

# 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**



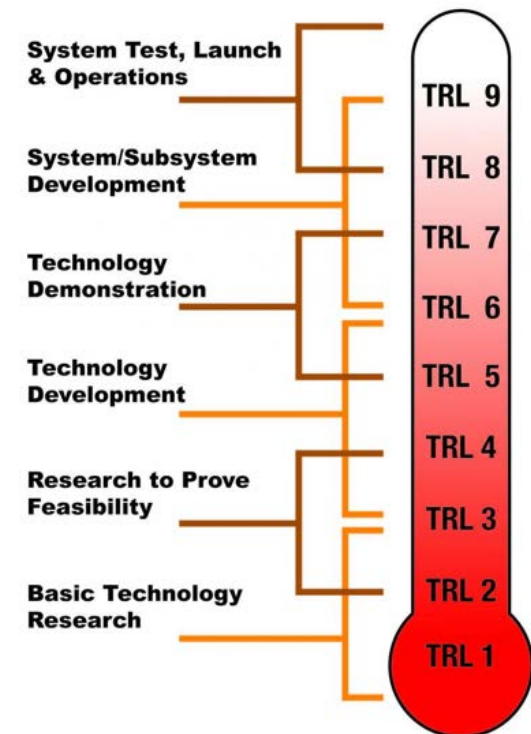
# Approaches to Quantify Biofouling and Considerations of Hull Cleaning

- **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**



[www.maritime-enviro.org](http://www.maritime-enviro.org)

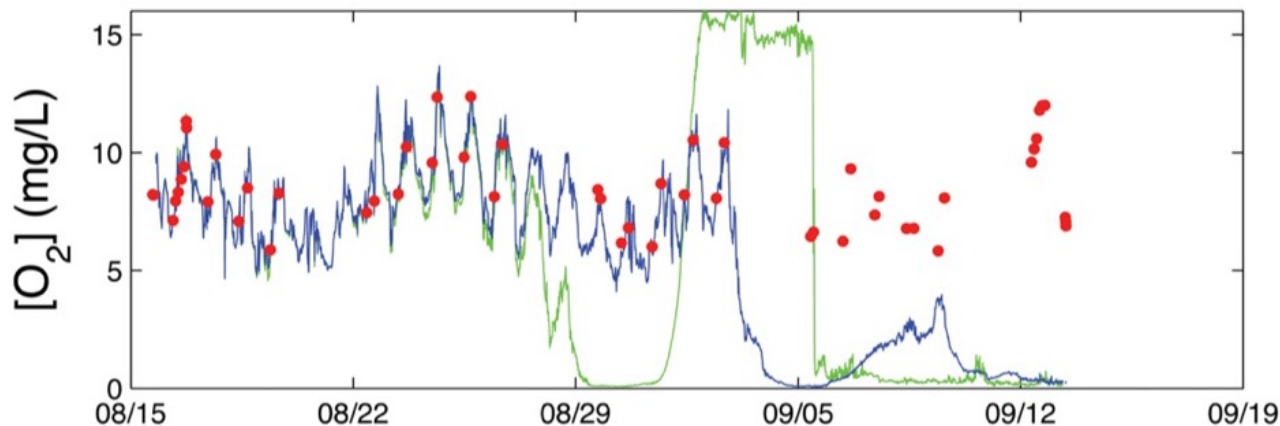
# Alliance for Coastal Technologies

- **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**

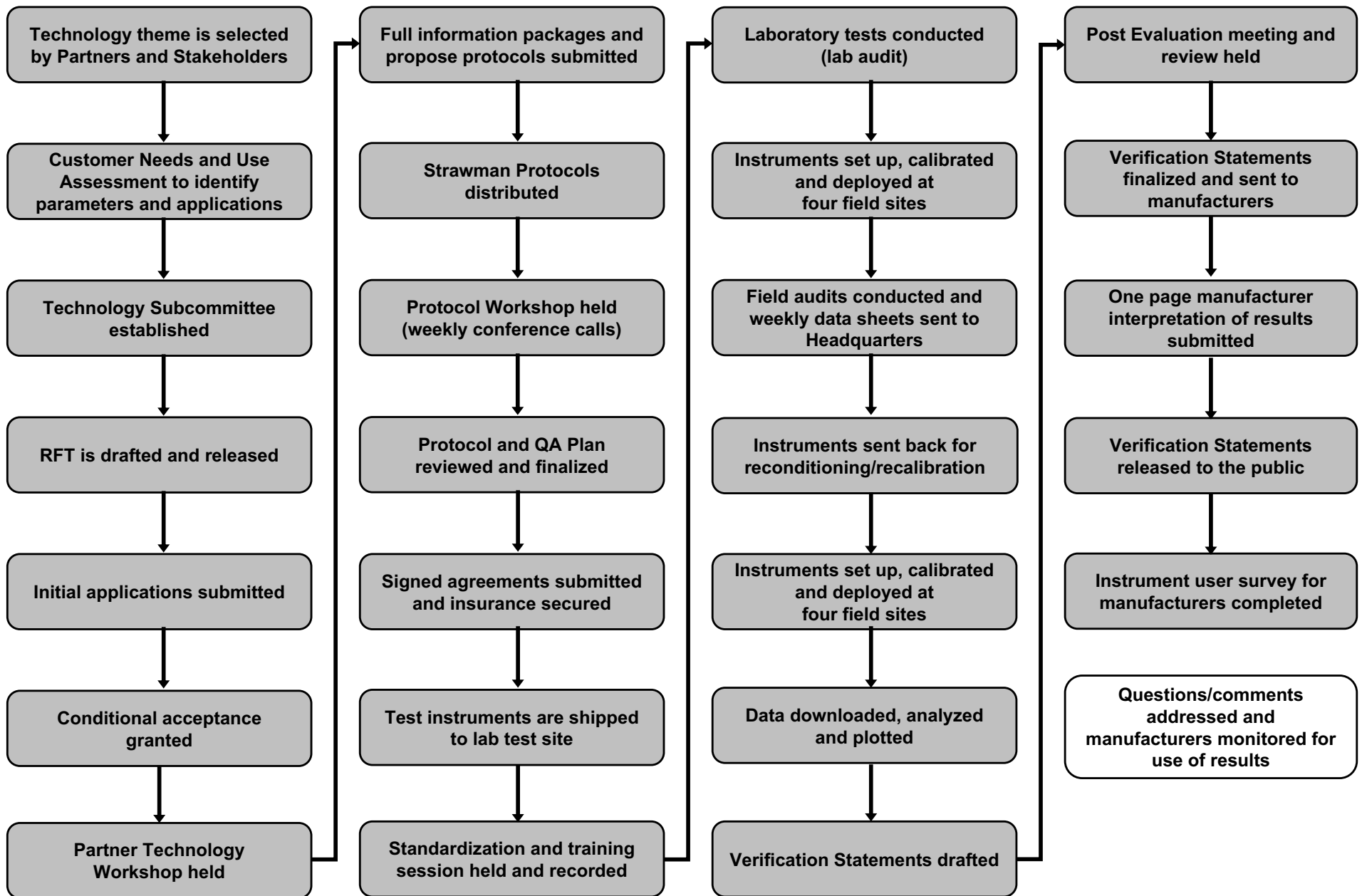


# Alliance for Coastal Technologies

- **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**



# ACT Technology Evaluation Process





# 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**

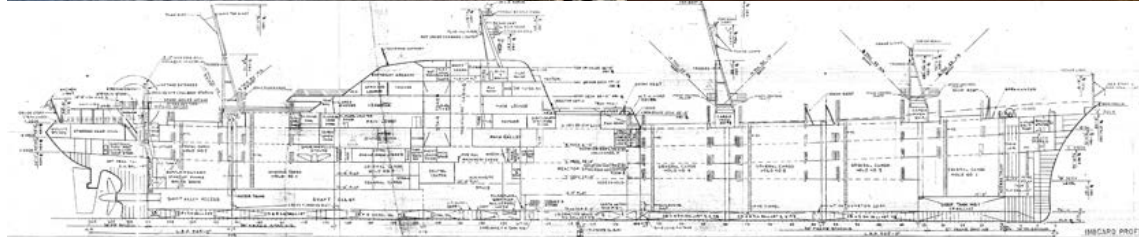
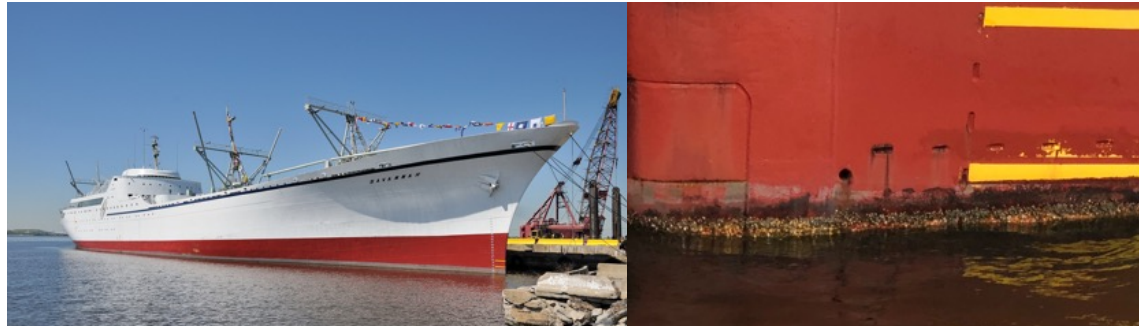
# Evaluations of IWCC and IWG Systems

- **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 Morrissey 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

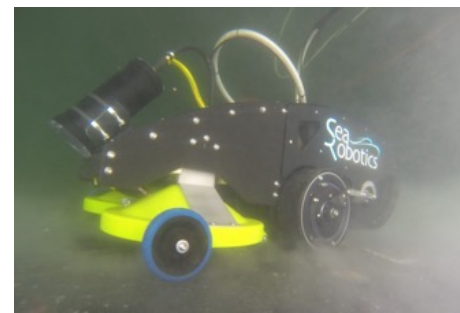
- **IWCC Technology/Service Providers:**

- CleanSubSea Envirocart
- ECOsubsea
- SGS EnviroHull
- SGS Whale Shark
- Sinku
- TechHullClean



- **IWG Technology/Service Providers:**

- HullWiper
- SeaRobotics HullBUG



- **Additional Requests for Technologies**

- 2018, 2019...

# Acknowledgements

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