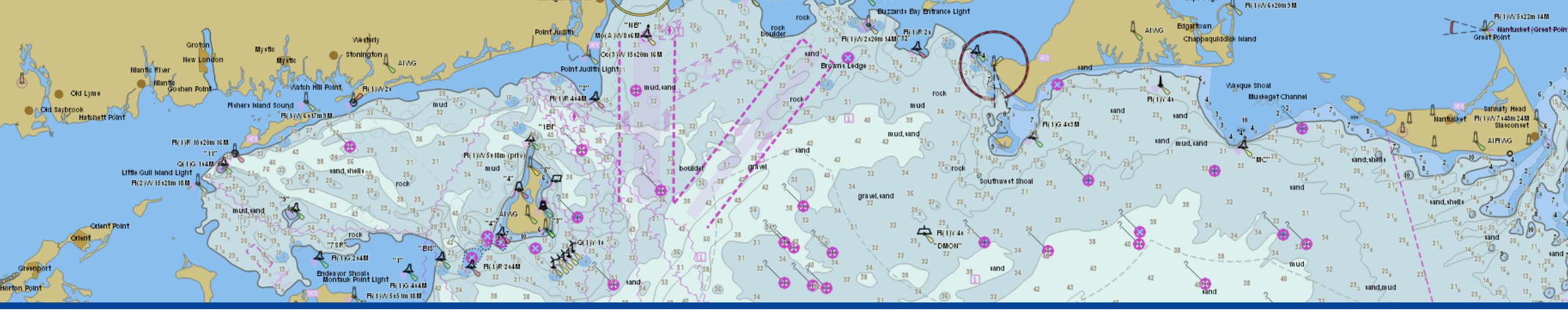


Unmanned Surface Vessels for Hydrography

Coast Survey Experiences

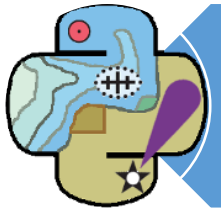
LCDR Damian Manda, NOAA

24 Feb 2020

Coast Survey UxS Strategy

Coast Survey Strategic Plan:
Integrate new and innovative technologies into mission priorities.

Coast Survey Development Lab Focus: More efficient, effective, and safer acquisition of data to support OCS requirements.



Develop Enabling Technologies

Build and Maintain Operational Expertise

Operational Innovation

Collaboration

NOAA UxS Strategy

Goal 1: Coordinate and Support UxS Operations at an Enterprise Level.

Goal 2: Expand UxS Applications Across NOAA's Mission Portfolio.

Goal 3: Accelerate transition of UxS Research to Operations.

Goal 4: Strengthen and Expand UxS Partnerships.

Goal 5: Promote Workforce Proficiency in UxS Use and Operations.

Primary Impacts and Use Cases

Unmanned Surface Vessels
- Shallow water mapping (small platforms)
- Dangerous or unknown situations
- Long duration missions

Unmanned Underwater Vessels
- Response (small platforms)
- Deepwater high resolution mapping

Conversion/Multimodal
- More utilization of existing platforms
- Workforce preparation for next generation

Unmanned Aerial Systems
- Faster shoreline
- Response imagery/assessment
- Shallow water bathymetry

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Autonomous Hydrographic Survey Launch (AHSL)

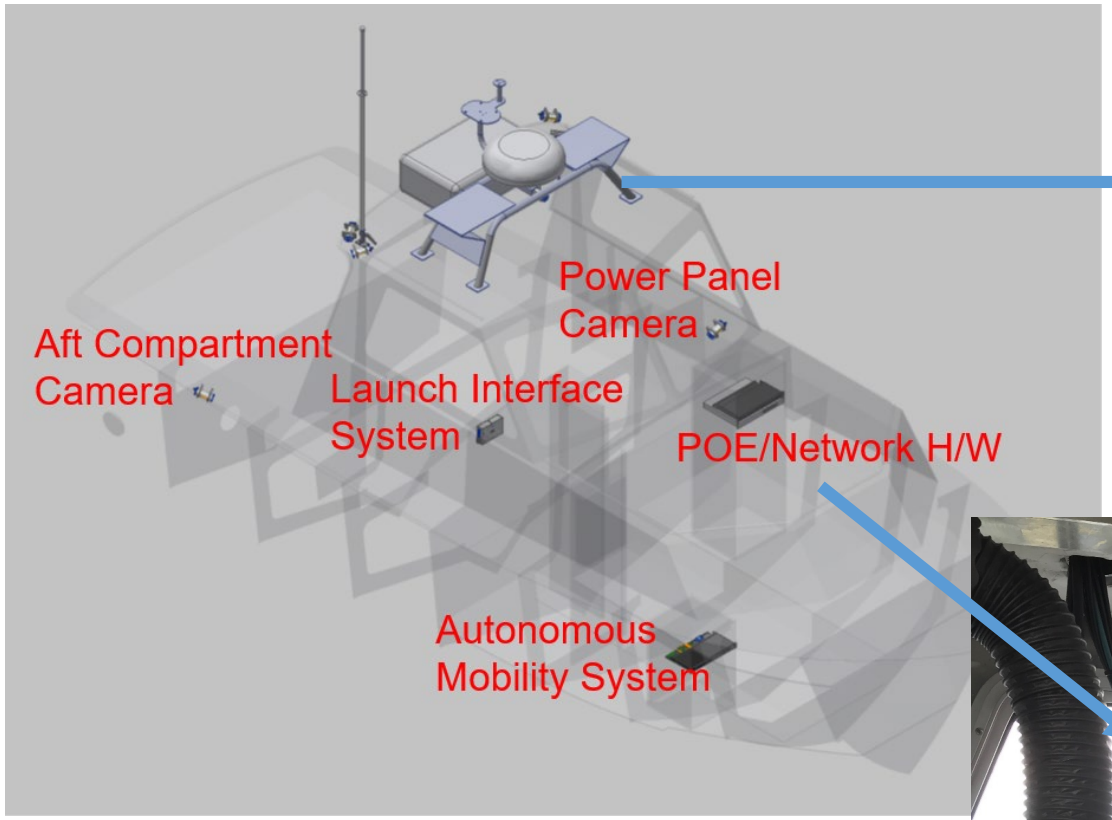
Purpose

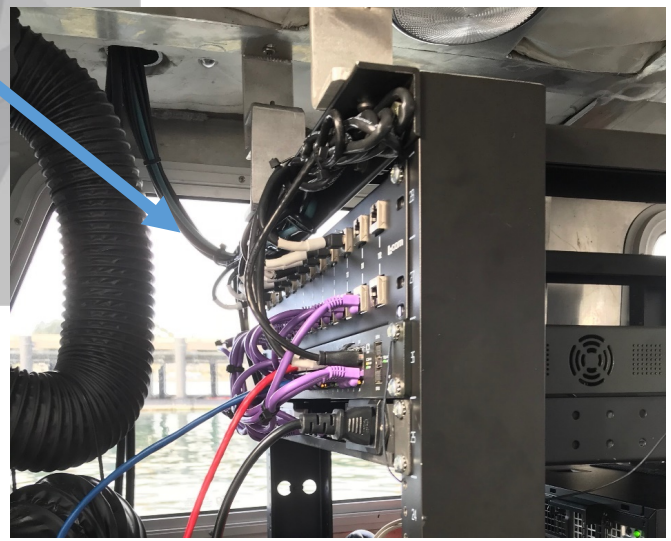
- Maximize use of current infrastructure and expertise
- Expedited, moderately priced, and scalable means to integrate unmanned systems
- Technical and operational development & testing
- Build shipboard knowledge & expertise

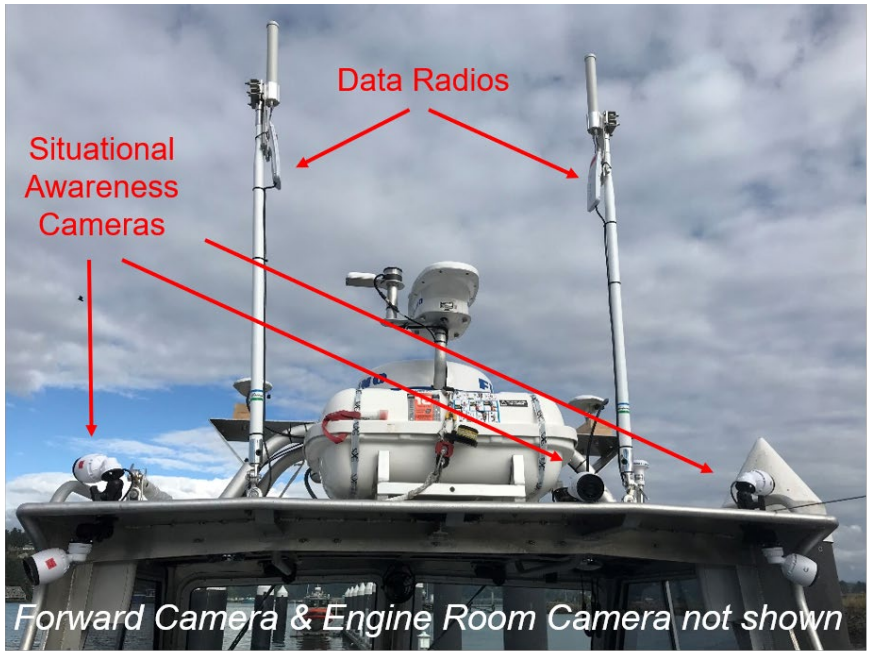
Possible Benefits

- More effective use of survey personnel
- Increased survey efficiency

AHSL Components







AHSL Development & Testing

2017

- Contracting and requirements

2018

- Initial Development and Testing

2019

- Acceptance Tests
- Phase 1 – Training
- Phase 1.5 – Local Operation

CROS – Control & Reconnaissance Operators Station

Testing Results

Personnel

- Staffing – 1:1 Operator-to-AHSL ratio likely possible
- Qualifications – May require specialized coxn

Operations

- Launch and recovery challenge
- Survey System Control – Power cycling lacking
- Situational Awareness – Camera views clear, require > 1 Hz update rate
- Communications: Bandwidth sufficient for LOS,
- Route Planning – Fairly intuitive, Hypack import

Dedicated USVs

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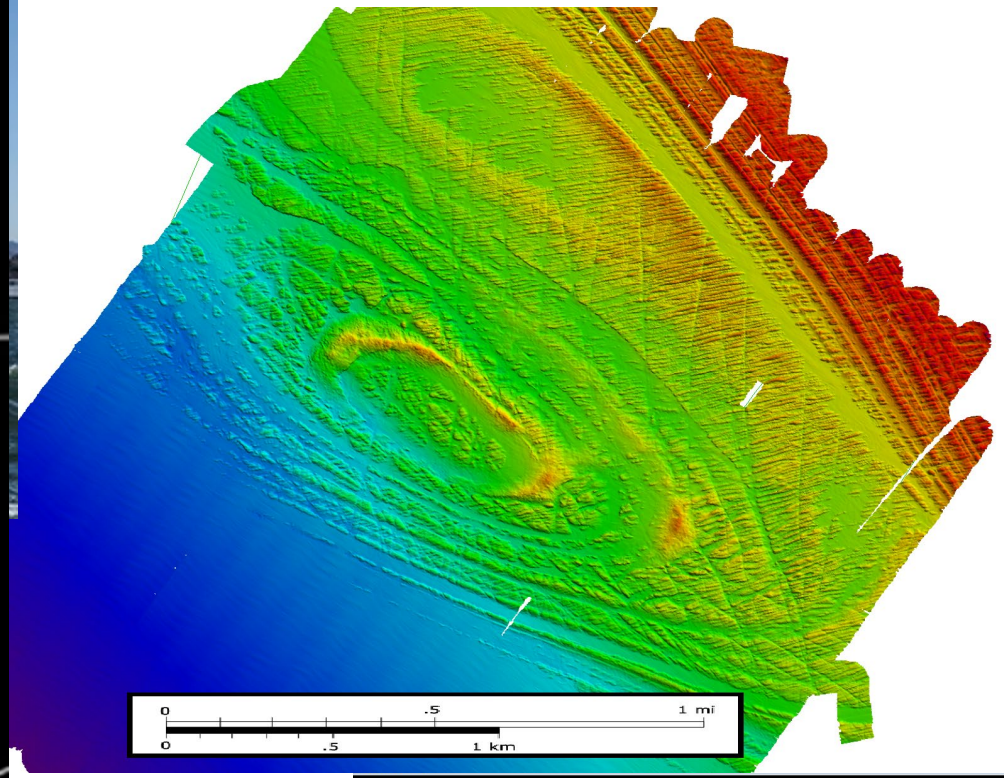
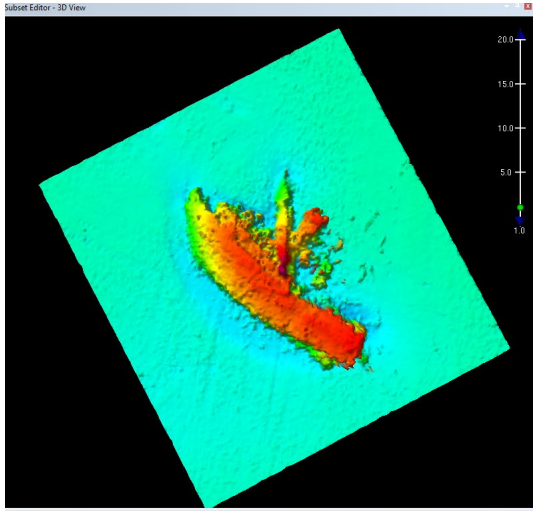
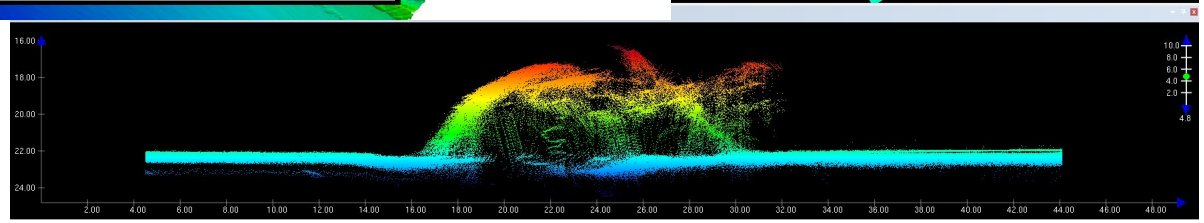
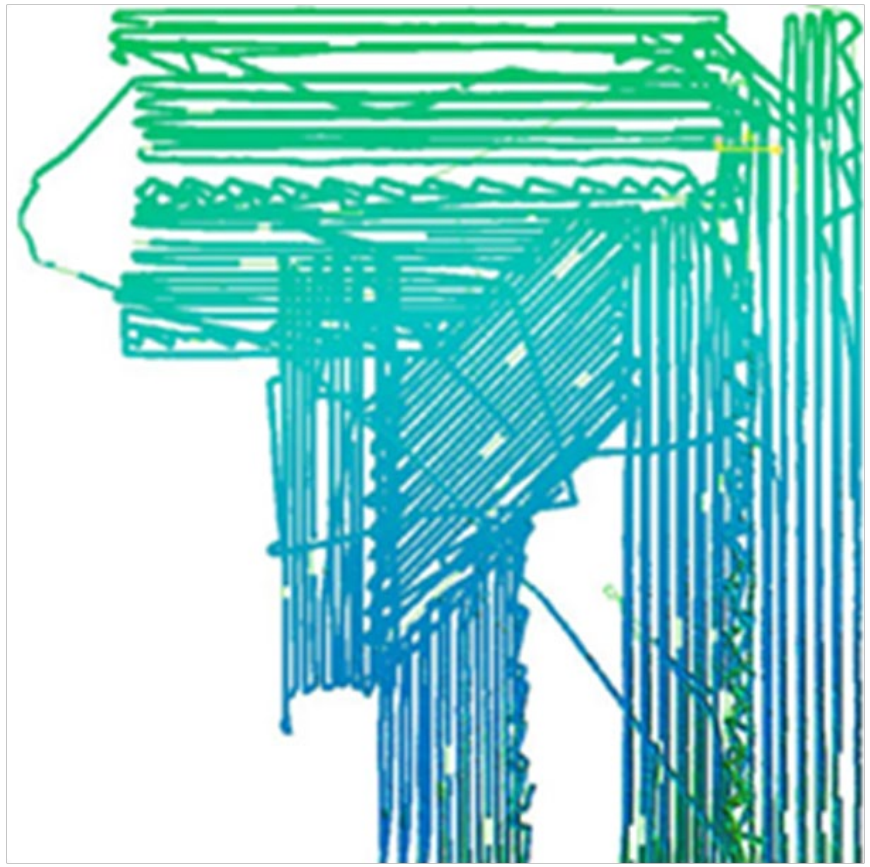
2019 Activities – Partners: USM & Saildrone







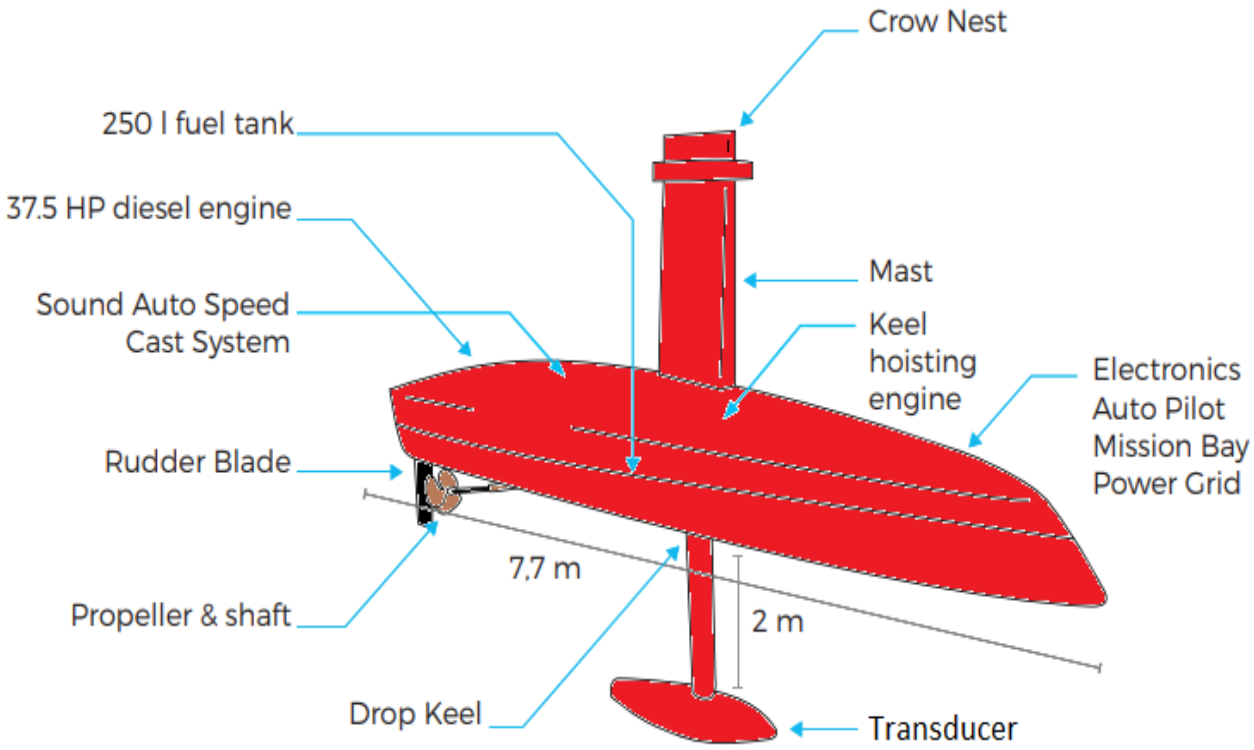
Saildrone – Lessons Learned



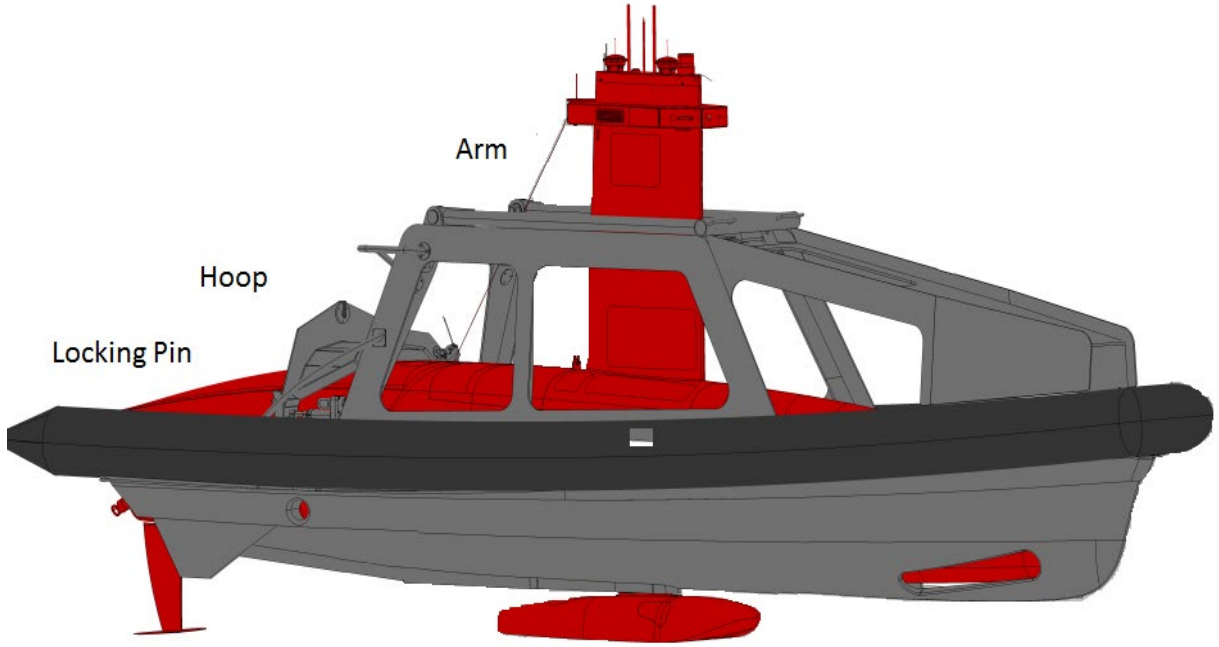
Wind Condition Adaptation

Biofouling

2019 Activities – Partners: UNH & iXBlue DriX



DriX



DDS – DriX Deployment System

Endurance: ~7 days @ 7kts, ~4 days @ 9-10 kts

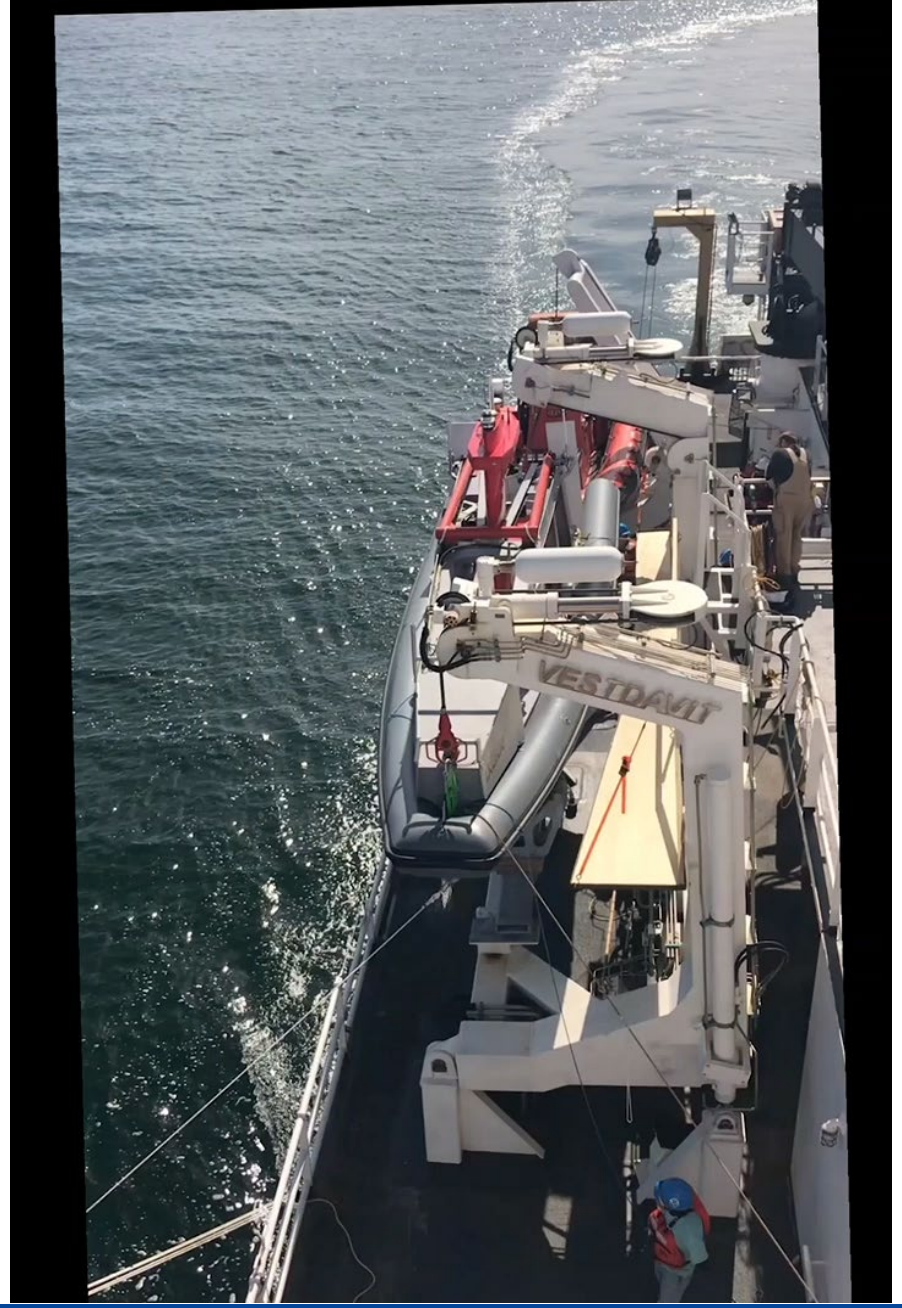
NOAA Ship *Thomas Jefferson* Trials


Retractable Boom

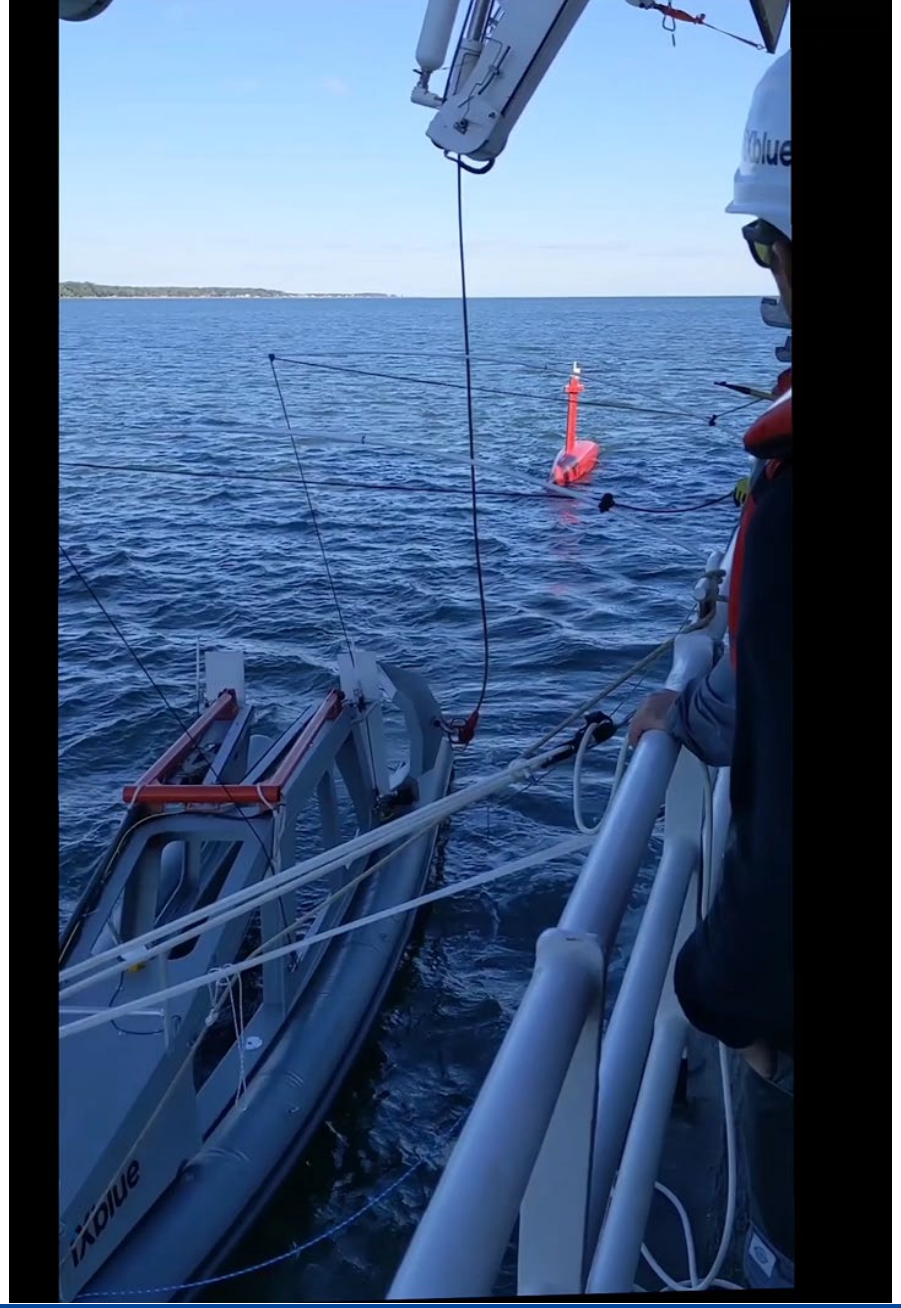
Training


Davit Retrofit

Launch



Recovery



DriX – Results

- Deployment and recovery up to 1 m seas
  - Room for improvement in handling
- Must be able to intercept with small boat for emergencies
  - Contingency plans and creative responses crucial
- DriX itself has a fairly wide sea state operating range
- Operator situational awareness is limited - Short range Lidar, camera systems, AIS (no Radar)

2020 Planned Activities

AHSL

- Conversion of *Fairweather* launch
- Phase 2-3 Testing on *Fairweather*
- Continued Operational Use

DriX

- Crew Training
- Thunder Bay Survey
- *Thomas Jefferson* Round 2

Saildrone

- Additional Tandem Operation
- Power management & endurance extension
- Deepwater system (w/ UNH)