Analysis of federal and state ballast water management policy as it concerns crude oil tankers engaged in coastwise trade to Alaska

Final Report

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Abstract

The ballast water of ships is regulated with an aim to minimize or prevent the introduction of aquatic nonnative species. In the United States, ballast water is regulated at the federal level by the United States Coast Guard (USCG) and Environmental Protection Agency (EPA) as well as by several state programs. Regulations by federal and state agencies are at times overlapping and conflicting. For example, 'crude oil tankers engaged in coastwise trade' were exempted from ballast water management activities by the National Invasive Species Act of 1996, and therefore all subsequent USCG regulations. However, the EPA began to regulate these vessels under the Clean Water Act in 2008. On the west coast, California does not provide such an exemption and in general has more stringent standards than federal entities. Washington also enforces state-specific regulations though they differ from California. This paper reviews the current, and when available proposed, federal and state ballast water regulations on the west coast of the United States as they pertain to the behavior of vessels discharging to Prince William Sound, Alaska; namely, tankers engaged in the transfer of crude oil from the terminus of the Trans-Alaska Pipeline System at the Alyeska Terminal in Port Valdez.

1. Introduction

The regulation of ships' ballast water to minimize the spread of nonnative species to novel environments has been ongoing for nearly three decades (Bailey 2015). During this time voluntary guidelines have given way to mandatory regulations that have recently transitioned from practices influencing vessel behavior (i.e. ballast water exchange) to various techniques of treating ballast water with onboard systems (e.g., filtration, chlorine, ultraviolet light). Policy has been initiated on international, national, and state levels, at times influencing sectors of the shipping industry in different ways. This paper is an analysis of current ballast water management regulations as they relate to vessels engaged in the coastwise trade[1] of crude oil from Alaska to the west coast of the United States, by first addressing why ballast water management is necessary; second, reviewing trends in ballast water discharge to Alaska; and third, comparing the federal and state regulatory regimes that influence vessel practices. Brief and detailed summaries of federal and relevant state ballast water management regulations can be found in Tables 1 and 2, respectively.

[1] In general, coastwise trade is transport between points in the United States or within the Exclusive Economic Zone.

2. The Need for Ballast Water Management

Ballast water is necessary to maintain vessel draft, stability, and trim, primarily in the absence of cargo. When a vessel offloads cargo to a delivery port it takes on seawater in large tanks to provide stabilization on the next leg of its journey. When the vessel arrives at a place to again load cargo, it discharges the unneeded ballast water into that recipient port. This transfer of seawater from one place to another, potentially across large geographic distances, has the potential to also transfer unwanted nonnative aquatic organisms.

Nonnative species that establish and spread in novel locations can cause harm to the environment, economy, or human health. For example, zebra mussels (*Dreissena polymorpha*) native to the Black and Caspian Seas were first introduced to North America in the Great Lakes via commercial vessels and have since caused extensive biological and economic damage. Impacts to commercial fishing, sport fishing, and fouling of water treatment systems from ballast-borne nonnative aquatic species introduced to the Great Lakes, including zebra mussels, are estimated to cost $138 million dollars annually (Rothlisberger et al. 2012). Zebra mussels have subsequently spread widely across the United States often on recreational boats and trailers, prompting states to conduct routine inspections of watercraft (Otts & Bowling 2013). The ctenophore *Mnemiopsis leidyi*, a small marine invertebrate native to the east coast of North and South America, severely depleted native fish stocks after being delivered in ballast water to the Black Sea and spreading to the Caspian Sea (Knowler 2005). The European green crab (*Carcinus maenus*) may impact commercial shellfish operations, and has spread quickly across the globe including ballast water transport of larvae. Green crabs have engaged in a northward spread along the west coast of North America from California to British Columbia, and current environmental conditions are considered suitable for colonization in Alaska (de Rivera et al. 2011).

Alaska has relatively fewer nonnative species than other locations on the west coast of North America, including California, Oregon, Washington, and British Columbia (Ruiz et al. 2011). However, intra-coastal vessel traffic is a viable transport mechanism for nonnative species along the west coast due to notable amounts of ballast water discharge on routes of relatively short duration (i.e. low species mortality) (Simkanin et al. 2009). Climate change may facilitate nonnative species establishment at higher latitudes, thus policies that proactively manage

dominant vectors such as ballast water have the potential to reduce adverse impacts of nonnative species (Hellman et al. 2008, Pyke et al. 2008).

3. Ballast Water Discharge in Alaska

The state of Alaska depends heavily on federal policies to regulate ballast water discharge to its waters. The Alaska Department of Environmental Conservation (ADEC) has authority in Alaska Statute 46.03.750 to regulate ballast water, but to date there is no statewide program with this specific aim.

Most ballast water discharged in Alaska occurs in the port of Valdez as tankers arrive at the Alyeska Marine Terminal at the terminus of the Trans-Alaska Pipeline System to transport crude oil to refineries on the west coast of the United States. After offloading oil to the refinery, a tanker will typically take on ballast water in port in preparation for a return trip to Alaska. This coastal ballast water is ideally exchanged with open ocean water on route to Alaska to reduce the density and likelihood of survival of organisms entrained within. The ballast water may not be exchanged if the vessel meets an exemption criterion (discussed further below) such as safety of the vessel or her crew. The tanker then discharges the exchanged or unexchanged ballast water upon arrival in Valdez before again loading crude oil. Some tankers may begin to discharge ballast water once inside Hinchinbrook Entrance or elsewhere along their track through the relatively sheltered waters of Prince William Sound, as vessel and load constraints allow. The report 'Updated: Analysis of Crude Oil Tanker Ballast Water Data for Valdez & Prince William Sound, Alaska' presented to the Prince William Sound Regional Citizens' Advisory Council on April 25, 2016, provides a detailed description of ballast water source and management locations and volumes. Following is a summary of those data.

In a review of vessel arrivals to Alaska from 2003 and 2004, Valdez received the majority of tankers and these arrivals were fairly constant throughout the year (McGee et al. 2006). An analysis of ballast water discharge data provided by the ADEC between July 1999 and December 2004 revealed that Valdez was clearly an outlier in the state, receiving 52.4 million metric tons of mostly unmanaged ballast water (McGee et al. 2006). The data provided by ADEC for this time period is considered nearly complete.

A more recent review of data provided by the National Ballast Information Clearinghouse, a federal database of ballast water activity mandated in 1996, reveals the

influence of federal policy on crude oil tanker reporting from 2005 through 2015. As discussed in detail below, federal ballast water management, recordkeeping, and reporting requirements went into effect for crude oil tankers engaged in coastwise trade in early 2009. This shift greatly influenced the reported volume of ballast water discharge to Alaska. For instance, the number of tankers that reported discharging ballast water to Valdez rose from 47 in 2008 to 258 in 2009 (Verna et al. 2016). The reported volume of ballast water discharge between 2008 and 2009 increased by nearly twenty-fold and remained relatively steady through 2015 (Figure 1). The decline in ballast water discharge volume between 2005 and 2008 may have been a function of reporting or represent an actual decrease in vessel traffic. Additional data analysis from 2005 through 2015 reveals that the dominant source locations of ballast water discharged by crude oil tankers in Valdez are on the west coast of the United States, specifically in the areas of Puget Sound, Washington, San Francisco Bay, California, and Long Beach, California (Figure 2).

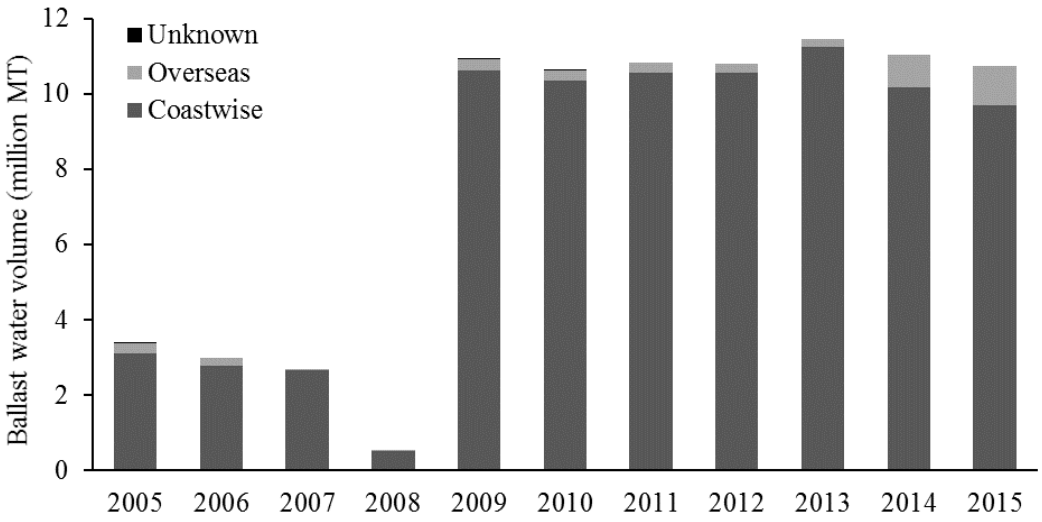

Figure 1. Volume (million metric tons) of ballast water discharged to Valdez from crude oil tankers engaged in coastwise trade, 2005 through 2015.

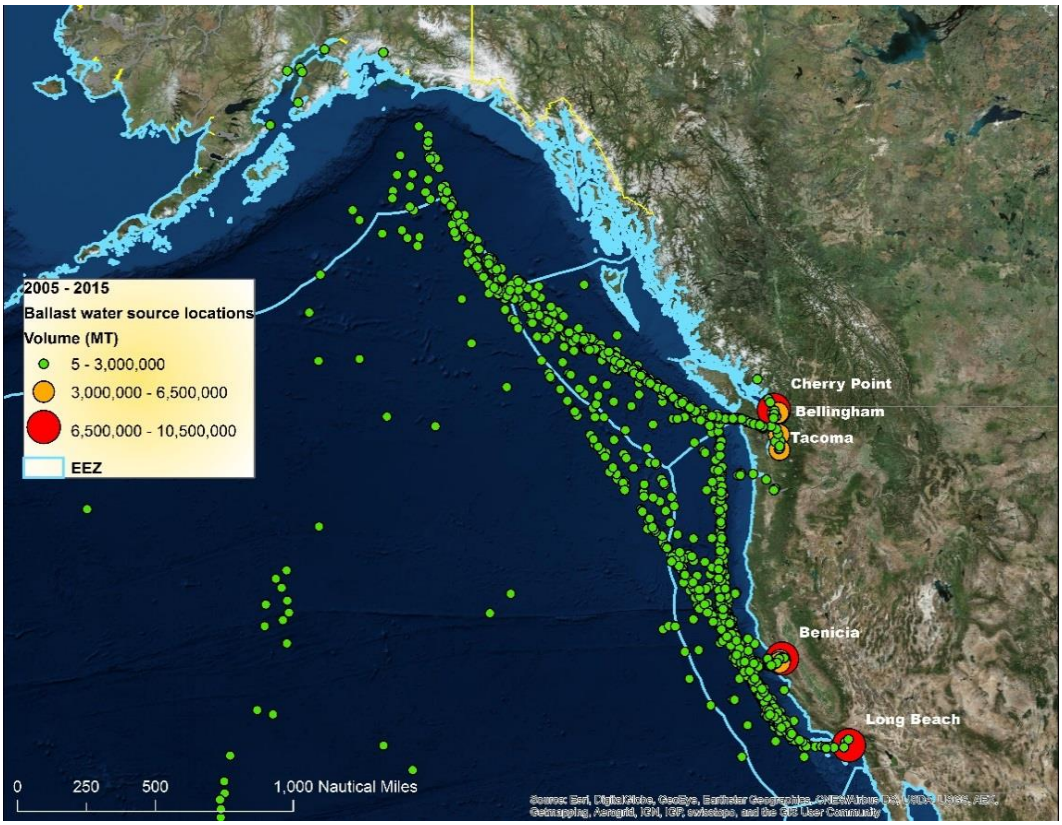

Figure 2. Reported source locations of ballast water discharged by crude oil tankers in Valdez, Alaska, 2005 through 2015. Red and yellow circles indicate dominant source locations in Puget Sound, Washington, San Francisco Bay, California, and Long Beach, California; smaller green circles primarily indicate locations of ballast water sourced on route to Valdez. Figures 1 & 2 are adapted from the report 'Updated: Analysis of Crude Oil Tanker Ballast Water Data for Valdez & Prince William Sound, Alaska' presented to the Prince William Sound Regional Citizens' Advisory Council on April 25, 2016.

A review of federal ballast water regulations provides context for the historic shifts in reporting behavior by crude oil tankers and explores recent policy developments that will influence ballast water management activities in the near future.

4. Federal Policy

Following the invasion of zebra mussels and Eurasian ruffe in the Great Lakes in the mid-to-late 1980's, the United States recognized the need to prevent, or minimize, introductions of nonnative species. The passing of the National Aquatic Nuisance Prevention and Control Act in 1990 (NANPCA 1990) was the first attempt to regulate ballast water discharge to the United States, though NANPCA applied only to the Great Lakes. Additional invasions, both

internationally and domestically, prompted Congress to reauthorize and amend NANPCA with the National Invasive Species Act of 1996 (NISA 1996). NISA broadened the regulatory scope of ballast water management activities to other coastal areas of the country. These Acts gave authority to the United States Coast Guard (USCG) to regulate ballast water discharge (Albert et al. 2013).

4.1 United States Coast Guard

Initial regulations by the USCG applied to vessels equipped with ballast tanks and arriving to ports or other destinations in the United States from beyond the 200 nautical mile exclusive economic zone (EEZ) and the equivalent zone of Canada (i.e., Canadian EEZ). Ballast water management was voluntary, but recordkeeping and reporting of management practices was required to determine efficacy of the program. The voluntary program went into effect in 1999 but within two years was deemed unsuccessful (Verna et al. 2016). By 2004, the USCG released new regulations for a mandatory ballast water management, recordkeeping, and reporting program. All vessels arriving from beyond the EEZ were required to conduct ballast water management, and all vessels were required to submit ballast water reporting forms regardless of management activity. Penalties for noncompliance with these rules included a fine of up to $35,000 per violation per day, and a class C felony for knowing violators (33 CFR 151).

Several exemptions were included in NISA that subsequently applied to all USCG regulations. Specifically, USCG exemptions were allowed for:

- Safety, to be applied at the discretion of the vessel master;
- Passenger vessels equipped with ballast water treatment systems (unless exchange was deemed more effective);
- Vessels that traveled solely within one USCG Captain of the Port Zone; and
- Crude oil tankers engaged in coastwise trade.

While most of the exemptions originated from a practical demand for safety or logistics, NISA did not provide an explanation for the exemption provided to crude oil tankers. A 1997 study led by the Smithsonian Environmental Research Center (SERC) analyzed the risk of ballast water discharge transported in segregated ballast tanks and oiled cargo holds by tankers arriving in Valdez (Ruiz & Hines 1997). Ballast water discharged directly into the port of Valdez from segregated tanks was found to present risk of introducing nonnative species. Conversely,

ballast water discharged to the Alyeska Ballast Water Treatment Facility from oiled cargo tanks was considered a minor risk due to low species abundance. The Treatment Facility, however, was designed to separate oil from water before discharge to the port, not to remove organisms. As a greater number of vessels became equipped with segregated ballast tanks (i.e. carried ballast water in cargo tanks less frequently), the risk of introducing nonnative species rose and the NISA exemption became of greater significance. However, it is worth noting that the routes of crude oil tankers engaged in coastwise trade tend to occur completely within the EEZ. Even without an exemption these vessels would not be required under USCG regulations to manage ballast water in segregated tanks, though they would be required to keep records and report ballast water activity.

Reported ballast water management activities are compiled into a database mandated by NISA entitled the National Ballast Information Clearinghouse (NBIC). The NBIC is jointly managed by the USCG and SERC (http://invasions.si.edu/nbic/). Vessels report data on standardized forms including the location, date, and volume of ballast water uptake, management, and discharge; management method; total ballast water capacity; total volume of ballast water onboard; and vessel identifying information. Under initial regulations, vessels were required to submit ballast water reporting forms 24 hours in advance of arrival at their destination; as of February 2016, most vessels may submit ballast water reports no later than six hours after arrival at their destination or prior to departure from that destination, whichever is earlier (33 CFR 151).

Ballast water management can be performed in a number of ways. USCG regulations provide vessels the following options: (1) retention of ballast water, (2) use of a USCG approved ballast water management system or alternative management system, (3) use of ballast from a public water system (i.e. water that meets Safe Drinking Water Act requirements), (4) discharge to a shoreside treatment facility, or (5) open ocean ballast water exchange. In practicality, retention of ballast water is often unfeasible in order to carry out cargo operations; at the time the regulations were written there were no approved management systems; the ability to use a public water system was not introduced until 2012; and to date there are no shoreside treatment facilities in the United States to remove nonnative species. As a result, open ocean ballast water exchange became the dominant method of management. Ballast water exchange may be performed in two ways: ‘empty refill exchange’ or ‘flow through exchange’. Empty refill

exchange occurs by emptying a ballast tank until pumps lose suction, then refilling the tank. Flow through exchange occurs by flowing water through the tank (i.e. overflowing the tank through vents or other deck openings) three times its volume. The anticipated effect of open ocean ballast water exchange is two-fold: (1) to replace coastal organisms with lower risk open ocean organisms, and (2) to provide an osmotic shock to organisms entrained in the ballast tank with high salinity open ocean water (Molina & Drake 2016). Hence, ballast water exchange is required to occur beyond the EEZ (200 nautical miles from shore). Vessels are not required to delay or deviate from their voyage in order to conduct exchange.

In an effort to further reduce the risk of nonnative species introductions, in 2012 the USCG released its final rule on numeric limits for organism density in ballast water discharge. To meet these limits, vessels are required to install and use a USCG approved ballast water management system, thus shifting away from ballast water exchange as a dominant management technique. The discharge limits are: less than 10 living organisms greater than or equal to 50 µm per cubic meter of ballast water and less than 10 living organisms less than 50 µm and greater than or equal to 10 µm per milliliter of ballast water, plus additional limits for bacteria and viruses (33 CFR 151). The USCG developed implementation schedule for meeting these discharge standards has lapsed (see Table 2). However, due to a lack of approved systems and verification protocols in the United States, the USCG has allowed vessels to apply for an extension to the implementation dates. A vessel master, owner, operator, agent or person in charge must submit an extension request at least 12 months prior to the implementation date detailing why the vessel cannot comply with the above regulations (Kelly 2015). In the interim, exchange remains the primary management method.

4.2 Environmental Protection Agency

The USCG provided sole regulation of ballast water in the United States until 2008 with the passing of the Environmental Protection Agency's (EPA) Vessel General Permit (VGP). The VGP was authorized under the Clean Water Act (CWA) to regulate discharges incidental to the normal operations of a vessel, including ballast water. The CWA had historically not regulated such discharges, but several years of litigation prompted a change. In 1999, a group led by the Pacific Environmental Advocacy Center petitioned the EPA to regulate ballast water under the CWA's National Pollutant Discharge Elimination System (NPDES). The EPA's denial of the

petition led to several groups, this time led by Northwest Environmental Advocates, to appeal to the U.S. District Court of Northern California in 2003. EPA argued that in both NANPCA and NISA Congress had given authority to the USCG to regulate ballast water in the United States. However in 2005, the court ruled that the EPA had exceeded its authority under the CWA by providing an exclusion for ballast water from NPDES permitting. This decision was upheld in the Ninth Circuit Court of Appeals in 2008. The VGP went into effect in December of 2008 for a period of five years. A vessel 300 gross tons or greater that is capable of discharging more than eight cubic meters of ballast water must submit a Notice of Intent with the EPA to receive coverage under the VGP.

The 2008 VGP had similar, but not identical, requirements for ballast water management as the USCG. Two differences impacted the practices of vessels transiting between Alaska and west coast states. First, the VGP lacked an exemption from ballast water management, recordkeeping, and reporting for crude oil tankers engaged in coastwise trade. The exemption provided in NISA (and subsequent USCG regulations) did not apply to the CWA or therefore the VGP. Likely as a result, data reported to NBIC showed a nearly 20-fold increase in reported ballast water discharge to Valdez from crude oil tankers between 2008 and 2009 (NBIC 2012, Figure 3). Much of the reported increase in ballast water discharge was coastwise, i.e. ballast water that did not travel beyond the EEZ, and under USCG regulations was not required to be managed. The second difference, though, was a condition for Pacific nearshore voyages (including vessels in a Pacific coastwise trade that would not travel beyond the EEZ) to manage ballast water beyond 50 nautical miles from shore in waters more than 200 meters deep, if the ballast water was taken on within that distance to shore. The increased proportion of managed ballast water post-2008 may be a result of the VGP requirement for management by Pacific nearshore voyages. The VGP also included a provision for saltwater flushing to reduce the risk of nonnative species introductions. Saltwater flushing is the practice of adding water to a nearly empty ballast tank to mix with residual water through the natural movement of the vessel, then discharging the combined water (Albert et al. 2013).

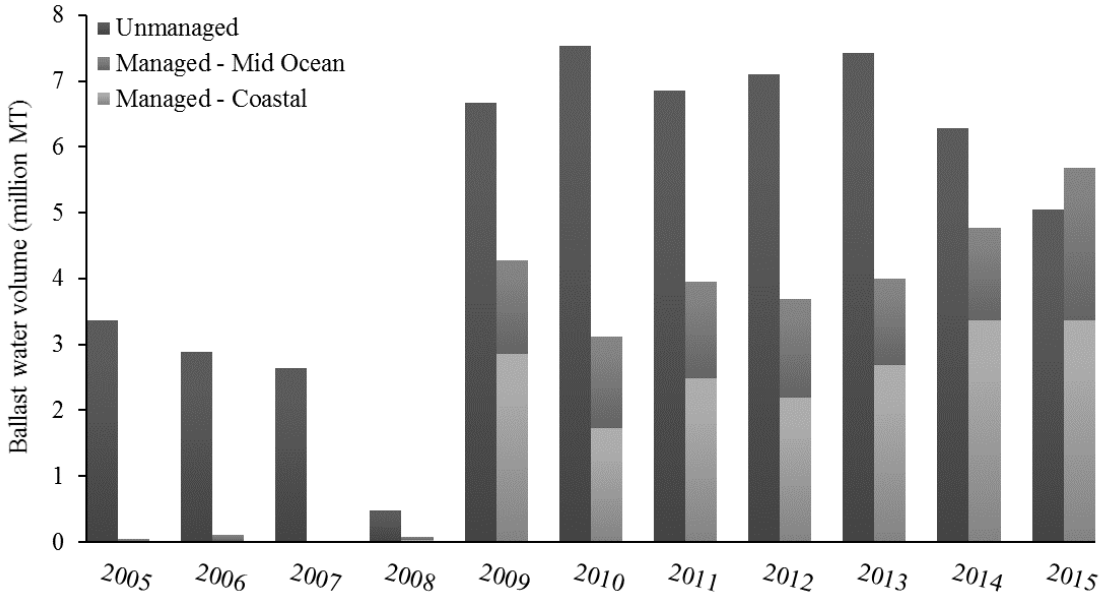

Figure 3. Volume (million metric tons) of managed and unmanaged ballast water discharged to Valdez from crude oil tankers, 2005 through 2015. Note the large annual differences prior to and after the VGP went into effect in December 2008. Figure adapted from the report 'Updated: Analysis of Crude Oil Tanker Ballast Water Data for Valdez & Prince William Sound, Alaska' presented to the Prince William Sound Regional Citizens' Advisory Council on April 25, 2016.

When the EPA released the 2013 VGP, it established numeric ballast water discharge limits identical to those by the USCG. These limits thus became applicable under federal regulations for crude oil tankers engaged in coastwise trade. The EPA does not require ballast water management systems that are installed for compliance with the VGP to receive approval from the USCG. Furthermore, the compliance dates for installing systems under the VGP have passed. However, the EPA and USCG have openly stated their intention to collaborate on ballast water management in the United States, including enforcement of the VGP (EPA 2011). As such, the EPA released a memo dated December 27, 2013, outlining an enforcement policy for vessels that did not comply with the installation dates in the VGP. If a vessel has received an extension from the USCG, and is not in compliance with the numeric discharge limits of the VGP but is otherwise in compliance, the EPA would consider the violation of the VGP a "low enforcement priority" (EPA 2013). The 2013 VGP also allows ballast water management via retention, use of a public water supply, or discharge to an onshore treatment facility[2].

[2] For a comprehensive review of the policy covered thus far as well as other actions taken to mitigate invasive species in the United States during this time see Verna & Harris 2016.

Both NANPCA/NISA and the CWA allow states to regulate ballast water discharge that occurs in their waters more stringently than federal standards (Albert et al. 2013). Several states have chosen to create such policies with an aim to further protect against the introduction of nonnative species; these regulations impact vessels arriving to or transiting between places within state waters. Of relevance to this report are California and Washington. Though Oregon also maintains a state-specific ballast water management program, waters of that state are not dominant ballast water source locations for tankers discharging in Valdez (see Figure 2).

5. West Coast State Policy

5.1 California

Efforts to reduce the introduction of nonnative species in California are led by the California Marine Invasive Species Program (MISP). Oversight and administration of the MISP is led by the California State Lands Commission (Commission), though the program is multi-agency and participants also include the California Department of Fish and Wildlife, State Water Resources Control Board, and the Board of Equalization. The MISP applies to vessels 300 gross registered tons and greater that are capable of carrying ballast water. The purpose of the MISP is to fill gaps in related federal regulations, as well as provide targeted regulations for the specific ballast practices and traffic patterns of vessels arriving to California (CSLC 2013). The MISP was initiated in 1999 with the Ballast Water Management for Control of Nonindigenous Species Act, prompted by legislation sponsored by California-based environmental groups (Dobroski et al. 2015). Crude oil tankers engaged in coastwise trade were provided an exemption to this Act, in accordance with the current USCG regulations. This exemption was removed when the Act was later reauthorized and amended by the Marine Invasive Species Act in 2003, likely to provide additional protection to California waters from nonnative species.

Ballast water regulations in California are similar but typically more stringent than federal counterparts. For example, California similarly requires vessels arriving from beyond the EEZ to conduct ballast water exchange at least 200 nautical miles from shore with an additional requirement that exchange be conducted in waters at least 2,000 meters deep. For those vessels carrying ballast water and arriving from a Pacific Coast Region port, California requires ballast water exchange at least 50 nautical miles from shore in water at least 200 meters deep. The Pacific Coast Region includes coastal waters extending to 200 nautical miles from shore east of

154° W (approximately the western side of Cook Inlet, Alaska) and north of 25° N (approximately three quarters of the length of Baja Peninsula) exclusive of the Gulf of California. The MISP provides fewer exemptions from ballast water exchange than federal regulations, though an exemption is provided for vessel safety such as inclement weather or a limitation in vessel design. In addition to exchange, the MISP allows ballast water management via retention, discharge to an onshore treatment facility, discharge in the same location as uptake (within one nautical mile), an approved alternative method, or use of a ballast water management system. Uniquely, the MISP charges vessels a per voyage fee to partially fund the state's program. The current fee is $850, though a recent proposal by the Commission would increase the fee to $1,000. The public comment period for this proposed regulatory change ended on November 7, 2016. California regulations also include a penalty for intentionally or negligently failing to comply with state reporting or management requirements up to $27,500 per violation per day. In addition, the Commission inspects a minimum of 25% of qualifying voyages for compliance with MISP requirements (both ballast water and biofouling). A vessel is more likely to be inspected on its first arrival to California, if it has had a previous violation, if it has not been boarded within the past 24 months, or if it has been previously flagged (CSLC 2013).

Analogous to the USCG and EPA, California has adapted its regulations over time as technology and global standards progressed. Numeric discharge limits for organisms in ballast water were established in the California Coastal Ecosystems Protection Act of 2006 (CSLC 2014). The current interim limits are: no detectable living organisms greater than 50 µm and less than 0.01 living organisms between 10 and 50 µm per milliliter, with additional limits for bacteria and viruses (Albert et al. 2013). As of January 1, 2016, these standards will be implemented on or after January 1, 2020 for newly built vessels and at the first drydock on or after January 1, 2020 for existing vessels. The final standards allow no detectable organisms for all size classes including viruses and bacteria (Albert et al. 2013); these final standards are to be implemented on January 1, 2030. Ballast water management systems used in California waters do not need to receive prior approval from the USCG.

California has several reporting requirements for vessel arrivals. First, vessels must report ballast water management activities using the federal Ballast Water Reporting Form. Until recently, vessels were required to submit reporting forms upon departure from each port in the state, with an aim to receive the most accurate information on ballast practices. However as of

January 1, 2016, reporting forms must be submitted 24 hours in advance of arrival at each port. Second, California requires vessels to submit a Ballast Water Treatment Technology Annual Reporting Form and a Ballast Water Treatment Supplemental Reporting Form. The former report, submitted annually, compiles data on treatment systems such as type, maintenance, and performance and must be submitted by vessels with onboard treatment systems that have or will discharge ballast water in California. The latter is submitted per treated discharge to provide information on treatment system use and maintenance for each voyage and must be submitted by any vessel that discharges treated ballast water (CSLC 2013).

5.2 Washington

Washington's ballast water management program was established in 2000 and is operated by the Department of Fish and Wildlife (WDFW) (WAC 220-150). The program applies to vessels 300 gross tons and greater that are capable of carrying ballast water. Washington laws and rules are similar to those of California, though not as strict, and also contain similarities to federal regulations. The most recent update to relevant Washington Administrative Code (WAC) occurred in June 2009, thus it is lacking some of the provisions that have been included in current versions of federal or California regulations. For example, Washington does not have state specific numeric discharge limits or an implementation schedule for such limits, though a placeholder is included in WAC 220-150-050. However, Washington does require vessels to manage ballast water via retention, use of a public water system, or ballast water exchange. Vessels arriving from beyond the EEZ must exchange ballast water at least 200 nautical miles from shore in waters at least 2,000 meters deep. Vessels engaged in a coastal voyage and not traveling 200 nautical miles or beyond from shore are required to conduct exchange at least 50 nautical miles from shore in waters more than 200 meters deep. Exchange is not necessary if the vessel is using a USCG approved ballast water management system. In addition, exchange is not necessary if the vessel is arriving to a port in Washington from within the state's common water zone[3] and has previously conducted an exchange as referenced above or if ballast water and sediments were sourced within the common water zone.

[3] The common water zone refers to "water or sediments that originated solely within the water of Washington State, the Columbia River system, or the internal waters of British Columbia south of latitude fifty degrees north, including the waters of the Straits of Georgia and Juan de Fuca" (WAC 220-150-040).

In comparison to federal regulations, Washington provides fewer exemption opportunities. A vessel may claim a safety exemption to ballast water management as a result of adverse weather, vessel design limitation, equipment failure, or an extraordinary condition (WAC 220-150-030). WDFW may charge a $500 administrative fee to assess these claims for compliance and may require the vessel to retain ballast water or discharge only the minimum amount necessary, possibly to an alternate location. WDFW regulations also retain the ability to require vessels to submit a temporary compliance plan or alternative strategy that outlines methods for aligning with state standards, while requesting a waiver to those standards up to two years. Such a plan might be necessary due to extenuating circumstances that do not allow for compliance, for example those addressed by a safety exemption. As of July 2016, WDFW had not used compliance plans as a tool (Glosten 2016).

Washington also sets standards for vessel reporting and inspections. Vessels must submit a USCG acceptable ballast water reporting form 24 hours prior to entering waters of the state, when transiting between Oregon and Washington ports on the Columbia River, and when transiting between ports within Washington, regardless of whether the vessel intends to discharge ballast water. If a vessel does not routinely, or ever, discharge ballast water they may request a reporting waiver from WDFW. Vessel inspections to ensure compliance with state laws may occur without notice, and WDFW intends to board between five and ten percent of vessels arriving to Washington ports as resources allow. Vessels identified to be carrying high risk ballast water will be maintained on a list and will be prioritized for inspection. High risk ballast water factors may include volume; frequency of discharge, prior violations, or safety exemption claims; source and management locations; and exchange effectiveness influenced by vessel design (see WAC 220-150-035 for a complete list). Similar to California, violations are subject to a penalty up to $27,500 per day.

Though the California ballast water program tends to be more robust than its Washington counterpart, both sets of regulations include similar provisions, including ballast water exchange requirements and basic reporting timelines. Both states provide fewer exemptions than federal programs and charge unique fees. Additionally, California intends to impose state-specific discharge standards and enforces a larger vessel inspection program.

6. Looking Forward

The evolution of ballast water management and invasive species policy is ongoing. USCG regulations are arguably the least likely to rapidly change, though as discussed they have minimal bearing on crude oil tankers. The current VGP, effective for a period of five years, will expire and be replaced in 2018. With notable exception for crude oil tankers and Pacific nearshore voyages, provisions for ballast water management within the VGP have largely aligned with the USCG to date. The 2018 VGP, however, is anticipated to differ. Responding to litigation brought against the 2013 VGP, the U.S. Second Circuit Court of Appeals found that the EPA "acted arbitrarily and capriciously" in, among other things, not considering more stringent numeric discharge limits and not considering the use of onshore ballast water treatment facilities (NRDC et al. v. EPA, 2015). The EPA will consider these options for the 2018 VGP, providing encouragement that a change in standards may bring greater protection against invasive species, while causing concern about the unpredictability of regulations owing to lawsuits and cyclical permits.

With an aim to unify standards across the nation, the Vessel Incidental Discharge Act (VIDA) has recurrently been introduced to Congress in various forms, recently as part of the Fiscal Year 2017 National Defense Authorization Act (NDAA). VIDA has gained support for its intent to create a national ballast water discharge standard under the single authority of the USCG, with consultation of the EPA, thereby removing the various overlapping ballast water regulatory programs currently in place. Opposition to VIDA has been extensive. Challengers note that VIDA applies to all discharges incidental to the normal operations of a vessel (including but not limited to ballast water) and would preempt states from regulating such discharges via state-specific programs. The effective removal of CWA regulations on vessel discharges and the decadal review of USCG ballast water standards has also raised concern. In a savings clause, VIDA does provide states the opportunity to petition for more stringent ballast water discharge standards if a compliant treatment system and detection technology are commercially available. The most recent attempt to pass VIDA failed when it was removed from the Senate version of the NDAA, thus maintaining the regulatory structure addressed here.

7. Conclusion

In general, the combination of multiple federal and state ballast water programs presents an intricate web of regulations. While many of the basic principles covering ballast water management are similar, each program provides unique variations or novel provisions that independently add complexity. This layered approach to policy is in part due to a growing awareness of the need to regulate ballast water, which has in turn progressed from authority granted to a single federal agency to various regulators promoting exclusive agendas and stronger enforcement mechanisms.

For crude oil tankers engaged in coastwise trade, the requirements for ballast water management can be summarized based on dominant vessel routes. As tankers deliver crude oil to refineries in California and Washington, they source ballast water that is subsequently discharged in Alaska. As discussed, Alaska's lack of a statewide ballast water program and exemption from USCG regulations indicate that these vessels are primarily subject to EPA VGP regulations while discharging ballast water in Valdez. The impact of VGP implementation beginning in 2009 suggests that comprehensive ballast water programs result in more accurate data collection and presumably are better suited to reduce risk of nonnative species introductions.

Vessels discharging ballast water to California and Washington, including crude oil tankers, are subject to more stringent standards than federal regulations with regards to potential fees, targeted inspections, limited exemptions, and future discharge standards (California only). Stricter discharge standards in particular are likely to influence the choice and installation of a ballast water management system by vessels transiting between California and Alaska. In this scenario, ballast water management systems installed by crude oil tankers must be able to meet the requirements of California interim standards (by 2020) that in turn would also meet the VGP requirements. Notably, neither the California or EPA management programs require USCG approved treatment systems. Likewise, Washington may influence treatment system choices if policies change to incorporate discharge standards. As ballast water management continues to shift from exchange toward numeric discharge limits, technology and policy forcing mechanisms such as those discussed here will presumably drive the behavior of industry.

Table 1. Quick-reference federal and select state ballast water regulations.

	USCG	**EPA**	**California**	**Washington**	**Alaska**
Ballast water management program	Yes	Yes	Yes	Yes	No
Ballast water management options under the program	• Retention • Public water source • Shoreside treatment • Onboard treatment • Exchange	• Retention • Public water source • Shoreside treatment • Onboard treatment • Exchange	• Retention • Shoreside treatment • Onboard treatment • Exchange • Discharge in same location as uptake	• Retention • Public water source • Onboard treatment • Exchange	N/A
Program contains numeric discharge standards for ballast water treatment systems	Yes	Yes – matches USCG	Yes – accepting current federal standard until 2020	No – accepting current federal standard	N/A
Ballast water exchange thresholds under the program	200 nm for overseas vessels	200 nm for overseas vessels, 50 nm for coastal vessels	200 nm for overseas vessels, 50 nm for coastal vessels	200 nm for overseas vessels, 50 nm for coastal vessels	N/A
Program applies to crude oil tankers engaged in coastwise trade	No	Yes	Yes	Yes	N/A

Table 2. Detailed federal and select state ballast water regulations, current as of November 2016.

	USCG	EPA	California	Washington
GENERAL				
Applicability	Non-recreational vessels equipped with ballast water tanks	Non-recreational vessel equipped with ballast water tanks	Vessels ≥ 300 gross registered tons capable of carrying ballast water	Vessels ≥ 300 gross registered tons capable of carrying ballast water
Exemptions	Safety Armed Forces Delay or deviation of voyage Transiting within one COTP Zone Crude oil tankers engaged in coastwise trade	Safety Armed Forces Delay or deviation of voyage Transiting within one COTP Zone	Safety Armed Forces	Safety (minimum $500 administrative fee) Armed Forces Water sourced within the common water zone
Fees	None	None	$850 per voyage	None
Recordkeeping				
Ballast Water Management Plan	Required	Required	Required	Required
Retain Records	2 years	3 years	2 years	2 years
Reporting Forms				
Per arrival:				
Ballast Water	No later than six hours after arrival	None	24 hours in advance	24 hours in advance
Ballast Water Treatment Supplemental	None	None	Upon departure	None
Annual reports:				
Ballast Water Treatment Technology	None	None	Once annually	None
Annual Report	None	February 28 of the following year	None	None
Onboard Ballast Water Inspections	A part of complete vessel inspections	None	Minimum of 25% of qualifying voyages	May occur, goal of 5-10% of vessels
Fines	Up to $35,000 per violation per day	Up to $20,000 per violation per day	Up to $27,500 per violation per day	Up to $27,500 per violation per day
BALLAST WATER EXCHANGE				
Exchange location				
Vessels traveling beyond EEZ	Beyond 200 nm	Beyond 200 nm	Beyond 200 nm in waters at least 2,000 meters deep	Beyond 200 nm in waters at least 2,000 meters deep
Vessels not traveling beyond EEZ	None	Beyond 50 nm for Pacific nearshore voyages	Beyond 50 nm for vessels in Pacific Coast Region	Beyond 50 nm for vessels from a Pacific Coast port

	USCG	EPA	California	Washington
BALLAST WATER TREATMENT				
Discharge limits			Interim[1]:	None
≥ 50 µm	<10 living organisms per m^3	<10 living organisms per m^3	No detectable living organisms	
< 50 µm and ≥ 10 µm	<10 living organisms per mL	<10 living organisms per mL	< 0.01 living organisms per mL	
< 10 µm			< 10^3 bacteria per 100 mL < 10^4 viruses per 100 mL	
Toxicogenic *Vibrio cholerae* (O1 & O139)	< 1 cfu per 100 mL	< 1 cfu per 100 mL	< 1 cfu per 100 mL	
Escherichia coli	< 250 cfu per 100 mL	< 250 cfu per 100 mL	< 126 cfu per 100 mL	
Intestinal enterococci	< 100 cfu per 100 mL	< 100 cfu per 100 mL	< 33 cfu per 100 mL	
Implementation date[2]				None
New vessels	On or after December 1, 2013	On or after December 1, 2013	On or after January 1, 2020	
Existing vessels			First drydock on or after January 1, 2020	
< 1500 m^3	First drydock after January 1, 2016	First drydock after January 1, 2016		
1500-5000 m^3	First drydock after January 1, 2014	First drydock after January 1, 2014		
>5000	First drydock after January 1, 2016	First drydock after January 1, 2016		

cfu = colony forming unit; COTP = Captain of the Port; mL = milliliters; nm = nautical miles

[1]To be implemented January 1, 2020.

[2]Vessels may apply for an extension to USCG implementation dates; if granted, upon review EPA may consider these vessels "low enforcement priority" for noncompliance with VGP compliance dates.

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