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# Pacific Northwest National Laboratory Support for DOE Funding Opportunity Announcement: Marine and Hydrokinetic Energy Conversion and Environmental Monitoring Technology Advancement DE-FOA-0001418

WEBINAR 9 MARCH 2016

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U.S. DEPARTMENT OF ENERGY

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# FOA Support

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## Marine and Hydrokinetic Energy Conversion and Environmental Monitoring Technology Advancement

The FOA can be found on EERE-Exchange at:

https://eere-exchange.energy.gov/Default.aspx#FoaIdfb505ad6-19d6-42e7-8d46-5be0fd9f9a14

Questions will not be taken during this webinar. All questions must be submitted to MHKFOA1418@ee.doe.gov. Please note: all Q&As will be posted publically.

# FOA Support

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- Pacific Northwest National Laboratory
- Triton Initiative
- Site conditions
- Facilities
- Expertise
- Timeline

# Pacific Northwest National Laboratory

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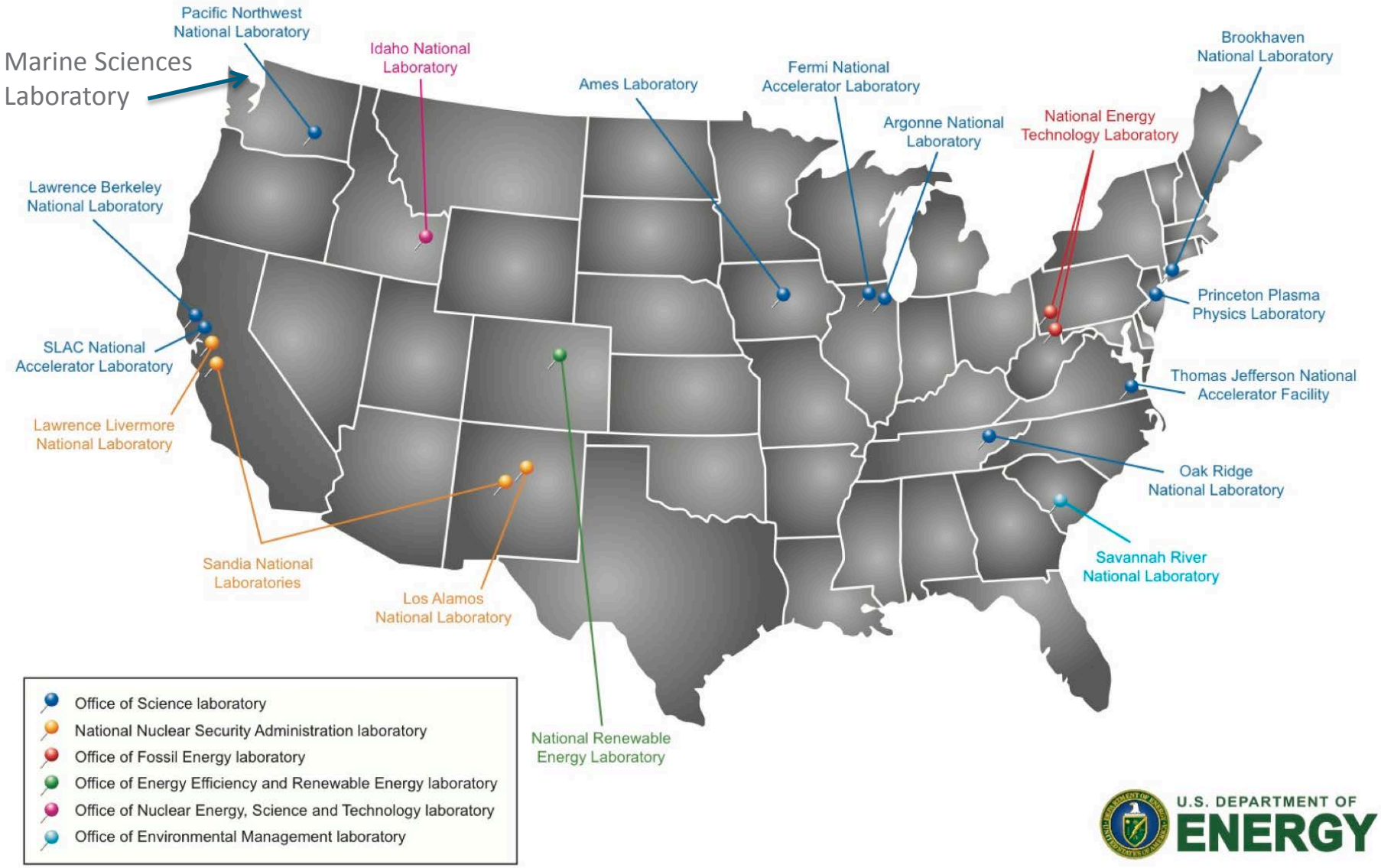


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# Pacific Northwest National Laboratory

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- PNNL is one of Department of Energy's national laboratories, managed by the DOE's Office of Science
- Based in Richland, with satellite offices in Seattle and Tacoma, WA; Portland, OR; Washington, DC
- Marine Sciences Laboratory in Sequim, WA – the only marine facility within the DOE
- Over 4,300 employees PNNL-wide, with 80 at MSL
- Operated by Battelle Memorial Institute

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# Triton Initiative

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- DOE funded capability to support FOA awardees and reduce environmental monitoring costs
- Based at Marine Sciences Laboratory
- Collaboration with universities, other national laboratories and industry
- Work together to develop better technologies and cheaper environmental monitoring solutions

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# Marine Sciences Laboratory

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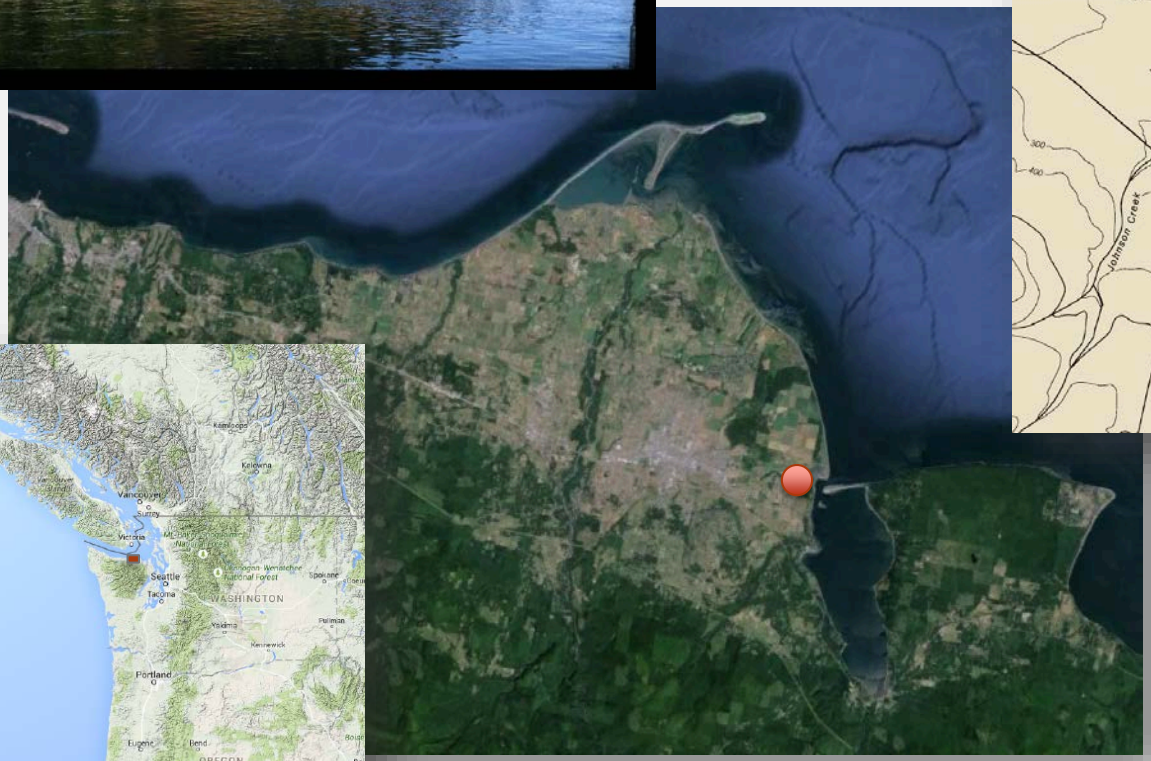

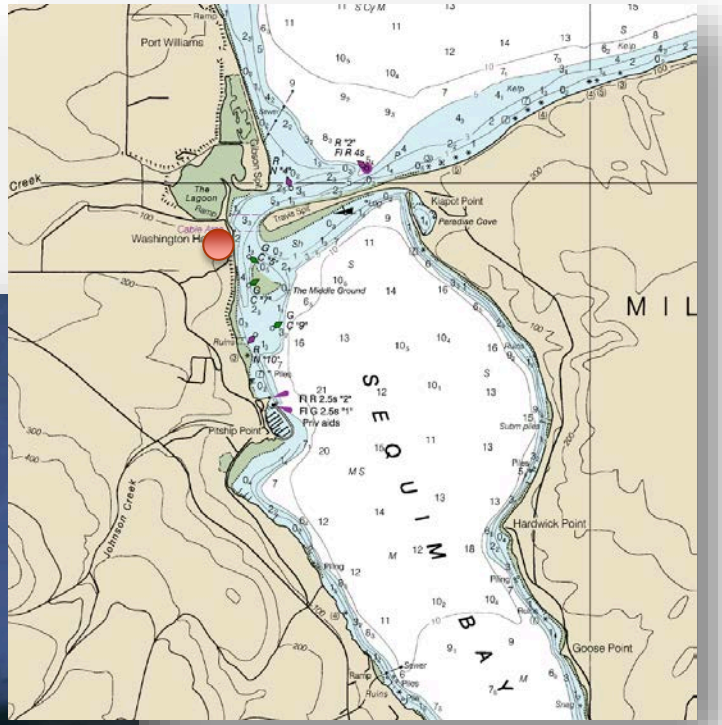





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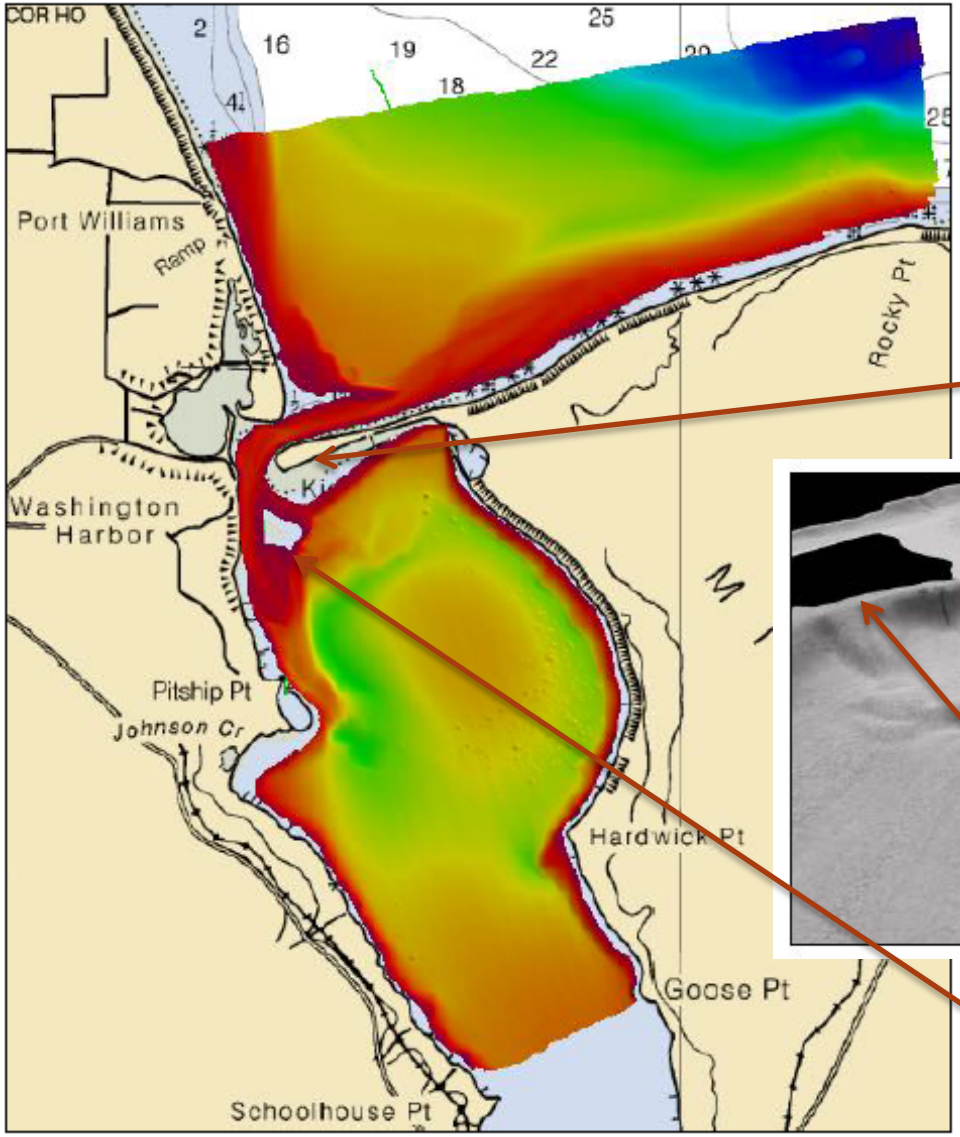
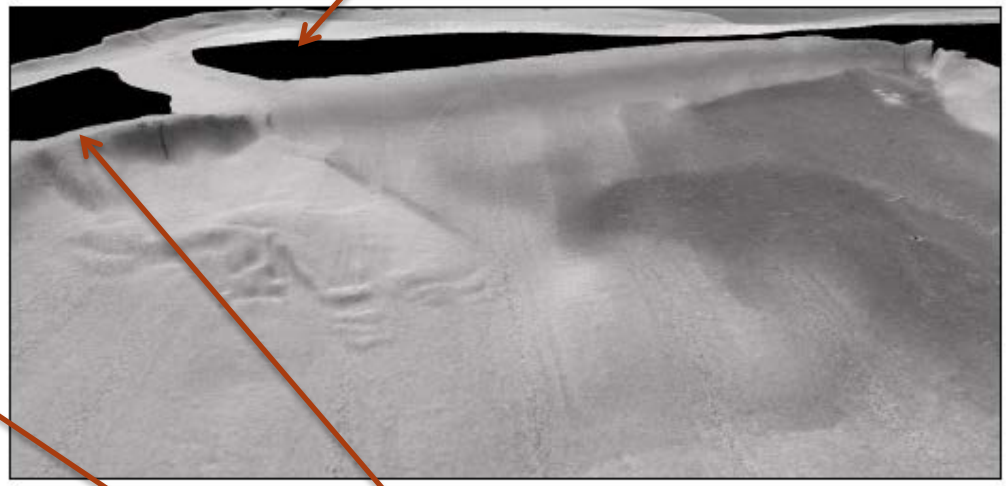
# Bathymetry Survey






Water depths: 12 m in channel
X m in Sequim Bay
Increases north from Travis Spit

Travis Spit



The Middle Ground

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# Bathymetry Survey

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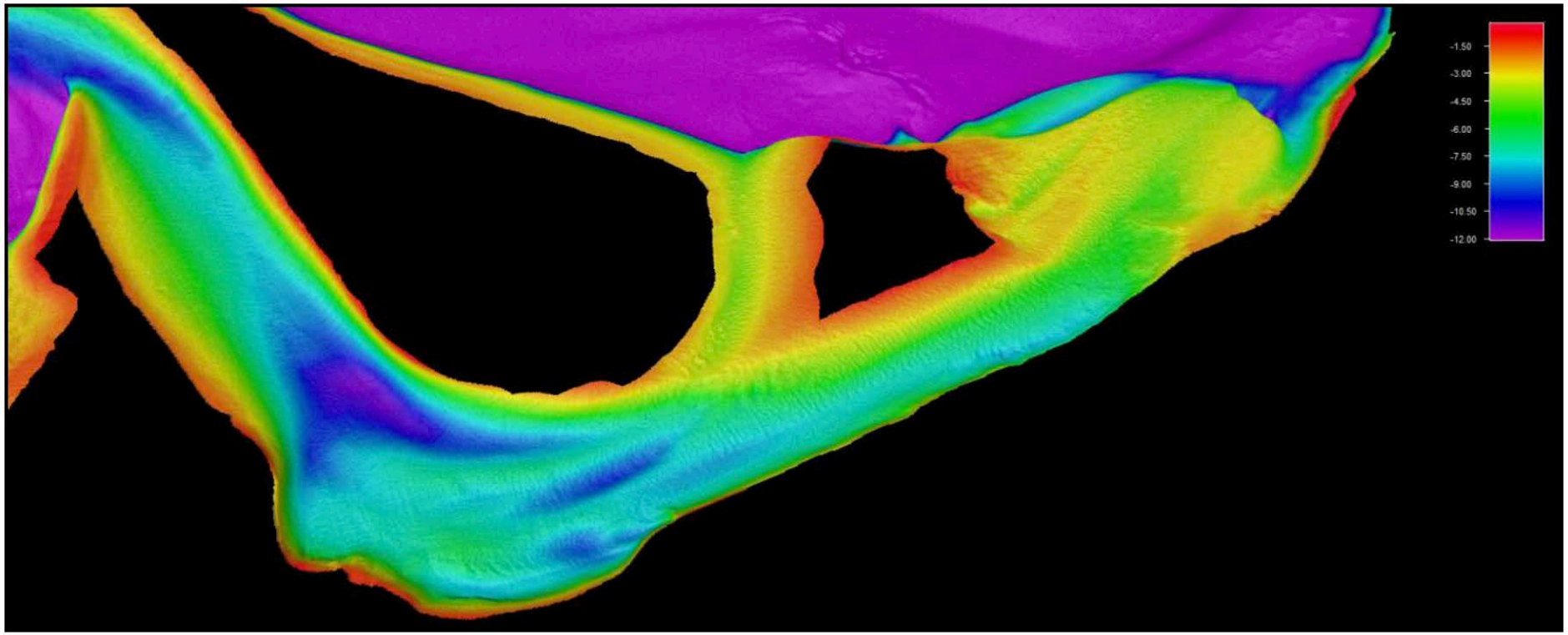
Depth in channel up to 12 m, ripple and high current features

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# Wider Area



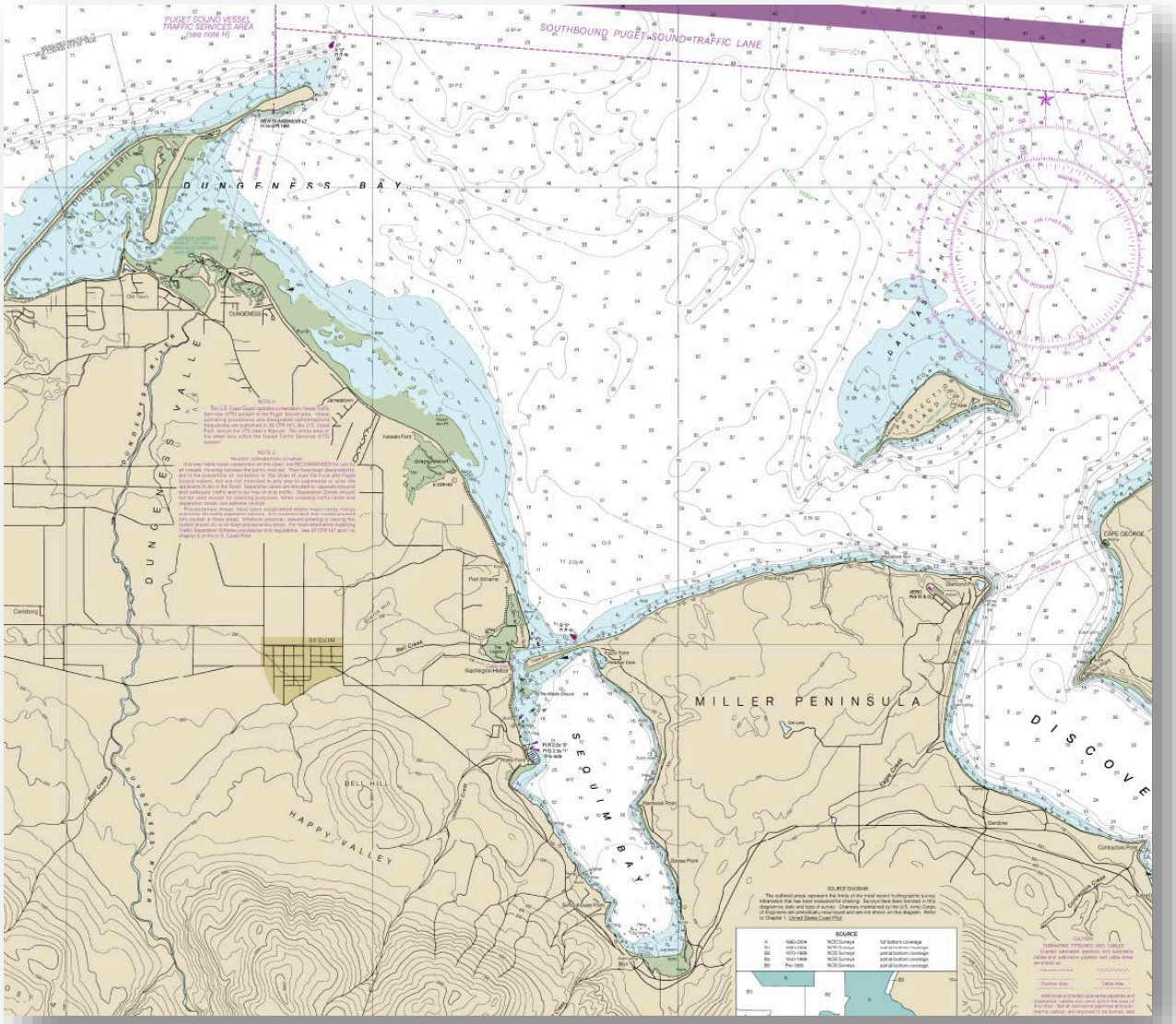
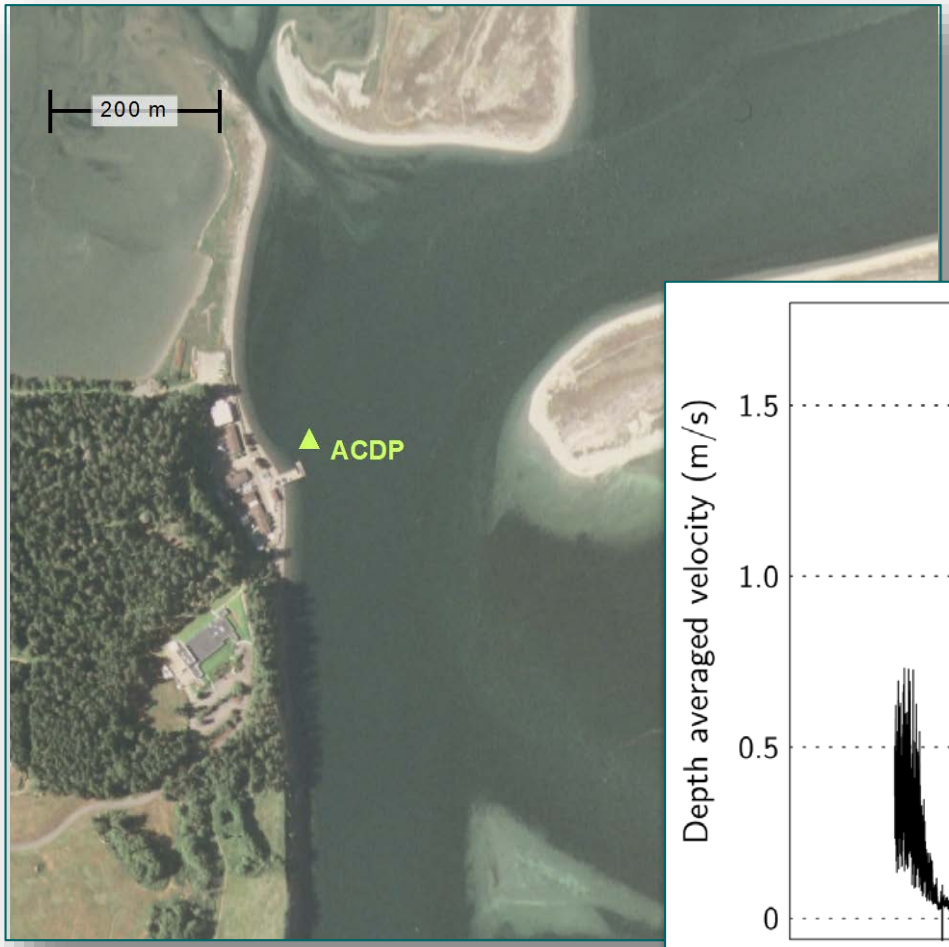
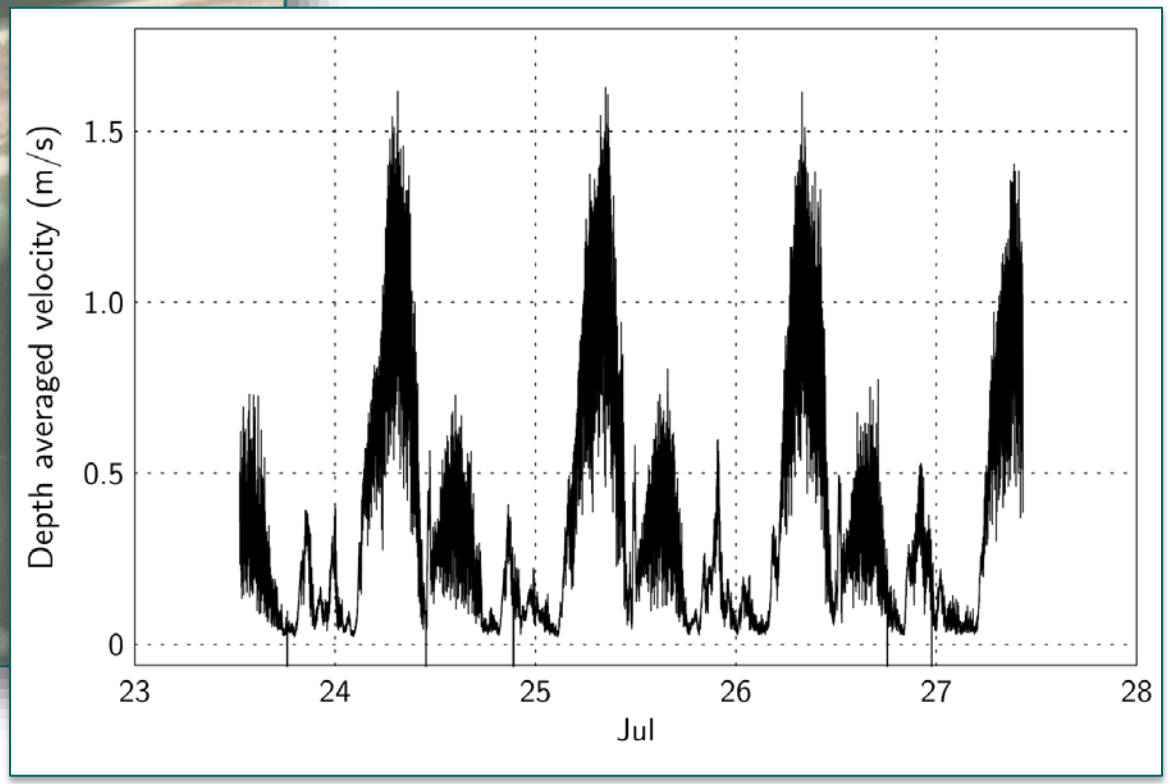



Chart 18471
Approaches to
Admiralty Inlet

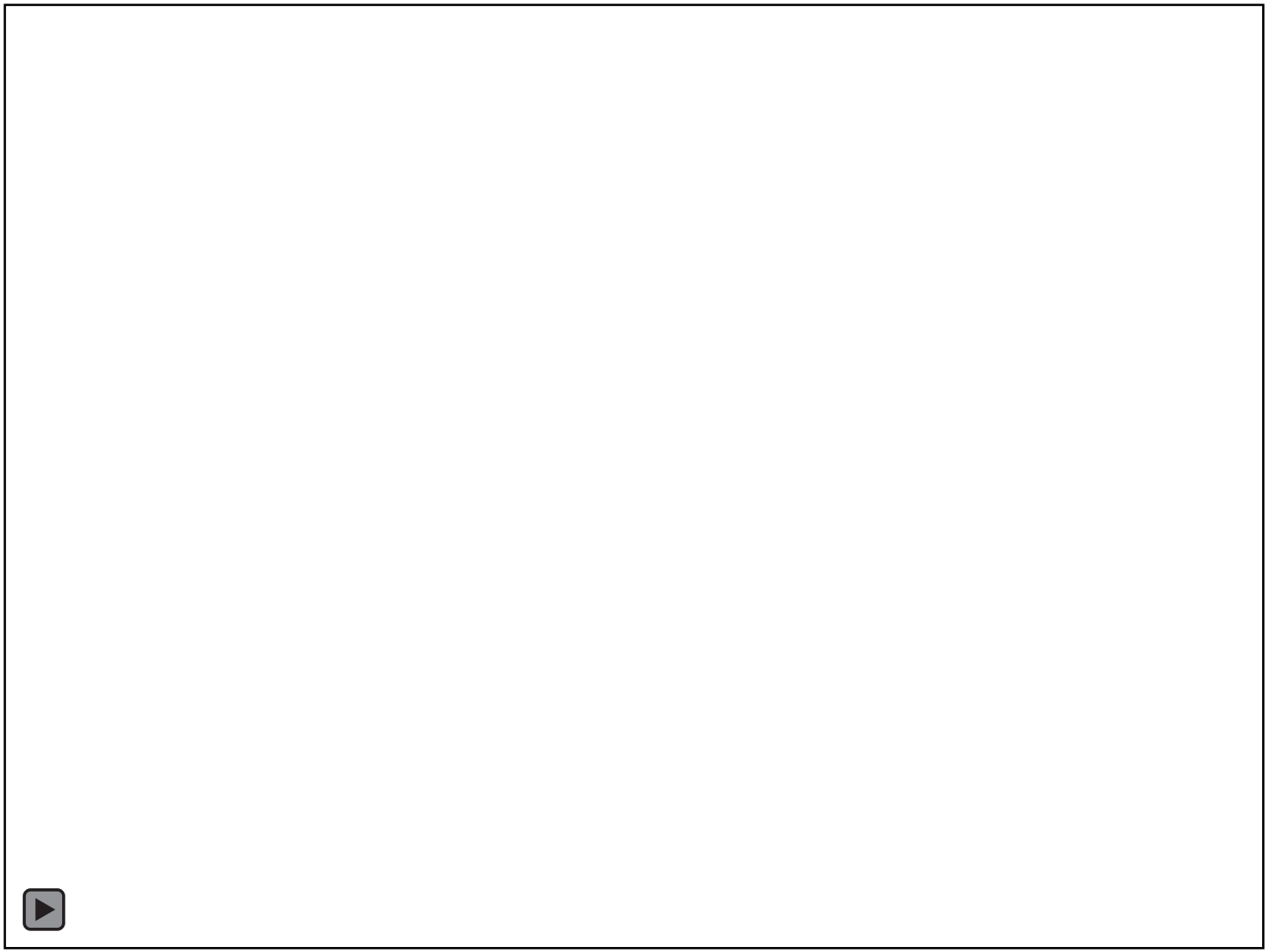
# ADCP Survey - Moored





# Tide Model

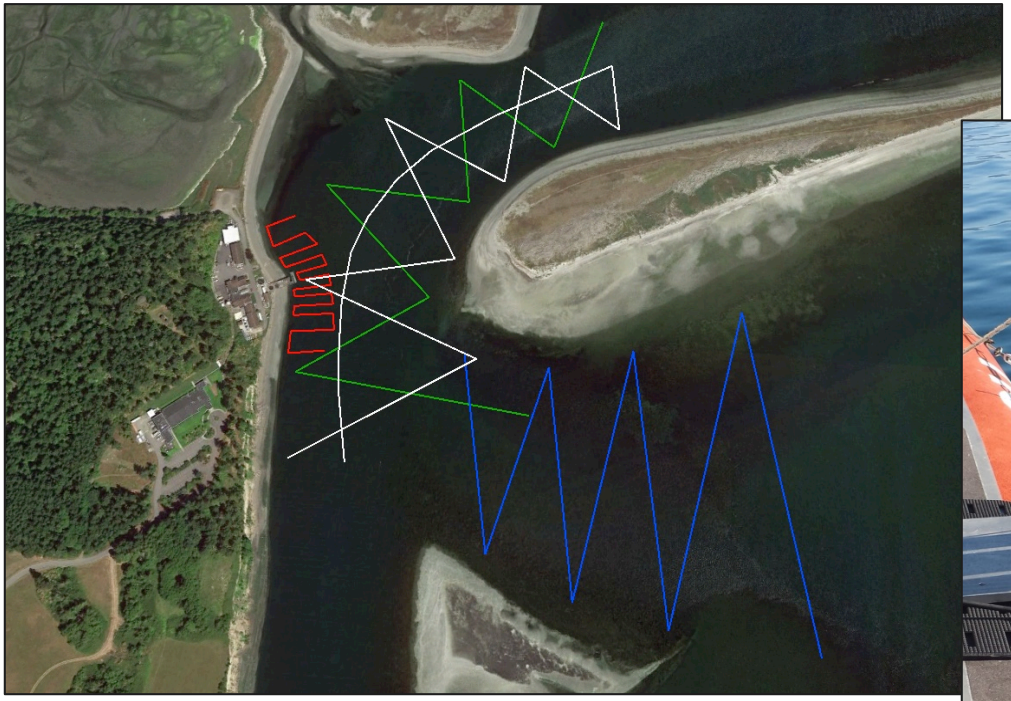


# ADCP Survey – Vessel Mounted



# ADCP Survey – Vessel Mounted





- Track of vessel-mounted ADCP survey
- Establish distribution of flow during flood and ebb tides

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# ADCP Survey – Vessel Mounted

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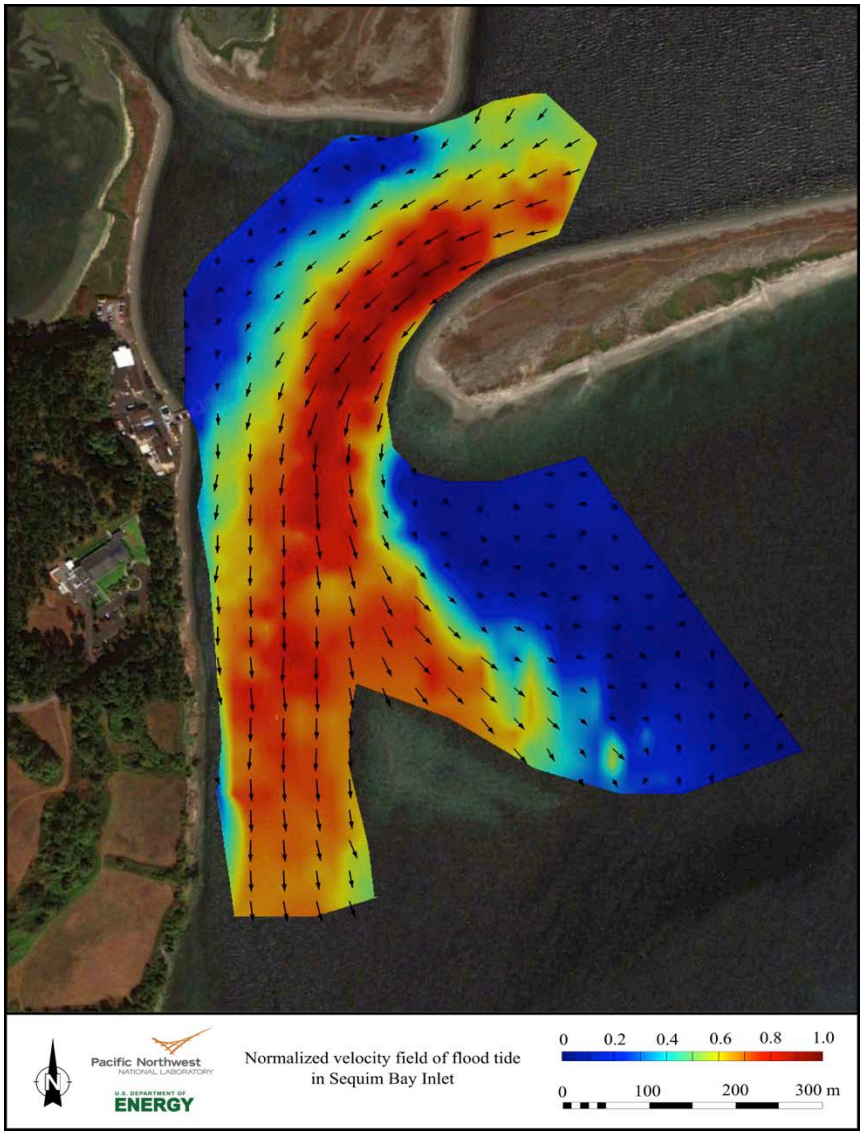


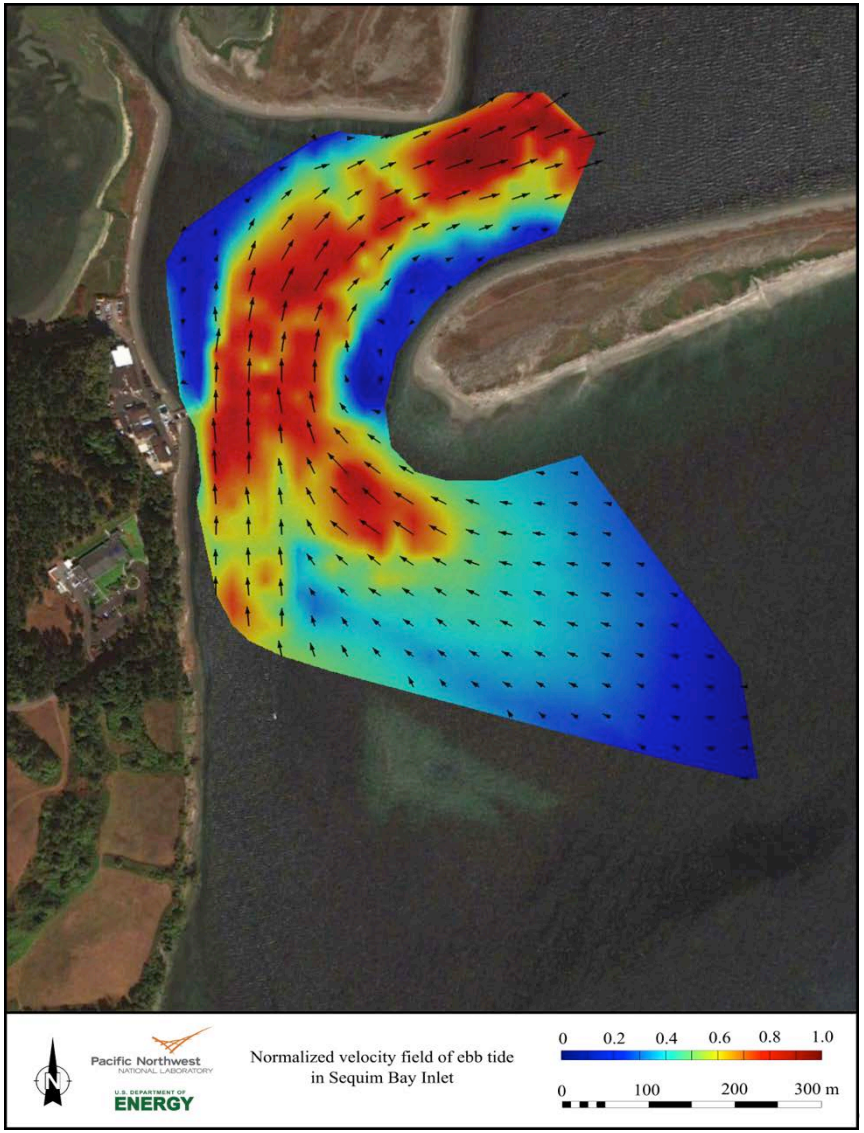

# Facilities - Vessels

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- RV Strait Science
  - 28-foot research vessel
  - 1000 lb load A-frame
  - 500 ft stainless steel cable
  - Hydraulic davit
  - Up-to-date electronics
  - Sonar-equipped
  - Deck space 77 $ft^2$
  - Cabin space 54 $ft^2$
  - Power for equipment and computers
  - Max speed 35 knots
  - Can work in shallow water (>5 ft)
- Surveys
  - Side-scan and video surveys
  - Benthic grabs/Sampling nets
  - Equipment deployment and recovery
  - Dive operations


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# Facilities - Vessels




- SAFE boat
  - 23-foot
  - 26 inch draft
  - Cruising speeds > 30 knots
  - Highly maneuverable
  - Suited to shallow water
  - Up-to-date electronics
  - Sonar-equipped
  - Open center console with storage cabinets = flexible uses
  - Deck space 34 $ft^2$
- Surveys
  - Hand-held sensor deployment
  - Towing
  - Observations
  - Dive operations

- Access to larger vessels in local area

# Facilities – Dive Team

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- Scientific dive team
  - Scientific surveys, equipment testing and sampling
  - Habitat assessment and restoration
  - Equipment deployment and maintenance
  - Photography and videography

# Facilities - General



- Permits in place to undertake specific work
- Wireless network over water
- Pier with floating dock
- Boat ramp
- Power and data cables to end of pier

# Facilities - General



- Met station
- Water level recorders
- Survey levels and equipment
- Outdoor experimental tanks
- Wet and dry lab facilities
- Anechoic tank
- Pumped seawater system
- Water supply and treatment system

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# Expertise



- Acoustics
  - Multiple previous field and laboratory studies
  - Equipment to play and detect sounds
  - Acoustically quiet platforms for instrument deployment
  - Acoustic tanks
  - Calibration equipment in Richland
  - Acoustic modeling
  - Software development for acoustic signals – detection and tracking

- Electromagnetic fields
  - Laboratory studies with fish, crab and lobster
  - Helmholtz coil
  - Modeling of EMF fields
  - Magnetic anomaly surveys

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# Expertise



- Physical interaction
  - Fish tag studies
  - Development of tags
  - JSATS
  - Deployment of structures
  - Deployment of instruments
  - Video and diver observations
  - AUV surveys
  - Algorithm development for both video and acoustic signals
  - Real-time analysis

- Combining sensors
  - Extensive practical experience in deployments nearshore and offshore
  - Instrument and battery development
  - System integration
  - System engineering

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# FOA Timeline

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- Year 1 → Testing at MSL 1
- Year 2 → Development of technology, using PNNL expertise if appropriate
  - ↓ Testing at MSL 2
- Year 3 → Testing at high energy site

# Questions

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# Thank you

Please no direct contact during the FOA application stage

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