Shipping Transport of Aquatic Invasive Species

State of Oregon
Department of
Environmental
Quality

A report prepared by the Oregon Task Force on
the Shipping Transport of Aquatic Invasive Species

for the 2011 Oregon Legislature

10-LQ-011

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June 2010

Acknowledgments

We wish to extend special thanks to the following for contributing comments and/or data that have supported Task Force activities and the production of this report:

Hans Meere and the Portland Merchants Exchange
Whitman Miller and the National Ballast Information Clearinghouse
Kevin Anderson (Puget Sound Partnership)
Stephen Phillips (Pacific States Marine Fisheries Commission)
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EXECUTIVE SUMMARY

The Oregon Task Force on the Shipping Transport of Aquatic Invasive Species (STAIS), as required by House Bill 2714 (2009) and Oregon law (ORS 783.625), prepared this report for the 2011 Oregon Legislature. The task force, similar to the Oregon Ballast Water Task Force of 2002, 2004, and 2006, was established to study and make recommendations for combating the introduction of non-indigenous species associated with shipping-related transport in Oregon. Members of the task force represent a diverse range of academic, maritime, regulatory and environmental perspectives, and include four advisory members from the Legislature.

Commercial shipping activities constitute an important, vital economic engine for Oregon. An unintentional consequence of trade, however, is the transport and introduction of species to ecosystems outside their historic ranges. These species, freed of the natural controls of their native range, can proliferate and become aquatic invasive species (AIS) in Oregon's waterways, displacing native species and degrading ecosystem services critical to human economies and health. A sustainable economy requires effective monitoring and management to prevent the introduction of aquatic invasive species via shipping-related pathways such as ballast water discharge and vessel biofouling.

This report provides information and analysis on a) current ballast water regulations at international, federal and regional levels; b) shipping and ballast water discharge trends in Oregon waters; c) shipping industry compliance with Oregon law; and d) emerging issues that may affect Oregon's efforts to reduce invasive species threats associated with shipping transport. In addition, the task force scrutinized ballast water program operations, priorities and funding challenges and has developed a recommended program budget and sustainable funding solution.

The Oregon Department of Environmental Quality Ballast Water Program is responsible for developing and implementing aquatic invasive species prevention strategies related to commercial shipping in Oregon waters. Program responsibilities include screening of vessel arrivals; vessel report monitoring; vessel inspections; verification sampling; outreach and communication with maritime industry stakeholders;

enforcement actions; policy development and coordination with regional jurisdictions; and providing staff support to the Shipping Transport of Aquatic Invasive Species Task Force.

In the coming years, an important transition in ballast water management policy is pending that aims to further reduce the risk of transporting and introducing new AIS via shipping activities. Although mid-ocean ballast exchange has been an important risk-reduction strategy, it is widely recognized that standards limiting the number of living organisms in discharged ballast water, and the likely implementation of treatment technologies, are required to sufficiently protect the state's waterways from AIS threats. The transition to this new management paradigm continues to be complicated by a potential lack of uniformity between discharge standards established by the International Maritime Organization, two independent federal authorities (U.S. Coast Guard and U.S. Environmental Protection Agency), and various states that have opted to enact their own regulations. Efforts to coordinate regulations, at least at a regional level, will continue to be important to ease shipping operations. Despite this transition, and because mid-ocean exchange will likely continue for at least another 10 years, local efforts dedicated to outreach, vessel inspections, and compliance verification will remain critical to Oregon's aquatic invasive species prevention goals.

In summary, the final section of this report proposes the following policy recommendations to the 2011 Oregon Legislature:

- Restructuring the budget and revenue source of the state ballast water management program to become more effective and sustainable while enhancing the state's aquatic invasive species prevention capabilities. Specifically, the task force proposal includes;
    - A modest increase in budget, while simultaneously reducing state General Fund support to the program by approximately 22 percent;
    - A new commercial shipping invasive species prevention fee for ballast water management activities, effective January 2012, which would contribute to an industry-government cost share in support of AIS prevention efforts;

  - Sufficient funding to support an additional half-time employee primarily focused on ballast water inspections.

- Supporting efforts that may increase state resources available for invasive species early detection/rapid-response events within state jurisdiction. Actions may include:
  - Directing revenue generated from ballast water management penalties to the Invasive Species Control Account, managed by the Oregon Invasive Species Council; and
  - Passing a Legislative Resolution to Congress and the President in support of S.B. 3063 (cosponsored by Senators Wyden and Merkley) and its companion bill H.R. 4782, to provide financial support to western states for managing new introductions of invasive species.
- Amending temporary provisions of Oregon law to provide for continuation of the Shipping Transport of Aquatic Invasive Species Task Force through the 2011-13 biennium.

TABLE OF CONTENTS

List of Abbreviations

ABRPI	Aquatic Bioinvasion Research and Policy Institute (PSU)
AIS	Aquatic Invasive Species
ANS	Aquatic Nuisance Species
BWDS	Ballast Water Discharge Standard
BWE	Ballast Water Exchange
BWM	Ballast Water Management
BWRF	Ballast Water Reporting Form
BWT	Ballast Water Treatment
COTP	Captain of the Port
CSLC	California State Lands Commission
EEZ	Exclusive Economic Zone
EPA	Environmental Protection Agency
EQC	Environmental Quality Commission
ETV	Environmental Technology Verification (EPA)
IMO	International Maritime Organization
MARAD	Maritime Administration (US Dept of Transportation)
MT	Metric Tons
NANPCA	National Aquatic Nuisance Prevention and Control Act
NBIC	National Ballast Information Clearinghouse
NIS	Non-indigenous Species
NISA	National Invasive Species Act
NM	Nautical Miles
NOAA	National Oceanographic and Atmospheric Association
NPDES	National Pollutant Discharge Elimination System
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
OSU	Oregon State University
PBWG	Pacific Ballast Water Group
PDXMEX	Portland Merchants Exchange
PSMFC	Pacific States Marine Fisheries Commission
PSU	Portland State University
PSAT	Puget Sound Action Team
SERC	Smithsonian Environmental Research Center
STAIS	Shipping Transport of Aquatic Invasive Species Task Force
STEP	Shipboard Technology Evaluation Program (USCG)
USCG	United States Coast Guard
VGP	Vessel General Permit
WCGA	West Coast Governors Agreement on Ocean Health
WDFW	Washington Department of Fish and Wildlife

List of Figures:

I. INTRODUCTION

A. Purpose

Non-native or non-indigenous species (NIS) are organisms that have been transported or introduced to ecosystems beyond their naturally occurring historic range. Only a small fraction of these organisms establish viable reproducing populations upon arrival, and even fewer become 'invasive', crowding out native species and potentially altering key ecosystem processes. Yet, invasive species have been globally implicated as a potent force for ecological and evolutionary change, ranking along with habitat loss, pollution, and climate change as the greatest threats to native biodiversity (Vitousek et al. 1997, Mack et al. 2000, Grosholz 2002, ISAB 2008). In addition to substantial ecological impacts, NIS may have harmful human consequences for human health, and represent a wide-ranging threat to local, national, and global economies.

Commercial shipping activities constitute an important and vital component of our economy, both globally and locally. Some activities incidental to shipping operations, however, have been identified as the leading pathways of NIS introductions along the West Coast (Sytsma et al. 2004, Molnar et al. 2008). In response to these concerns, the 2001 Oregon Legislature created the Oregon Ballast Water Management Program (ORS 783.620 – 783.992; Appendix A). In the absence of a federally mandated program, this statute established ballast water management and reporting requirements for all transoceanic and coastal arrivals to Oregon waters. In addition, the statute established the Oregon Ballast Water Task Force for the purposes of studying and making recommendations for future adjustments to ballast water regulations (Vingograd and Sytsma 2002, Flynn and Sytsma 2004, Simkanin and Sytsma 2006).

The 2007 Legislature renamed the task force (to the Shipping Transport of Aquatic Invasive Species (STAIS) Task Force) to reflect a broader range of shipping concerns, in addition to ballast water operations, that may contribute to aquatic invasive species (AIS) risks for state waters (SB 643). In addition to legislative advisors appointed by House and Senate leadership, the task force is comprised of various state, federal, academic, industry, non-governmental, and academic representatives appointed by the Director of ODEQ. The STAIS Task Force produced a 2008 report that provides significant background on shipping related AIS concerns in Oregon waters (STAIS 2008)

and included multiple recommendations to the 2009 Legislature, most of which were implemented.

The 2009 Legislature voted to convene the task force in 2009-10 (HB 2714) for studying and making recommendations on the following topics:

- Identifying sources of funding to support and maintain Oregon's Ballast Water Management Program;
- Combating the introduction of aquatic non-indigenous species associated with shipping-related transport into the waters of this state; and
- Changes to the Oregon Ballast Water Management Program (ORS 783.620-992; Appendix A), including but not limited to the following considerations:
    - Shipping industry compliance with ballast management regulations;
    - Practicable and cost-effective ballast water treatment technologies;
    - Appropriate standards for discharge of treated ballast water into waters of this state;
    - The compatibility of our state regulations 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;
    - Practicable and cost-effective techniques to combat the introduction of aquatic non-indigenous species associated with shipping related transport into the waters of this state; and
    - Appropriate regulations and standards to combat the introduction of aquatic non-indigenous species associated with shipping related transport into the waters of this state.

The 2010 Task Force has produced this report to assess ballast water management trends in the state, to summarize key regulatory developments from other jurisdictions, and to recommend funding strategies that will sufficiently support ballast water program activities at ODEQ.

B. Non-indigenous Species and Their Potential

In some cases, NIS become 'invasive' wherein reproductive and distribution patterns threaten native biodiversity, ecosystem processes and often have indirect impacts on socio-cultural, economic and/or human health (Mack et al. 2000, Carlton 2001, US Ocean Commission 2004). Once established, NIS can inflict a cascade of direct and indirect effects upon the receiving environment. In some cases, the absence of a natural suite of predators and/or parasites enables NIS to achieve densities far greater than observed in their historical range. In doing so, NIS often out compete native species for critical resources such as food or space. In some cases, NIS may themselves introduce disease and/or parasites for which native species are ill-adapted (ISAB 2008). As a result of their introduction, NIS may alter food web dynamics and disrupt biogeochemical cycling processes (Grosholz 2002). Specific examples of well-studied biological invasions in aquatic environments include: mudflat conversion by cord grass, *Spartina altinoflora* (Daehler and Strong 1996); water quality degradation caused by hydrilla, *Hydrilla verticillata* (Langeland 1996); alteration of plankton production dynamics by Asian clam, *Potamocorbula amurensis* (Kimmerer et al. 1994, Cloern 1996); and declines in native fisheries production resulting from the North American comb jelly, *Mnemiopsis leidyi* (Shiganova 1998). Although the impacts of such well-documented case studies are clear, there are an unknown number of NIS for which the impacts have not been sufficiently evaluated (Parker et al. 1999, Lodge et al. 2006).

The rapid expansion of Eurasian freshwater mussels of the Dreissenid family in North America serves as a stark example of why NIS prevention efforts are critical to protecting Oregon's waterways. Zebra mussels (*Dreissena polymorpha*) and the closely related quagga mussel (*Dreissena rostriformis bugensis*) were introduced to the Great Lakes in the late 1980's, most likely via ballast water discharge (Mills et al. 1994). As a result of their high fecundity (up to 1 million eggs/female/year) and rapid dispersal, both species expanded their range throughout the Great Lakes, Ohio River and Mississippi River regions during the 1990's. An immediate economic consequence of their extraordinarily high densities (up to 700,000 individuals per m^2) was the cost of combating biofouling of industrial and municipal water intake pipes. Additionally, these mussels have been implicated as the catalyst for a cascade of impacts to water quality and

fisheries production, including disrupted ecosystem processes and altered food web dynamics that contribute to outbreaks of *E. coli* and botulism (MacIsaac 1996). In total, the direct and indirect economic losses resulting from invasive species in the Midwest has been estimated at $1 billion per year (Pimentel et al. 2005).

Efforts to confine the *Dreissena spp.* infestation have been challenged in recent years by discovery of populations that have become established in the western U.S.. Since its first detection in early 2007, the quagga has been identified in 16 reservoirs associated with the lower Colorado Aqueduct system in Arizona, Nevada and California, as well as isolated lakes in Utah and Colorado. More recently in February 2008, Zebra mussels were identified for the first time west of the Continental Divide in a small reservoir east of Monterey Bay, California.

Although *Dreissena spp.* were first introduced to North America from ballast water discharge, the transport of recreational vessels between waterbodies in western states is considered the greatest threat for their expansion to new locations, including Oregon. In fact, mussels have been intercepted by wildlife authorities in recent years on the hulls of numerous recreational vessels being transported on trailers coming into the Pacific Northwest (PNW). Nonetheless, it is mentioned in this report as one example to illustrate the broader potential consequences that are at stake from biological invasions and the importance of efforts aimed at reducing the risk of introducing new NIS.

Some reports suggest that *Dreissena spp.* reproduction and growth may be limited in waters of the PNW due to low calcium levels, especially west of the Cascades (Whittier et al. 2008). Despite this potential source of optimism regarding the likelihood of *Dreissena spp.* infestation in PNW waterways, it is worth noting that another invasive freshwater mussel from Asia, *Limoperna fortunei*, has demonstrated invasion characteristics in South America comparable to *Dreissena spp.*, but may be more suited to survival in PNW waters than either quagga or zebra (Oliveira et al. 2010). Predicting which NIS are likely to become invasive is a daunting challenge. Thus prevention efforts, such as ballast water management, may be the most effective tool to combat AIS threats.

The value of NIS prevention efforts is most easily recognized in comparison with case studies of the economic costs attributed to eradicating, controlling, or mitigating

invasive species that have become established. Currently, it is estimated that the cost to protect, clean and maintain infrastructure from the impacts of *Dreissena spp.* have exceeded $1 billion per year in North America (Pimentel et al. 2005). For the PNW, a report by Phillips et al. (2005) projected the control and maintenance costs of a *Dreissena spp*. infestation to be $27 million per year just for the 13 hydropower facilities on the Columbia River. Although it is difficult to quantify the economic costs of the combined impact of all terrestrial and aquatic NIS, the most comprehensive assessments have estimated U.S. annual losses to be near $138 billion per year (Pimentel et al. 2005).

In addition to the ecological and economic harm that can result from the introduction of NIS, there has been growing concern over human health risks (Ruiz et al. 1997). Some phytoplankton produce toxic compounds and form dense algal blooms that may become incorporated into the tissue of fish and shellfish that may be harvested for human consumption (Van Dolah et al. 2001). Other organisms act as intermediate hosts to human pathogens, such as the Asian inter-tidal snail, *Assiminea parasitologica*, which can host the parasitic human lung fluke and was first detected in Coos Bay in July 2007 (pers. comm. J. Chapman OSU, 2008), and has since been identified in multiple other estuaries along the Oregon coast (pers. comm. A. Lafaviere ODFW 2009). Furthermore, the intake and subsequent discharge of substantial volumes of ballast water for normal shipping operations have been implicated as a major factor resulting in the global spread of microbial communities (Hallegraff 1998, Drake 2001, Drake and Lodge 2006), including the potential dispersal of pathogenic bacteria and viruses, such as cholera (Ruiz et al. 2000). Compared to impacts of larger sized NIS, the impacts and extent to which microorganisms are being globally distributed by human activities is poorly understood.

C. Shipping Mediated Pathways of Aquatic Invasive Species (AIS)

The processes by which living organisms are introduced into new ecosystems, outside of their historic range, are referred to as ‘vectors’ or ‘pathways.’ Whether intentional (e.g. aquaculture, recreational fisheries, pet trade) or unintentional (e.g. shipping), a continued increase in the introduction of NIS is generally attributed to global trade and travel (Ruiz et al. 2000, Ruiz & Carlton 2003).

Shipping operations may contribute to biological introduction by two primary pathways: ballast water discharge and biofouling. Ship operators manage changes in cargo load by transferring ambient waters from the vessel's surroundings into ballast tanks or cargo holds, thereby increasing stability, efficiency and safety during a vessel's voyage. The process of pumping large volumes of water into ballast tanks while unloading cargo at one port, and then discharging the ballast upon loading cargo at a distant port, provides a mechanism by which aquatic organisms (typically plankton and other small organisms that easily become entrained by the flow of intake pumps) may 'hitchhike' to regions outside their historic range (Carlton 1985). Although many planktonic organisms spend their entire lifecycle free-floating in the water column, others are only planktonic for days to months as larvae prior to settling into benthic habitats for the adult portion of their life cycle. Because sediment tends to accumulate at the bottom of ballast tanks, organisms may also settle out within the tanks to establish reproducing populations that travel within the vessel and may be capable of repeatedly replenishing the tanks waters with larvae that may then be released upon ballast discharge (Carlton & Geller 1993). In a different manner, ships may act as an invasion pathway for organisms that colonize (or 'foul') hard substrate surfaces of the vessel (e.g., hull, sea chests, anchors, and piping) for the adult portion of their life cycle. These biofouling organisms may be responsible for the introduction of NIS to a new region if they release reproductive offspring or become dislodged from the vessel and fall into the surrounding waters (Gollasch 2002, Fofonoff et al. 2003).

Ballast Water Discharge –The use of ambient waters for ship ballast has become a relatively new pathway for NIS transport in the past 50 years. In particular, regulations requiring the use of oily water separators to limit the discharge of hazardous substances during ballast transfer, has inadvertently contributed to increased survival of ballast tank organisms during the past 25 years. The risk of NIS becoming established is influenced by various factors, including propagule pressure (i.e., quantity of NIS being released), condition of the propagules upon release, timing of inoculation, the ecological stability of the receiving system, and the presence or absence of suitable resources to support colonization by specific taxa (Elton 1958, Ruiz et al. 2000, Kolar and Lodge 2000). The

discharge of ballast water is a considerable AIS risk because not only may it release an abundance of NIS individuals into the receiving environment, but it also results in the transfer of entire ecological communities, including viruses, bacteria, phytoplankton, zooplankton, fish, and macrophytes (Carlton and Geller 1993, Ruiz et al. 1997). For these reasons, regulatory management of ballast discharge has focused on pathway management rather than a species-specific approach to managing individual AIS of greatest concern (Ruiz and Carlton 2003).

Because a single cubic meter, or one MT, of coastal marine water contains approximately 4,000 – 40,000 living animals (not including single celled bacteria and viruses), ballast discharge constitutes a considerable environmental threat. To prevent the threat of globally transferring entire biological communities, mid-ocean exchange of ballast water has been the predominant management strategy imposed by state and federal jurisdictions during the past decade. As defined by most regulations, 'exchange' may be completed by one of two accepted methods. Most regulations accept the use of either the '*empty/refill'* method (i.e., pump out as much of ballast as is possible; then re-fill with mid-ocean water) or the *'flow through'* method (i.e., flush out the tank by pumping in mid-ocean water at the bottom of the tank; continuously overflowing the tank from the top until the equivalent of three full-tank volumes have been pumped into the tank). Both methods aim to replace at least 95% of the original ballast volume contents, but tank configuration (e.g., height of pump intakes from the bottom of the tank and 'dead space' that may not flush as easily) may limit this goal, especially for vessels that are unable to use the empty/refill method.

Ballast water exchange (BWE) aims to not only reduce the absolute quantity of organisms in ballast tanks (i.e. number per m^3), but also aims to remove species that originated from near-shore habitats (including estuarine and freshwater zones). Ballast water exchange (BWE) is estimated to reduce the quantity of coastal zooplankton discharged by one order of magnitude (Minton et al. 2005, Ruiz and Reid 2007). However, even after an order of magnitude reduction in propagules following BWE, approximately two million zooplankton (and approximately 200 billion phytoplankton) may still be released from a typical bulk carrier that discharges 40,000 m^3. Theoretically, most of the organisms remaining in tanks after a successful BWE are accustomed to

higher salinity or open ocean conditions rather than the environments more commonly observed in ports. Therefore, these individuals have a lower probability of survival upon discharge in our near shore waters.

However, even thorough implementation of BWE does not replace more than 95% of ballast contents, and therefore a de-ballasting vessel may still discharge millions of viable organisms, including some that were sourced from near shore (i.e., high risk) habitats. For these reasons, BWE has long been recognized as an interim solution to reducing the risk of AIS introduction via ballast water discharge. In particular, three major problems have challenged the usefulness of BWE as a long-term solution to invasive species prevention. The first problem concerns operational challenges and safety concerns for vessels requiring BWE. Secondly, BWE efficacy is highly variable, largely dependent on vessel type, voyage duration and environmental characteristics of source and discharge locations. Lastly, there has been a lack of effective verification tools for regulatory enforcement agencies to use during dockside inspections.

It is widely recognized that ballast treatment technologies, and/or vessel re-designs to eliminate the need for ballast transfer, are needed in order to sufficiently manage AIS risks. Although current federal law allows the United States Coast Guard to approve the use of ballast treatment technology (BWT) with efficacy greater than or equal to BWE, variability in vessel type and voyage characteristics have complicated and delayed the development and federal implementation of BWT. In response to a lack of progress at the federal level, several states have implemented ballast discharge performance standards that will likely necessitate the implementation of shipboard ballast treatment systems. To diminish ballast water transfer as a pathway for biological invasions, regulatory entities must promote the development of ballast treatment technologies that are suitable to industry operations and are sufficiently protective of the environment.

Biofouling –Ship surfaces subject to fouling and wood boring organism have been a probable AIS vector for thousands of years. However, since the advent of steel-hulled ships and particularly the application of anti-fouling paints, fouling mediated introduction of AIS has been less of a concern than ballast water transfer. Since January

2003, the application of organotin-based anti-fouling paint systems has been banned by the IMO because of harmful impacts of its active compounds on the marine environment. Since January 2008, ships may not bear any organotin compounds on their hulls or surfaces, or must have covered the non-complying organotin layer with a coating to prevent the toxic compounds from leaching into the environment. As new anti-fouling coatings are developed and vessels shift to different coatings with potentially lower efficacies at preventing biofouling, there are concerns that the risk of fouling mediated transport of AIS may increase (Nehring 2001). This concern has been evident at various international maritime and scientific conferences and has become a prominent topic of discussion for international, national, and state regulations.

II. PERTINENT LAWS & REGULATIONS

Vessels operating in west coast waters are subject to a combination of international, national, and state ballast management regulatory jurisdictions. Generally, the various regulations conform to similar reporting protocols and management requirements. For example, all jurisdictions currently allow oceanic exchange as an acceptable method of ballast water management, and most programs provide a safety clause exemption if a vessel and its crew are at risk from a proposed ballast exchange operation. However, the asynchronous development and implementation of more environmentally protective regulatory standards may result in a regulatory patchwork among jurisdictions. This section describes regulations that are currently in place, whereas section IV-A of this report (Pending Federal Regulations) describes other developments that may alter the regulatory landscape in the coming years.

A. International

The International Maritime Organization (IMO) and member countries adopted the *International Convention for the Control and Management of Ships' Ballast Water and Sediments* in February of 2004. This convention requires all vessels to implement a ballast water and sediment management plan and provides guidance on best management practices. Furthermore, the convention includes provisions for establishing ballast water discharge standards (BWDS) and associated implementation timelines based on vessel construction date and ballast water capacity (Appendix B).

The IMO BWDS, like other standards adopted or proposed by specific states or countries, specify limits on the number of organisms or microbe colonies permissible per unit of ballast water discharged. Under most environmental conditions and voyage types, it is likely that many vessels will require shipboard ballast treatment systems to comply with the discharge standards. The implementation timeline for the IMO Convention is based upon construction date and vessel ballast water capacity; ultimately all vessels will be required to meet the standards by 2016.

The convention, however, will not go into effect until 12 months after it is ratified by 30 countries representing 35% of the world's shipping tonnage. As of May 2010, 21 countries representing 23% of the world shipping tonnage had ratified the convention.

B. Canadian

Canadian regulations require that all vessels arriving to Canadian ports with ballast water originating from outside of Canadian waters conduct open-ocean ballast exchange at least 200 nautical miles (nm) from shore in water at least 2000 meters (m) deep. Vessels discharging waters sourced from within the Economic Exclusion Zone (EEZ) must exchange ballast water at least 50 nm from shore in water at least 500 m deep. These regulations allow for safety exemptions and require that all arrivals submit a ballast management report after completing exchange. The province of British Columbia supports the federally mandated ballast management program and has not established regulatory measures specific to the Pacific Coast region of Canada.

Beginning in 2008, Transport Canada, the Canadian government agency responsible for ballast water management, dramatically increased its inspection and enforcement program to satisfy regulations established in the Canada Shipping Act of 2006 and the bi-national agreement regarding transoceanic arrivals to the St. Lawrence Seaway. The Canadian government's investment of roughly $4.5 million during the 2008-2013 is aimed at protecting Canadian waters from ship-sourced biological pollution. In part, these funds have been devoted to joint vessel inspections coordinated by the Great Lakes Seaway Ballast Management Workgroup. In 2009, the effort resulted in vessel inspections, including ballast tank sampling, for 100% of arrivals through the Great Lakes Seaway (GLSBWWG 2010).

The Canada Shipping Act also adopts BWDS identical to those proposed by the IMO Convention. However, Transport Canada is currently investigating a possible amendment to the IMO convention that would continue to require BWE, in addition to BWDS, for vessels proposing to discharge foreign sourced ballast into freshwater environments.

C. U.S. Federal

There are currently two independent legislative authorities regulating ballast water discharge and the management of invasive species transport by commercial shipping traffic. First, authority delegated to USCG via the National Aquatic Nuisance

Prevention and Control Act of 1990 (NANPCA), and more recently, authorities delegated to the Environmental Protection Agency under the Clean Water Act.

USCG Ballast Water Management - The National Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA) was established to reduce invasive species risks in the Great Lakes and Hudson River region. The NANPCA was later reauthorized under the National Invasive Species Act of 1996 (NISA) and mandated the USCG to issue BWM guidelines and regulations applicable to all U.S. waters. In 2004, after five years of a voluntary ballast management program, the USCG established mandatory regulations governing ballast discharge from vessels entering the U.S. waters from outside the U.S. EEZ. For these vessels, ship operators are required to conduct mid-ocean ballast water exchanges at least 200 nm from shore in waters at least 200 m deep. In contrast to state regulations on the West Coast, there is no exchange requirement for vessels conducting coastwise voyages within the 200 nm EEZ. Federal provisions do not require vessels to alter their voyage plan solely for performing a mid-ocean ballast exchange (e.g., vessels transiting from Mexican or other Central American locations may conduct their ballast exchange < 200 nm from shore if their voyage plan does not involve sailing outside the required range). The U.S. Federal ballast regulations also allow for safety exemptions if weather or extraordinary equipment limitations put the crew or vessel at risk from conducting ballast exchange.

Vessel operators must submit federal ballast water management reports (Appendix C) to the National Ballast Information Clearinghouse (NBIC) located at the Smithsonian Environmental Research Center (SERC) in Edgewater, Maryland. Ballast Water reporting forms (BWRF) 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, the Columbia River, and north to Grays Harbor, Washington. Reports may be submitted electronically and must be received by the NBIC at least 24 hours prior to arrival.

The USCG is responsible for enforcing ballast management regulations and regularly boards vessels to inspect various compliance measures. These inspections include verification of ballast water reporting forms and may include sampling salinity of ballast tanks to verify ballast exchange compliance. Priority for port-state control USCG inspectors to conduct thorough ballast management inspections, in relation to multiple other inspection mandates, seems to vary widely amongst COTP zones. The USCG may assess civil penalties up to $47,500 per ballast management violation, as well as criminal penalties when intentional negligence is a factor.

In recognition that ballast water exchange management practices do not adequately protect our nations waterways from AIS threats, the USCG released a notice of proposed rulemaking (NPRM) in September 2009 that will establish new ballast management requirements. The NPRM includes ballast water discharge standards (BWDS) and implementation timelines that will likely require the use of shipboard ballast water treatment systems for many vessel operators. The NPRM suggests a two phase implementation process that would first, implement IMO level BWDS beginning in 2012; and second, pending a practicability review, require a more stringent BWDS beginning in 2016 (Appendix B). The USCG is currently reviewing a wide range of public comments and concerns about the NPRM, a process that could delay the final rules for multiple years and thereby result in further postponement of the proposed implementation dates.

EPA Vessel General Permit - In 2005, the U.S. District 9th Circuit Court ruled that a Clean Water Act exemption for incidental vessel discharges was unjustified and called for it to be vacated. The EPA appealed the District Court's decision, but the decision was upheld, which ultimately required EPA to develop permits to regulate vessel discharge by December 2008. In response to this court order, EPA issued an NPDES vessel general permit (VGP), effective December 19, 2008, covering approximately 70,000 vessels operating in U.S. waters.

The VGP establishes various regulations, best management practices and reporting requirements for 26 types of discharges including ballast water discharge, hull coating leachate and underwater hull cleaning, deck runoff, deck and hull washdown,

bilgewater, ire fighting foam, boiler blowdown, cathodic protection, chain locker effluent, hydraulic and lubricating fluids, desalinization brine, exhaust scrubber wastewater, graywater and graywater with sewage, and others. The VGP regulates ballast water management during coastal voyages and management of ballast tank sediments more stringently than current Coast Guard requirements. In particular, the VGP has adopted ballast water exchange requirements for coastal voyages similar to the regulations established by Oregon, Washington and California. The EPA did not establish ballast water discharge standards or ballast water treatment requirements for this issuance of the VGP.

The NPDES permits are subject to section 401-certification: state and tribal jurisdictions are required to approve the federal permit for applicability in local waters, and may also add permit requirements, if necessary, that are more stringent than those established in the federal permit. A total of 28 states, Tribes, and Territories added requirements to the permit through the 401-certification process; however, Oregon waived its right to 401-certification, thereby allowing issuance of the permit for Oregon waters, but without any additional requirements.

D. State-specific Ballast Water Regulations

Since 1999, multiple states have adopted ballast water management regulations more comprehensive than federal requirements. To reduce industry concerns that a patchwork of regulations could ensue, some states have attempted to coordinate ballast water regulations on a regional basis. For example, the U.S. mainland Pacific States (with the exception of Alaska) established uniform regulations that require vessel operators of coast-wide/domestic voyages to conduct ballast exchange operations at least 50 nm offshore if transferring ballast between Pacific coast ports. This effort has largely been successful due to coordination efforts of the Pacific Ballast Water Workgroup (PBWG) with support from the Pacific States Marine Fisheries Commission (PSMFC). The PBWG, and other regional efforts around the country, will continue to play an important role as individual states have begun implementing BWDS and timelines that differ from international, federal and/or neighboring state regulations. The following

describes ballast water management efforts by individual states around the country, with particular emphasis on Pacific Coast States.

Washington – The Aquatic Nuisance Species Unit of the Washington Department of Fish and Wildlife (WDFW) administers the Washington State ballast water program. Since its onset in 2000, the Washington State program has required ballast management for both foreign and domestic/coastal voyage arrivals. The regulations require ballast exchange to occur at least 200 nm offshore for foreign arrivals and at least 50 nm offshore for coastal voyages. In contrast to some other ballast regulatory programs, no depth requirements are established under the Washington statute (RCW 77.120). Vessel operators may be exempt from BWE requirements for safety considerations, or if ballast contents solely originate from state waters, the Columbia River system, or internal waters of British Columbia south of 50N (Figure 1).

State general funds (with some supplemental support from motorized boat registration fees and federal ANS Management Plan funds) support 3.5 FTE dedicated to ballast water management activities including; vessel report tracking and vessel inspection efforts as well as supplemental funds to support ballast sample analyses and ancillary AIS research and monitoring activities. Two vessel inspectors (one in Puget Sound and another in SW/Columbia River region) target high-risk vessels for boarding and ballast sampling. To verify proper BWE and to further research ballast water ecology, inspectors collect zooplankton samples that are analyzed by taxonomists at the University of Washington for presence of NIS and composition of coastal species.

In 2009, under guidance from the Washington Ballast Water Work Group (BWWG), WDFW adopted revised rules governing ballast management in state Washington State waters (WAC 220-150). Rule amendments specifically addressed;

- Recordkeeping – Operators must develop and maintain a vessel-specific ballast water management plan, similar to that required by USCG. In addition, a distinct ballast water log or record book is a state requirement, but may be met in a variety of ways.
- Safety exemptions – Vessels claiming safety exemptions have distinct documentation requirements, are subject to department review process,

require a discharge authorization from the state, and are subject to a safety exemption filing fee of $500.

- Vessels carrying high risk ballast water – Establishes factors that can result in a vessel being placed on a list of high-risk vessels, and also provides delisting criteria for options that have been placed on the list.
- Sediment – Establishes allowable methods for ballast tank sediment removal and disposal as well as reporting requirements specific to sediment management activities.
- Penalties and enforcement – Provides base penalties and calculation formula for assessing penalties associated with ballast management non-compliance. Base penalties range between $2,000 and $5,000 with potential maximum penalties up to $27,500 per day of violation.

The BWWG also worked extensively toward resolution of Washington state ballast water discharge standards, however, federal rulemaking developments and a lack of consensus resulted in establishing an administrative rule placeholder for rulemaking efforts in 2010 to finalize this issue.

California – The California State Lands Commission (CSLC) administers the state's Marine Invasive Species Program (MISP), which, in 2000, became the first program on the West Coast to implement mandatory ballast water regulations. The California Marine Invasive Species Act requires vessel inspections and sampling for at least 25% of all qualifying arrivals to state waters. To achieve this goal, the program supports the activities of 12 vessel inspectors throughout the state. The entire program (including policy development, data management, vessel inspections, and outreach,) consists of approximately 20 FTE and is supported by fees assessed on arrivals from out-of-state waters. In addition to program activities carried out by CSLC, the MISP fee also supports ambient monitoring of NIS by the California Department of Fish and Game, and grant funding to support various applicable research initiatives. Effective January 1, 2010, the fee was increased from $625 to $850 USD per arrival to compensate for lost revenue caused by the economic downturn.

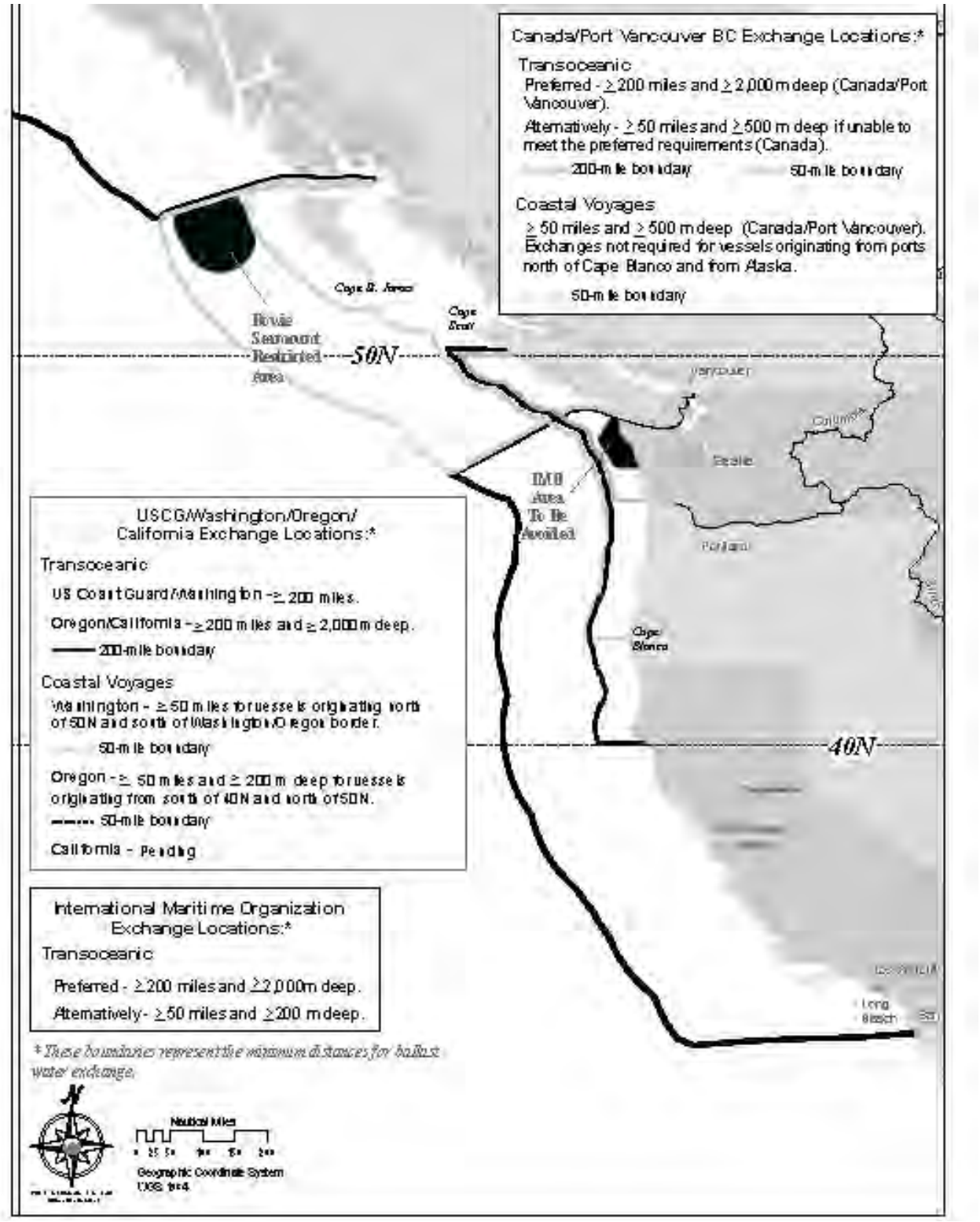

Figure 1. Map of Pacific Coast Region including key ballast water management locations (courtesy of PSAT 2007. *Ballast Water Management In Washington State: Recommendations for Improvement.* March 2007. Puget Sound Action Team).

In response to the need for more effective ballast management strategies, CSLC with the support of an advisory panel (comprised of industry, environmental, regulatory and research representatives), developed recommendations for ballast water discharge performance standards (Falkner et al. 2006). The performance standards are based on the allowable number of living organisms per unit volume that may be discharged for various organism size classes and taxonomical groups. The standards are to be implemented on a phase-in schedule (similar to the IMO timeline) based on vessel size class and construction date (Appendix B). These standards were adopted as part of the Coastal Ecosystems Protection Act of 2006.

The CSLC is required to assess ballast water treatment technology to determine the availability, practicability and environmental impacts of such technology to meet the proposed standards. The first implementation date of the standards for newly constructed vessels with ballast capacity less than 5000 metric tons was proposed for January 2009. Based on results from the technology assessment review by CSLC, the California Legislature delayed the implementation schedule by one year. A subsequent technology review by CSLC in 2009 found substantial evidence that technology development had progressed sufficiently for implementation of the standards beginning January 2010. According to the implementation schedule (Appendix B) all vessels discharging ballast into California waters must meet performance standards by January 2016. Although ballast retention and discharge to reception facilities would be allowable under the CA law, most vessels intent on discharging ballast will need to install on-board treatment technology to comply with the new standards.

Hawaii – In October 2007, the Department of Land and Natural Resources adopted new rules to manage ballast discharge from vessels operating in Hawaiian waters. The regulations require a vessel specific management plan, advance reporting to the state, and mid-ocean BWE for any ballast originating from outside state waters.

Alaska – Alaska does not have a formal program for the management of aquatic nuisance species in ballast water discharges. It relies on the USCG to enforce national

standards. The only Alaskan laws that deal specifically with ballast water discharges refer only to ballast water that contains chemical contaminants or sewage organisms.

Ballast water management in other regions of the United States – In 2006, representatives from the St. Lawrence Seaway Development Corporation, Transport Canada, and the USCG formed the Great Lakes Ballast Water Working Group. A bi-national cooperative agreement between Canada, the USCG, and participating states emphasizes the importance of ballast water exchange verification (i.e., vessel inspections) as the most critical strategy for preventing future biological introductions to the Great Lakes. As a result, 100% of transoceanic vessels entering the St. Lawrence Seaway/Great Lakes system were inspected for ballast water management compliance in 2009. Inspections included ballast tank sampling to ensure salinity values greater than 30 parts per thousand, and revealed 97.9% compliance (GLSBWWG 2010).

As stated above, the legal decision to vacate Clean Water Act exemptions for vessel discharges has resulted in the development of an EPA issued NPDES vessel general permit. Individual states, under the 401-certification process, have established ballast management requirements that are more stringent than the federal permit. Some states, including Illinois, Indiana and Ohio, have used this process to adopt IMO ballast discharge performance standards by 2012 for newly built vessels and by 2016 for existing vessels. New York and Pennsylvania also established ballast discharge performance standards under the 401-certification process, but opted for a phase-in approach of standards more stringent than IMO BWDS that eventually achieves protection levels equivalent to the California standard (Appendix B).

Other states in the Great Lakes region have opted to pass their own legislation, independent of the NPDES VGP, to implement state ballast water management programs and protect their waters from future threats of biological invasions. Beginning January 2007, the Michigan Department of Environmental Quality began a general permit issuance program to cover maritime operations and the discharge of ballast into state waters. The general permit requires ballast treatment systems for all ocean-going vessels intending to discharge in Michigan waters. The state has approved four treatments for use under the general permit, including sodium hypochlorite, chlorine dioxide, ultraviolet

light, and de-oxygenation. Vessel operators may propose alternative ballast treatment options that may be covered by individual permit.

Effective July 2008, the Minnesota Pollution Control Agency began regulating and enforcing ballast water management via issuance of a general permit for vessels discharging in Lake Superior and associated waterways. Under the Minnesota general permit, newly constructed vessels must meet the IMO BWDS beginning in 2012, and existing vessels must meet the standard no later than January 2016.

Most recently, Wisconsin Department of Natural Resources issued a general permit for ballast water discharge, effective February 2010. Among the provisions of the general permit, vessels constructed in 2012 or newer must meet ballast discharge performance standards equivalent to 10 times more protective than the IMO BWDS, whereas pre-existing vessels must meet the same standard no later than January 2014.

III. OREGON BALLAST WATER PROGRAM

In response to AIS threats posed by shipping activities, the 2001 Oregon Legislature passed SB 895 that authorized the ODEQ to implement and enforce ballast water regulations under the Oregon Ballast Water Program. The Oregon program evolved from meetings of the Pacific Ballast Water Group, an ad hoc organization of environmental groups, academic scientists, regulators and shipping industry representatives, who began discussions in 1997 concerning West Coast ballast management solutions. Modifications to the Oregon Ballast Water Program were made in 2003 (HB 3620), 2005 (HB 2170), and 2007 (SB 643, 644). The Oregon Ballast Water Task Force (Vingograd and Sytsma 2002, Flynn and Sytsma 2004, Simkanin and Sytsma 2006), the Oregon Invasive Species Council, and our State Aquatic Nuisance Species Management Plan (ANSMP 2001) guided these program developments.

Prior to late 2007, ODEQ had received no direct funding to implement and enforce our state ballast management regulations. In response to the lack of funding at ODEQ, other stakeholders contributed to data gathering and compliance monitoring for ballast operations in Oregon waters from 2002 - 2007. Specifically, the program was maintained by a Columbia River Steamship Operators grant to Portland State University (2002); WDFW data collection and monitoring efforts of Columbia River arrivals (2003 & 2004); and USCG pilot study funding to PSU /SERC (2005-2006). During the 2007 legislative session, however, SB 644 established 1.0 FTE general fund support to ODEQ for ballast program activities, resulting in the hire of a ballast water project manager in October 2007. With these resources, ODEQ is responsible for program development and policy analysis; screening of vessel arrivals and report compliance monitoring; vessel inspections and ballast exchange verification sampling; outreach and communication with maritime industry stakeholders; enforcement actions; and providing staff support to the STAIS Task Force.

A. Regulatory Overview

Oregon's initial ballast management legislation, SB 895 (2001), addressed shipping transport of AIS concerns while federal regulations were only promoting voluntary best management practices for foreign vessel arrivals. The state implemented

mandatory regulations requiring mid-ocean ballast exchange (200 nm offshore; 2000 m deep) for all vessels arriving from outside the U.S. EEZ. Furthermore, the legislation established the first regulations aimed at reducing the risk of intra-coastal transfer of invasive species. As a result, domestic voyages within the U.S. EEZ are required to exchange ballast at least 50 nm offshore in waters at least 200 m deep prior to discharge in Oregon waters. Similar coastal exchange requirements have also been adopted by the states of Washington and California. Ballast exchange regulations accept the use of either the '*empty/refill'* method (i.e., pump out as much of ballast as is possible, then re-fill with mid-ocean water) or the *'flow through'* method (i.e., flush out the tank by pumping in mid-ocean water at the bottom of the tank; continuously overflowing the tank from the top until the equivalent of three full-tank volumes have been pumped into the tank). Since 2007 (SB 643), the regulations apply to all vessels greater than 300 gross tons equipped with ballast tanks (including barges); however, military vessels and the commercial fishing fleet are exempt.

Oregon law requires that all vessels submit a ballast water reporting form (BWRF, Appendix B) at least 24 hours prior to transiting state waters, declaring their ballast management intentions. The report is required regardless of whether the owner or operator plans to discharge ballast into the waters of the state. Vessel operators and agents may submit their ballast water reporting forms to ODEQ via multiple delivery methods (e.g., fax, email attachments), including through the Portland Merchants Exchange, a shipping agent service that currently receives BWRF's and batch delivers to ODEQ on a daily basis. If a vessel operator alters their ballast management practices for any reason after submitting its pre-arrival BWRF, the owner or operator must submit an amended ballast water report as soon as possible.

Unmanaged ballast water (i.e., ballast water that have not undergone oceanic exchange/flushing) may only be discharged into state waters if i) the vessel operator declares a safety exemption due to extraordinary conditions (e.g., adverse weather, equipment failure, etc.) that could threaten the safety of the vessel or its crew, or ii) the contents of the ballast solely originated from within 'common waters' of Oregon. Coastal waters between 40N and 50N latitude are considered common waters for BWM purposes (Figure 1). A vessel is also exempt from Oregon's BWE requirements if

"discharged ballast water has been treated to remove organisms in a manner approved by the USCG" (ORS 783.630; Appendix A). However, with the exception of a program encouraging experimental testing of viable systems (see STEP in section IV-B of this report), no treatment standards or systems have been authorized by USCG.

Civil penalties for failure to comply with Oregon ballast management regulations were revised in 2009 (SB 105). Non-compliant reporting and non-compliant discharge violations are subject to base rate penalties and protocols for calculating penalties up to $25,000 for each violation.

In response to recommendations from the 2008 STAIS Task Force, the 2009 Legislature provided ODEQ with additional rulemaking authority to respond to ongoing changes in ballast water management and technology development. Specifically, HB 2714 established rulemaking authority for: i) ballast water discharge performance standards and associated implementation timelines, and ii) the development of emergency ballast water management protocols to further reduce the risk of introducing AIS to Oregon waterways. Administrative rules for ballast water management (OAR 340-143; Appendix D), established in 2002, are currently undergoing revision with the STAIS Task Force acting in an advisory capacity. A notice of proposed rulemaking is anticipated in late 2010, which may include provisions for ballast treatment standards and/or emergency response.

B. Shipping Traffic and Ballast Operations in State Waters

Data are collected as part of ODEQ program activities aimed at screening vessel arrivals and monitoring for compliance with ballast management compliance. These data allow for analysis of shipping trends and ballast operation behavior patterns and ultimately, enhance our risk-assessment capabilities aimed at preventing high-risk shipping activities that could result in transporting AIS into Oregon waterways.

Approximately 1,642 vessel arrivals (including barge arrivals) subject to our state ballast water regulations enter Oregon waters each year (2003-2009 average; Figure 2A). Portland Harbor is the initial destination port for about 56% of the arrivals; Vancouver (WA), Longview (WA), Kalama (WA), Astoria, Coos Bay, and Rainier receive the remaining 16%, 12%, 10%, 3%, 2%, and 1%, respectively (Figure 2B). Seasonally,

shipping activity on the Columbia River tends to be slightly greater during the autumn months, corresponding with a peak in the export of agricultural commodities (Noble 2007).

Local shipping activity is strongly correlated with global economic conditions, and was particularly evident from late 2008 through 2009, when monthly arrivals declined by as much as 26% (Feb 09) relative to the 2003-2009 mean (Figure 2A). Shipping activity in Coos Bay has been particularly hard hit by the recent global economic downturn combined with longer-term economic changes in the south coast region, resulting in 2009 arrival counts that were 50% of the 2003-2009 mean (Figure 2A).

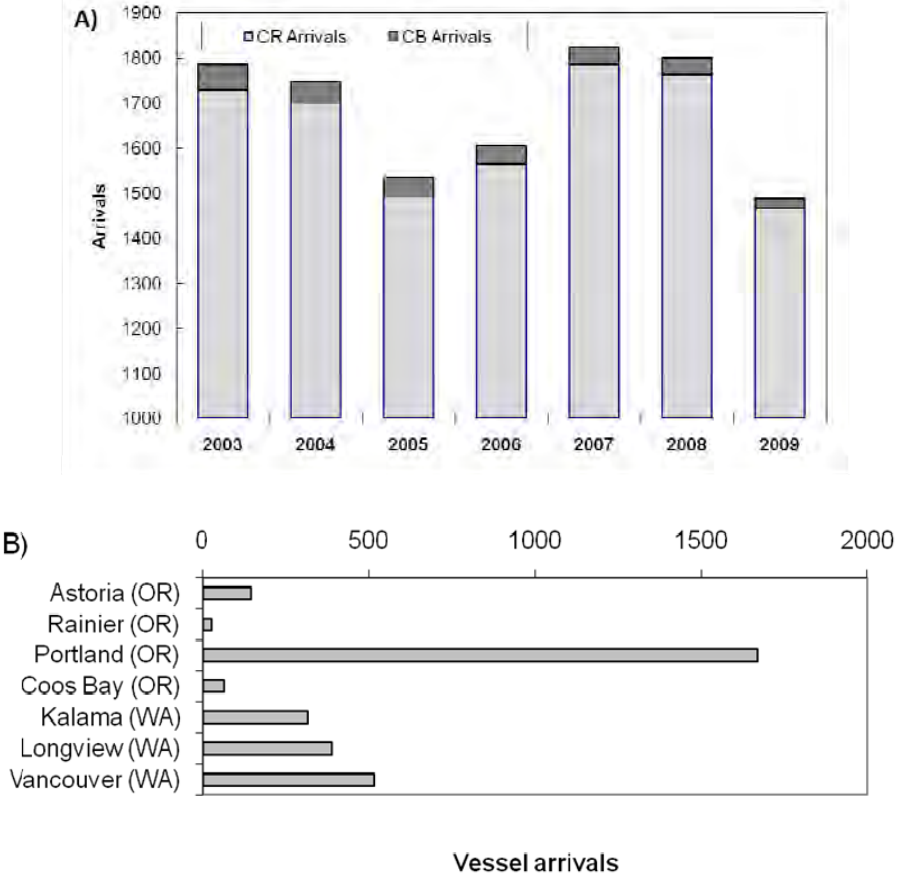

Figure 2. Vessel arrivals to Oregon waterways: A) 2003-2009 (CR; Oregon and Washington ports) and Coos Bay (CB) and B) Destination port according to ballast water reporting forms (2008-2009).

In addition to the initial arrival port declared on ballast water reporting forms, however, some vessels may transit to multiple ports or anchorage sites within the Columbia River system. There were approximately 31 transits per month from Washington ports or anchorages on the Columbia River to Oregon from 2008 to 2009, and 38 per month from Oregon and Washington (Figure 3). These transits represent approximately 51% of total arrivals to the Columbia River system. Ballast water reporting forms do not accurately capture these transits and thereby complicate vessel tracking and compliance monitoring in a bi-state environment.

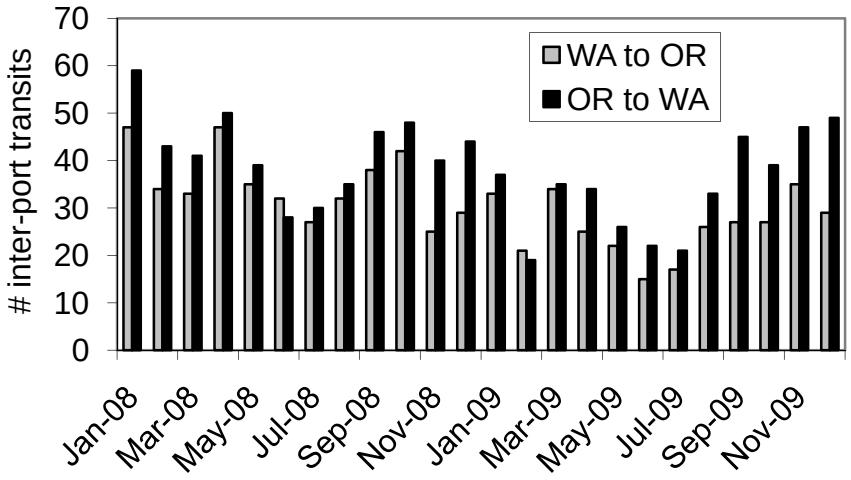

Figure 3. Inter-port transits on the Columbia River between Oregon and Washington (2008-2009).

Nearly 50% of the arrivals to Oregon waters are bulk carrier vessels, which routinely transport our region's exports around the globe. Other significant contributors to Oregon shipping traffic include vehicle carriers (16%), general cargo (11%), container vessels (8%), and tankers (8%) (Figure 4).

Although the proportion of vessel types calling on Oregon waters has remained relatively stable, two factors in particular have resulted in noteworthy changes to composition of vessels in recent years. First, a 2007 legislative change to the definition of regulated vessels expanded coverage to include unmanned barges equipped with ballast tanks. Outreach efforts and increased enforcement of this change is the primary reason for a proportional increase in 'other' vessel types (Figure 4). Second, although all

sectors of maritime activity have been impacted by the recent economic downturn, some types of shipping activity were disproportionately affected. Specifically, arrivals of car carrier vessels (aka Roll-on/Roll-off carriers) and container vessels seem to have experienced greater declines in 2009 than bulk carriers (Figure 4).

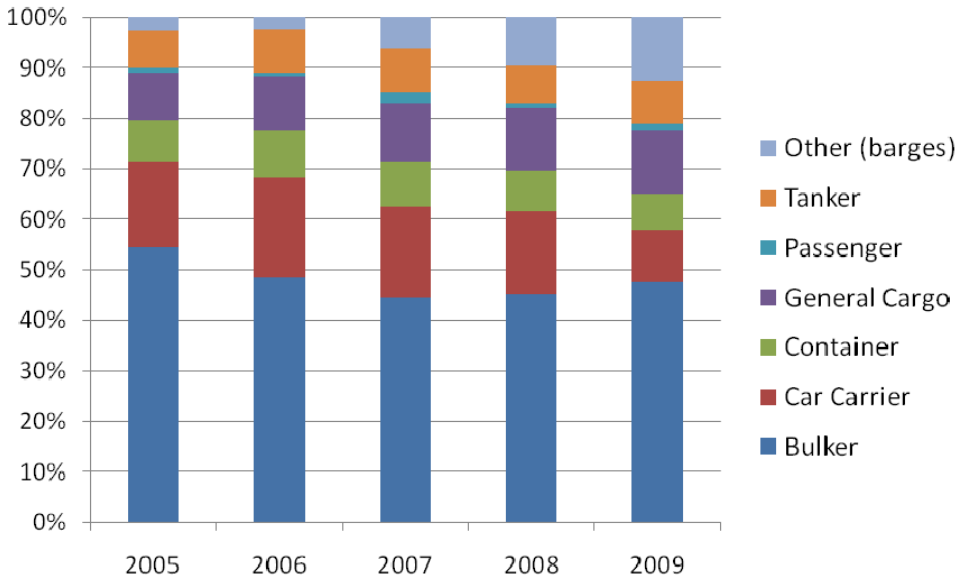

Figure 4. Composition of vessel types for vessel arriving to Oregon waters.

Analysis of ballast water reports received by the state and the NBIC from 2008-09 reveal that nearly 56% of arrivals to Oregon waters are transoceanic voyages while 44% are coast wide traffic (Figure 5A, B). A vast majority of the transoceanic arrivals made their last port call in Asian countries such as Japan, South Korea, and China (together comprise 54% of all arrivals) whereas coastal voyages were primarily from British Columbia (16%), California (12%), and Washington State (13%) (Figure 6). In Coos Bay, a slightly greater proportion of the arrivals are transoceanic (61%) compared to coast wide traffic (39%) (Figure 5B).

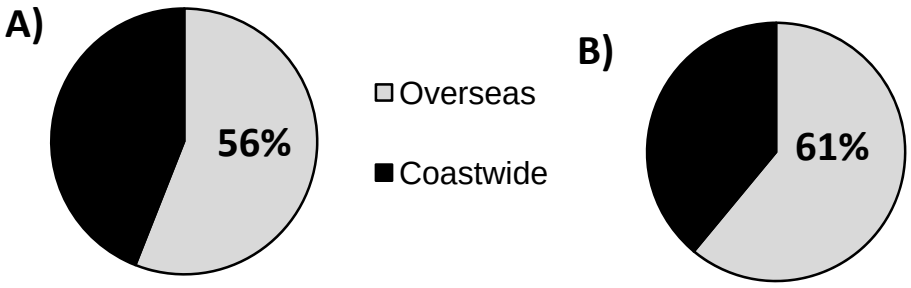

Figure 5. Voyage type (transoceanic or coast wide) for vessel arrivals to: A) the Columbia River, and B) Coos Bay (2008-2009 average).

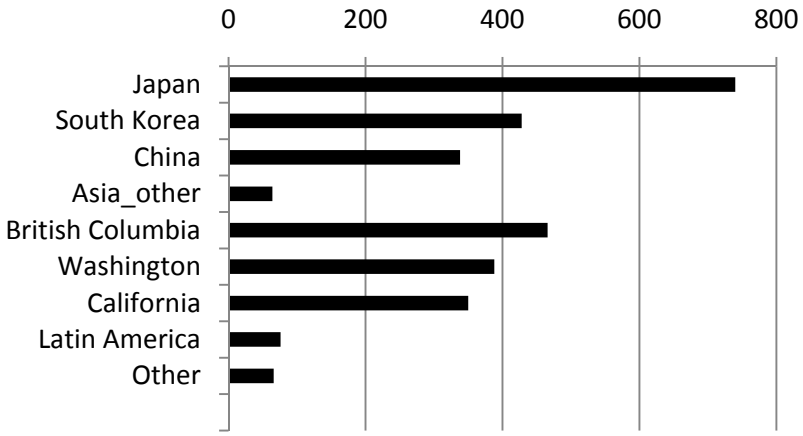

Figure 6. Last port of call for Columbia River arrivals (2008-2009).

Bulk carrier traffic, in particular, is of great concern for our AIS prevention efforts because these vessel types typically discharge substantial volumes of ballast water during cargo loading operations. Figure 7 shows the average discharge per arrival for six vessel type categories arriving to Oregon waters from 2008-2009. On average, each bulk carrier transiting Oregon waters discharges over 10,000 m^3 per voyage, a volume roughly equivalent to 3.5 Olympic sized swimming pools (Figure 7). Although some bulk carrier vessels may discharge little or no ballast, others may discharge more than 30,000 m^3 during cargo loading operations at an Oregon port. In total, bulk carrier vessels are responsible for 91% of all ballast water discharged into Oregon waterways from 2008-2009. General cargo vessels and tanker vessels are responsible for 6% and 2% of total ballast discharged, respectively (Figure 8).

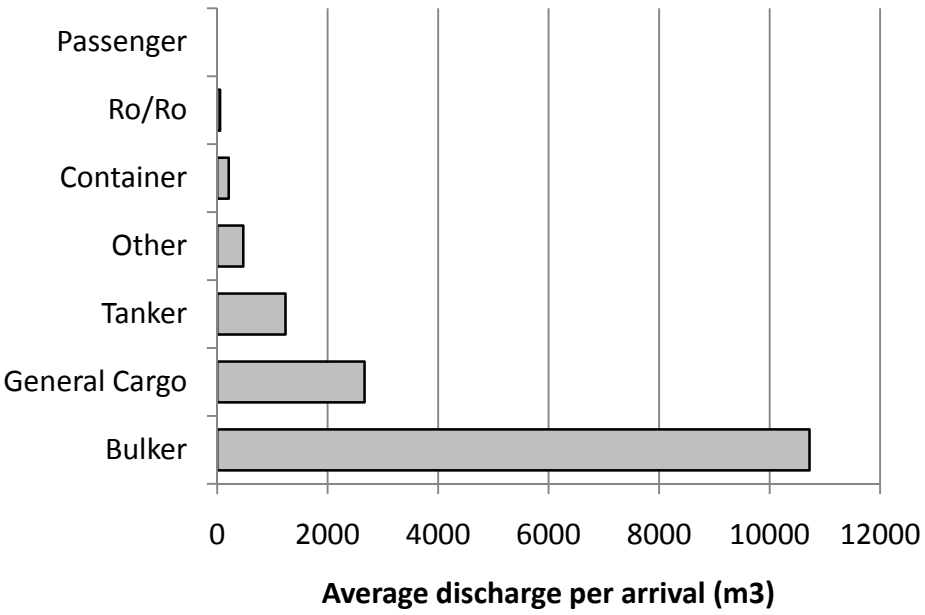

Figure 7. Average discharge by vessel type per arrival (2008-2009).

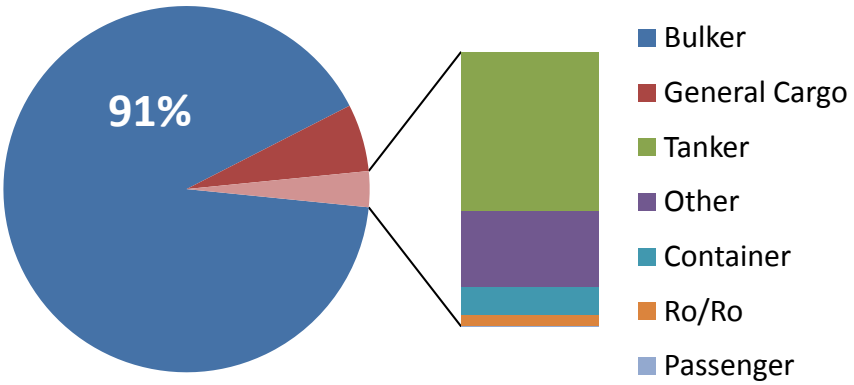

Figure 8. Proportion of total ballast discharged by vessel type in Oregon waters (2008-2009).

Retention of ballast water, or any operational practice that eliminates the need to discharge ballast into state waters, represents the most environmental protective management strategy available. In the Columbia River, 46% of the vessel arrivals during 2008-2009 operated in state waters without discharging ballast water (Figure 9A). However, ballast retention may not be feasible for many vessel arrivals due to cargo loading constraints and/or vessel design limitations. Wood product bulk carriers typically discharge greater volumes than the average bulk carrier, and are the predominant vessel type calling on Coos Bay in which the proportion of vessels discharging is over 75% (Figure 9B).

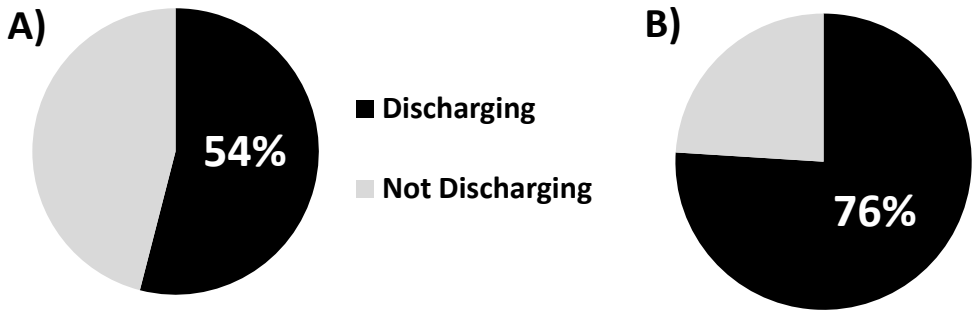

Figure 9. Discharge behavior (% vessel arrivals discharging vs. retaining ballast water) for arrivals to: A) the Columbia River, and B) Coos Bay (2008-2009 average).

Ballast discharge data collected in Oregon from 2002-2008 has shown that the reported volume of ballast water discharged into the Columbia River has increased from about 5.5 to over 8.0 million m^3 per year (Figure 10A). Because the total number of arrivals in Oregon has remained relatively constant (STAIS 2008), the progressive increase in declared ballast discharge may be attributed to increased compliance and greater accuracy of ballast management reporting. Declines in vessel traffic to all Oregon ports are the likely source for the relatively minor decrease in ballast discharge between 2008 and 2009. In Coos Bay (data were only available since 2006), despite a decrease in vessel arrivals (Figure 5B), reported discharge remained relatively stable until a marked decrease was observed in 2009 (Figure 10B).

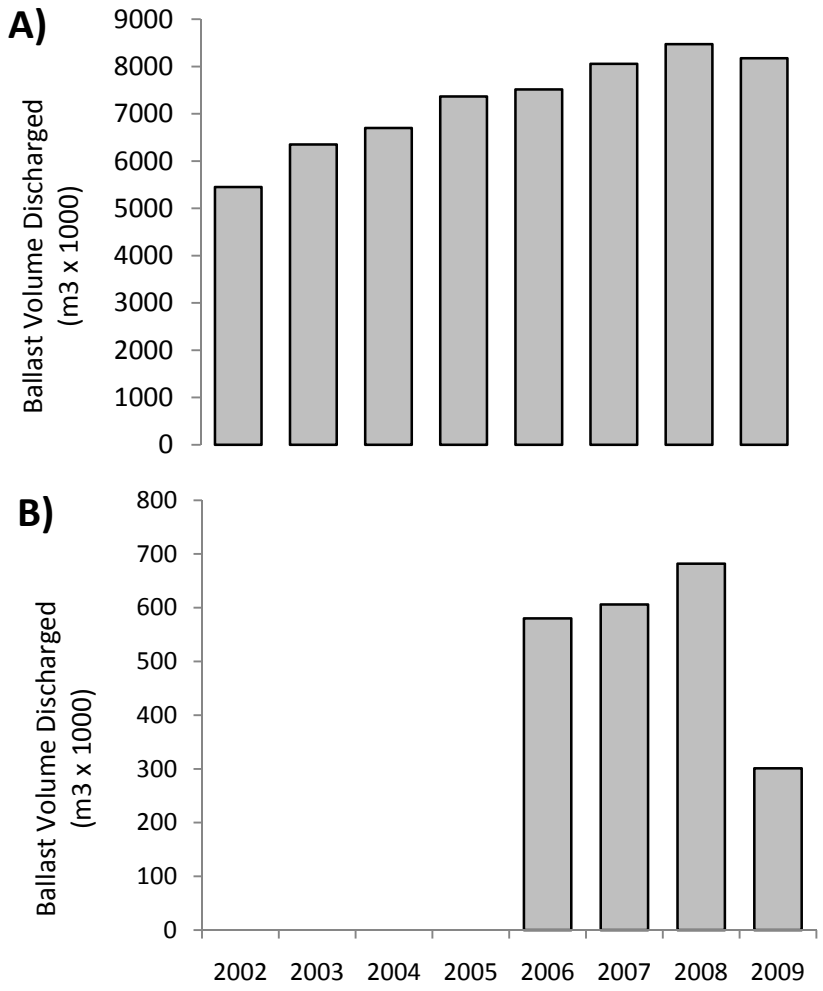

Figure 10. Annual ballast discharge from vessel arrivals to: A) Columbia River (OR and WA ports combined) and B) Coos Bay. (Note the order of magnitude difference on scale bars between the two figures).

Figure 11A reveals the source origin of nearly 8.2 million m^3 of ballast water that were reportedly discharged into Oregon waters during 2009. If ballast management practices were not implemented, over 92% of this water discharged into Oregon waterways would have been directly sourced from Asian coastal waters, including estuarine and freshwater zones (Figure 11A). The greatest source of coastwise voyage ballast discharge in 2009 was from California (3% of total). However, according to BWRF data submitted by vessel operators, over 94% of this ballast was subject to management practices prior to discharge in Oregon waters (Figure 11B).

With the exception of one vessel that discharged ballast using an experimental ballast treatment system (M/V Moku Pahu), ballast is primarily managed through BWE. Vessels may conduct mid-ocean exchange (MOE) by either empty-refill (E/R) or flow-through (F/T) methods. Neither method achieves 100% efficacy for removal of high-risk (i.e., near shore) organisms, yet empty-refill is widely encouraged as a more environmentally protective strategy when available as an option to vessel operators. Nonetheless, data suggest that flow through exchange is the predominant management strategy employed for ballast discharged into Oregon waters, especially for transoceanic voyages (Figure 11B).

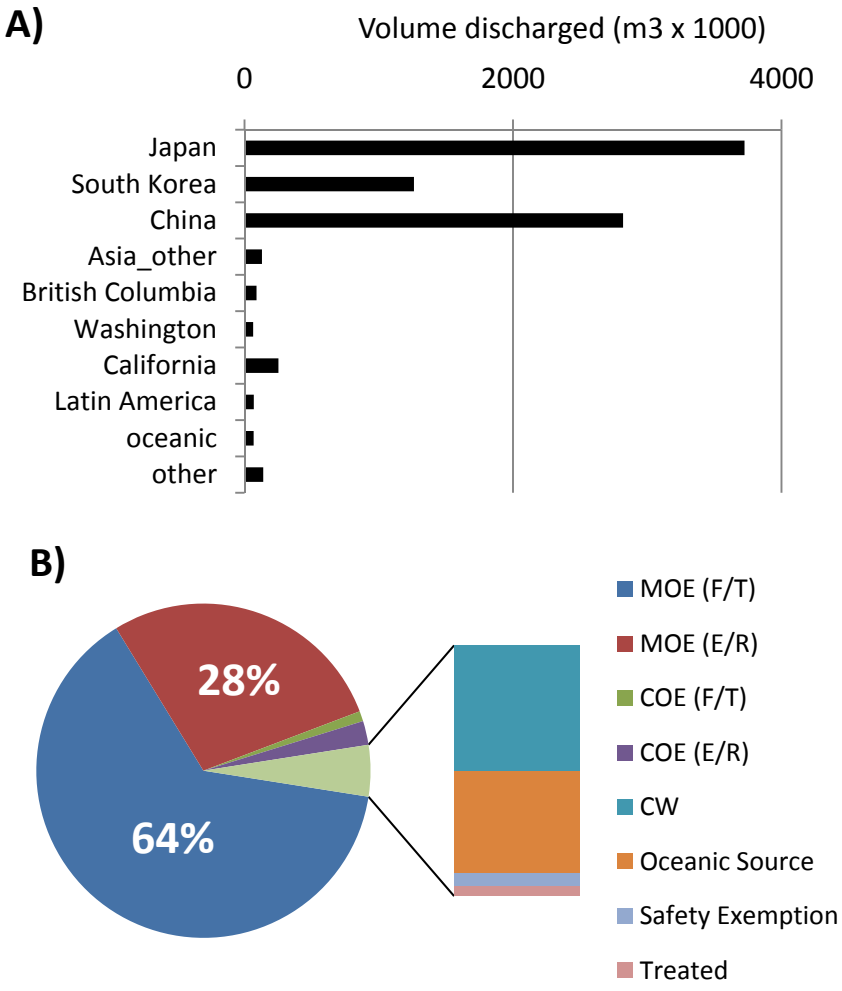

Figure 11. Comparison of discharged ballast characteristics in the presence and absence of ballast management practices. A) Original source of (in the absence of ballast management practices) and B) reported management of ballast discharged into Oregon waters (2009).

Approximately 5% of the ballast discharged into Oregon waters during 2009 did not undergo ballast water exchange in mid-ocean (>200 nm from shore) or coastal waters (>50 nm from shore). Most of this 'unexchanged' ballast water was exempt from BWM management requirements because it was sourced from a 'common water' location along the Pacific Coast (between 40N and 50N), or the tanks were filled mid-ocean. Less than 1% of the ballast discharged to Oregon waters was declared exempt from BWM under safety exemption. These unmanaged discharges are attributed to unmanned barge types that are rarely able to conduct ballast exchange at sea. In all nine cases, the vessels were discharging ballast into the Portland harbor that had been sourced from the San Francisco Bay – Sacramento/San Joaquin River Delta system.

C. Compliance

Because Oregon ballast water regulations and reporting requirements began in 2002, reporting compliance has been largely dependent upon the resources devoted to local follow-up efforts with vessel operators and local shipping agents (STAIS 2008, Figure 12). After a period of no resources dedicated to these efforts, grant funding supported awarded to PSU-ABRPI for compliance monitoring beginning in May 2005, as part of a joint reporting pilot study with the National Ballast Information Clearinghouse (USCG). In addition to identifying opportunities to streamline monitoring efforts and reduce duplication of effort in data processing, the local follow-up resulting from the pilot studies helped reduce the missing report rate for Columbia River arrivals to 6.2% between May 2005 and Apr 2007 (Simkanin & Sytsma 2006). Following the termination of the pilot study in April 2007, reporting compliance declined once again (Figure 12). Beginning in November 2007, funding commenced for ODEQ staff to conduct report monitoring and follow-up activities. As a result, on-time reporting compliance has been over 85% during the most recent year, and outreach and follow-up efforts result in less than 2% delinquent reporting (Figure 12). To achieve and maintain high rates of ballast management and reporting compliance, patterns over the past five years strongly support the need for local enforcement efforts.

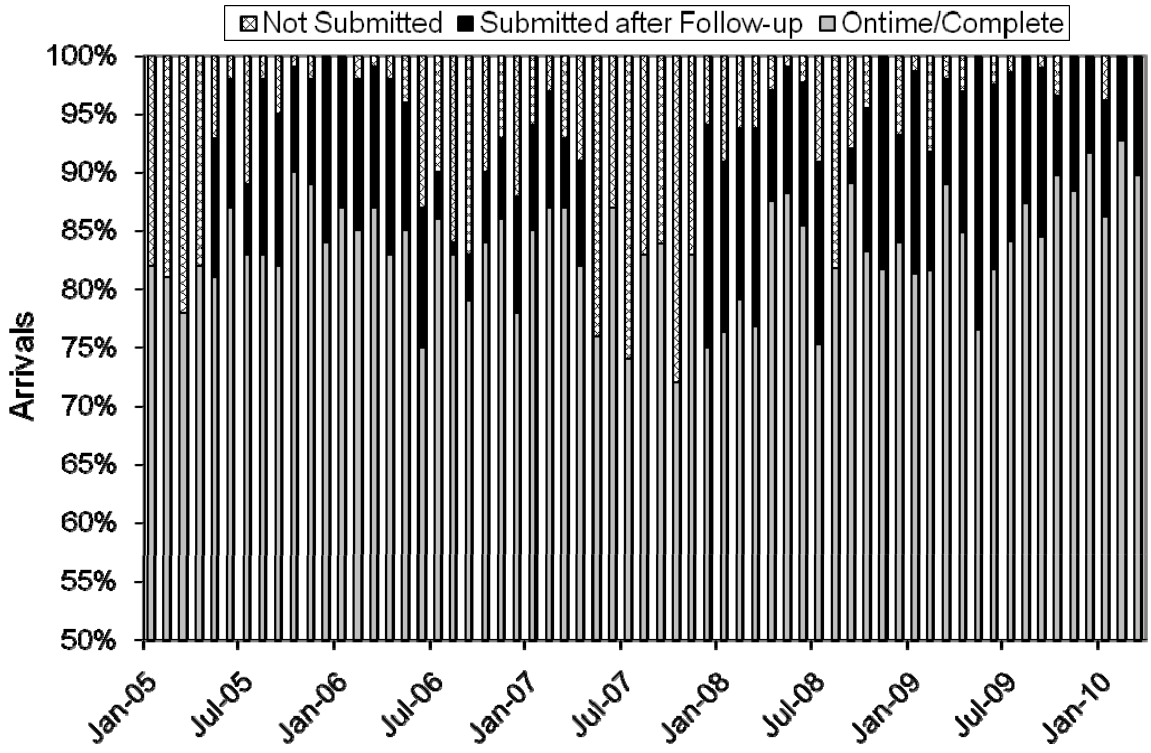

Figure 12. Monthly reporting compliance rates for vessel arrivals to Oregon ports (2005 – present). Note: Only includes Coos Bay data since January 2008.

D. Inspection & Enforcement Activities

Although reporting compliance is an important aspect of ballast water management, vessel inspections, verification sampling of ballast tanks prior to discharge, and consistent enforcement actions are necessary activities to promote AIS prevention. Vessel inspection activities focus on generating greater understanding of our regulations and assisting vessel operators in achieving greater compliance and transparency in their ballast management operations. Inspection protocols focus on an audit of bookkeeping records to ensure that various shipboard logbooks (i.e., ballast logbook, deck logbook) reveal consistent reporting and cataloging of ballast management activities. Sampling of ballast tanks may be conducted when record book audits reveal inconsistencies, at random, or for non-enforcement research purposes. Salinity is most often used as a coarse measure of oceanic exchange efficacy and compliance, though ODEQ staff are involved with research efforts aimed at developing more robust and effective measures of

verification sampling and ballast exchange efficacy, including the use of chemical signatures and zooplankton species composition and enumeration (see section IV-C).

Vessel inspection effort by ODEQ staff fluctuates from month to month, but represented 3.9% of ship arrivals to Oregon ports in 2009 (Figure 13A). The variability of inspection effort is largely driven by the range of activities and demands on the one ODEQ staff position dedicated to ballast program activities. Vessels identified as non-compliant or high-risk rank as a high priority for vessel boarding and inspection, when the ballast program manager is available. However, conducting routine or periodic vessel inspections is often pre-empted by other program activity tasks. Generally, vessel selection for boarding/inspection is based on risk-assessment criteria, including: reporting compliance, proposed discharge behavior, original ballast source location (and similarity with receiving environment), and vessel compliance history.

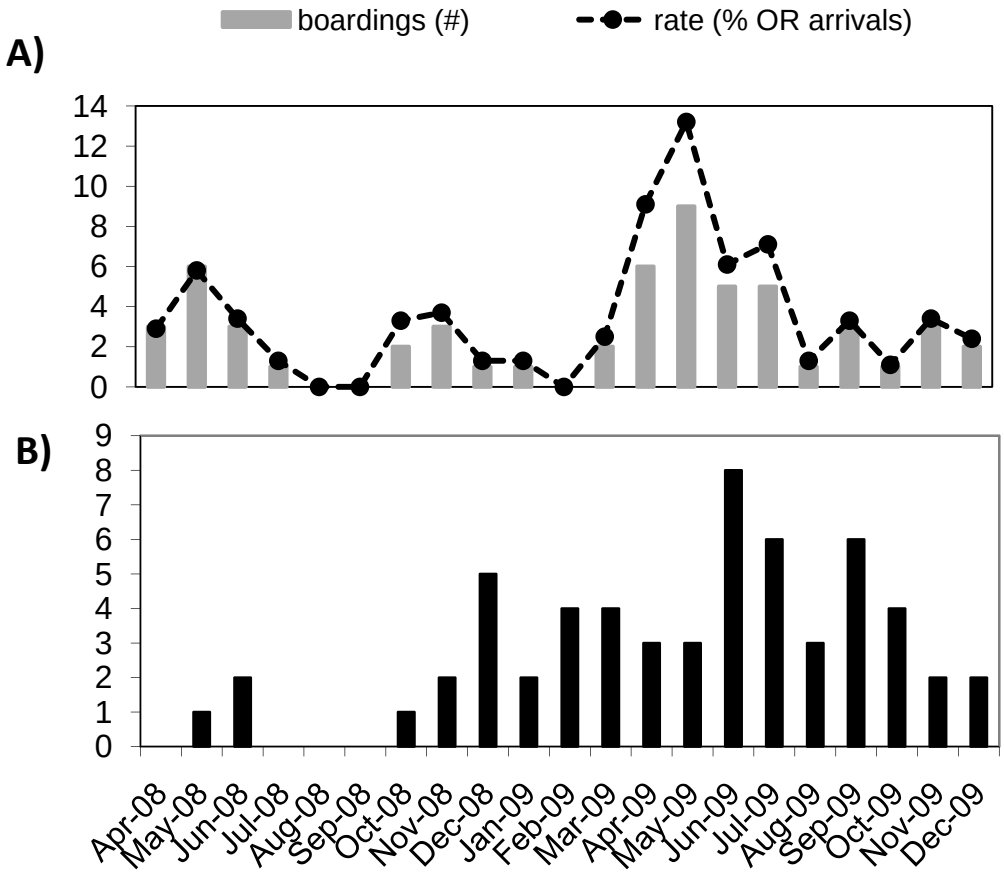

Figure 13. Summary of monthly program activities related to A) vessel inspections at Oregon ports, and B) enforcement warning letters issued.

ODEQ has enforcement authority to levy civil penalties for ballast management non-compliance, and has recently revised maximum fines associated with these penalties. During the first two years of program, ODEQ staff were primarily focused on outreach and education efforts as a means to encourage regulatory understanding and compliance. For delinquent reporting and for some less severe non-compliant discharge violations (e.g., conducting BWE closer to shore than allowed by statute), ODEQ has been issuing formal warning letters to vessel owners as the primary enforcement action (Figure 13B). In 2010, ODEQ is pursuing a stricter implementation of enforcement guidelines (including issuance of formal enforcement action), as well as supplemental program funding support that is necessary for referring enforcement action to the agencies Office of Compliance and Enforcement.

IV. RELATED & EMERGING ISSUES

A variety of policy developments, research and technology advancements are underway that will have significant impacts on the management of shipping related pathways for invasive species. The following is a collection of some of those issues that may be important to Oregon policymakers and stakeholders as we consider how best to protect our economy and aquatic ecosystems from future AIS threats.

A. Pending Changes to Federal Regulations

It is widely recognized that current ballast management practices (i.e. BWE) are not optimal for shipping operations, nor do they sufficiently protect the environment. A more robust management paradigm, based on establishing numeric limits for living organisms in discharged ballast water, has been anticipated for many years (commonly referred to as ballast water discharge standards or BWDS). Yet, slow progress on the development of federal standards continues to impede treatment technology development and AIS prevention goals. One consequence of these delays that is most alarming to vessel operators is increased activity to establish state-specific discharge standards. This has been accomplished via state legislative actions (that may not be superseded by NANCPA), or via state-specific 401-certifications associated with the recently established NPDES Vessel General Permit. Generally, these developments complicate efforts aimed at establishing regulatory uniformity for ballast management in U.S. waters.

In response to the need for a more protective federal program, the USCG published a long awaited Notice of Proposed Rulemaking in the Federal Register on August 28, 2009. The USCG is proposing various amendments to ballast management regulations, including discharge standards that would be implemented in a two-phase process. First, BWDS equivalent to the IMO convention would be implemented for all vessels between 2012 and 2016 (or first dry-docking thereafter). Under this proposal, some vessels constructed before 2012 may continue to operate without being subject to the BWDS requirements until 2021. A second, more stringent, BWDS comparable to standards adopted in California (aka ‘1000x IMO’) is also proposed. As proposed, the phase II standards could be required as early as 2016; however, it may be postponed at two-year intervals pending review of technology feasibility and practicability. Another

significant component of the NPRM are rules aimed at preventing inter-coastal transfer of AIS by managing coastwise traffic into Pacific Coast ports. The USCG currently only regulates voyages transiting into U.S. waters from beyond 200 nm, but is proposing to regulate coastwise voyages in a similar manner to regulations already established by Oregon, Washington, and California.

Generally, the USCG NPRM aims to advance sufficiently protective BWM practices in a manner that could eventually promote regulatory consistency amongst U.S. states. However, some industry and environmental stakeholders, including ODEQ and the STAIS Task Force, have voiced concerns regarding the two-phase implementation proposal. The USCG is currently analyzing public comments on the NPRM, which may result in significantly revised rules. Finalized rules could be delayed well beyond 2010, which would likely result in a further extension of the proposed implementation dates.

In parallel to USCG authorities, the EPA issued the NPDES Vessel General Permit (VGP) in December 2008 because of a court order to vacate a longstanding Clean Water Act exemption for incidental discharges from vessels. As a result, two independent Federal agencies are legislatively mandated to develop and implement ballast water management regulations to protect U.S. waters from AIS threats. For the current VGP, EPA adopted USCG regulations (i.e., BWE). However, there is currently no legislative requirement to maintain consistency between the two programs, nor does one program pre-empt the other. Various legal challenges to the VGP are currently under consideration and may result in revision and reissuance of the permit. Notwithstanding pending litigation, re-issuance of the VGP will occur no later than 2013, and EPA has acknowledged that they have begun evaluating permit revisions and will strongly consider including BWDS as a component of permit reissuance (pers. comm. R. Alpert EPA, 2010).

Federal legislative action would be required to alleviate the dual regulatory authorities that currently exist for ballast management in U.S. waters, however, no proposals have been submitted to either chamber of Congress as of April 2010. Given USCG familiarity with shipping operations, and strong support for Clean Water Act authorities amongst its advocates, the most effective strategy may be to encourage cooperative agreements between USCG and EPA that promote regulatory consistency

and enforcement efficiency. Recent developments, including the joint USCG/EPA request for a 2010 National Research Council study to inform efforts in the development of numerical limits for living organisms in ballast water, show promise for establishing cooperation and regulatory uniformity at the federal level.

B. Ballast Water Treatment Technology

In response to economic losses and environmental degradation resulting from invasive species, various international, federal and state entities are preparing to implement BWDS as a strategy more protective than BWE. To meet these pending regulatory changes, cumulative investment on ballast treatment systems by the worldwide shipping fleet is projected to be over $30 billion dollars in the coming decade (Frost & Sullivan 2010). Given this considerable economic incentive, there has been rapid development of ballast treatment technology in recent years.

Although wastewater treatment systems provide an extensive history of research, development and implementation, applying these existing technologies to ballast water management and invasive species prevention has been problematic. Both shore-based treatment facilities and shipboard treatment technology present unique sets of advantages and disadvantages. Shore-based or barge-based treatment facilities allow for greater regulatory control, increased storage and treatment time options, and increased monitoring of active ingredient neutralization prior to release to ambient waters, yet feasibility reviews have identified a range of significant operational and logistical challenges that may be overcome in only limited circumstances (Falkner et al. 2006).

Specific challenges to shipboard technology development include operational constraints, such as space limitations for equipment installation, limited energy supply, and high flow rates and variable holding times for ballasting operations. Different vessel types and the variable nature of shipping routes and port environmental characteristics pose additional challenges to technology developers. Moreover, protecting water quality of receiving waters by allowing sufficient neutralization time for active compounds is problematic for vessel operations that have relatively short voyage times. Because of the wide range of variables that dictate ballast treatment options in a shipboard setting, it is unlikely that a single treatment technology will be suitable for all vessel types, voyage

routes, and environmental conditions. Rather, a suite of treatment technologies and system types will likely be necessary to meet different vessel operator needs. The development of this range of treatment technologies has become evident in recent technology reviews (Dobroski 2007, 2009, in prep., Lloyd's Register 2010).

Although most treatment methods employ chemical, mechanical, physical, or biological approaches, the majority of ballast treatment systems successfully meeting discharge performance standards under a wide range of environmental conditions use a combination of two or more treatment types. As is common in the wastewater treatment sector, use of chemical methods (i.e. 'active substances') seems to be common in many of the forthcoming shipboard treatment technologies.

Implementing chemical methods for ballast operations, however, requires close attention to a variety of unique factors that present challenges for environmental protection and vessel safety. The time required to inactivate organisms and subsequently wait for sufficient neutralization of active compounds and residuals varies depending upon ballast volume, water temperature, salinity, turbidity and organic content. Short voyage routes may be particularly challenged by these limitations. In addition, the use of active substances in a shipboard setting raises significant operational concerns regarding storage space, corrosion of metals in ballast tanks, and personnel and vessel safety. These challenges will likely require extensive coordination and consultation between treatment system developers, water quality specialists, and those familiar with shipboard operations.

Installation and operation of ballast treatment systems will require significant economic investment by vessel owners. Initial investment costs will largely be dependent upon system size necessary to handle ballast volumes and/or pump rates (i.e., rate of treated volume). For systems with ballast pump capacity of 200-250 m3/h price estimates range from $175,000 to $490,000, costs for larger systems (pump capacity around 2000 m3/h) range from $650,000 to $3 million (Frost & Sullivan 2010, Lloyds Register 2010). The installation of even the most expensive systems is not expected to exceed 1-2% of new vessel construction expense (Dobroski, in prep). Vessel specific circumstances make it more difficult to estimate the expense to retrofit existing vessels with ballast treatment systems, but it may cost significantly more than costs for newly

built vessels. Compared to the costs of managing and controlling AIS that have become established, however, the costs to treat ballast water – thereby minimizing or preventing the establishment of new AIS - may be negligible.

Treatment System Development & Approval - As ratification of the IMO Convention on Ballast Water Management looms nearer, the IMO Marine Environment Protection Committee (MEPC) has adopted a set of guidelines for approving the use of ballast treatment systems (MEPC 2008a, 2008b). The guidelines aim to establish a uniform framework for the evaluation and certification of treatment systems that ensure system efficacy with the IMO discharge standards, vessel and crew safety, and environmental protection of receiving waters.

Ultimately, it is the legal authority of Flag State signatories to the Convention (not the IMO) to issue certified approval for use of ballast treatment systems. The IMO guidelines establish criteria and evaluation protocols whereby the systems must undergo extensive testing in both land-based and shipboard settings (including a range of environmental characteristics) prior to issuance of a flag state 'type approval certificate'. Treatment systems engineered to use 'active substances' (i.e. biocides such as chlorine), however, must undergo a more extensive review process conducted by the MEPC, in addition to land-based and shipboard testing overseen by flag states. Because these systems represent a greater potential threat to the environment upon release of discharged water, and may also pose risks to vessel and crew safety, the systems must undergo a two-step review process conducted by MEPC: prior to land-based and ship-board testing ('basic approval') and following testing ('final approval'). For systems using active substances, the MEPC basic and final approvals are prerequisites to a flag state issued type approval certificate.

The estimated time to complete the IMO pathway to approval for ballast treatment systems is between 6 months and 2 years, and once a system has acquired a flag state approved type approval certificate, it is deemed acceptable by parties to the convention for use in international waters. As of April 2010: 9 systems (7 use active substances, 2 do not), have received a flag state type approval certificate, 4 systems have received basic and final approval from MEPC but await final type approval certification, and 13 systems

have received basic approval but require the successful completion of land-based and shipboard testing before proceeding to final approval. Since the United States is not yet a signatory flag state to the Convention, there is currently no mechanism for the United States to submit applications on behalf of treatment technology developers.

Until the USCG approves a final rule on ballast discharge performance standards (see section IV-A, above), they have no ability to establish testing and approval procedures for any treatment systems. In the interim, two U.S. federal efforts aim to encourage technology development and support system evaluation and efficacy testing.

First, the USCG Shipboard Technology Evaluation Program (STEP) aims to support the development and implementation of experimental shipboard treatment systems. The STEP provides incentives for vessel operators to install and use promising new technologies that have demonstrated efficacy for inactivating biological organisms and achieving sufficiently low concentrations of residual chemicals prior to discharging into ambient waters. Vessel operators participating in the program may use the treatment system to meet the USCG ballast management requirements and may use the system under future discharge standard regulations for the life of the vessel or treatment system, whichever is shorter. As of May 2010, four applicants have been accepted into the STEP program, including Matson Shipping's *Moku Pahu* that called on Portland Harbor in 2009.

Second, the EPA's Environmental Technology Verification Program (ETV) generally aims to accelerate the development of various environmental technologies. The USCG and EPA have formed an agreement to use the ETV program to promote ballast water treatment technology development. In coordination with the Naval Research Laboratory (NRL) engineering facility in Key West, Florida, a model ETV ballast water treatment system test facility was established to support development of technical testing procedures and approval protocols for treatment systems. This work has been instrumental in the completion of an ETV treatment technology verification protocol that was released in draft form for public comment in March 2010.

The development of shore-based and shipboard testing facilities that provide access to various operational and environmental conditions, will be critical in the coming years as more technology developers seek to demonstrate and verify the performance of

their systems. In addition to the Key West facility, the Great Ships Initiative has established a shore-based testing facility in Lake Superior that provides the only location in the world designed to test system efficacy under freshwater conditions. With support from NOAA, plans for a Pacific Northwest based testing facility at the PNNL Lab in Sequim, WA began in 2008. However, it is our understanding that this project may be currently on hold due to financial and logistical challenges.

To provide much needed testing facilities on the west coast, a recent collaboration between the Maritime Administration, the California Maritime Academy, and various West Coast researchers has led to the retrofit of the T/S Golden Bear (a Cal Maritime Academy training ship) as a shipboard platform that will be available for ballast treatment system testing. Because of its mobility and homeport location in the upper SF estuary, this program will facilitate the testing of systems capable of functioning in a wide range of environmental conditions. Without sufficient testing platform opportunities, it may result in a bottleneck of the system development process, which could result in further delays to implement more protective management strategies to combat AIS threats.

In California, where the implementation of ballast discharge performance standards began in January 2010, the state will not approve or certify specific ballast water treatment systems for use in California waters. However, CSLC is legislatively mandated to produce a technology assessment review 18 months prior to each implementation date. Based on the CSLC review and recommendations, the state legislature may opt to delay implementation dates (as they did in 2009 for the originally proposed implementation date for newly built vessels). These reports have been instrumental in describing the global landscape of technology development, including the efficacy and environmental impacts of currently available ballast treatment systems. The reviews also aim to provide vendors with guidance on testing and reporting guidelines (Dobroski 2007, 2009, in prep). The 2010 report will specifically address the efficacy and availability of treatment systems designed for vessels with ballast capacity greater than 5000 MT. This review, in particular will help address some concerns regarding whether or not commercially available treatment systems will be able to treat ballast water

effectively at high flow rates. This is particularly relevant to bulk carriers calling on Oregon waters.

In general, the California technology assessment reports have indicated a significant increase in technology development. Compared to the initial assessment (Dobroski et al. 2007), in which system efficacy data was only available for 20 systems (none of which demonstrated ability to meet CA standards): the most recently completed technology assessment (Dobroski et al. 2009) found 7 systems (of 30 reviewed) that showed evidence of meeting California standards in at least one testing replicate. By the same measure, the 2010 draft report suggests that nine systems, of 46 reviewed, show the potential to meet California standards. A final version of the 2010 report is expected by summer 2010.

C. Ballast water exchange verification and enforcement

Despite the adoption and pending development of performance standards that will likely require the use of treatment technology prior to ballast discharge, oceanic exchange of ballast (BWE) will remain an important management strategy for at least the next 10 years. Despite this pending transition, there remains considerable opportunity to prevent AIS introductions in the interim by strengthening BWE verification tools and enforcement capabilities.

Sampling the salinity concentration of ballast tank water continues to be the primary verification tool used during inspections. Yet, this indicator of BWE is not as robust as most regulatory and enforcement entities desire, particularly for circumstances when the ballast had originally been sourced in a marine environment. Recent research has identified alternative hydrographic indicators that may be better indicators of BWE compliance than salinity; specifically, chromophoric dissolved organic matter or CDOM (Murphy et al. 2004, 2006). In 2009, a technology developer and vendor (Dakota Technologies, Inc.) began marketing a hand-held CDOM sampling instrument for field-based (real-time) evaluation of ballast exchange compliance.

To further investigate the applicability of CDOM sampling for ballast management verification purposes, and to assess the efficacy and ruggedness of the Dakota Technology sampling instrument for field inspector use, the California State

Lands Commission funded a study by the Smithsonian Environmental Research Center (SERC). Staff from state ballast water programs, including ODEQ, collected samples from 73 ballast tanks at ports along the West Coast in 2009. Preliminary results suggest that CDOM analysis, using sampling devices similar to the Dakota Technology instrument, may be a valuable alternative to salinity for conducting dockside verification of ballast exchange practices. Also of importance were results for some vessels declaring mid-ocean exchange that showed exceptionally higher CDOM levels than should be attained for waters sourced at mid-ocean locations. Preliminary results suggest that up to 15% of the vessels sampled at West Coast ports may not have performed ballast water exchange as reported or required (Ruiz et al., in prep).

The ODEQ ballast program budget does not currently include funds for sampling equipment or ballast sample analyses, including the expense of the Dakota Technology CDOM instrument (suggested retail of $9,000 USD). However, if sufficient supplemental funds are available, or other more economically priced verification tools are developed, West Coast states should incorporate more robust ballast exchange verification sampling as soon as possible.

D. Data management efficiency and coordination between state-federal programs

The fact that state programs and the USCG program have similar ballast water reporting requirements, including the use of identical ballast water reporting forms, suggests that there could be opportunities for increased efficiency via data management coordination. Data sharing and coordination could alleviate potential frustration by vessel operators who feel burdened by dual regulatory authority from state and federal levels, and could reduce duplicative data management efforts, thereby allowing limited resources to be devoted to other program activities (e.g., inspections, enforcement, policy development, etc.). In part, these motivations were the basis of a joint study between the National Ballast Information Clearinghouse (USCG) and Portland State University in 2005-06. The pilot study aimed to use near real-time data sharing between the two entities to assess similarity of data reporting compliance, and to explore opportunities to reduce time spent on data management at the local level. Generally, results from the study noted some important improvements that resulted from local follow-up efforts.

Furthermore, the study showed that access to the reporting data collected at the federal level was a great asset to a resource limited local program.

During 2005-06, the PSU/NBIC pilot study found some notable inconsistencies between data collected at NBIC and the data acquired from local monitoring efforts, particularly for quantity of ballast water discharged to Oregon waterways (Figure 14). Generally, however, the pilot study noted the value of follow-up efforts and outreach correspondence with local shipping agents as a primary factor contributing to higher reporting compliance and quality data (Simkanin and Sytsma 2006).

More recent comparisons suggest that NBIC database programming efforts to manage electronic BWRF submittal, and extensive QA/QC procedures, have resulted in an improved correlation between the data captured at the federal level, and the data collected by ODEQ (Figure 14). With the exception of a higher number of 2009 Coos Bay arrivals noted by NBIC (source of discrepancy unknown), a general pattern of slightly higher reporting to ODEQ remains apparent, which is likely the result of outreach and enforcement efforts targeting delinquent or missing reports. Despite these differences, improved correlation suggests that ODEQ may rely on NBIC data for collection of some data parameters in an effort to reduce data management efforts.

Unfortunately, once ODEQ began implementing the ballast water program in 2007, it was determined that data collection agreements by the NBIC on behalf of a state program are prohibited by USCG-NBIC contract limitations. Rather, the contract only allows providing raw data in conjunction with collaborative research agreements and not state government regulatory programs (pers. comm. R. Everett, USCG 2008). Instead, the only mechanism currently available to ODEQ for accessing federally collected BWRF data records is to wait for NBIC to complete its QA/QC processes and release the data on its public online data server. Although the lag time for publically releasing this data has recently improved to a 2-3 month delay, it still limits opportunity to use the data for real-time local compliance monitoring or production of monthly summary reports.

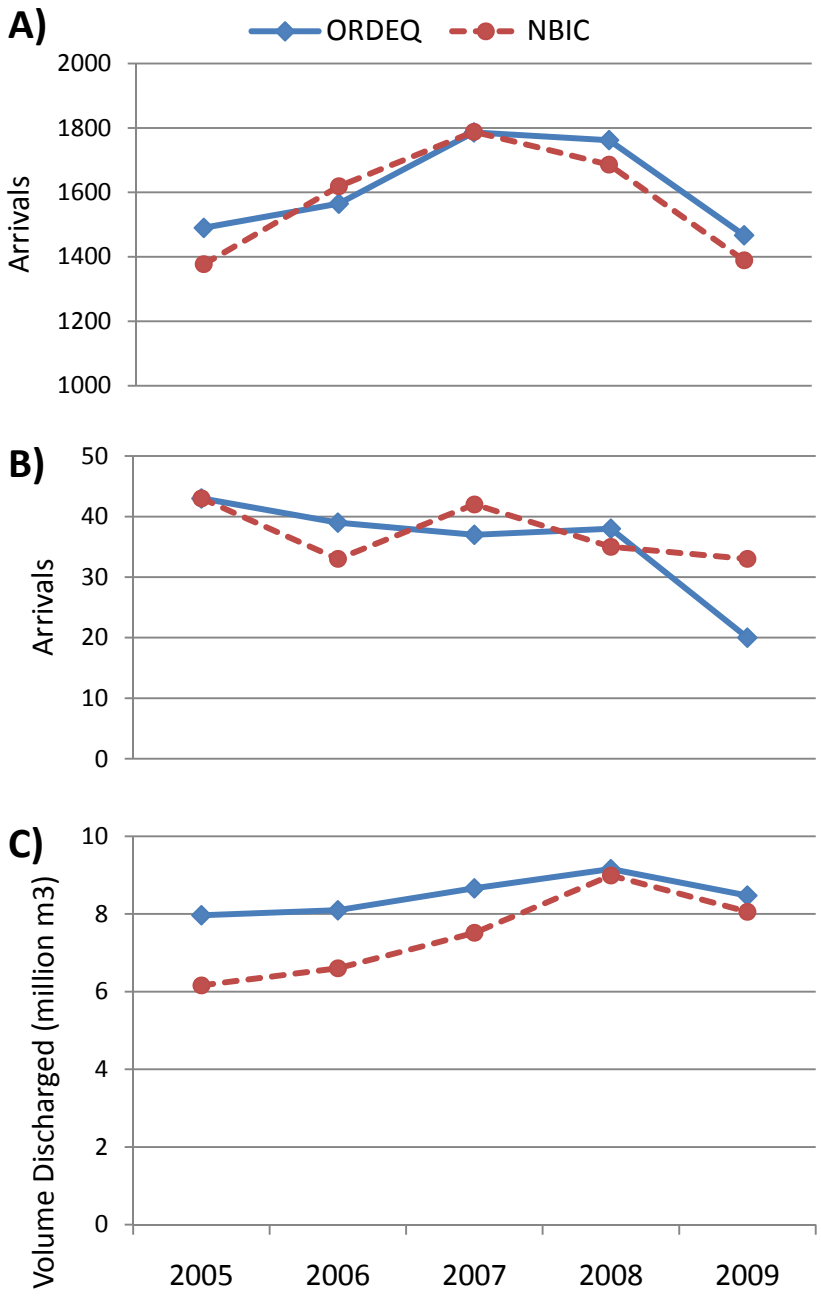

Figure 14. Comparison of data collected by local monitoring efforts in Oregon (ODEQ) and BWRF reports received by the U.S. Coast Guard via the National Ballast Information Clearinghouse (NBIC) for A) Columbia River arrivals, B) Coos Bay arrivals, and C) total volume of ballast discharged into Oregon waterways.

Although contract stipulations and logistical limitations (i.e. lag-time in serving NBIC data to public server) limit the opportunity to use NBIC collected data for real-time local monitoring and enforcement purposes, the NBIC online server may be a suitable surrogate for the collection of various general data parameters that are not critical for real-time management needs at the local level. Specifically, ODEQ may consider streamlining data collection and data entry protocols to bare necessity of real-time compliance monitoring and enforcement needs, but rely on NBIC for collection and management of other data parameters more applicable to analysis of long-term shipping and ballast management trends. Based on these findings, ODEQ staff implemented a change in data collection protocols in 2009 to help reduce the amount of personnel time devoted to data entry and data management.

Lastly, to address frustration over dual reporting requirements, ODEQ staff continue to encourage vessel operators and local shipping agents to satisfy all reporting requirements by simply attaching BWRF to one email that is sent to both NBIC and applicable state programs (both OR and WA if entering the Columbia River).

E. Risk Assessment and Emergency Management Preparedness

Various events in recent years have demonstrated cases where high-risk ballast water is designated for discharge without undergoing sufficient management practices. For example, the grounding of a vessel near Biscayne Bay National Park in 1996 required discharge of ballast to move the ship off the reef. Because of high-risk origins of the ballast and the vessel's close proximity to sensitive natural resources, emergency ballast treatment was required prior to discharge (Glosten 2010). A lack of available procedures for that incident sparked the development of various emergency treatment testing initiatives. Other potential examples of emergency ballast water scenarios could involve adverse weather or equipment failure exemptions that allow vessels carrying high-risk ballast to discharge into state waters without conducting any preventative management measures to reduce the likelihood of transferring AIS. Furthermore, these discharge events typically occur with minimal advance warning to regulatory authorities and thus, preclude any opportunity to explore alternative management options. To be prepared for these types of emergencies in Oregon waters, the ODEQ ballast water program is seeking

to develop administrative rules for analyzing risk and possible alternative emergency management strategies.

Promulgated via administrative rule, these emergency management procedures would only apply under specified conditions triggered by pre-determined risk assessment criteria. Criteria to assess risk should include various factors such as original ballast source location and prominence of AIS in those waters; duration of holding time in ballast tanks; and environmental similarity between source location and receiving waters. Furthermore, recent advances in AIS risk modeling may also greatly enhance our risk assessment capabilities by indicating port regions and/or specific AIS that pose the greatest threat to Oregon waters (MRBP 2009, Oliveira et al. 2010).

The development of new administrative rules may require advance notification to the department for some vessel arrivals that are deemed particularly high-risk (e.g., safety exemptions). In addition, rules may enhance authority to temporarily delay de-ballasting operations while ODEQ staff investigates availability of alternative management options. In some cases, alternative management options may not be feasible. In other cases, authorities may be able to rapidly treat and neutralize ballast tanks prior to discharge and only require a minor delay to vessel loading operations (Glosten 2009). Alternatively, it may be feasible to discharge the high-risk ballast to shore based treatment systems or barge holding tanks for subsequent treatment and neutralization. For some cases, risk of introducing AIS populations in state waters may simply be reduced by working with vessel operators to discharge under specific conditions (e.g., timing of discharge related to phase of tides or currents, rate of discharge, alternative discharge locations, etc.).

The primary intent of this rulemaking effort will be increased preparedness and regulatory transparency for contingency plans aimed at preventing AIS establishment in state waters. Other states, including Washington, have already established similar rules and will serve as a template for developing a suitable approach to these challenges for conditions in Oregon.

F. Status of biofouling research and policy development for Oregon waters

In recent years, the release of highly effective antifouling paint compounds has been phased out because of persistent toxic effects on marine organisms in the natural environment. Uncertainties about the efficacy of new anti-fouling systems have prompted concerns that resurgence in transport of AIS could result from biofouling pathways associated with shipping transport. Prompted by legislative action, the 2008 Task Force reviewed available research on bio-fouling risks and considered possible management solutions. Based on a scarcity of information regarding hull management practices of vessels transiting Oregon waters, the 2008 STAIS Task Force recommended that ODEQ develop and implement a voluntary hull-husbandry survey for vessels calling on Oregon ports. In 2009, ODEQ staff initiated data collection efforts by adopting the hull-husbandry reporting form (HHRF) used by the California Marine Invasive Species Program during the past 2 years.

California launched a voluntary survey effort in 2007, but established mandatory reporting requirements for all vessels transiting California waters via legislative statute in 2008. The compliance rate for this annual reporting requirement was 76% in 2008 and 94% in 2009. As a result, they have generated a better understanding of hull management practices for vessels operating in California waters that will better inform policy development considerations.

ODEQ staff presented the survey rationale and format to local shipping agents in February 2009 to generate their assistance in distributing forms to vessel operators for completion. In addition, the forms were distributed to vessel operators during ballast management vessel inspections. Despite these efforts, the voluntary survey response rate was quite low in 2009 (< 10 % of vessels). Limited personnel resources, and competition with other program priorities, have diminished outreach and follow-through efforts that are necessary to generate a sufficient survey response. Consequently, ODEQ has not yet acquired sufficient data for a worthwhile analysis of hull management practices by vessels calling on Oregon ports.

If additional resources are acquired for ODEQ program activities, a renewed effort for generating survey results should be pursued. In the meantime, the task force

encourages research activities that further our understanding of AIS biofouling pathway risks associated with shipping activity in Oregon waters.

G. Regional Coordination

Regulatory uncertainties at the Federal level – and broad support for minimizing a patchwork of regulations at the individual state level – suggest regional coordination efforts may be critical for establishing sufficiently protective regulations that are also favorable to shipping industry operations. To help facilitate greater coordination, ODEQ staff participates in a variety of regional workgroup activities, including; the Pacific Ballast Water Group, Washington's Ballast Water Work Group, and California's Technical Advisory Group. In the absence of a strong federal program, state regulatory authorities, environmental advocates, and maritime industry representatives generally support efforts to establish regulatory consistency among regions. In particular, the entities and partnerships described below may contribute to this goal among west coast states.

Pacific Ballast Water Group (PBWG)

The Pacific Ballast Water Group (PBWG) began in 1997 as an ad hoc forum for industry, academic research, and regulatory representatives to address shipping related transport of AIS concerns for the West Coast. In recent years, the Pacific States Marine Fisheries Commission has facilitated activities of the workgroup that has expanded to include a breadth of interests concerned with ballast management policies. The group has been instrumental in minimizing regulatory differences among west coast states that could otherwise cause operational challenges for some vessels. Although regulations have been similar among Oregon, California and Washington in recent years, ongoing efforts to implement ballast treatment standards necessitate continued support for PBWG's work.

The PBWG most recently convened January 12-13, 2010 in Vallejo, CA, where presentations and discussion focused on program activities among the individual states, regulatory developments at the federal level, implementation of discharge performance standards in California, and the need for increased ballast treatment testing facilities.

Relative to shipboard testing, there was broad-based agreement amongst participants that greater funding support should be dedicated to testing capabilities aboard the 'T/S Golden Bear', a Cal-Maritime Academy training vessel that is preparing a multi-phase retrofitting to accommodate testing of treatment systems. Further developing the T/S Golden Bear capability to serve as a ballast treatment system testing platform will greatly enhance opportunities for technology developers to address West Coast specific research needs and concerns. Although the PBWG does not have any specific mechanism to fund research or policy initiatives, agreements among the groups representatives may serve to advocate funding priorities for other entities seeking to advance AIS prevention efforts.

West Coast Governor's Agreement on Ocean Health (WCGA)

Motivated by the findings of the Pew Oceans Commission and the U.S. Commission on Ocean Policy, the Governors of Washington, Oregon and California have forged an agreement aimed at greater regional coordination of marine resource management. The agreement and resulting action plans have been developed to address critical marine resource issues facing all three states and the importance of cooperation in addressing challenges that transcend political boundaries.

The WCGA action plan released in July 2008 identifies the protection and restoration of ocean and coastal habitats (including the prevention of marine invasive species) as one of seven priority areas. Specifically, the plan acknowledges the interdependency of the three states in invasive species prevention due to interstate vessel traffic and ocean currents that may disperse AIS across jurisdictions. The plan also calls for the three states to "cooperatively reduce pathways of introduction such as ballast water, vessel hulls of commercial ships and recreational boats, and boat trailers traveling across state boundaries" (WCGA 2008).

Although the June 2009 Draft work plan did not establish ballast water management as one of the 8 action coordination work teams, the WCGA has identified the PBWG as an existing group best suited to coordinate ballast management issues for the WCGA. As such, the WCGA Executive Committee may consider PBWG funding priorities when awarding the roughly $500,000 in grant support it will distribute from the 2010 federal budget.

Bi-State Coordination on the Columbia River

Shared interest and responsibility to protect the integrity of the Columbia River ecosystem from AIS requires a coordinated ballast water management effort by both states. Currently, few differences in regulations exist between Oregon and Washington; however, the transition from BWE to ballast treatment technology management poses a new challenge for establishing regulatory uniformity. Contrasting standards and/or approval procedures could result in ballast discharge to the Columbia River that is authorized by one state but not the other. Given the considerable degree of inter-harbor traffic at Columbia River ports (Figure 3), the potential for regulatory differences imposes operational challenges for vessels as well as legal complications for the environmental protection of a shared water body.

In addition to policy coordination, increased coordination between Oregon and Washington may be possible in the areas of vessel monitoring, ballast report screening, and vessel inspections. Cross-river coordination of report screening may be challenged, however, by slight difference in reporting requirements and submittal procedures. The ODEQ may not receive reporting forms when vessel operators send reports exclusively to WDFW (or vice-versa). Inter-agency communication between ODEQ and WDFW should be maximized to reduce repeat vessel inspections where appropriate; particularly for vessels that have made inter-port moves across the river. No memoranda of agreement are currently in place, but may be helpful for increasing the efficiency of ship inspection efforts, and reducing unnecessary or duplicative burdens on ship operators.

V. CONCLUSIONS

Commercial shipping activities represent an inadvertent but significant vector for introducing non-indigenous species into Oregon waterways (Carlton and Geller 1993, Sytsma et al. 2004, Molnar et al. 2008). Research has shown that simple assessment of ship arrival numbers is a poor predictor of environmental risk associated with shipping transport (Verling et al. 2005). Rather, voyage characteristics, vessel type, hull-husbandry practices, ballast management strategies, and ballast discharge behavior (i.e., volume discharged) are important factors in determining a regions susceptibility shipping transport of AIS (Ruiz et al. 1997, Fofonoff et al. 2003, Minton et al. 2005). Attention to these factors is critical in the successful development and implementation of environmental protection strategies. In the Columbia River, for example, our state receives substantially fewer port calls than other major ports along the West Coast (e.g., Puget Sound, SF Bay, LA/Long Beach), yet it regularly receives a greater volume of ballast discharge, particularly compared to SF Bay or LA/Long Beach. Similarly, Coos Bay receives roughly an order of magnitude more ballast discharge than San Diego harbor, despite receiving 18 times fewer ship arrivals. This disproportionate vulnerability to environmental risks associated with ballast water transfer is largely a result of the shipping operations (i.e., discharge behavior) associated with serving our regions export commodities (STAIS 2008).

To protect state economic interests that depend on sustainable natural resources and healthy native ecosystems, the Oregon Legislature has supported the development of ballast water regulations in an effort to combat the threat of invasive species. Most recently, the 2009 Legislature passed multiple regulatory amendments, including HB 2714, expanded rulemaking authority for the Environmental Quality Commission to enhance AIS prevention efforts for ships entering Oregon waters. Successful legislation, promoted by stakeholder initiative and cooperation, has resulted in important reductions in risk for Oregon waters, but further improvement and sustained prevention efforts are required to protect our natural resources from biological invasions.

Despite the implementation of mid-ocean ballast exchange requirements, recent studies have confirmed that Pacific Northwest waterways remain vulnerable to introduction of AIS from shipping pathways. Cordell et al. (2008) found substantial

numbers of non-indigenous and coastally derived species in ballast tanks discharged to Puget Sound that, according to vessel operators, had undergone ballast exchange management. These studies also revealed a high degree of variability in ballast exchange efficacy for all voyage types, suggesting questionable ballast management compliance for some ships visiting our ports. In addition to concerns that transoceanic voyages may introduce new invaders to North America, recent studies support the need for greater scrutiny of ballast management practices regulating inter-coastal or coastwise voyages (Lawrence & Cordell 2010). Relative to the high degree of invasion within the San Francisco Estuary (Cohen and Carlton 1998, Molnar et al. 2008), coastal shipping traffic and close proximity between ports increases the risk of secondary invasions between ports of the Pacific Coast Region (Simkanin et al. 2009). Generally, these studies support the need for adequately funded local programs dedicated to inspection, verification and enforcement, as well as the development of more robust ballast management strategies such as ballast water treatment. Progress in these areas will substantially reduce the risk of transporting AIS to Oregon waterways from transoceanic or inter-coastal shipping voyages.

The STAIS Task Force has reviewed available research, assessed developments in other jurisdictions, and scrutinized ODEQ ballast program activities in an effort to advise potential revisions to Oregon's AIS prevention strategies. The remainder of this section identifies general themes for guiding program development and concludes with a set of recommended action items for the 2011 Legislature.

Policy Development - The task force submitted comments to the USCG Notice of Proposed Rulemaking (September 2009), strongly supporting the development of federal ballast water discharge standards (BWDS) that would replace ballast water exchange (BWE) as the primary ballast management strategy to protect our nation's aquatic ecosystems. Furthermore, we voiced support for the development of regulatory consistency amongst neighboring jurisdictions, where appropriate, as a means to facilitate interstate and international shipping operations. In some instances, however, we believe that local environmental characteristics and shipping operations warrant some degree of regulatory flexibility for local level programmatic implementation. In this regard, we

support a federal program that represents a baseline that also allows for state-specific programmatic considerations and enforcement capabilities.

Specifically, we voiced concerns that the USCG phase I BWDS (aka 'IMO') does not represent a sufficient increase in environmental protection, particularly for freshwater and estuarine environments. Furthermore, the proposed two-stage implementation poses significant capital expenditure challenges for vessels that would be required to install new treatment systems twice within a 5-10 year period. For these reasons, and to promote regulatory uniformity with state-specific BWDS already established in some states, task force members are generally in favor of moving directly to the phase II standard (aka '1000x IMO' or 'CA standard'), if technologically feasible.

Regardless of pending outcomes regarding implementation of BWDS via USCG or the EPA regulatory authority, the ODEQ and EQC may adopt by rule state-specific BWDS for Oregon waters. In particular, ODEQ and EQC need to consider i) a reasonable timeline for transitioning away from ballast water exchange toward management solutions more protective of our natural resources, and ii) whether IMO level BWDS, or some other level, is sufficiently protective for discharging ballast into Oregon waterways. If it is determined that IMO level discharge standards are inadequate, and the USCG finalizes its rules as proposed, the state of Oregon should strongly consider a proposal being developed in Canada that would allow for use of BWT systems meeting IMO BWDS, but impose additional requirements to protect vulnerable freshwater ecosystems. Specifically, the Canadian government is considering adoption of the IMO convention, but with an amendment requiring BWE, in addition to IMO level treatment, for vessels discharging into freshwater environments. For Canada, this amendment is primarily designed for increased protection of the Great Lakes, but may be an important consideration for Oregon, where a majority of ballast discharge occurs within freshwater habitats of the Columbia River.

Oregon ballast management administrative rules were first adopted in 2002 and have not been revised in accordance with amendments to Oregon ballast management statutes (ORS 783.620-992; App. A) or recent program developments at ODEQ. Proposed ballast management rulemaking in 2010-11 by ODEQ/EQC aims to revise existing rules for consistency with ballast water management statutes, enhance reporting

efficiency, and establish new rules to increase the state's prevention capabilities. Specific rulemaking actions proposed include,

- Revising the definition of coastal exchange, common waters, and regulated vessels to be consistent with ORS amendments passed in 2005, and 2007;
- Amending reporting to requirements to clarify submission requirements and chain-of-custody protocols;
- Providing ballast management exemptions for vessels that opt to use and discharge ballast solely sourced from municipal/potable origins.
- Providing clarity to vessel inspection and ballast sample collection authority;
- Establishing on-board ballast management plans that will be consistent with federal requirements and clarify compliance enforcement capabilities; and
- Establishing risk-assessment protocols and contingency plans for responding to high-risk and/or emergency ballast water discharge events.

Members of the task force will continue to provide advisory support to ODEQ for these rulemaking actions. In addition, guidance from task force members will be instrumental in assessing the timing and scope of possible BWDS rulemaking for Oregon waters, pending developments at the federal level.

ODEQ Program Priorities and Performance Measures - One of the primary objectives for the 2009-10 Task Force was to assess ODEQ ballast program activities, determine the appropriate level of funding to meet environmental protection goals, and explore alternative sources of funding to maintain program operations. In light of projected shortfalls in the General Fund and limited sources of alternative funding, the task force also evaluated ODEQ program activities and priorities to identify possible opportunities for increased efficiency. Our primary objective was to determine the personnel needs and appropriate budget level for the ballast management program in

coming years, and to determine the most sustainable funding strategy to ensure continuation of the program.

Over the past two years, vessel monitoring, screening of ballast reporting forms, and data management has demanded up to 0.45 FTE of the programs resources. These efforts are directly responsible for the high reporting compliance that has been achieved since a ballast program position was established at ODEQ (Figure 14). In addition, approximately 0.4 FTE of personnel time has been devoted to activities, such as legislative policy, rulemaking, staffing the STAIS Task Force, and regional policy coordination. Although these are all important components of implementing a successful program, it translates into limited time available for other key program areas, such as vessel inspections, enforcement, and outreach/education support to maritime industry stakeholders.

In 2009, to reduce time spent on data entry, ODEQ staff revised data collection protocols in a manner that requires relying on the National Ballast Information Clearinghouse (USCG) for collection and QA/QC of some ballast reporting form data that is not critical for real-time compliance monitoring. The downside to this change is that there is typically a 2-3 month lag before NBIC data is made available to the public (or ODEQ) via their online server. Thus, for some data parameters (e.g. ballast water exchange location) program staff will not have access to the most recent data for use in presentations and reports. Despite these modest time savings and subsequent sacrifices in data propriety, an allocation of approximately 0.35 FTE is still required for real-time compliance monitoring and data management efforts.

Daily monitoring of vessel arrivals and screening of ballast water reporting forms, prior to vessel docking at port, is a critical portion of prevention activities and can also have important consequences for vessel operations. If a vessel unknowingly proceeds toward port operations with a non-compliant ballast management plan (e.g. proposing to discharge ‘unexchanged’ ballast sourced from SF Bay), and is not identified by regulators until after notice of intent agreements have been signed, the vessel may be responsible for significant expenses that can be incurred from delayed operations. Having greater coverage for timely monitoring and screening activities at ODEQ reduces the likelihood of potentially costly operational modifications to vessel operators in these types of

instances. The task force estimates that an additional 0.5 FTE in ODEQ ballast program personnel resources would result in increased daily monitoring coverage of approximately 10% (from 185 to 220 days per year). Timely regulatory services such as this, including communication and outreach with the maritime industry, is important to the efficiency and profitability of vessel and port operations.

Although screening vessel arrivals, collecting data, and maintaining a high rate of ballast water reporting compliance is an important aspect of our prevention strategy, it is assurance of compliance verification requires regular boarding and inspection efforts of vessels visiting our ports. In particular, our capacity to collect and analyze ballast tank samples for verification of management practices is essential to our enforcement capabilities and ability to encourage management compliance. At the current level of personnel resources allocated to the ODEQ ballast program (1.0 FTE), vessel inspection efforts (roughly 0.1 FTE) are not likely to exceed 4% of arrivals to Oregon ports. The task force generally acknowledges the need for increased vessel inspection resources in order to protect our waterways and achieve a vessel inspection rate comparable to the level of effort in our neighboring states: roughly 20-25% of arrivals to the state. Moreover, the task force recognizes that a lack of supplemental program funds is limiting various program activities, including the need for sampling equipment and laboratory analyses associated with an effective verification and enforcement program.

During the first two years of implementing the program, ODEQ enforcement efforts have been limited to maritime industry outreach and the issuance of non-compliance warning letters. In 2010, the ODEQ staff is transitioning to a stricter interpretation of enforcement policies and plans to refer all non-compliant cases to ODEQ Office of Compliance and Enforcement (OCE) for formal enforcement action. To implement and maintain formal enforcement procedures for this program, supplemental funding to support OCE consultation will be required.

Finally, it remains important to recognize that the most direct way to assess the efficacy of our ballast management regulations, and the potential need for more robust management strategies, is to conduct periodic surveys for the presence of NIS in our navigable waterways. In 2001, at the onset of ballast water regulations for state waters, a survey of NIS of the lower Columbia River revealed an apparent exponential rise in

invertebrate NIS over the past 50 years, largely attributable to increased shipping traffic (Sytsma et al. 2004). Despite a lack of systematic surveys in other vulnerable waters of the state, numerous NIS (some directly attributed to shipping transport) have also been documented in Coos Bay and other ports along the Oregon coast. Since the 2001 survey of the lower Columbia, however, lack of funding has limited the ability to conduct follow-up monitoring that could reveal any possible changes in the rate of new introductions. These data would help in determining whether our state needs to adopt more robust ballast management practices, such as ballast water treatment, as an alternative to mid-ocean exchange.

Looking forward – resources and funding support - Implementing a successful ballast management program requires that ODEQ staff perform a wide variety of tasks. These tasks include monitoring and screening vessel arrivals and associated reporting forms for BWM compliance; data management and report writing; policy development and coordination including support to the STAIS Task Force, vessel inspections and ballast management compliance verification; industry outreach and education; enforcement actions; and broader participation in statewide efforts related to invasive species management.

Despite recognition by previous task force reports recommending that a core ballast management program be funded with 2.49 FTE, ODEQ has been developing and implementing the program with 1.0 FTE General Fund support since 2007. In addition to a scarcity of personnel to support program objectives, the budget also lacks supplemental funds needed for various activities. These include sampling equipment and lab costs to support ballast management verification and enforcement; consultation fees for database development, legal/policy, or enforcement support; subscription and membership fees associated with vessel tracking and information services; and travel funds to support vessel inspections and regional policy coordination efforts. Although the establishment of ballast management regulations in Oregon and other states has resulted in a significant reduction in risk, greater resources dedicated to vessel monitoring, inspection and enforcement are required to protect our natural resources and prevent further introduction of invasive species.

In response to a 2009 Legislative directive (HB 2714), the task force has considered program funding needs, as well as alternate sources of funding to help ensure continuation of the state's ballast water program. Discussions focused on possible sources for increased efficiencies, re-evaluation of program priorities, and ultimately, the adequate funding level needed to implement ballast management regulations in Oregon that will sufficiently protect our resources and meet various needs of the maritime industry. Together with ODEQ staff, the task force considered several budget re-structuring proposals to achieve a reasonable and balanced approach.

The task force generally supports an increase in funding for the ODEQ ballast water management program. Specifically, an increase in program resources would help protect state waters and the public from AIS threats and improve outreach and regulatory services to the maritime industry in the following ways:

- Supplemental funds would support a variety of currently unfunded program activities aimed at consultation with the shipping industry, increasing compliance and enforcement, enhanced data management, and supporting policy coordination across jurisdictional boundaries.
- Increase vessel boarding and inspection, including verification of ballast management compliance and providing technical assistance to vessel operators, to a rate more comparable to efforts in our neighboring states.
- Provide a higher rate of real-time ballast water report screening and monitoring prior to vessels docking in port. Greater ODEQ coverage for this activity reduces the likelihood of costly operational modifications to vessel owners in the event that non-compliant activities are identified after key operational trigger points).
- Increase staff time dedicated to policy development issues: including, administrative rulemaking; staffing and outreach for task force and advisory purposes; regional coordination; and assessment of regulatory developments at USCG and EPA (Note, however, that current proposal discussions do not assume staff time for implementing the NPDES Vessel General Permit, should EPA delegate permit authority to ODEQ).

- Improve consultation and coordination efforts with shipping industry and other stakeholders regarding emerging issues relevant to AIS risk management in state waters.

Although a majority of task force members identified 2 (or more) FTE as an appropriate staffing level to support program objectives, there is broad recognition of the significant challenges for the state General Fund and stakeholder resources following the recent economic downturn. In light of these constraints, the task force generally came to agreement on a recommended budget level and funding strategy that will be sufficient to implement a successful and efficient ballast program in the coming years. Specifically, the task force favors a program funding level of 1.5 FTE, with an additional $17,500 per biennium in supplemental funds to support program activities.

To achieve this requested increase in program resources, while simultaneously reducing reliance on General Fund support for the program, the task force recommends a 50-50 cost share funding partnership between public and private sources comprised of both General Fund support and revenue generated from shipping activity in the state. Aquatic invasive species threats from shipping related transport represents an issue of both public interest and industry responsibility. As a regulated entity, industry representatives on the task force recognize the need for an effective and responsive program. To contribute to the support of ODEQ ballast program activities, most industry and other representatives on the task force support creating a new ballast water management fee levied on all regulated vessels transiting Oregon waters. Details regarding the recommended budget and this funding mechanism are outlined in the section below.

Minority opposition to the task force funding recommendation is noted by Frank Holmes, representing the Western States Petroleum Association (WSPA). In general, members of the WSPA are not inclined to support a more robust ballast water management effort at the state level. Specifically, they advocate for a federal solution to address this environmental threat, but support the current level of ODEQ effort with continued funding provided by the state General Fund.

VI. LEGISLATIVE RECOMMENDATIONS

The following recommendations were developed over the course of seven meetings of the Shipping Transport of Aquatic Invasive Species task force between October 2009 and May 2010.

1. The task force recommends legislative and budgetary approval to increase ballast water management program resources at ODEQ, including a restructuring of the program budget to enhance the sustainability and continuation of AIS prevention activities. A new ballast water management fee assessed on all regulated commercial vessels arriving to Oregon waters will help support various programmatic improvements and will result in a reduction of General Fund resources allocated to the program by approximately 22% ($25,000 per year). This proposal has the support of all members of the task force, except one, and is based on the following elements;
    - A public-private cost share arrangement to support ODEQ ballast water program activities seeking to fund the program budget with 50% revenue from General Fund and 50% from ballast water management fees assessed on arriving vessels.
    - Authorization for ODEQ to increase staffing for the ballast water program by 0.5 FTE. A new half-time position (NRS-3 level) will contribute to an overall increase in program services, particularly with regard to screening of vessel arrivals, data management, and vessel inspections.
    - Supplemental funding of $35,000 per biennium to support various program activities, including: inspection and ballast management verification efforts; consultation fees for database development, legal/policy, or enforcement support; subscription and membership fees associated with vessel tracking and information services; and

travel funds to support vessel inspections and regional policy coordination efforts.

- A new ballast water management fee assessed on all commercial vessels transiting into Oregon waters that are regulated by ORS 783.620-992). This new fee proposal is based on the existing and successful cooperative model between industry and ODEQ that is already in place to support reporting and fee collection required in the state's Oil Spill Prevention Program. Although various options for assessing a new fee were discussed (e.g. risk-based sliding scale, per volume of ballast discharged, etc.), the task force favors a statutory flat-fee as more predictable for vessel operators and more cost-efficient to administer. Assuming 1500 qualifying arrivals per year, a flat fee of $68-70 per arrival (pending determination of 3rd party administrative costs) should provide sufficient revenue to support 50% of the proposed program budget.
- Implementation of the new vessel arrival fee, and the hiring of additional 0.5 FTE personnel to ODEQ ballast water program, would begin January 2012.

2. Support efforts that may increase state resources available for invasive species early detection/rapid-response events within state jurisdiction. Specifically,
    - Amend ORS 783.990-992 to appropriate revenue generated from BWM penalties to the Invasive Species Control Account, managed by the Oregon Invasive Species Council. Whereas the task force recognizes that any potential penalty revenue associated with ballast water violations shall not be used to support program activities at ODEQ, members strongly support the dedication of these funds to broader statewide invasive species management efforts. The OISC Control Account is currently underfunded, and although ballast management penalties are not expected to be a

significant source of revenue, task force members identify a strong rationale for contributing to the Fund in this manner.

- Pass a Legislative Resolution to Congress and the President in support of S. 3063 (cosponsored by Senators Wyden and Merkley) and its companion bill H.R. 4782, which will provide financial support to western states to manage new introductions of invasive species.

3. Amend temporary provisions of Sections 2 to 4, chapter 148, Oregon Laws 2009 such that it provides for continuation of the Shipping Transport of Aquatic Invasive Species Task Force through the 2011-2013 biennium.

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Appendix A: Oregon Ballast Management Statute (ORS 783.625-640)

BALLAST WATER

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 ship in commerce that is equipped with ballast tanks, other than a tank vessel or a vessel used solely for commercial fish harvesting, 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, 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; 2007 c.816 §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; rules; aquatic invasive species. (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 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.

(c) If the ballast water is discharged in a manner consistent with standards and procedures adopted by the Environmental Quality Commission under subsection (4) of this section.

(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.

(4)(a) The Environmental Quality Commission may adopt by rule standards and procedures that the commission considers necessary to carry out the provisions of ORS 783.625 to 783.640. The standards and procedures must minimize the risk of introducing aquatic invasive species into the waters of this state and must be based on the availability of treatment technology. Rules adopted under this subsection include, but are not limited to:

(A) Standards for the discharge of ballast water into the waters of this state and appropriate timelines for the implementation of the standards. In adopting the standards, the commission shall consider the extent to which treatment technology is feasible, practicable and commercially available, or expected to be available, by the proposed implementation timelines.

(B) Emergency response procedures for managing high-risk ballast water. The rules must define high-risk ballast water in light of the source of the water and other applicable factors. The procedures must establish notification and consultation requirements, as well as feasible alternative ballast water management strategies.

(C) Procedures for implementing alternative ballast water management strategies for the exemptions specified in subsection (2)(b) of this section.

(b) To the extent practicable, the commission shall adopt rules under this subsection consistent with relevant rules adopted by the States of California and Washington. [2001 c.722 §3; 2005 c.62 §3; 2009 c.148 §1]

(Temporary provisions relating to Shipping Transport of Aquatic Invasive Species Task Force)

Note: Sections 2 to 4, chapter 148, Oregon Laws 2009, provide:

Sec. 2. In adopting rules under ORS 783.635, the Environmental Quality Commission shall consult with the Shipping Transport of Aquatic Invasive Species Task Force created under section 3 of this 2009 Act. [2009 c.148 §2]

Sec. 3. (1)(a) There is created the Shipping Transport of Aquatic Invasive Species Task Force.

(b) The President of the Senate and the Speaker of the House of Representatives shall each 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 to provide equitable representation from individuals who represent the interests of this state and federal, State of Washington, maritime industry, environmental and academic interests.

(2) The purpose of the task force is to study and make recommendations:

(a) For combating the introduction of aquatic nonindigenous species associated with shipping-related transport into the waters of this state;

(b) For identifying sources of funding to support and maintain the ballast water program established in ORS 783.625 to 783.640; and

(c) For 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) Practicable and cost-effective ballast water treatment technologies;

(C) Appropriate standards for discharge of treated ballast water into the waters of this state;

(D) 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) Practicable and cost-effective techniques to combat the introduction of aquatic nonindigenous species associated with shipping-related transport into the waters of this state; and

(F) Appropriate regulations and standards to combat the introduction of aquatic nonindigenous species associated with shipping-related transport into the waters of this state.

(3) The Department of Environmental Quality may provide staff support or coordination assistance to the task force.

(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 of the Legislative Assembly related to natural resources no later than June 1, 2010.

(9) Notwithstanding ORS 171.072, 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:

(a) "Aquatic nonindigenous species" means any species or other viable biological material that enters an ecosystem beyond its historic range.

(b) "Waters of this state" has the meaning given that term in ORS 783.625. [2009 c.148 §3]

Sec. 4. Section 3 of this 2009 Act is repealed on January 2, 2012. [2009 c.148 §4]

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:

(a) Relying on tests conducted by the United States Coast Guard or on other tests determined to be appropriate by the department.

(b) Boarding and inspecting vessels regulated under ORS 783.625 to 783.640 and collecting samples of ballast water as part of the inspection. [2001 c.722 §4; 2005 c.62 §4; 2009 c.144 §1]

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: The amendments to 783.992 by section 16, chapter 267, Oregon Laws 2009, become operative January 1, 2011, and apply to violations occurring on or after January 1, 2011. See sections 17 and 19, chapter 267, Oregon Laws 2009. The text that is operative on and after January 1, 2011, is set forth for the user's convenience.

783.992. As specified in ORS 468.140, 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.

Appendix B: Ballast Water Discharge Standards and implementation timelines proposed by IMO, USCG and California (modified from Dobroski et al. 2009).

Organism Size Class	IMO Regulation and USCG NPRM Phase I	California[1]	USCG NPRM – Phase II
> 50 µm in minimum dimension	< 10 viable organisms per cubic meter	No detectable living organisms	< 1 viable organisms per cubic meter
10 – 50 µm in minimum dimension	< 10 viable organisms per ml	< 0.01 living organisms per ml	Same as CA
< 10 µm in minimum dimension		< 10^3 bacteria/100 ml < 10^4 viruses/100 ml	Same as CA Same as CA
Escherichia coli	< 250 cfu[2]/100 ml[4]	< 126 cfu[2]/100 ml[4]	Same as CA
Intestinal enterococci	< 100 cfu[2]/100 ml[4]	< 33 cfu[2]/100 ml[4]	Same as CA
Toxicogenic *Vibrio cholerae* (01 & 0139)	< 1 cfu[2]/100 ml or < 1 cfu[2]/gram wet weight zooplankton samples	< 1 cfu[2]/100 ml or < 1 cfu[2]/gram wet weight zoological samples	Same as CA Same as CA

[1] Final discharge standard for California, beginning January 1, 2020, is zero detectable living organisms for all organism size classes

[2] Colony-forming-unit – a measure of viable bacterial numbers

Appendix B (cont): Implementation timelines for ballast discharge standards, as proposed established via CA statute (modified from Dobroski et al. 2009). In parentheses are comparable implementation dates proposed by USCG for phase I (**bold**) and phase II (*italics*). Note, IMO timelines have passed and will be revised based on ratification date.

Ballast Water Capacity of Vessel	Standards apply to new vessels in this size class constructed on or after	Standards apply to all other vessels in this size class beginning in
< 1500 metric tons	2010 (**2012**, *2016*)	2016 (**2016**, *2016*[a])
1500 – 5000 metric tons	2010 (**2012**, *2016*)	2014 (**2014**, *2016*[a])
> 5000 metric tons	2012 (**2012**, *2016*)	2016 (**2016**, *2016*[a])

[a] BWDS compliance required upon first drydocking after January 1, 2016, or 5 years after installation of ballast water management system meeting the phase-I standard.

Appendix C: Ballast Water Reporting Form (BWRF; OMB 1625-0069)

OMB Control Number 1625-0069

BALLAST WATER REPORTING FORM

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

1. VESSEL INFORMATION	2. VOYAGE INFORMATION		3. BALLAST WATER USAGE AND CAPACITY		
Vessel Name:	Arrival Port:		*Specify Units Below (m^3, MT, LT, ST)*		
IMO Number:	Arrival Date (D/M/YYYY):		Total Ballast Water on Board:		
Owner:	Agent:		Volume	Units	No. of Tanks in Ballast
Type:	Last Port:	Country of Last Port:		m3	
GT:			Total Ballast Water Capacity:		
Call Sign:	Next Port:	Country of Next Port:	Volume	Units	Total No. of Tanks on Ship
Flag:				m3	

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

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

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

If no ballast treatment conducted, state reason why not: ☐

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

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

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

Tanks/ Holds List multiple sources/tanks separately	BW SOURCE				BW MANAGEMENT PRACTICES						BW DISCHARGE			
	DATE D/M/YYYY	PORT or LAT. LONG.	VOLUME (units)	TEMP (units)	DATE D/M/YYYY	ENDPOINT LAT. LONG.	VOLUME (units)	% Exch	METHOD (ER/FT/ ALT)	SEA HT. (m)	DATE D/M/YYYY	PORT or LAT. LONG.	VOLUME (units)	SALINITY (units)
			m3	C			m3		ER				m3	sg
			m3	C			m3		ER				m3	sg
			m3	C			m3		ER				m3	sg
			m3	C			m3		ER				m3	sg
			m3	C			m3		ER				m3	sg
			m3	C			m3		ER				m3	sg
			m3	C			m3		ER				m3	sg

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

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

Released 12-01-2006 | Send form by e-mail | **OR** | Submit form on-line | **OR** | Save as text file | NBICReportingForm-1.6.pd

Appendix D: Oregon Administrative Rule (OAR 340-143)

340-143-0001
Authority, Purpose, and Scope

(1) The purpose of these rules is to establish procedures for the proper management of ballast water and reporting of ballast water management information as regulated by ORS 783.620 through 783.640, in order to protect the waters of this state from aquatic nuisance species.

(2) These rules 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, and the ballast water is not mixed with ballast water from areas other than open sea waters;
(b) Traverses only the internal waters of this state;
(c) 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;
(d) Discharges only ballast water that originated from coastal waters between the parallel 40 degrees north latitude and the parallel 50 degrees north latitude.

(3) These rules do not authorize the spilling or releasing of any oil or hazardous materials.

Stat. Auth.: ORS 783
Stats. Implemented: ORS 783.620-783.640

340-143-0005
Definitions

(1) "Aquatic nuisance species" means any species or other viable biological material that enters an ecosystem beyond its historic range.

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

(3) "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.

(4) "Coastal exchange" means replacing 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; or
(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.

(5) "Coastal waters" means the Pacific Ocean within 200 nautical miles of the United States or Canada.

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

(7) "Internal waters of this state" means those waters of this state that do not have shared jurisdiction with an adjacent state.

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

(9) "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.

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

(11) "Port" means any place to which a vessel is bound to anchor or moor.

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

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

(14) "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.

(15) "Territorial Sea of the United States" means the waters extending three nautical miles seaward from the coastline in conformance with federal law.

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

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

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

Stat. Auth.: ORS 783
Stats. Implemented: ORS 783.620-783.640

340-143-0010
Ballast water management: Discharge Prohibitions

(1) Discharge of ballast water containing oil or hazardous material into waters of this state is prohibited.

(2) Discharge of any ballast water into waters of this state from vessels carrying ballast water into waters of this state is prohibited, unless:

(a) The vessel discharges ballast water only at the location where the ballast water originated, and the ballast water is not mixed with ballast water or sediment from areas other than open sea water;
(b) The owner or operator of the vessel conducted an open sea exchange, or a coastal exchange, if applicable, of ballast water before entering the waters of this state;
(c) The ballast water discharged originated solely from coastal waters between the parallel 40 degrees north latitude and the parallel 50 degrees north latitude; or
(d) The owner or operator of the vessel did not conduct an open sea exchange or a coastal exchange of ballast water because the owner or operator determined that performing an exchange would threaten the safety or stability of the vessel or the vessel's crew or passengers because of an extraordinary condition, including but not limited to adverse weather, vessel design limitations, or equipment failure.

Stat. Auth.: ORS 783
Stats. Implemented: ORS 783.620-783.640

340-143-0020
Ballast water management: Reporting

(1) An owner or operator of a vessel covered by these rules must report ballast water management information to the Department at least 24 hours before entering waters of this state. The report is required whether or not the owner or operator plans to discharge ballast water into the waters of this state. Compliance with these reporting requirements may be met by sending the report to the Merchants Exchange of Portland**.**

(2) The report must be submitted on a form acceptable to the U.S. Coast Guard pursuant to 33 CFR Part 151, unless an alternative format is approved in writing by the Department.

(3) If an owner or operator of a vessel alters or plans to alter its ballast water management for any reason after reporting its ballast water management information, the owner or operator must immediately submit an amended ballast water management report.

(4) Any owner or operator who fails to report its ballast water management information as required by this rule must file the required report immediately upon discovering the violation.

Stat. Auth.: ORS 783
Stats. Implemented: ORS 783.620-783.640