PORT of vancouver | Vancouver Fraser Port Authority

ECHO Program
2022 Annual report

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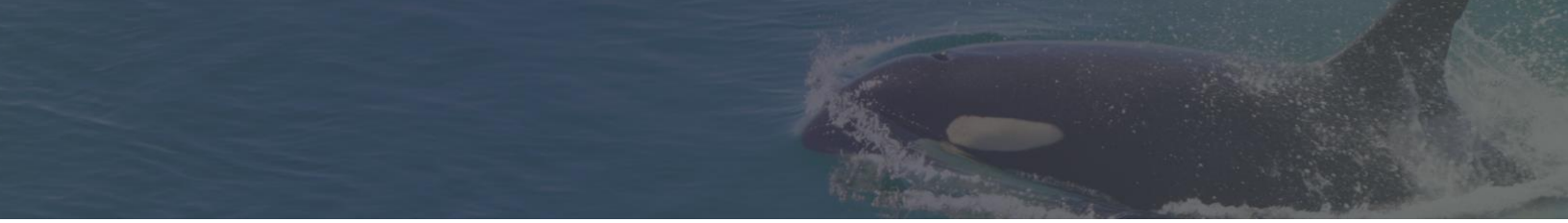
Canada



Message from the vice president, environmental and external affairs

Environmental protection is a key part of both the Vancouver Fraser Port Authority's federal mandate and our vision for the Port of Vancouver to be the world's most sustainable port. Towards this vision, the port authority has led the Enhancing Cetacean Habitat and Observation (ECHO) Program since 2014 to better understand and reduce the cumulative impacts of commercial shipping on at-risk whales, with a particular focus on endangered southern resident killer whales.

Since the program's launch nearly a decade ago, the ECHO Program has grown to become a world-leading program in underwater noise reduction research and mitigation. Today, in close collaboration with partners across government, the marine transportation industry, Indigenous communities, and environmental groups, the program coordinates one of the world's largest and most successful voluntary efforts to reduce the impacts of underwater noise on at-risk whales.

The year 2022 was marked by record-breaking achievements for the ECHO Program. Not only did the program coordinate underwater noise reduction initiatives over the largest geographical area to date — nearly 80 nautical miles of the Salish Sea — it also achieved an all-time-high participation rate, with 86% of all large commercial ships slowing down or keeping their distance from key areas of southern resident killer whale critical habitat.

Notably, the ECHO Program also successfully expanded its voluntary ship slowdown trial at Swiftsure Bank, a key foraging area for southern resident killer whales within both U.S. and Canadian waters. The program's success at coordinating this measure — outside of both the port authority and the Government of Canada's jurisdiction — is a testament to the strength of the program's voluntary, collaboration-based approach.

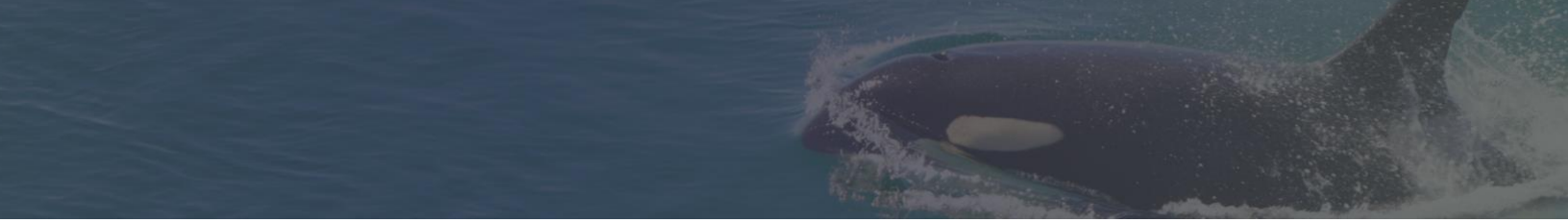
On the world stage, the ECHO Program represented the International Association of Ports and Harbours at the International Maritime Organization (IMO), where the ECHO Program team and partners at Transport Canada helped shape the IMO's new underwater noise reduction guidelines, which are expected to be approved later in 2023.

Highlights of 2022

- Coordinated threat reduction measures across nearly **80 nautical miles** of the Salish Sea, in both U.S. and Canadian waters
- Achieved an all-time high voluntary participation rate of **86%** by the marine transportation industry
- Expanded the Swiftsure Bank ship slowdown trial to include both the inbound and outbound shipping lanes
- Encouraged over **5,700** ship transits to slow down or stay distanced
- Helped shape the International Maritime Organization's new underwater noise reduction guidelines

As we reflect on the achievements made in the year behind us, it's with gratitude that we thank our many advisors, partners, and participants for their collective efforts to protect at-risk whales in our region. In the year ahead, we look forward to continuing to work collaboratively to advance our shared goal of creating quieter oceans for healthier whales.

Duncan Wilson, vice president, environment and external affairs



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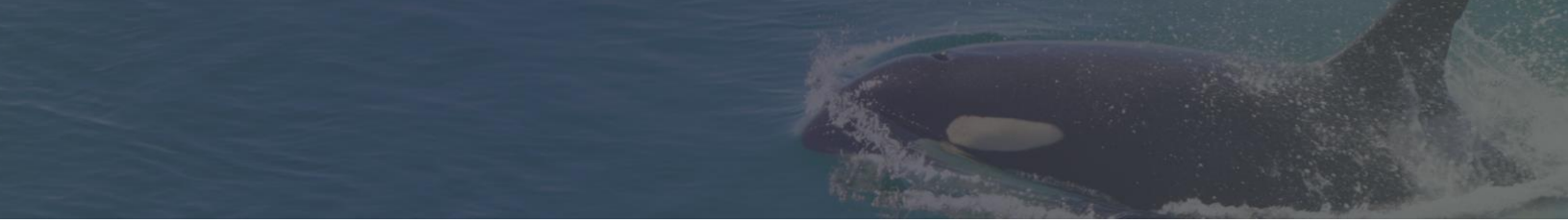


About this report

This report covers activities of the Vancouver Fraser Port Authority-led Enhancing Cetacean Habitat and Observation (ECHO) Program throughout the 2022 calendar year, as well as a brief overview of activities planned in 2023. Further details about the ECHO Program, including project summaries, technical project reports, and past annual reports can be found on our website at portvancouver.com/echo.

About the ECHO Program

The ECHO Program is a world-leading, first-of-its-kind program developed and led by the port authority to better understand and reduce the cumulative effects of commercial shipping on at-risk whales along British Columbia's southern coast, with particular focus on endangered southern resident killer whales.

Since 2014, the ECHO Program has brought together Canadian and U.S. advisors and partners from across government, the marine transportation industry, Indigenous communities, and environmental groups to develop and implement underwater noise reduction measures for at-risk whales.

To date, the ECHO Program's initiatives have encouraged thousands of ship operators to slow down or stay distanced while traveling within key areas of southern resident killer whale critical habitat — helping to measurably reduce underwater noise, one of the four key threats to southern resident killer whales identified by Fisheries and Oceans Canada.

In addition to its underwater noise reduction measures, the ECHO Program spearheads world-leading research efforts to broaden understanding of ship-generated underwater noise and inform potential solutions. The ECHO Program has been invited to present its findings to international forums including the International Maritime Organization (IMO) and is recognized as one of the world's most well-known and broadly spanning programs to address underwater noise from ships.

About the Vancouver Fraser Port Authority

The Vancouver Fraser Port Authority is the federal agency responsible for the stewardship of the Port of Vancouver. Like all Canada Port Authorities, the Vancouver Fraser Port Authority is accountable to the federal minister of transport, and operates pursuant to the *Canada Marine Act* with a mandate to enable Canada's trade through the Port of Vancouver, while protecting the environment and considering local communities. The port authority has control over the use of port land and water, which includes more than 16,000 hectares of water, over 1,500 hectares of land, and approximately 350 kilometres of shoreline. Located on the southwest coast of British Columbia in Canada, the Port of Vancouver extends from Roberts Bank and the Fraser River up to and including Burrard Inlet, bordering 16 municipalities, and intersecting the traditional territories and treaty lands of several Coast Salish First Nations. The Port of Vancouver is Canada's largest port, and the third largest in North America by tonnes of cargo. Enabling the trade of approximately $240 billion in goods with more than 170 world economies, port activities sustain 115,300 jobs, $7 billion in wages, and $11.9 billion in GDP across Canada.

Geographic focus area

The ECHO Program's geographic focus, pictured below, is on key areas of southern resident killer whale critical habitat off the coast of British Columbia and Washington State. This area encompasses the traditional waters of the Coast Salish and Nuu-Chah-Nulth peoples, including the maritime territory of Pacheedaht First Nation and the Usual and Accustomed Fishing Area of the Makah Tribe.

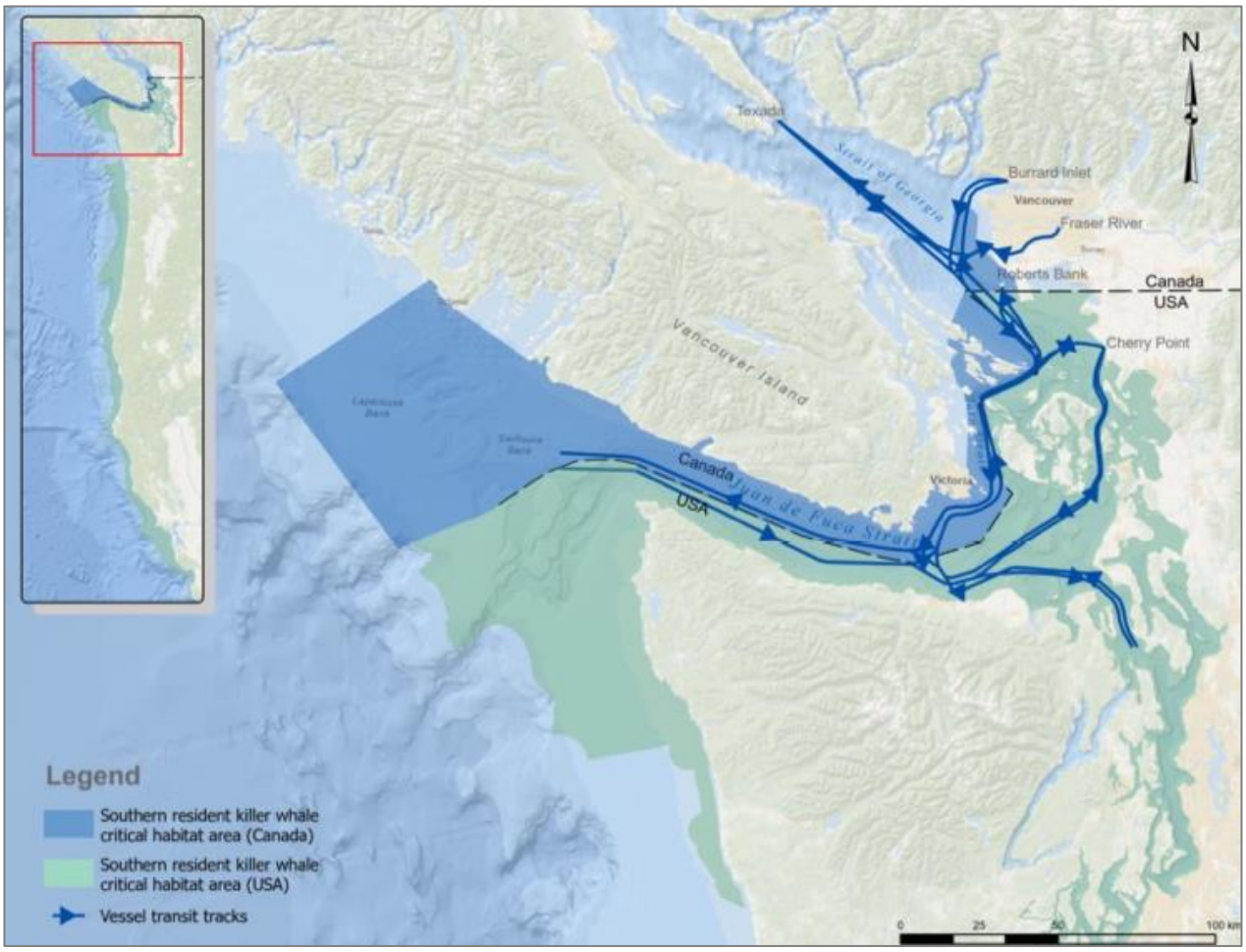
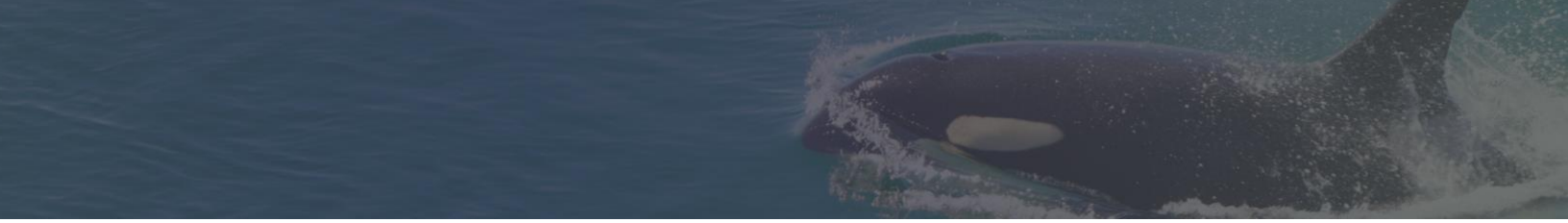


Figure 1: The ECHO Program's geographic focus area. The blue arrows represent international shipping lanes, while the green and blue shades indicate areas designated as critical habitat by the U.S. and Canadian governments. Critical habitat is defined as "the habitat that is necessary for the survival or recovery of a listed wildlife species" by the Canadian *Species at Risk Act.*



Our approach to collaboration

The ECHO Program is guided by the advice and input of advisors and partners from across government, the marine transportation industry, Indigenous communities, and environmental groups in Canada and the U.S. These advisors and partners provide invaluable guidance to the ECHO Program management team in determining which activities to advance to best meet the program's long-term goal of quantifiably reducing threats to whales from commercial shipping. Meetings of the advisory working group and most technical committee meetings are independently facilitated by the Fraser Basin Council.

Below is an overview of ECHO Program working groups, technical committees, funding partners, and in-kind contributors who supported the success of the ECHO Program in 2022. A full list of partners and advisors can be found on our website at portvancouver.com/echo/partners-advisors.

Working groups and committees

Advisory working group

The ECHO Program advisory working group is made up of over 30 Canadian and U.S. representatives from a broad range of backgrounds and areas of expertise who share a common goal of reducing threats to at-risk whales. The role of the advisory working group is to provide the ECHO Program management team with timely input, advice and recommendations on the development and execution of the program's projects and initiatives. In 2022, the ECHO Program welcomed a new member, the Makah Tribe, to the advisory working group. In total, the advisory working group met seven times last year.

Vessel operators committee

The vessel operators committee provides the ECHO Program management team with input and guidance on key considerations relevant to the marine transportation industry, including navigational safety, economic impacts, and other factors that may affect the marine transportation industry's participation in underwater noise reduction initiatives. The vessel operators committee met six times in 2022.

Acoustic technical committee

The acoustic technical committee provides technical and scientific advice on the development and execution of the ECHO Program's research projects, on an as-needed basis. The committee is composed of marine mammal biologists, acousticians, naval architects and engineers, and others with technical expertise in underwater noise.

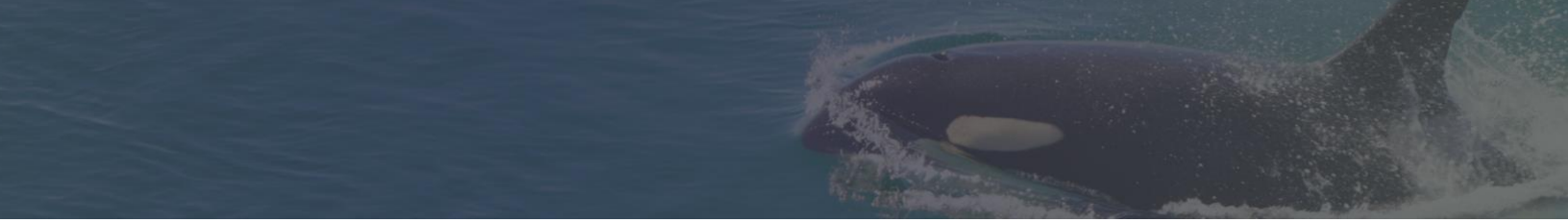
Conservation agreement management committee

The conservation agreement management committee consists of the nine signatory parties of the *Conservation Agreement to Support the Recovery of the Southern Resident Killer Whale,* a first-of-its-kind agreement with the Government of Canada that formalizes the role of the ECHO Program and various partners to support the recovery of the southern resident killer whales.

The purpose of the conservation agreement management committee is to oversee the implementation of the conservation agreement and to provide a collaborative forum to discuss and resolve issues regarding the interpretation and implementation of the agreement, as needed.

The nine parties to the conservation agreement are (in alphabetical order):

1. Chamber of Shipping



2. Council of Marine Carriers
3. Cruise Lines International Association – North West & Canada
4. Fisheries and Oceans Canada
5. International Ship-Owners Alliance of Canada
6. Pacific Pilotage Authority
7. Shipping Federation of Canada
8. Transport Canada
9. Vancouver Fraser Port Authority

In May 2022, the conservation agreement management committee met to review and finalize the Conservation Agreement Period 3 annual report. In July 2022, the conservation agreement management committee and members of the advisory working group met to provide input into the development of the year four conservation agreement measures.

Participation in government initiatives

The ECHO Program management team works closely with government to provide input on projects of shared interest related to the recovery of at-risk whales. In 2022, the ECHO Program management team participated in various government projects and initiatives, including:

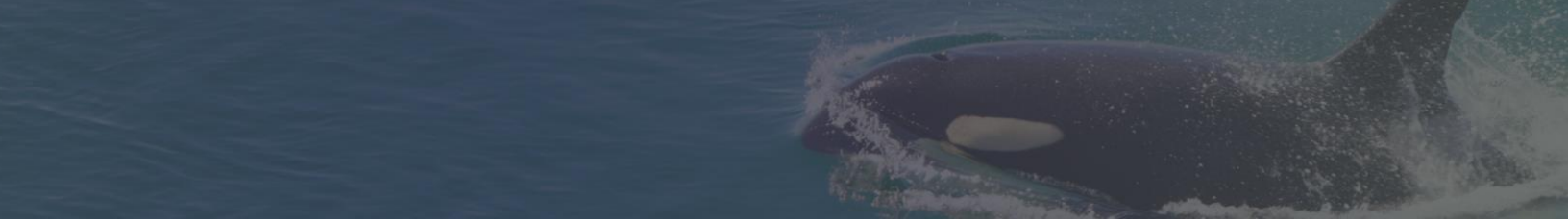
- Providing regular updates on the program's voluntary initiatives to the government-led Indigenous and multi-stakeholder advisory working group
- Participating in government engagement opportunities, including providing input on Fisheries and Oceans Canada's *Species At Risk Act* Review for Grey Whales and Fin Whales
- Collaborating with Transport Canada to provide input to the International Maritime Organization''s review of underwater noise guidelines
- Participating in Transport Canada's project on Underwater Vessel Noise Reduction Targets committees and providing advice and data to support evaluation of potential ship noise targets
- Providing Fisheries and Oceans Canada with real-time southern resident killer whale presence data to support the initiation of their seasonal measures, creating alignment with the start of the Haro Strait and Boundary Pass slowdown

Funding partners and in-kind contributors

March 2022 marked the completion of the third year of a five-year funding agreement with Transport Canada through the Marine Research and Development Innovation Centre. As part of the agreement, the ECHO Program provides Transport Canada with quarterly updates and reports on relevant projects and initiatives in progress.

Transport Canada and the Canadian Coast Guard provided an in-kind contribution to the ECHO Program of automatic information system (AIS) data and analysis, which was used to monitor and report on participation rates in the Strait of Juan de Fuca lateral displacement initiative and the Swiftsure Bank voluntary ship slowdown.

Fisheries and Oceans Canada provided in-kind contributions of hydrophone equipment and analysis of acoustic data to support evaluation of the Strait of Juan de Fuca lateral displacement and the Swiftsure Bank voluntary outbound slowdown.



Year in review

Underwater noise reduction initiatives

Overview

In 2022, the ECHO Program coordinated three large-scale underwater noise reduction initiatives in key areas of southern resident killer whale critical habitat including Haro Strait and Boundary Pass, the Strait of Juan de Fuca, and at Swiftsure Bank. In total, these initiatives spanned across nearly 80 nautical miles of southern resident killer whale critical habitat and overlapped with approximately 45% of all southern resident killer whale critical habitat that intersects with international shipping lanes.

The cumulative participation rate, based on the number of individual ship transits, was 86% across all three measures – which translates to more than 5,700 slower or more distanced ship transits within key areas of southern resident killer whale critical habitat. In total, more than 100 marine transportation organizations voluntarily participated in the ECHO Program's measures (see full list of participating marine transportation organizations).

Map of ECHO Program voluntary underwater noise reduction initiatives

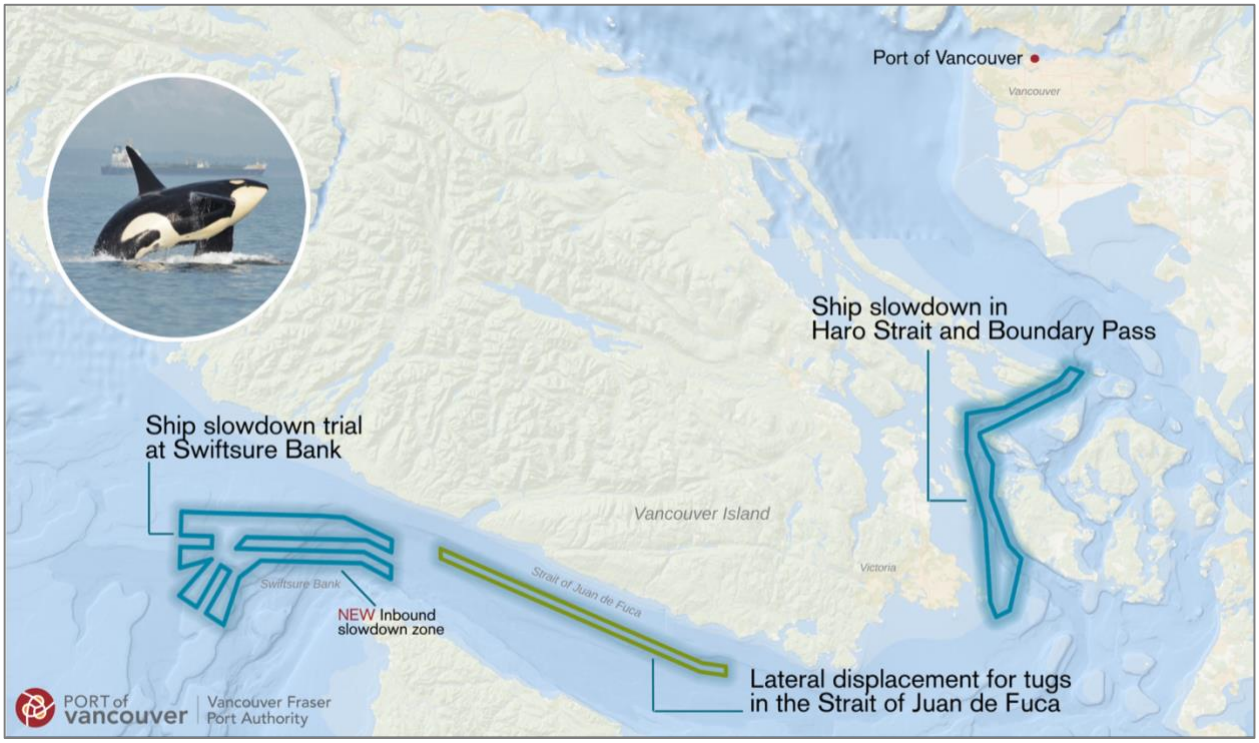
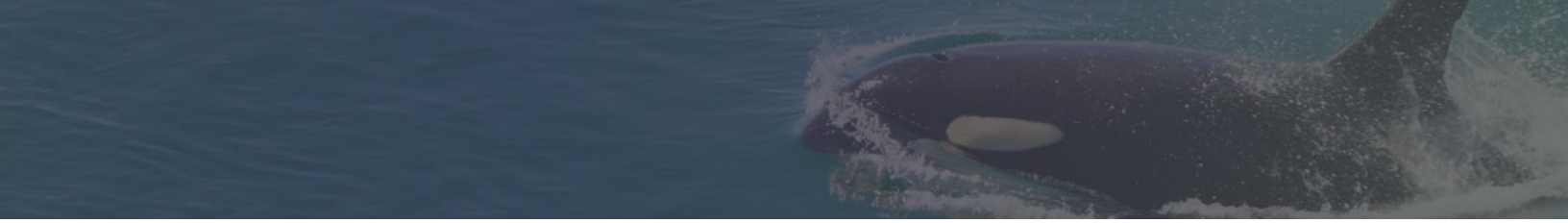


Figure 2: Map of the ECHO Program's three underwater noise reduction initiatives in key areas of southern resident killer whale critical habitat in the Salish Sea.



1. Haro Strait and Boundary Pass voluntary ship slowdown

For the sixth year in a row, the ECHO Program coordinated a voluntary ship slowdown in the Haro Strait and Boundary Pass area, a key area of southern resident killer whale critical habitat.

The Haro Strait and Boundary Pass voluntary slowdown ran from June 1 to October 31, 2022. The cumulative participation rate was 93%, or 2,098 out of 2,262 ship transits — the highest participation rate ever achieved in the slowdown's six-year history.

Preliminary data shows that underwater noise in the area was reduced by an average of 2.7 to 2.8 decibels, or approximately a 47% percent reduction in underwater sound intensity as a result of reduced ship speeds.

During the slowdown, operators of large commercial ships transiting through Haro Strait and Boundary Pass—two areas of known importance for the southern resident killer whales—were asked to voluntarily slow down to the following speeds, if and when it was safe and operationally feasible to do so:

- 14.5 knots or less through the water for vehicle carriers, passenger ships and container ships
- 11 knots or less through the water for bulkers, tankers, ferries and government ships

The Pacific Pilotage Authority gathered participation rate data by asking ship operators whether they intended to participate in the slowdown on each transit through the area. As in previous years, the primary reasons that ship operators did not participate in the slowdown were related to schedule or tidal window requirements.

Figure 3: Haro Strait and Boundary Pass voluntary ship slowdown area

Throughout the slowdown period, on-land observers and in-water hydrophones placed nearby the slowdown areas monitored for southern resident killer whales. Southern resident killer whales were observed or acoustically detected on forty days during the slowdown period. The slowdown's start and end dates were determined using this data, as well as historical data on the presence of southern resident killer whale in the area, which is typically highest between June and September.

2. Strait of Juan de Fuca voluntary inshore lateral displacement

For the fifth year in a row, the ECHO Program coordinated a lateral displacement in the Strait of Juan de Fuca, encouraging tug operators to move away, or laterally displace, from the known area of importance to southern resident killer whales off the coast of Vancouver Island.

The Strait of Juan de Fuca lateral displacement initiative ran from June 1 to October 31, 2022. The cumulative participation rate was 97%, or 100 out of 103 ship transits — the highest participation rate ever achieved in the lateral displacement's five-year history.

During the lateral displacement period, tug operators were encouraged to navigate either through the outbound shipping lane or the inshore lateral displacement zone while maintaining a buffer distance of 1,000 metres from the traffic separation scheme, when it was safe and operationally feasible to do so.

Pacheedaht First Nation monitored and recorded whale presence in the Strait of Juan de Fuca and at Swiftsure Bank through boat surveys within their territorial waters. Between June and October, the Pacheedaht First Nation's boat crew recorded a total of 766 cetacean sightings, including 24 sightings of killer whales during the slowdown period.

Data indicates that a noise reduction of approximately 4 dB to 7 dB can be achieved for each individual tug displacement, which is a 60-80% reduction in sound intensity.

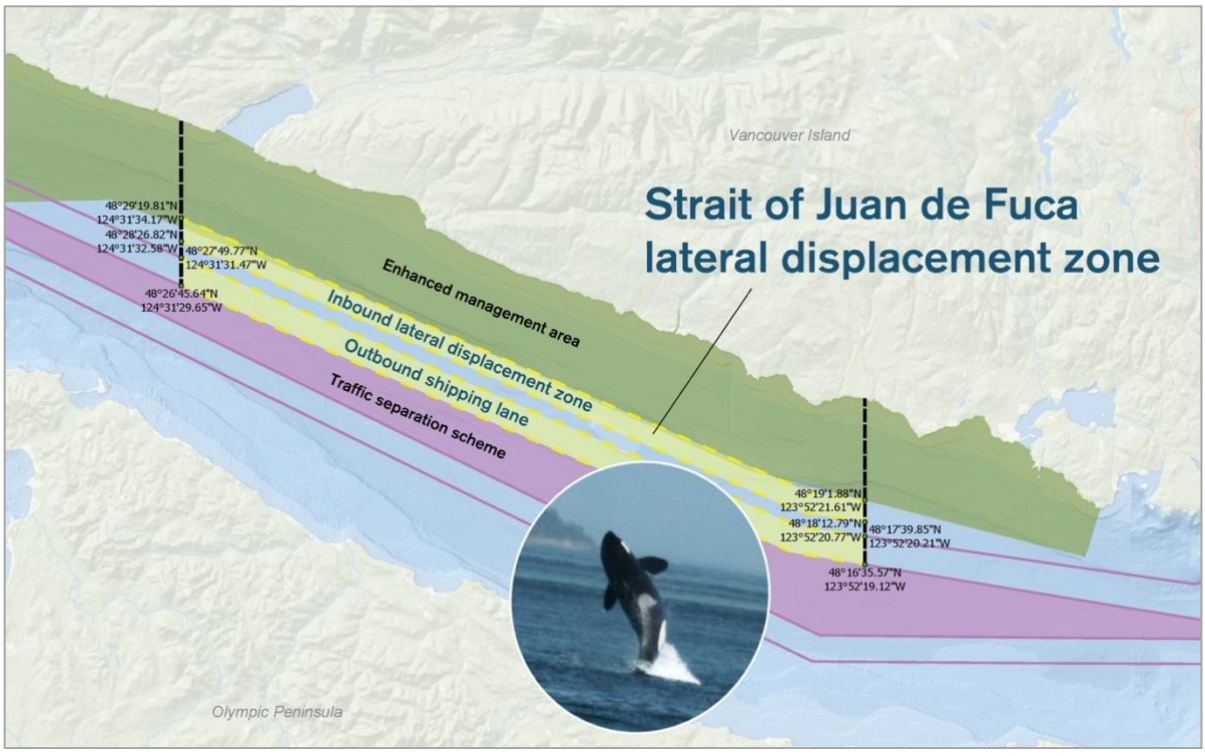
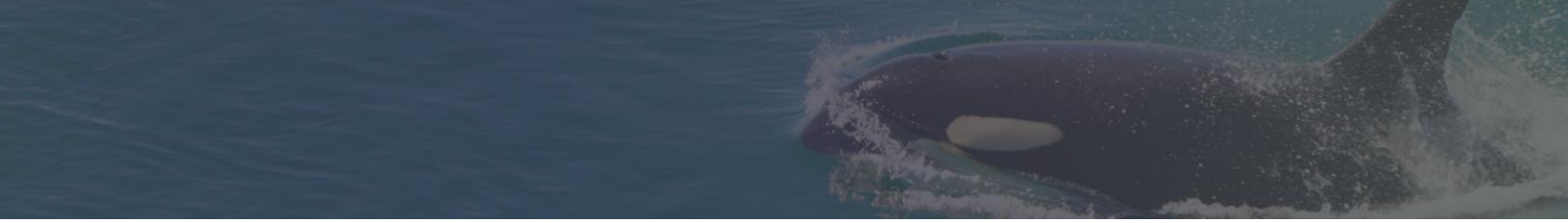


Figure 4: Strait of Juan de Fuca voluntary inshore lateral displacement area



3. Swiftsure Bank voluntary ship slowdown trial

In 2022, the ECHO Program expanded its voluntary ship slowdown at Swiftsure Bank to include the inbound shipping lane, a key foraging area for southern resident killer whales that overlaps with the primary entry point used by commercial ships en route to the Port of Vancouver from the open ocean.

The voluntary ship slowdown at Swifture Bank ran on a trial basis from June 1 to October 31, 2022. The cumulative participation rate by the marine transportation industry was 82%, which translates to 3,565 slower ship transits through this important area for southern resident killer whales.

Preliminary modelling indicates that underwater noise was reduced on average by 2.2 decibels in the inbound lane and 3.1 decibels in the outbound lane, which is approximately a 40 to 50 percent reduction in underwater sound intensity as a result of the slowdown.

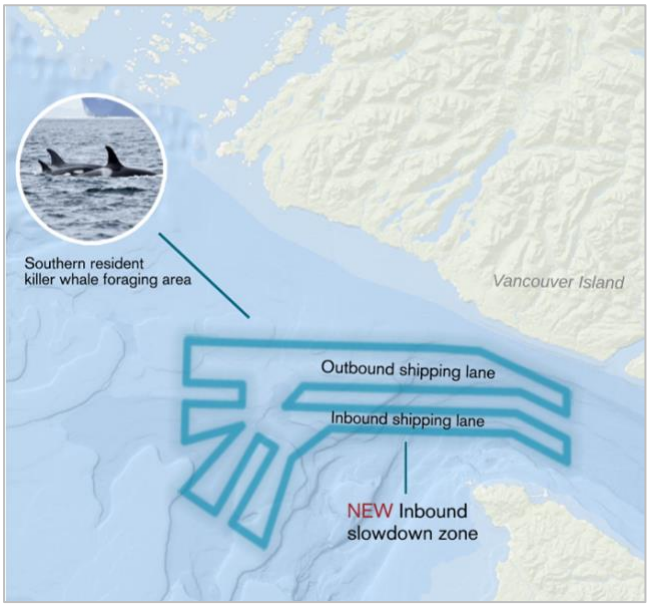


Figure 5: Swiftsure Bank voluntary ship slowdown trial area

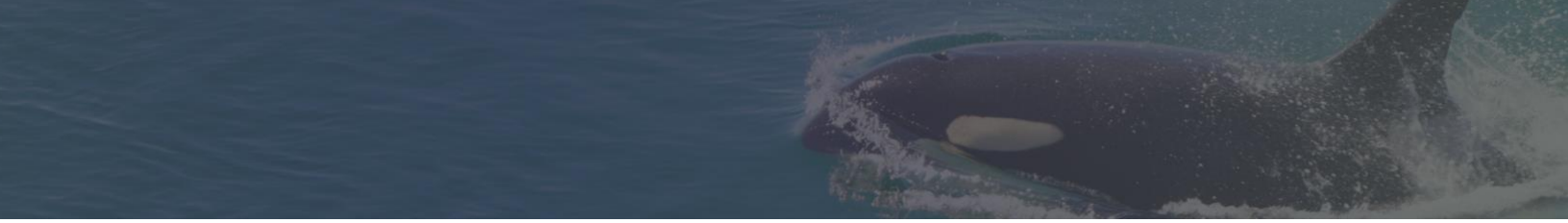
During the slowdown, operators of large commercial ships were asked to voluntarily slow down to the following speeds, when and if it was safe and operationally feasible to do so:

- 14.5 knots or less through the water for vehicle carriers, passenger ships and container ships
- 11 knots or less through the water for bulkers, tankers and government ships

Participation rates were determined using automatic identification system data on individual ship transits, as well as information about ship operators' intention to participate provided by the Canadian and U.S. Coast Guards and BC Coast and Puget Sound Pilots.

The expansion of the Swiftsure Bank slowdown was coordinated in close collaboration with the Makah Tribe and the Pacheedaht First Nation, who were key advisors in the development and implementation of safe ship slowdown practices in this area. The Swiftsure Bank slowdown trial area falls within the treaty-protected Usual and Accustomed Fishing Area of the Makah Tribe and the maritime territory of the Pacheedaht First Nation, an area of significant cultural and spiritual value where harvested resources of Indigenous nations are located.

Concurrent with this slowdown trial, the ECHO Program also collaborated with two major container ship lines to conduct a small research project focused on evaluating whether container ships could safely slow down to the 11-knot target, which is three-and-a-half knots slower than the regular target speed for this ship type. Results of this research project indicated that 72% of container ship transits within this subset were made within the 11-knot target speed.



Year in review

Research and education initiatives

4. Quiet vessel notation alignment

The ECHO Program management team continued to lead efforts to align the quiet vessel notations of international ship classification societies, in partnership with Transport Canada and JASCO Applied Sciences. Quiet ship notations are a type of designation given to ships that have proven that their underwater noise emissions are below a certain level established as “quiet” by a ship classification society. At present, the varying methodologies used to measure and analyze underwater noise make it challenging for ship owners and operators to compare the different notations and determine which quiet notation may be appropriate for their organization.

To create more alignment between the different notations, the ECHO Program management team has worked with project participants and acoustic experts to develop a consistent methodology to measure and analyze underwater noise, regardless of where it is measured in the world. The long-term goal of these efforts is to increase the number of commercial ship owners that seek and qualify for a quiet notation, while ensuring consistency between the notations.

In 2022, the ECHO Program convened technical experts and representatives from seven international ship classification societies for the third and final project workshop. Participants arrived at a final set of recommendations for the alignment of quiet ship notations, which will be published as the *Recommended Procedures for Measuring Underwater Radiated Noise Emissions of Ships for Quiet Ship Certification*, in 2023. These recommendations will provide best practices for accurately measuring and analyzing underwater noise emissions from ships in multiple water depths and will be targeted towards international ship classification societies, researchers, and policymakers.

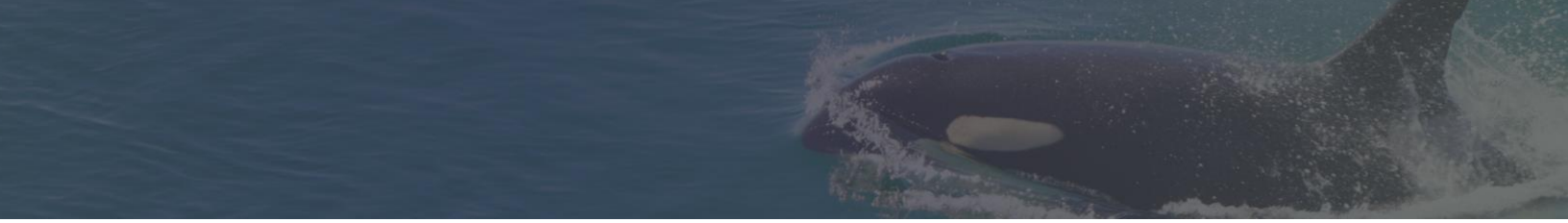
5. Vessel noise correlations study

In 2022, the ECHO Program published its third and final report on the correlations between ship design characteristics and underwater noise levels. The purpose of this multi-year study was to better understand the extent to which physical qualities, such a ship’s length, draft, or propeller type, impact a ship’s underwater noise levels, as well as assess whether a statistical model could be developed to accurately predict ships’ underwater noise levels based on data about their physical characteristics.

In July 2022, the ECHO Program and partners’ research on this subject was featured in a peer-reviewed article in the Journal of the Acoustical Society of America. The article presents a model that can be used to predict ships’ underwater noise levels, enabling ship operators and researchers to better predict ships’ underwater noise levels without the need for hydrophone measurements. The model was developed using the ECHO Program’s database of nearly 10,000 underwater noise measurements of ships —– the largest known non-military database of underwater ship noise.

The ECHO Program team thanks the project partners, JASCO Applied Sciences, and ERM Consultants Canada, as well as ECHO Program acoustical technical committee members for their contributions to this research, and to Transport Canada, for funding for this important research effort.

To read the article, and test the model, visit the Journal of the Acoustical Society of America’s website.



6. Underwater noise monitoring

Since 2015, the ECHO Program has worked with regional partners to monitor and analyze underwater noise levels at various locations across the Salish Sea. Through its underwater noise monitoring efforts, the ECHO Program has collected one of the world's largest ship noise databases, with more than 20,000 recordings of ship transits. This dataset helps the ECHO Program and researchers across the globe better understand the factors contributing to ship noise and how they can be reduced. In 2022, the ECHO Program published underwater noise monitoring reports for Boundary Pass and Burrard Inlet.

6.1. Boundary Pass underwater listening station

In July 2022, the ECHO Program published its third annual report on the underwater noise monitoring project at Boundary Pass. This project analyzes acoustic data acquired by Transport Canada's underwater listening station in Boundary Pass to understand trends in underwater noise levels, marine mammal presence and ship-generated noise. The third annual report on underwater noise in Boundary Pass recorded more than 24,000 marine mammal and fish vocalizations, as well as audio measurements of more than 1,770 unique vessels. Other noteworthy findings from the report included:

- Killer whales were detected on 57 days of the year, with detections peaking in September
- Humpback whales were detected on 34 days, with detections peaking in November

6.2. Burrard Inlet underwater noise monitoring

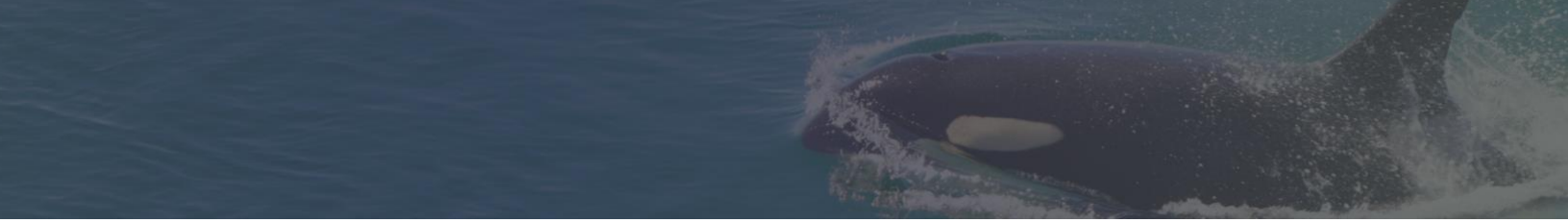
In April 2022, the ECHO Program published its third annual report on the underwater noise monitoring project at Burrard Inlet. In partnership with Tsleil-Waututh Nation, this project assesses longer-term trends in total underwater noise and marine mammal presence in Burrard Inlet while also measuring sources of noise from port activities. Underwater noise monitoring is conducted using hydrophones on the western and eastern side of Burrard Inlet, as well as in Indian Arm and English Bay. Noteworthy findings from the third annual report on underwater noise in Burrard Inlet included:

- Killer whales were detected on 12 days, between the months of December and March
- For the first time, northern resident killer whales were detected in the inlet on five days
- Harbour porpoises were detected in the inlet on 144 days, a 30% increase from the previous year

7. Cavitation inception speed study

In 2022, the ECHO Program completed its cavitation inception speed study, which evaluated whether cavitation could be identified within a vessel's acoustic signature, and from this, determine the speed at which cavitation is produced by ships. Cavitation occurs when ship propellers rotate quickly through low-pressure areas of water, forming gas-filled bubbles that emit noise when they collapse. It is estimated that cavitation causes the majority of ships' underwater radiated noise.

While the study's results provided valuable insight into the potential range of cavitation inception speeds, the study's findings indicated that there is too high a level of variability to accurately assess a ship's cavitation speed without numerous underwater noise measurements. As such, the ECHO Program does not plan to continue the evaluation of cavitation inception speed further at this time.



Increasing global understanding of underwater noise

Educational activities

In 2022, the ECHO Program team continued to advance awareness of underwater noise through educational activities, including webinars, workshops, and educational tools. Notably, the ECHO Program partnered with BC Ferries and Ocean Wise to revamp the Whales in our Waters tutorial, a free, online course that educates mariners on how to safely navigate ships in the presence of whales. The new tutorial platform was launched in February 2022 and promoted through media placements, and the port authority and its partners' internal and external channels. To date, the tutorial has been taken by more than 4,300 people, including BC Ferries and Washington State Ferries employees.

Presentations and training sessions

Presentations and training sessions are a key component of the ECHO Program's efforts to increase understanding of the impact of underwater noise on whales and assist the development of similar regional initiatives. In 2022, the ECHO Program team delivered over 25 presentations and training sessions to a variety of audiences across regional and international marine industry groups, port authorities, government agencies, environmental organizations, academic institutions, and more. Of note, the ECHO Program hosted a special presentation about the benefits of its approach to marine mammal threat reduction at the International Association of Ports & Harbours' 2022 World Conference, an annual meeting of hundreds of port stakeholders from across the world.

Noteworthy presentations were also provided at:

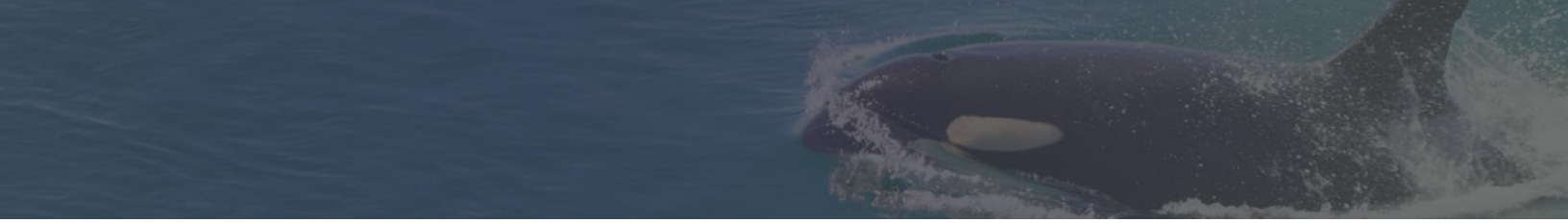
- Salish Sea Ecosystem Conference
- International Conference on the Effects of Noise on Aquatic Life
- International Maritime Organization

In addition, the ECHO Program provided training sessions to the Canadian Coast Guard's Marine Mammal Desk staff, which covered marine mammal biology, underwater noise and the ECHO Program's research and noise reduction initiatives.

International collaboration

In 2022, the ECHO Program continued to collaborate internationally to build greater understanding of underwater noise and support the development of underwater noise reduction solutions. Notably, in 2022, the ECHO Program represented the International Association of Ports and Harbors at the International Maritime Organization (IMO)'s sub-committee on ship design and construction. As part of this work, the ECHO Program and partners from Transport Canada worked alongside IMO member states and non-government organizations to review and revise the IMO's *Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life.* The new guidelines will provide best practices for the reduction of underwater noise by ship manufacturers, owners, and operators across the world.

In 2022, the ECHO Program also supported several underwater noise mapping efforts focused on better understanding global ship-generated noise, such as the SATURN Project led out of Europe. The ECHO Program provided anonymized data from its database of ship underwater noise measurements, which is the largest non-military database of its kind. This data is being used by acoustic scientists across the globe to create a "map" of underwater noise levels. Learn more about these efforts in the academic journal article: *A Reference Spectrum Model for Estimating Source Levels of Marine Shipping Based on Automated Identification System Data*.



Incentivizing quieter ships to call the Port of Vancouver

Since 2017, the port authority has provided incentives for quieter ships to call the Port of Vancouver through the EcoAction Program for ships. These incentives are offered to ships that either have a quiet ship notation, or that use a noise-quieting technology, such as certain types of propellers that reduce cavitation and improve wake flow. The incentives were introduced based on the ECHO Program's study of ship-quieting options, which identified 30 potential noise-quieting measures that could be incorporated into the EcoAction Program.

Incentives for quiet ships

In 2022, the following incentives were offered to encourage quieter ships to call the Port of Vancouver:

- Up to a 47% discount on harbour dues for ships that have a quiet ship notation from an international shipping classification society
- Up to a 35% discount on harbour dues for ships that use technologies that reduce cavitation and improve wake flow, resulting in quieter ship operation

Participation in the EcoAction Program

In 2022, 63 ship calls qualified for an EcoAction Program discount for using underwater noise reducing technologies or having a 'quiet' ship notation — nearly double that of the year before.

Figure 7: Number of ships that qualified for an EcoAction Program discount

	2017	2018	2019	2020	2021	2022
Total # of eligible calls	2,575	2,572	2,528	2,451	2,375	2,420
Total # of calls that qualified for an EcoAction discount	762	866	986	772	650	744
Total # of calls that received an EcoAction discount for reduced underwater noise	33	37	39	32	37	63

In 2023, the EcoAction Program will introduce a new 'Platinum' level discount offering 75% off harbour dues for ships that take measures to reduce their air emissions or underwater noise, such as by receiving a 'quiet ship' notation, plugging into shore power, or using low-emission fuels and technologies.

Photo: Lauren Laturnus

Looking ahead to 2023

In 2023, in close collaboration with the ECHO Program's many partners and advisors, the ECHO Program team will continue to lead underwater noise reduction measures in key areas of southern resident killer whale critical habitat while advancing globally-reaching research and education efforts. Highlights of the ECHO Program's 2023 priorities are summarized below:

Publish recommendations for the alignment of quiet ship notations

In 2023, the ECHO Program will conclude its multi-year effort to align the quiet ship notations of international ship classification societies. These recommendations will provide best practices for accurately measuring underwater noise from ships for international ship classification societies, researchers, and policymakers.

Explore development of a regional noise target for the Salish Sea

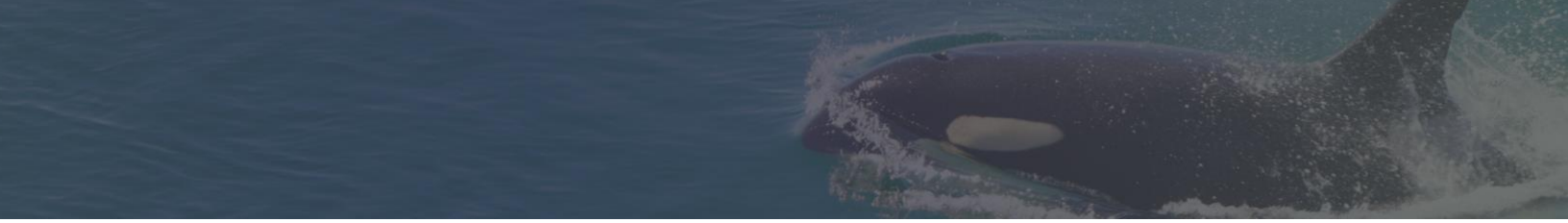
In 2023, the ECHO Program team will convene workshops with Fisheries and Oceans Canada, Transport Canada, advisory working group members, and subject matter experts to explore the development of regional ambient noise targets and other possible approaches to assessing and managing underwater noise from current and future ship traffic, in support of at-risk whales.

Quantify co-benefits of slowing down

In 2023, to better understand the full benefits of the ECHO Program's voluntary slowdowns, the program team will finalize a co-benefits study that quantifies the benefits of slowing vessels down on factors such as whale strike risk and greenhouse gas emissions.

Continue to advance work with the International Maritime Organization

In 2023, the ECHO Program will continue to provide input to the IMO's new underwater noise reduction guidelines, as a representative for the International Association of Ports and Harbors. These new guidelines will provide best practices for the reduction of underwater noise by ship manufacturers, owners, and operators around the world.



Thank you

The ECHO Program team thanks its many partners, advisors, and participants for the valuable contributions they have made towards creating quieter oceans for healthier whales in our region. A full list of our advisors, partners, and participants in 2022 is included below.

Advisory working group

BC Coast Pilots

BC Ferries

Canadian Coast Guard

Chamber of Shipping

Council of Marine Carriers

Cruise Lines International Association – North West & Canada

Fisheries and Oceans Canada

Indigenous advisors

National Oceanic and Atmospheric Administration

Natural Resources Defense Council

Makah Tribe

Ocean Wise

Pacific Pilotage Authority

Royal Canadian Navy

Shipping Federation of Canada

Transport Canada

Vancouver Fraser Port Authority

Washington State Ferries

WWF-Canada

Vessel operators committee

BC Coast Pilots

BC Ferries

Canadian Coast Guard

Chamber of Shipping

Council of Marine Carriers

Cruise Lines International Association – North West & Canada

Hapag-Lloyd (Canada) Inc.

Holland America Group
Marine Exchange of Puget Sound

Pacific Merchant Shipping Association

Pacific Northwest Ship & Cargo Services

Pacific Pilotage Authority

Royal Canadian Navy

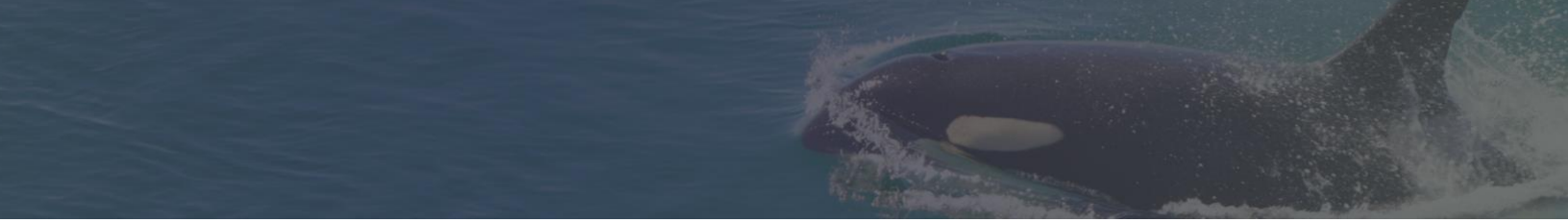
Shipping Federation of Canada

Transport Canada

U.S. Coast Guard

Vancouver Fraser Port Authority

Washington State Ferries



Acoustic technical committee

BC Ferries

Fisheries and Oceans Canada

DHI Group Inc.

DW Ship Consult

JASCO Applied Sciences

National Oceanic and Atmospheric Administration

NOAA Olympic Coast National Marine Sanctuary

Oceans Networks Canada

Ocean Wise

Royal Canadian Navy

Robert Allan Naval Architects

Saturna Cetacean Sighting Network

Sea Mammal Research Unit (SMRU) Consulting Canada

Transport Canada

University of British Columbia

University of St. Andrews

University of Victoria

Washington State Department of Transportation

Other program or project collaborators

Achieve Quieter Oceans (AQUO)

American Waterways Operators

Green Marine

Nanaimo Port Authority

Port of Seattle

Port of Tacoma

Prince Rupert Port Authority

JASCO Applied Sciences

Oceans Networks Canada

Makah Tribe

Pacheedaht First Nation

Puget Sound Pilots

Saturna Island Marine Research and Education Society

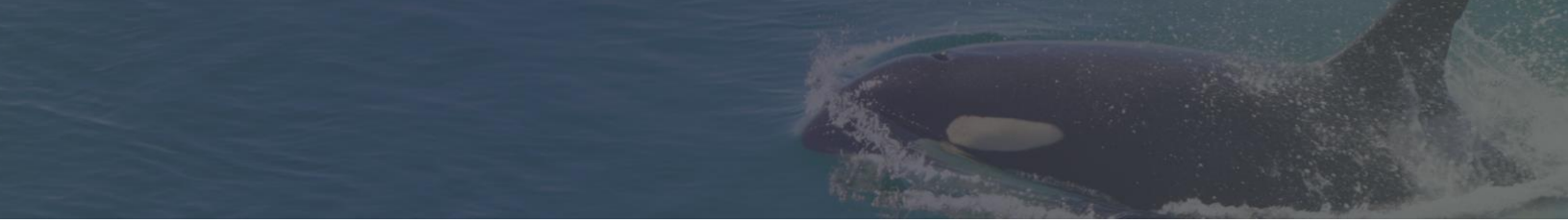
Scripps Institute of Oceanography

Sea Mammal Research Unit (SMRU) Consulting Canada

Tsleil-Waututh Nation

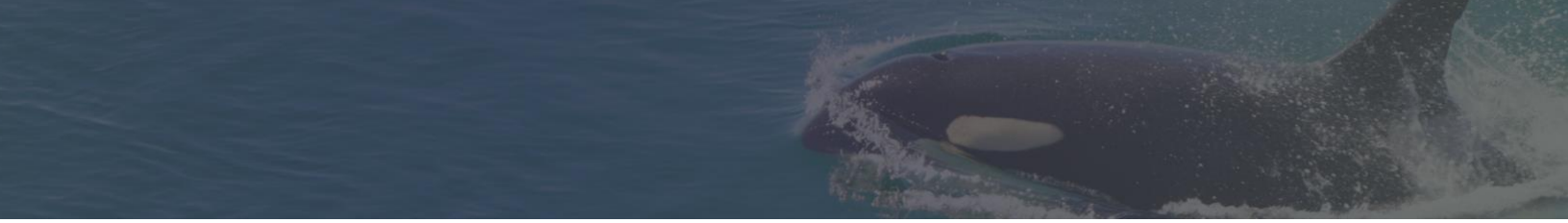
University of Victoria NEMES Project (Noise Exposure to the Marine Environment from Ships)

The Whale Museum



Participating marine transportation organizations in 2022

AAL Shipping
ACGI Shipping Inc.
Alaska Tanker Company, LLC
Amix Group
Armateurs du Saint-Laurent
Blue Water Shipping
Canpotex Shipping Services Ltd.
Carnival Cruise Line
Celebrity Cruises
Champion Tankers AS
CMA CGM Canada Inc.
Coast Island Marine
Colley West Shipping Ltd.
Compagnie du Ponant (Ponant)
ConocoPhillips Company / Polar Tankers, Inc.
COSCO Shipping Lines (Canada) Inc.
Crowley Marine Services Inc.
CSL Americas
Cunard Line
Disney Cruise Line
Evergreen Shipping Agency (America) Corp.
Fairmont Shipping (Canada) Ltd.
Fednav
FK Warren Limited / Mclean Kennedy Inc
Fleet Seaspan Ship Management Ltd.
G2 Ocean AS
General Steamship Corp., Ltd.
GFY Marine Group Inc.
Hamburg Süd
Hapag-Lloyd
HMM
Holland America Line
Neptune Bulk Terminas
Norton Lilly International Inc.
Norwegian Cruise Line
NYK Group Americas Inc.
Oak Maritime (Canada) Inc.
Ocean BC Towing Inc
Ocean Network Express (Canada) Inc.
Oceania Cruises
Oldendorff Carriers
OOCL (CANADA) INC
Pacific Basin Shipping Limited
Pacific Industrial & Marine Ltd.
Pacific Northwest Ship & Cargo Services Inc
Pinnacle Renewable Energy
Ponant Yacht Cruises & Expeditions
Princess Cruises
Regent Seven Seas Cruises
Robert Reford Shipping Agency
Royal Caribbean International
SAAM Towage
Saga Welco AS. Inc.
Scenic Luxury Cruises & Tours
Seabourn Cruise Line
Seaspan ULC
Seaward Engineering and Research Ltd.
Silversea Cruises
Sino Star Management Ltd.
SM Line Corp
SMS International Shore Operations US Inc
Southport Agencies Inc.
Sultran Limited
Swire Bulk



Hudson Shipping Lines, Inc.
Hurtigruten
Hyundai America Shipping Agency, Inc. (PNW)
Inchcape Shipping Services
Intercruises Shoreside & Port Services
Island Tug and Barge Ltd
"K" Line America Inc.
Kirby Corporation
Kirby Offshore Marine, LLC
LBH Shipping Canada Inc.
Ledcor Resources & Transportation
Maersk Line
Mason Agency Ltd.
Matson, Inc.
Mediterranean Shipping Company
MOL (Americas) LLC
MOL Chemical Tankers America Inc.
Montship Inc.
MV Seabourn Sojourn
Navitrans Shipping Agencies West Inc.
Swire Shipping Pte. Ltd.
Talon Marine Services
Teekay Shipping
Tormar Inc.
TOTE Maritime
Trans Mountain
Transmarine Navigation Corp
Trans-Oceanic Shipping
Valles Steamship Company, Limited
Vancouver Island Agencies (VI Marine)
Varamar
Waterfront Shipping Ltd.
Western Towboat Co.
Westward Shipping Ltd.
Westwood Shipping Lines
Wheelhouse Shipping Agency Ltd.
Wilhelmsen Ships Service
Windstar Cruises
World Logistics Service (U.S.A.) Inc.
Yang Ming Marine Transport Corp
Zim Integrated Shipping Services Ltd.