



PORT of
vancouver

Whales & shipping:

How the ECHO Program is working to reduce the impact of vessel traffic on whales in the Salish Sea

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Whales in our waters

Many at-risk marine mammals species in our shared waters



Harbour Porpoise
(Special Concern)



Humpback
(Threatened)



Fin
(Threatened)



Sei
(Endangered)



Blue
(Endangered)



North Pacific Right whale
(Endangered)



Biggs (transient) killer whale
(Threatened)



Resident killer whale
(Endangered)

Known threats to marine mammals



Acoustic Disturbance



Physical Disturbance



Environmental Contaminants

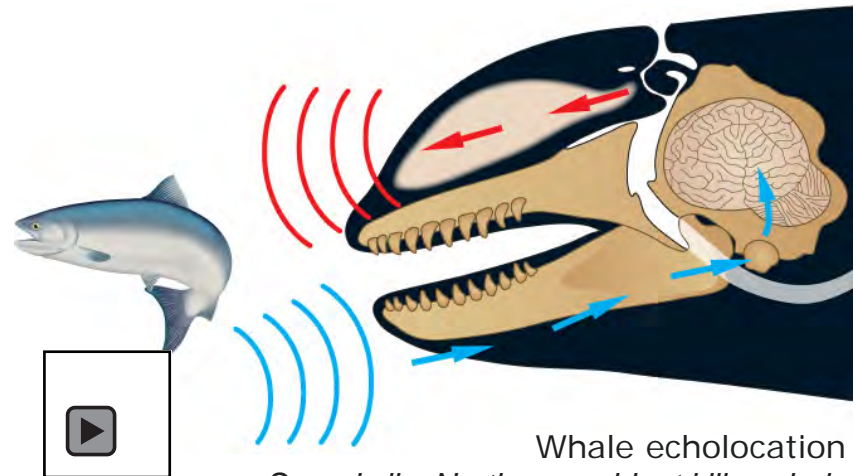


Availability of prey

Photo: Vancouver Aquarium/NOAA

Whales & acoustic disturbance

- Whales use sound to find food, communicate and navigate
- Vessel noise can disrupt their behavior and their ability to hear returning echolocation clicks – “masking”
- Under *SARA*, no person shall kill, harm, harass, capture or take a resident killer whale, nor destroy any part of its critical habitat
- Acoustic impacts may lead to “destruction of critical habitat” due to loss of vital habitat functions



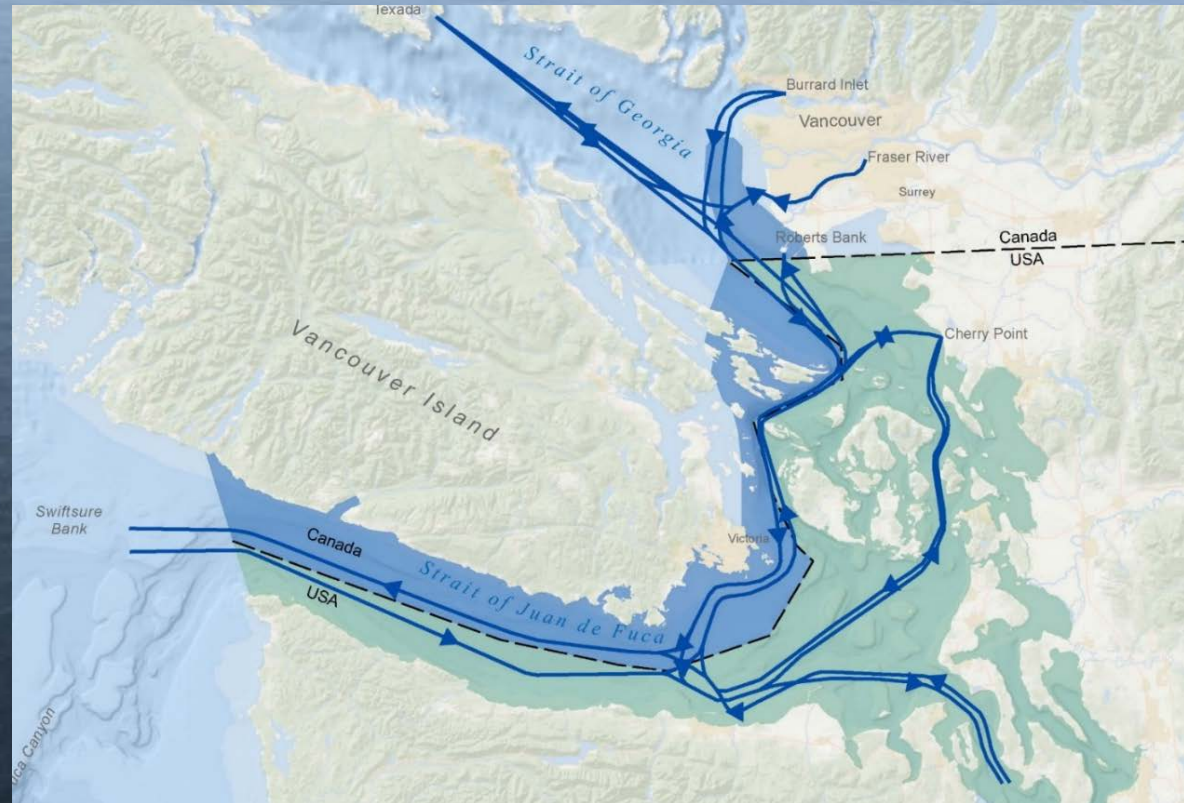
Whale echolocation

Sound clip: Northern resident killer whale masking from passing commercial vessel.

Credit: Orcalab

ECHO Program context

- SRKW critical habitat and vessel shipping lanes overlap
- Predicted growth in population and vessel movements
- *Canada Marine Act* mandate



ECHO Program

What? A **collaboration** with marine transportation industries, conservation groups, scientists, First Nations and Canadian and US governments

When? Convened Nov 2014

Why? To **better understand and reduce the cumulative impacts** of commercial vessel activities on at-risk whales throughout the southern coast of British Columbia

Goal? To develop mitigation measures that quantifiably reduce the threats to whales as a result of shipping activities

Photo: Joan Lopez

ECHO Program collaborators



ECHO Acoustic Research

What do different vessel types sound like?

ECHO Underwater Listening Station (ULS)



ECHO Underwater Listening Station

Research partners



Transport Canada



What do different vessel types sound like?

ECHO Underwater Listening Station (ULS)



Container ship
190.5 dB



Humpback?



Where do different vessel types contribute to noise?

Vessel noise contributors study



Container ships



Passenger



Ferries



Fishing



Recreational



Oil Tankers



Tugs



Whale watching



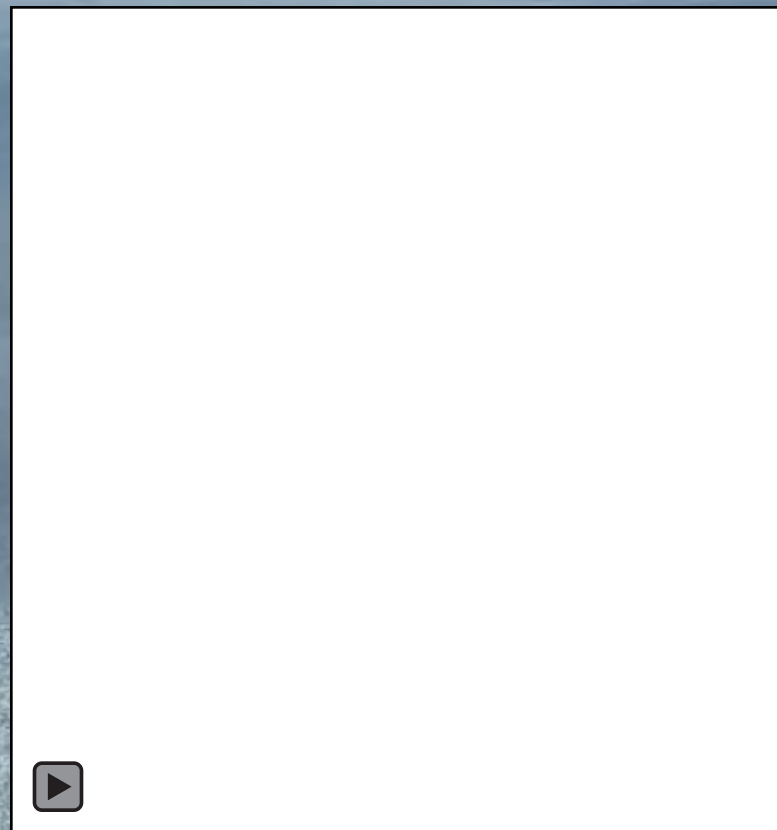
Government,
Navy, Research



Other merchant
vessels



Miscellaneous



What options exist to reduce vessel underwater noise?

Vessel noise reduction option study

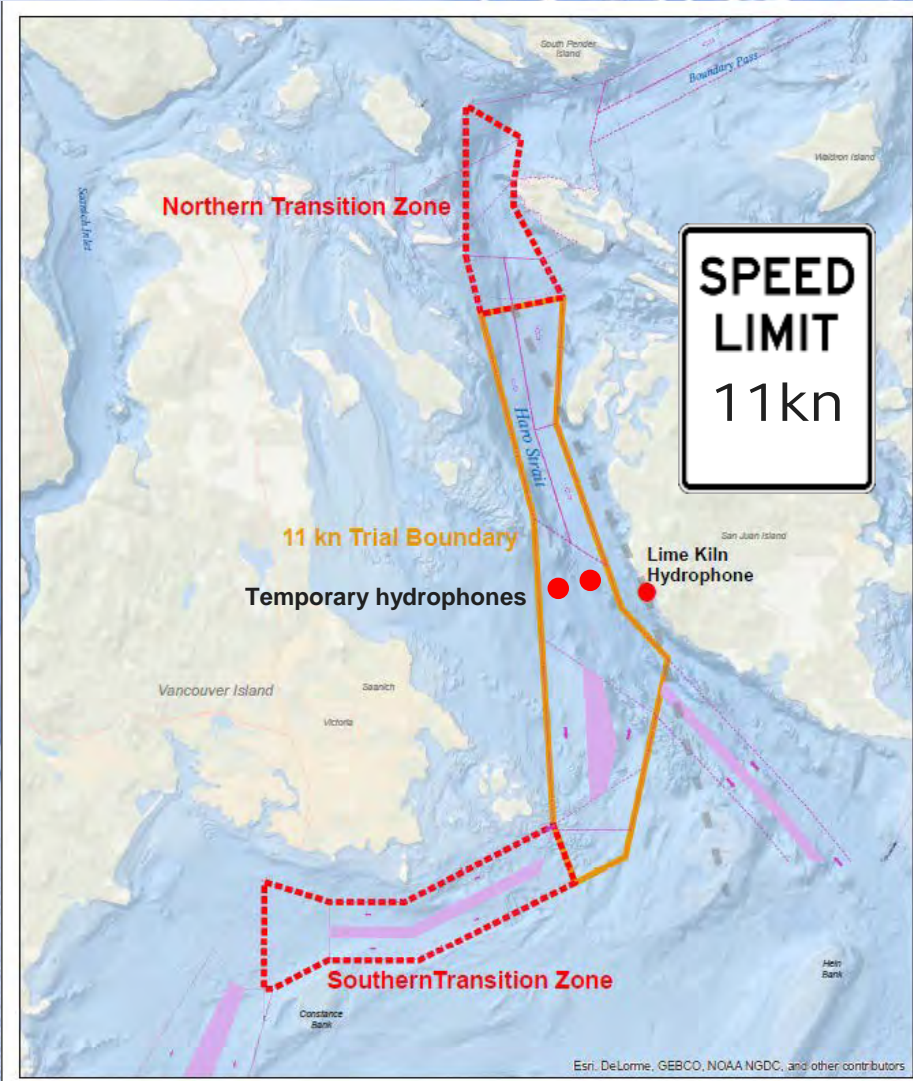


EcoAction
incentives



Vessel
slow
down trial

Vessel slowdown trial: description



Vessel slowdown trial

Why: The trial aims to better understand the relationship between vessel speed, underwater noise and potential effects on killer whales

Where: ~16 nautical miles through critical whale foraging habitat in Haro Strait

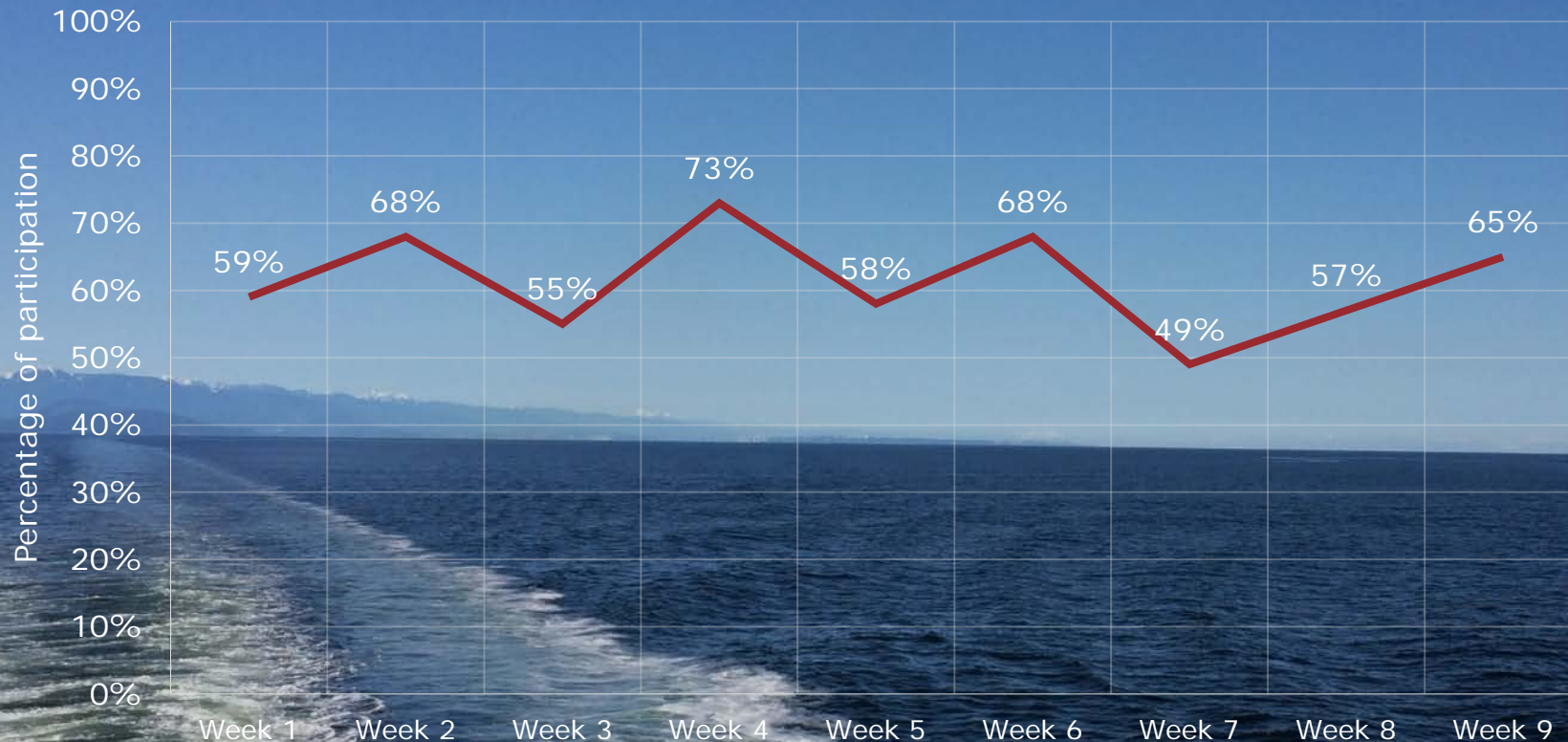
When: Two (lunar) month trial, August 7 - October 6, 2017

What speed: 11 kn through the water



Vessel slowdown trial: participation

Overall trial participation rate* by week



Vessel slowdown trial: data collection & utility

Data Collection & Analysis

- Vessel source level data (deployments in shipping lane)
- Ambient noise at Lime Kiln
- Whale presence (hydrophone & observations)

Results and Utility

- Speed-sound relationship
- Changes in received and total ambient noise
- Refine existing acoustic models



ECHO Program: looking ahead

- Vessel slowdown trial - data evaluation to inform next steps
- Evaluate and implement voluntary mitigation measures
- Correlations between noise & ship characteristics
- Explore real-time notification of whale presence
- Year 3 of the Underwater Listening station (vessels ranking by class)

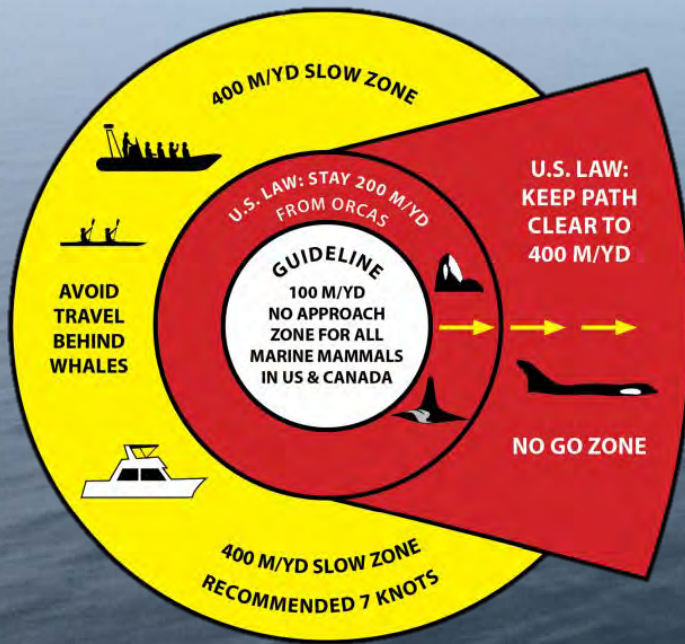


Photo: Joan Lopez

Applications for other regional action committees

- Underwater noise & whales is an emerging issue
- Evidence-based solutions
- A collaborative approach to build trust and momentum
- Engage early and often

How you can get involved



Be Whale Wise Guidelines



Seasound.org



Whale Museum
Hotline



Whale Alert App
(Worldwide)



Whale Report App
(Vancouver
Aquarium)

Watch. Read. Share.

Mariner's Guide TO WHALES, DOLPHINS, AND PORPOISES OF WESTERN CANADA



THE EFFECTS OF VESSEL UNDERWATER NOISE ON WHALES AND WHAT MARINERS CAN DO ABOUT IT

SOURCES OF NOISE

While there are plenty of natural sources of noise, it's estimated that the noise in harbours is comparable to that of a jet engine. A lot of the noise is caused by increased underwater energy.

In the North Pacific Ocean, ship noise has been **DOUBLING** in volume **EVERY DECADE** for the past **60 YEARS**.

WHERE VESSEL NOISE COMES FROM

- PROPEL AND OUTBOARD MACHINERY
- DEAD END PORT HULL MAINTENANCE
- WIND-DRIVEN BUBBLES
- PROPELLER
- CAVITATION

Most underwater noise from large vessels is caused by propeller cavitation.

IMPACTS

Underwater noise interferes with the ability of marine animals to transmit and receive acoustic information.

VESSEL NOISE CAN AFFECT THE ABILITY OF MARINE ANIMALS TO...

- FIND PREY
- REST
- MAINTAIN AND REPRODUCE
- NAVIGATE
- AVOID DANGERS
- COMMUNICATE

In some areas, vessel noise has reduced the area some whales can communicate by **90%**.

WHAT YOU CAN DO

In 2014, the International Maritime Organization (IMO) recognized that underwater noise associated with shipping is something that can be mitigated. Options to reduce ship noise underwater already exist!

- SLOW DOWN**: Operate vessels within speed zones set by local authorities.
- MAINTAIN**: Clean and maintain propellers.
- OPTIMIZE**: Install ship noise reduction measures like propeller modifications, bubble curtains, etc.
- DESIGN**: Encourage vessel builders to incorporate noise-reducing technologies during the design phase of the vessel.
- REDUCE**: Modify vessel operations to avoid noise in sensitive areas.

READ THE GUIDELINES
WWW.IMO.ORG

The Emergency Response, Habitat and Observation (ERHO) Program is a Vancouver Port Authority-led and government-backed understanding and managing the impact of vessel activities on sensitive waters throughout the coast of British Columbia, Canada. For more information and feedback, information, please go to portofvancouver.com/erho

Two orcas are swimming in clear blue water. The larger orca is in the foreground, swimming towards the top left, while a smaller one is behind it, swimming towards the top right. Both have dark brown backs and white bellies.

Thank you for listening!

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