CIVIL AND CRIMINAL PENALTIES AND LIABILITY

SEC. 25. Section 71216 of the Public Resources Code is amended to read:

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 may 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 may 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, or knowingly and with intent to deceive, tampers with or disables a system for controlling the release of nonindigenous species, required by this division, may be liable for an administrative civil penalty in an amount which may not exceed five thousand dollars (\$5,000) per violation. Each day of a continuing violation constitutes a separate violation.

(d) The executive officer of the commission may issue a complaint to any person on whom civil liability may be imposed pursuant to this division. The complaint shall allege the facts or failures to act that constitute a basis for liability and the amount of the proposed civil liability. The complaint shall be served by personal service or certified mail and shall inform the person so served of the right to a hearing. A person served with a complaint pursuant to this subdivision may, within 30 days after service of the complaint, request a hearing by filing with the executive officer a notice of defense, as described in Section 11506 of the Government Code. A notice of defense is deemed to be filed within the 30-day period if it is postmarked within the 30-day period. If a hearing is requested by the person, it shall be conducted within 30 days after the executive officer receives the notice of defense. If no notice of defense is filed within 30 days after service of the complaint, the executive officer shall issue an order setting liability in the amount proposed in the complaint unless the executive officer and the person have entered into a settlement agreement, in which case the executive officer shall issue an order setting liability in the amount specified in the settlement agreement. If the person has not filed a notice of defense or if the executive officer and the person have entered into a settlement agreement, the order may not be subject to review by a court or agency.

(e) A hearing required under this section shall be conducted by an independent hearing officer, in accordance with the procedures specified in Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code, except as otherwise specified in this section. In making a determination, the hearing officer shall take into consideration the nature, circumstances, extent, and gravity of the violation, the violator's past and present efforts to prevent, abate, or clean up conditions posing a threat to the public health and safety of the environment, and the violator's ability to pay the proposed civil penalty. After conducting a hearing required under this section, the hearing officer shall, within 30 days after the case is submitted, issue a decision, including an order setting the amount, if any, of the civil penalty to be imposed.

(f) Orders setting civil liability and issued pursuant to this section are effective and final upon issuance. The violator shall pay any penalty within 30 days of service, unless he or she seeks judicial review pursuant to subdivision (g), in which case he or she shall pay any penalty within 30 days of service of the court's order setting civil liability. Copies of the orders shall be served by personal service or by certified mail upon the person served with the complaint and upon other persons who appeared at the hearing and requested a copy.

(g) Within 30 days after service of a copy of a decision issued by the hearing officer that the person served is liable for a civil penalty, a person so served may file a petition for writ of mandate for review of the decision pursuant to Section 11523 of the Government Code. A person who fails to file the petition within the 30-day period may not challenge the reasonableness or validity of a decision or order of the hearing officer in any judicial proceedings brought to enforce the decision or order or for other remedies. Except as otherwise provided in this section, Section 1094.5 of the Code of Civil Procedure shall govern any proceedings conducted pursuant to this subdivision. In all proceedings pursuant to this subdivision, the court shall uphold the decision of the hearing officer if the decision is based upon substantial evidence in the whole record. The filing of a petition for writ of mandate may not stay any corrective action required pursuant to this act or the accrual of any penalties assessed pursuant to this act. This subdivision does not prohibit the court from granting any appropriate relief within its jurisdiction.

(h) An order for administrative penalties entered pursuant to this section shall be subject to interest at the legal rate from the filing date of the complaint as specified in subdivision (d).

(i) A provision of this chapter or a ruling of the executive officer may not be construed to limit, abridge, or supersede the power of the Attorney General, at the request of the executive officer, or upon his or her own motion, to bring an action in the name of the people of the State of California to enjoin a violation of this division, seek necessary remedial action by a person who violates this division, or seek civil and criminal penalties against a person who violates this division.

(j) In lieu of a complaint under subdivision (d) to impose administrative civil penalties set forth in subdivisions (a), (b), and (c), the Attorney General, at the request of the commission, may bring an action in superior court, in the name of the People of the State of California, to enjoin a violation of this division, seek necessary remedial action by a person who violates this division, or seek civil penalties in the amounts set forth in subdivisions (a), (b), and (c).

SEC. 26. Section 71217 is added to the Public Resources Code, to read:

71217. A person who violates subdivision (c) of Section 71216 is guilty of a misdemeanor, and is punishable by imprisonment in the county jail for not more than one year.

SEC. 27. Section 71271 of the Public Resources Code is amended to read:

71271. This division shall remain in effect only until January 1, 2010, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2010, deletes or extends that date. If a federal program and regulations similar to the program and regulations developed pursuant to this division are established and implemented prior to January 1, 2010, the commission shall submit a report to the Legislature within eight months of the implementation of the federal program. The report shall compare the federal program with the program described in this division and make a finding as to the federal program's relative effectiveness in preventing the introduction of marine invasive species from vessels visiting California. The commission shall recommend repeal of the program described in this division only if it finds that the federal program is equally or more effective at implementing and funding effective controls on the release of aquatic invasive species into the waters of the state than the program described in this division.

SEC. 28. Section 44000 of the Revenue and Taxation Code is amended to read:

44000. This part shall be known, and may be cited, as the Marine Invasive Species Fee Collection Law.

SEC. 29. Section 44005 of the Revenue and Taxation Code is amended to read:

44005. Except as authorized in Section 44006, 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.

SEC. 30. Section 44007 of the Revenue and Taxation Code is amended to read:

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 Marine Invasive Species Control Fund.

SEC. 31. Section 44008 of the Revenue and Taxation Code is amended to read:

44008. This part shall remain in effect only until January 1, 2010, and as of that date is repealed, unless a later enacted

statute, that is enacted before January 1, 2010, 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, 2010; 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. 32. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because the only costs that may be incurred by a local agency or school district will be incurred because this act creates a new crime or infraction, eliminates a crime or infraction, or changes the penalty for a crime or infraction, within the meaning of Section 17556 of the Government Code, or changes the definition of a crime within the meaning of Section 6 of Article XIII B of the California Constitution.