In-Water Cleaning

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In-Water Cleaning
Why Does In-Water Cleaning exist?

Efficiency

Hull biofouling = $\uparrow$ Drag = $\uparrow$ Fuel consumption = $\uparrow$$\uparrow$$\uparrow$$\uparrow$$\uparrow$

Days for development of added resistance

Munk 2006
Why Does In-Water Cleaning exist?

Inspections: UWILD (Underwater Inspection in Lieu of Drydock)
Why Does In-Water Cleaning exist?

- Reduce long-term NIS introduction risk
Why Does In-Water Cleaning exist?

- Inspections: UWILD (Underwater Inspection in Lieu of Drydock)
- Efficiency
- Reduce long-term NIS introduction risk
When Is In-Water Cleaning Needed?

Worst-case scenario: Contingency measure

NOT PREFERRED
When Is In-Water Cleaning Needed?

To Improve Operational Efficiency

[Diagram showing the increase of resistance over days for development of added resistance, with points indicating cleaning activities such as hull cleaning and dry-docking.]
When Is In-Water Cleaning Needed?

Hull Grooming

“Beards on faces, not on vessels”
When Is In-Water Cleaning Needed?

Worst-case scenario: Contingency measure

To Improve Operational Efficiency

Hull Grooming
In-Water Cleaning Systems

Traditional IWC: NO debris capture

https://www.youtube.com/watch?v=fqcyt2qr9x4
In-Water Cleaning Systems

IWC: With debris capture
In-Water Cleaning Systems
In-Water Cleaning Systems
Issues With In-Water Cleaning

- Release of organisms (e.g., larvae, fragments, gametes)
- Release of biocides (e.g., copper, zinc)

Overlapping Jurisdiction
- NIS, water quality
- State, federal, regional

- Capture efficiency
- Discharge concentrations (e.g., organisms, copper)
In-Water Cleaning: How Are Risks Realized?

During removal:
- Capture efficiency
- Incidental release by diver or equipment

Upon discharge of the effluent
Possible Solution to IWC Issues

- In-water cleaning
  - Can be addressed consistently across the region
  - What level of protection are we looking for?
    - Discharge limits
    - Capture efficiency
    - What is the BAT?
      - Can it meet our expectations?

- Water Quality concerns
  - Varies locally
  - Permitted locally

- Biosecurity concerns
  - Local water quality standards
  - Regional biosecurity standards

Local permits:
- Local water quality standards
- Regional biosecurity standards
CSU COAST Summer Internship Project

Status Report: Capabilities, limitations, and regulations surrounding in-water vessel cleaning technologies.

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Food For Thought

What about niche areas? Can they be cleaned?
Thank You

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