

Regulating Vessel Biofouling and In-Water Cleaning in Hawaii

Pacific Ballast Water Group Meeting
April 12, 2017



Jules Kuo
Ballast Water & Biofouling Coordinator – DLNR, DAR c/o PCSU

Biofouling and In-water Cleaning a Concern in Hawaii

- Inspected overseas and coastwise commercial vessels and yachts indicated aquatic aliens routinely arrive to Hawaii from overseas and may be spread interisland via vessel biofouling (**Godwin & Eldredge 2001; Godwin et al 2004**).
- Mediterranean mussels were transferred from Puget Sound, WA to Pearl Harbor, HI as biofouling on the USS Missouri. (**Apte et al. 2000**).
- Technical reports on biofouling in Hawaii (**Davidson et al., 2014a; Leonard, 2009**)
- Technical report on in-water cleaning in Hawaii (**Zabin et al., 2016**)



Hawaii Biofouling (BF) regulations and compliance standards

- IMO Guidelines for Control and Management of Ships'
 - BF management plan for reducing or minimizing hull/niche area growth
 - BF management record book
 - in-water cleaning
 - dry-docking
 - hull inspections
 - anti-fouling paint maintenance
- New Zealand Regulations
 - BF Rules implement in May 2018
 - Thresholds for allowable biofouling for short-stay and long-stay vessels
 - Approved BF management/treatment systems (ie: debris capture)
 - Approved locations for cleaning
- California BF Regulations
- Australia BF guidelines
 - Vessel Check Biofouling Risk Assessment Tool



What are the biofouling risk assessment criteria?

- Vessel biofouling risk assessment criteria:
 - *1) Vessel structurel & operational profile
 - *2) Vessel hull maintenance history
 - 3) Biofouling baseline risk

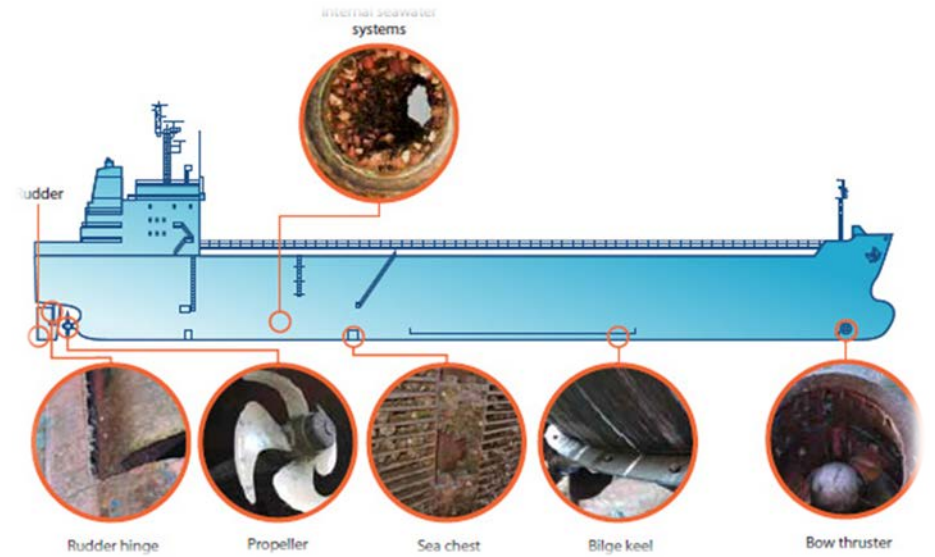


Hawaii Biofouling Questionnaire for commercial vessels

Vessel Information & Particulars	
Vessel Name	
Official / IMO Number	
Vessel type (containership, barge etc)	
Responsible Officer's Name and Title (Person filling this form)	
Vessel/Company/Agent Email address	
Date of Submission (Day/Month/Year)	
Vessel Age (years)	
Vessel typical speed (laden speed in knots over the last four months)	
Vessel typical port residence time (hours or days)	hours OR days
Previous Dry Docking	
Since delivery, has the vessel been removed from water for maintenance?	Yes <input type="checkbox"/> No <input type="checkbox"/>
If YES, enter the date and location of the <u>most recent</u> out-of-water maintenance:	Date (Day/Month/Year): 04/15/2015 City/Port: Country:
If NO, enter the delivery date and location where the vessel was built:	Delivery Date (Day/Month/Year): City/Port: Country:
Anti-Fouling Paint (A/F Paint)	
Were the vessel's <u>submerged portions</u> coated with an anti-fouling paint (includes foul-release paint) during the out-of-water period listed above?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
If <u>not</u> , when was the last anti-fouling coating applied to the vessel?	Date of A/F paint application (Day/Month/Year):
For the most recent anti-fouling coating, what product (top coat A/F paint) was used for <u>hull surfaces</u> ? Please list more than one if necessary and indicate what parts of the hull each product was used on?	For the <u>hull bottom</u> Manufacturer/Company: Product Name: For the <u>hull sides</u> Manufacturer/Company: Product Name:
Were additional anti-fouling coatings used for other submerged surfaces (e.g. rudder, thrusters, sea- chests)?	No <input type="checkbox"/> Don't know <input type="checkbox"/> Yes <input type="checkbox"/> If yes, what products were used Manufacturer/Company: Product Name: Manufacturer/Company: Product Name:

What are the biofouling risk assessment criteria?

- Vessel biofouling risk assessment criteria:
 - *1) Vessel structure & operational profile
 - Structure – vessel design, size, niche areas
 - Operational profile - Vessel speeds, lay-up period(s) and location(s), vessel itineraries
 - *2) Vessel hull maintenance history
 - 3) Biofouling baseline risk



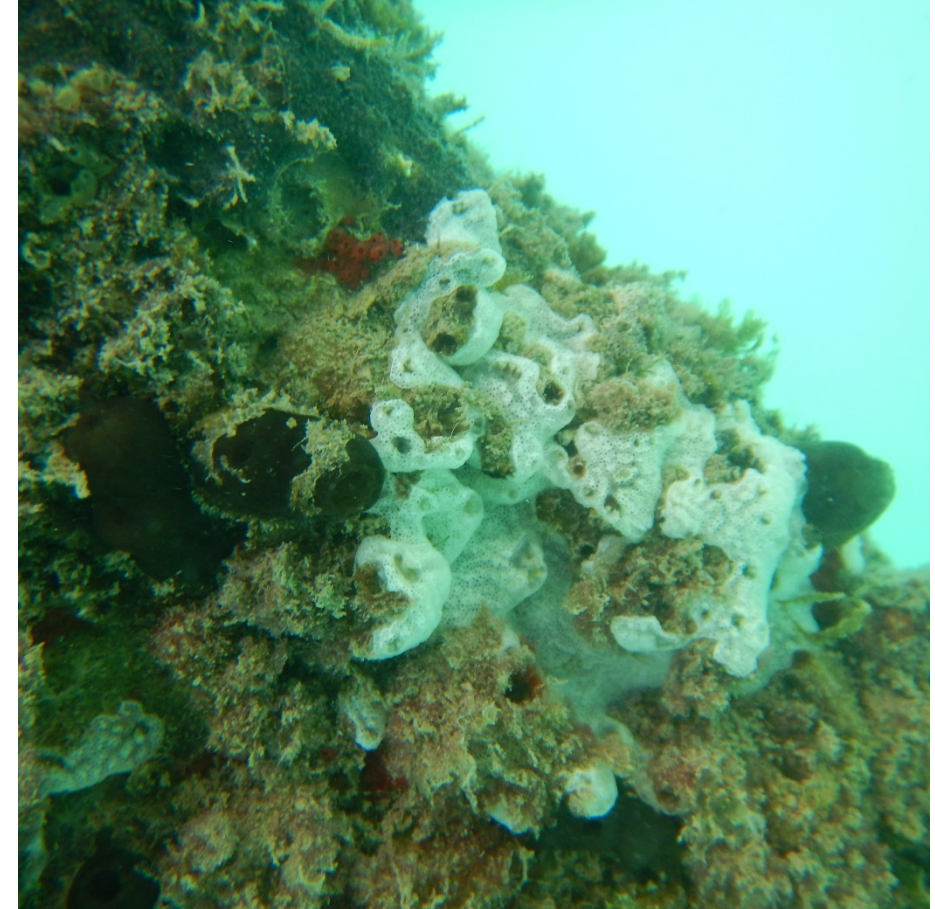
What are the biofouling risk assessment criteria?

- Vessel biofouling risk assessment criteria:
 - *1) Vessel structural/operational profile
 - *2) Vessel hull maintenance history
 - Installation of anti-fouling (AF) system (ie: hull paint)
 - type, age, and method of installing system
 - Last dry-docking
 - In-water inspection on AF system condition and biofouling hull/niche areas
 - Method, frequency, and location of in-water cleaning
 - 3) Biofouling baseline risk



What are the biofouling risk assessment criteria?

- Vessel biofouling risk assessment criteria:
 - *1) Vessel structural/operational profile
 - *2) Vessel hull maintenance history
 - 3) Biofouling baseline risk
 - Species composition – species geographic origin, diversity of assemblage, micro- vs. macro-fouling
 - Degree of fouling – organism concentration, % cover, location of fouling
 - Species condition/health



What is the protocol for implementing biofouling risk assessment criteria?

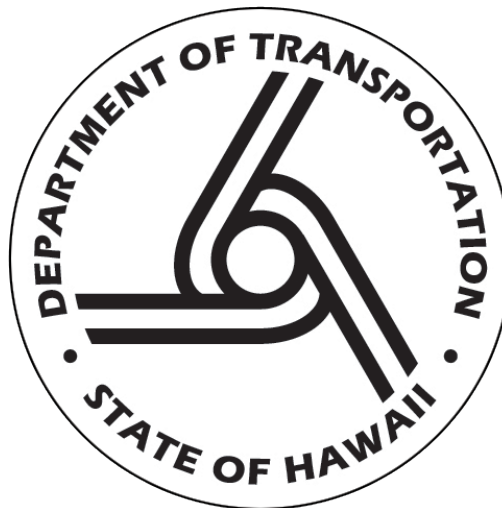
- **Initial Assessment**– hull husbandry forms, BF management plan, BF management record book
- **Secondary Assessment** – vessel boarding for documentation inspection
- **Tertiary Assessment** – ROV or SCUBA dive inspection to monitor for compliance



In-Water Cleaning (IWC) is “allowed” in Hawaii...

- **Puzzle pieces of approval:**

- Hawaii Department of Health (DOH), Clean Water Branch (required)
- Hawaii Department of Transportation (DOT), Harbors Division (required)
- Hawaii DLNR, Division of Aquatic Resources (recommended)



IWC is “allowed” in Hawaii...

- Puzzle pieces of approval:

- DOH/EPA (required)
- DOT (required)
- DLNR, DAR (recommended)

- **DOH/EPA Approval**

- Must be covered under the VGP
- Prove compliance with conditional requirements (**Section 401 WQC in VGP 2013 and HAR Ch 11-54 and 11-55**)

- Vessels can undergo IWC as long as operations discharge of:

- *Materials that will settle to form objectionable sludge*
- *Floating debris, oil, grease, scum, or other floating materials*
- *Substances in amounts sufficient to produce taste and coloration in the water or detectable off flavor in the flesh of fish*
- *High or low temperatures; biocides, pathogenic organisms, toxic, radioactive, corrosive, or other deleterious substances at levels or in combinations sufficient to be toxic or harmful to human, animal, plant, or aquatic life, or in amounts sufficient to interfere with any beneficial use of the water*
- *Substances or conditions or combinations thereof in concentrations which produce undesirable aquatic life*

- Limitations of total residual chlorine, pH, salinity, water temperature, turbidity, and Enterococcus are also specified
- Special mention of commercial passenger vessel limitations



IWC is “allowed” in Hawaii...

- Puzzle pieces of approval:

- DOH/EPA (required)
- DOT (required) 
- DLNR, DAR (recommended)
- Certificate of approval by DOH
- Safety purposes (ie: designate no-wake zone)



IWC is “allowed” in Hawaii...

- Puzzle pieces of approval:

- DOH/EPA (required)
- DOT (required)
- DLNR, DAR (recommended)



- Assist in identifying potential BMPs for IWC during BF regulation and IWC policy implementation interim
 - Disclaimer: this does not guarantee IWC operations will be approved by DOH or DOT
- After BF regulations are accepted, as a Hawaii Administrative Rule, IWC requests will require DLNR, DAR approval*
 - Pass initial, secondary, and tertiary biofouling risk assessment
 - Show cleaning method will not damage AF paint and release toxic chemicals into the environment above compliance standards

*At this point, DLNR, DOH, and DOT will have agreed on standard procedures for IWC approval and it will be SIMPLE while simultaneously protecting Hawaii’s aquatic resources.



IWC is “allowed” in Hawaii...

- Reality of Hawaii’s current IWC state-of-affairs
 - IWC is NOT ALLOWED for ANY VESSEL in any Hawaii DOT harbors
 - Survey shows IWC cleaning does occur in Hawaii (Zabin et al. 2016)
- Hawaii In-water Cleaning Report (Zabin et al. 2016)
 - In-water Cleaning Technologies and Practices
 - Literature Review of Biosecurity Risks Associated with In-Water Cleaning
 - An Assessment of In-water Cleaning in Hawaii
 - Management Recommendations



An Assessment of IWC in Hawaii

- Surveyed 6 out of 8 major IWC companies
- Survey questions included:
 - Numbers and types of vessels cleaned in Oahu
 - Cleaning methods
 - Paint types
 - Degree of fouling on vessels that were cleaned in-water
 - Recommendations for IWC policy for Hawaii



An Assessment of IWC in Hawaii

- Summary of survey responses:
 - **Numbers and types of vessels cleaned**
 - >100 (cumulative total) large vessels were cleaned in Oahu in 2015
 - Military, seafaring commercial, non-seafaring commercial, cruise ships, research and fishing vessels, barges, yachts, and small recreational boats
 - Travel history/itinerary were not provided though requested
 - **Cleaning methods**
 - Manual, mechanical, and water blasting—no debris-capture technology was used
 - Dependent on condition of anti-fouling paint and degree of biofouling
 - **Paint types**
 - All customers employed some sort of anti-fouling system (AF or ablative paint)



An Assessment of IWC in Hawaii

- Summary of survey responses (continued):
 - **Vessel type more “clean” than others?**
 - Military vessels and yachts were cleanest and foreign commercial vessels tended to be dirtiest
 - **Recommendations for IWC policy for Hawaii**
 - Utilize Navy’s BMPs – regular inspections and cleanings
 - Frequent or consistent cleaning schedule
 - offset cost in the long run (ie: fuel efficiency, less risk of damaging paint)
 - Easier for company and lower risk of paint damage (ie: quarterly)
 - Clear guidelines for how and where cleaning should occur
 - Require debris capture system subsidized by State and non-toxic bottom coatings

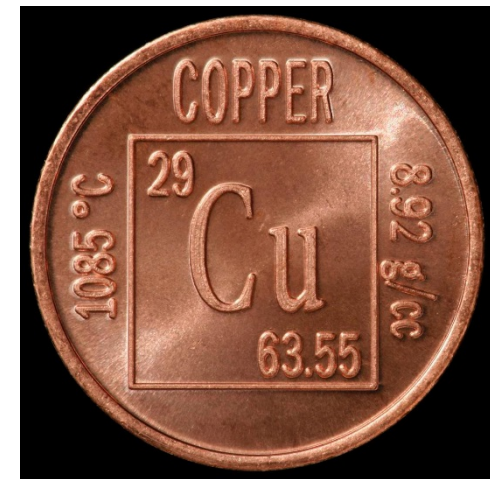
Responses by IWC companies demonstrated willingness (for the most part) to reduce the difficulties associated with biofouling that impinge on the environment and shipping industry



In-Water Cleaning (IWC) Considerations

- Disadvantages of NOT allowing IWC
 - IWC activities continue unregulated
 - Vessels conduct voyages with heavy biofouling

Increase AIS transfer and toxic AF paint release into the environment



In-Water Cleaning (IWC) Considerations



- Benefits of allowing regulated IWC
 - Environmental
 - Reduce aquatic invasive species (AIS) transfer
 - Lower carbon emissions
 - Industry
 - Cheaper and faster than dry-dock
 - Increase hydrodynamic flow of vessel
 - Increase fuel efficiency
 - Save shipping company money

Decrease AIS transfer, toxic AF paint release, and fossil fuel emissions into the environment

In-Water Cleaning (IWC) Considerations

- Possible management options (Zabin et al. 2016)
 1. Maintain status quo (do nothing)
 2. Institute voluntary IWC BMPs
 3. Gather additional data
 4. Make IWC debris-capture technology available to HI IWC companies
 5. Institute mandatory regulations



In-Water Cleaning (IWC) Considerations

- Possible management options (Zabin et al. 2016)
 1. Maintain status quo (do nothing)
 2. Institute voluntary IWC BMPs
 3. Gather additional data
 4. Make IWC debris-capture technology available to HI IWC companies
 5. Institute mandatory regulations



In-Water Cleaning (IWC) Considerations

- Possible management options (Zabin et al. 2016)
 1. Maintain status quo (do nothing)
 2. Institute voluntary IWC BMPs
 3. Gather additional data
 4. Make IWC debris-capture technology available to HI IWC companies
 5. Institute mandatory regulations

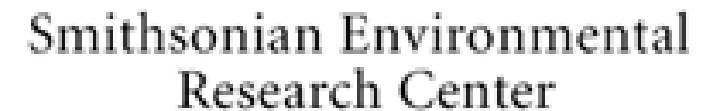


In summary, DLNR is:

- Developing biofouling regulations, BMPs, compliance standards, risk assessment criteria and protocols
- Developing IWC policies and compliance standards
- Collaborating with stakeholders for all of the above
 - Facilitate meeting with DOH/EPA and DOT on BF and IWC regs/policies
 - Acquire industry recommendations for policies on BF and IWC
 - Work with regional states to reduce duplication of hull husbandry reporting
 - Align BF and IWC policies and compliance standards with national and international government partners



Funding Sources and Acknowledgements



QUESTIONS?

Contact information:

Jules Kuo (HI Ballast Water & Biofouling Coordinator, DLNR):

- julie.c.kuo@hawaii.gov

Brett Higgins (Intern BW Data Specialist, DLNR/AmeriCorps):

- brett.e.Higgins.hawaii.gov

For more information:

- <http://dlnr.hawaii.gov/ais/>



Supplemental slides



Ideal IWC Technology

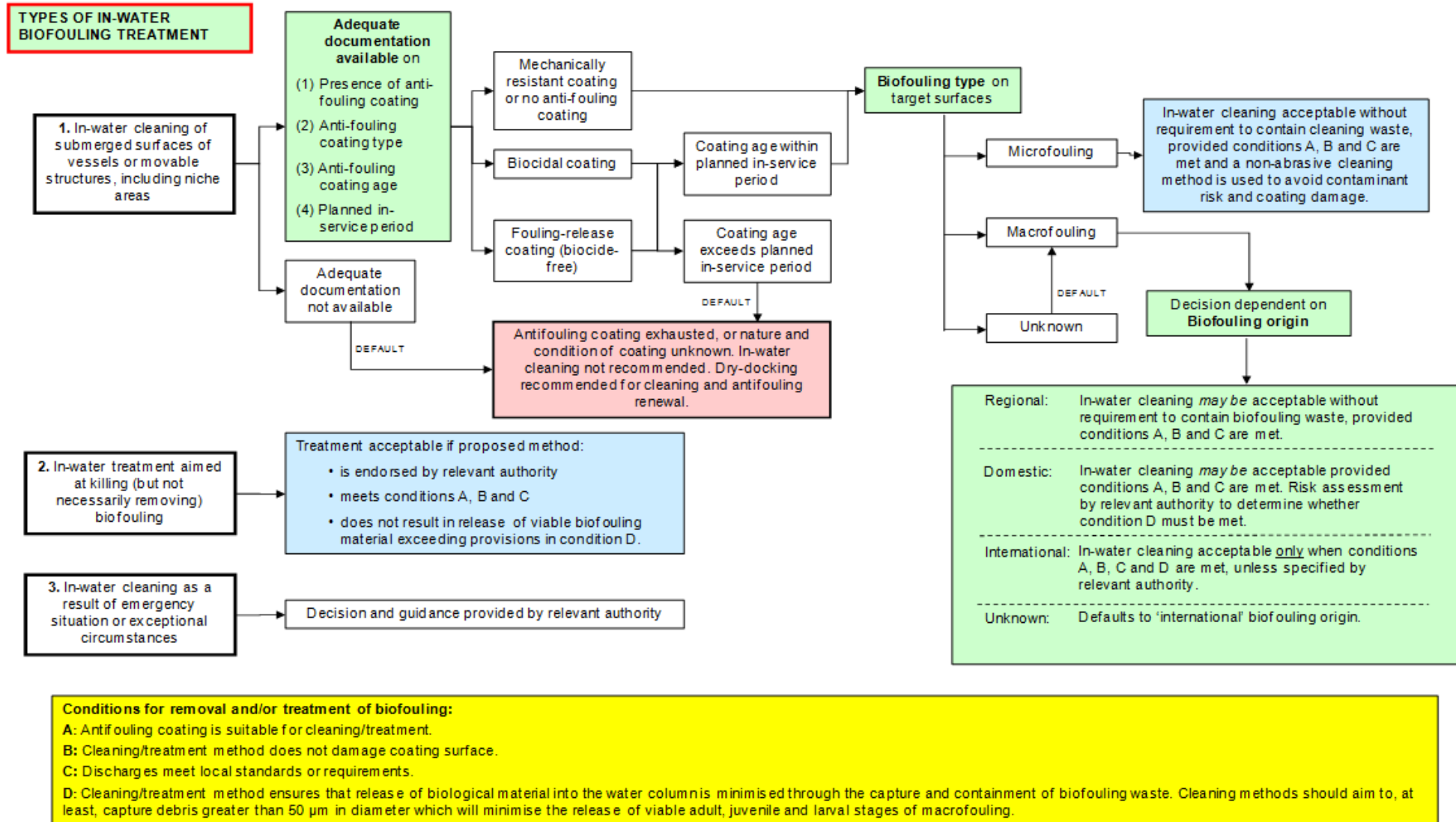
- Effectively remove biofouling from vessels or other submerged structures, including niche areas. This reduces the biosecurity risk posed by fouled vessels and improves a ship's fuel efficiency, safety, and maneuverability
- Kill all biofouling or contain all released viable biofouling, in cases where fouling communities might include non-native species, and follow best management practices for disposal at an on-shore solid waste treatment facility
- Extend the performance period of ship coatings (IWC technology utilized must not damage or impair coating)
- Prevent the release of chemical contaminants into the environment during cleaning by containment and proper disposal
- Be widely available
- Not be cost prohibitive
- Be safe for equipment operators

Perform cleaning over a reasonable (hours/days) time frame



Decision-Support Tool for in-water cleaning

This tool is designed to assist relevant authorities with making decisions about in-water cleaning practices in their jurisdictions. The tool is a part of, and must be used in conjunction with, the main text of the *Anti-fouling and in-water cleaning guidelines*. The terms used in this tool are defined in the guidelines.



The Problem: Aquatic Invasive Species

Intentional	Accidental
Aquaculture	Biofouling
Sport	Ballast water or solid ballast
Bio control	Ship boring
Improvement of wild stock	Aquaculture escape
Ornamental trade	Marine debris fouling
Research	Polyvectic [includes accidental release on or with imported commercial products, inside airplane cabins, in soil, and on or with aquarium plants and greenhouse plants (Carlton and Ruiz, 2005)]

