



PORT of  
**vancouver**

Vancouver Fraser  
Port Authority

## Workshop on the Relationship between Energy Efficiency and Underwater Radiated Noise from Ships

### Operational measures to reduce underwater noise

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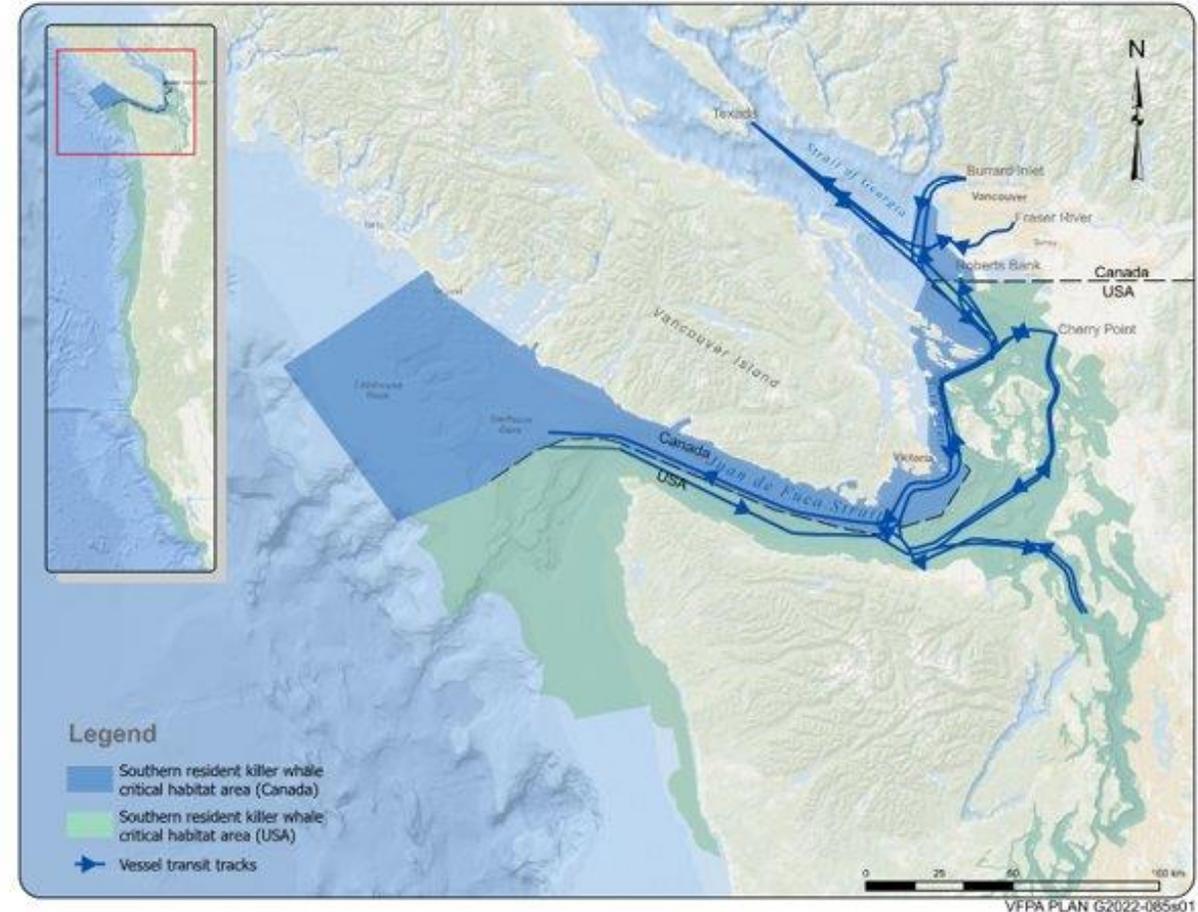
September 19, 2023

# Enhancing Cetacean Habitat and Observation (ECHO) Program

## About the ECHO Program

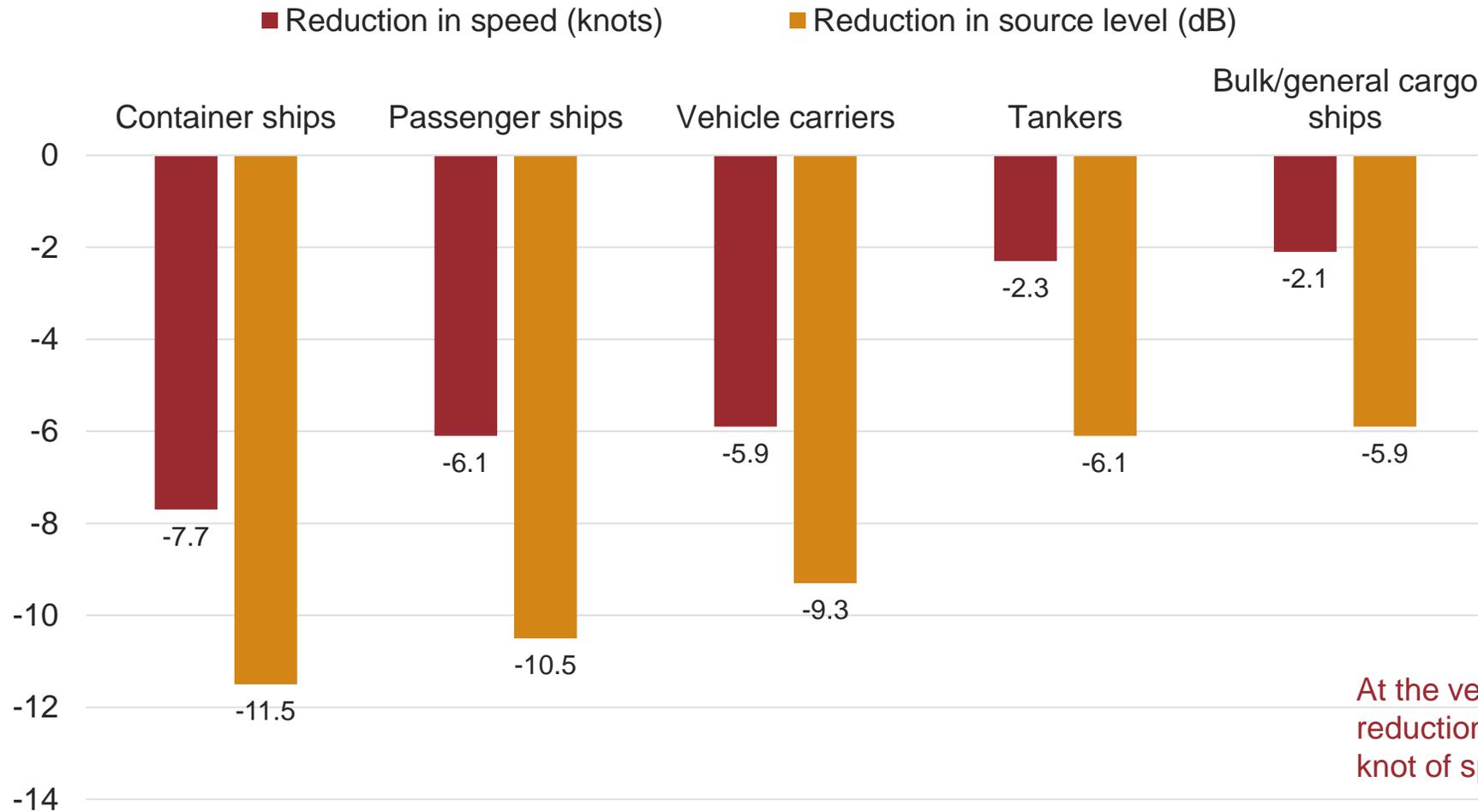


A first-of-its-kind program, convened in 2014 to better understand and **reduce the impacts of commercial shipping on at-risk whales**, in collaboration with government, the marine transportation industry, Indigenous communities, and environmental groups.



- ❑ On-water initiatives to reduce underwater noise
- ❑ Correlation of vessel characteristics to underwater noise
- ❑ Co-benefits of vessel slowdown beyond underwater noise
- ❑ Environmental technology that increases underwater noise
- ❑ EcoAction incentive program

# On-water initiatives – results of 2017 slowdown trial



# On-water initiatives – results of 2022 voluntary efforts



Slow to **11 knots or less\*** for bulkers, tankers, government



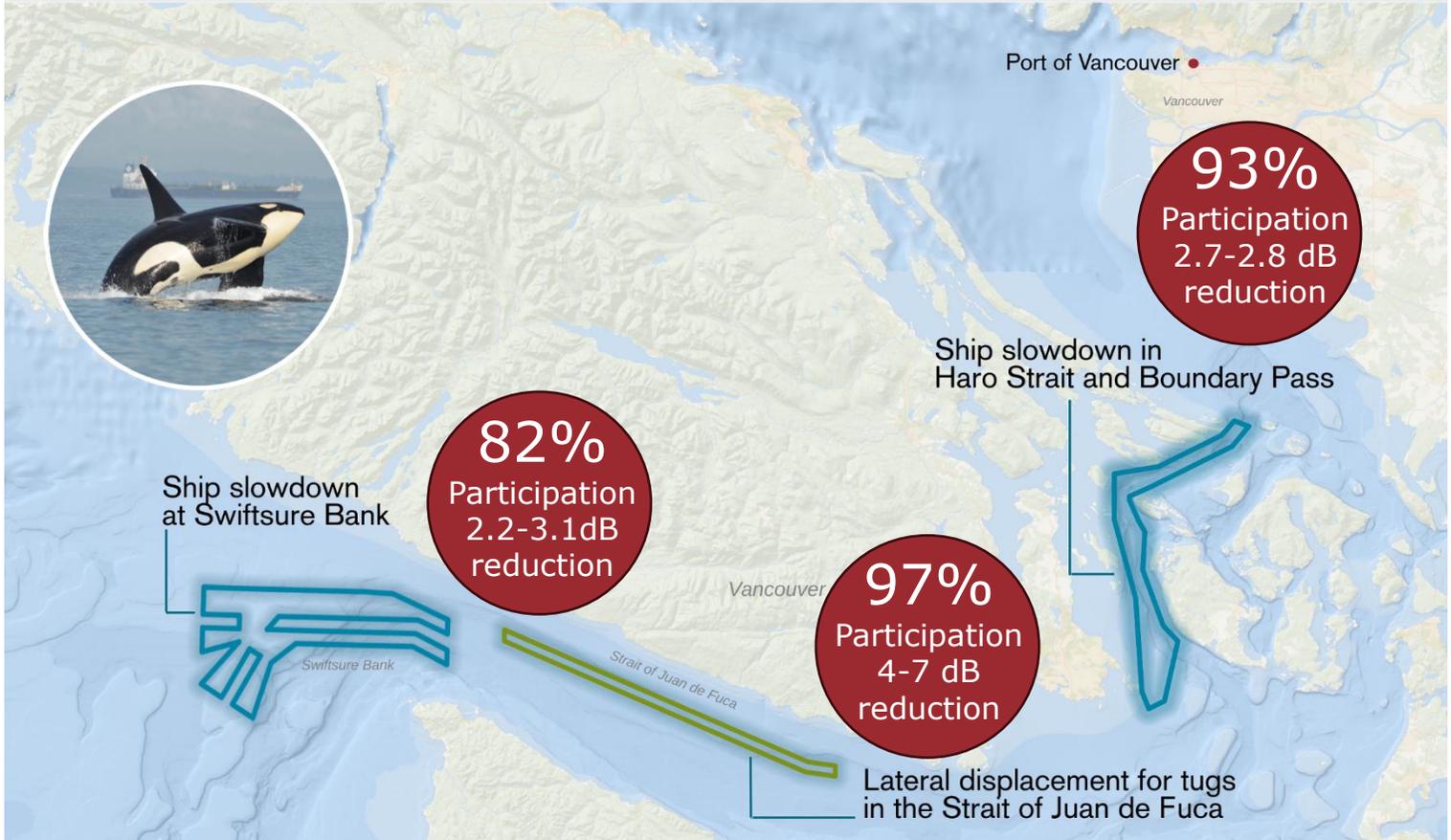
Slow to **14.5 knots or less\*** for car carriers, container ships, cruise ships



Tugs to displace from shoreline

## Enhancing Cetacean Habitat and Observation (ECHO) Program

Voluntary underwater noise reduction measures in southern resident killer whale critical habitat



<https://www.portvancouver.com/environmental-protection-at-the-port-of-vancouver/maintaining-healthy-ecosystems-throughout-our-jurisdiction/echo-program/projects/>

# Correlation of vessel characteristics to underwater noise

## Which key vessel design and operational characteristics drive differences in underwater noise?

- Three-phase statistical study of vessel characteristics and underwater noise
- Utilized 9880 passes of 3188 unique ships measured in our region
- Considered GHG and EVDI ratings
- Model tested against dataset from California
- Peer-reviewed publication of final model and associated noise prediction tool

## Operational

1. **Speed through Water**
2. **Draft**
3. Wind resistance
4. Measurement angle

## Design

1. **Length**
2. Main Engine design PRM
3. Design Speed
4. Engine Power kW
5. Vessel Age

# Co-benefits study objectives – air emissions and whale strike risk

Study undertaken to evaluate the results of the 2022 slowdown

- **Why do this study:** ECHO slowdowns focus on underwater noise reduction quantification of other benefits may help to improve both participation and promotion
- **How was the study conducted:** Leveraged the previous work of the Blue Whales Blue Skies program in California to evaluate both absolute (air emissions) and relative benefits (air emissions and whale strike)

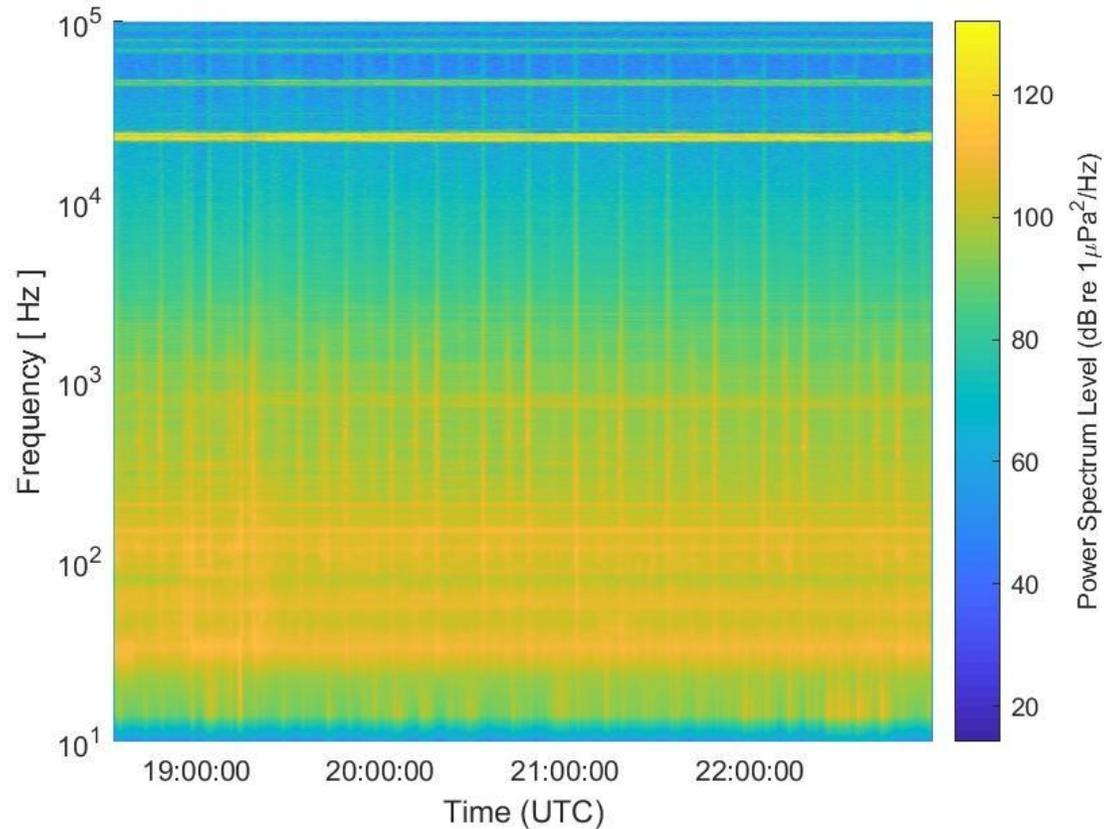
# Co-benefits study results – air emissions and whale strike risk

- Voluntary slowdowns have benefits beyond reduction of underwater noise
- Localized reductions in air emissions ranged from 13-17% overall
- Regional air emissions are heavily dependent on vessel behaviour outside of the slowdown area
- Whale strike risk reduced by between 10 - 22% on a per transit basis across the slowdown regions

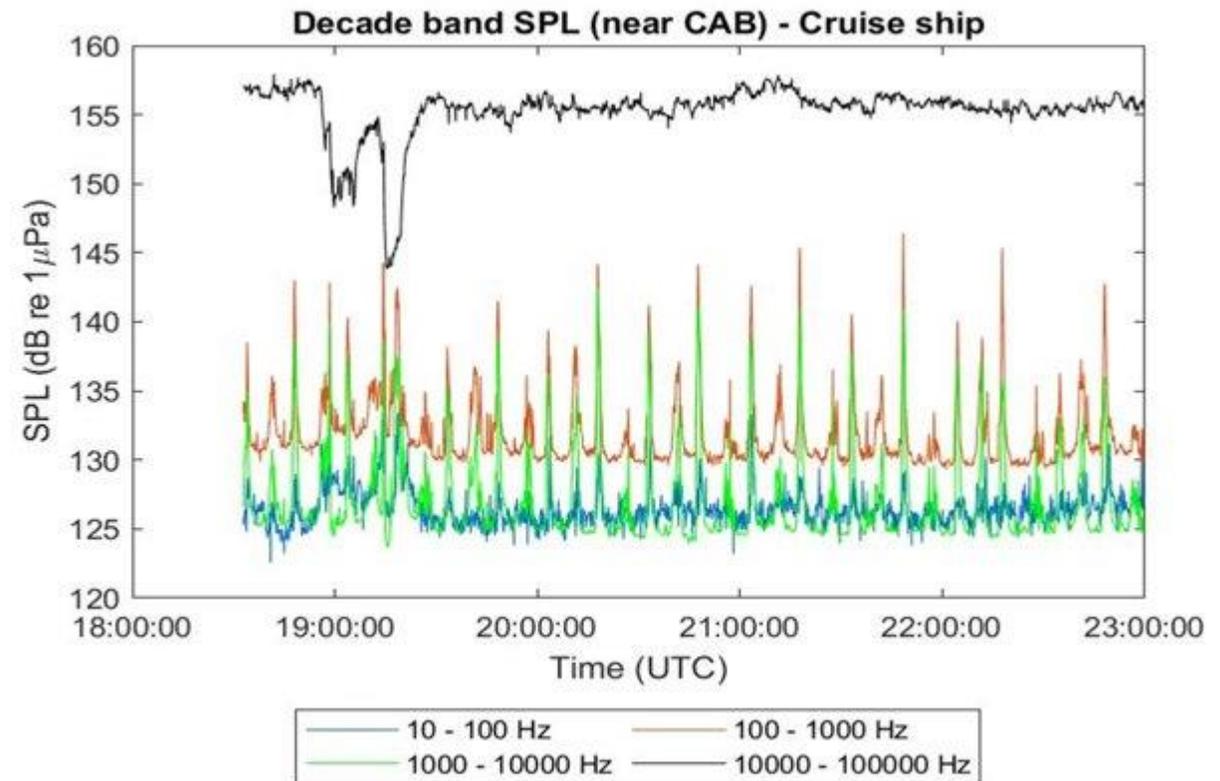
Photo credit: Robin Silvester

# Acoustic measurements of vessel with active anti-fouling system

Spectrogram of vessel at berth with system enabled:  
characteristic bright spectra line at 23 kHz



Measurement as a function of time for specific  
frequency bands. Spikes indicate vessel passes



# EcoAction incentive program for Port of Vancouver

- Since 2007, the Port of Vancouver offers discounted harbour dues for cleaner and quieter ships
- **NEW Platinum** (75%) discount option in 2023 for vessels using alternative marine fuels and technologies, connecting to shore power, and obtaining underwater noise notations
- Incentivizing standardized evaluation criteria internationally such as Environmental Ship Index (ESI), Green Marine or RightShip GHG rating and class society notations can help encourage technology adoption.



*Based on Vancouver Fraser Port Authority harbour due rates, effective January 1, 2023 per gross registered tonne (GRT) in Canadian funds.*

# Thank you



Photo credit: Olivia Murphy



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