



## HAWAII INVASIVE SPECIES COUNCIL (HISC) FINAL REPORT FY19

**Project Title:** Ballast Water and Hull Fouling Project  
**Project Period:** April 2019 – Dec 2020  
**Content area:** Prevention  
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**Abstract:** Hawaii Revised Statutes §187A-32 was adopted in 2000 by the State legislature to designate Hawaii Department of Land and Natural Resources (DLNR) as the lead agency for preventing aquatic invasive species (AIS) introductions and spread in Hawaii through controlling vessel-borne vectors. HRS §187A-32 was an unfunded mandate and while Hawaii Administrative Rules Ch 13-76 was adopted by the Board of Land and Natural resources in 2007 for regulating ballast water discharge in Hawaii, the Division of Aquatic Resources (DAR) continues to lack the personnel capacity and operational resources to support a fully functional program for addressing these top pathways of invasive species arrivals to Hawaii. Furthermore, a looming implementation deadline under the Vessel Incidental Discharge Act (VIDA), signed into law December 2018, continues to draw closer with federal agencies in a similar capacity and operational funding challenge to the states for co-enforcing VIDA standards. This report documents how the HISC FY19 grant award (matched by the US Fish and Wildlife Service Aquatic Nuisance Species federal grant award) was used to continue to develop Hawaii's Ballast Water and Biofouling Program and seek necessary resources and capacity for minimizing "boatloads" of aquatic invasive species flowing into the State.

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## Key Accomplishments

- The State of Hawaii, along with New Zealand, Australia, the State of California, and Canada, were recognized internationally as ‘first-movers’ for controlling the invasive species biofouling pathway at a meeting held at the UN International Maritime Organization in London
- The Ballast Water and Hull Fouling Coordinator was appointed by the DLNR Chairperson and Governor’s Office to be Hawaii’s point of contact during state consultation on USCG VIDA ballast water enforcement standards
- Adoption of the Hawaii State [Senate Resolution 121](#) on urging all applicable state agencies to work together with interested stakeholders, including the Honolulu Harbor Users Group, in assessing the risk of aquatic invasive species to Hawaii, vectors, and possible mitigations, in preparation for the establishment of new federal standards in 2022
- Hosted an Aquatic Alien Organism Stakeholder meeting jointly with DOT Harbor’s Division on aquatic biosecurity and VIDA, which led the collective support of the amended Aquatic Biosecurity Bill ([Senate Bill 2935 SD1](#)) introduced in 2020
- Finalized the [Recreational Vessel Biofouling Management Best Practices](#) outreach document with the subgroup of the Western Regional Panel Coastal Committee
- Hosted an international stakeholder meeting on biofouling management and VIDA with CGAPS, where international and state regulators from Australia Department of Agriculture and Water Resources, New Zealand Ministry for Primary Industries, California State Lands Commission presented on their successful biofouling management programs and provided considerations for Hawaii regulators
- Conducted outreach/educational field trips for congressional staff representing the offices of Representative Gabbard and Senator Hirono with CGAPS and Sause Brothers
- Worked collaboratively with Marisco and state/federal government partners in Hawaii and Washington State to minimize aquatic alien species introductions into Hawaii during the transfer of the company’s dry-dock which accumulated more than 50 years of biofouling in Washington
- Completed the development of ballast water discharge risk assessment matrix for vessel boardings
- Efficacy tested a rapid assessment tool for monitoring ballast water discharge compliance
- Drafted preliminary in-water cleaning and grooming regulatory decision tool framework
- Supported the successful completion of the BW and BF Kupu Intern (Oct 2018 -August 2019) and hired a new Kupu Intern (October 2019 – August 2020)
- A temporary civil service Aquatic Biologist IV was hired to support field aspects of the BW and BF Program

## Introduction

Vessel traffic, not limited to commercial and recreational vessels, continue to arrive in Hawaii's ports, each possessing an unknown level of biosecurity risk to nearshore natural habitats. Various studies spanning several decades have indicated that vessel biofouling and ballast water are the top two vectors of aquatic non-indigenous species introductions into the State (Davidson et al. 2014) associated with nearly 80% of 346 established aquatic non-indigenous algae and invertebrate species (Eldredge and Carlton 2009). While only a handful of aquatic non-native species established in the State are considered invasive, there are numerous examples of the level of detriment a single invader can have on the local economy, wellbeing of residence, and Hawaii's unique ecosystems—invaders are incredibly costly to control and generally impossible to eradicate once established.

Hawaii Revised Statutes §187A-32 was adopted in 2000 by the State legislature to designate Hawaii Department of Land and Natural Resources (DLNR) as the lead agency for preventing aquatic invasive species (AIS) introductions and spread in Hawaii through controlling vessel-borne vectors. However, HRS §187A-32 was an unfunded mandate and while Hawaii Administrative Rules Ch 13-76 was adopted by the Board of Land and Natural resources in 2007 for regulating ballast water discharge in Hawaii (a significant milestone), the Division of Aquatic Resources (DAR) continues to lack the personnel capacity and operational resources to support a fully functional program for addressing these top pathways of invasive species arrivals to Hawaii. Furthermore, a looming implementation deadline under the Vessel Incidental Discharge Act (VIDA), signed into law December 2018 inches closer with the federal agencies in a similar conundrum, where capacity and resources are limiting for co-enforcing VIDA standards with their state counterparts; therefore, the necessity to support capacity needs and budget requirements for the State Ballast Water (BW) and Biofouling (BF) Program under DLNR, DAR is more important than ever before.

### Vessel Incidental Discharge Act Summary:

- Signed into law December 4<sup>th</sup>, 2018
- Transfers state authority of 28 vessel incidental discharges of commercial vessels to the EPA and USCG
- Affects the State's ability to control vessel pollutants and invasive species
- EPA to develop discharge compliance standards by December 4<sup>th</sup>, 2020
- USCG to develop enforcement standards by December 4<sup>th</sup>, 2022
- States are preempted from adopting more stringent standards
- States retain co-enforcement ability with USCG
- USCG and states are limited in personnel and operating funds to co-enforce VIDA
- States are preempted from adopting a vessel fee/levy to support co-enforcement efforts
- Commercial fishing vessels are required to comply with ballast water discharge standards, but are exempt from complying with all the other discharge standards

This report documents the achievements of the BW and BF Program associated with the HISC FY19 grant award—matched by the US Fish and Wildlife Service Aquatic Nuisance Species federal grant award.

## Personnel/Capacity

### Hawaii Ballast Water and Biofouling Program Personnel

During the grant period, Hawaii's BW and BF Program personnel was composed of a full-time BW and BF Coordinator position, a full-time Kupu Intern, and a University of Hawaii volunteer working towards the completion of her senior thesis. The Coordinating Group on Alien Pest Species and Aquatic Invasive Species (post-border) field team contributed significantly to Program initiatives. The majority of the FY19 funds were used to contract Hawaii's Ballast Water and Hull Fouling Coordinator, provide travel support, as well as purchases for field and lab supplies/equipment. The Kupu Intern position was funded by the US FWS ANS grant. Together, the Coordinator and Kupu Intern addressed many BW and BF action items described in the Hawaii Interagency Biosecurity Plan (HIBP). Towards the end of 2019, a temporary civil service Aquatic Biologist IV was hired to support field aspects of the BW and BF Program.

### Working Groups

The BW and BF Coordinator was involved with multiple working groups at a local, national and international level as ballast water and biofouling vector challenges required local, national and international solutions. Therefore, the Coordinator prioritized participation in working groups as a high priority to develop solutions and accomplish joint initiatives collaboratively due to the Program's limited capacity. Some working groups were exclusive and inclusive of city & county/state/federal government agencies, maritime industry representatives, small boat owners, scientists, NGOs and at times, a combination of one or more stakeholders. These groups meet regularly bi-monthly, monthly, quarterly, annually, and as needed. A list of presentations delivered by the Coordinator at meetings/conferences/workshops can be found in the Outreach and Education section. Provided below is a summary table of the working groups and their general purpose.

<b>Local</b>	<u>Hawaii Ocean Safety Team (HOST)</u> – develop maritime safety practices and address aquatic biosecurity  <u>Ocean Resources Management Plan (ORMP) Working Group</u> – protect/conservate/support infrastructure for nearshore coastline to deal with climate change, aquatic invasive species, pollutants/runoff  <u>HISC-CGAPS Strategic Plan Working Group</u> – develop HISC-CGAPS strategic plans to address aquatic and terrestrial biosecurity in Hawaii  <u>Natural Resources Advancement Team (NRAT)</u> – support DLNR civil service and contract staff in leadership roles working on state and federal legislative projects, including participating in Halau Ohia Leadership Course  <u>30x30 Strategic Plan WG</u> – develop DAR 30x30 strategic plan inclusive of aquatic biosecurity, fisheries management, and coral restoration
<b>Regional</b>	<u>Western Regional Panel Aquatic Nuisance Species Coastal Committee (WRPCC)</u> – collaborate on aquatic biosecurity initiatives with Pacific regional states  <u>Washington Department of Fish and Wildlife Ballast Working Group (WDFW BWG)</u> – collaborate on regional solutions and provide/receive consultation

	<u>California State Lands Commission Technical Advisory Group (CSLC TAG)</u> - collaborate on regional solutions and provide/receive consultation
<b>National</b>	<p><u>EPA VIDA Consultation Group</u> – provide informal/official state consultation to EPA for developing VIDA compliance standards</p> <p><u>USCG VIDA Consultation Group</u> – provide informal/official state consultation to USCG for developing VIDA enforcement standards</p> <p><u>HI/SERC National Ballast Information Clearinghouse Pilot Study Working Group</u> – provide informal consultation to SERC for developing a data portal for transferring ballast water reporting forms and relevant data in real-time as it relates to VIDA and state/USCG co-enforcement efforts</p> <p><u>NRL-USCG Aquatic Nuisance Species Working Group</u> – provide/receive consultation to working group on topics related ballast water and biofouling biosecurity concerns</p>
<b>International</b>	<p><u>Biofouling International Regulators Discussion (BIRD)</u> - collaborate on biosecurity initiatives with Pacific regional countries/areas including representatives from federal and state agencies in New Zealand, Australia, Canada, California, and US EPA</p> <p><u>Alliance for Coastal Technologies In-water Cleaning Science Advisory Group (ACT)</u> – provide consultation to the working group on topics related to efficacy testing of vessel in-water cleaning capture systems and non-capture systems of macrofouling and microfouling organisms</p> <p><u>Vessel Check 2.0 Working Group</u> – biosecurity risk assessment tool for vessel biofouling and database storage</p>

## Federal and State Legislation

### Federal Vessel Incidental Discharge Act

Commercial vessels are currently regulated for 28 incidental discharges, under the EPA Vessel General Permit, including ballast water and hull husbandry effluent. “Hull husbandry effluent” discharge is composed of biological and chemical debris created during biofouling management/cleaning operations, better known as “in-water cleaning discharge”. In some cases, ballast water and hull husbandry effluent discharges are hardly incidental and have serious implications to Hawaii and other states’ coastal ecosystems in relation to aquatic alien species introductions and water pollution. Since the VGP was not protective enough for certain states due to the nature of standards relying on “best management practices” and “best available technology” rather than numerical compliance standards, many states adopted standards that were more stringent than the VGP. Another reason that states developed more stringent standards was due to the unique waterways, aquatic resources, biosecurity and water pollution challenges that each state possessed. As a result, a patchwork of regulations/policies and state/federal government agencies, which were meant to protect individual states, posed an operational burden to the commercial maritime industry, resulting in the push for developing a national set of compliance and enforcement standards for governing the 28 vessel incidental discharges; this was concerning to many state authorities as this meant state agencies would lose their ability to develop more stringent standards if the finalized VIDA standards were not protective enough. For over a decade, VIDA has gone through countless iterations and was signed into law on December 4<sup>th</sup>, 2018. In summary, VIDA stipulates that:

- State authority over 28 vessel incidental discharges of commercial vessels will be transferred to the EPA and USCG which will have implications to the State’s ability to control vessel pollutants and invasive species
- The EPA is to develop and finalize standards for 28 incidental discharges by December 4<sup>th</sup>, 2020
- The USCG is to develop enforcement standards for 28 incidental discharges by December 4<sup>th</sup>, 2022
- The EPA and USCG are required to hold consultation meetings with state authorities during the development of VIDA standards
- Specific to Hawaii, vessels discharging BW intra-/inter-island must manage their ballast water to minimize new introductions and their spread in the State
- The USCG are required to create a reporting form data portal for states to access reporting forms in real-time
- States can continue to require vessels to send reporting forms at least 24hrs prior so state/federal enforcement authorities can prioritize vessel boardings
- States are preempted from adopting more stringent standards
- States retain co-enforcement ability with USCG
- States are preempted from charging a vessel fee/levy to support co-enforcement efforts thereby suggesting that funds will need to come from another source
- Commercial fishing vessels are required to comply with ballast water discharge standards, but are exempt from complying with all the other incidental discharge standards

As part of the state consultation requirements described in VIDA, the BW and BF Coordinator was designated as the point of contact by the DLNR Chair, under the request of the USCG in DC headquarters and subsequently Governor Ige's Office through a letter from the USCG. The role of this person provides State consultation on ballast water and biofouling topics to the USCG as well as coordinates information sharing with local state agencies as well as their participation in relevant meetings hosted by the USCG during the State consultation period for developing VIDA enforcement standards.

#### EPA Consultations

During EPA consultation meetings, EPA presented broadly on how they might draft the standards, suggesting some of their inspiration will be taken from the 2013 VGP. They also asked states for ideas and suggestions for compliance standards supported by "science" and "best available technology". The Coordinator provided relevant literature and developed a framework for compliance standards related to hull husbandry effluent which took into consideration the unique geographical aspects of the State of Hawaii and shared it with the EPA.

#### USCG Consultations

During the USCG meetings, which were specifically focused on ballast water discharge, the Coordinator similarly provided input and considerations for enforcement standards protective of Hawaii. The USCG requested the following information from state representatives and the Coordinator provided the following response:

- 1. Does your state have an established ballast water program or is under development?**
  - Hawaii's Ballast Water Program is a hybrid of being established and under development. We have State statutes and rules regarding BW, but are working towards increasing capacity (personnel).
- 2. A (very) brief description of your program**
  - Hawaii's Ballast Water Program aims to minimize aquatic alien species introductions into State waters as well as their transfer inter-island. Our Program is equipped with BW reporting form database and risk matrix, lab instrumentation and expertise for measuring BW compliance for the >50um and 10-50um size class following ETV Protocol. Our strength is in science-based evidence collection using viability assays (methodologies) to interrogate BW; we've invested in developing this ability because we feel strongly about ground-truthing reporting forms and data logs in order to assist as many vessels as possible in reducing their BW biosecurity risk.
- 3. How the program was established (i.e. through state law, regulation, etc.)**
  - In 2000, Hawaii Revised Statutes 187A-32 (HRS 187A-32) designated DLNR, DAR as the leading state agency for addressing ballast water and biofouling biosecurity risks. In 2007, Hawaii Administrative Rules Ch13-76 (HAR Ch13-76) was adopted to provide regulatory authority to DLNR, DAR for requiring vessels to send BW reporting forms 24 hours in advance of their arrival, to board vessels to review logs/documentation and sample ballast water and sediment, and to take action if a vessel is out of compliance.
- 4. How any ballast water enforcement is currently conducted**



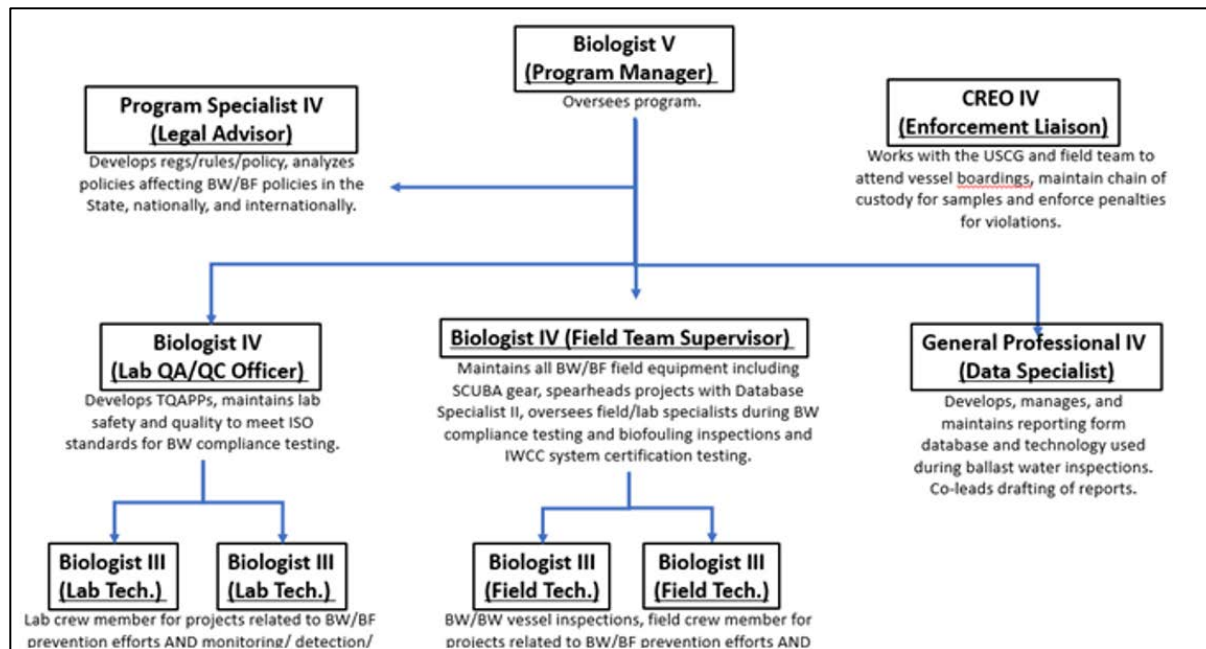
- Due to our limited capacity, we board around 4-5 vessels/year opportunistically and usually in coordination with the USCG to learn about safety and enforcement on various types of vessels. However, we vet 100% of the ballast water reporting forms received (using NBIC and Marine Traffic), and we correspond regularly with vessel operators to provide guidance.

During another USCG VIDA Working Group meeting, Hawaii was invited by the working group Chair to present on the State's BW and BF Program capabilities (next to the State of California and Michigan) to share possible avenues and ideas for co-enforcement. The USCG has also shared helpful tools and information that could help with prioritizing vessel boardings with the states (i.e.: [Sea Vision](#) and [DHS Ship Arrival Notification System \(DHS SANS\)](#)).

The Coordinator also reached out to the National Ballast Information Clearinghouse (NBIC) database managers at the Smithsonian Environmental Research Center in Maryland to aid in the development of a data portal for states under VIDA purview. With the help of 2 previous Kupu interns and 1 current one, the team engaged in testing various iterations of the NBIC platform and data analysis tool and provided feedback on where the software could be improved to support data sharing with states—this project is ongoing. This project was made possible by attending national and international conferences where the Coordinator met and discussed the idea with the NBIC Program Director on multiple occasions.

### State Biofouling Resolution

The Coordinator created a draft Ballast Water and Biofouling Program strategy, deliverables, personnel and budget requirements in preparation for implementing HRS 187a-32 and state/federal co-enforcement efforts under VIDA. The strategy included the need for 10 FTE positions, shown below, and nominally \$471K in the first year, \$661K in the second year, \$674K in the third year, and \$680K in the fourth year to support personnel and actions items related to managing the ballast water and vessel



biofouling vectors of aquatic non-indigenous species introductions and transfer to and within the State for all vessel types (e.g.: mobile marine infrastructure, recreational vessels, fishing vessels, research vessels, commercial vessels, etc.). The strategy was also inspired by the need to fulfill action items described in the Hawaii Interagency Biosecurity Plan, DAR AIS Management Plan, Hawaii 30x30 Resources Management Plan, and Hawaii Ocean Resources Management Plan. During the 2019 State legislative session, the strategy was drafted into a state legislative bill and later adopted as [Senate Resolution 121](#).

## State Aquatic Biosecurity Bill

### International Aquatic Alien Organism Stakeholder Meeting on Biofouling Management and VIDA

Following the adoption of the SR121, the Coordinator and CGAPS jointly hosted a state and federal regulators meeting in April 2019 on biofouling management where international and state regulators from Australia Department of Agriculture and Water Resources, New Zealand Ministry for Primary Industries, California State Lands Commission were guest speakers invited to present on their successful biofouling management programs for stimulating conversation on VIDA compliance standards and state-federal implementation of those standards. The meeting was well attended by representatives from California Water Resources Control Board, and MARAD, US EPA, and USCG from DC headquarters as well as local state and federal agencies: DOH Clean Water Branch, DOT Harbors Division, scientists/researchers, CBP, NOAA, USFWS, and USCG. Many questions surrounding what vessels can and cannot discharge were discussed as well as enforcement capacity limitations among state and federal agencies. Since the EPA and USCG were still in the early stages of developing VIDA standards, the representatives were unable to respond to certain inquiries, however it was stated that the compliance standards would be evidence-based and reliant on best available technology. The EPA and USCG representative also provided their contact information to the group for later insight.

### Aquatic Biosecurity and VIDA Fact Finding Meeting

In addition to the international meeting described above, the Coordinator and Deputy Director of DOT Harbor's Division met frequently in 2019 after the legislative session to discuss the importance of aquatic biosecurity in Hawaii, VIDA implementation challenges, provide input on the Director's white paper to the Hawaii Harbor's User Group describing the above issues, as well as to plan a joint stakeholder meeting to discuss VIDA and adopt a solution to manage ballast water and vessel biofouling vectors of aquatic alien transfer in Hawaii.

In November 2019, DOT and DLNR co-hosted a local stakeholder meeting at a conference room in DOT Harbor's Division on Aquatic Biosecurity and VIDA fact-finding, where Dr. Celia Smith, Dr. Mike Hadfield (experts in the field of Hawaii aquatic invasions), each presented on aquatic invasive species' and their detriment to Hawaii's economy, residents' quality of life, and environmental impacts. CGAPS presented an overview of VIDA, USCG presented on their enforcement abilities and capacity limitations, and the Coordinator presented on identifying solutions for streamlining VIDA implementation and co-enforcement capacity building.



Participants included maritime industry representatives from HHUG as well as representatives from other federal agencies NOAA, USFWS. DOH CWB was also invited. A discussion ensued regarding a state legislative bill that would support the BW and BF Program's capacity/personnel needs and operational budget and a collective agreement among the group suggested that the issue of aquatic biosecurity in the State needed to be addressed and capacity/budget requirements should be supported. With the help of state legislators, DOT, maritime industry representatives, CGAPS, and DLNR, an Aquatic Biosecurity Bill was introduced during the 2020 State legislative session. The bill passed First Reading and Second Reading with the help of DOT and members of the maritime industry, resulting in [Senate Bill 2935 SD1](#). Unfortunately, COVID-19 paused the legislative session and inevitably killed the bill due to the session never reconvening. However, the collaborative efforts in 2019 were significant in building trust and communication among stakeholders which supports solution development and implementation.



## Enforcement and Voluntary Compliance

### Ballast Water

Under HAR Ch13-76, qualifying commercial vessels arriving to Hawaii are required to send their ballast water reporting forms to DLNR, DAR 24 hrs prior to their arrival; this information is used to prioritize vessel boardings and aid in identifying where the BW and BF Program should prioritize their outreach/assistance to aid vessel operators in meeting compliance.

The information included in the reporting form include vessel name and other identifying information, ballast water volume, total ballast water capacity, number of tanks on ship, ballast water management system installed, arrival port, arrival date, last port of call, next port of call, total ballast capacity and number of tanks, number of tanks currently in ballast, and number of tanks planning to be discharged. If the vessel indicates that it plans to discharge BW, the operator must complete the latter portion of the form (not pictured here) for each ballast tank. The information includes the geographic location of the uptaken ballast water, how it was managed/treated (i.e. open ocean exchange, UV treatment system, chlorination, etc.), and where it will be discharged. The data is then cross checked with the National Ballast Clearinghouse (NBIC) data and Marine Traffic. NBIC is the federal BW reporting site and Marine Traffic is a software that the Program has subscribed to for tracking vessels in real-time.

Currently, qualifying foreign and domestic commercial vessels are required to submit their reporting forms to NBIC under USCG BW regulations. However, the federal regulations do not require submission 24 hrs prior to the vessel's arrival leaving little to no time for states to prioritize vessel boarding. In addition, the data from the reporting forms submitted to NBIC is posted onto their website for public access with a delay of up to 30-days, as data is being verified by their the NBIC data specialists. As a result, DLNR, DAR and other states with BW programs implemented a policy requiring vessels to submit their reporting forms directly to the agency as well as 24 hrs in advance of the vessel's arrival.

The BW reporting forms submitted in 2019 were carefully validated, compiled, archived and analyzed by the Kupu Intern data specialist. In 2019, a total of 932 vessels reported arriving into a harbor or moored offshore within the State of Hawaii. A subset of the analyses were cherry-picked for this report.

OMB number 1625-0069  
Exp. date: 31-Dec-2018

### Ballast Water Management Report

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#### Vessel Information

Vessel name			
ID number	IMO number		
Country of Registry	Select country		
Owner/operator			
Type	Select vessel type	Gross Tonnage	
Ballast water volume units	Select units		
Total ballast water capacity		Number of tanks on ship	
Onboard BW Management System			

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#### Voyage Information

Arrival port (port and state)	Select state		
Arrival date			
Last port (port and country)	Select country		
Next port (port and country)	Select country		
Total ballast water on board		Number of tanks in ballast	
		Number of tanks discharged	
Alternative BW management conducted, per instructions from COTP <input type="checkbox"/>			

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#### Certificate of accurate information

By checking this box, I attest to the accuracy of the information provided and that ballast water management activities were in accordance with the ballast water management plan required by CFR 151.2050(g). ☐

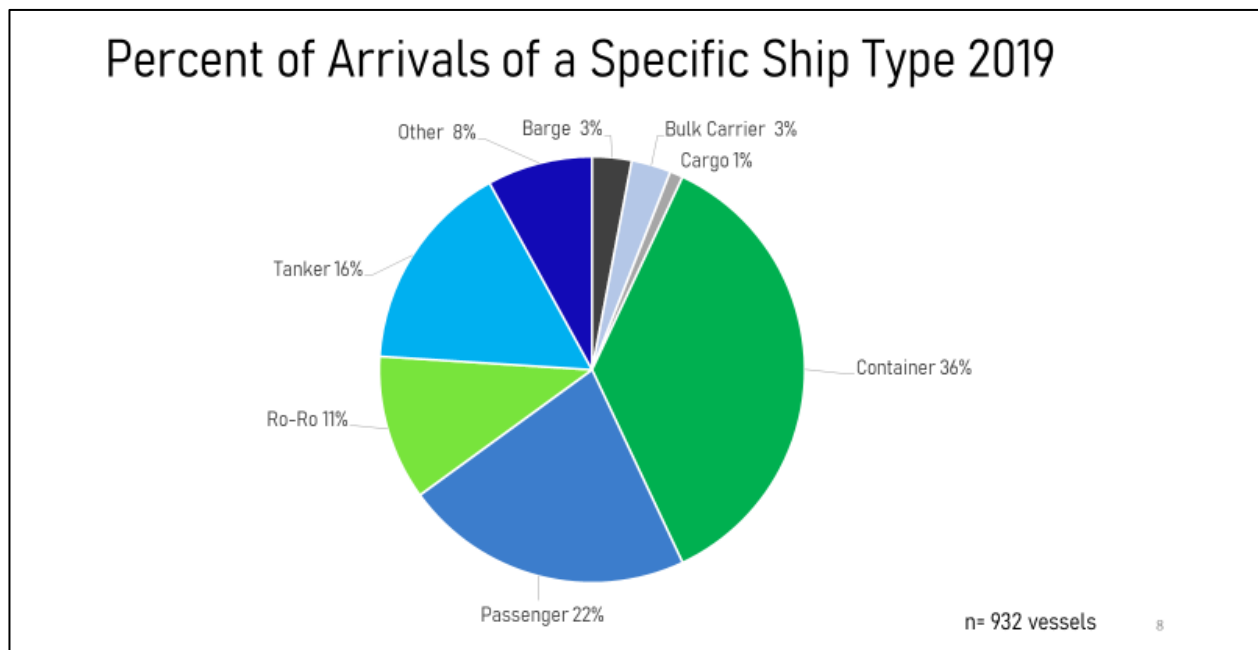
Responsible Officer's name and title			
Report type	Select report type		
Submitted by		Contact information	

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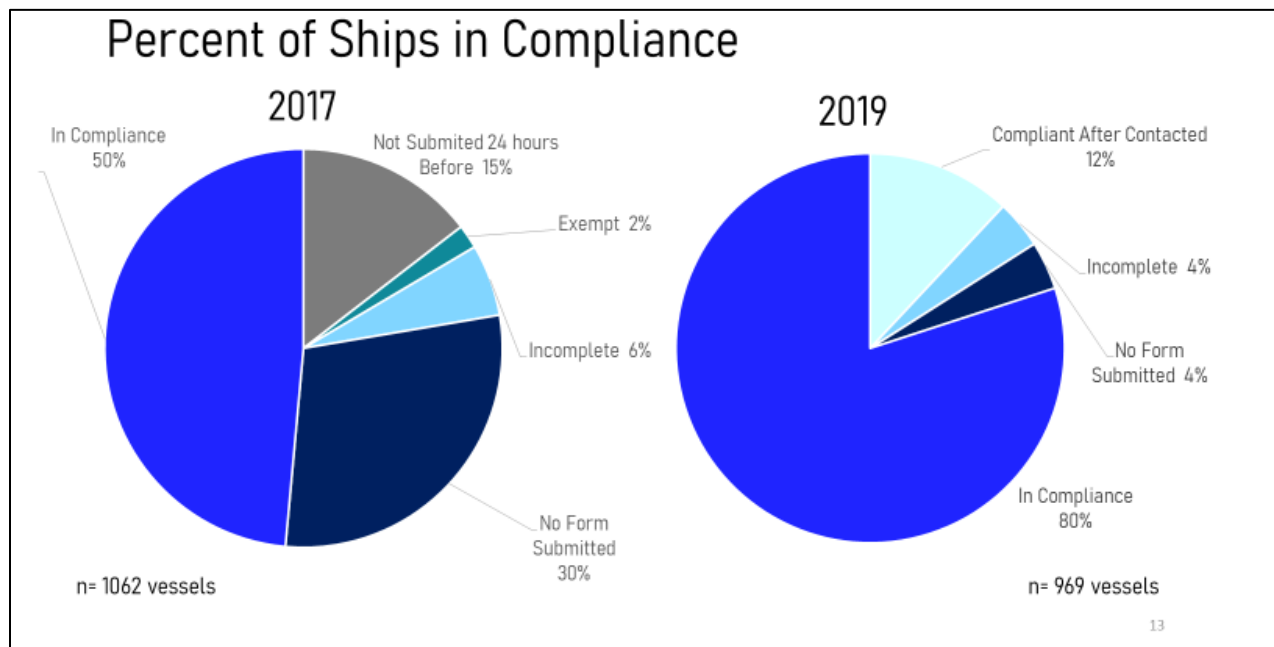
#### Ballast Water History

On the following page(s), provide the ballast water history for each tank discharged into the waters of the United States or to a reception facility, en route to or at the arrival port. Vessels entering the Great Lakes or Hudson River (north of George Washington Bridge) from beyond the US EEZ must also provide the history for empty tanks that underwent alternative management.

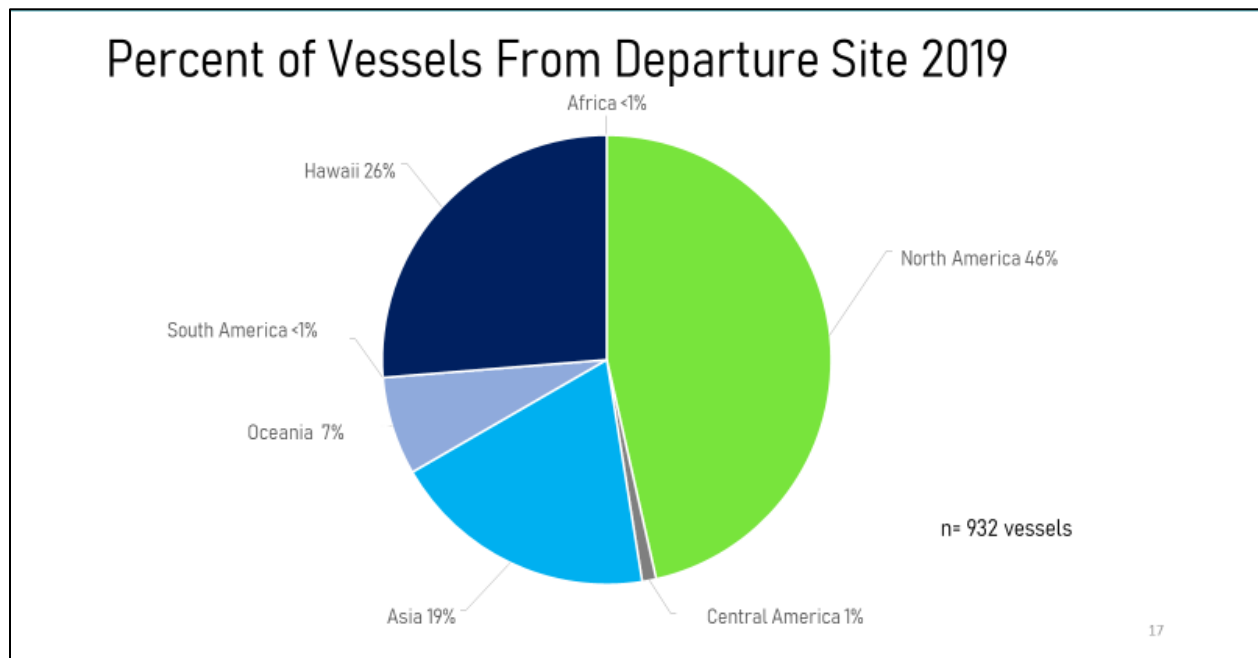
Slide 8 shows the majority of vessel arrivals in Hawaii are container ships, RO-ROs, tankers, and passenger vessels.



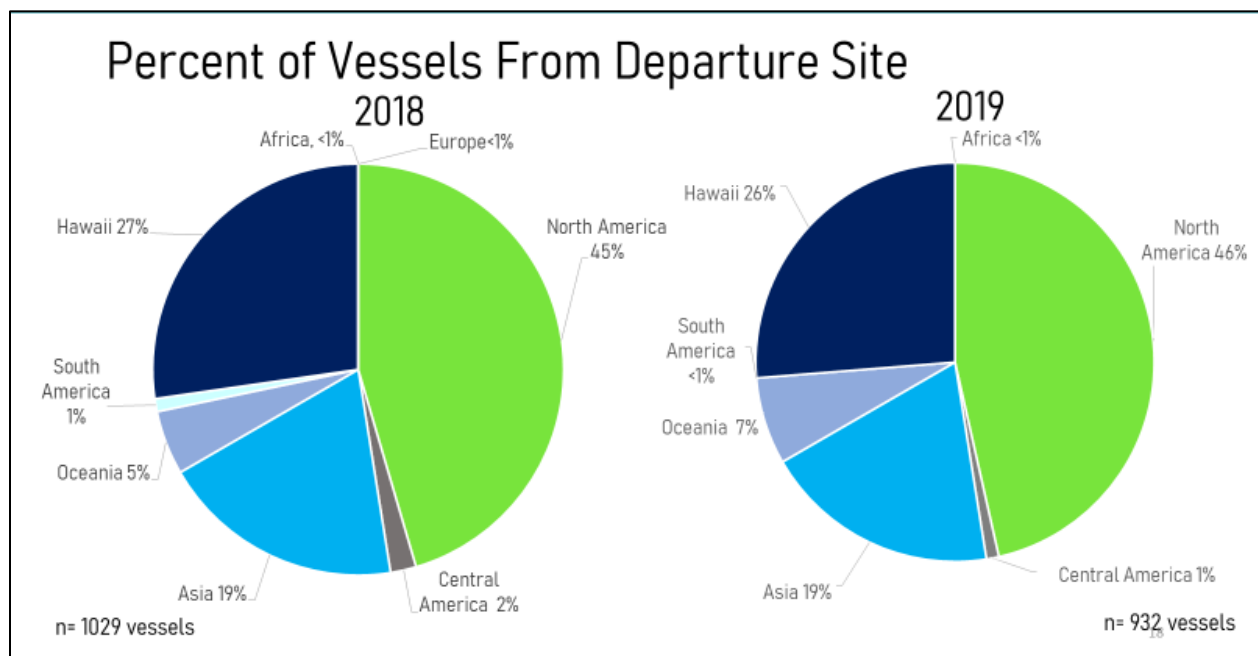
Slide 13 indicates that BW reporting form compliance went from 50% in 2017 to 80% in 2019—a significant improvement, suggesting communication between the Program and vessel operators/agents aided with the increase.



Slide 17 suggests that vessels arrive from around the world, but the majority are departing from the continental US, a location within Hawaii, and Asia. (Note: Under HAR Ch 13-76, inter-island travel and BW discharge submissions are voluntary and therefore suggests that the diagram in slide 17 does not provide a full representation of the inter-island commercial vessel travel and BW discharges—a concern for the spread of aquatic invasive species inter- and intra-island).

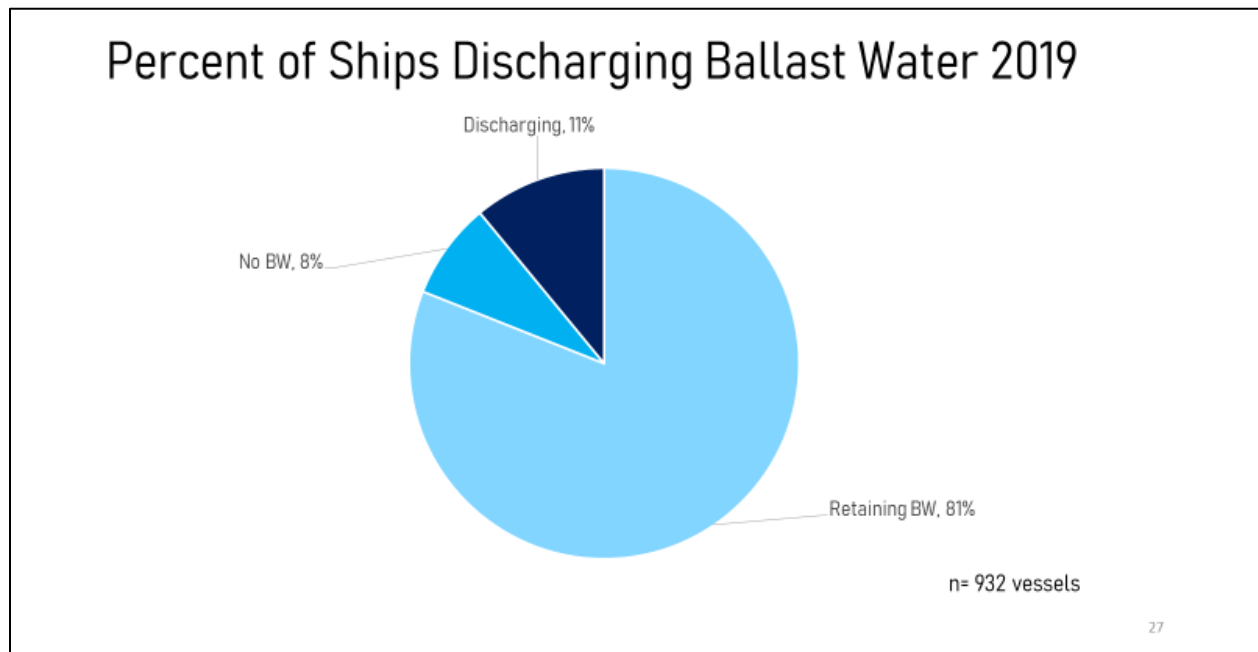


Slide 18 compares 2018 to 2019 data suggesting a relatively similar trend between the two years.

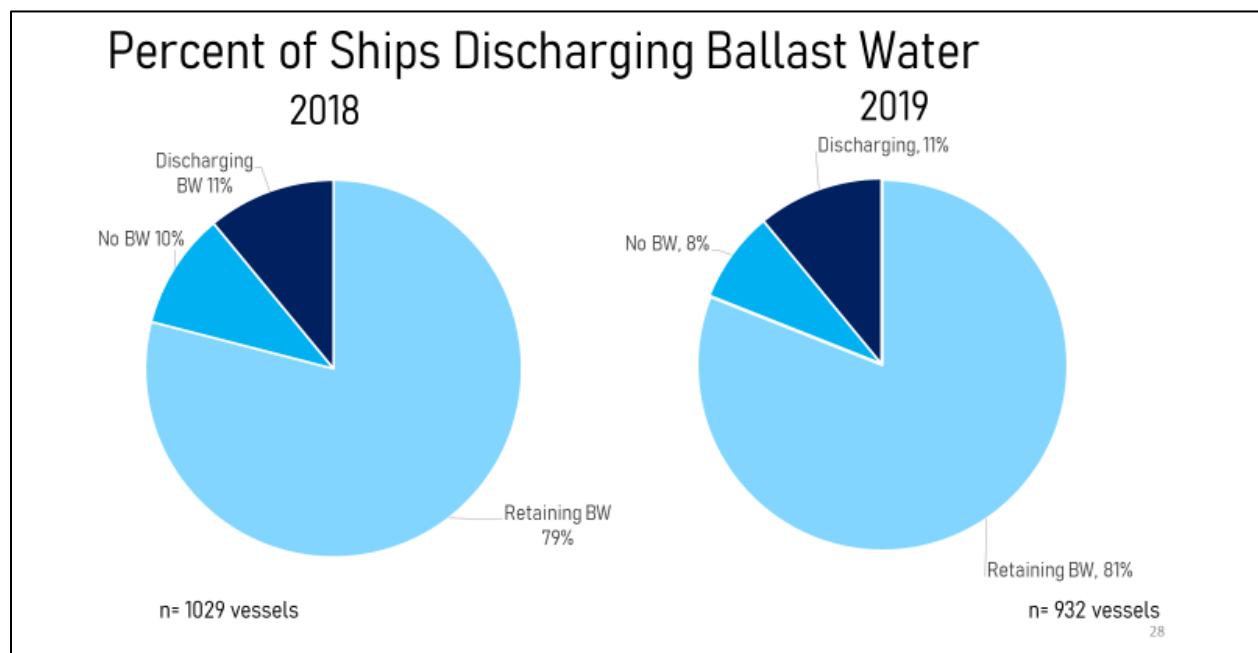




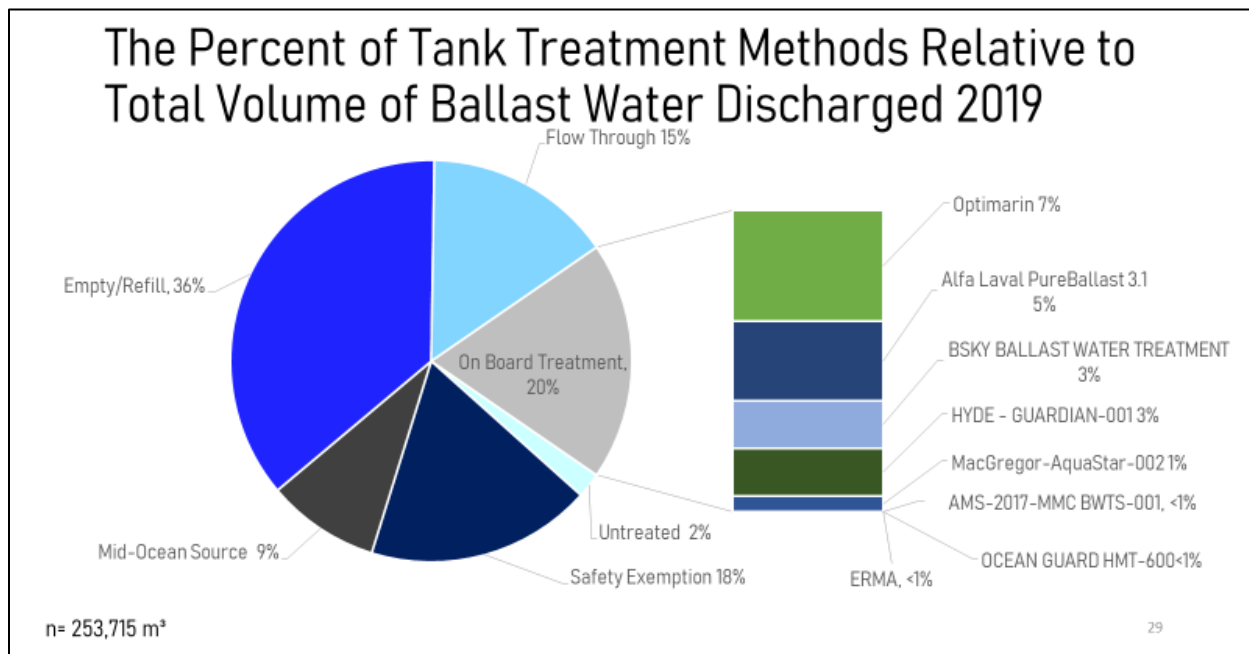
Slide 27 indicates around 81% of the vessels arriving to Hawaii are carrying BW but retaining their load (not discharging), whereas 11% is discharging.



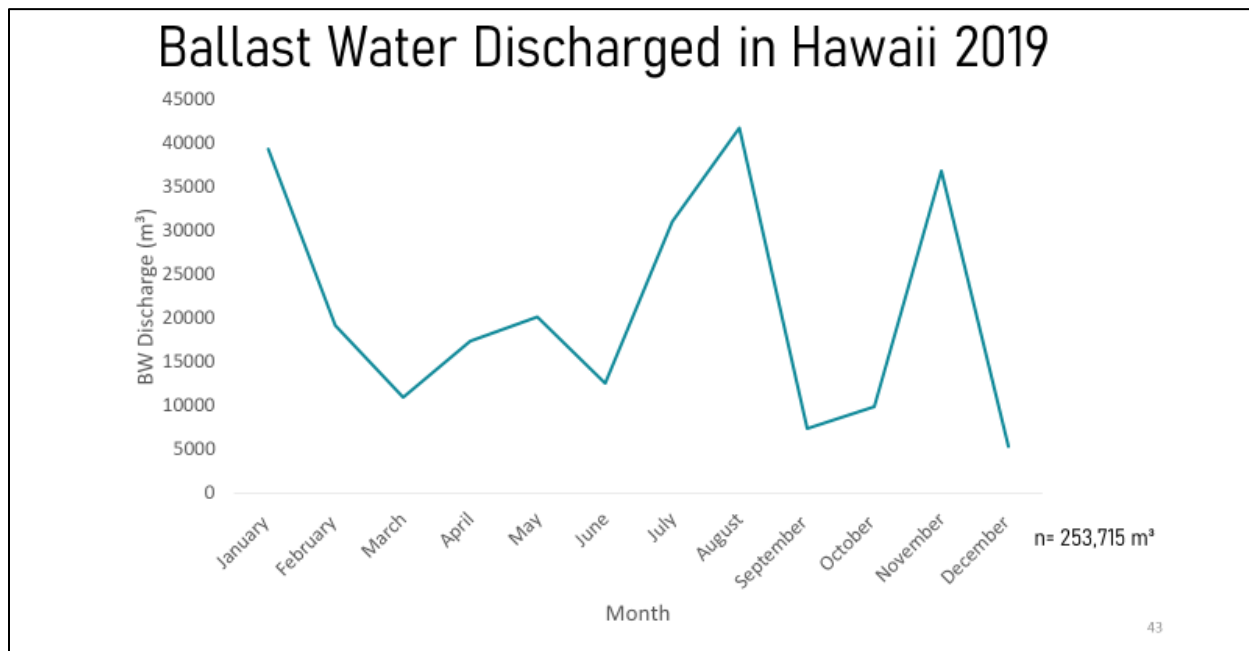
Slide 28 shows a similar trend of vessels retaining BW between 2018 and 2019.



Slide 29 further analyzes how BW discharged in Hawaii is managed/treated prior to discharge. The data indicates that 2% (out of a total volume of 253,715 cubic meters) was discharged into the State without any management/treatment efforts, while the overwhelming majority is managed by a USCG approved method—a good sign. In most cases, the vessels that discharged unmanaged BW claim ‘safety exemption’. However, it would be prudent for the Program to work with these vessel operators and managers to develop a solution for managing their ballast water that does not compromise their safety.

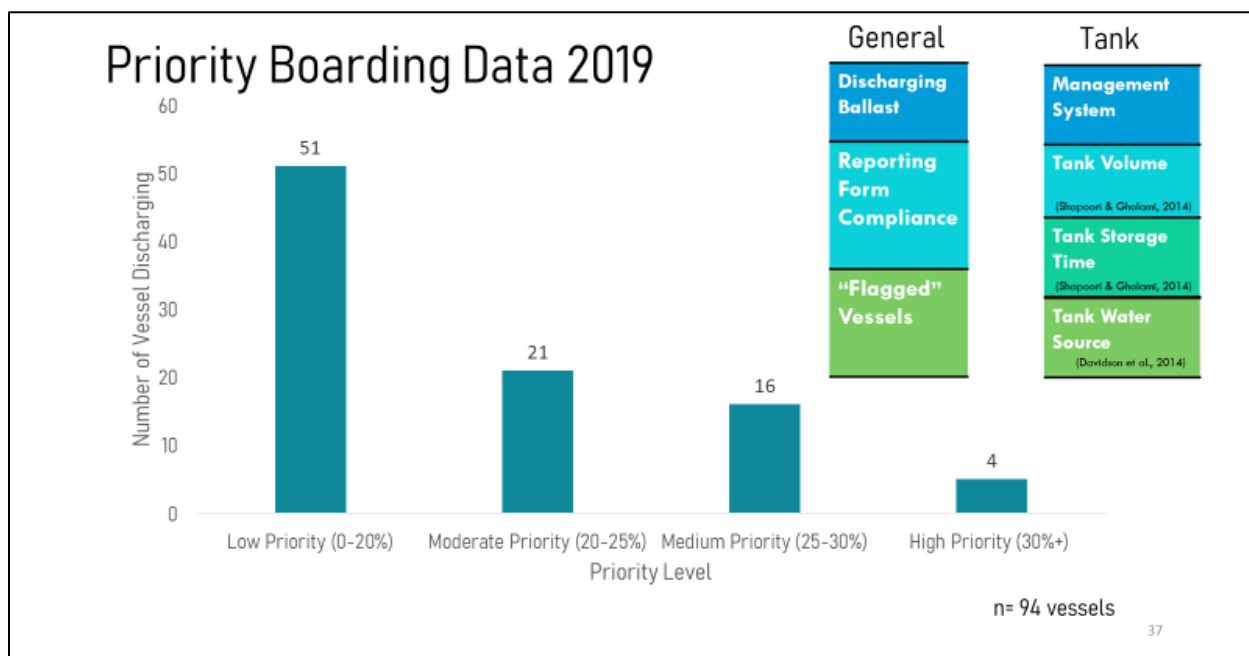


Slide 43 suggests that more BW was discharged in the summertime and wintertime—an interesting trend and perhaps helpful for requesting enforcement support from partner agencies during those times.

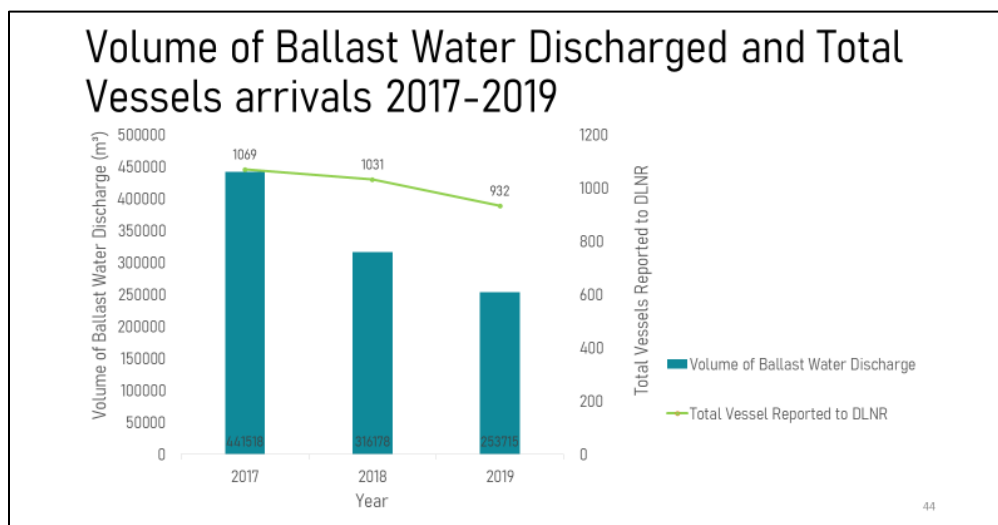




Slide 37 provides an analysis of vessels discharging BW categorized as high, medium, moderate, and low priority for boarding, where the majority of the vessels are considered low priority for boarding. An algorithm was developed using scientific literature to score vessels based on information in the reporting form. However, the priority matrix has yet to be validated by boarding vessels and conducting secondary (e.g.: checking logs and documentation) and tertiary (e.g.: testing ballast water and ballast sediment) assessments. As a reference, a primary assessment is performed on 100% of ballast water reporting forms using the algorithm. Due to the limited capacity of the Program, it would be impossible to perform a secondary and tertiary inspection on all discharging vessels, but the Program could be validating the tool by randomly sampling from each category—this effort is considered a high priority for the Program.



Slide 44 provides an overview of BW discharged and vessel arrivals into the State between 2017 to 2019. The vessel arrivals seemed to have slightly decreased, but the ballast water discharged has decreased by around 42%.



### Marisco AFDL-45 Dry-dock Transfer from Washington State to Hawaii

Provided below is a summary of events regarding the Marisco AFDL dry-dock transfer from Washington State to Hawaii.

Marisco reached out to Hawaii DLNR, DAR in September 2019 regarding biosecurity requirements for transferring the AFDL-45 dry-dock, “Faithful Servant,” to from Washington State to Hawaii. The dry-dock had accumulated biofouling over a period of more than 50 years in Washington waters and Marisco had indicated that it intended to carry BW in the dry-dock ballast tanks to stabilize its journey to Hawaii. DAR worked collaboratively with Marisco, and state and federal agency partners in Washington (Department of Fish and Wildlife – aquatic biosecurity authority, Department of Ecology-water quality authority, USCG Sector Puget Sound), Hawaii (DLNR, DOH Clean Water Branch, DOT Harbors Division, USCG Sector Honolulu) and a regional EPA representative to support the safe and environmental transport of Marisco’s newly purchased dry-dock.



All agencies provided formal guidance to the company including DLNR, DAR. DAR issued guidance requiring the company to develop a ballast water management plan for the ballast water and sediment load, and to submit a ballast water reporting form under Hawaii Administrative Rules Ch. 13-76 prior to the arrival of the dry-dock at Barber’s Point.

Options provided to Marisco for managing ballast water included using:

- Freshwater municipal water source in Washington
- Open ocean exchange following USCG-approved ballast water management options
- USCG type-approved ballast water treatment system
- Onshore ballast water treatment facility approved by USCG

Options provided to Marisco for managing ballast tank sediment included:

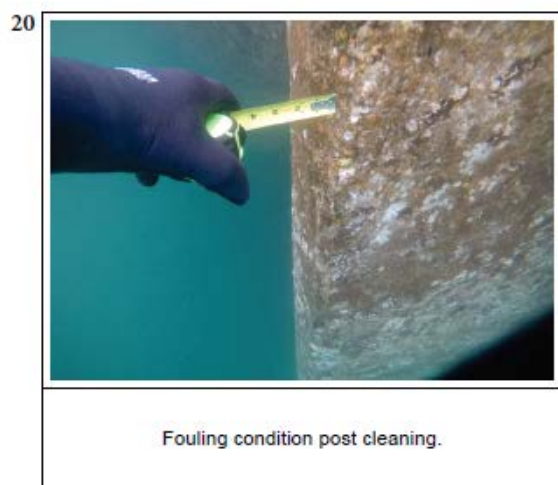
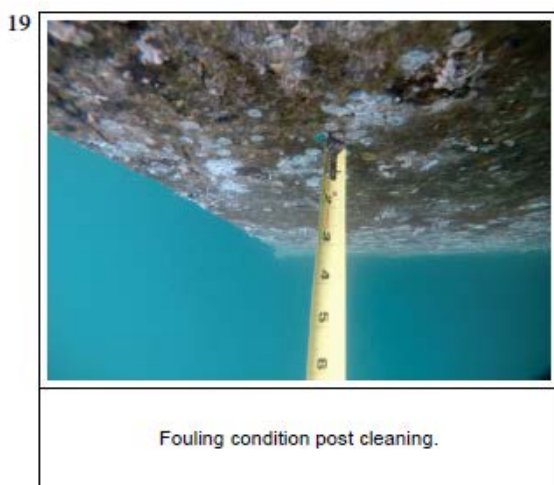
- Flushing ballast tanks appropriately to remove all sediment
- Clean and scrub any organisms off tank walls

Regarding biofouling, DAR recommended that the biofouling be managed in Washington State, where it accumulated, prior to the dry-dock’s departure.

Marisco responded with the dry-dock’s ballast water management plan and ballast water reporting form, meeting both USCG and DLNR requirements. In summary, their plan specified that the ballast water would be discharged into large containers and trucked to an onshore treatment facility where the water would be appropriately managed and disposed of by a certified company.

Since the State of Hawaii has not adopted Hawaii Administrative Rules for presence of biofouling or biofouling management standards, it could not require Marisco to manage their biofouling prior to the

vessel's departure for Hawaii. However, Marisco kindly agreed to manage their biofouling in Washington prior to the dry-dock's departure. They moved the dry-dock from Bellingham Harbor to Port Angeles Harbor to conduct cleaning with an in-water cleaning capture system, since the Washington biosecurity and water quality authorities were concerned for intra-state transfer of aquatic invasives from one port to another as well as biomaterial loading into the harbor Port Angeles. The biofouling management operation took a week and a half to complete. According to the report, an impressive volume of biofouling, 9-inches in depth in some areas, were reduced to 1mm, mostly composed of leftover organism shells. Provided below are photos taken from the report showing an ecosystem of living organisms attached to the hull prior to cleaning and successful removal of living organisms, post-cleaning:



Due to unsafe weather conditions, the dry-dock transfer was delayed around 3-weeks after the cleaning, potentially allowing some organisms to recruit back onto the dry-dock. Eventually the dry-dock did make it to Kalaeloa Harbor (Barber's Point) in mid-January and upon its arrival, Marisco kindly agreed to allow DAR to perform a biofouling survey under the dry-dock. The newly hired field biologist, supporting the BW and BF Program, coordinated the survey effort with Marisco, the AIS post-border team, NOAA representatives, USCG and the BW and BF Coordinator. Multiple visits to the Marisco site and prep meetings were conducted prior to performing the dive survey, as the overhead environment created by the dry-dock posed a dive safety concern. Due to the successful planning effort, the biofouling SCUBA survey under the AFDL-45 went smoothly.



The survey was conducted in early February 2020 and results indicated that the AFDL-45 had been thoroughly cleaned including in most of the niche areas (crevices that biofouling organisms could hide). However, there were a few areas with live colonial and solitary organisms including a group of mussels (>10 individuals) on the bottom of the hull (bow section), a large barnacle (extending 10 cm) on the end of the starboard sked off the stern, and a cluster of sea stars (~5 individuals) in a crevice of the starboard sked, and calcareous colonial tubeworms. A total of 21 samples were collected and thought to represent 13 different species including mussels, barnacles, anemones, sea stars, algae, and tubeworms. Many of



the species collected were not known by DAR or NOAA staff to be pelagic or established in Hawai'i, and are therefore likely to be non-native so DAR contracted Bishop Museum to morphologically and phylogenetically identify the samples. In addition, the distribution of any non-native species identified will need to be defined to determine if the species is already established in Hawai'i or an "intercept." This will provide insight into the potential impact of the species on the native ecosystem and inform next steps for management. Following the survey, DAR thanked Marisco for implementing proactive

measures to minimize aquatic biosecurity risks to the State including reaching out to DAR, complying with State ballast water discharge requirements, and voluntarily managing AFDL-45's biofouling biosecurity risks.

Recommendations for addressing similar events in the future include:

- Creating a permitting framework for the transfer of mobile marine infrastructure from out-of-state
- Developing a list of contacts and state and federal agencies relevant to the permit

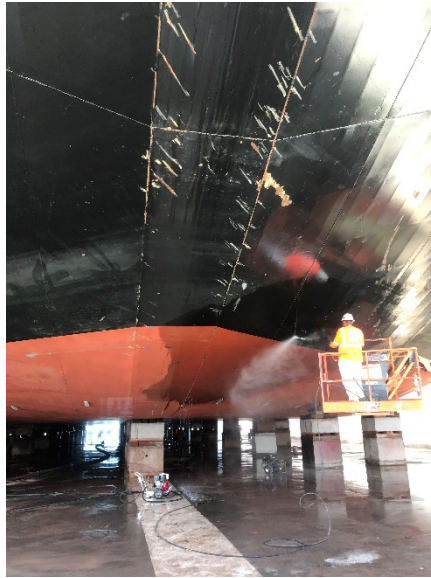
- Developing and implementing biofouling compliance standards, biofouling management standards (i.e.: in-water cleaning, in-water grooming), and inspection/survey standards
- Require a ballast water management plan and biofouling management plan from the vessel(s) owner and any documentation that suggests the plans were implemented
- Require vessels to manage their BF again if the vessel is unable to depart within 21 days of managing their BF using an in-water cleaning or grooming system
- Visual observations to be conducted by SCUBA or ROV survey as soon as possible after the vessel's arrival to minimize confounding factors such as biofouling growth accumulation due to local organisms



## Research

### Sause Brothers' Hull Maintenance Operations

Sause Brothers invited the BW and BF Program to observe one of their barges while it was being maintained in a dry-dock. The vessel underwent high pressure water blasting to remove biofouling organisms from hull surfaces and niche areas. During the event, the representative provided a tour from the bow to the stern of the vessel as well as shared information on his company's biofouling management and inspection frequency for their barges and tugs.



### Vessel Check 2.0: Vessel Biofouling Risk Assessment

[Vessel Check 2.0](#) is an aquatic biosecurity risk management tool for commercial vessel operators and regulators focused on biofouling, structured to serve a global community. The BW and BF Program evaluated the tool, in consideration of an annual subscription. In summary, the evaluation identified that the tool was beneficial for:

- 1) creating a location and a framework for BF management reporting at an international level, essentially supporting international consistency and ideally easing vessel operator regulatory and reporting burden
- 2) providing a cloud-based database and built-in biofouling risk assessment matrix and vessel tracking feature that serves both regulators and vessel operators, where operators could use the tool to assess their biofouling biosecurity risk and plan for meeting various jurisdictional requirements
- 3) corresponding with other regulators internationally and regionally to develop solutions and minimize vessel operator burden across jurisdictions
- 4) convenient interface between regulators and vessel operators, agents, managers, and owners
- 5) the tool also possesses the capability to expand into incorporating ballast water and other incidental discharges
- 6) data analysis features, analysis report print-out options, error-proofing, and overall user-friendly platform

While the Program is interested in subscribing to the tool and validating the built-in algorithm through secondary assessments (e.g.: vessel documentation and logs) and tertiary assessments (e.g.: performing vessel biofouling surveys using ROV or SCUBA), it is currently limited on operational funds.

### Rapid Ballast Water Assessment Tool Efficacy Testing

The BW and BF Program completed an efficacy test on a ballast water rapid assessment tool developed by LuminUltra, which uses adenosine triphosphate as an indicator of BW compliance—last year the Program tested a rapid assessment tool which utilized phytoplankton fluorescence as an indicator.

Currently, standard operating procedures used for measuring ballast water treatment compliance against USCG regulations are expensive, require specialized technical training, and are time-consuming to perform, at times taking 6 hrs to acquire a result, at which point the vessel may already have departed. The LuminUltra ballast water rapid assessment tool provides indicative results in a matter of an 1-2 hrs for both the >50um and 10-50um organism size class as well as for aquatic bacteria. The Program assessed the tool for convenience, time requirements, and reliability/duplicability of results against standard numerical counting methods for live organisms, specific to the >50um and 10-50um size classes, described in the ETV Protocol for testing ballast water management systems. For logistical reasons, the Program conducted the experiment using ambient seawater from Honolulu Harbor and Keehi Marina.



In summary, the tool was significantly faster at providing results when compared to numerical counting methods. The tool also provided reliable indicative results when the organism concentrations were well below or above the USCG BW discharge compliance standards for both size classes, though not as reliable near the compliance threshold; this may not be an issue as the Program may only consider further testing if the indicator suggested high risk for non-compliance. The tool also required a multitude of reagents and steps requiring a relatively clean space so as not to accidentally contaminate the sample; in other words, it may be challenging to test BW onboard a ship with this tool but may be more reliable if the ballast water sample was brought off the ship and tested in a lab setting where cleanliness can be managed.

## Harbor Aquatic Alien Species Autonomous Reef Monitoring Structure Project



In 2018, with the help of the DAR Aquatic Invasive Species Field Team, Autonomous Reef Monitoring Structures (ARMS) were deployed at a depth of 10-15ft inside five heavily trafficked commercial harbors in the State of Hawaii (Honolulu Harbor, Barber Point Harbor, Nawiliwili Harbor, Kahalui Harbor, and Hilo Harbor) to monitor for aquatic non-indigenous species recruitment. ARMS were also deployed on adjacent


coral reefs directly outside of the commercial harbors. The purpose of this project is to monitor the presence of newly established aquatic alien species and invasive behavior of newly and previously established non-native species. ARMS are made of stacked PVC plates to create niches and crevices similar to the protection that coral habitats offer. In 2019, one ARMS unit from within Honolulu Harbor and one from the adjacent reef outside the harbor were collected and carefully sorted with the help of the Bishop Museum, AIS Field Team, a UH volunteer working on her thesis, and the Kupu Intern. The Bishop Museum was contracted to perform morphologic and phylogenetic analyses on the sorted organisms to continue to expand the baseline assessment of established aquatic aliens as well as to catalog and create a database for these non-natives species in order to support implementation of future eDNA sampling techniques.









## Outreach and Education

The Coordinator participated and hosted various outreach and education events including ones for high school students, specific vessel types, maritime industry, local/national/international regulators, and researchers, combining one or more stakeholders groups depending on the topic(s) of discussion.

Month	Event	Audience	Location, Purpose, and Travel Expenditures (funding source)
Jan	NRAT Legislative Pau Hana	State legislators and DLNR colleagues	<p><u>Location:</u> Pacific Club; Honolulu, HI</p> <p><u>Purpose:</u> An evening open-house style event was organized for state legislators to showcase BW and BF Program as well as other aquatic and terrestrial biosecurity programs and share stories on invasive species concerns and successes.</p> 
Jan	State Legislative Biosecurity Briefing	State legislators, general public	<p><u>Location:</u> Hawaii State Capitol; Honolulu, HI</p> <p><u>Purpose:</u> Provided slides for the 2019 Legislative Biosecurity Briefing provided by DLNR Chair.</p>
Jan	DOCARE Meeting	DOCARE Officers	<p><u>Location:</u> DOCARE Field Station; Aiea, HI</p> <p><u>Purpose:</u> To request DOCARE's assistance during BW and BF inspections. The Coordinator presented on the BW and BF Program initiatives and potential safety concerns for performing vessel inspections. The DOCARE Chief and officers kindly agreed to assist during vessel boardings where safety was a concern.</p>
Feb	Rotary Club Meeting; Hilo	General public	<p><u>Location:</u> Hilo, HI</p> <p><u>Purpose:</u> Jointly presented with DOFAW representative on DLNR programs, including the BW and BF Program, to rotary club members as part of an NRAT initiative.</p> <p><u>Expenditure:</u> \$200 (USFWS)</p>
Feb	Recreational Vessel Biofouling Survey Demonstration	Federal legislators	<p><u>Location:</u> He'eia DOBOR Marine; Kaneohe, HI</p> <p><u>Purpose:</u> A fieldtrip for Senator Hirono's staff was jointly conducted with CGAPS and Captain Barry. A pole camera (camera attached to the end of a telescoping pole) was used to visualize biofouling on a dirty vs. a clean vessel; this demonstration was a reference point for discussing biosecurity risks associated with vessel biofouling and challenges associated with implementing VIDA. A YouTube video was created using the recordings from the demonstration:  <a href="https://www.youtube.com/watch?v=qnjOUaSvGtY&amp;feature=youtu.be">https://www.youtube.com/watch?v=qnjOUaSvGtY&amp;feature=youtu.be</a></p>
Mar	Rotary Club Meeting; Kona	General public	<p><u>Location:</u> Kona, HI</p> <p><u>Purpose:</u> Jointly presented with a DOFAW representative on DLNR programs, including the BW and BF Program, to rotary club members as part of an NRAT initiative.</p> <p><u>Expenditure:</u> \$200 (USFWS)</p>

Mar/Apr	National Ballast Information Clearinghouse (NBIC) Meeting	Federal regulators and researchers	<p><u>Location:</u> Smithsonian Environmental Research Center (SERC); Edgewater, MD</p> <p><u>Purpose:</u> Meet with SERC representatives to support USCG VIDA enforcement standard development and kickstart a joint pilot project for creating a BW data portal for states under VIDA</p>
	Pacific Ballast Water Group Meeting (PBWG)	Regional federal/state regulators, maritime industry, and researchers	<p><u>Location:</u> California Maritime Academy; Vallejo, CA</p> <p><u>Purpose:</u> Participate in the PBWG Meeting, Western Regional Panel Coastal Committee Meeting, and Pacific Regional State Regulators VIDA Meeting. The purposes of the meeting was to update regional state and federal regulators (BC Canada, AK, WA, OR, CA), industry, researchers, and other partners on Hawaii's BW and BF Program, share information on VIDA, and discuss joint projects (i.e.: fishing vessel, mobile marine infrastructure, recreational vessel biofouling management best management practices outreach documents) as well as continue to strengthen each network. The <a href="#">Coordinator</a> and <a href="#">Kupu Intern</a> each provided a presentation during the meeting. A tour of the Golden Bear Facility, a ballast water management system efficacy testing facility, was also provided to meeting attendees during this meeting.</p> <p><u>Expenditure:</u> \$2149 (HISC), \$391 (USFWS)</p> 
Apr	Alliance for Coastal Technologies IWC Workshop	International regulators, scientists, industry group, US state/federal agencies	<p><u>Location:</u> UH Manoa; Honolulu, HI</p> <p><u>Purpose:</u> 2-day discussion with international regulators, industry representatives, and scientists to formulate an in-water grooming system efficacy testing protocol</p>
Apr	DLNR/CGAPS Biofouling, IWC, and VIDA Meeting	International regulators, state/federal agencies	<p><u>Location:</u> Homer Maxey International Trade Center; Honolulu, HI</p> <p><u>Purpose:</u> Discuss biofouling regulation and management from the international, national, and state perspectives, with emphasis on new federal regulatory changes related to the Vessel Incidental Discharge Act (VIDA); the meeting in the morning will be facilitated by DLNR and centered around seeking advice/recommendations for Hawaii's next-steps on managing biofouling biosecurity risks with the advent of VIDA in mind</p>
May	International Maritime Organization Biofouling	National and International regulators, maritime	<p><u>Location:</u> UN International Maritime Organization; London, UK</p> <p><u>Purpose:</u> Present on Hawaii's proposed biofouling and vessel in-water cleaning regulatory framework and discuss the State's dedication towards developing consistent, practical, and protective measures for</p>

	Management “First Movers” Meeting	industry, federal	<p>addressing vessel biofouling biosecurity risks relevant to New Zealand, Australia, and California's biofouling regulations and IMO biofouling management guidelines. The importance of this meeting was to strengthen national and international networks in developing consistent regulatory frameworks for managing vessel biofouling and in-water cleaning biosecurity risks, learn about innovative technology for managing biofouling that could be applied in Hawaii, and show the international community that Hawaii is engaged in biofouling management initiatives.</p> <p><u>Expenditures:</u> \$3370 (HISC)</p> 
July	Hawaii Conservation Conference	General public	<p><u>Location:</u> Hawaii Convention Center; Honolulu, HI</p> <p><u>Purpose:</u> The BW and BF Kupu Intern introduced the BW and BF Program as well as concerns regarding these vectors. She also presented on her analysis of the BW reporting form submissions from year 2018 and commercial vessel demographics at the Hawaii Conservation Conference</p> 
Aug	USCG-NRL ANS Program Review Meeting	Federal regulators and researchers	<p><u>Location:</u> Webinar Platform; Florida Keys, FL</p> <p><u>Purpose:</u> Invited by USCG DC headquarters and Naval Research Laboratory to share Hawaii's BW and BF Program's vessel survey/inspection capabilities to stimulate conversation regarding state/federal co-enforcement possibilities under VIDA</p>
Aug	Commercial Vessel Biofouling Survey Demonstration	Federal legislators	<p><u>Location:</u> Honolulu Harbor; Honolulu, HI</p> <p><u>Purpose:</u> A fieldtrip for Representative Gabbard's staff was jointly conducted with CGAPS and Sause Brother's. The purpose was to provide outreach on vessel biofouling biosecurity risks to Hawaii through visualizing biofouling using DAR's remotely operative vehicle on Sause Brother's clean hull as well as another vessel with a heavily fouled hull.</p> 

Aug	HISC Brown Bag: Ballast Water and Biofouling Program Update	Public and DLNR colleagues	<p><u>Location:</u> DOFAW Office; Honolulu, HI</p> <p><u>Purpose:</u> Presented an update on Hawaii's Ballast Water and Biofouling Program initiatives, accomplishments, and next steps. Provided are links to: <a href="#">presentation slides</a> and <a href="#">recording</a> from the HISC website.</p>
Sep	Live/Dead Analysis of Ballast Water Organisms Workshop	UH volunteer, Kupu Intern	<p><u>Location:</u> AFRC; Honolulu Harbor, Hawaii</p> <p><u>Purpose:</u> A two-day training session was provided to a UH volunteer and two Kupu interns for performing live dead analyses of &gt;50um and 10-50um organisms found in ballast water discharge, following standard operating procedures described in the EPA ETV Protocol for efficacy testing ballast water management systems. During the training session, a LIVE copepod (~1mm length) from a seawater sample collected in Honolulu Harbor was found to be fouled with an ecosystem of organisms—epiphytic diatoms (yellow hair-like structures) and ostracods (mite-like organisms): <a href="https://www.youtube.com/watch?v=-tvMh1gOdfQ">https://www.youtube.com/watch?v=-tvMh1gOdfQ</a></p> 
Sept/Oct	ANZPAC	International regulators, industry groups, scientists, technology innovators	<p><u>Location:</u> Melbourne, Australia</p> <p><u>Purpose:</u> Participate in the Australia New Zealand Pacific Antifouling and Corrosion Workshop/Symposium, Vessel Check 2.0 and CEBRA Biofouling Risk Assessment Project Meeting, and Biofouling International Regulators Discussion (BIRD) Meeting on regulating vessel biofouling and in-water cleaning where the Coordinator presented on BF enforcement considerations and facilitated a discussion on challenges and solutions. The significance of this meeting was to strengthen networks, identify innovative research and ideas to support BW and BF Program initiatives, develop collaborative projects with leading regulators and industry groups, and elevate the importance of aquatic biosecurity in Hawaii to the international community</p> <p><u>Expenditures:</u> \$3541 (USFWS)</p>
Oct	DAR AFRC Legislative Fieldtrips	State legislators	<p><u>Location:</u> AFRC; Honolulu, HI</p> <p><u>Purpose:</u> Four legislative tours at AFRC were organized for various state legislators and their staff for sharing information on the BW and BF Program as well as other DAR programs</p>
Nov	DOT/DLNR Fact Finding Meeting	State/federal regulators, maritime industry, scientists	<p><u>Location:</u> DOT Harbor Division Conference Rm; Honolulu, HI</p> <p><u>Purpose:</u> DOT and DLNR co-hosted a local stakeholder meeting at a conference room in DOT Harbor's Division on Aquatic Biosecurity and VIDA fact-finding, where the Dr. Celia Smith, Dr. Mike Hadfield (experts in the field of Hawaii aquatic invasions), each presented on aquatic invasive species' and their detriment to Hawaii's economy, residents' quality of life, and environmental impacts. CGAPS presented an overview of VIDA, USCG presented on their</p>



