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The ECHO Program: an overview

March 9, 2023

Jennifer McIntyre, Collaborative Initiatives Specialist – ECHO Program

Agenda

Topic
1. Whales and shipping
2. What is the ECHO Program?
3. ECHO Program research
4. Voluntary on-water initiatives
5. International work

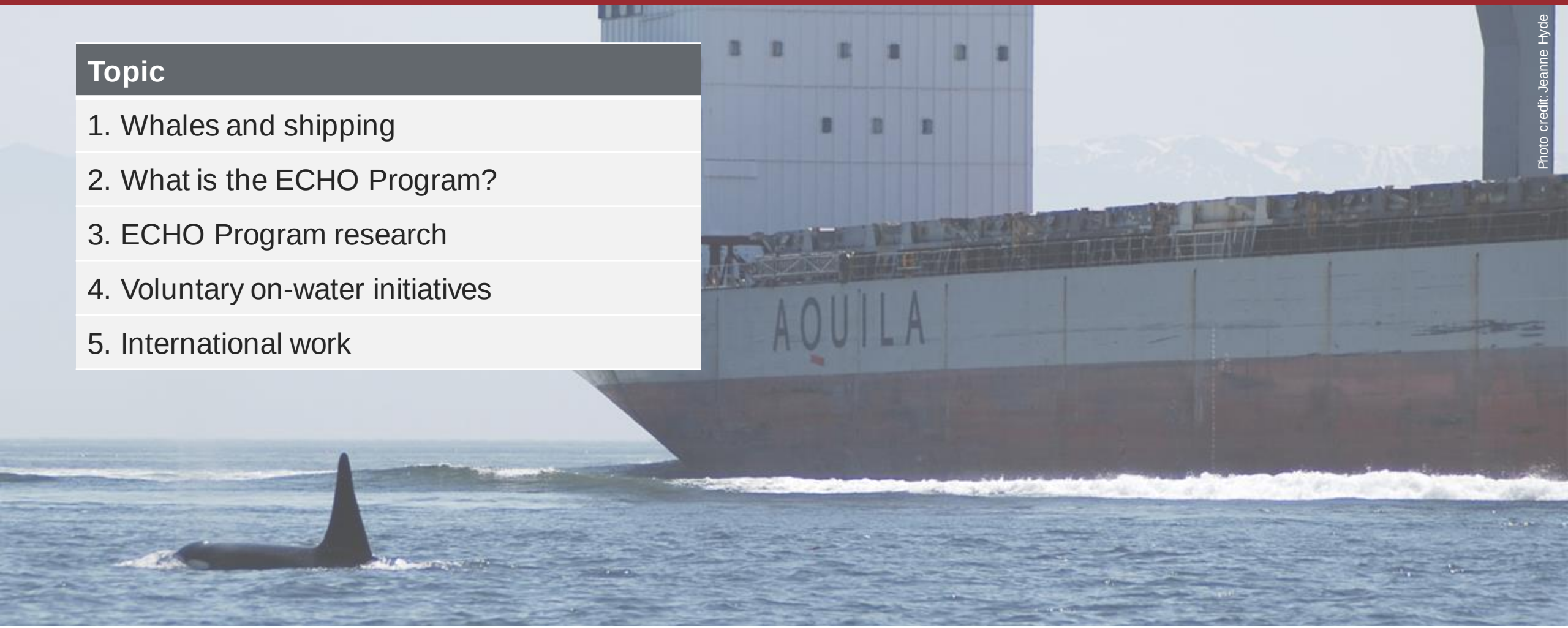

Photo credit: Jeanne Hyde

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At-risk marine mammals in our region

Harbour Porpoise
(Special Concern)

Humpback whale
(Special Concern)

Fin whale
(Threatened)

Sei whale
(Endangered)

Blue whale
(Endangered)

North Pacific Right whale
(Endangered)

Biggs (transient) killer whale
(Threatened)

Resident killer whale
(Endangered)

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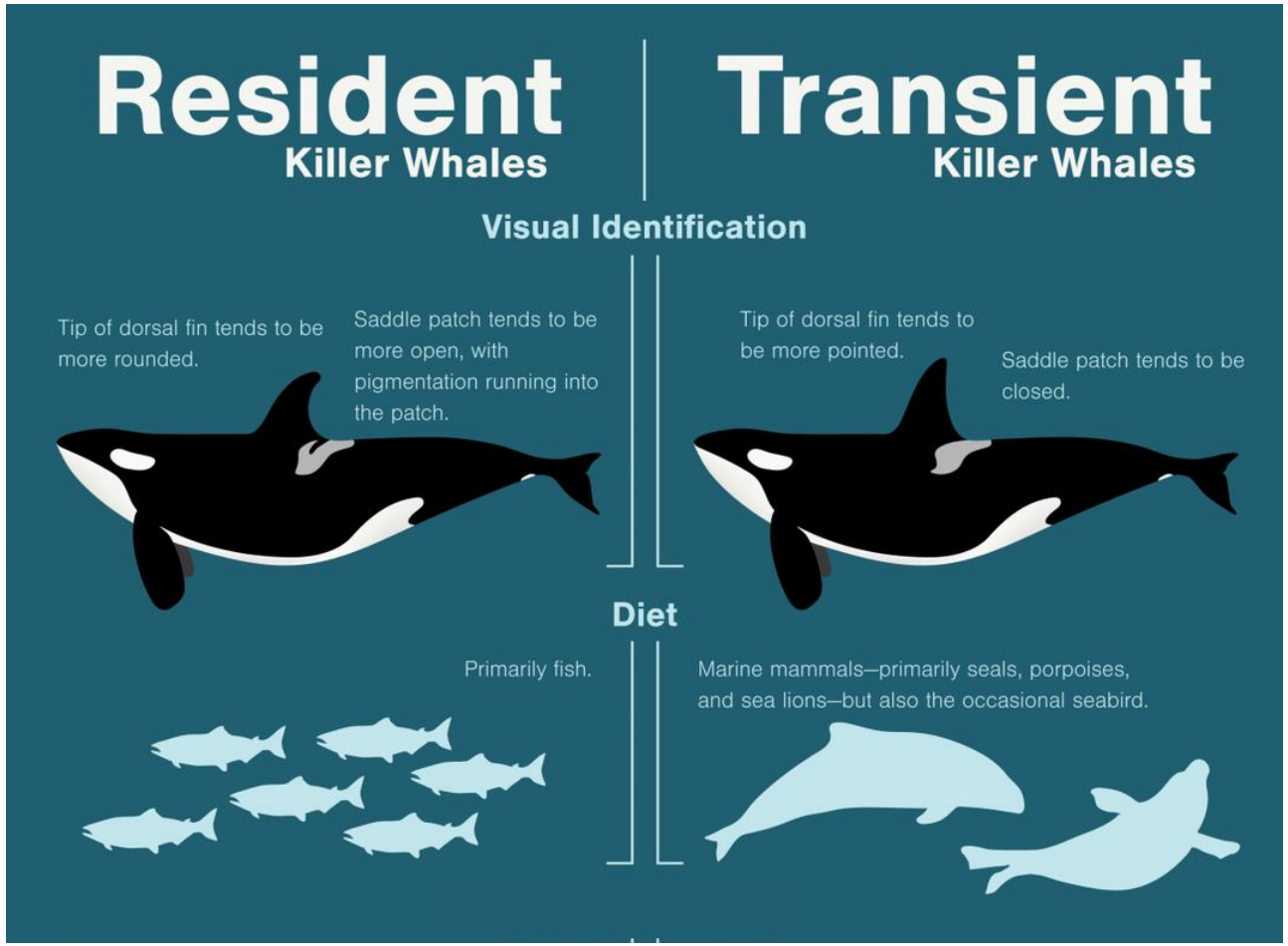
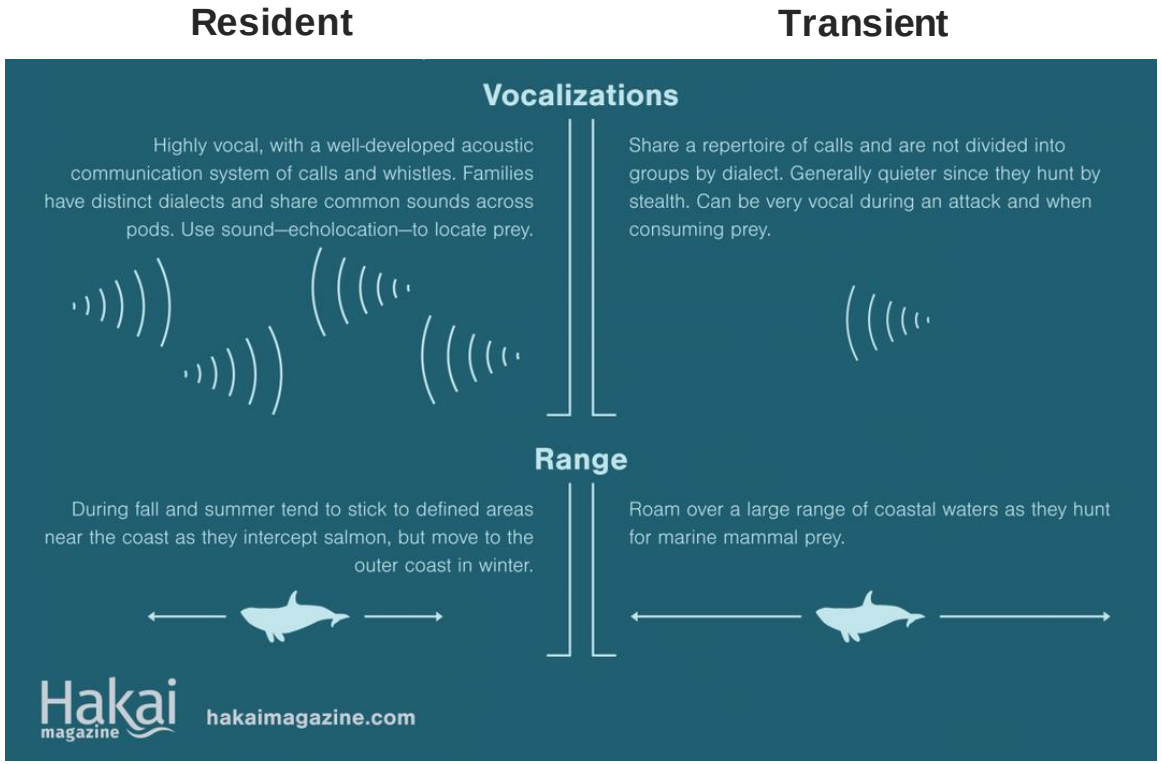
Cetaceans = whales, dolphins and porpoises

Based on Canadian Species at Risk Act.

Resident vs. Transient (Biggs) killer whales





Source: Hakai Magazine

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Northern vs. southern resident killer whales

- Northern and southern resident ranges overlap
- Same diet of mostly salmon
- Northern resident killer whale population: 250+

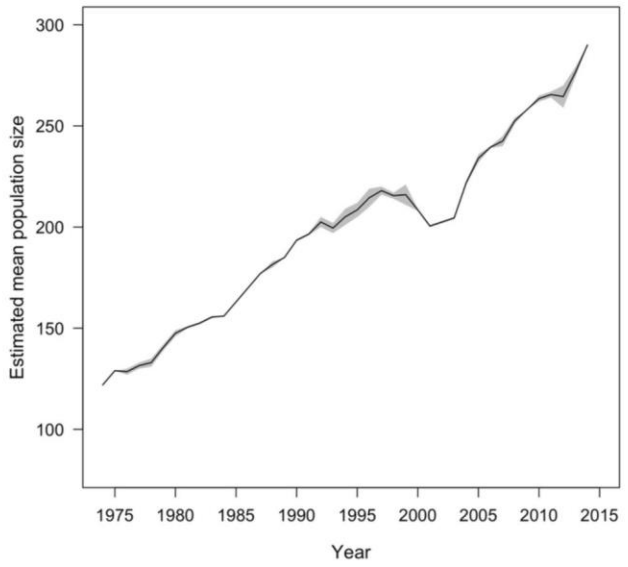
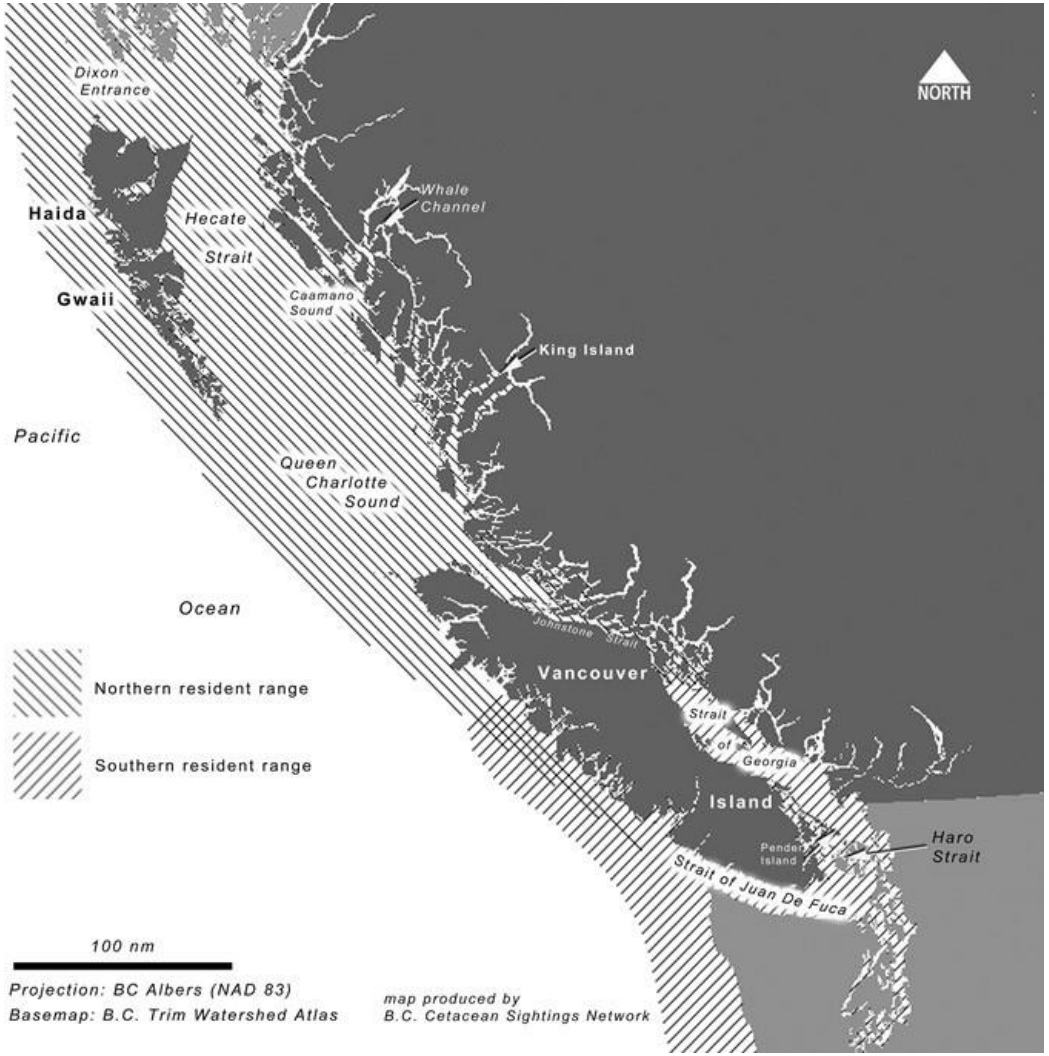


Figure 1. Abundance trend of the northern resident killer whale population, 1974–2014. In years with uncertainty, the minimum and maximum population sizes are represented with shading.

Source: Jared Towers, 2015



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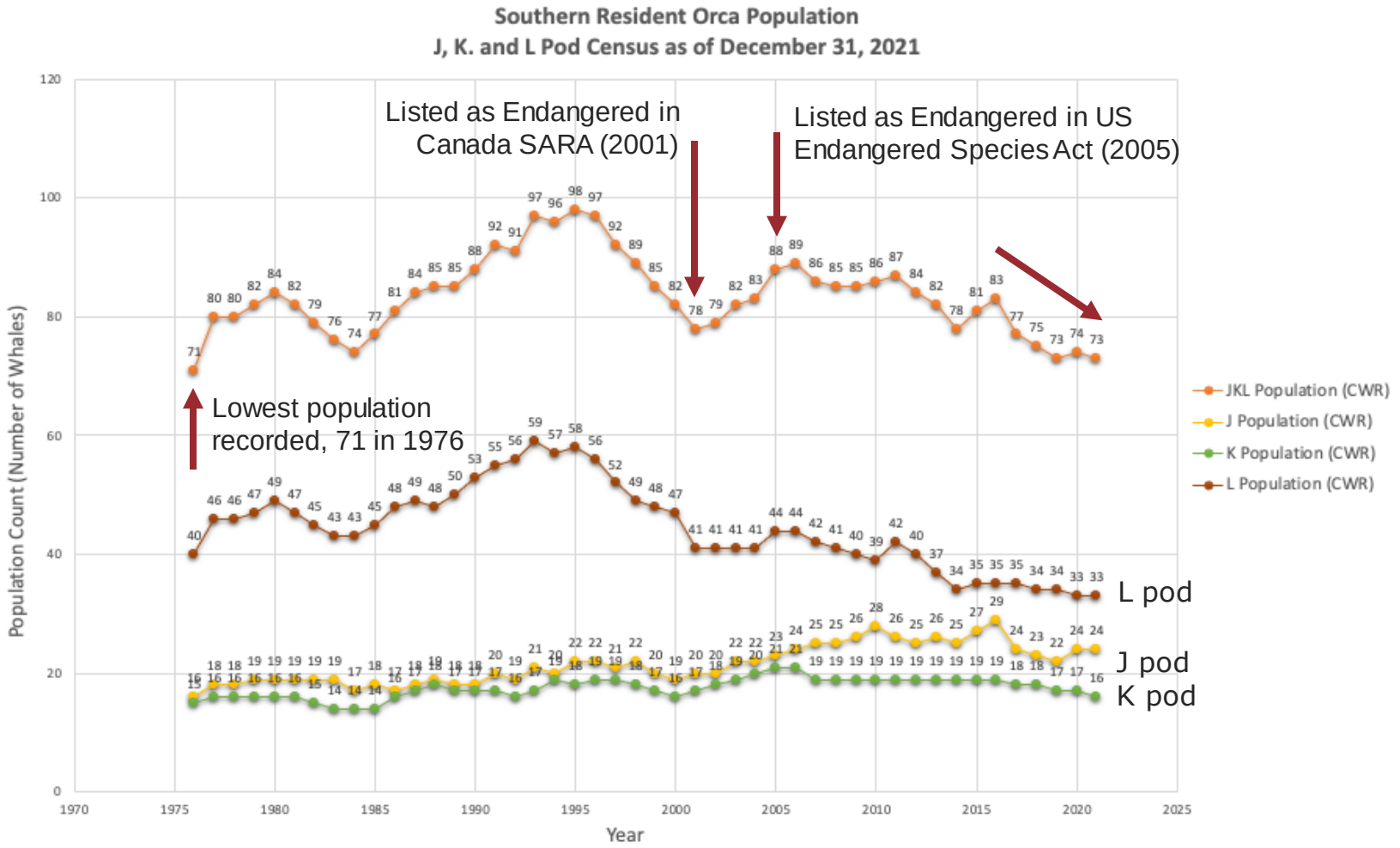
Southern resident killer whale (SRKW) population



Between 1962-1973 approx. 263 killer whales were caught or killed in BC/ Washington waters.

SRKW population is 73 as of July 2022.

Source: Center for Whale Research, San Juan Island Washington

Known threats to marine mammals

Acoustic disturbance

Physical disturbance

Environmental contaminants

Availability of prey

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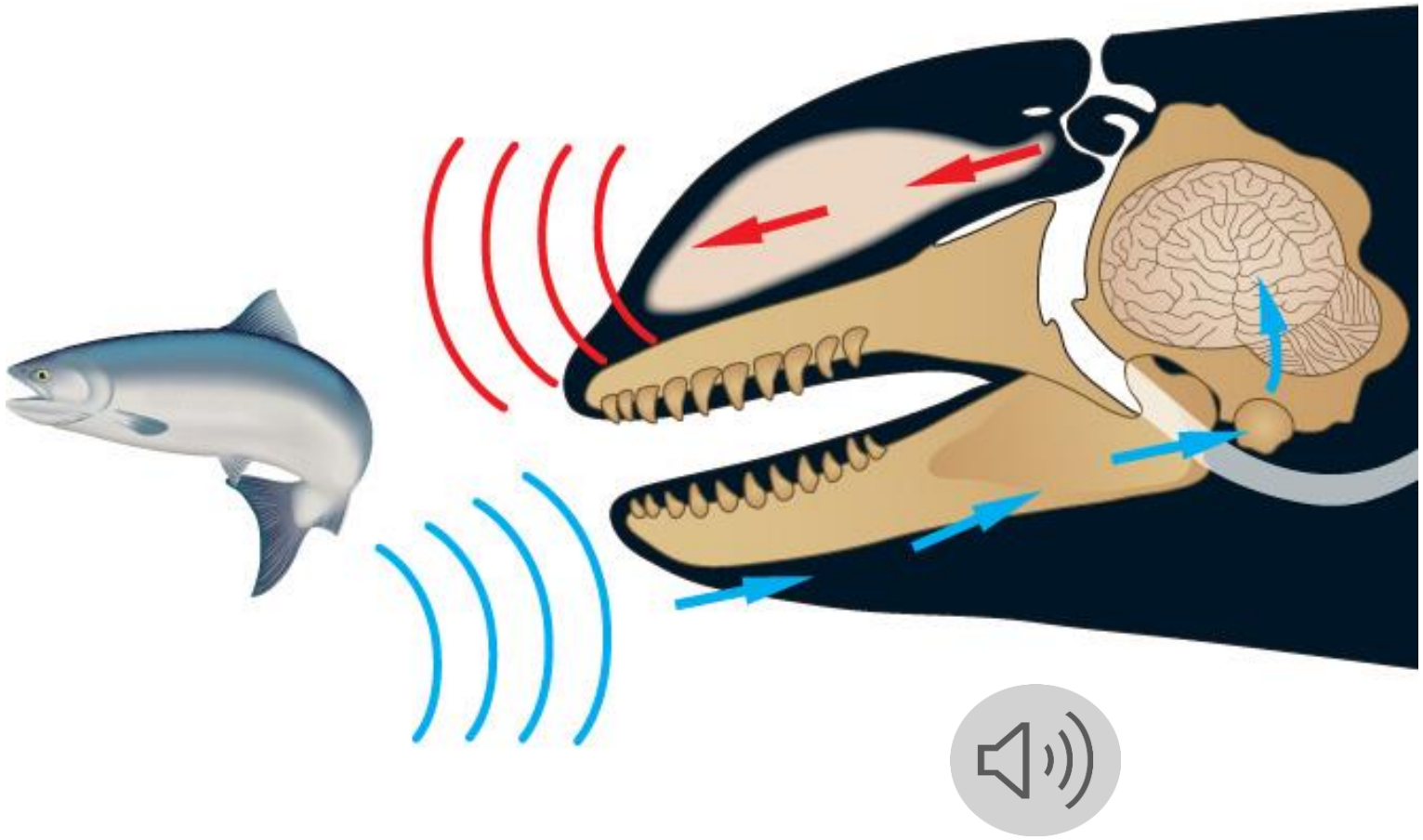
Whale anatomy & echolocation

- Southern resident killer whales use sound to find food, communicate and navigate
- To locate salmon, they create echolocation clicks that travel through the water
- Their clicks bounces off a fish (hopefully), then comes back into their lower jaw and into their brain
- Ship noise can disrupt their ability to communicate, socialize, rest and hear returning echolocation clicks



What is the ECHO Program?

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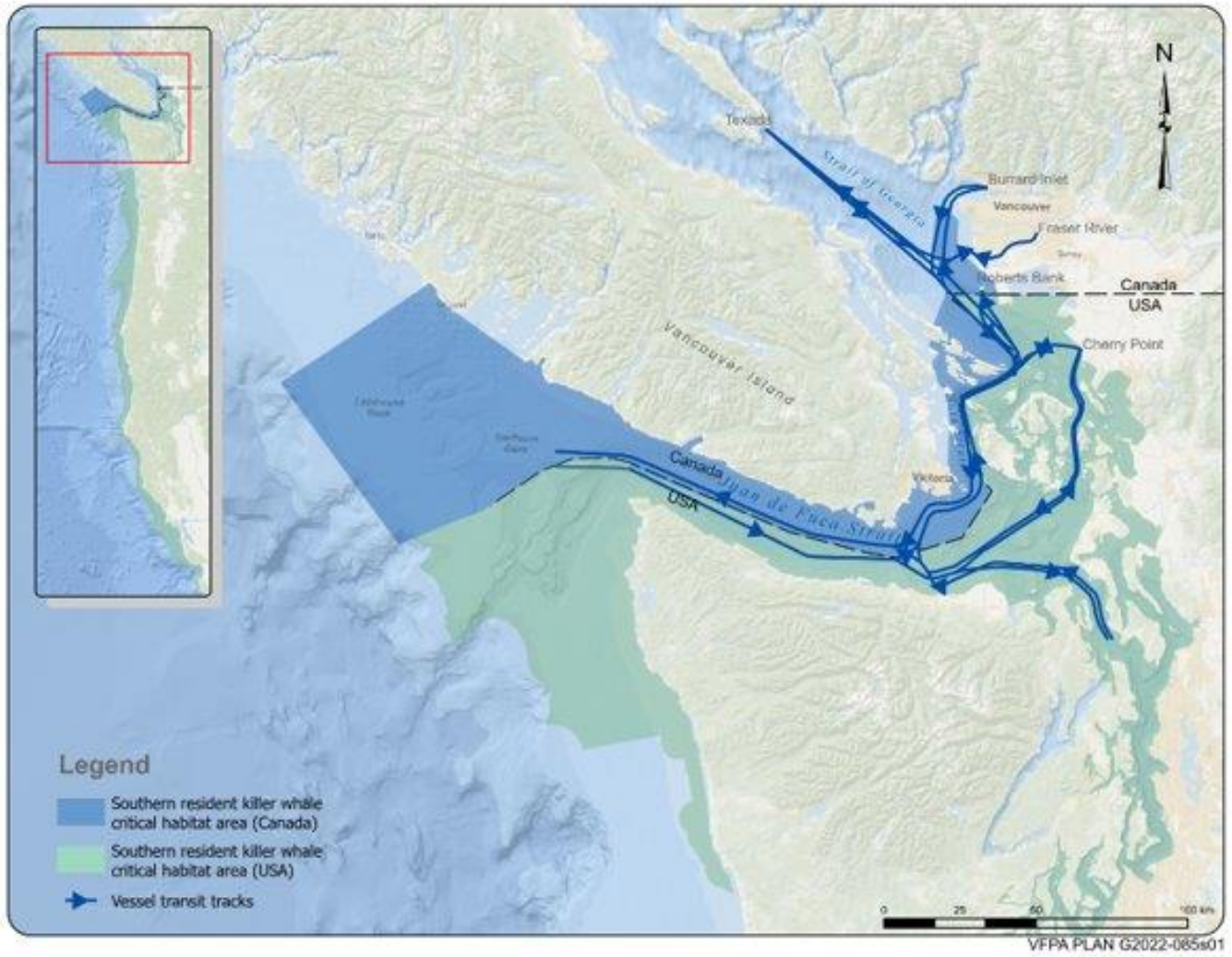

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Enhancing Cetacean Habitat and Observation (ECHO) Program

About the ECHO Program

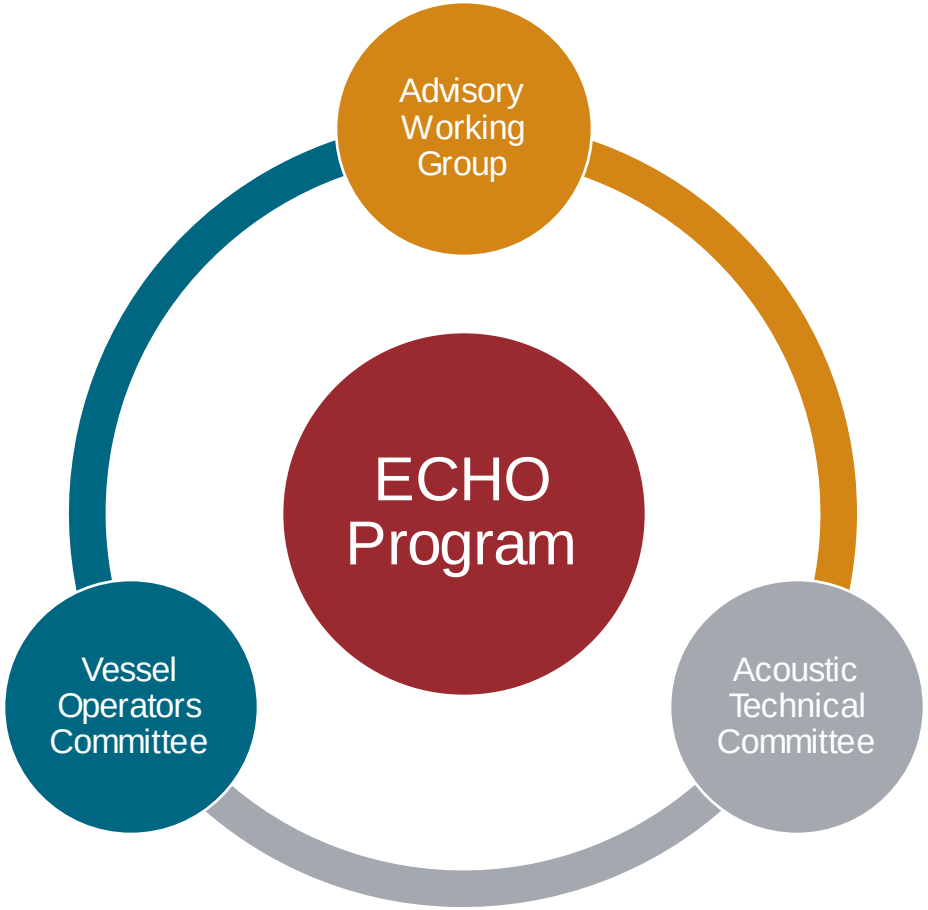
A first-of-its-kind program to better understand and **reduce the impacts of commercial shipping on at-risk whales**, in collaboration with government, the marine transportation industry, Indigenous communities, and environmental groups.

The ECHO Program

Focus areas:

- Facilitate **regional collaboration**
- Advance **research and education** projects
- Implement **threat reduction measures**

ECHO Program structure



Advisory Working Group

Provides guidance and advice to shape the program

- Marine transportation industry
- Canadian and US government
- Indigenous representatives
- Environmental organizations

Vessel Operators Committee

Supports the planning, implementation and communication of on-water noise reduction initiatives

- Marine transportation industry
- Canadian and US Coast Guards

Acoustic Technical Committee

Provides technical and scientific advice on research projects and measurement and evaluation of underwater radiated noise (URN)

- Acousticians and bio acousticians
- Naval architects and engineers

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Conservation Agreement: Formalizing our collective commitment

Species at Risk Act Section 11 Conservation Agreement to support recovery of southern resident killer whales in 2019

- First of its kind in Canada
- Formalizes role of ECHO Program over five-year term
- Focuses on existing and new voluntary efforts to reduce acoustic and physical disturbance from large commercial vessels operating in Southern Resident killer whale critical habitat

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Fisheries and Oceans Canada

Pêches et Océans Canada

Shipping Federation of Canada

CHAMBER OF SHIPPING

CLIA CRUISE LINES INTERNATIONAL ASSOCIATION

PPA

Transport Canada

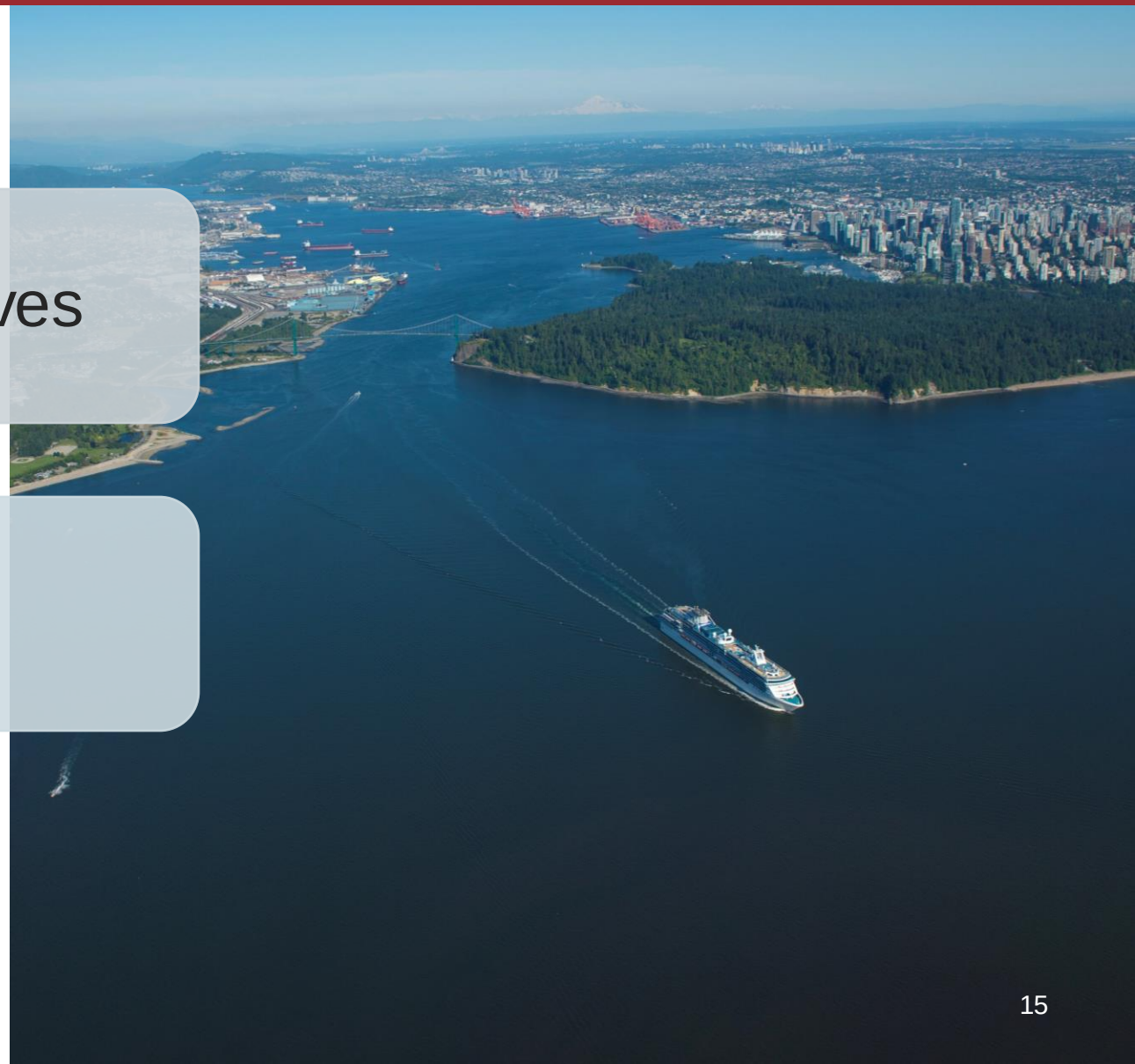
COUNCIL OF MARINE CARRIERS

INTERNATIONAL SHIP-OWNERS ALLIANCE OF CANADA

ISAC

What options exist to reduce vessel underwater noise?

Quiet design & technology	Research and incentives
Quiet operations	Slowdowns and route alterations



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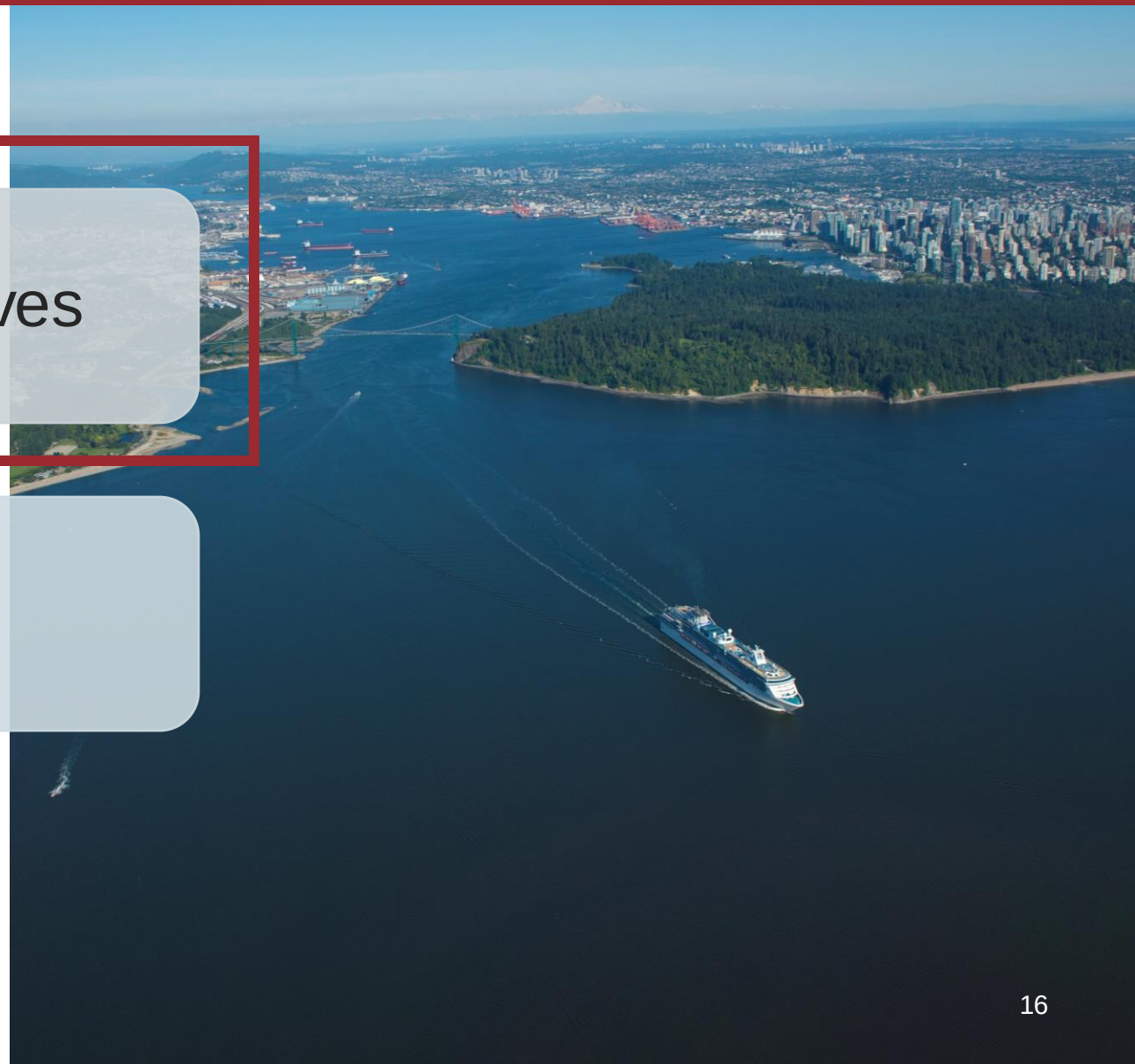

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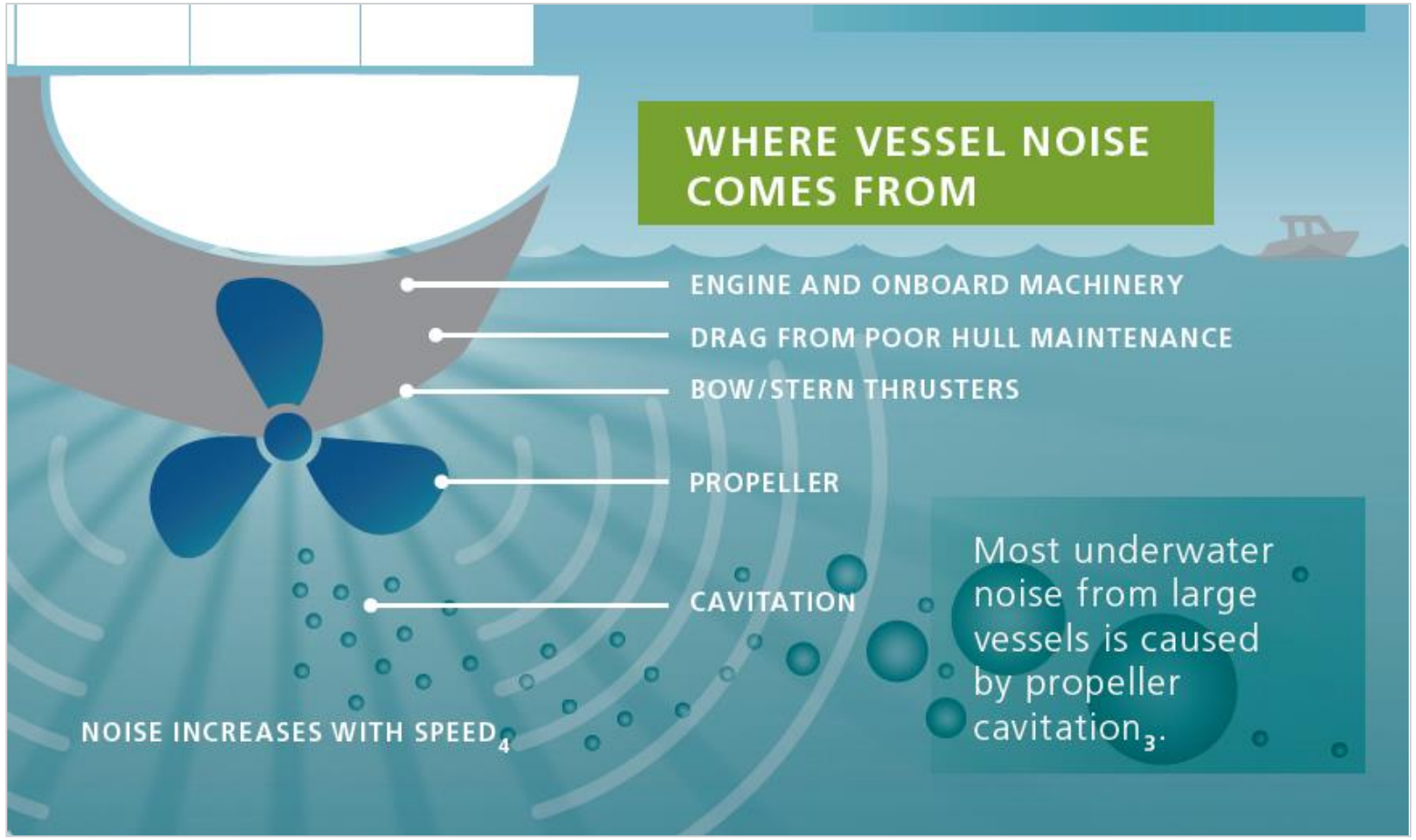
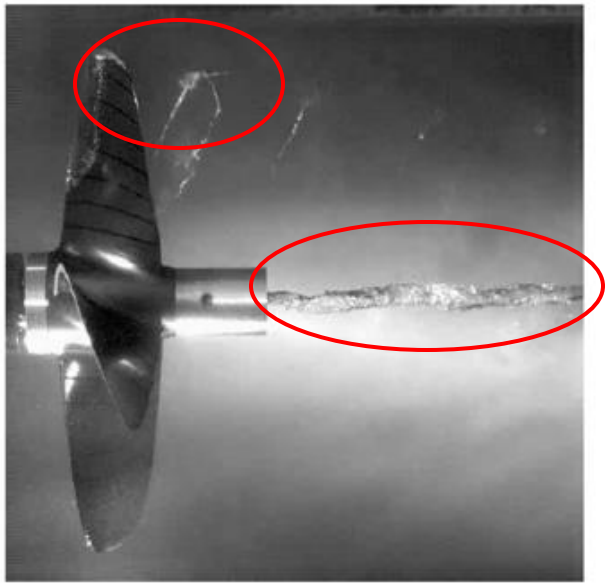
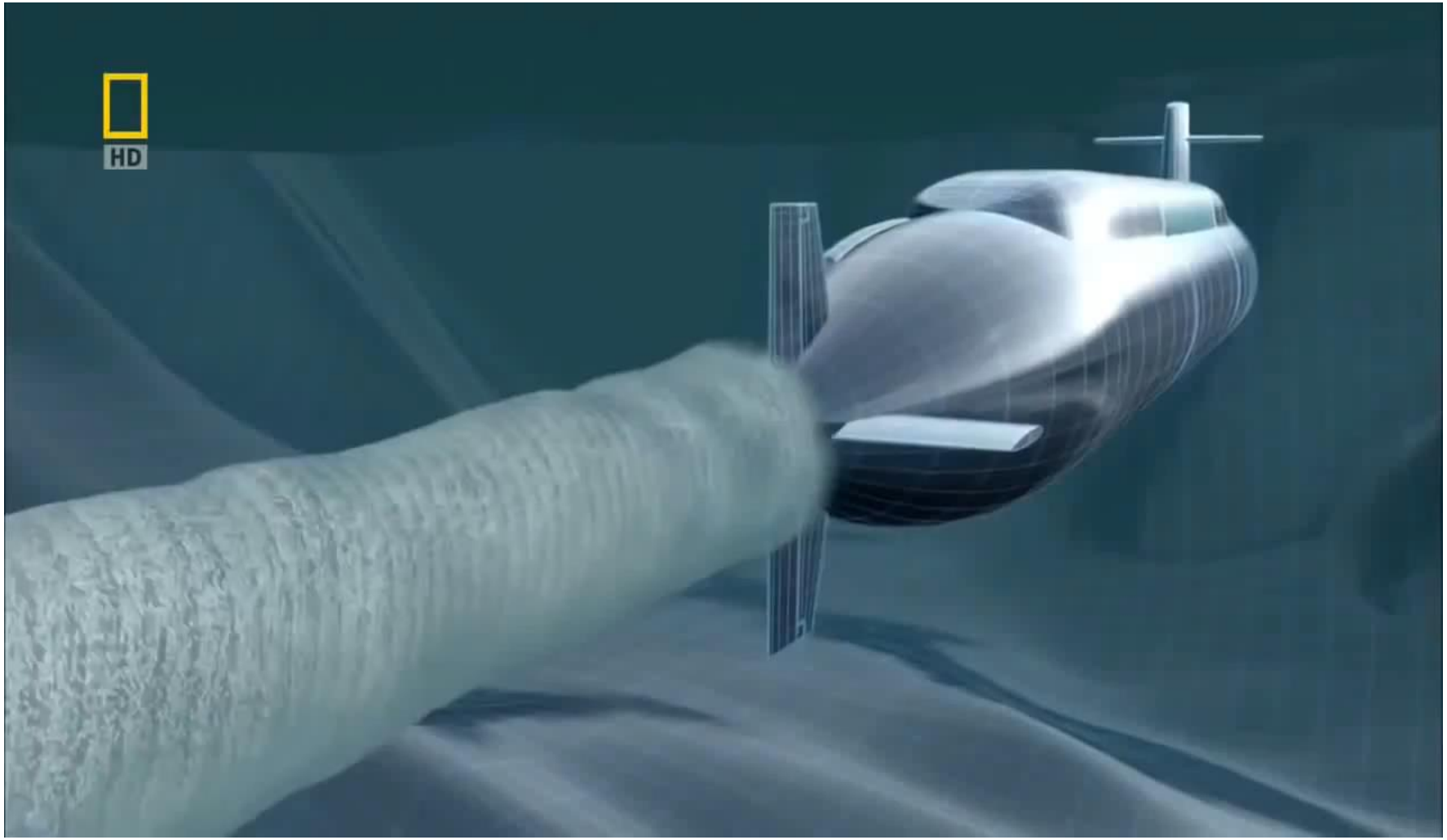
Acoustic research



Conventional propeller



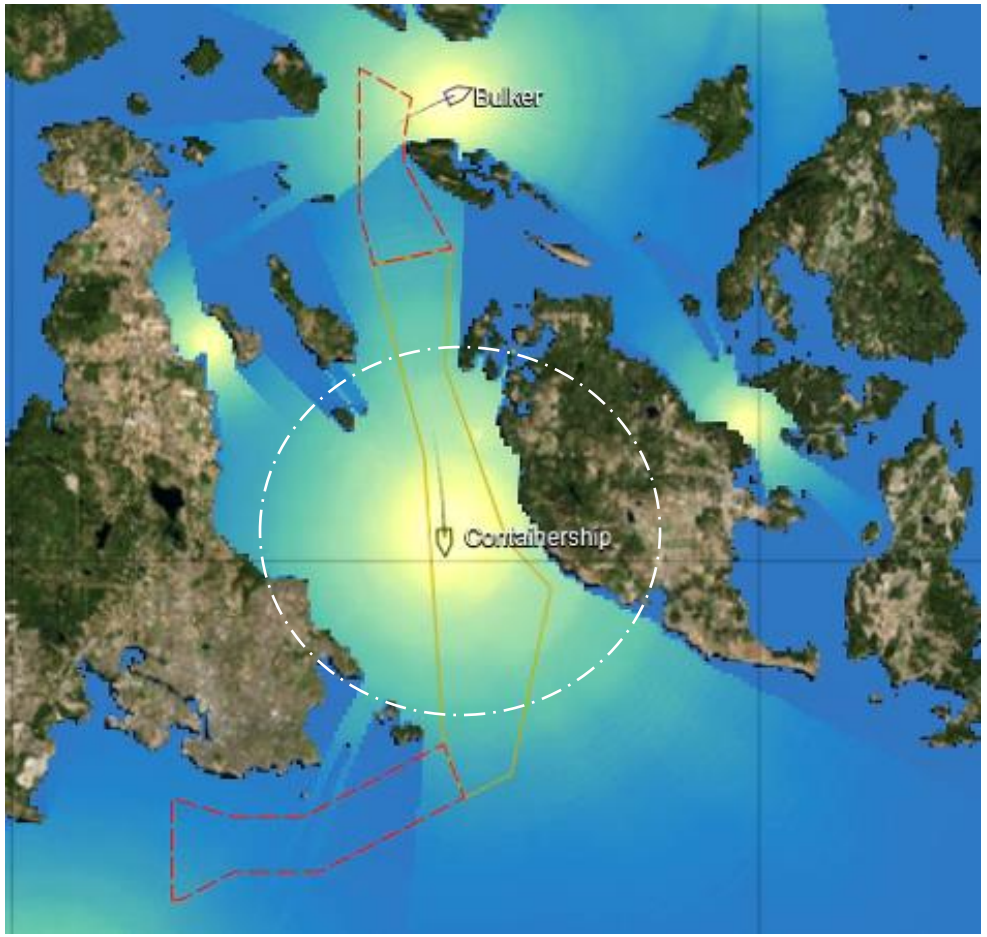
Cavitation



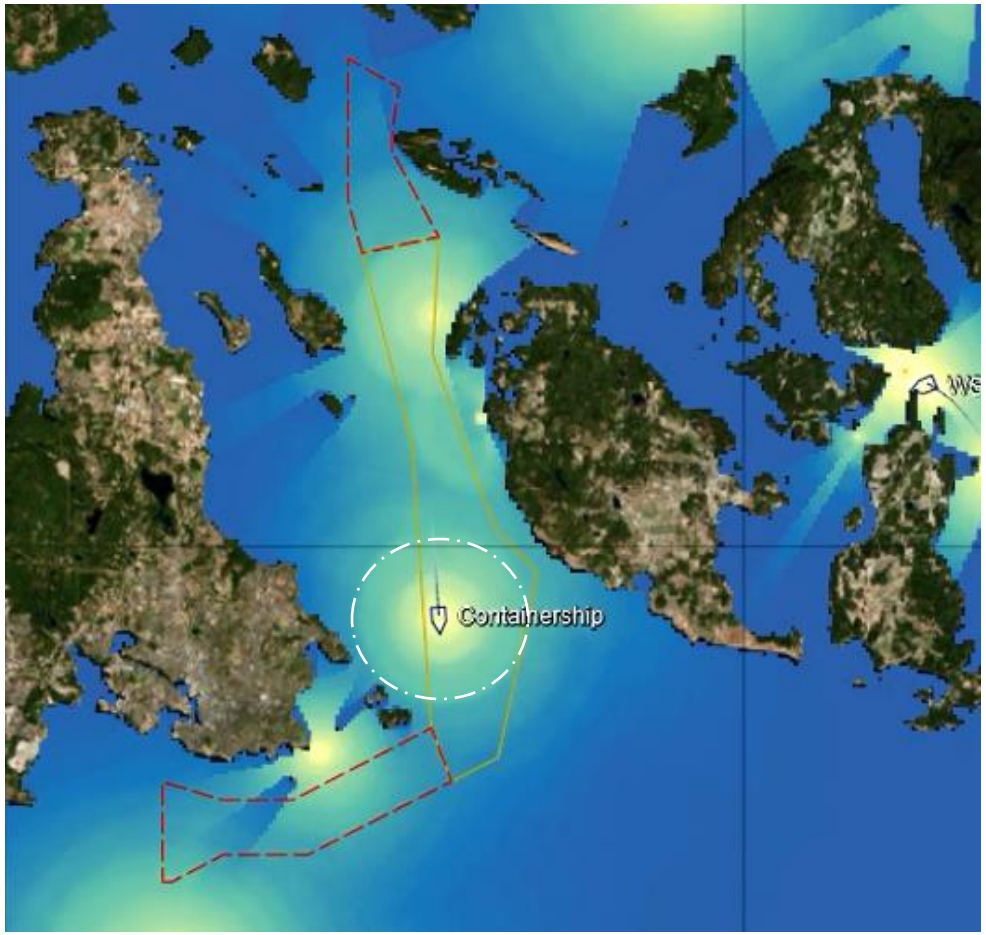
https://www.youtube.com/watch?v=ON_irzFAU9c

Voluntary ship slowdown in Haro Strait
Vessel noise modelling

Baseline speed (19.4 knots)



Trial speed (10.6 knots)



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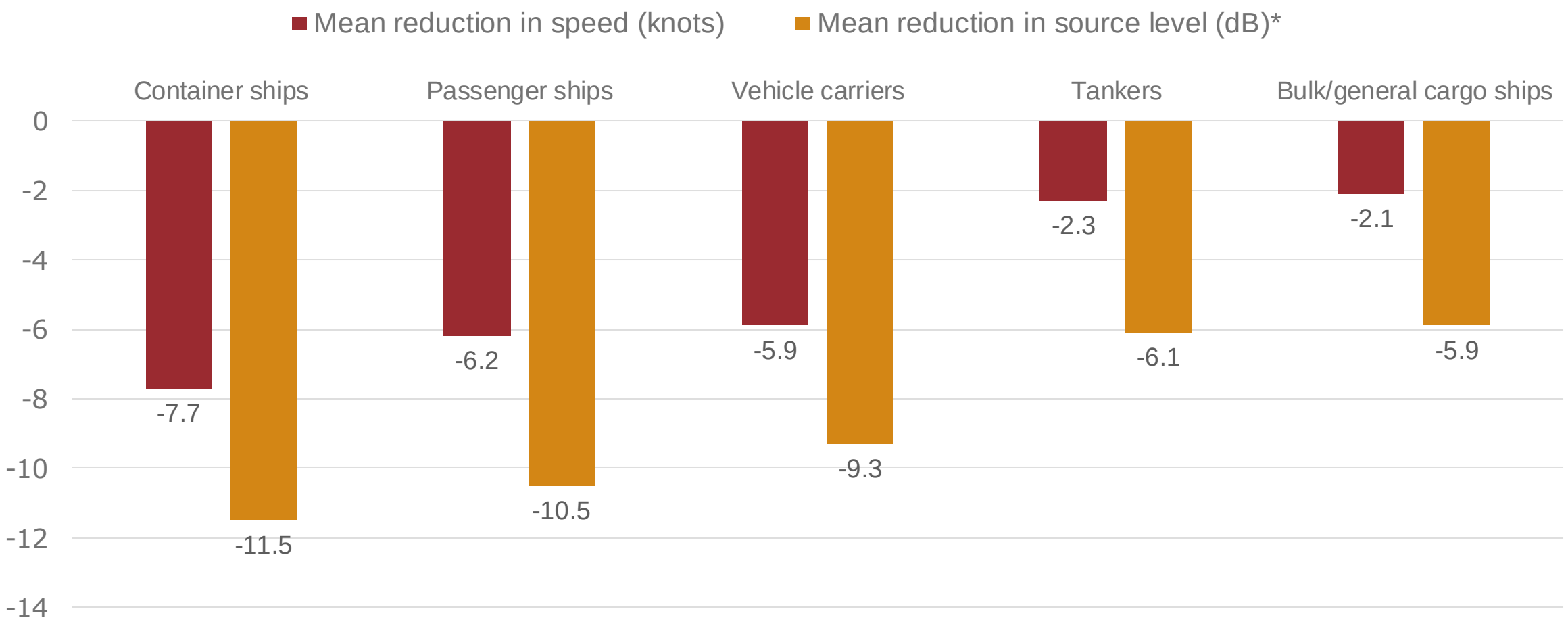
Comparison of a underwater noise from a container ship
Source: JASCO Applied Sciences

Haro Strait voluntary vessel slowdown
Vessel source levels (2017)



*dB reduction (control vs. trial period) based on broadband monopole source level
Note: a 3 dB reduction is roughly equivalent to a 50% reduction in sound intensity.
Source: JASCO Applied Sciences

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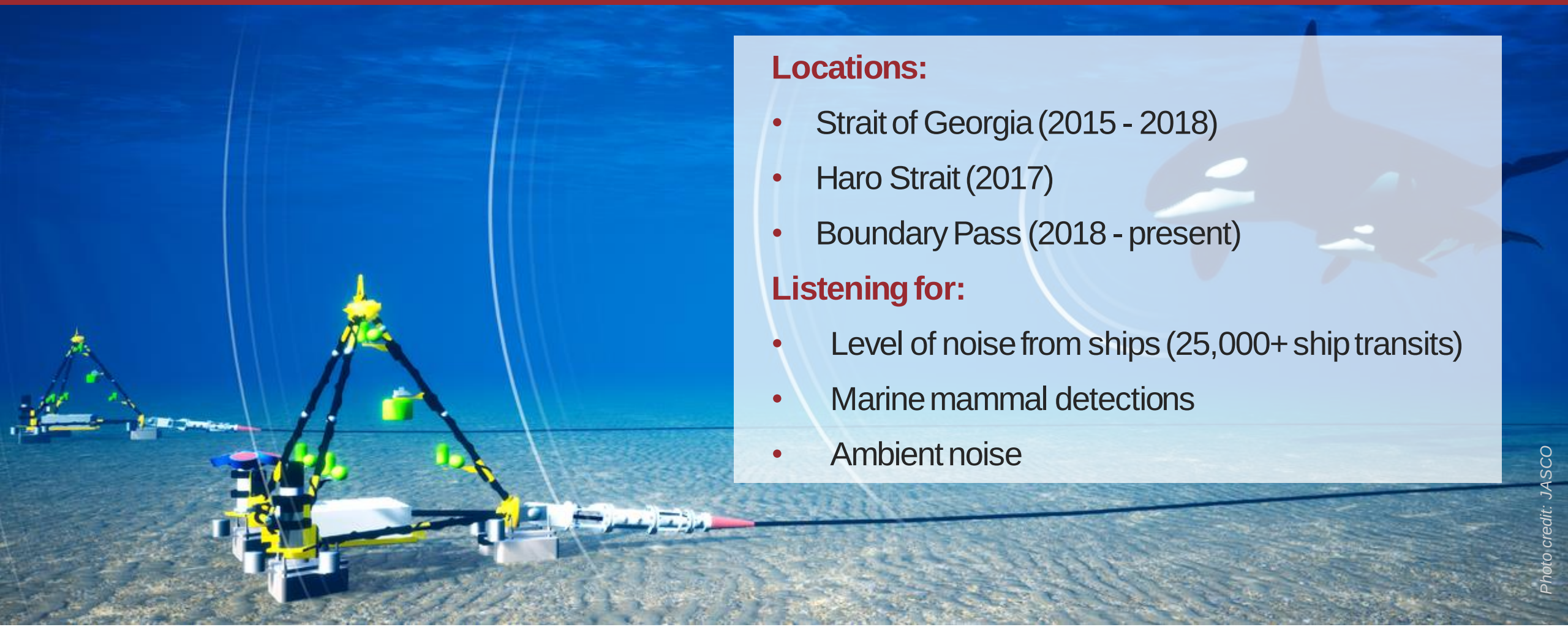
What do different ships sound like?
Underwater listening stations



Locations:

- Strait of Georgia (2015 - 2018)
- Haro Strait (2017)
- Boundary Pass (2018 - present)

Listening for:

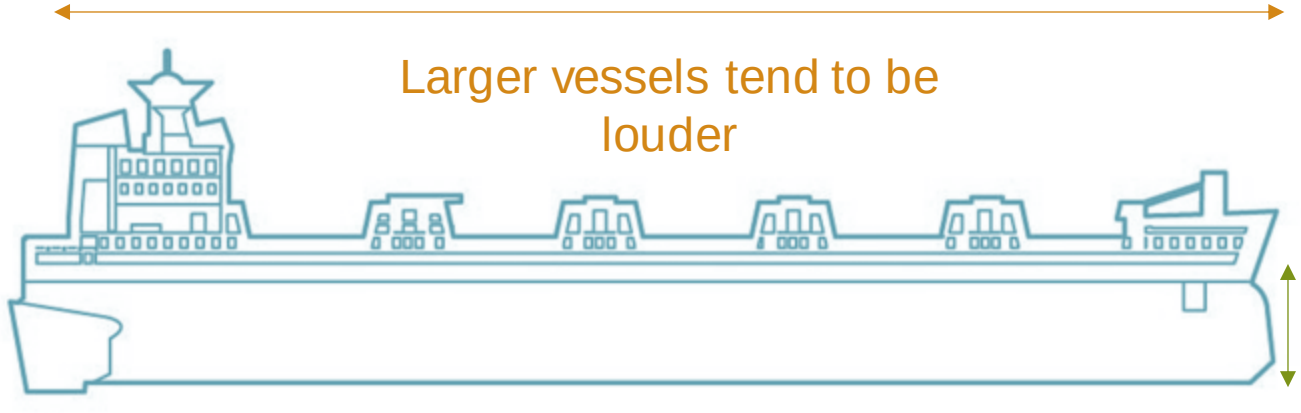
- Level of noise from ships (25,000+ ship transits)
- Marine mammal detections
- Ambient noise

Photo credit: JASCO

Vessel noise correlation study

Published in the September 2022 edition of the Journal of the Acoustical Society of America

Each vessel has variations in sound, even under the same conditions



At mid to higher frequencies, cargo ships with deeper draft tend to be louder

Speed is the most significant factor related to noise emissions

The model can predict general levels and trends in noise emissions

Design parameters

- Vessel length
- Vessel design main engine power
- Vessel design RPM
- Vessel design speed

Operational parameters

- Vessel speed through water
- Vessel draft
- Vessel wind resistance
- Vessel age
- Vessel measurement angle

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EcoAction incentive program for ships

- Since 2007, we have offered discounted harbour dues for cleaner and quieter ships
- *NEW* Platinum (75%) discount option in 2023 for vessels using alternative marine fuels, connecting to shore power, and ***obtaining underwater noise notations***
- Carriers with highest participation rates are recognized with the Blue Circle Award

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

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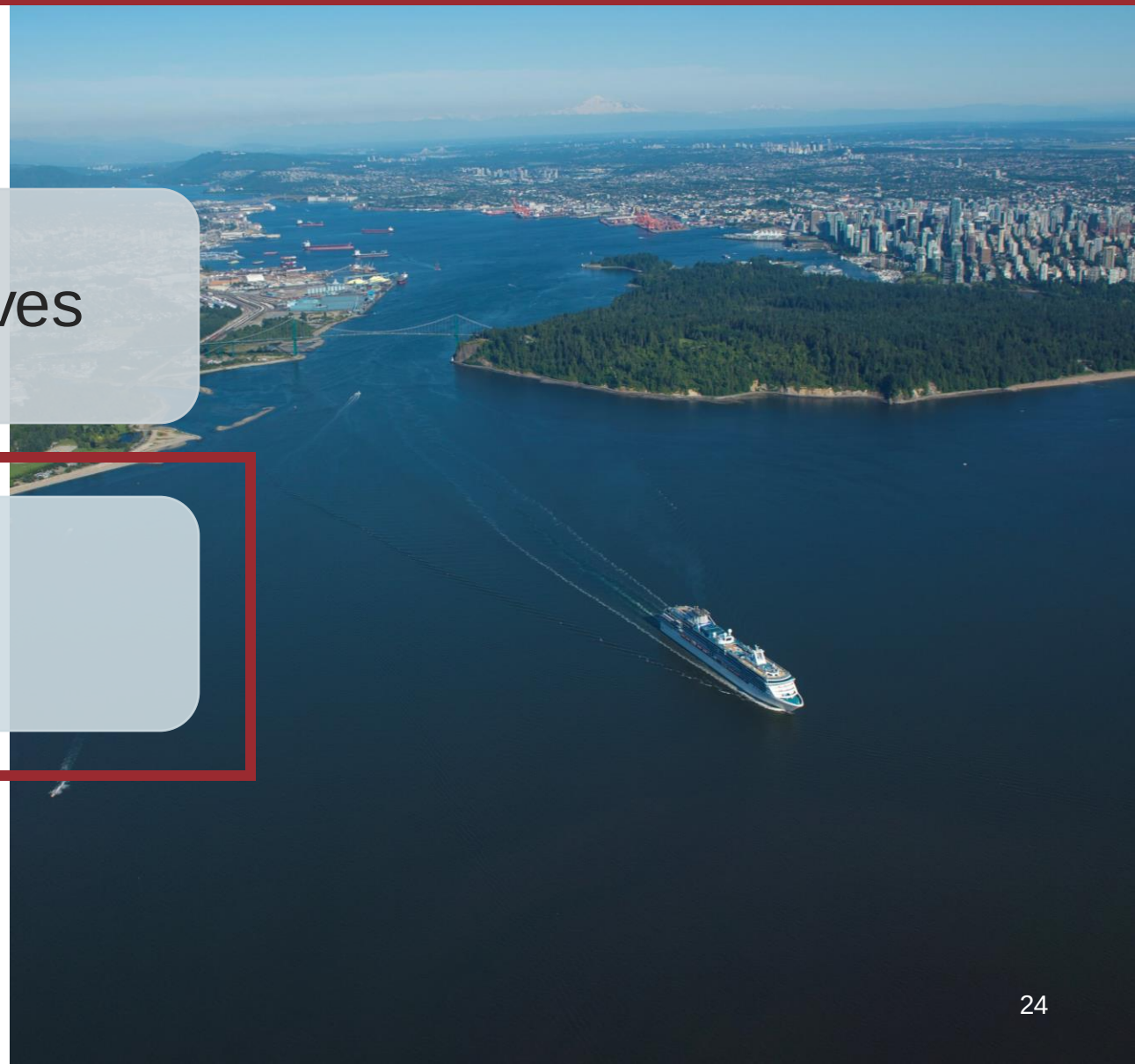
What options exist to reduce vessel underwater noise?

Quiet design & technology	Research and incentives
Quiet operations	Slowdowns and route alterations



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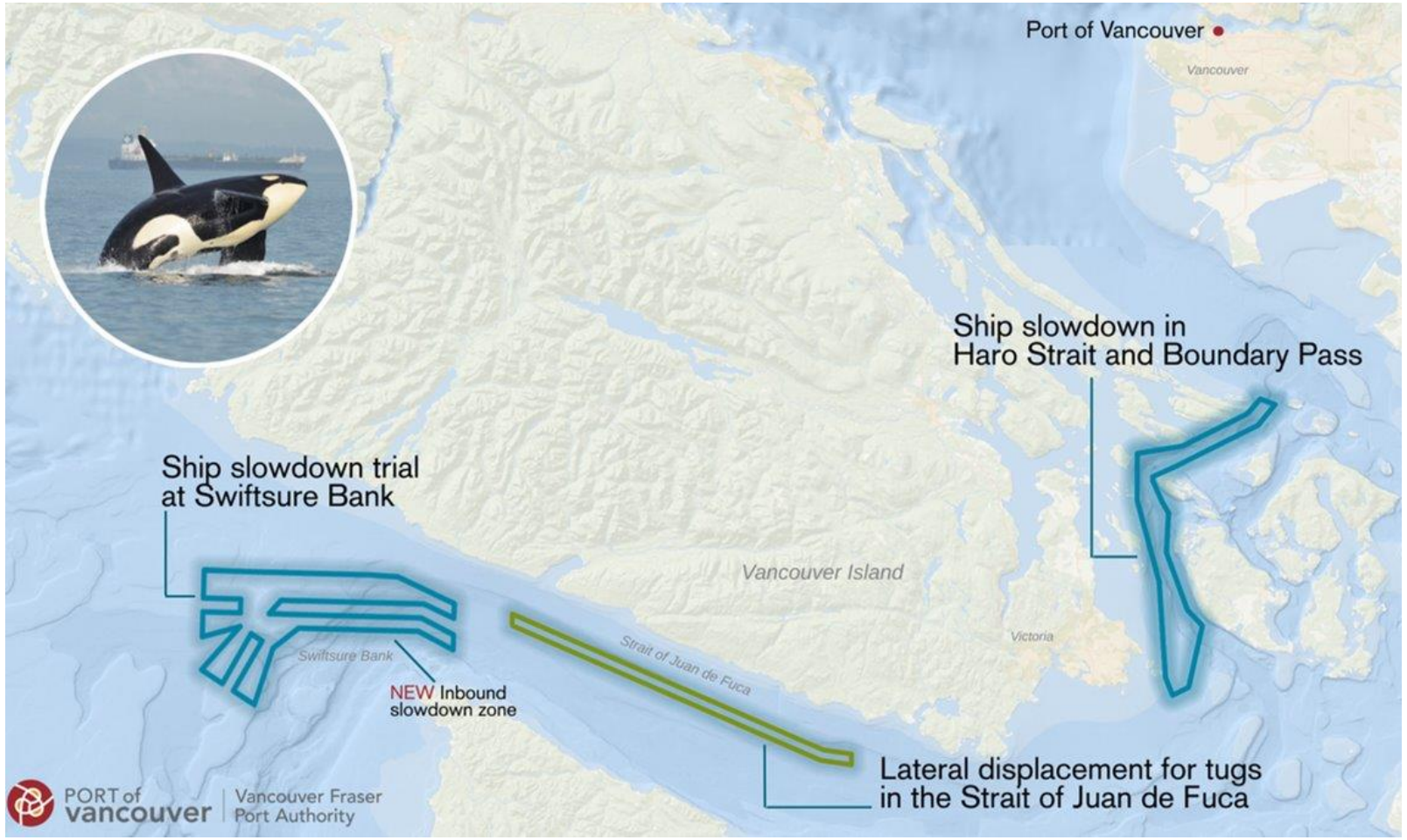
On-water threat reduction initiatives

1. Haro Strait and Boundary Pass large vessel slowdown (2017 – 2022)
2. Lateral displacement of inshore tug traffic in Strait of Juan de Fuca (2018 – 2022)
3. Swiftsure Bank large vessel slowdown **inbound new for 2022* (2020 - 2022)



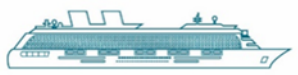
Haro Strait and Boundary Pass voluntary ship slowdown 2022 parameters

June 1 to October 31 (dependent on whale presence)

11 knots or less*

speed through the water:

- bulk carriers
- tankers
- government/ other



14.5 knots or less*

speed through the water:

- car carriers
- passenger/ cruise
- container ships

** When safe and operationally feasible*

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Haro Strait and Boundary Pass voluntary ship slowdown
2022 pilot-reported participation

93%

of all vessel transits participated *

2,098

out of 2,262 vessel transits

>3 dB

reduction in ambient noise in 2021

~55%

reduction in underwater sound intensity in 2021

Photo credit: Olivia Murphy

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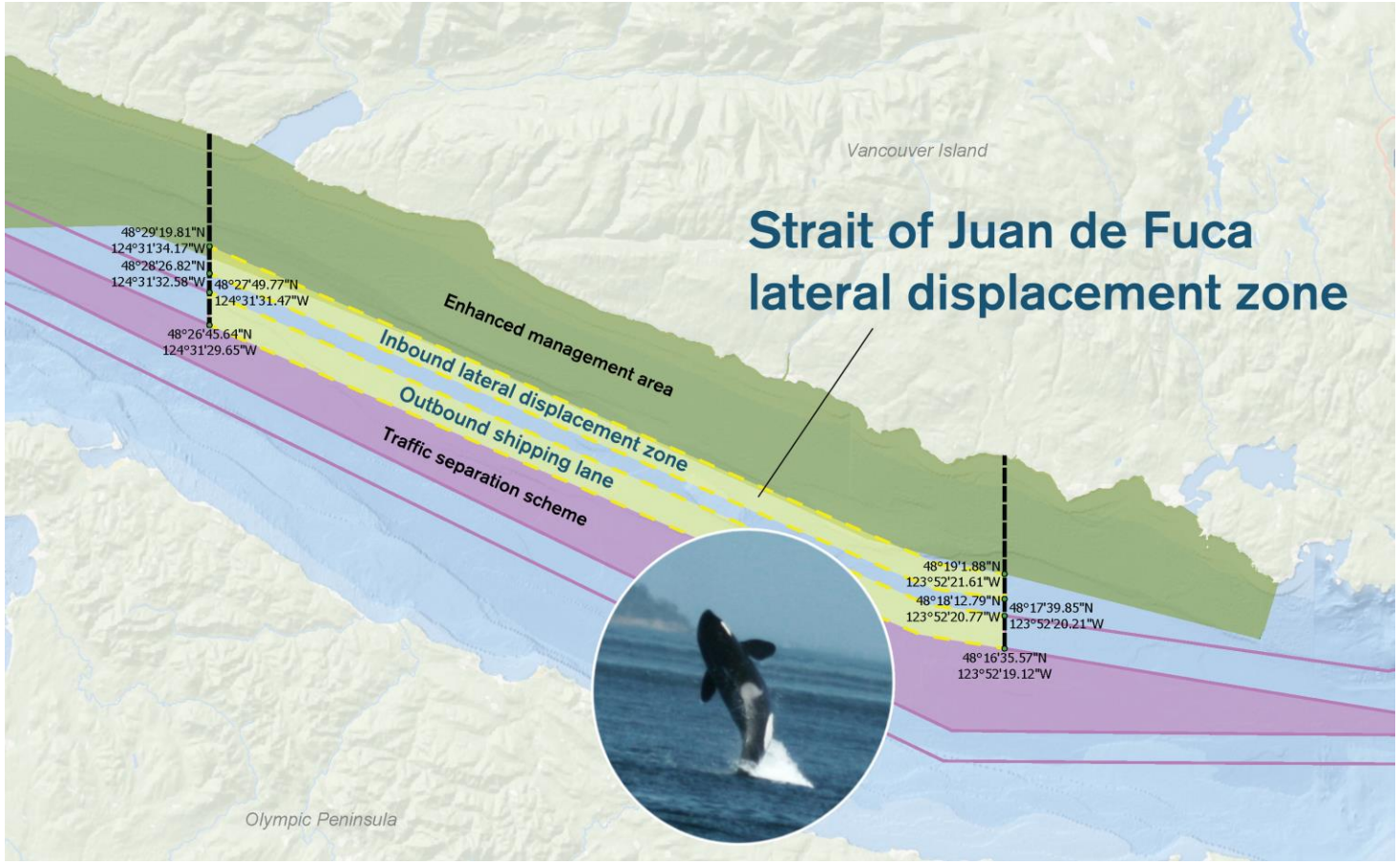
Strait of Juan de Fuca voluntary lateral displacement 2022 parameters



June 1 to October 31

Tugs to displace away from enhanced management area*

- transit in lateral displacement zone
- transit in outbound shipping lane
- avoid buffer zone

** When safe and operationally feasible*

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Strait of Juan de Fuca voluntary lateral displacement 2022 participation

97%

of all tug transits participated *

100

out of 103 tug transits

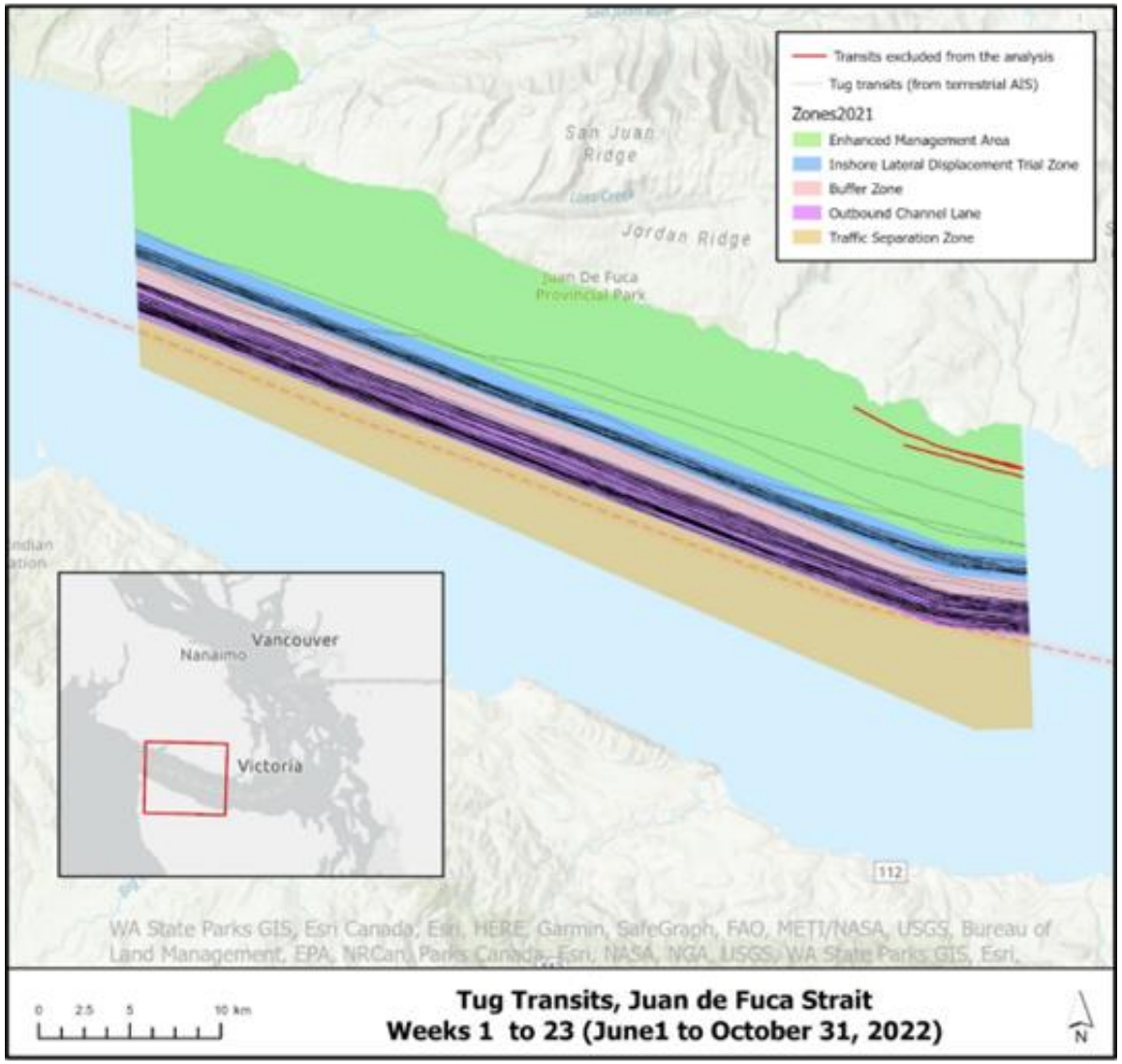
~4-7 dB

reduction in ambient underwater noise per tug transit in 2021

~70%

reduction in underwater sound intensity per tug transit in 2021

*Spent more than half of transit in the inshore lateral displacement zone or the outbound shipping lane.



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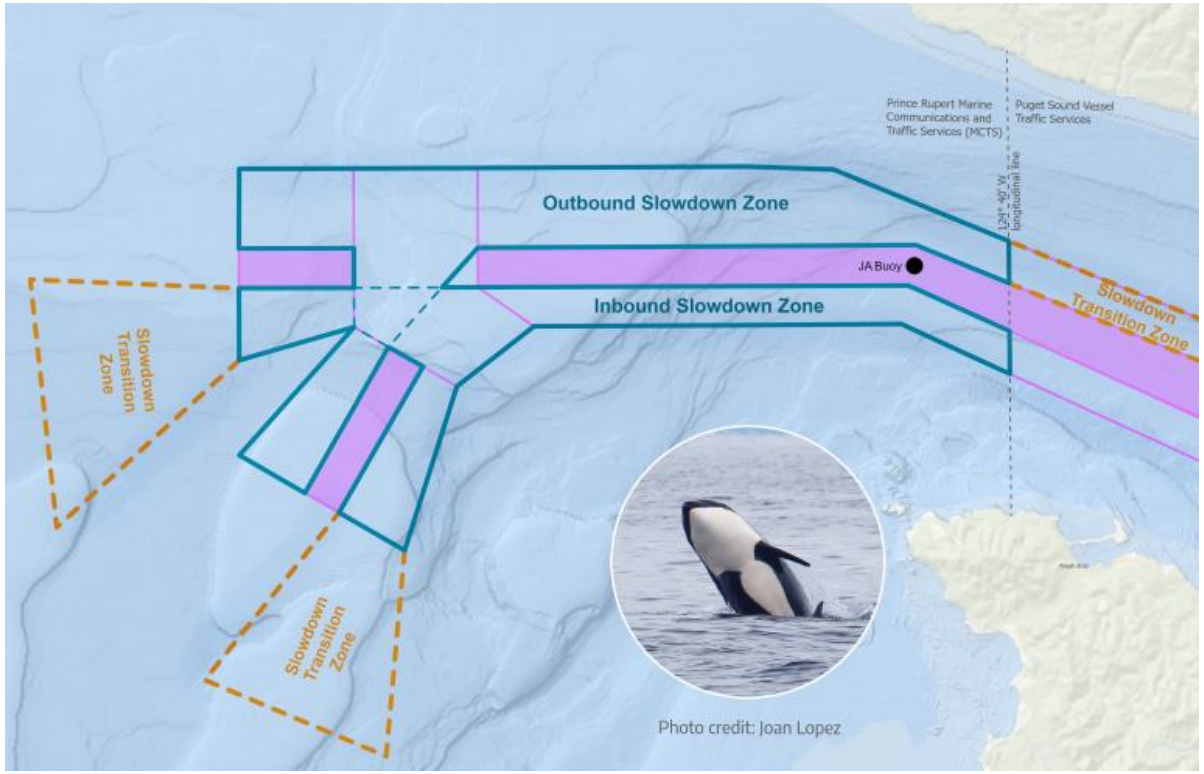
Swiftsure Bank voluntary ship slowdown 2022 parameters

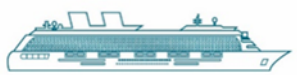


June 1 to October 31

11 knots or less*

speed through the water:

- bulk carriers
- tankers
- government/ other



14.5 knots or less*

speed through the water:

- car carriers
- passenger/ cruise
- container ships

** When safe and operationally feasible*

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Swiftsure Bank voluntary ship slowdown 2022 calculated participation

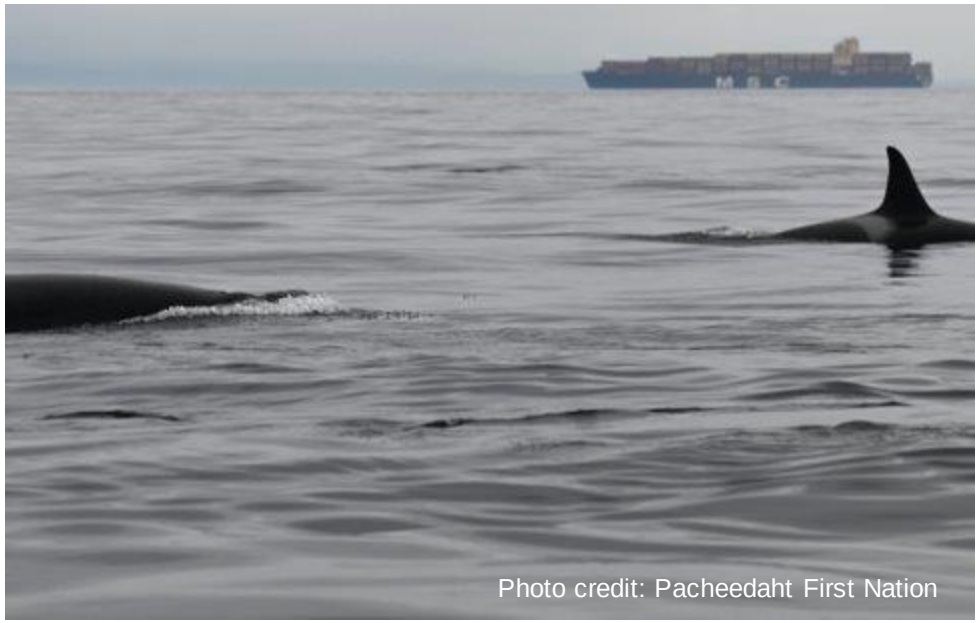

Photo credit: Pacheedaht First Nation

82%

of all vessel transits participated *

3,565

out of 4,331 vessel transits

~2 dB

reduction in ambient noise in 2020

~37%

reduction in underwater sound intensity in 2020

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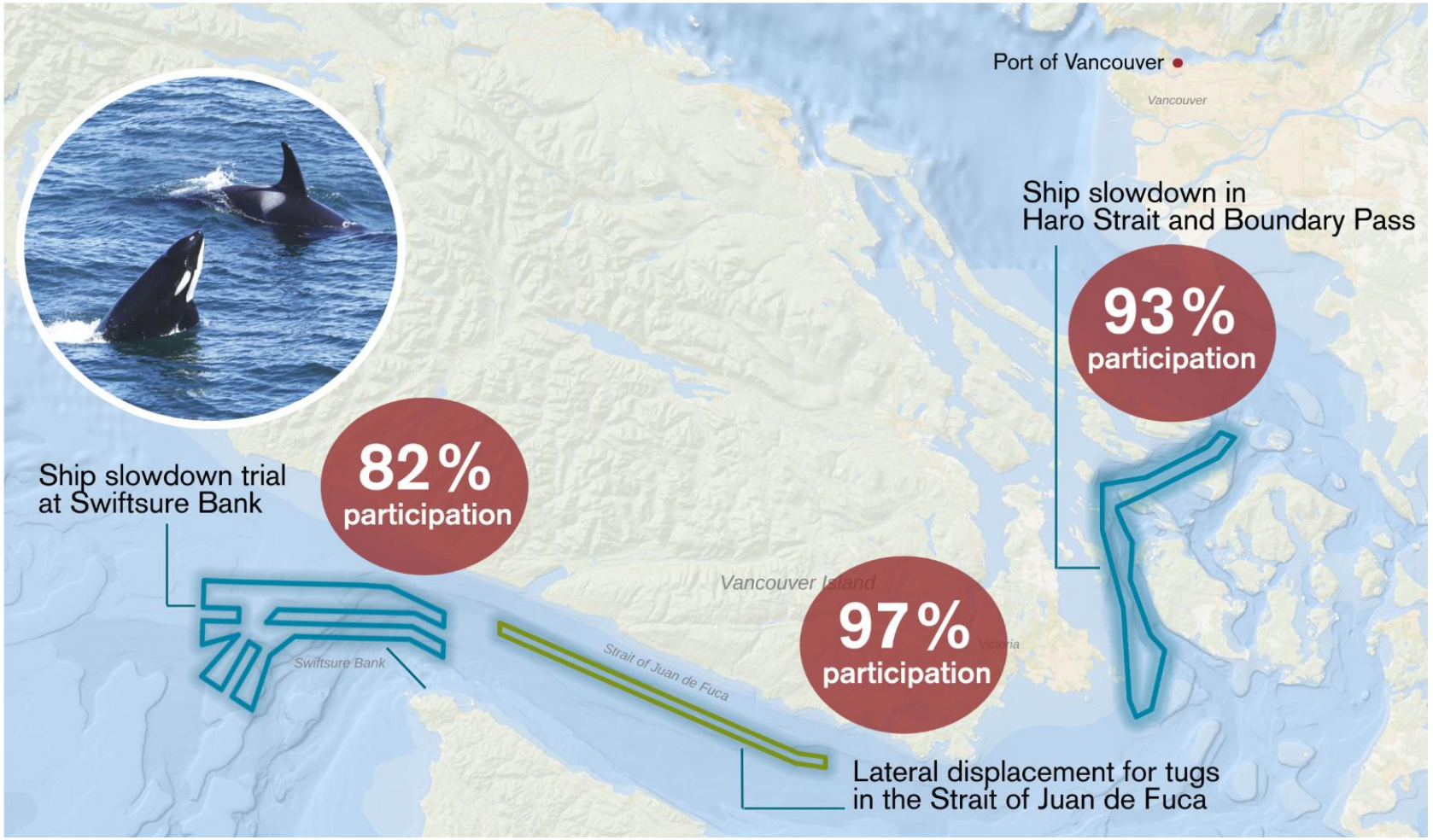
2022 overall participation



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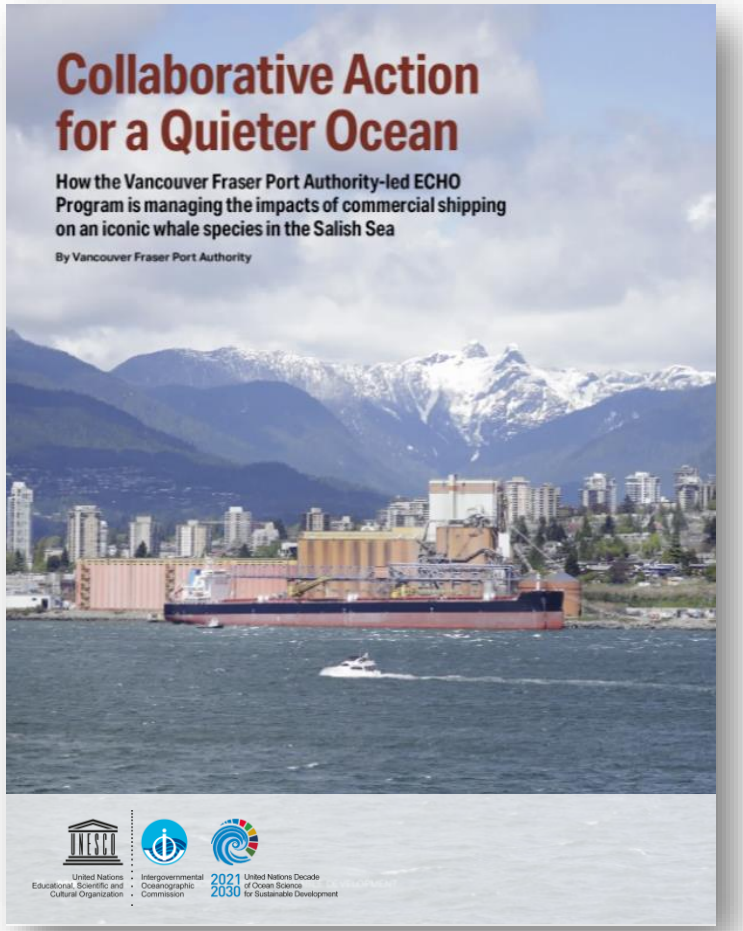
ECHO Program international work

International collaboration

- Spearheading internationally-reaching research and education on ship-generated underwater noise
- Current projects:
  - Helping to shape the International Maritime Organization on its underwater noise reduction guidelines
  - Working with international shipping classification societies to align ‘quiet ship’ notations
  - Providing input and research to various other international research efforts

The ECHO Program - international recognition



- Featured in the United Nations' publication, distributed at the UN's Annual Oceans Conference
- Highlighted as a case study by the European Maritime Safety Agency, which described the program as:
  - *One of the world's most "well known" and "broadly spanning" programs to reduce ship-generated underwater noise*

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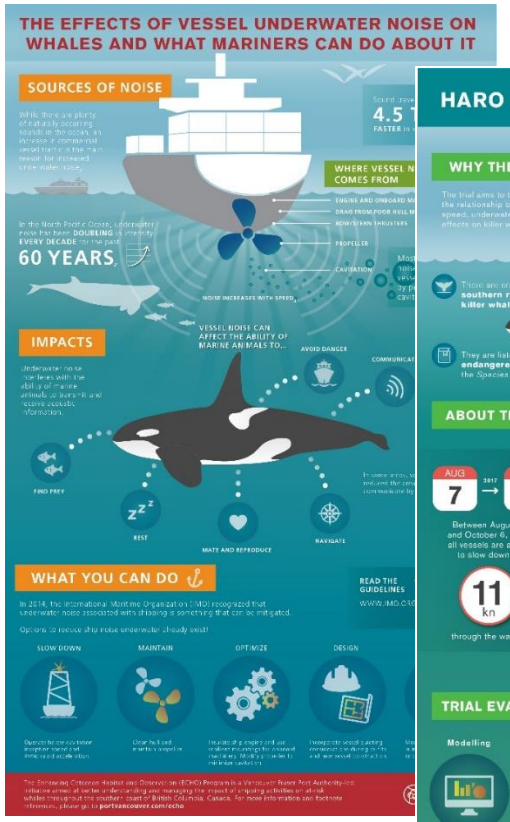
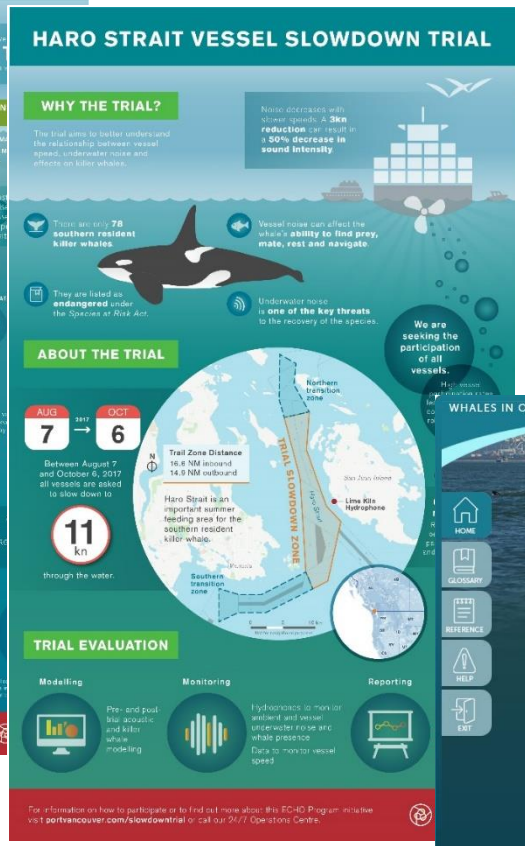
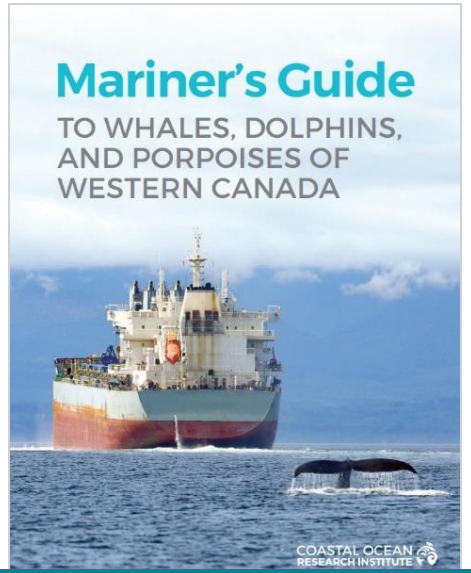
Educational resources







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Thank you!

Photo credit: Olivia Murphy

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