Port-operated systems for automated vessel underwater noise measurements

David Hannay,
JASCO Applied Sciences
UNOLS Green Boats and Ports Workshop,
Portland, August 30, 2018

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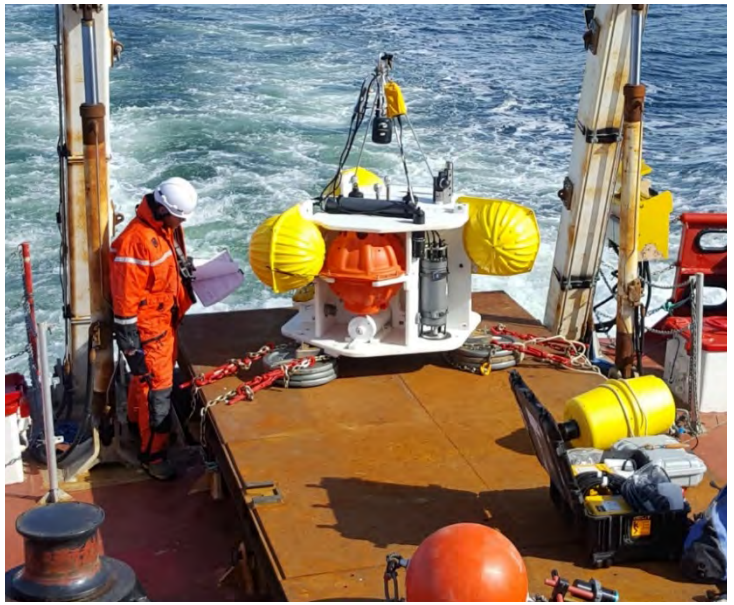

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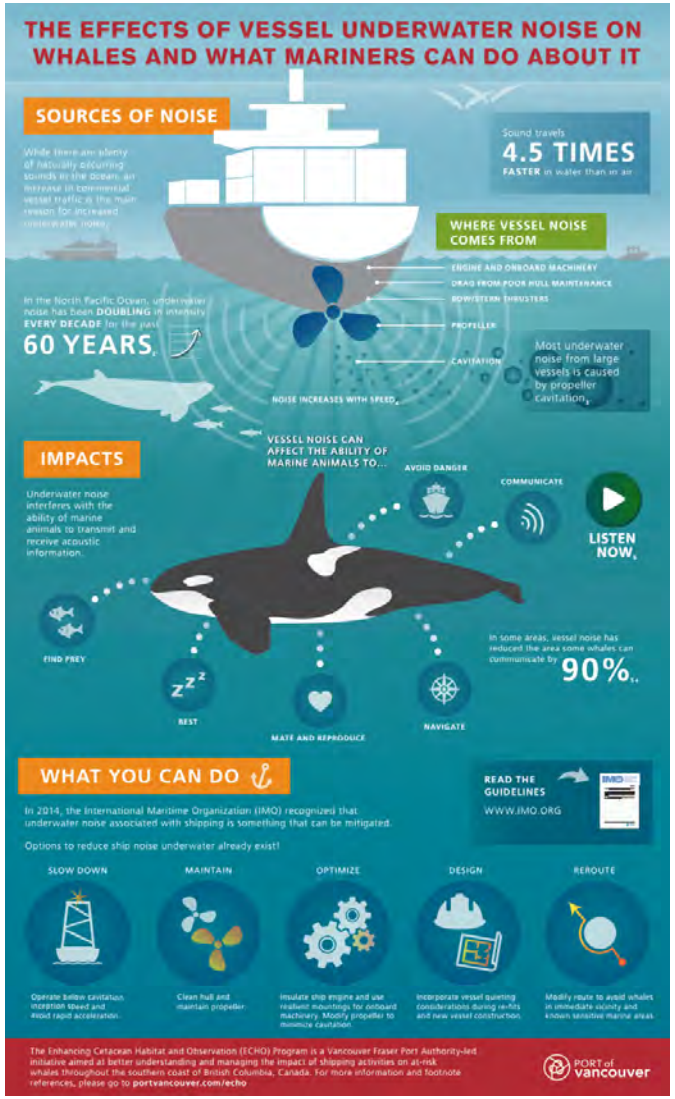
Overview

- Context: underwater ship noise effects on marine fauna
- Automated Underwater Listening Stations
- Data transmission and processing
- Vessel Noise Measurements
- How measurements can be used by ports for managing vessel noise



https://www.portvancouver.com/wp-content/uploads/2016/04/ECHO-Program-Underwater-Noise-Infographic-April-2016.pdf

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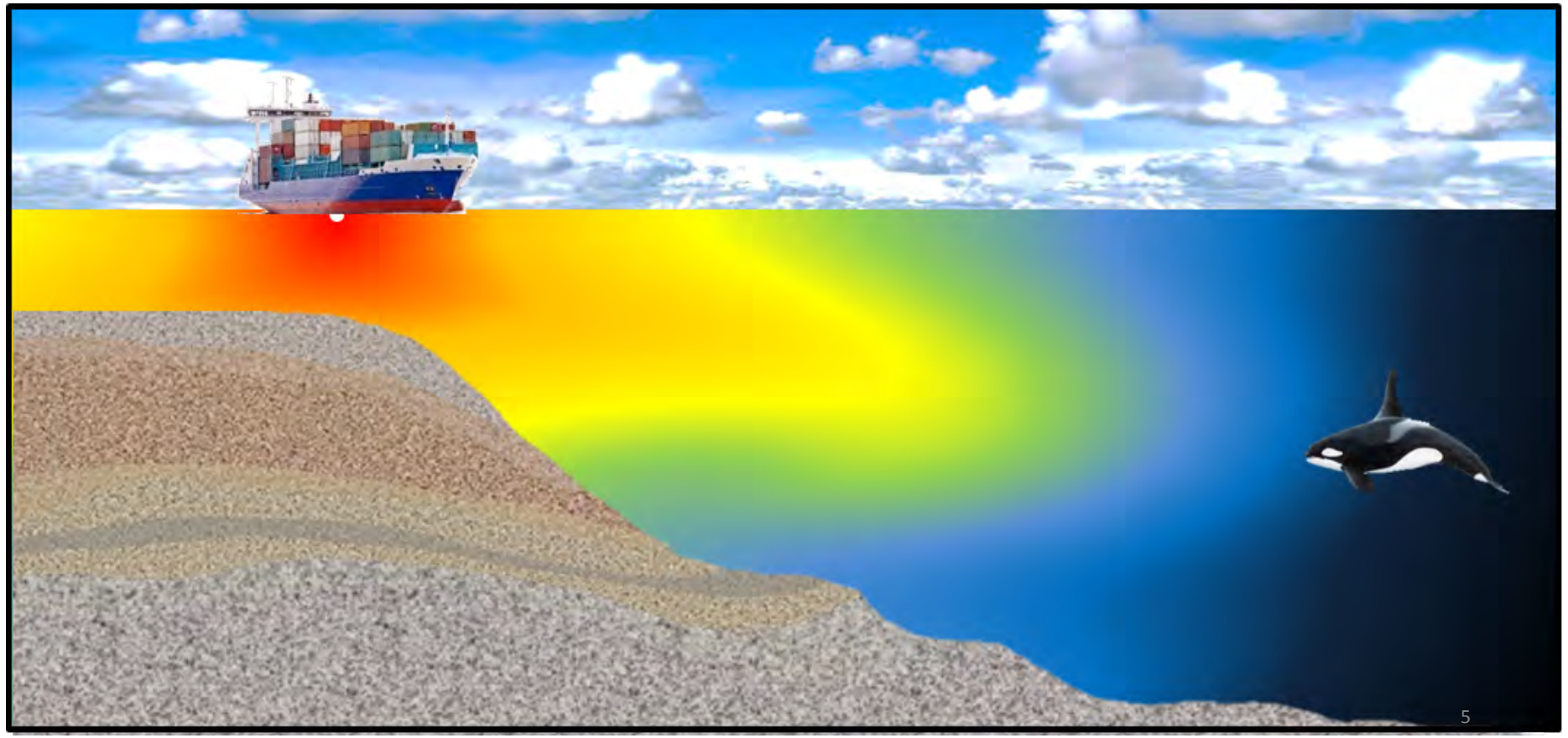

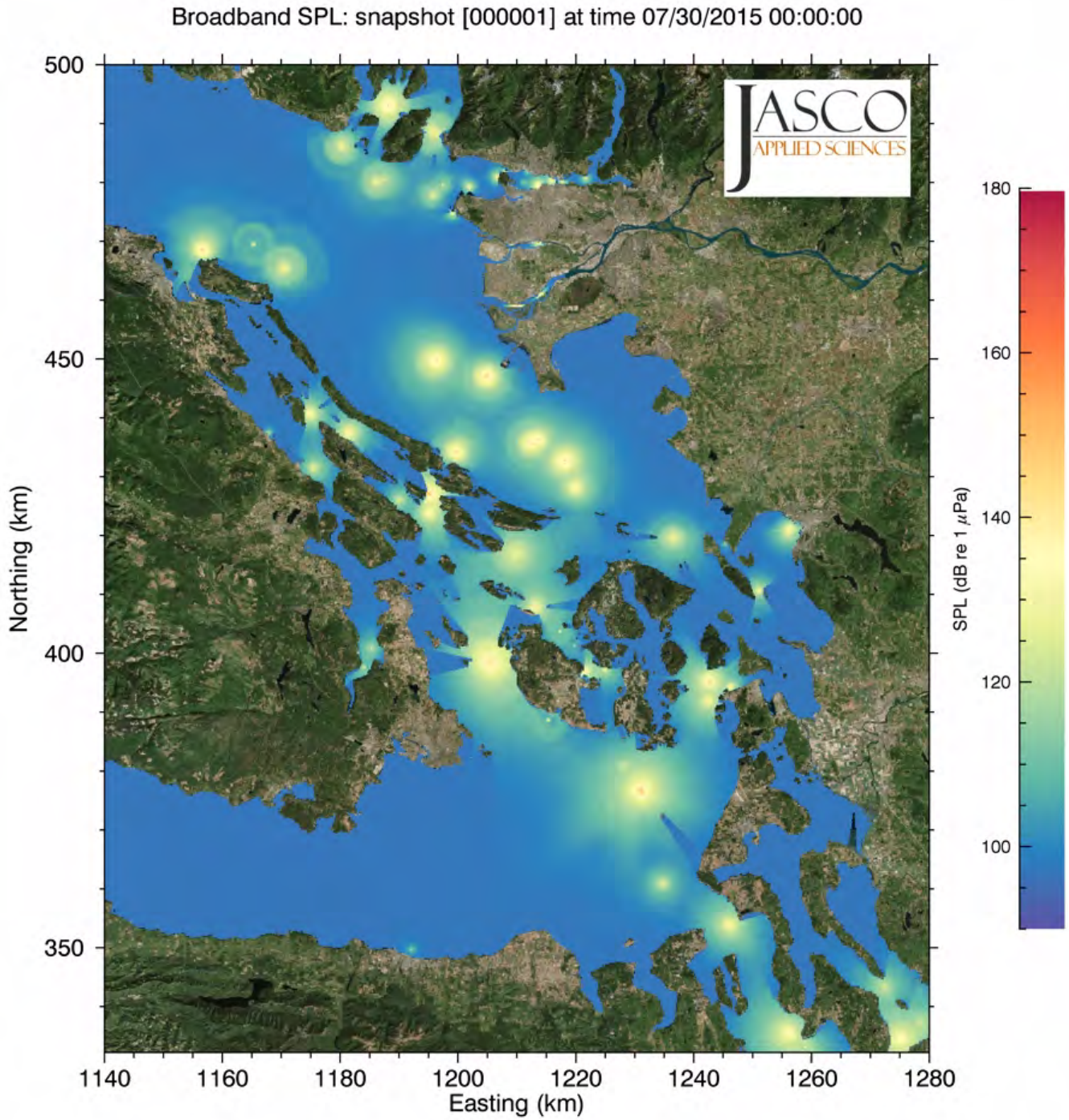
Broadband SPL: snapshot [000001] at time 07/30/2015 00:00:00
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Northing (km)
500
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Easting (km)
SPL (dB re 1 μPa)
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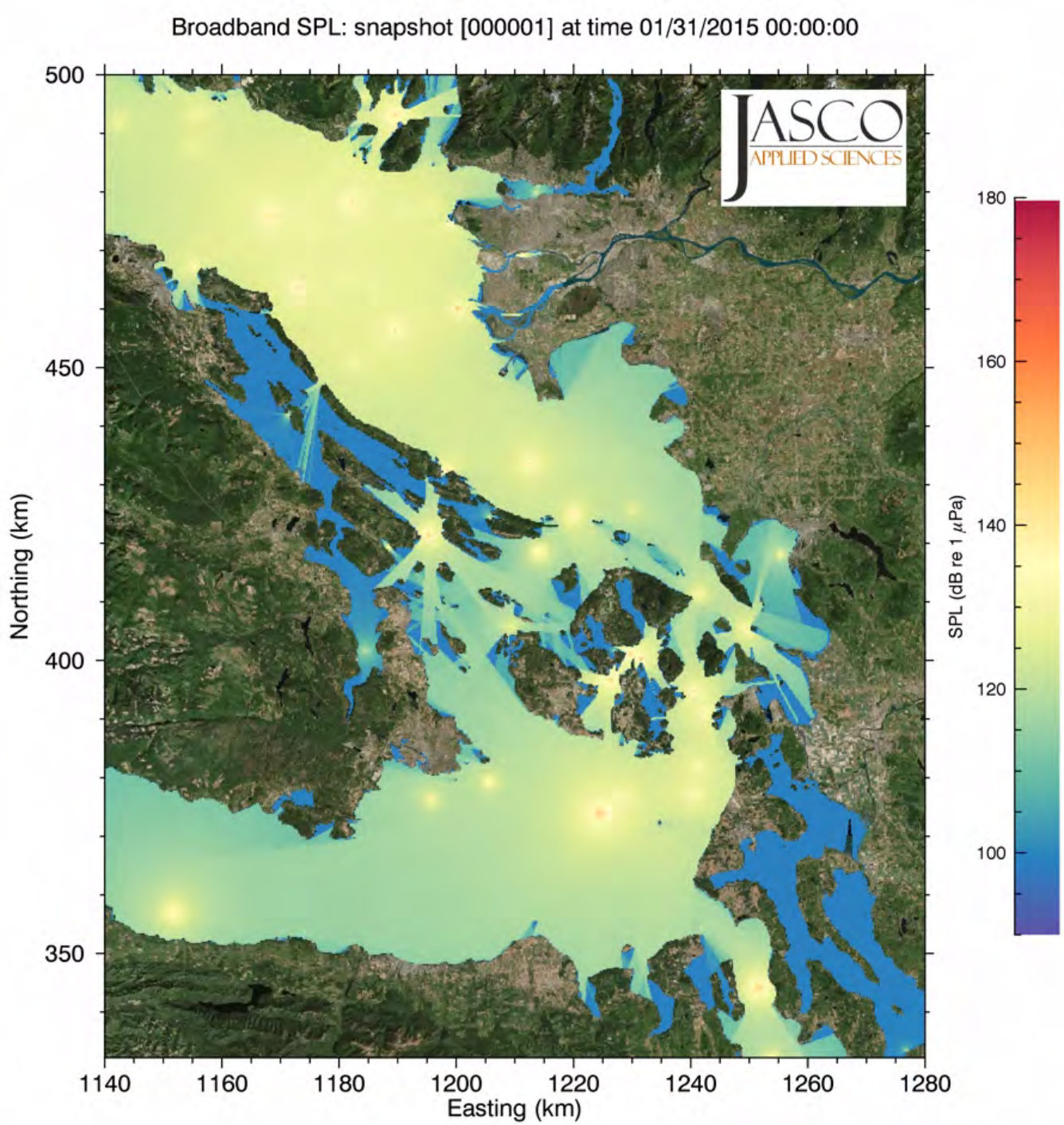
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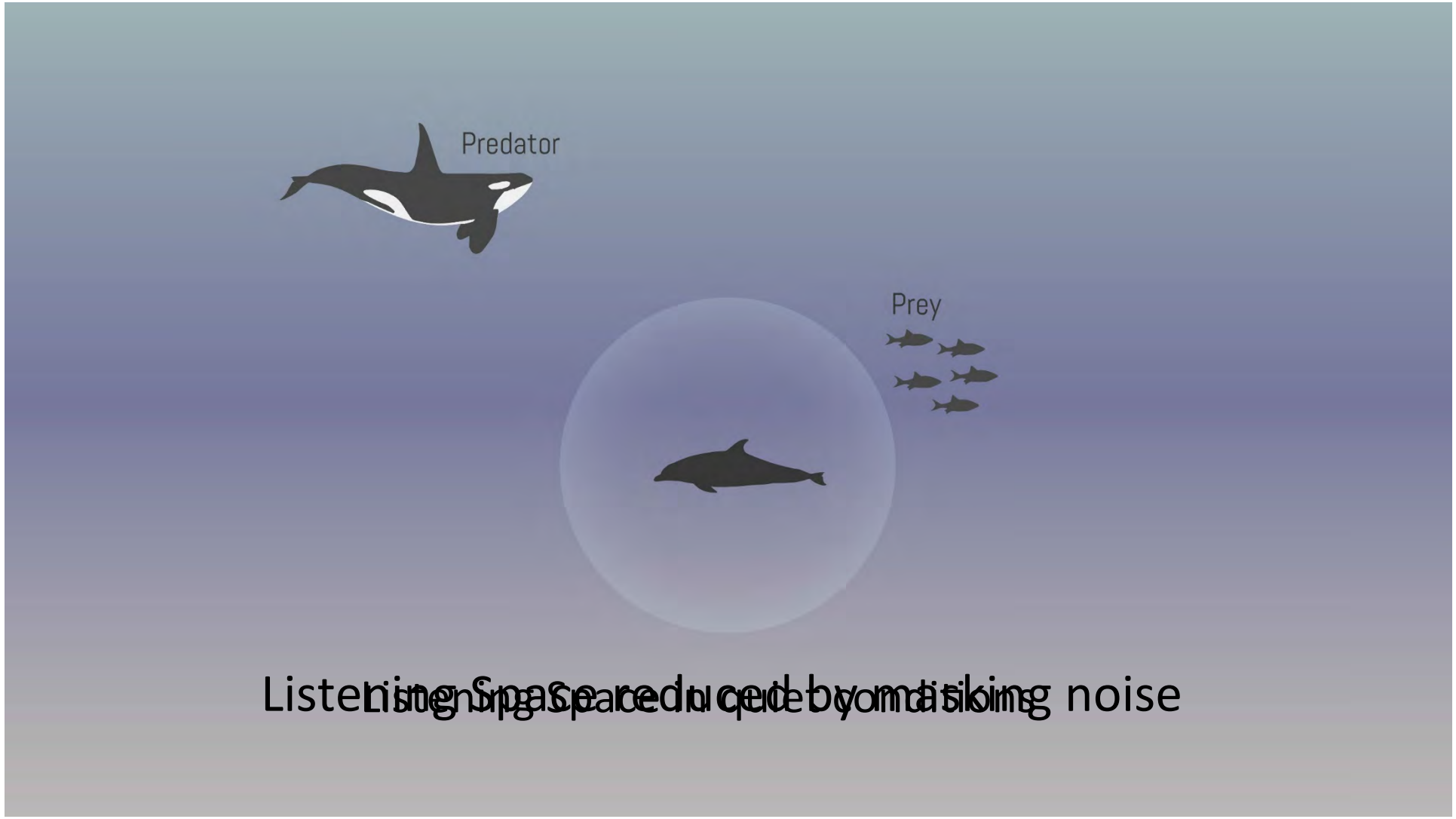
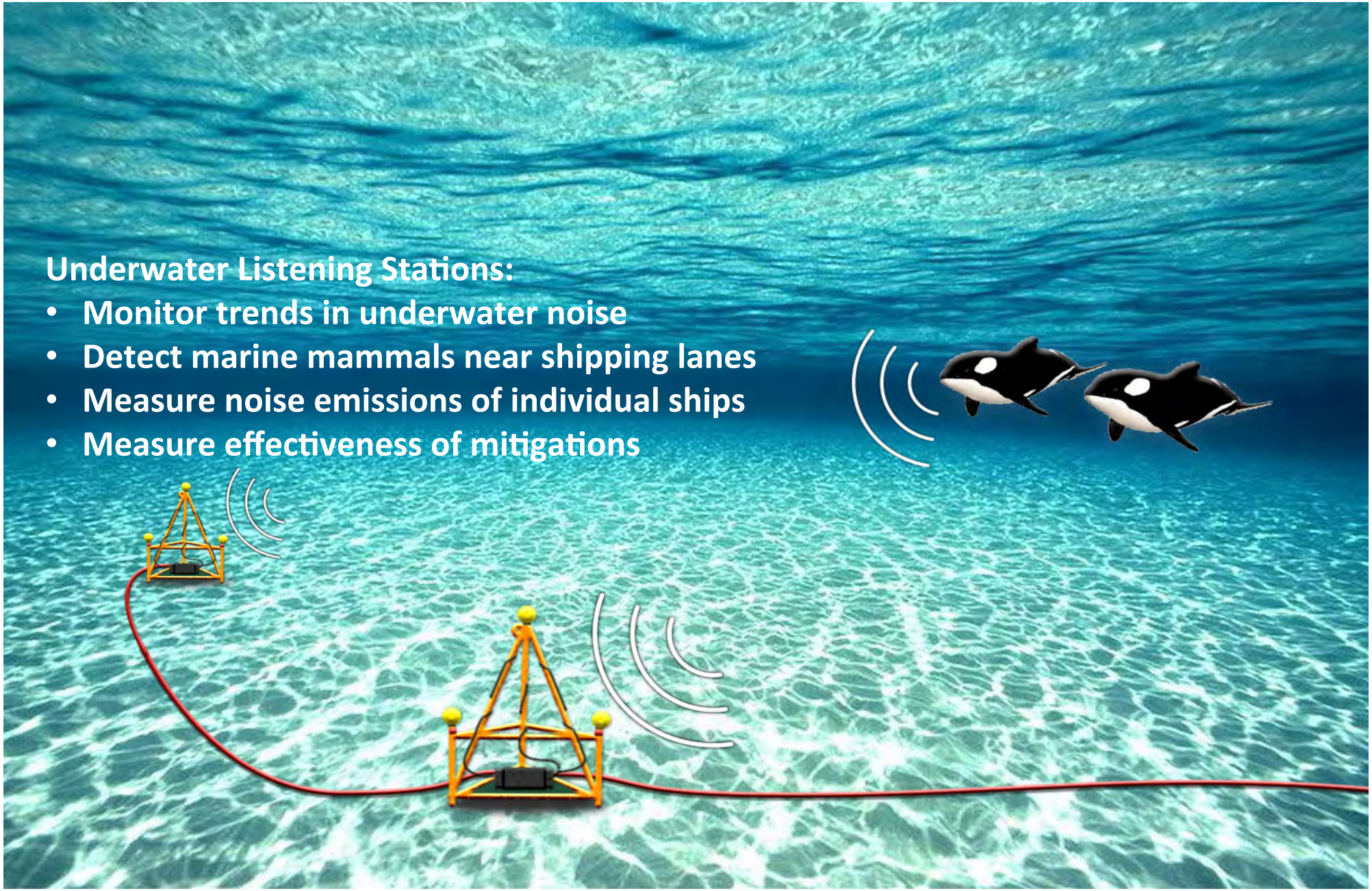
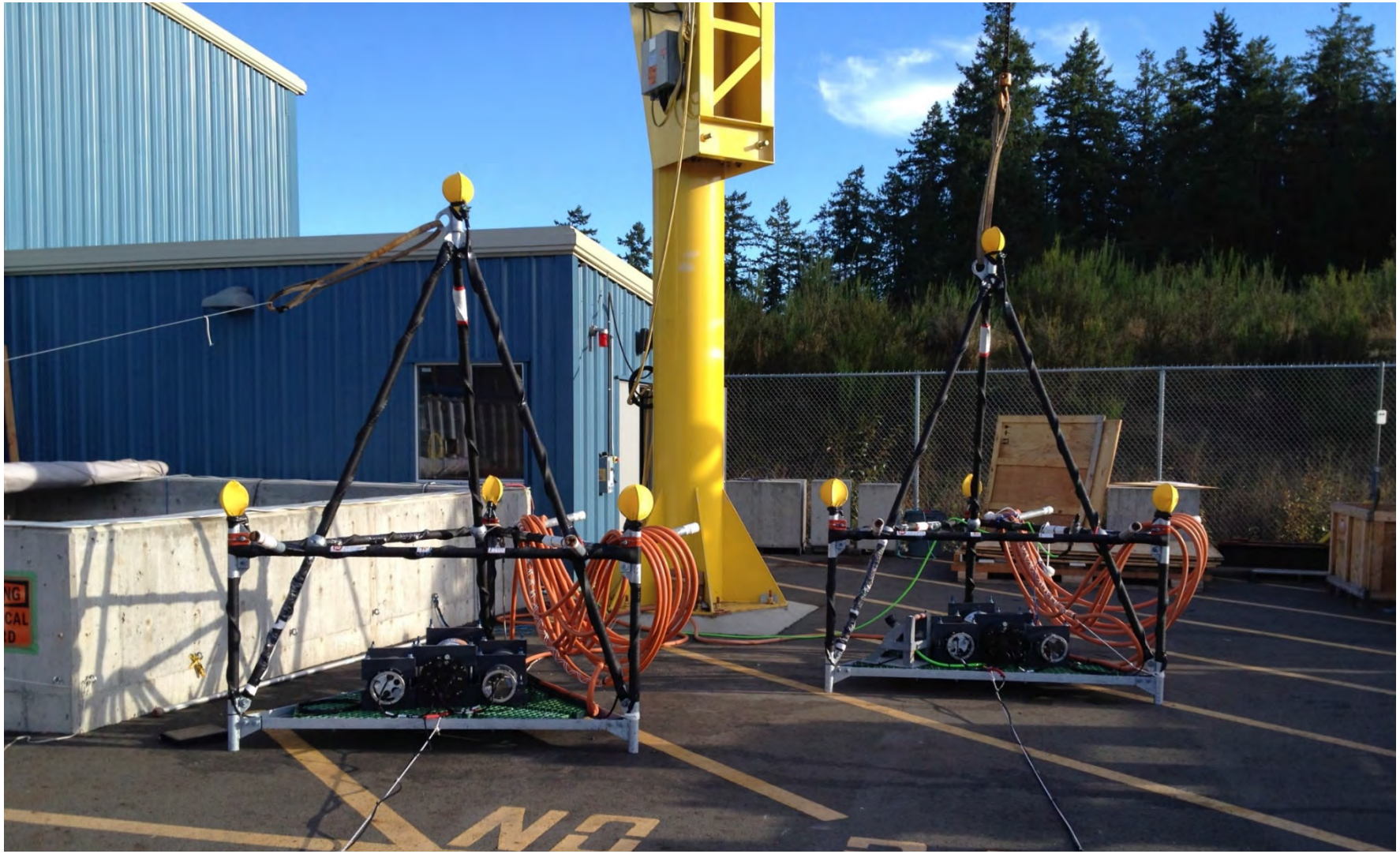

Predator
Prey
Listening space reduced by masking noise

Managing Underwater Shipping Noise

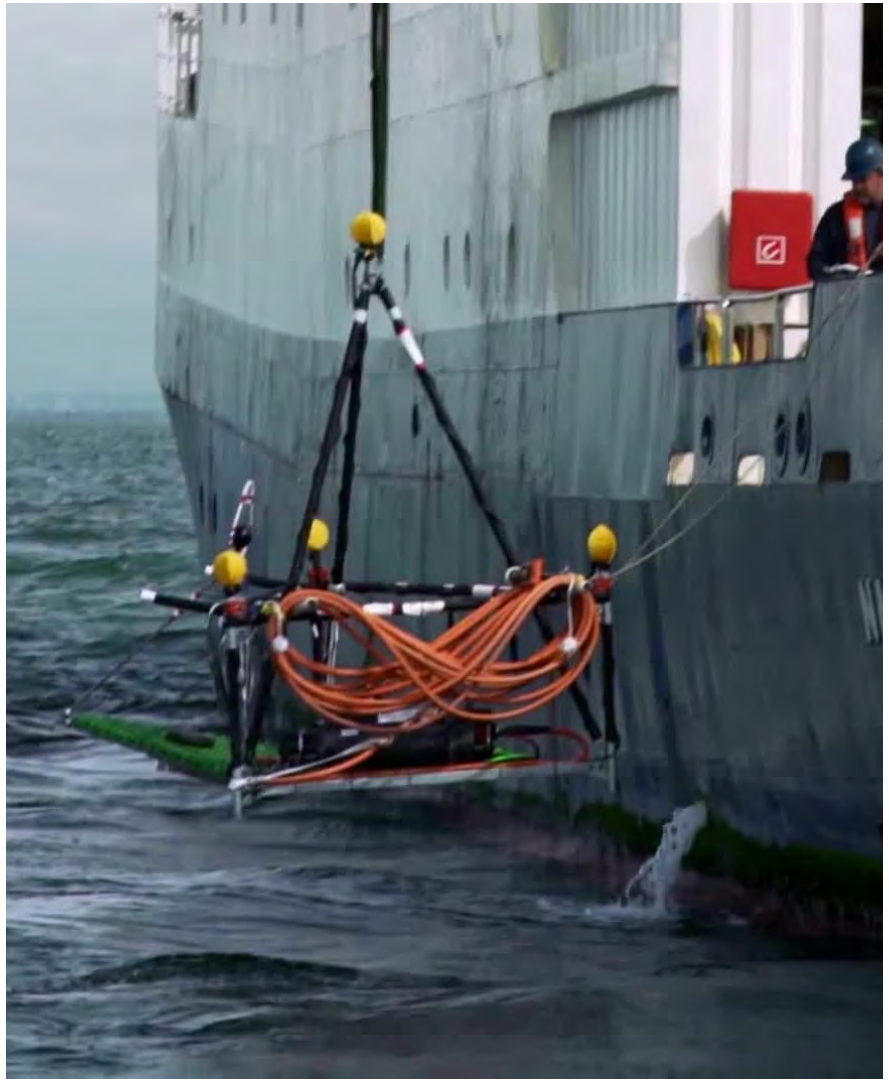
1. Understand its spatial and temporal distribution
2. Determine when/where sensitive fauna may be exposed
3. Develop regulations (or preferably incentives) to influence noisy vessels to become quieter
4. Implement mitigation measures to reduce exposures, e.g.:
    - slow vessels when animals are present
    - move shipping lanes to avoid sensitive areas
    - implement no-go periods to create quiet times


Underwater Listening Stations:
• Monitor trends in underwater noise
• Detect marine mammals near shipping lanes
• Measure noise emissions of individual ships
• Measure effectiveness of mitigations

Underwater Listening Station arrays deployed by JASCO for Port of Vancouver's ECHO Program

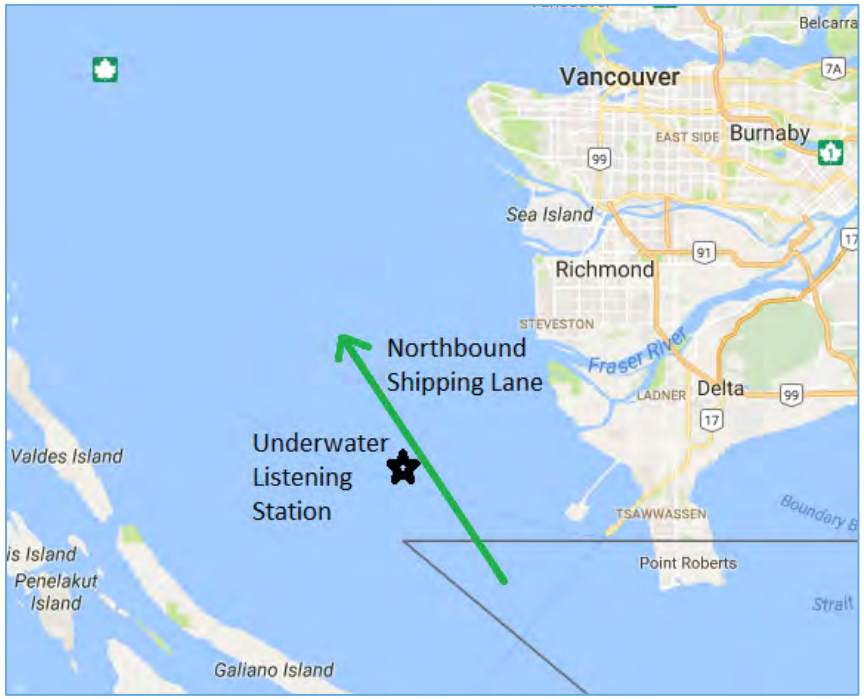


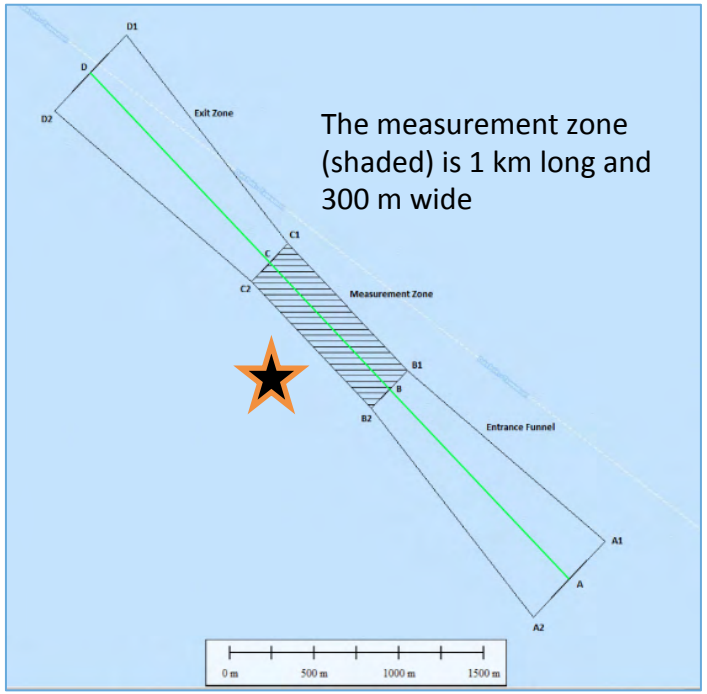
- ULS deployed in 170 m water depth on inbound shipping lane
- Subsea fibre optic data cables plugged into a subsea network operated by Ocean Networks Canada (ONC)
- Acoustic data are transmitted to shore in real-time and processed immediately by JASCO's automated analysis systems



Ship measurements geometry

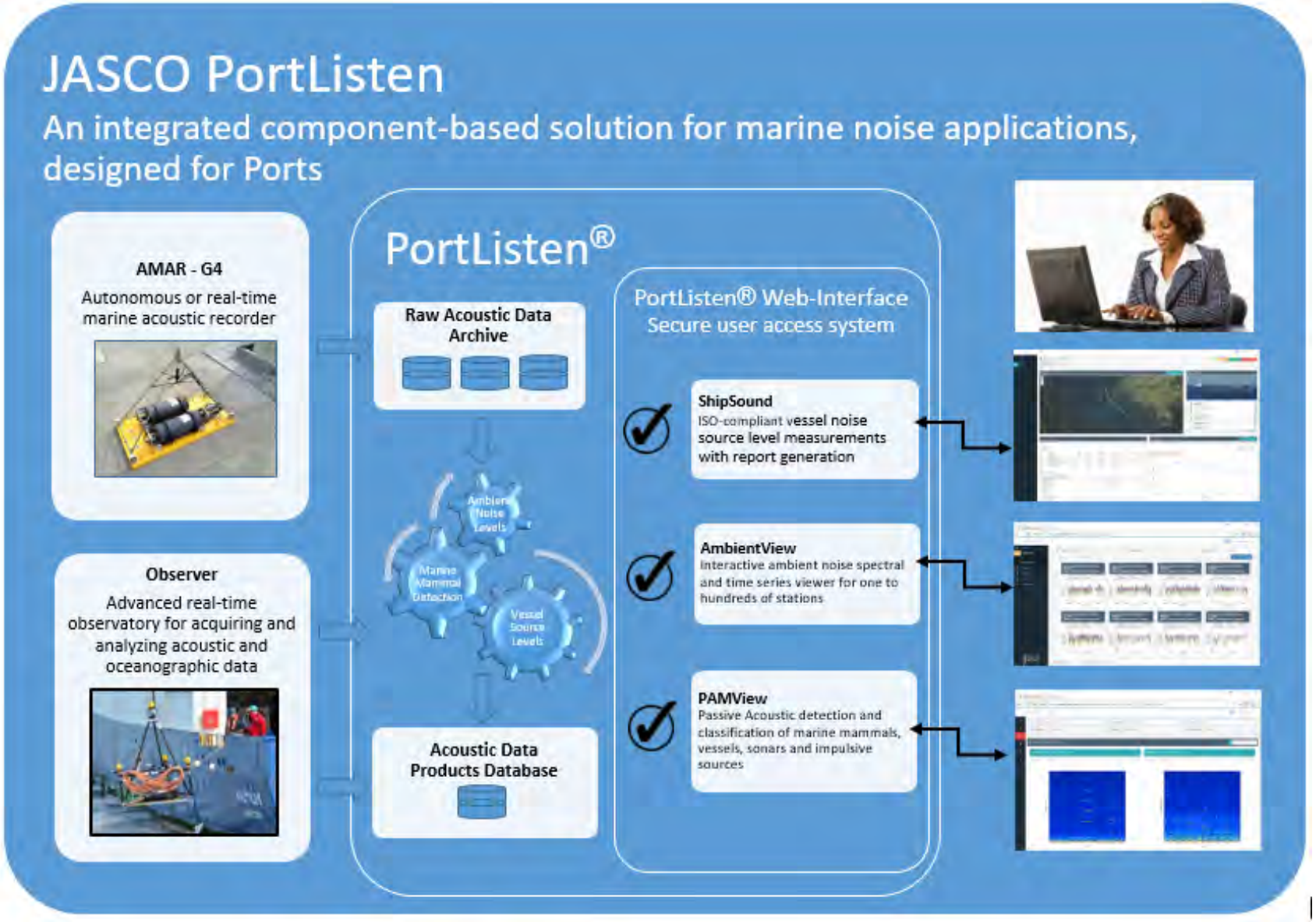
- Approximately meets ANSI S12.64 Vessel Noise Measurement Standard, which is similar to ISO 17208-1
- Pilots have control of vessels, allowing systematic passes through a prescribed measurement zone
- Other vessels are able to use this system



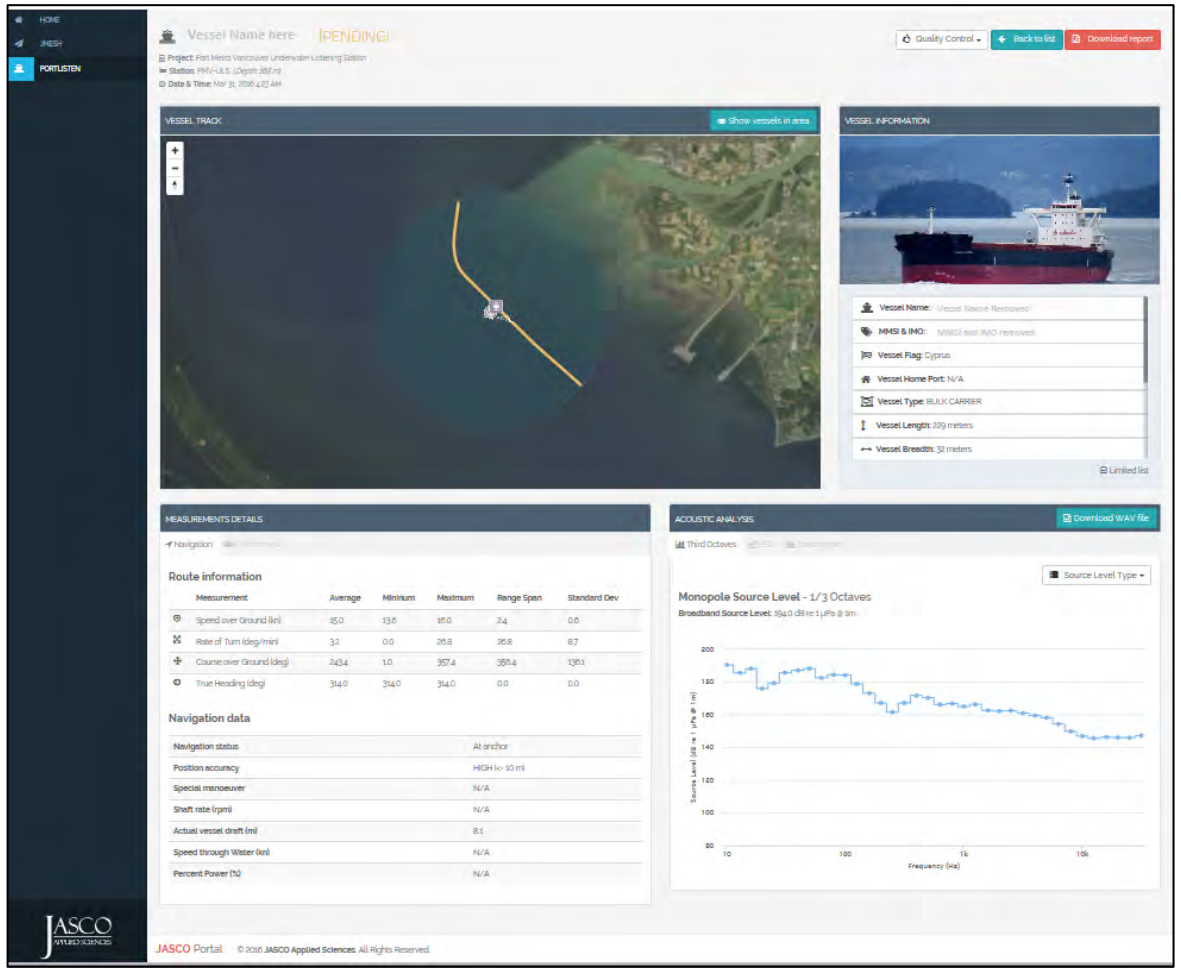


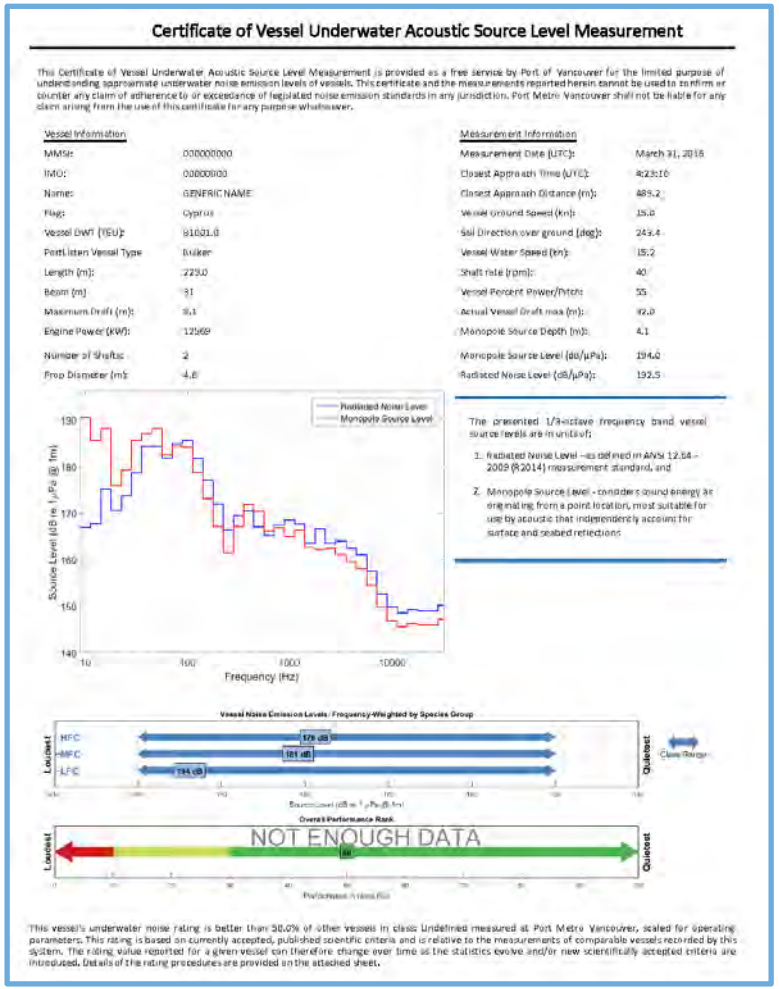
The measurement zone (shaded) is 1 km long and 300 m wide

Automated Acoustic Data Analysis

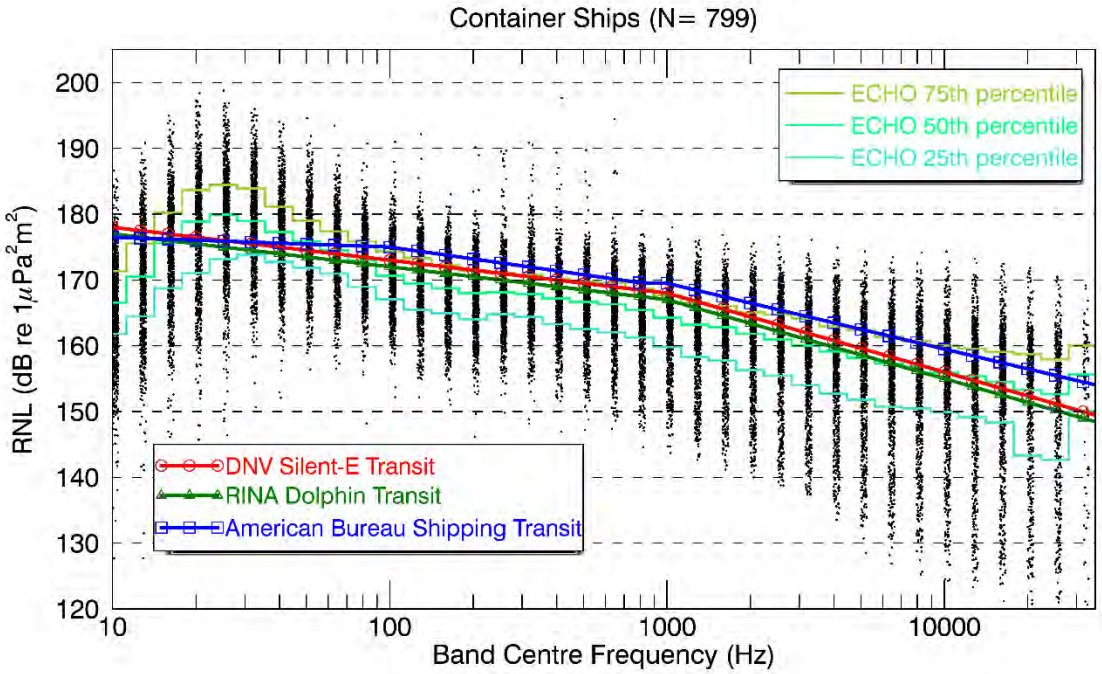


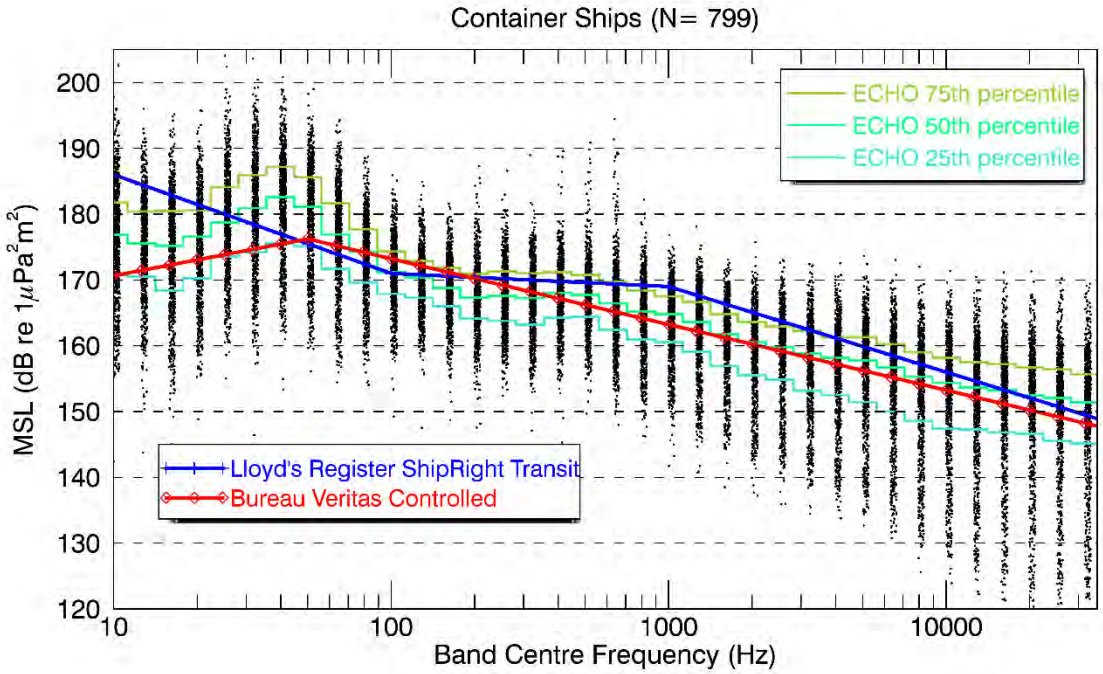
ShipSound: Vessel Noise Emission Measurement System



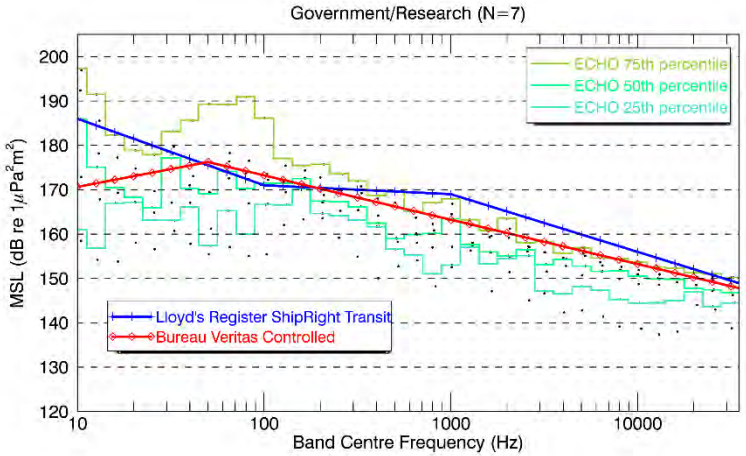


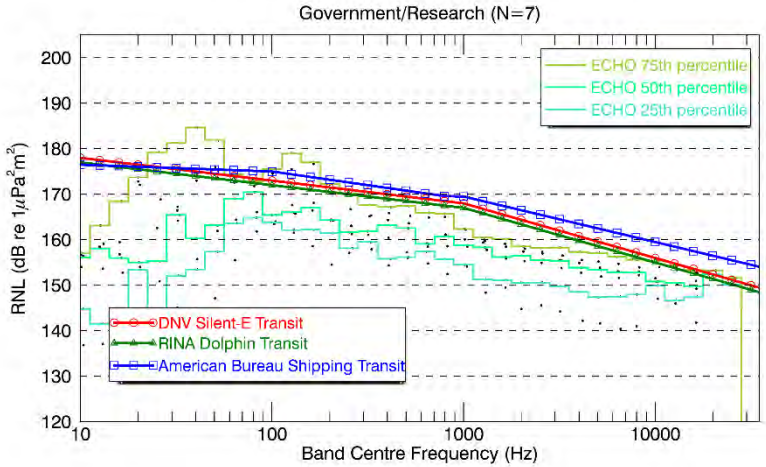
Comparisons of ULS measurements (black dots and percentile lines) with Noise Certification Organization Thresholds (heavier red, green and blue lines)





Note: RNL=Radiated Noise Level, MSL=Monopole Source Level





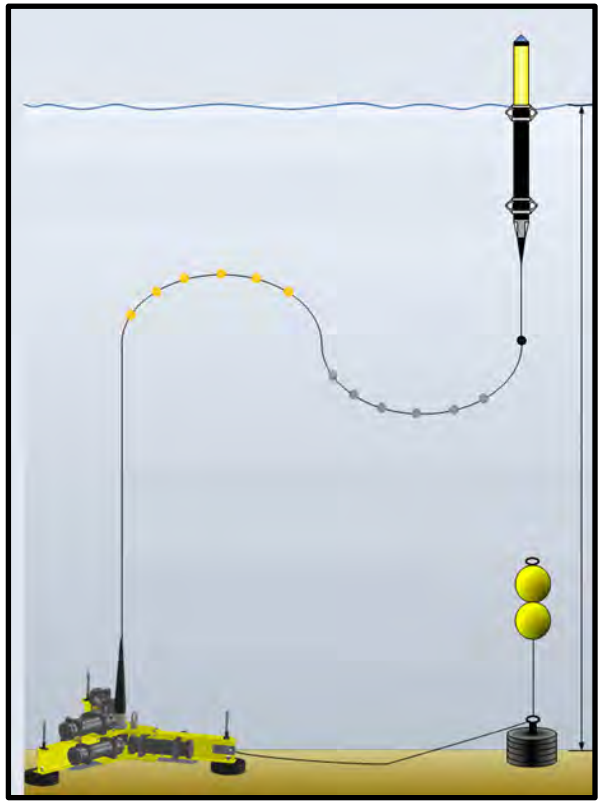
Research Vessels

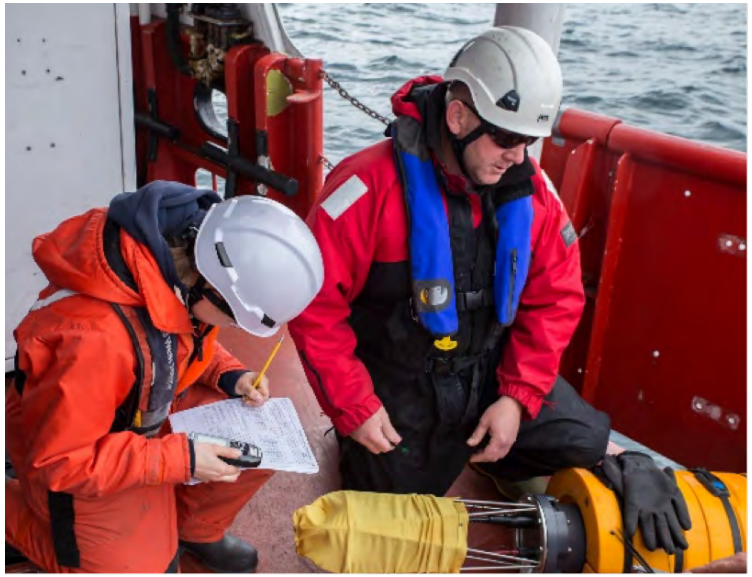
Port of Vancouver's use of these measurements

http://seattletimes.nwsource.com/html/localnews/2018025831_orcas20m.html

- The ECHO Program's ULS has acquired more than 7000 accepted vessel measurements since September 2015
- ECHO offers the reports to vessel owners for free, and these can be used by the owners to meet requirements of certification organizations such as Green Marine
- A key plan for this system is to rank the noise emissions of vessels visiting the Port. The intention is to incentivize vessels that are quieter by providing rebates on port fees

Telemetered Acoustic Station (does not need a cable)





Thank You!
Questions are welcome

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