Evaluations of In-Water Cleaning & Capture Technologies

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Evaluations of In-Water Cleaning & Capture Technologies

- 2016 Workshop - Approaches to Quantifying Biofouling and Considerations of Hull Cleaning
- Third-Party Technology Evaluations
- Initial IWCC Evaluations
Approaches to Quantify Biofouling and Considerations of Hull Cleaning

• August 2016, Smithsonian Environmental Research Center
• Consider approaches to characterize and quantify vessel biofouling
• Identify and discuss existing approaches used for in-water cleaning of vessels and quantifying cleaning efficacy

• 21 attendees, from 15 institutions, in Australia, Canada, New Zealand and USA

• Presentations and discussions on:
  • National and regional biofouling standards
  • Current and future research on quantifying fouling
  • Hull husbandry options, practices, and assessment efforts
Independent Third-Party Technology Evaluations

- **Technology Users:**
  - Awareness and confidence
  - Identified needs and priorities
  - De-risk technologies
  - Reliable quantification of quality
  - Approvals/certifications

- **Technology Developers and Funders:**
  - Facilitate maturation and crossing the “valley of death”
  - Increase rate and probability of transition into operations
  - Build market / user awareness and confidence
  - Enhance return on investment
  - Approvals/certifications

Source: NASA
Maritime Environmental Resource Center

- Third-party testing of ballast water management systems to prevent invasive species and associated compliance monitoring tools
  - Type Approval Certification testing for US Coast Guard and other administrations (formerly)
  - Verification of ballast water compliance sensors
- Evaluations of vessel fouling and invasion risk, tests of power plant antifouling systems, and now in-water cleaning technologies
- Facilitating the development and adoption of Green Ship / Green Port innovations

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- A third-party testbed for evaluating technologies – sensors and platforms for studying and monitoring aquatic environments
  - In partnership with NOAA, EPA, USCG, NRL, USGS, USDA, & NIST
  - Including verification of ballast water compliance sensors
- A forum for capacity and consensus building – technology workshops and training exercises
- An information clearinghouse for environmental technologies – searchable database of environmental technologies, reports and data

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- **Types of Evaluations**
  - Performance Verifications
  - Performance Demonstrations
  - No direct comparisons, ranking, etc.

- **Transparency and Credibility**
  - Objective testing with community input
  - Skilled, trained personnel
  - Sound methodologies with statistical rigor
  - ISO 17025 compliant quality management
Technology theme is selected by Partners and Stakeholders

Customer Needs and Use Assessment to identify parameters and applications

Technology Subcommittee established

RFT is drafted and released

Initial applications submitted

Conditional acceptance granted

Partner Technology Workshop held

Full information packages and propose protocols submitted

Strawman Protocols distributed

Protocol Workshop held (weekly conference calls)

Protocol and QA Plan reviewed and finalized

Signed agreements submitted and insurance secured

Test instruments are shipped to lab test site

Standardization and training session held and recorded

Laboratory tests conducted (lab audit)

Instruments set up, calibrated and deployed at four field sites

Field audits conducted and weekly data sheets sent to Headquarters

Instruments sent back for reconditioning/recalibration

Data downloaded, analyzed and plotted

Verification Statements drafted

Post Evaluation meeting and review held

Verification Statements finalized and sent to manufacturers

One page manufacturer interpretation of results submitted

Verification Statements released to the public

Instrument user survey for manufacturers completed

Questions/comments addressed and manufacturers monitored for use of results
Evaluations of IWCC and IWG Systems

• Original Goals:
  • Provide independent evaluations of technologies designed to support the maritime industry and to prevent the spread of invasive species
  • Facilitate the transition into routine operations and increased application of in-water cleaning technologies
  • Refine and standardize testing protocols
  • Provide rigorous, third-party data on the performance (removal and capture, hull and niche areas) of IWCC systems to support the approval of their commercial use

• Evolution:
  • Separate out and in-water cleaning and capture (IWCC) and in-water grooming (IWG) – distinct approach, technologies and test protocols
  • Almost all existing IWCC/IWG systems are focused hulls, not so much on niche areas
Evaluations of IWCC and IWG Systems

**Steps:**

- ✔ Update review of currently available in water cleaning technologies
- ✔ Compile relevant regulatory and permitting requirements for in-water cleaning
- ✔ Establish a Technical Advisory Committee (TAC) and begin to draft Test Protocols (based on Morrisey et al. 2015)
- ✔ Release a Request for Technologies (RFT) that invites in-water cleaning providers to apply to participate in evaluations
- ✔ Accept IWCC providers into the evaluation
  - ✔ Finalize IWCC Test Protocols at a workshop – April 2018.
  - ✔ Conduct IWCC field test on a MARAD ship in Baltimore, MD – June 2018.
  - ✔ Conduct field test on a MARAD ship in Alameda, CA – October 2018.
  - ✔ Conduct independent assessments of cost for IWCC – November 2018
  - ✔ IWCC data analysis and report writing – December 2018
  - ✔ Initiate IWG evaluations – December 2018
  - ✔ IWCC field test in Honolulu, HI – Spring 2019
  - ✔ Workshop and peer-reviewed publication on evaluating IWCC systems – Spring 2019
  - ✔ IWG testing and additional IWCC testing – 2019/2020
Evaluations of IWCC and IWG Systems

- First Field Testing Baltimore, June 2018 – NV Savannah

- Last drydocking, March 2008
- Copper SPC a/f coating
- Fouling ratings from initial ROV survey is FR50 and greater with level of fouling consistently distributed at 60-100% cover.
Evaluations of IWCC and IWG Systems

- **Testing Team:**
  - Mario Tamburri, ACT/MERC/UMCES
  - Lisa Drake, US NRL
  - Greg Ruiz, SERC
  - Chris Scianni, CSLC
  - Ian Davidson, SERC
  - Matt First, US NRL
  - Jules Kuo, Hawaii DLNR
  - Plus technical staff, QA/QC, analytical services, etc.

- **Technical Advisory Committee:**
  - William Hertel, US NSWCC
  - Eugene Georgiades, MPI New Zealand
  - Graeme Inglis, NIWAR New Zealand
  - Carolyn Junemann, MARAD
  - David Elias, RWQCB San Francisco
  - Jesús Cisneros-Aguirre, U of Las Palmas, Spain
  - Regina Bergner, USCG
  - Myron Honda, Hawaii DLNR
Evaluations of IWCC and IWG Systems

• IWCC Technology/Service Providers:
  • CleanSubSea Envirocart
  • ECOsubsea
  • SGS EnviroHull
  • SGS Whale Shark
  • Sinku
  • TecHullClean

• IWG Technology/Service Providers:
  • HullWiper
  • SeaRobotics HullBUG

• Additional Requests for Technologies
  • 2018, 2019…
Acknowledgements

• This work is funded by the US Maritime Administration, Maryland Port Administration, and California State Lands Commission