

# 475: Combating the Ongoing Threat of Aquatic Alien Species Through Ballast Water Risk Analysis



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## Introduction



An Example of a Microscopic Organism That Could be Transferred in Ballast Water

Hawaii has identified 346 non-indigenous marine algae and invertebrate species compared to approximately 450 non-indigenous marine algae and invertebrate species found on the continental coastline (Ruiz et al., 1997). Vessel biofouling and ballast water are the top two vectors responsible for more than 60% of species across 10 of the 12 major taxonomic groups (Davidson et al., 2014). Seen in the graph below, non-indigenous species (NIS) introduced via vessel borne vectors greatly outnumber non-vessel fouling vectors such as aquaculture. This begins to explain why Hawaii is such a hot spot for aquatic invaders.



Number of NIS Algae and Invertebrate Species By Vector (Davidson et al)

It is no surprise that, being an island state, Hawaii has an abundance of vessel traffic that ships more than 80 percent of consumer goods. It is estimated that in 2017 there were roughly 18,000 arrivals throughout the Hawaiian Islands. As a consequence, the inadvertent transfer of NIS to the state continues to pose a high risk to native species.



2017 Marine Traffic Route Density Map

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## 2018 Data Summary

There are seven major ports for large vessel arrivals throughout the Hawaiian Islands. The most popular port for arrivals, in 2018, was Honolulu, which received 628 reported arrivals.



Most of those arrivals retained their ballast water or did not have any ballast water on board. You can see here that only 11% of reported arrivals discharged their ballast water into the state.



Although the majority of ships did not discharge their ballast, 316,178 metric tons of ballast was still discharged in the state in 2018. Most of discharged ballast was sourced from the pacific region of North America which major ports including California, Washington State and Canadian ports.



48% of reported ballast water was treated through management options, the most popular being empty/refills, flow throughs, mid-ocean source or on-board management with USCG certified systems. The different types of on-board treatment systems were also recorded in the reporting forms. It should be noted that 52% of reported water was untreated, with 51% of those vessels claiming a safety exemption.



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## Risk Analysis



Hawaii DLNR/DAR has the authority to require data reporting and also has the ability to board vessels to sample for compliance but was missing a way to prioritize the vessel's biosecurity risk for further assessment. Therefore, a risk matrix was created in late 2018, using other studies as a reference, to establish a point system out of 100 for prioritizing these vessels. Prioritizing vessels is important in allocating limited resources to the more risky vessels.



After creating this point system, the 2018 discharge data was analyzed for risk. Eight vessels were classified high risk, 11 as medium risk and 28 as moderate risk. 53 were classified as low risk.

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## Ongoing Improvements

In the past, DAR's vessel ballast water data was incomplete, therefore data from the National Ballast Information Clearinghouse (NBIC) was used to supplement DAR's data set. This accounted for vessels that submitted to NBIC and not the state of Hawaii. Referenced below is the data discrepancy between DAR's received reporting forms and those received by NBIC in 2017 and 2018.



This check for compliance assumed that NBIC was receiving all forms from vessels arriving to the state. However, it was discovered that some vessels were not reporting to NBIC or DAR. This shows a larger compliance issue which prevents adequate risk analysis of all vessels. All reporting forms must be received by DAR in order to have a complete understanding of possible biosecurity risks.

In order to improve this in 2019, DAR has begun monitoring daily arrivals through MarineTraffic, a website that uses a ship's satellite system to track arrivals to Hawaii. This allows DAR to contact vessels and vessel agents directly to receive missing reporting forms, instead of using NBIC data to supplement gaps in DAR's data set.



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## About Ballast Water



A Vessel Discharging Ballast

To provide stability, ballast water is taken onboard by a ship when offloading cargo. The water is then carried to a new port and discharged when on-loading new cargo. If the ballast water is discharged untreated, it may introduce aquatic invasive species as well as pathogenic diseases that could destabilize natural ecosystems and incur negative human health and/or socioeconomic impacts.



(NOAA IMO)

To try and limit AIS introductions, ships are required under Hawaii Administrative Rules Chapter 13-76, to use the following ways to manage ballast water:

1. Ballast water management system
2. Use of a municipal water source
3. Onshore treatment of ballast water
4. Empty/Refill
5. Flow Through
6. No Ballast Water Discharge

Ships are also required to submit a "Ballast Water Management Report" 24 hours prior to their arrival in any Hawaiian port. The State's ballast water management report provides the State with information that allows a primary assessment to be performed that can indicate possible biosecurity risks.



The HI State Ballast Water Reporting Form

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## Conclusions & Works Cited



Next steps include implementing and ground-truthing this risk assessment using vessel inspections to sample ballast water. Samples can then be tested with the EPA Environmental Technology Verification (ETV) standard protocol or with an indicative rapid assessment tool to gauge compliance. The department is also working to increase capacity to perform more compliance inspections, better analyse ballast water data and limit the transfer of alien aquatic organisms in ballast water more successfully.

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