



# **Oregon Ballast Water Task Force Report on Ballast Water Management in Oregon**

Oregon Ballast Water Task Force

## **Report on Ballast Water Management in Oregon**

Prepared for the Oregon State Legislature

Written by:  
Christina Simkanin and Mark Sytsma  
Center for Lakes and Reservoirs  
Portland State University

October 2006

## **Report on Ballast Water Management in Oregon-2006**

### **Acknowledgements**

We would like to thank the members and support staff of the Oregon Ballast Water Task Force for discussion, detailed comments, and recommendations on this report. The Washington Department of Fish and Wildlife provided data from 2002 to 2005. Kevin Anderson of the Puget Sound Action Team allowed the use of the treatment standards tables in Appendix II. The Pacific States Marine Fisheries Commission provided partial support for preparation of this report. Additional support was provided by the U.S. Fish and Wildlife Service through their support of the Oregon Aquatic Nuisance Species Management Plan. Thanks to Patricia Moran Simkanin for technical support and everything.

**Executive Summary**

This report to the 2007 Legislature was prepared by the Oregon Ballast Water Task Force pursuant to HB 2170 (2005). It provides information and analysis on the current ballast water regulations at international, federal, regional and state levels; ballast water discharge trends in Oregon; the shipping industry's compliance with Oregon law; and current and emerging issues affecting Oregon's ballast water legislation. The report also provides recommendations for strengthening Oregon's management of shipping-related pathways of invasive species introduction.

Shipping is critical to the economy of Oregon. Ports in Coos Bay and the Columbia River import and export a variety of goods, providing a link between the rest of the world and Oregon businesses and consumers. An unintentional consequence of trade is the transport and introduction of species to ecosystems outside their historical ranges. These aquatic nonindigenous species (ANS), freed of the natural controls in their native range, can proliferate in Oregon's waterways, displace native species, and degrade ecosystem services important to human economies and health. A sustainable economy requires effective and efficient management to prevent the introduction of ANS via shipping vectors such as ballast water and vessel fouling.

Ballast water management (reporting, exchange and/or treatment) regulations have been implemented at international, federal and state levels to reduce the risks posed by ANS and their spread via ballast water transport and discharge. Currently, the only approved method for managing ballast on a large scale is open-ocean ballast water exchange. The effectiveness of ballast water exchange is variable and it does not eliminate the threat of ANS introduction. Ballast water exchange is therefore considered a short-term solution until ballast water treatment technologies are developed and implemented on the global commercial ship fleet.

Ballast water management is particularly important for Oregon waters because the type of vessels that call on Oregon ports (primarily bulk carriers) discharge large volumes of ballast water. About seven million metric tons of ballast water were discharged into the Columbia River in 2005. From 2002 through 2005, 9% of the ballast water discharged was unexchanged. Of the unexchanged ballast water that was discharged, most (65%) came from ports that were within the 40-50 degrees north latitude "common waters" area in Oregon law and therefore were exempt

## **Report on Ballast Water Management in Oregon-2006**

from the requirement for exchange. California was the source of 27%, and foreign ports were the source of 8% of the unexchanged ballast water that was illegally discharged without exchange.

Generally, Oregon ballast water management laws are congruent with federal, California and Washington laws. Washington and Oregon do differ, however, in how ballast water treated with ship-based technology is managed. Oregon law requires treatment systems to be approved by the U.S. Coast Guard; Washington has its own technology approval process that differs from the federal process. Consequently, if a ship discharges water into Oregon water in the Columbia River that is treated with a Washington-approved technology that is not U.S. Coast Guard-approved, that ship could be in violation of Oregon law. The number of such ships is expected to be small, however, potential conflict could occur.

The definition of “cargo vessel” in Oregon law makes it unclear whether barges are covered under Oregon ballast water management regulations. Federal regulations clearly apply to barges. A modification of the definition of “cargo vessel” in Oregon law is required to clarify ballast water management requirements and to harmonize those requirements with federal regulations.

Specific recommendations to the legislature by the Oregon Ballast Water Task Force are to:

- Support and encourage development of federal ballast water treatment standards that are protective of Oregon’s water resources. If federal standards are not in place by 2009, the legislature should consider developing state standards that are congruent with those in neighboring states.
- Establish a bi-state Columbia River Commission on Bioinvasions with members appointed by the legislatures and governors of Oregon and Washington to develop a common approach and to harmonize regulations for the management of shipping-related introductions of ANS to the Columbia River.
- Change the definition of “cargo vessel” in Oregon ballast water law to clarify the ships that are covered by the law.
- Create a Shipping Transport of Aquatic Invasive Species Task Force to address changes in international, federal, and state regulations on ballast water and the

## **Report on Ballast Water Management in Oregon-2006**

management of vessel fouling. The Task Force will provide recommendations on changes to the Oregon law to the 2009 legislature.

Since its onset, the Oregon ballast water program has received no direct funding. All monitoring and analysis of compliance has been conducted by Portland State University (PSU) on grants and contracts and the Washington Department of Fish and Wildlife. Perhaps due to this lack of funding, the amount of unexchanged water reported as discharged has remained relatively constant since the programs onset in 2002. A truly effective effort to protect Oregon waters from invasive species requires state investment. We recommend funding a full-time position at the Oregon Department of Environmental Quality to enforce ballast water management regulations. In addition, we recommend funding regular biological monitoring of the Columbia River and Coos Bay for new species introductions. PSU research has established a baseline of ANS in the Columbia River. Follow-up monitoring by PSU is required to determine whether the current regulations are successful in reducing new species introductions. Oregon support of the Columbia River Commission on Bioinvasions is estimated at \$10,000. Therefore, a total of about \$504,000/biennium is required for full implementation of the recommended Oregon State Ballast Water program.

**Table of Contents**

Acknowledgements ..... i

Executive Summary..... ii

Table of Contents..... v

List of Tables ..... vi

List of Figures..... vi

Abbreviations..... vii

Purpose ..... 1

Nonindigenous Species and Their Impacts ..... 2

Ship Mediated Vectors of Aquatic Nonindigenous Species..... 3

Ballast Water Discharge in Oregon ..... 4

Laws and Regulations..... 5

    International Regulations..... 6

    Canadian Regulations..... 6

    Federal Regulations ..... 7

    West Coast State Regulations..... 9

Oregon Ballast Water Program..... 12

    Requirements ..... 13

    Shipping and Ballast Water Patterns in Oregon ..... 13

    Vessel Compliance ..... 15

    Barge Compliance ..... 18

    Coordination between Washington and Oregon..... 18

Emerging Issues..... 19

    Vessel Fouling ..... 19

    Columbia River Ballast Water Treatment ..... 20

    U.S. EPA Regulation of Ballast Water..... 21

    Alternative Ballast Water Exchange Areas ..... 21

Regional Collaborations, Research, and Technology Developments..... 22

Conclusions and Recommendations ..... 23

References ..... 27

Appendix I: HB 2170 ..... 32

Appendix II: Proposed and Existing Ballast Water Treatment Performance Standards for the West Coast. Modified with permission from K. Anderson. .... 36

Appendix III: Recommended Amendments to current Oregon Ballast Water statute. .... 38

**List of Tables**

Table 1: Vessel arrivals to Columbia River ports from 2002 through 2005 by ship type and percentage of ballast water that each ship type discharged. ....14

**List of Figures**

Figure 1: M/V Cougar Ace listing to port following ballast water adjustment.....5

Figure 2: A) Percentage of arrivals for each ship type from 2002-2005. B) The number of container arrivals from before (2004) and after (2005) the container lines pulled out of Portland. ....14

Figure 3: A) Volume of ballast water discharged (MT) in the Columbia River from 2002 through 2005; B) Number of vessel arrivals to the Columbia River from 2002 through 2005 using U.S. Maritime Administration (MARAD) arrivals data. ....15

Figure 4: Percentage of international and coastal commercial vessel arrivals submitting reports to Oregon (includes WA ports on the Columbia River). Data from 2003-2004 are from the WDFW and data from 2005 onwards are from PSU. (Arrow indicates onset of PSU ballast water reporting pilot project. ....16

Figure 5: Percentage of international and coastal commercial vessel arrivals submitting reports since February 2005 when agents were contacted for missing or erroneous reports..16

Figure 6: The percentage of vessels submitting ballast water reports to the federal and state programs from 2003 to May 2006. Data from 2003-June 2004 include international vessel arrivals only, whereas data from July 2004 to present include domestic and international arrivals. Barges are excluded from all analyses.....17

## **Report on Ballast Water Management in Oregon-2006**

### **Abbreviations**

|        |  |
|--------|--|
| ABRPI  | Aquatic Bioinvasion Research and Policy Institute    |
| ABWEA  | Alternative Ballast Water Exchange Areas             |
| ANS    | Aquatic Nonindigenous Species                        |
| COTP   | Captain Of The Port                                  |
| CSLC   | California State Lands Commission                    |
| EEZ    | Exclusive Economic Zone                              |
| EPA    | Environmental Protection Agency                      |
| IMO    | International Maritime Organization                  |
| MARAD  | Maritime Administration                              |
| MT     | Metric Tons  |
| NANPCA | National Aquatic Nuisance Prevention and Control Act |
| NBIC   | National Ballast Information Clearinghouse           |
| NISA   | National Invasive Species Act                        |
| NM     | Nautical Miles                                       |
| NOAA   | National Oceanographic and Atmospheric Association   |
| ODEQ   | Oregon Department of Environmental Quality           |
| PSMFC  | Pacific States Marine Fisheries Commission           |
| PSU    | Portland State University                            |
| SERC   | Smithsonian Environmental Research Center            |
| STEP   | Shipboard Technology Evaluation Program              |
| UBC    | University of British Columbia                       |
| USCG   | United States Coast Guard                            |
| UW     | University of Washington                             |
| WDFW   | Washington Department of Fish and Wildlife           |

# Report on Ballast Water Management in Oregon

## Purpose

The Oregon Ballast Water Task Force prepared this report on ballast water management in Oregon for the 2007 legislature pursuant to HB 2170 (Appendix I). Previous reports were provided to the 2003 (Vinograd and Sytsma, 2002) and 2005 (Flynn and Sytsma, 2004) legislatures. HB 2170 amended and created new provisions in ORS 783.625, 783.630, 783.635, 783.640 and 783.992. The bill implemented some of the recommendations to the legislature by the 2003-2004 Oregon Ballast Water Task Force. Among other things, the 2005 legislative assembly changed the location of coastal exchange to at least 50 nautical miles (nm) from land and at a depth of at least 200 meters (m); clarified methods for exchange (*i.e.* flow through and empty refill exchange); and added qualifying terms to the ballast water management reporting requirements.

The 2005 legislature also created a task force in HB 2170 to study and make recommendations on changes to the ballast water program established in ORS 783.625 to 783.640. The Task Force was charged with reporting on:

- Shipping industry compliance with ORS 783.625 to 783.640;
- Practical and cost-effective ballast water treatment technologies;
- Appropriate standards for discharge of treated ballast water into Oregon waters;
- The degree to which open sea and coastal ballast water exchange reduces risk of introduction of nonindigenous species into Oregon waters;
- The compatibility of 783.630 to 783.640 to federal laws and regulations and to ballast water management programs established by the states of Alaska, California, Washington, and the Province of British Columbia;
- Research requirements for ballast water treatment technology and other areas of concern related to the introduction of aquatic nonindigenous species;
- Amendments to the National Invasive Species Act of 1996 (P.L. 104-332) for a single national system of regulation; and

## **Report on Ballast Water Management in Oregon-2006**

- The degree to which ballast water management is consistent with and made part of efforts to eradicate invasive species throughout Oregon.

The director of the Oregon Department of Environmental Quality appointed the Task Force. Task Force members included:

Maurya Falkner, California State Lands Commission  
James Gores, Oregon Department of Fish and Wildlife  
Marla Harrison, Port of Portland  
Senator Betsy Johnson, Oregon State Senator-District 16  
Representative Wayne Krieger, Oregon State Representative-District 7  
Pamela Meachum, Washington Department of Fish and Wildlife  
Michael Pearson, United States Coast Guard  
Mark Sytsma, Portland State University  
James Townley, Columbia River Steamship Operators Association  
Dick Vanderschaaf, The Nature Conservancy

The Task Force was chaired by Dr. Mark Sytsma from Portland State University (PSU) and supported by Christina Simkanin and students at PSU and Jack Wylie from the Oregon Department of Environmental Quality. The Task Force met on April 21 in Portland and August 16 in Salem and reviewed two drafts of this report.

### **Nonindigenous Species and Their Impacts**

Shipping is critical to the economy of Oregon. Ports in Coos Bay and the Columbia River import and export a variety of goods, providing a link between the rest of the world and Oregon businesses and consumers. An unintentional consequence of trade is the movement of “hitchhiking” organisms. As globalization and the transportation of goods around the world increases, the numbers of species transported to new areas through human mediated activities also increases (Vitousek *et al.*, 1997; Mack *et al.*, 2000; Ruiz *et al.*, 2000).

Approximately 50,000 nonindigenous species have been introduced into the United States (Pimentel *et al.*, 2005). Impacts of these introductions are varied – not all of them have negative or detrimental socio-economic and/or environmental effects; some were intentionally introduced for human benefit or profit (Mack *et al.*, 2000; Pimentel *et al.*, 2005). A subset of these introduced species, freed of the natural controls in their native range, proliferate and invade natural systems, displace native species, and degrade ecosystem services important to human economies and health (Vitousek *et al.*, 1996; Mack and Lonsdale, 2001; Vitousek *et al.*, 1997; Wilcove *et al.*, 1998; Mack *et al.*, 2000).

The combined cost of damage and control of these invasive species is estimated at \$120 billion a year in the U.S. (Pimentel *et al.*, 2005). The invasion of the Asian clam *Potamocorbula amurensis* in San Francisco Bay (Carlton *et al.*, 1990), the zebra mussel *Dreissena polymorpha* in the Laurentian Great Lakes (Roberts, 1990; Vitousek *et al.*, 1997), and the comb jelly *Mnemiopsis leidyi* in the Black Sea (Shiganova, 1998) are dramatic examples of the catastrophic impacts of ballast water introductions (Carlton and Geller, 1993). The zebra mussel alone is estimated to cause \$1 billion per year in damages and associated control costs (Pimentel *et al.*, 2005). Among other impacts, it has fouled water intake pipes at municipal and industrial plants, disrupted municipal water supplies (Roberts, 1990), and reduced food, oxygen, and space for native species (Pimentel *et al.*, 2005). The true cost of aquatic nonindigenous species (ANS) in Oregon is unknown; however, if zebra mussels were to become established in the Columbia River, the estimated cost to the hydropower industry alone is over \$23 million per year (Phillips *et al.* 2005).

Shipping is one of the important vectors for invasive species introduction in Oregon. A detailed survey of the Lower Columbia River (Bonneville Dam to the Pacific Ocean) in 2002 showed that 81 nonindigenous fish, aquatic plants and invertebrates were introduced since the mid 1800's (Sytsma *et al.*, 2004). Ship-related vectors accounted for 32 of the nonindigenous species in the river and ballast water was a possible mechanism of introduction for 91% of these species (vessel fouling was a possible mechanism for 9%). Sytsma *et al.* (2004) reported that the numbers of nonindigenous species associated with shipping had increased since 1950, possibly because of the increase in ship size and speed in recent decades. Other introductions occurred as a result of intentional release for sport fishing, aquaculture/mariculture and biological control, and intentional and accidental release from aquaria and ornamental ponds.

### **Ship Mediated Vectors of Aquatic Nonindigenous Species**

Ballast water and vessel fouling are considered the principal vectors for the introduction and spread of ANS (Carlton, 1985; Ruiz *et al.*, 1997, Fofonoff *et al.*, 2003; Drake *et al.*, 2005; Verling *et al.*, 2005). The rate of aquatic invasions attributed solely to shipping has increased over the past 200 years. Shipping accounts for up to 62% of initial invasions in the past 30 years (Ruiz *et al.*, 2000). In 1999, there were over 45,000 cargo vessels traversing the world's seas (Lloyds Register of Shipping 1999; Phillips, 2005). On a daily basis, these vessels are estimated to carry over 7,000 species of aquatic plants and animals in their ballast (Carlton, 1999). In

## **Report on Ballast Water Management in Oregon-2006**

addition, a study conducted in the North Sea found that 96% of the species attached to ships' hulls were ANS (Gollasch, 2002).

Although many aspects of commercial shipping have been implicated in the introduction of ANS, ballast water, because of its sheer volume, remains the primary means of global transport (Carlton, 1999; Sytsma *et al.*, 2004). Ballast water is used to maintain the balance, stability and structural integrity of vessels in varying states of cargo load (National Research Council, 1996). Typically, a vessel will take on ballast water to compensate for weight as cargo is unloaded in one port and then discharge ballast water when cargo is picked up at another port (Falkner *et al.*, 2005). When a vessel draws water into its ballast tanks, a broad range of organisms, from microscopic phytoplankton to fish can be entrained (Medcof, 1975; Williams *et al.*, 1988; Carlton and Geller, 1993; Lavoie *et al.*, 1999; Wonham *et al.*, 2000). As a vessel moves from port to port, possibly across oceans and biogeographical boundaries, these species may survive transport and upon discharge become established in the new, recipient environment.

### **Ballast Water Discharge in Oregon**

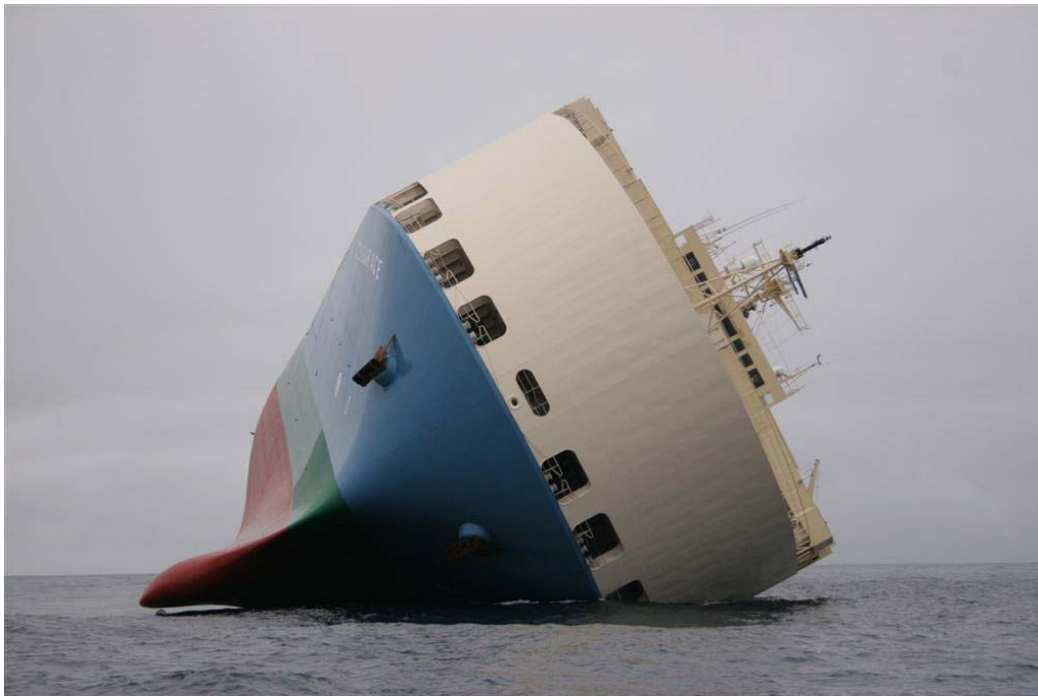
The Columbia River, the second largest river in the United States, and the largest on the West Coast, is important to the economy of Oregon and the Pacific Northwest. There are five major ports on the Columbia River, two in Oregon (Astoria and Portland) and three in Washington (Kalama, Longview and Vancouver). On average, these ports receive 1,700 commercial vessel arrivals a year, with the majority arriving in Portland, OR ( $\approx 59\%$ ).

Columbia River ports are predominantly export ports. In 2004, approximately 23 million metric tons (MT) were exported, while about 5 million MT were imported. In 2005, Oregon exported \$12.38 billion in food and goods to foreign countries (State of Oregon, Economic and Community Development Department, 2006). Most of this commerce was shipped overseas on commercial vessels. Because many vessels are coming to load goods for export, they carry little cargo and a heavy load of ballast water. Consequently, the Columbia River receives a large amount of ballast water relative to the number of arrivals. For instance, in 2004, the ports of Los Angeles/Long Beach (LA/LB) received 5,526 arrivals, which discharged 3,858,709 MT of ballast water (Falkner *et al.*, 2005); during the same year, Columbia River ports received 1,943 arrivals, which discharged 6,742,323 MT of ballast water – 75% more ballast water than LA/LB.

**Laws and Regulations**

Ballast water management (reporting, exchange and/or treatment) regulations have been implemented at international, federal and state levels to reduce the risks posed by ANS and their spread via ballast water transport and discharge. Currently, the only approved method for managing ballast on a large scale is open-ocean ballast water exchange. During exchange, the biologically rich water that is loaded while a vessel is in port or near the coast is exchanged with the comparatively biologically depauperate waters of the open ocean (Falkner *et al.*, 2005).

Federal and Oregon laws exempt ships from exchange for safety considerations. Few ships require the safety exemption. On July 23, 2006, the M/V Cougar Ace, a car carrier en route from Japan to Vancouver, BC, listed 80 degrees onto its port side when the crew attempted to adjust (not exchange) ballast water on the vessel (Alaska Department of Environmental Conservation, 2006) (Figure 1). The Cougar Ace incident illustrates the importance of careful ballast water management for ship safety.



**Figure 1: M/V Cougar Ace listing to port following ballast water adjustment. (Photograph by: The Associated Press)**

The efficiency of ballast water exchange is variable. Exchange removes from 67-99% of coastal zooplankton, but it does not completely eliminate them (Hines and Ruiz, 2000; Wonham *et al.*, 2001; Levings *et al.*, 2004; Ruiz *et al.*, 2005). Due to these limitations, ballast water

## **Report on Ballast Water Management in Oregon-2006**

exchange is considered a short-term solution until ballast water treatment technologies are developed and implemented on a large scale (Galil and Hülsmann, 2002). Currently a number of treatment technologies are being tested experimentally (either at an onshore treatment facility or shipboard) but in the U.S. none have been approved at any level (federal or state) for broad-scale use. Some of the most promising (*i.e.* efficient, practical and cost-effective) treatment technologies are: chemical, such as electro-chlorination and ozone; and mechanical/physical such as deoxygenation, ultraviolet radiation, and filtration.

### *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. The Convention will enter into force 12 months after ratification by 30 countries representing 35% of the world shipping tonnage (International Maritime Organization, 2006). As of June 2006, six countries (Maldives, Spain, St. Kitts & Nevis, Syrian Arabic Republic, Nigeria and Tuvalu) representing 0.62% of the world shipping tonnage had ratified the convention.

The Convention requires that all vessels implement a ballast water and sediment management plan. Specifically, it requires that vessels conduct exchange at least 50 nm from shore in waters at least 200 m deep, though it is preferred that exchange be conducted 200 nm offshore (International Maritime Organization, 2006). The Convention specifies varying ballast management requirements and deadlines depending on vessel size and construction date. By 2016, all vessels must meet a stringent “Ballast Water Performance Standard”, through either exchange or treatment. The performance standard specifies strict limits on the number of organisms or microbe colonies permissible per unit of ballast water (See Appendix II for ballast water standards).

### *Canadian Regulations*

In June 2006, Canada announced mandatory ballast water management regulations, replacing earlier voluntary guidelines. The regulations require that all vessels, arriving into Canadian ports with ballast water from outside of Canadian waters, conduct an open-ocean exchange at least 200 nm from land and in water where the depth is at least 2,000 m. If a vessel is unable to comply with the 200 nm regulation, they are permitted to discharge 50 nm from land at a water depth greater or equal to 500 m. In addition, all vessels are required to complete and

## **Report on Ballast Water Management in Oregon-2006**

submit a ballast water management report after completing exchange. The Canadian regulations also specify treatment standards identical to the IMO's Ballast Water Performance Standards.

### *Federal Regulations*

In September of 2004, after five years of a voluntary program, the United States Coast Guard (USCG) established mandatory management requirements for vessels entering the U.S. from outside the U.S. Exclusive Economic Zone (EEZ). The regulations require that exchange be conducted more than 200 nm offshore. There is no exchange requirement for vessels traveling "coastally" or wholly within the 200 nm EEZ. The new provisions also established mandatory reporting requirements for both foreign and coastal arrivals, and increased the fines assessed for non-compliance to \$27,500.

All federal ballast water reports must be submitted to the National Ballast Information Clearinghouse (NBIC) located at the Smithsonian Environmental Research Center (SERC) in Maryland. They are required from all vessels arriving to a U.S. port or place from outside the U.S. EEZ and vessels traveling from one Captain of the Port (COTP) Zone (a USCG delineation for port systems in the U.S.) to another. There are five COTP Zones on the West Coast: San Diego, Los Angeles/Long Beach, San Francisco Bay, Portland, and Puget Sound. The Portland COTP Zone encompasses all of Oregon and the Columbia River.

Currently the USCG has not implemented treatment standards or an implementation schedule, although they are expected to release their proposed standards sometime in 2006. To facilitate the development of effective ballast water treatment technologies the USCG has implemented the Shipboard Technology Evaluation Program (STEP). The STEP allows foreign or domestic vessel operators to apply for the ability to install and operate experimental ballast water treatment systems on board their vessels. So far, no vessels have been accepted into the STEP program (Richard Everett pers. comm.).

### Pending Federal Legislation

The National Aquatic Nuisance Prevention and Control Act (NANPCA) was established in 1990 and revised as the National Invasive Species Act (NISA) in 1996. Since 1996, a number of related bills have been proposed in the Senate and House of Representatives. Five of the bills address ballast water management on a national scale, and are summarized below, with particular reference to the ballast water provisions.

## Report on Ballast Water Management in Oregon-2006

### S. 363

The Ballast Water Management Act of 2005 contains provisions, which would make ballast water management (*i.e.* exchange until treatment is implemented and treatment thereafter) and reporting mandatory for foreign and coastal vessel arrivals. Foreign arrivals would be required to exchange their ballast beyond 200 nm in at least 200 m of water, and coastal arrivals would be required to exchange outside 50 nm in at least 200 m of water. The Act also specifies ballast water treatment standards and an implementation schedule (see Appendix II for details). If implemented, the federal treatment standards would be more rigorous than the IMO's standards. In addition, the act declares that all exchange and treatment standards contained in the bill shall supersede state or local laws that are inconsistent with such federal standards.

Sponsor: Sen. Daniel K. Inouye (HI) (introduced on 2/10/2005)

Current Status: Placed on the Senate Legislative Calendar under General Orders.  
Calendar No. 291.

### S. 770

The National Aquatic Invasive Species Act of 2005 contains provisions referring to ballast water exchange, treatment and reporting. Ballast water exchange is required of all foreign and domestic vessel arrivals. However, the bill refers to the area for exchange as the 'high seas' but gives no specifics on the location (distance from shore and depth) of exchange. The bill also specifies that ballast water exchange should be replaced by treatment no later than December 31, 2011. The bill does not define specific treatment standards; however, it does contain provisions to promulgate numeric discharge standards and states that if no technology exists to accomplish the standards set, the best performing treatment technology should be used. The standards for best performing treatment technology are defined as: for existing vessels, a reduction of 99% of viable biological material from the intake water of the vessel; for new vessels, a reduction of 99.9% of viable biological material from the intake water of the vessel. The bill does not contain preemption provisions, which would allow its federal standards to supersede state and local laws.

Sponsor: Sen. Carl Levin (MI) (introduced on 4/12/2005)

Current Status: Referred to the Committee on Environment and Public Works.

### S. 1224

The National Oceans Protection Act of 2005 contains provisions for ballast water management (exchange, reporting, treatment and treatment implementation) that are identical to

## Report on Ballast Water Management in Oregon-2006

S. 363. However, there are two differences, in terms of ballast water management. The bill contains no preemption provision, and the bill states that a vessel is not required to deviate from its intended voyage or unduly delay its voyage to comply with requirements.

Sponsor: Sen. Barbara Boxer (CA) (introduced on 6/9/2005)

Current Status: Referred to the Committee on Commerce, Science, and Transportation.

### H.R. 5030

Like S. 1224, the Prevention of Aquatic Invasive Species Act of 2006 contains provisions for ballast water management (exchange, reporting, treatment and treatment implementation) which are identical to S. 363. The only difference, in terms of ballast water management, is that the act specifically states that it does not supersede any more stringent standards at the federal, state or local level. There is no exemption for vessels that must deviate or delay their voyage to comply with requirements.

Sponsor: Rep. Candice S. Miller (MI-10) (introduced on 3/28/2006)

Current status: Referred to the Subcommittee on Water Resources and Environment.

### H.R. to be numbered

The Ballast Water Management Act of 2006 is a draft bill that amends NANPCA of 1990. NANPCA was originally amended by NISA in 1996. However, this 2006 Ballast Water Bill refers only to NANPCA and not NISA. The amendments make no recommendations regarding ballast water exchange or reporting. However, they do define alternative ballast water management and include standards for the use of treatment technologies. The act states that in order for a treatment technology to be installed on a vessel it must, at a minimum, reduce the number of organisms greater than 50 microns to less than 10 viable organisms per m<sup>3</sup> of water. There are no standards for smaller size classes of organisms. The Act exempts vessels from ballast water management if the vessel has to deviate or delay from its intended voyage. There is no preemption provision in the bill.

Sponsors: Not yet introduced

Current Status: Not yet introduced

### *West Coast State Regulations*

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.

Specifically, the mainland Pacific states now have unified regulations (with some variations) regarding the exchange of ballast water for vessels traveling coastally between domestic ports.

## **Report on Ballast Water Management in Oregon-2006**

### Alaska

Alaska currently has no state ballast water program and as such, commercial vessels arriving into Alaskan waters are regulated by federal ballast water regulations only. There are Alaskan laws which address the control of invasive species (*e.g.* Alaska Statute 46: prohibits people or organizations from transporting, possessing, selling, purchasing or exporting fish, game, marine aquatic plants, and eggs or nests of fish and game (Flynn and Sytsma, 2004), but none which addresses ballast water specifically.

### California

In January 2000, California became the first state on the West Coast to implement a ballast water program. Originally, the program required ballast water management (exchange 200 nm from land in at least 2000 m of water) and reporting for vessels arriving to California ports from outside the EEZ, and excluded coastal arrivals from management requirements. In January 2004, the California law was amended, requiring all vessels operating in State waters, regardless of their last port call, to report their ballast water management activities. In June 2005, the California State Lands Commission (CSLC) approved regulations for coastal ballast water management. The regulations, which became effective in March 2006, require that all vessels arriving at a California port or place from a Pacific Coast Region (*i.e.* from  $\approx$  Cooks Inlet, AK to Baja California, Mexico) exchange their ballast water 50 nm from land and in at least 200 m of water.

In response to the slow progress of ballast water treatment technology development and the need for effective ballast water treatment options, the CSLC with the aid of an advisory panel (industry members, scientists and regulators), developed recommendations for ballast water treatment standards (Faulkner *et al.*, 2006). The ballast water standards determined by the advisory panel were submitted as majority recommendations with minority objections attached. CSLC developed a separate report, in consideration of the advisory panel's recommendation, which was approved by their Commission in January 2006 and subsequently submitted to the California Legislature. The treatment implementation schedule is consistent with the IMO schedule, but with the requirement of no detectable living organisms of greater than 50 microns, the treatment standards are the most stringent proposed yet. The CSLC included recommendations for the interim treatment standards to be periodically reevaluated and, if needed, adjusted depending on the capabilities of treatment systems available. In February 2006,

## **Report on Ballast Water Management in Oregon-2006**

Senator Simitian introduced Senate Bill 497, which would require the CSLC to adopt, via regulations, the performance standards and implementation schedule outlined in their report (Falkner et al., 2006). The bill passed the Assembly and Senate and has been forwarded to the Governor for his signature.

### Washington

The Washington State ballast water program began in 2001 with regulatory authority housed in the Washington Department of Fish and Wildlife (WDFW). From the onset, the regulation required ballast water management (exchange and reporting) for foreign and coastal vessel arrivals. The regulations require that foreign vessels exchange at least 200 nm from shore and that coastal vessels exchange at least 50 nm from shore. The only exemption for exchange is for vessels carrying ballast water or sediments that originate in WA waters, the Columbia River system, or internal waters of British Columbia south of 50°N, including straits of Georgia and Juan de Fuca. Vessels excluded from exchange are still required to report ballast water operations to WDFW. There are no depth requirements for either the foreign or coastal exchange locations.

Washington was the first state on the West Coast to adopt treatment standards, an implementation schedule, and a process to approve treatment technologies for use by vessels that call on Washington ports (Puget Sound Action Team, 2006). The ballast water standards are significantly different from those proposed by the IMO, federal bills and California. The main difference is that percent reduction is used as a standard, as opposed to the number of organisms per volume (See Appendix II). In order to effectively use percent reduction as a standard, the original density of organisms (*i.e.* before ballast water treatment) must be known. In many cases, this will not be possible; making a percent reduction standard less robust than a standard based upon the number of organisms per volume of discharge. As well, the implementation schedule allows vessels to use treatment technologies after July 1, 2007, if exchange cannot be conducted. In anticipation of the treatment onset date, WDFW has required that all commercial vessel owners operating in Washington waters, submit a one-time Interim Ballast Water Management Report to describe how they will comply with the new law. In addition to the treatment onset date, after July 1, 2007, vessels will no longer be allowed to claim a safety exemption as a reason for not exchanging their ballast.

**Oregon Ballast Water Program**

The Oregon Ballast Water Management Program evolved from meetings of the Pacific Ballast Water Group in 1997, an *ad hoc* organization of environmental groups, academic scientists, regulators, and the shipping industry that came together at PSU to discuss ballast water management on the West Coast when the federal and state programs were in their infancy. In recognition of the potential for ANS discharged in ballast water to cause economic and environmental damage to the state, the Port of Portland, the shipping industry, and PSU supported SB 895 in the 2001 legislative session. SB 895 established the Oregon Ballast Water Program.

The program was modified by the legislature in 2003 (HB 3620) and 2005 (HB 2170). The Oregon Department of Environmental Quality (ODEQ) was given authority for implementing and enforcing ballast water management regulations in Oregon. Ballast water management in Oregon is integrated with other aquatic invasive species management in the state through the Oregon Aquatic Nuisance Species Management Plan, which was produced, and is implemented, by the Center for Lakes and Reservoirs at PSU. PSU coordinates aquatic nuisance species management with other state agencies through the Oregon Invasive Species Council.

Since its onset, the Oregon Ballast Water Management Program has received no direct funding. In 2002, PSU and the Columbia River Steamship Operators funded a graduate student (Jordan Vinograd) to monitor compliance throughout the program's first year. With no one to monitor compliance in Oregon after the first year, the WDFW agreed to collect, enter and analyze Oregon ballast water data along with the data acquisition they were already carrying out as part of the Washington ballast water program. Throughout this time, the ODEQ continued to remain supportive of the program. For example, the WDFW notifies ODEQ of vessels violating Oregon's law. Since 2002, five warning letters (two in 2004, three in 2005) have been issued to vessels not complying with Oregon's regulations (Jack Wylie pers. comm.).

In January 2005, a pilot project at the Aquatic Bioinvasion Research and Policy Institute (ABRPI) at PSU began monitoring the compliance of Oregon and Columbia River arrivals with both state and federal ballast water regulations. The project aims to harmonize the federal and state programs through collaboration, to reduce the duplication of effort and increase the quality of data received by both programs (Simkanin *et al.*, 2005).

## Report on Ballast Water Management in Oregon-2006

### *Requirements*

Since January 2002, ballast water exchange and reporting have been required of all foreign and coastal arrivals (barges, military and fishing vessels are exempt). Foreign arrivals are required to exchange their ballast at least 200 nm from shore and in at least 2000 m of water. The exchange requirement for coastal arrivals has changed since the onset of regulations. Originally, coastal vessels were required to exchange their ballast south of 40°N or north of 50°N on the Pacific coast, with no distance from shore or depth required. Effective January 2006, the coastal exchange requirement was changed to 50 nm from shore in at least 200 m of water (HB 2170). The regulations exempt vessels that “discharge ballast water that originated solely from the waters located between the parallel 40°N and parallel 50°N on the West Coast of North America” from exchange.

To date, Oregon has not recommended ballast water treatment standards or an implementation program. The law does state, however, that a vessel is exempt from exchange if it “discharges ballast water that has been treated to remove organisms in a manner that is approved by the USCG”.

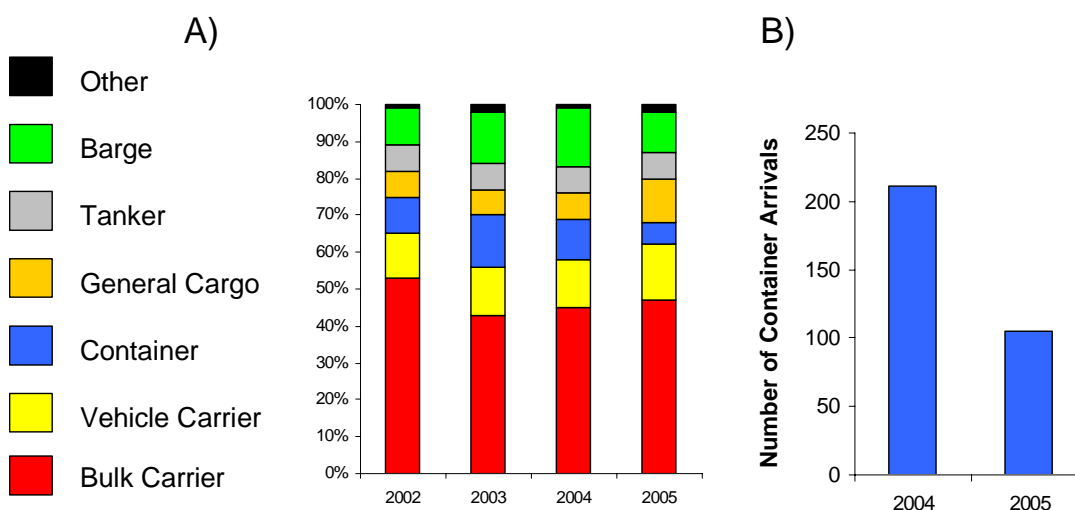
### *Shipping and Ballast Water Patterns in Oregon*

Analysis of three years of arrivals data ( $\approx 1,700$  a year) found that vessels arriving to the Columbia River come from 377 ports, in 66 countries, on six continents and within three oceans (Davidson *et al.*, 2006). On average, 51% of vessel arrivals were from foreign ports (*i.e.* from outside the U.S. EEZ), and 49% are from domestic ports (this includes West Coast Canadian ports). The majority of the foreign arrivals come from Asian ports in Japan, South Korea and China, whereas the majority of the domestic arrivals come from California and British Columbia. Nearly 50% of all arrivals to the Columbia River are bulk carriers, which are known to routinely carry more ballast water than other ship types (Verling *et al.*, 2005, Table 1).

**Table 1: Vessel arrivals to Columbia River ports from 2002 through 2005 by ship type and percentage of ballast water that each ship type discharged.**

| Vessel Type     | Percent of Arrivals | Percent of Ballast Water Discharged |
|-----------------|---------------------|-------------------------------------|
| Bulk Carrier    | 47                  | 80                                  |
| Vehicle Carrier | 13                  | 1                                   |
| Barge           | 13                  | 1                                   |
| Container       | 10                  | 7                                   |
| General Cargo   | 8                   | 9                                   |
| Tanker          | 7                   | 1                                   |
| Other           | 2                   | <1                                  |

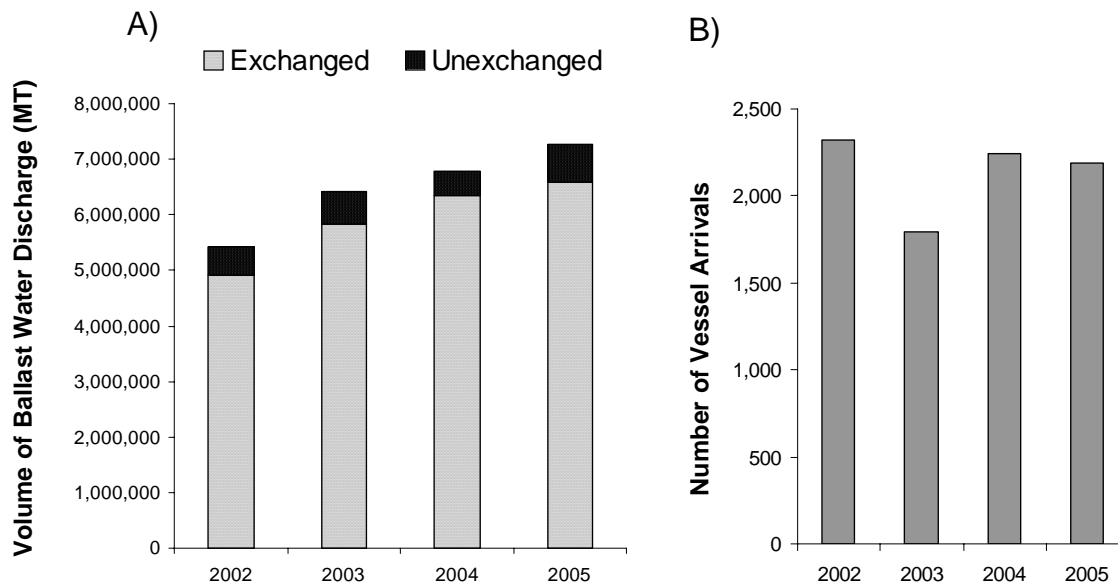
Vessel traffic in the Columbia River has been relatively stable over the past four years; with only minor differences between years in the proportion of vessel types (an indicator of the type of trade) arriving to the five ports on the river (Figure 2A). One difference between years was the decline in container ship arrivals: the only container terminals in the Columbia River are at the Port of Portland and two companies K-Line and Hyundai stopped operations in Portland at the end of 2004 (Figure 2B; Read, 2004). Since then container ship arrivals have rebounded and in August 2006 rose to levels nearly equivalent to those prior to the departure of K-Line and Hyundai. Container ship arrivals are expected to continue to increase with the addition of several new carriers (Marla Harrison pers. comm.).



**Figure 2: A) Percentage of arrivals for each ship type from 2002-2005. B) The number of container arrivals from before (2004) and after (2005) the container lines pulled out of Portland.**

## Report on Ballast Water Management in Oregon-2006

In the first four years of the Oregon ballast water management program, the volume of ballast water reported as discharged increased from about 5.5 to 7 million MT (Figure 3A), but the number of vessels arriving has remained nearly constant (Figure 3B). Because the number of arrivals has not increased and the type of vessels arriving has not fluctuated considerably through time (Figure 2A), the increase in the amount of ballast water discharged is likely a result of increased reporting compliance (and the amount of data available for analysis; See Fig. 4). The amount of unexchanged water reported as discharged remained relatively constant at 7 to 10% of the total discharge volume. The unexchanged ballast water largely originated from the West Coast of North America: 65% was from Washington and British Columbia, *i.e.* within 40°N-50°N and exempt from exchange, 27% was from California and 8% was from foreign ports.



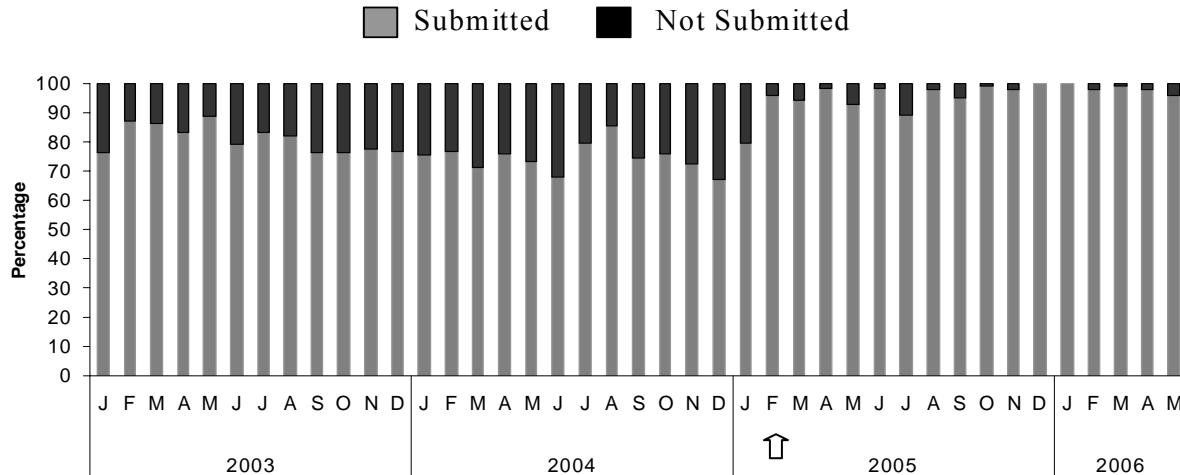
**Figure 3: A) Volume of ballast water discharged (MT) in the Columbia River from 2002 through 2005; B) Number of vessel arrivals to the Columbia River from 2002 through 2005 using U.S. Maritime Administration (MARAD) arrivals data.**

### *Vessel Compliance*

Since the beginning of the program in 2002, reporting rates have been highly variable. During the first 10 months, when a PSU graduate student was following up with vessels who were not submitting reports, compliance was 98.5% (Vinograd and Sytsma, 2002). After the graduate student finished, and no follow-up or daily monitoring was being carried out, reporting compliance dropped to a low of 67% in December 2004 and averaged 78% throughout 2003-

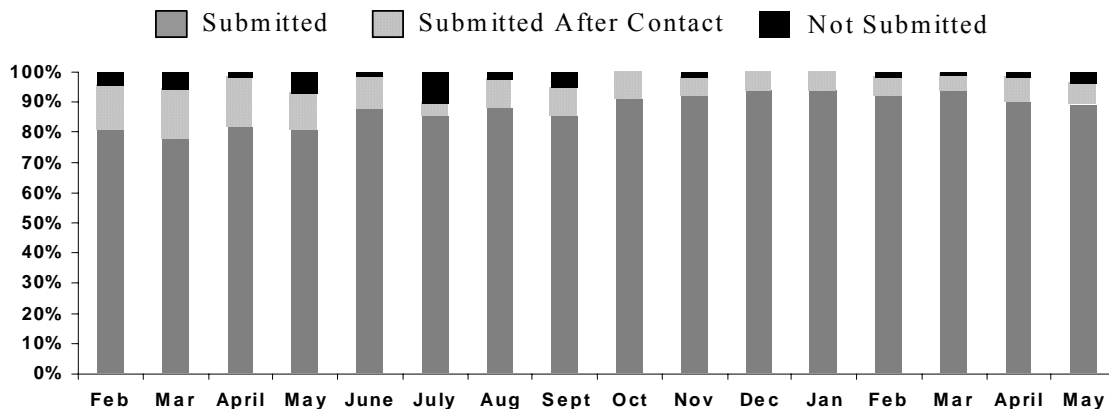
**Report on Ballast Water Management in Oregon-2006**

2004 (Figure 4). In February 2005, when the ABRPI reporting pilot project began monitoring arrivals and contacting agents regarding missing or erroneous information, compliance increased to a high of 100% in December 2005 and an average of 97%.



**Figure 4: Percentage of international and coastal commercial vessel arrivals submitting reports to Oregon (includes WA ports on the Columbia River). Data from 2003-2004 are from the WDFW and data from 2005 onwards are from PSU. (Arrow indicates onset of PSU ballast water reporting pilot project).**

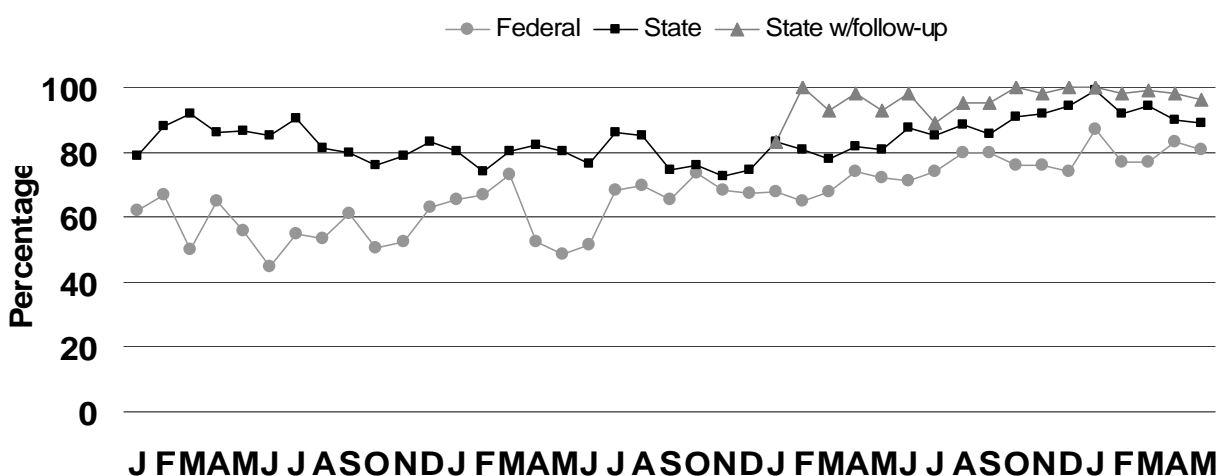
The variability in reporting compliance can be directly attributed to the amount of effort applied to monitor and follow-up on missing or erroneous reports. In addition, persistent monitoring and agent contact increases compliance through time (Figure 5), decreasing the number of vessels that need to be contacted.



**Figure 5: Percentage of international and coastal commercial vessel arrivals submitting reports since February 2005 when agents were contacted for missing or erroneous reports.**

## Report on Ballast Water Management in Oregon-2006

Although reporting compliance has fluctuated through time, it has consistently been higher than federal reporting compliance (Figure 6). This trend was unexpected, especially because fines at the federal level are higher than those at the state level and the USCG boards vessels at random and ballast water logs are checked as part of their inspection. It is likely, however, that the monitoring, follow-up, and outreach to shipping agents conducted at the beginning of Oregon's ballast water program familiarized agents with the state's reporting requirements and stimulated compliance. Another possible difference in compliance could be the result of miscommunication. Early in the Oregon program, shipping agents were told that reports submitted to the state would be forwarded to the NBIC and would fulfill the USCG regulations – this was incorrect.



**Figure 6: The percentage of vessels submitting ballast water reports to the federal and state programs from 2003 to May 2006. Data from 2003-June 2004 include international vessel arrivals only, whereas data from July 2004 to present include domestic and international arrivals. Barges are excluded from all analyses.**

In assessing Oregon and Columbia River compliance, it is important to note that the ballast water reports are self-reported. No state inspections are conducted on vessels operating on the Columbia River. From 2004-2006, a WDFW employee was boarding vessels in Puget Sound and by checking the ships' ballast water logs, was able to determine whether the vessel had reported accurate information. These random and targeted inspections resulted in higher reporting compliance, and a decrease in the amount of unexchanged ballast water discharged into Puget Sound (Keith Strieck pers. comm.). In California, 18 CSLC inspectors board 20-25% of all vessel arrivals (Maurya Falkner pers. comm.). Vessel inspections in California and issuance of

## **Report on Ballast Water Management in Oregon-2006**

penalties for non-compliance, along with outreach and direct contact with the maritime industry, have increased compliance with the California requirements to 97%.

### *Barge Compliance*

It is not clear whether Oregon ballast water legislation or rules apply to barges. Oregon regulations apply to “cargo vessels”, which are defined as “a self-propelled ship in commerce, other than a tank vessel or a vessel used solely for commercial fish harvesting, of 300 gross tons or more”. Some barges may not be considered self-propelled because a tug is used to move them from location to location and because of this many barges operating in Oregon waters are not reporting ballast water management activities to the state. Federal ballast water management regulations require that “all vessels, U.S. and foreign, equipped with ballast tanks that operate in the waters of the United States carry out ballast water management” and therefore explicitly apply to barges capable of carrying ballast. An analysis of the first six months of 2006 (n=29) showed that 83% of barges submitted reports to the USCG via the NBIC.

California adopted language identical to the USCG requirements which requires that barges equipped with ballast water tanks conduct ballast water management (exchange and reporting). Washington law however, also uses the self-propelled language similar to Oregon’s legislation. Because federal law does not apply to coastal traffic, and because Oregon’s law is unclear, barges may be arriving into Oregon and the Columbia River with unexchanged ballast water. All 29 barges coming to the Columbia in the first six months of 2006 arrived at a Portland berth. Of these, 24 were from ports within 40°N-50°N and therefore would be exempt from exchange if regulated by Oregon. These vessels discharged 3,420 MT of ballast water. The other five barges arrived from California ports and discharged 173 MT. According to ballast water reports submitted to the NBIC, these vessels did not conduct an exchange but took on ballast water over 50 nm off the California coast—and therefore are not required to exchange. Our sample size is very small and it is unclear why these vessels would take on ballast at sea. Nevertheless, coastal movement of barges could pose a significant risk for introduction of invasive species.

### *Coordination between Washington and Oregon*

The shared waters of the Columbia and differing approaches to ballast water management in Washington and Oregon present some unique difficulties. One complication is how to deal

## **Report on Ballast Water Management in Oregon-2006**

with vessels that make inter-state moves on the Columbia River; i.e., they make multiple port calls on the river, switching back and forth between Oregon and Washington ports.

Approximately 29 vessels (or 21% of arrivals) a month carry out interstate port moves. Currently these vessels either: do not report, include all port arrivals and ballast operations on one report, or submit multiple reports for each port call.

To address the special circumstances of the Columbia River, the Puget Sound Action Team contracted with the Center for Lakes and Reservoirs (at PSU) to assess alternatives for ballast water management on the Columbia. One alternative under review is a risk-based approach to ballast water management. Because the Columbia River is a freshwater system, organisms entrained in saline water may be killed once discharged and therefore may not pose a high risk of invasion. Management of ballast water based upon invasion risk has been attempted in a number of countries around the world (*e.g.* Australia and Canada). However, uniform and consistent management at all regulatory levels is important for the shipping industry, and such a unique approach for the Columbia may not be operationally feasible. Such a risk-based approach however, may be useful in focusing limited enforcement resources (Larson and Sytsma, 2006). After careful evaluation of the current and potential ballast water management strategies on the Columbia River, a recommendation was made for a special Columbia River Commission on Bioinvasions. The Commission, with members appointed by governors of each state and with shared funding, would be charged with developing a common approach to management of shipping-related introductions of ANS to the Columbia River.

### **Emerging Issues**

#### *Vessel Fouling*

Vessel fouling has been implicated in the introduction of numerous taxa throughout the world, but is considerably understudied compared to ballast water as a vector for ANS (Davidson *et al.*, 2006). The International Convention on the Control of Harmful Anti-Fouling Systems began phasing out use of organo-tins as anti-fouling paints on ships in January 2003; the ban will be complete after January 2008. Organo-tins act as biocides that, over time, leach into surrounding water and sediments causing harmful effects on numerous organisms. The phase out of organo-tins may result in less effective anti-fouling paints and an increase in the importance of vessel fouling as a vector for ANS introduction.

## **Report on Ballast Water Management in Oregon-2006**

The CSLC, under direction of the Marine Invasive Species Act of 2003, analyzed and evaluated the risk of vessel fouling as a vector for ANS introductions (Takata *et al.*, 2006). CSLC, in consultation with a technical advisory group of scientists and stakeholders, made recommendations to the California legislature on the management of vessel fouling that included: research and monitoring, broadening of the state program and the CSLC's authority to regulate vessel fouling, and requiring vessel arrivals to report hull maintenance practices (Takata *et al.*, 2006).

A recent report on vessel fouling on commercial vessels in the Columbia River, suggested that the potential for invasion via this pathway is significant. During a three-year period, over 40.5 million square meters (m<sup>2</sup>) of wetted hull surface (i.e. the area of a ship available for fouling species to occupy and be transferred) arrived in the Lower Columbia River (Davidson *et al.*, 2006). A small number of vessels examined on dry-dock revealed that fouling on individual vessels is highly variable, ranging from 1% to more than 90% (Davidson *et al.*, 2006). It is clear that ships' hulls readily transport ANS to the Columbia River, but the environmental conditions of the river, particularly the acute reduction in salinity as ships move into the river from the ocean may limit the river's susceptibility to hull-mediated introductions (Davidson *et al.*, 2006).

### *Columbia River Ballast Water Treatment*

There is potential for conflict in ballast water management in the Columbia River because Oregon and Washington have differing approval processes for ballast water treatment technologies. Under Washington law, vessels arriving into Washington waters will be allowed to use Washington-approved treatment technologies in lieu of ballast water exchange starting in July 2007. Oregon law only allows discharge of water treated using technologies approved by the USCG. Many shipping operators and operation schedules consider the Columbia River as one system and therefore do not restrict themselves to carrying out unloading and loading operations in one state. Approximately, 29 vessels a month arrive at a Washington port on the Columbia River and within days move to an Oregon berth.

This difference in approval processes may complicate ballast water management on the Columbia River in the future. However, because vessels arriving from outside the U.S. EEZ are regulated by the USCG, it is unlikely that they will use a Washington approved treatment system and face a \$27,500 fine for being in violation of federal regulations. In addition, vessels traveling

## **Report on Ballast Water Management in Oregon-2006**

coastally to the Columbia River from a port within 40°N and 50°N are not required to manage their ballast and thus are also unlikely to be using a Washington approved treatment system. Therefore, the vessels most likely to use a Washington approved treatment technology, and to conflict with Oregon requirements, are those arriving at a Washington port on the Columbia River from a California port or place. Approximately 315 vessels (or  $\approx$  19% of arrivals) arrive at a Washington port on the Columbia River from a California port each year. A small number of these, approximately 58 vessels a year (or  $\approx$  3% of arrivals) carry out ballast water operations in both states on the Columbia River. If they discharged water treated with a Washington-approved treatment technology into Oregon waters, these vessels would be in violation of Oregon law.

### *U.S. EPA Regulation of Ballast Water*

On September 18, 2006 a federal court ordered the U.S. Environmental Protection Agency (EPA) to include ballast water discharge under the regulatory guidelines of the Clean Water Act. The Act, enacted in 1972, established a basic structure for regulating the discharge of pollutants into the waters of the U.S. Under the Clean Water Act it is unlawful for any person to discharge any pollutant from a point source into navigable waters, without a permit (U.S. EPA, 2006). The recent court ruling directs the EPA to take specific action by September 30, 2008 to ensure that shipping companies comply with the Clean Water Act and restrict the discharge of invasive species in ballast water.

### *Alternative Ballast Water Exchange Areas*

A workshop on the physical and biological oceanographic considerations of Alternative Ballast Water Exchange Areas (ABWEA's) was held in June 2006 in Seattle, hosted by the PSMFC, the USCG and the National Oceanographic and Atmospheric Administration (NOAA). The National Invasive Species Act of 1996 defines ABWEA's as "areas within the waters of the U.S. and the EEZ, if any, where the exchange of ballast water does not pose a threat of infestation or spread of ANS in the Great Lakes and other waters of the U.S.". Under extraordinary conditions current federal ballast water regulations (33 CFR 151 Subpart D) allow vessels to conduct a ballast water exchange within an area agreed to by the COTP. These areas have yet to be defined. If the use of specific ABWEA's were to be adopted by federal legislation, states along the Pacific Coast would need to modify their ballast water laws to allow for their use.

## **Report on Ballast Water Management in Oregon-2006**

The overall aim of the workshop was to gain a greater understanding of the biological and physical oceanography processes, and the ecological risk posed by ballast water exchange within U.S. territorial waters of the eastern Pacific. One of the major conclusions of the meeting was that because the continental shelf drops off within 50 nm of the West Coast (except for around the Catalina Islands, California), ballast water exchange beyond 50 nm is relatively low risk if sea mounts and other underwater features are avoided. In addition, the number of vessels which would require the use of an ABWEA is quite low; on average two vessels a year claim a safety exemption from ballast water exchange. Therefore the use of ABWEA's on the West Coast may not be necessary but the workshop laid out a framework for other coasts (East and Gulf) to determine alternative locations for exchange. The East and Gulf Coasts of the U.S. have long gentle sloping continental shelves and the determination of areas for low-risk ABWEA's will be much more difficult.

### **Regional Collaborations, Research, and Technology Developments**

Through collaboration between states on the west coast, a unified coastal exchange requirement is now in place. Oregon ports are often second ports of call for vessels coming to the West Coast. The short transit time and the presence of ANS in other West Coast ports (San Francisco Bay/Delta has 234 known ANS (Cohen and Carlton, 1998)) makes ballast water discharged from domestic ports a high risk. By requiring coastal vessels to exchange their ballast 50nm offshore, Oregon, California and Washington are adding to the protection of aquatic resources on the West Coast.

As well as legislative coordination, research collaboration is being carried out amongst the Pacific Coast States and British Columbia. This coordination is varied and involves research projects, workshops and working groups. Research on shipping-related vectors of ANS is carried out by state agencies: the CSLC, and the WDFW; and federal agencies: the USCG, the Pacific States Marine Fisheries Commission (PSMFC), and the Canadian Department of Fisheries and Oceans. Academic institutes such as the Aquatic Bioinvasion Research and Policy Institute (ABRPI) at PSU, the School of Aquatic and Fishery Sciences at the University of Washington (UW), and the University of British Columbia (UBC) Center for Aquaculture and Environmental Research, have active ballast water and ANS programs.

A number of working groups, workshops and advisory committees have been formed to inform regulatory decisions, aid in the definition of research needs, and promote collaboration.

## **Report on Ballast Water Management in Oregon-2006**

The Pacific Ballast Water Group, the Testing of Ballast Water Treatment Systems Workshop (see below), the ABWEA's Workshop, and the CSLC Technical Advisory Group on Hull-Fouling met to formulate policy and legislative recommendations in 2005 and 2006.

In Oregon, Portland State University and the Smithsonian Environmental Research Center (SERC) established the ABRPI in October 2004. The ABRPI has collaborated with other agencies and research institutes to conduct several research projects relating to ballast water and shipping transport of ANS including: harmonizing federal and state ballast water reporting (with the NBIC and PSMFC); ballast water exchange verification (with SERC, USCG and CSLC); the efficacy of coastal ballast water exchange (with USCG and UBC); an assessment of the vessel fouling vector in the Columbia River (with USCG); an assessment of vessel fouling and the invasion risk associated with the movement of obsolete vessels on a national scale (with MARAD); and the eradication of an established ANS-*Carcinus maenus* in Bodega Bay California (with PSMFC and the University of California Davis).

In June 2005, the ABRPI hosted a workshop to develop a strategy for moving towards shipboard testing of ballast water treatment technologies. Although the primary focus of the workshop was intended to be shipboard testing, the role of scale and when to conduct shipboard tests was a central theme. Thus, the output of this workshop included explicit consideration of both scale and experimental approach, in establishing general guidelines for treatment testing. The workshop report (see Ruiz *et al.*, 2006) provides an overview of current issues in ballast water treatment development.

### **Conclusions and Recommendations**

Oregon's natural resources continue to be vulnerable to shipping-related invasive species introduction. Oregon's ballast water management program provides more protection to Oregon's natural resources than the federal ballast water program, chiefly through regulation of domestic ballast water. Therefore, it is imperative that the Oregon ballast water management program continue.

Shipping industry compliance with Oregon ballast water reporting requirements is high. A PSU project on harmonizing state and federal reporting, demonstrated that compliance is clearly a function of local oversight and follow up on missing reports. Additional effort should be made to verify accuracy of ballast water reports through boarding and examination of ballast water management logs. The PSU ballast water reporting project will end in June 2007, and state

## Report on Ballast Water Management in Oregon-2006

funding of a position at ODEQ specifically for implementing the ballast water management program is required if any follow-up on reporting is to continue after that date.

Open sea and coastal ballast water exchange is the most widely applicable and effective ballast water treatment currently available. While not 100% effective in preventing the introduction of ANS into Oregon, exchange does reduce the risk of introductions and it will be the primary method of management until ballast water treatment systems are developed and installed on the World's fleet – potentially a decade or more from now. A PSU study on the movement of ballast water from Sacramento to the Columbia River found that coastal exchange was very effective in removing potentially high-risk freshwater species from ballast tanks (Noble *et al.*, 2006). In order to fully protect Oregon waters from the risk of ANS introductions through ships' ballast, the development of ballast water treatment technologies, which meet robust standards, is critical.

Currently no practical and cost-effective ballast water treatment technologies have been approved for broad use. A workshop hosted by PSU in June 2005 identified a lack of standards and testing facilities, along with difficulties in sampling and evaluating survival of some life stages of aquatic organisms as major obstacles to ship-board testing of new technologies. At least two proposals to establish a ballast water treatment technology testing facility in the Pacific Northwest have been submitted to NOAA. The Aquatic Bioinvasion Research and Policy Institute at PSU has partnered with Battelle and the Pacific Northwest National Laboratory in Sequim, WA on one proposal. Technologies that use well-known technologies for waste water treatment, such as chlorination, in combination with some type of filtration as a pretreatment appear to hold most promise.

Oregon ballast water treatment standards are not recommended at this time. The USCG is developing treatment standards, and Washington and California have standards in place. The Washington and California standards differ substantially (See Appendix II). Development of Oregon standards at this point would further complicate the regulatory environment on the West Coast. A strong federal regulatory role on ballast water has been a clear position of the legislature and the shipping and port industries in Oregon since the beginning of the Oregon Ballast Water Program. We recommend that Oregon support development of federal ballast water treatment standards that are protective of Oregon water resources. If protective federal

## **Report on Ballast Water Management in Oregon-2006**

standards are not in place by 2009, the legislature should consider developing state standards that are complementary to those in neighboring states.

There is general congruency between state ballast water management requirements on the West Coast. Differences between Washington and Oregon programs are most significant in how the States address discharge of treated water. Given what appear to be fundamental differences in legislative approaches to the regulation of ballast water discharge in Oregon and Washington, a special Columbia River Commission on Bioinvasions is recommended. The Commission, with members appointed by the legislatures and governors of each state and with shared funding, should be charged with developing a common approach to management of shipping-related introductions of ANS to the Columbia River. Language establishing the Commission should be negotiated with legislators in Washington and inserted into the Oregon revised statutes.

International, federal, and state ballast water management programs continue to evolve and should be tracked by the legislature to ensure that Oregon law is protective of Oregon's natural resources while avoiding duplication of federal regulations and/or conflicts with regulations in neighboring states. While several new federal bills address ballast water management, none have moved through Congress. The vessel fouling pathway for invasive species introduction is currently not directly addressed in federal regulations but is the focus of future regulation in California.

Ballast water management is integrated with other aquatic invasive species management in Oregon through the Oregon Aquatic Nuisance Species Management Plan. The Plan was developed, and is currently implemented, by the Center for Lakes and Reservoirs at PSU. Funding for implementation of the Plan is from grants and contracts from multiple agencies. The Oregon Invasive Species Council provides a coordinating function for the ballast water program and other activities on invasive species in Oregon. Currently, no agency in Oregon has clear responsibility for regulating species introduction via vessel fouling.

The legislature should create a Shipping Transport of Aquatic Invasive Species Task Force to report to the 2009 Legislative session on developments in ballast water and vessel fouling management. The Task Force should be charged with reporting recommendations on management of all shipping-related pathways of invasive species introduction. Recommended amendment of ORS 783.625 to establish the Task Force is included in Appendix III.

## Report on Ballast Water Management in Oregon-2006

There is confusion over whether the Oregon regulations apply to barges, primarily due to the definition of a cargo vessel in Oregon statute. ORS 783.625 defines a cargo vessel as “a self-propelled ship in commerce, other than a tank vessel or a vessel used solely for commercial fish harvesting, of 300 gross tons or more”. Oregon ballast water regulation should be made consistent with the USCG regulations by changing the definition of a cargo vessel to “a ship in commerce, other than a tank vessel or a vessel used solely for commercial fish harvesting, which is equipped with ballast tanks and of 300 gross tons or more”. This change would result in the greater protection of Oregon waters, since a majority of barges travel coastally and therefore are not currently required to manage their ballast under federal regulation. Specific recommendations for amendment of Oregon ballast water law to redefine “vessel” are included in Appendix III.

The Oregon ballast water management program has been unfunded from its inception. Tracking ballast water management reports and discharges to enforce the required management options is clearly an Oregon Department of Environmental Quality function under existing statute; however, since 2001, report tracking has been conducted either by the WDFW or PSU. After June 2007, there is no mechanism for tracking compliance with Oregon requirements. In addition, no one is currently boarding ships to ensure compliance with Oregon requirements for management of ballast water. Funding for the ODEQ to track ballast water management reports and enforce the state law should be provided.

Effective ballast water management on the Columbia River should reduce the number of ANS introduced to the river. Evaluation of program effectiveness requires monitoring of the river for ANS. A 2004 survey conducted by PSU set a baseline for ANS in the lower Columbia that can be used to evaluate program success. Surveys should be conducted regularly to determine the rate of new species introduction and to detect incursions by ANS that could be eradicated if detected when populations are small.

Funding for ODEQ enforcement of the ballast water regulations and ongoing monitoring of the Columbia River and Coos Bay to evaluate efficacy of regulations is necessary. The cost of an effective Oregon Ballast Water Management Program, as outlined in this report, is \$504,000 per biennium. The cost includes:

## Report on Ballast Water Management in Oregon-2006

- 1 FTE at ODEQ to monitor ballast water reports and ship arrivals, board targeted vessels, and to support the proposed Shipping Transport of Aquatic Invasive Species Task Force;
- 1 FTE at PSU with associated travel, field supplies and equipment, and taxonomic assistance, to survey for ANS in Oregon waterways and evaluate the efficacy of the program and for early detection of potential invasive species incursions;
- and Oregon support of the proposed Columbia River Commission on Bioinvasions.

## References

- Alaska Department of Environmental Conservation. (2006). M/V Cougar Ace Situation Report # 1. Division of Spill Prevention and Response, Prevention and Emergency Response Program.
- Carlton, J.T. (1985). Transoceanic and interoceanic dispersal of coastal marine organisms: the biology of ballast water. *Oceanography & Marine Biology Annual Review*, 23: 313-371.
- Carlton, J.T. (1999). The scale and ecological consequences of biological invasions in the world's oceans. In: Sandlund, O.T., Schei, P.J. & Viken, A. (eds). *Invasive Species and Biodiversity Management*. The Netherlands: Kluwer Academic Publishers. p. 195-212.
- Carlton, J.T. & Geller, J.B. (1993). Ecological roulette: the global transport of nonindigenous marine organisms. *Science*, 261: 78-82.
- Carlton, J.T., Thompson, J.K., Schemel, L.E. & Nichols, F.H. (1990). Remarkable invasion of San Francisco Bay by the Asian clam *Potamocorbula amurensis*. I. Introduction and dispersal. *Marine Ecology Progress Series*. 66: 81-94.
- Cohen, A. N. & Carlton, J.T. (1998). Accelerating invasion rate in a highly invaded estuary. *Science*, 279: 555-558.
- Davidson, I., Sytsma, M. & Ruiz, G. (2006). Preliminary Investigations of Biofouling of Ships' Hulls: Non-indigenous Species Investigations in the Columbia River. Produced for the U.S. Coast Guard Research and Development Center.
- Drake, J.M., Lodge, D.M. & Lewis, M. (2005). Theory and preliminary analysis of species invasions from ballast water: controlling discharge volume and location. *The American Midland Naturalist*, 154: 459-470.

## Report on Ballast Water Management in Oregon-2006

- Falkner, M., Takata, L., & Gilmore, S. (2005). Report on the California Marine Invasive Species Program. Prepared for the California State Legislature by the California State Lands Commission.
- Falkner, M., Takata, L. & Gilmore, S. (2006). California State Lands Commission Report on Performance Standards for Ballast Water Discharges in California Waters. Prepared for the California State Legislature.
- Flynn, K & Sytsma, M. (2004). Report on the Oregon Ballast Water Management Program in 2004. Prepared in cooperation with the Oregon Ballast Water Task Force. September 2004.
- Fofonoff, P.W., Ruiz, G.M., Steves, B. & Carlton, J.T. (2003). In ships or on ships? Mechanisms of transfer and invasion for nonnative species to the coasts of North America. In: Ruiz, G.M. & Carlton, J.T. (eds) *Invasive species: vectors and management strategies*. Washington DC: Island Press. p. 152-182.
- Galil, B.S., & Hülsmann, N. (2002) The biological efficacy of open ocean exchange: implications for ballast water management. In: Lappäkoski, E., Gollasch, S. & Olenin, S. (eds) *Invasive Aquatic Species of Europe: Distribution, Impacts, and Management*. Kluwer Academic Publishers. p. 20-26.
- Gollasch, S. (2002). The importance of ship vessel fouling as a vector of species introductions into the North Sea. *Biofouling*, 18(2): 105-121.
- Hines, A.H. & Ruiz, G.M. (eds). (2000). Biological Invasions of Cold-water Ecosystems: Ballast-mediated introductions in Port Valdez/Prince William Sound, Alaska. Final report to Regional Citizen's Advisory Council of Prince William Sound.
- International Maritime Organization. (2006). Global Ballast Water Management Program-The New Convention. Accessed 8/2/06. <http://globalast.imo/index.asp>
- Larson, I. & Sytsma, M. (2006). Ballast Water Management on the Columbia River. Prepared for the Puget Sound Action Team, Office of the Governor of Washington.
- Lavoie, D.M., Smith, L.D. & Ruiz, G.M. (1999). The potential for intracoastal transfer of non-indigenous species in the ballast water of ships. *Estuarine, Coastal and Shelf Science*, 48: 551-564.
- Levings, C.D., J.R. Cordell, S. Ong, & G.E. Piercey. (2004). The origin and identity of invertebrate organisms being transported to Canada's Pacific coast by ballast water. *Canadian Journal of Fisheries and Aquatic Science*, 61: 1-11.
- Lloyd's Register of Shipping. (2000). "Lloyd's World Fleet Statistics 1999." Lloyd's Register of Shipping, London, United Kingdom.
- Mack, R.N. & Lonsdale, W.M. (2001). Humans as global plant dispersers: getting more than we bargained for. *Bioscience*, 51(2): 95-102.

## Report on Ballast Water Management in Oregon-2006

- Mack, R.N., Simberloff, D., Lonsdale, W.M., Evans, H., Clout, M. & Bazzaz, F.A. (2000). Biotic invasions: causes, epidemiology, global consequences, and control. *Ecological Applications*, 10(3): 689-710.
- Medcof, J.C. (1975). Living marine animals in a ship's ballast water. *Proceedings of the National Shellfisheries Association*, 65: 11-12.
- National Resource Council (1996). *Stemming the Tide: Controlling Introductions of Nonindigenous Species by Ships' Ballast Water*. Washington DC: National Academy Press. p. 141.
- Noble, M., Sytsma, M., Ruiz, G., & Simkanin, C. (2006). Biological Characterization of Ballast Water Arriving in the Columbia River. Produced for the U.S. Coast Guard Research and Development Center.
- Phillips, S. (2005). Ballast water issue paper. Portland, Oregon: Pacific States Marine Fisheries Commission.
- Phillips, S., Darland, T., & Sytsma, M. (2005). Potential Economic Impacts of Zebra Mussels on the Hydropower Facilities in the Columbia River Basin. Prepared for the Bonneville Power Administration.
- Pimentel, D., Rodolfo, Z. & Morrison, D. (2005). Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics*, 52: 273-288.
- Puget Sound Action Team. (2006). Mid-term Report: Ballast Water Management in Washington State. Prepared for the Washington State Ballast Water Work Group.
- Read, R. (2004). Shippers Weigh Container Lines. *The Oregonian*: August 14, 2006.
- Roberts, L. (1990). Zebra mussel invasion threatens U.S. waters. *Science*, 249(4975): 1370-1372.
- Ruiz, G.M., Carlton, J.T., Grosholz, E.D. & Hines, A.H. (1997). Global invasions of marine and estuarine habitats by non-indigenous species: mechanisms, extent and consequences. *American Zoologist*, 37: 621-632.
- Ruiz, G.M., Fofonoff, P.W., Carlton, J.T., Wonham, M.J. & Hines, A.H. (2000). Invasion of coastal marine communities in North America: apparent patterns, processes, and biases. *Annual Review of Ecology and Systematics*, 31: 481-531.
- Ruiz G.M., Smith, G., Anderson, D, Orlova, T., Leisy, D., Leong, J.A., Abbot, S., Inami, G., Jiang, S., Chu, W., Bills, J., Kimmerer, W., Hyung, K., & Lee J-H. (2005). Biological Study of Container Ships Arriving to the Port of Oakland. Three part final report: (a) Biota Associated with Ballast of Container Ships Arriving to the Port of Oakland . (b) Ballast Water Exchange Efficacy: Results of Tests on Eight Container Ships. (c) Analysis of Biofouling Organisms Associated with the hulls of Container Ships Arriving to the Port of Oakland : A pilot Study. Report submitted to the Port of Oakland.

## Report on Ballast Water Management in Oregon-2006

- Ruiz, G.M., Smith, G.E., & Sytsma, M. (2006). Workshop Report on Testing of Ballast Water Treatment Systems: General Guidelines and Step-wise Strategy toward Shipboard Testing. Prepared for the Pacific States Marine Fisheries Commission, the Alaska Department of Fish and Game, and the Prince William Sound Regional Citizens Advisory Council.
- Shiganova, T.A. (1998). Invasion of the Black Sea by the ctenophore *Mnemiopsis leidyi* and recent changes in pelagic community structure. *Fisheries Oceanography*, 7: 305-310.
- Simkanin, C., Sytsma, M., Ruiz, G., & Miller, A.W. (2005). Coordination of Ballast Water Reporting Between Federal and State Programs: A Pilot Project. Semi-Annual Progress Report (July 1, 2004-June 30, 2005) prepared for the Pacific States Marine Fisheries Commission.
- State of Oregon, Economic and Community Development Department. (2006). <http://www.econ.state.or.us/stats.htm>. Accessed on 07/13/06
- Sytsma, M.D., Cordell, J.R., Chapman, J.W. & Draheim, R.C. (2004). Lower Columbia River Aquatic Non-indigenous Species Survey 2001-2004. United States Coast Guard and United States Fish and Wildlife Service.
- Takata, L., Falkner, M. & Gilmore, S. (2006). Commercial Vessel Fouling in California: Analysis, Evaluation, and Recommendations to Reduce Nonindigenous Species Release From the Non-Ballast Water Vector. Prepared for the California State Legislature.
- United States Environmental Protection Agency (2006). <http://www.epa.gov/r5water/cwa.htm> Accessed on 09/19/06.
- Verling, E., Ruiz, G.M., Smith, L.D., Galil, B., Miller, A.W. & Murphy, K.R. (2005). Supply-side invasion ecology: characterizing propagule pressure in coastal ecosystems. *Proceeding of the Royal Society of London B*, 272: 1249-1256.
- Vinograd, J. & Sytsma, M. (2002). Report on the Oregon ballast water management program in 2002. Prepared in cooperation with the Oregon Ballast Water Task Force. December 2002.
- Vitousek, P.M., Antonio, C.M.D., Loope, L.L. & Westbrooks, R. (1996). Biological invasions as global environmental change. *American Scientist*, 84: 468-478.
- Vitousek, P.M., Antonio, C.M.D., Loope, L.L., Rejmanek, M. & Westbrooks, R. (1997). Introduced species: A significant component of human-caused global change. *New Zealand Journal of Ecology*, 21(1): 1-16.
- Wilcove, D.S., Rothstein, D., Dubow, J., Phillips, A. & Losos, E. (1998). Quantifying threats to imperiled species in the United States. *Bioscience*, 48(8): 607-615.

**Report on Ballast Water Management in Oregon-2006**

Williams, R.J., Griffiths, F.B., Van der Wal, E.J. & Kelly, J. (1988). Cargo vessel ballast water as a vector for the transport of non-indigenous marine species. *Estuarine, Coastal and Shelf Science*, 26: 409-420.

Wonham, M.J., Carlton, J.T., Ruiz, G.M. & Smith, L.D. (2000). Fish and ships: relating dispersal frequency to success in biological invasions. *Marine Biology*, 136: 1111-1121.

Wonham, M.J., Walton, W.C., Ruiz, G.M., Frese, A.M. & Galil, B.S. (2001). Going to the source: role of the invasion pathway in determining potential invaders. *Marine Ecology Progress Series*, 215: 1-12.

Appendix I: HB 2170

73rd OREGON LEGISLATIVE ASSEMBLY--2005 Regular Session

Enrolled  
House Bill 2170

Ordered printed by the Speaker pursuant to House Rule 12.00A (5). Pre-session filed (at the request of House Interim Committee on Agriculture and Natural Resources for Subcommittee on Water)

CHAPTER .....

AN ACT

Relating to ballast water; creating new provisions; and amending ORS 783.625, 783.630, 783.635, 783.640 and 783.992.

Be It Enacted by the People of the State of Oregon:

**SECTION 1.** (1)(a) There is created the Task Force on Ballast Water Management.

(b) The President of the Senate and the Speaker of the House of Representatives shall appoint two members from among members of the Legislative Assembly to serve in an advisory capacity to the task force.

(c) The Director of the Department of Environmental Quality may appoint members to the task force who represent federal, state, State of Washington, maritime, environmental and academic interests.

(2) The purpose of the task force is to study and make recommendations on changes to the ballast water program established in ORS 783.625 to 783.640, including but not limited to the following considerations:

- (a) Shipping industry compliance with ORS 783.625 to 783.640;
- (b) Practical and cost-effective ballast water treatment technologies;
- (c) Appropriate standards for discharge of treated ballast water in waters of this state;
- (d) The degree to which open sea exchange and coastal exchange of ballast water decreases the risk of transporting aquatic nonindigenous species into the waters of Oregon;
- (e) The compatibility of ORS 783.625 to 783.640 with new laws enacted by the United States Congress, regulations promulgated by the United States Coast Guard and ballast water management programs established by the States of Alaska, California and Washington and the Province of British Columbia;
- (f) Research requirements for ballast water treatment technology and other areas of concern related to the possible introduction of aquatic nonindigenous species;
- (g) Amendments to the National Invasive Species Act of 1996 (P.L. 104-332) for a single national system of regulation; and

(h) The degree to which ballast water management is consistent with and made a part of efforts to eradicate invasive species throughout Oregon.

(3) Portland State University may provide staff support or coordination assistance to the task force, subject to available funding from gifts, grants or donations.

(4) All agencies of state government, as defined in ORS 174.111, are directed to assist the task force in the performance of its duties and, to the extent permitted by laws relating to

confidentiality, to furnish such information and advice as the members of the task force consider necessary to perform their duties.

(5) A majority of the members of the task force constitutes a quorum for the transaction of business.

(6) Official action by the task force requires the approval of a majority of the members of the task force.

(7) The task force shall elect one of its members to serve as chairperson.

(8) The task force shall submit a report, including recommendations for legislation, to an interim committee related to natural resources no later than October 1, 2006.

(9) Notwithstanding ORS 172.072, members of the task force who are members of the Legislative Assembly are not entitled to mileage expenses or a per diem and serve as volunteers on the task force. Other members of the task force are not entitled to compensation or reimbursement for expenses and serve as volunteers on the task force.

(10) As used in this section, "aquatic nonindigenous species" means any species or other viable biological material that enters an ecosystem beyond its historic range.

**SECTION 2.** ORS 783.625 is amended to read:

783.625. As used in ORS 783.625 to 783.640, unless the context requires otherwise:

(1) "Ballast water" means any water used to manipulate the trim and stability of a vessel.

(2) "Cargo vessel" means a self-propelled ship in commerce, other than a tank vessel or a vessel used solely for commercial fish harvesting, of 300 gross tons or more.

(3) "Coastal exchange" means *[replacing]* **exchanging** the ballast water taken onboard at a North American coastal port *[in one of the following manners:]*

*[(a) For vessels departing from a North American coastal port located south of the parallel 40 degrees north latitude and traveling northward into the waters of this state, the replacement of ballast water at sea south of the parallel 40 degrees north latitude;]*

*[(b) For vessels departing from a North American coastal port located north of the parallel 50 degrees north latitude and traveling southward into the waters of this state, the replacement of ballast water at sea north of the parallel 50 degrees north latitude; or]*

*[(c) In accordance with regional or federal guidelines that provide for methods of replacing ballast water that are equally or more protective of the waters of this state than the methods provided in paragraphs (a) and (b) of this subsection.] at a distance of at least 50 nautical miles from land and at a depth of at least 200 meters.*

(4) "Department" means the Department of Environmental Quality.

(5) "Oil" means oil, gasoline, crude oil, fuel oil, diesel oil, lubricating oil, oil sludge, oil refuse and any other petroleum related product.

(6) "Open sea exchange" means a replacement of ballast water that occurs in an area no less than 200 nautical miles from any shore *[and where the water depth exceeds 2,000 meters]*.

(7) "Passenger vessel" means a ship of 300 gross tons or more carrying passengers for compensation.

(8) "Sediment" means any matter that settles out of ballast water.

(9) "Ship" means any boat, ship, vessel, barge or other floating craft of any kind.

(10) "Tank vessel" means a ship that is constructed or adapted to carry oil in bulk as cargo or cargo residue other than:

(a) A vessel carrying oil in drums, barrels or other packages;

(b) A vessel carrying oil as fuel or stores for that vessel; or

(c) An oil spill response barge or vessel.

(11) "Vessel" means a tank vessel, cargo vessel or passenger vessel.

(12) "Voyage" means any transit by a vessel destined for any Oregon port.

(13) "Waters of this state" means natural waterways including all tidal and nontidal bays, intermittent streams, constantly flowing streams, lakes, wetlands and other bodies of water in this state, navigable and nonnavigable, including that portion of the Pacific Ocean that is in the boundaries of Oregon.

**SECTION 3.** ORS 783.635 is amended to read:

783.635. (1) Except as authorized by this section, the discharge of ballast water in the waters of this state is prohibited.

(2) An owner or operator of a vessel may discharge ballast water in the waters of this state:

(a) If the owner or operator has conducted *[an]* **a complete open sea or coastal exchange**, *or a coastal exchange, if applicable,* of ballast water prior to entering the waters of this state. **The open sea or coastal exchange must be performed using either of the following methods:**

(A) **Flow-through exchange.** A flow-through exchange occurs when an amount of ocean water equal to or exceeding three times the capacity of the vessel's ballast water tank is pumped into an opening in the ballast water tank while the existing ballast water is discharged through another opening.

(B) **An empty and refill exchange.** An empty and refill exchange occurs when a ballast water tank is pumped empty to the point that the pump loses suction and then is refilled with ocean water.*;* *or*

(b) Without performing an open sea exchange or a coastal exchange of ballast water if:

(A)(i) The owner or operator reasonably believes that an exchange would threaten the safety of the vessel; *or* *[if]*

(ii) The exchange is not feasible due to vessel design limitations or equipment failure; **and**

(B) **The vessel discharges only the amount of ballast water that is operationally necessary.**

(3) An owner or operator who discharges ballast water in the waters of this state under subsection (2)(b) of this section is subject to the reporting requirements under ORS 783.640.

**SECTION 4.** ORS 783.640 is amended to read:

783.640. (1) Owners or operators of vessels regulated under ORS *[783.630]* **783.625** to 783.640 must report ballast water management information to the Department of Environmental Quality:

(a) **For voyages greater than 24 hours in length**, at least 24 hours prior to entering the waters of this state; **or**

(b) **For voyages less than 24 hours in length**, prior to departing the port or place of departure.

(2) The department may work with maritime associations **and any national ballast information clearinghouse** to establish the manner and form of *[such]* **the reporting required under this section.**

*[2]* (3) The department may verify compliance with ORS *[783.630]* **783.625** to 783.640 by relying on tests conducted by the United States Coast Guard or on other tests determined to be appropriate by the department.

**SECTION 5.** ORS 783.630 is amended to read:

783.630. (1) *[This section and ORS 783.635]* **ORS 783.625 to 783.640** apply to all vessels carrying ballast water into the waters of this state from a voyage, except a vessel that:

(a) Discharges ballast water only at the location where the ballast water originated, if the ballast water is not mixed with ballast water from areas other than open sea waters;

(b) Does not discharge ballast water in waters of this state;

(c) Traverses only the internal waters of this state;

(d) Traverses only the territorial sea of the United States and does not enter or depart an Oregon port or navigate the waters of this state;

(e) Discharges ballast water that originated solely from waters located between the parallel 40 degrees north latitude and the parallel 50 degrees north latitude **on the west coast of North America**; *or*

(f) Discharges ballast water that has been treated to remove organisms in a manner that is approved by the United States Coast Guard.

(2) ORS *[783.630]* **783.625** to 783.640 do not authorize the discharge of oil or noxious liquid substances in a manner prohibited by state, federal or international laws or regulations. Ballast water

**Report on Ballast Water Management in Oregon-2006**

containing oil or noxious liquid substances shall be discharged in accordance with the [applicable] requirements **applicable to those substances.**

(3) Nothing in this section:

(a) Requires an open sea [exchange] or coastal exchange if the owner or operator in charge of a vessel determines that performing an open sea [exchange] or coastal exchange would threaten the safety or stability of the vessel or the safety of the vessel's crew or passengers because of any extraordinary condition, including but not limited to adverse weather, vessel design limitations or equipment failure.

(b) Exempts the owner or operator in charge of a vessel from the reporting requirements under ORS 783.640, whether or not ballast water is carried or discharged in the waters of this state.

**SECTION 6.** ORS 783.992 is amended to read:

783.992. (1) Except as provided in subsection (2) of this section, the Director of the Department of Environmental Quality may impose a civil penalty on the owner or operator of a vessel for failure to comply with the requirements of ORS [783.630] **783.625** to 783.640. The penalty imposed under this section may not exceed \$5,000 for each violation. In determining the penalty imposed, the director shall consider whether the violation was intentional, negligent or without any fault and shall consider the quality and nature of risks created by the violation. The owner or operator of a vessel subject to such a penalty may contest the determination by requesting a hearing under ORS 183.413 to 183.470.

(2) The civil penalty for a violation of the reporting requirements of ORS 783.640 may not exceed \$500 per violation.

**SECTION 7.** Section 1 of this 2005 Act is repealed on the date of the convening of the next regular biennial legislative session.

Passed by House March 17, 2005

Received by Governor:

.....M....., 2005

.....  
Chief Clerk of House

Approved:

.....M....., 2005

.....  
Speaker of House

.....  
Governor

Passed by Senate May 3, 2005

Filed in Office of Secretary of State:

.....  
President of Senate

.....M....., 2005

.....  
Secretary of State

**Appendix II: Proposed and Existing Ballast Water Treatment Performance Standards for the West Coast. Modified with permission from K. Anderson.**

|  | IMO Regulation D-2 and Canada                                   | California Advisory Committee   | S. 363; H.R. 5030; S.1224                                       | S.770  | Washington                                      |
|--|---|---|---|--|---|
| <b>Management Approach</b>                                 | Exchange moving towards treatment only                          | Exchange moving towards treatment only  | Exchange moving towards treatment only                          | Exchange moving towards treatment only   | Exchange or treatment                           |
| <b>Standard:</b>   | <b>IMO: Proposed<br/>Canada: Adopted</b>                        | <b>Proposed</b>   | <b>Proposed</b>   | <b>Proposed</b>  | <b>Adopted Interim</b>                          |
| 1) Organisms greater than 50 microns in minimum dimension: | <10 viable organisms per cubic meter                            | No detectable living organisms  | <0.1 living organisms per cubic meter                           | Promulgate numeric discharge standards to ensure that non-native species will not establish in U.S. waters   | Technology to inactivate or remove:             |
| 2) Organisms 10-50 microns in minimum dimension:           | <10 viable organisms per ml                                     | <10 <sup>-2</sup> (0.01) living organisms per ml  | <0.1 living organisms per ml                                    | When no technology exists to accomplish above standard, treat with best performing treatment technology  | 95% zooplankton<br>99% bacteria & phytoplankton |
| 3) Organisms less than 10 microns in minimum dimension:    | No standards  | <10 <sup>3</sup> cfu bacteria/100ml<br><10 <sup>4</sup> viruses/100 ml  | No standards  | <u>For existing vessels:</u> has a concentration of viable biological material that contains 99% fewer near-coastal plankton than the concentration of viable biological material of the intake water of the vessel. |   |
| 4) Escherichia coli  | <250 cfu/100ml  | <126 cfu/100ml  | <126 cfu/100ml  |  |   |
| 5) Intestinal Enterococci                                  | <100 cfu/100ml  | <33 cfu/100ml   | <33 cfu/100ml   | <u>For new vessels:</u> has a concentration of viable biological material that contains 99.9% fewer near-coastal plankton than the concentration of viable biological material of the intake water of the vessel     |   |
| 6) Toxicogenic <i>Vibrio cholerae</i> (O1 & O139)          | <1cfu/100ml<br><br><1 cfu/gram wet weight of zoological samples | <1cfu/100ml<br><br><1 cfu/gram wet weight of zoological samples<br><br><b>Final Standards:</b> No discharge of living organisms | <1cfu/100ml<br><br><1 cfu/gram wet weight of zoological samples |  |   |

**Report on Ballast Water Management in Oregon-2006**

**Appendix II** *continued*: Proposed Implementation Schedules:

|  | <b>Ballast Capacity of Vessel</b> | <b>Applies to vessels in this class if constructed in or after:</b> | <b>Applies to all other vessels in this class starting in:</b> |
|--|-----------------------------------|---|--|
| <b>International Maritime Organization</b> |                                   |   |  |
| <b>Canada</b>                              | <1500 metric tons                 | 2009  | 2016   |
| <b>California</b>                          | 1500-5000 metric tons             | 2009  | 2014   |
| <b>S. 363</b>                              | >5000 metric tons                 | 2012  | 2016   |
| <b>S.1224</b>                              |                                   |   |  |
| <b>H.R. 5030</b>                           |                                   |   |  |

|                           |   |
|---------------------------|---|
| <b>Proposed in S. 770</b> | Implement treatment for vessels built on January 1, 2008 or after<br>Implement treatment for <b>all</b> vessels starting on January 1, 2011 |
|---------------------------|---|

|                               |                          |
|-------------------------------|--------------------------|
| <b>Current Washington Law</b> | All vessels by June 2007 |
|-------------------------------|--------------------------|

**Appendix III: Recommended Amendments to current Oregon Ballast Water statute.**

**NOTE:** Matter in [*italic and bracketed*] is existing law to be omitted. New sections are in **boldfaced** type.

783.620 Discharge of ballast in navigable waters. Except as provided in ORS 783.635, a person may not discharge the ballast of any vessel into the navigable portions or channels of any of the bays, harbors or rivers of this state, or within the jurisdiction of this state, so as to injuriously affect such portions or channels of such bays, harbors or rivers, or to obstruct navigation thereof. [Formerly 783.600]

783.625 Definitions for ORS 783.625 to 783.640. As used in ORS 783.625 to 783.640, unless the context requires otherwise:

- (1) “Ballast water” means any water used to manipulate the trim and stability of a vessel.
- (2) “Cargo vessel” means a [*self-propelled*] ship in commerce, other than a tank vessel or a vessel used solely for commercial fish harvesting, **which is equipped with ballast tanks and** of 300 gross tons or more.
- (3) “Coastal exchange” means exchanging the ballast water taken onboard at a North American coastal port at a distance of at least 50 nautical miles from land and at a depth of at least 200 meters.
- (4) “Department” means the Department of Environmental Quality.
- (5) “Oil” means oil, gasoline, crude oil, fuel oil, diesel oil, lubricating oil, oil sludge, oil refuse and any other petroleum related product.
- (6) “Open sea exchange” means a replacement of ballast water that occurs in an area no less than 200 nautical miles from any shore.
- (7) “Passenger vessel” means a ship of 300 gross tons or more carrying passengers for compensation.
- (8) “Sediment” means any matter that settles out of ballast water.
- (9) “Ship” means any boat, ship, vessel, barge or other floating craft of any kind.
- (10) “Tank vessel” means a ship that is constructed or adapted to carry oil in bulk as cargo or cargo residue other than:
  - (a) A vessel carrying oil in drums, barrels or other packages;
  - (b) A vessel carrying oil as fuel or stores for that vessel; or
  - (c) An oil spill response barge or vessel.
- (11) “Vessel” means a tank vessel, cargo vessel or passenger vessel.
- (12) “Voyage” means any transit by a vessel destined for any Oregon port.
- (13) “Waters of this state” means natural waterways including all tidal and nontidal bays,

## Report on Ballast Water Management in Oregon-2006

intermittent streams, constantly flowing streams, lakes, wetlands and other bodies of water in this state, navigable and nonnavigable, including that portion of the Pacific Ocean that is in the boundaries of Oregon. [2001 c.722 §1; 2003 c.692 §1; 2005 c.62 §2]

783.630 Application; exclusions. (1) ORS 783.625 to 783.640 apply to all vessels carrying ballast water into the waters of this state from a voyage, except a vessel that:

- (a) Discharges ballast water only at the location where the ballast water originated, if the ballast water is not mixed with ballast water from areas other than open sea waters;
  - (b) Does not discharge ballast water in waters of this state;
  - (c) Traverses only the internal waters of this state;
  - (d) Traverses only the territorial sea of the United States and does not enter or depart an Oregon port or navigate the waters of this state;
  - (e) Discharges ballast water that originated solely from waters located between the parallel 40 degrees north latitude and the parallel 50 degrees north latitude on the west coast of North America; or
  - (f) Discharges ballast water that has been treated to remove organisms in a manner that is approved by the United States Coast Guard.
- (2) ORS 783.625 to 783.640 do not authorize the discharge of oil or noxious liquid substances in a manner prohibited by state, federal or international laws or regulations. Ballast water containing oil or noxious liquid substances shall be discharged in accordance with the requirements applicable to those substances.
- (3) Nothing in this section:
- (a) Requires an open sea or coastal exchange if the owner or operator in charge of a vessel determines that performing an open sea or coastal exchange would threaten the safety or stability of the vessel or the safety of the vessel's crew or passengers because of any extraordinary condition, including but not limited to adverse weather, vessel design limitations or equipment failure.
  - (b) Exempts the owner or operator in charge of a vessel from the reporting requirements under ORS 783.640, whether or not ballast water is carried or discharged in the waters of this state. [2001 c.722 §2; 2003 c.692 §2; 2005 c.62 §5]

783.635 Discharge of ballast water prohibited; exemption. (1) Except as authorized by this section, the discharge of ballast water in the waters of this state is prohibited.

- (2) An owner or operator of a vessel may discharge ballast water in the waters of this state:
- (a) If the owner or operator has conducted a complete open sea or coastal exchange of ballast water prior to entering the waters of this state. The open sea or coastal exchange must be performed using either of the following methods:
    - (A) Flow-through exchange. A flow-through exchange occurs when an amount of ocean water equal to or exceeding three times the capacity of the vessel's ballast water tank is pumped into

## Report on Ballast Water Management in Oregon-2006

an opening in the ballast water tank while the existing ballast water is discharged through another opening.

- (B) An empty and refill exchange. An empty and refill exchange occurs when a ballast water tank is pumped empty to the point that the pump loses suction and then is refilled with ocean water.
- (b) Without performing an open sea exchange or a coastal exchange of ballast water if:
  - (A)(i) The owner or operator reasonably believes that an exchange would threaten the safety of the vessel; or
  - (ii) The exchange is not feasible due to vessel design limitations or equipment failure; and
- (B) The vessel discharges only the amount of ballast water that is operationally necessary.
- (3) An owner or operator who discharges ballast water in the waters of this state under subsection (2)(b) of this section is subject to the reporting requirements under ORS 783.640. [2001 c.722 §3; 2005 c.62 §3]

783.640 Reporting of ballast water management. (1) Owners or operators of vessels regulated under ORS 783.625 to 783.640 must report ballast water management information to the Department of Environmental Quality:

- (a) For voyages greater than 24 hours in length, at least 24 hours prior to entering the waters of this state; or
- (b) For voyages less than 24 hours in length, prior to departing the port or place of departure.
- (2) The department may work with maritime associations and any national ballast information clearinghouse to establish the manner and form of the reporting required under this section.
- (3) The department may verify compliance with ORS 783.625 to 783.640 by relying on tests conducted by the United States Coast Guard or on other tests determined to be appropriate by the department. [2001 c.722 §4; 2005 c.62 §4]

Note: Sections 1 and 7, chapter 62, Oregon Laws 2005, provide:

Sec. 1. (1)(a) There is created the [*the Task Force on Ballast Water Management*] **Shipping Transport of Aquatic Invasive Species Task Force.**

- (b) The President of the Senate and the Speaker of the House of Representatives shall appoint two members from among members of the Legislative Assembly to serve in an advisory capacity to the task force.
- (c) The Director of the Department of Environmental Quality may appoint members to the task force who represent federal, state, State of Washington, maritime, environmental and academic interests.
- (2) The purpose of the task force is **to make recommendations on management of organisms transported by all ship vectors including by vessel fouling and** to study and make recommendations on changes to the ballast water program established in ORS 783.625 to 783.640, including but not limited to the following considerations:

## Report on Ballast Water Management in Oregon-2006

- (a) Shipping industry compliance with ORS 783.625 to 783.640;
- (b) Practical and cost-effective ballast water treatment technologies;
- (c) Appropriate standards for discharge of treated ballast water in waters of this state;
- [(d) *The degree to which open sea exchange and coastal exchange of ballast water decreases the risk of transporting aquatic nonindigenous species into the waters of Oregon;*]
- (d) [(e)] The compatibility of ORS 783.625 to 783.640 with new laws enacted by the United States Congress, regulations promulgated by the United States Coast Guard and ballast water management programs established by the States of Alaska, California and Washington and the Province of British Columbia;
- (e) Practical and cost-effective techniques for management of vessel fouling;**
- (f) Appropriate regulations and standards for management of vessel fouling and other shipping-related aquatic invasive species transfer vectors;**
- [(f) *Research requirements for ballast water treatment technology and other areas of concern related to the possible introduction of aquatic nonindigenous species;*
- (g) *Amendments to the National Invasive Species Act of 1996 (P.L. 104-332) for a single national system of regulation; and*
- (h) *The degree to which ballast water management is consistent with and made a part of efforts to eradicate invasive species throughout Oregon.*]
- (3) Portland State University may provide staff support or coordination assistance to the task force, subject to available funding from gifts, grants or donations.
- (4) All agencies of state government, as defined in ORS 174.111, are directed to assist the task force in the performance of its duties and, to the extent permitted by laws relating to confidentiality, to furnish such information and advice as the members of the task force consider necessary to perform their duties.
- (5) A majority of the members of the task force constitutes a quorum for the transaction of business.
- (6) Official action by the task force requires the approval of a majority of the members of the task force.
- (7) The task force shall elect one of its members to serve as chairperson.
- (8) The task force shall submit a report, including recommendations for legislation, to an interim committee related to natural resources no later than October 1, [2006] **2008**.
- (9) Notwithstanding ORS 172.072, members of the task force who are members of the Legislative Assembly are not entitled to mileage expenses or a per diem and serve as volunteers on the task force. Other members of the task force are not entitled to compensation or reimbursement for expenses and serve as volunteers on the task force.
- (10) As used in this section, “aquatic nonindigenous species” means any species or other viable biological material that enters an ecosystem beyond its historic range. [2005 c.62 §1]

Sec. 7. Section 1 of this 2005 Act is repealed on the date of the convening of the next regular biennial legislative session [January 8, 2007]. [2005 c.62 §7]

**PENALTIES**

- 783.990 Penalties. (1) Violation of ORS 783.510 is punishable, upon conviction, in a justice or circuit court, by a fine of not less than \$50 nor more than \$200, or by imprisonment in the county jail for not less than one nor more than six months, or both.
- (2) Violation of ORS 783.520 is punishable, upon conviction, in a justice or circuit court, by a fine of not less than \$50 nor more than \$250, or by imprisonment in the county jail for not less than 60 days nor more than six months.
- (3) Violation of ORS 783.530 is punishable, upon conviction, in a justice or circuit court, by a fine of not less than \$20 nor more than \$200, or by imprisonment in the county jail for not less than 10 nor more than 100 days.
- (4) Violation of ORS 783.550 is punishable, upon conviction, in a justice or circuit court, by a fine of not less than \$20 nor more than \$100 or by imprisonment in the county jail for not less than 10 nor more than 100 days, or both.
- (5) Violation of ORS 783.560 by any officer is a Class D violation.
- (6) Violation of ORS 783.580 is punishable, upon conviction, by a fine of not less than \$100 nor more than \$250, and by imprisonment in the county jail not less than 10 nor more than 25 days. Justices of the peace have jurisdiction of violations of ORS 783.580.
- (7) Violation of ORS 783.590 and injury or damage of any bridge across the Willamette River for want of the appliances described in ORS 783.590 is a Class A violation.
- (8) Violation of ORS 783.620 is punishable, upon conviction, by a fine of not less than \$100 nor more than \$500, or by imprisonment in the county jail for not less than three months nor more than one year.
- (9) Violation of ORS 783.610 is punishable, upon conviction, by a fine of not less than \$100 nor more than \$200, or by imprisonment in the county jail not less than one nor more than six months, or both. [Amended by 1953 c.113 §2; 1997 c.249 §224; 1999 c.1051 §227]

783.992 Civil penalties. (1) Except as provided in subsection (2) of this section, the Director of the Department of Environmental Quality may impose a civil penalty on the owner or operator of a vessel for failure to comply with the requirements of ORS 783.625 to 783.640. The penalty imposed under this section may not exceed \$5,000 for each violation. In determining the penalty imposed, the director shall consider whether the violation was intentional, negligent or without any fault and shall consider the quality and nature of risks created by the violation. The owner or operator of a vessel subject to such a penalty may contest the determination by requesting a hearing under ORS 183.413 to 183.470.

- (2) The civil penalty for a violation of the reporting requirements of ORS 783.640 may not exceed \$500 per violation. [2001 c.722 §7; 2005 c.62 §6]

---

**NOTE:** In addition, language should be negotiated with legislators in Washington to jointly establish the Columbia River Commission on Bioinvasions.