



Enhancing Cetacean Habitat and Observation (ECHO) Program
2017 Annual Report

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ECHO Program

British Columbia, Canada is a dynamic and growing international trade gateway. It also has a productive coastal ecosystem that sustains populations of whales, porpoises and dolphins (cetaceans). Fisheries and Oceans Canada has published *Species at Risk Act* recovery strategies and action plans for a number of endangered and threatened whale species in the region, including the endangered southern resident killer whales, which have only 76 individuals remaining in their population. Some of the key threats to at-risk whales in this region include: availability of prey, physical disturbance (e.g. vessel collisions), environmental contaminants, and acoustic disturbance (e.g. underwater noise from vessels).



Endangered southern resident killer whales in the Salish Sea, BC.
Photo: Ocean Wise / NOAA

Much of the commercial vessel activity within the southern coast of British Columbia transits critical habitat for the southern resident killer whales, as well as areas known to be of importance to other at-risk whales. The Vancouver Fraser Port Authority is committed to conducting operations in a responsible and sustainable manner. Our mission is to enable Canada's trade objectives, ensuring safety, environmental protection and consideration for local communities. We have a vision to be the world's most sustainable port and we define sustainability as delivering economic prosperity through trade, maintaining a healthy environment and enabling thriving communities. For these reasons, the Enhancing Cetacean Habitat and Observation (ECHO) Program was developed in 2014.

The ECHO Program is a Vancouver Fraser Port Authority-led collaborative initiative aimed at better understanding and managing the cumulative impacts of shipping activities on at-risk whales throughout the southern coast of British Columbia. Although the geographic scope of the Vancouver Fraser Port Authority's jurisdiction is limited, it is recognized that to adequately address the cumulative threats posed by commercial vessel activities, a larger, regional-scale collaborative approach is required. To this end, the ECHO Program is advancing projects within the Salish Sea, as well as the waters off the western coast of Vancouver Island and the entrance to the Strait of Juan de Fuca.

The ECHO Program has benefited from early input and advice from scientists, maritime industries, conservation and environmental groups, First Nations individuals and government agencies, to help focus program efforts and set goals and objectives. The long-term goal of the program is to quantifiably reduce threats from commercial vessel-related activities to at-risk whales and the work undertaken by the program in 2017 has demonstrated considerable progress.

Program structure

The ECHO Program aims to engage and involve key regional interested parties to maximize program success and help ensure that mitigation and management measures developed through the program are informed by cultural, economic and environmental sustainability interests.

The program, led by the port authority, is guided by the advice and input of an advisory working group, a federal government advisory committee and associated technical

committees. The guidance provided by these volunteer advisors greatly assists the program management team in deciding which scientific studies, educational initiatives and other projects should be advanced to best meet program objectives.

Advisory groups and technical committees are independently facilitated by the Fraser Basin Council.

Advisory working group

The ECHO Program advisory working group brings together a broad spectrum of relevant backgrounds, perspectives and interests from both Canada and the United States, who share the common goal of reducing threats to at-risk whales. The role of the advisory working group is to provide the program management team with timely input, advice and recommendations during the development and execution of the program's projects and initiatives.

Members include representatives from the following organizations:

- BC Coast Pilots
- BC Ferries
- Canadian Coast Guard
- Chamber of Shipping
- Cruise Lines International Association - North West & Canada
- Fisheries and Oceans Canada
- First Nations individuals
- Hemmera
- National Oceanic and Atmospheric Administration
- Pacific Pilotage Authority
- Shipping Federation of Canada
- Transport Canada
- Vancouver Aquarium
- Vancouver Fraser Port Authority
- Washington State Ferries
- WWF-Canada

Federal government advisory committee

The Canadian federal government advisory committee offers strategic advice, recommendations and guidance to the ECHO Program management team on the overall program direction, objectives and goals.

The committee provides the opportunity for the program's management team to collaborate and communicate with those federal agencies who have direct regulatory authority or decision-making responsibility pertinent to the goals of the program. This committee includes representatives from Environment and Climate Change Canada, Fisheries and Oceans Canada, Transport Canada and Vancouver Fraser Port Authority.

Acoustic technical committee

Acoustic disturbance has been identified by Fisheries and Oceans Canada as a key threat to the recovery of the endangered southern resident killer whales. Recognizing this, and given the complex technical nature of the subject area, the ECHO Program management team has focused considerable effort on better understanding the threat of acoustic disturbance. An acoustic technical committee was first convened by the ECHO Program in 2015.

The role of the committee is to provide technical and scientific advice in the development and execution of ECHO Program research, mitigation and management projects and is composed of marine mammal biologists, acousticians, naval architects and others with specific technical knowledge around the sources and impacts of underwater noise.

The acoustic technical committee includes representatives from:

- Fisheries and Oceans Canada
- JASCO Applied Sciences
- National Oceanic and Atmospheric Administration
- Oceans Networks Canada
- Robert Allan Naval Architects
- Sea Mammal Research Unit (SMRU) Consulting Canada
- Transport Canada
- University of British Columbia
- University of St. Andrews
- Vancouver Aquarium
- Washington State Ferries

Vessel operators committee

The vessel operators committee was established in December 2016 to help provide the ECHO Program team with advice, support and guidance pertaining to potential mitigation options that may directly impact the shipping industry. The vessel slowdown trial was the key focus for this committee in 2017 (see page 7).

The vessel operators committee includes industry representatives from:

- BC Coast Pilots
- BC Ferries
- Canadian Coast Guard
- Chamber of Shipping
- Cruise Lines International Association – North West & Canada
- Hapag-Lloyd (Canada) Inc.
- Holland America Group
- Pacific Northwest Ship & Cargo Services
- Pacific Pilotage Authority
- Shipping Federation of Canada
- Transport Canada
- Vancouver Fraser Port Authority
- Washington State Ferries

Other program or project collaborators

The ECHO Program is a collaborative undertaking which recognizes and highlights the value of sharing resources and information to meet common project or program goals. Along with the guidance and advice of the advisory working group, federal government advisory committee and technical committee members listed above, some of these members are also collaborating with the program on specific projects.

The program has been fortunate to engage with additional parties to support the interests of the program and collaborate on specific aspects, such as data sharing initiatives and research projects. These additional collaborators include:

- Achieve Quieter Oceans (AQUO)
- BC Coast Pilots
- Green Marine
- Prince Rupert Port Authority
- Saturna Island Marine Research and Education Society
- Scripps Institute of Oceanography
- University of Victoria NEMES Project (Noise Exposure to the Marine Environment from Ships)
- Nanaimo Port Authority
- Port of Seattle
- Port of Tacoma
- The Whale Museum

Contributors

The Vancouver Fraser Port Authority has initiated and provided the seed funding for the ECHO Program, however, the program has benefited from contributions from other industry and government stakeholders. Contributions have been received, or committed, either by way of direct financial support or in-kind contribution of equipment, resources and staffing at either the program level or for specific projects. These funding partners include:

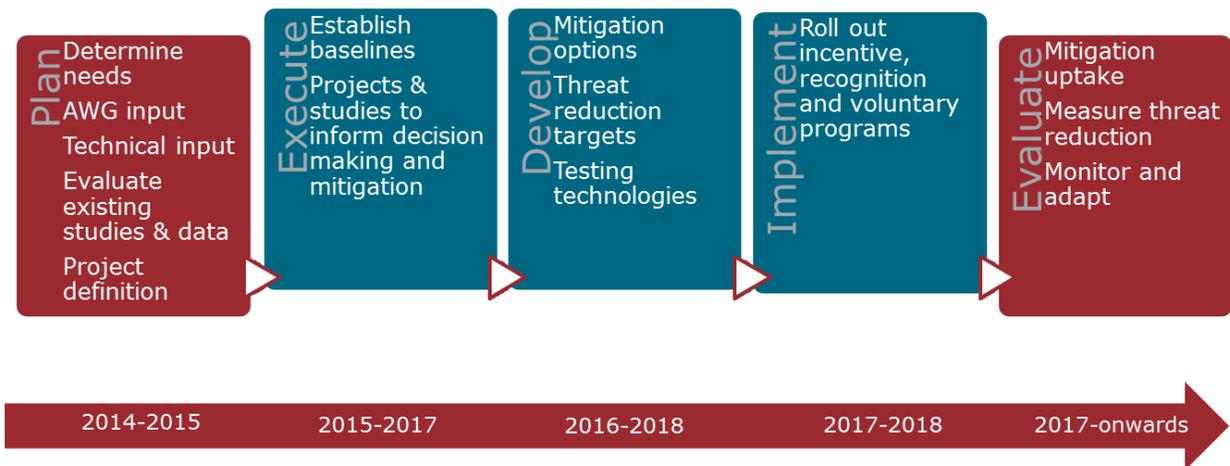
- Fraser River Pile & Dredge
- Trans Mountain
- Transport Canada
- Fisheries and Oceans Canada
- JASCO Applied Sciences
- Ocean Networks Canada

ECHO Program status

Road map

The ECHO Program launched in November 2014 with the inaugural ECHO Advisory Working Group meeting. The program either initiates or supports short-term projects, scientific studies and educational initiatives to fill knowledge gaps and inform the development of threat reduction solutions and voluntary mitigation options.

Throughout 2017, the ECHO Program spanned three key program stages of executing, developing and implementing multiple projects including a voluntary trial aimed at implementing short-term mitigation measures. The program roadmap is outlined below:



Engagement and consultation

The ECHO Program is a collaborative effort which informs and engages stakeholders not only in Canada, but internationally. In 2017, the advisory working group met three times and the vessel operators committee nine times. Relevant experts were engaged as needed throughout the year from our federal government advisory committee and acoustic technical committee.



Carrie Brown, Vancouver Fraser Port Authority's director of environmental programs, addressing the International Maritime Organization Marine Environment Protection Committee in July 2017.

Education outreach

The ECHO Program aims to deliver credible, science-based information in a timely manner and to build trust and confidence in the program through collaboration. We also believe there is a need to educate and increase awareness of the impacts of shipping on marine mammals. To achieve these goals, the program maintains regular communication with our advisors and collaborators, issues public newsletters, posts information to our [website](#) and create educational materials to help raise awareness about the program.

The program team delivered 45 presentations in 2017, reaching over 2,600 individuals, an increase of 62% from 2016. Presentations have been delivered to a variety of audiences ranging from regional and international marine industry stakeholders, environmental groups, acoustic scientists and naval architects.

Highlights of presentations given in 2017 include the International Maritime Organizations Marine Environment Protection Committee, session 71 in London, England and several North American and international aquatic noise and industry conferences, including the OceanNoise conference in Barcelona, Spain.



Snapshot of the ECHO community awareness campaign social media video. TV, radio and social media ads about the ECHO Program ran in fall 2017 and achieved over 20 million impressions.

Community Awareness Campaign

To raise awareness about the ECHO Program and recognize industry's active participation in a voluntary vessel slowdown trial which took place in summer 2017, several television, radio and social media ads were created and aired throughout the fall. Over the two month ad campaign period, more than 20 million interactions with the ad content were recorded across all port authority platforms.

Media

The ECHO Program was featured in over 50 unique media and industry articles in 2017. Highlights include:

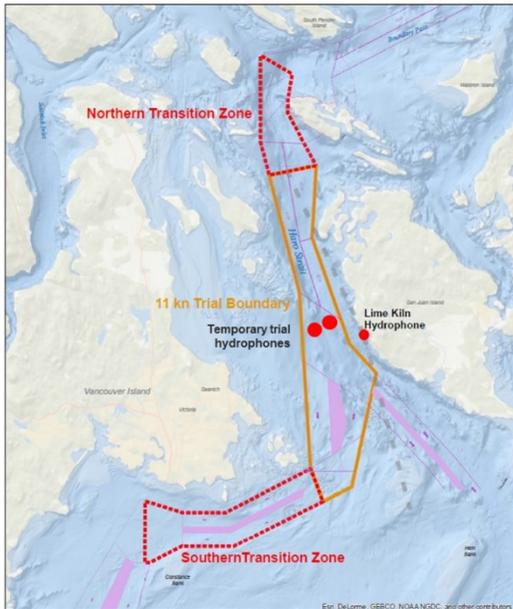
- **New EcoAction underwater noise reduction incentives**
 - [Vancouver Port Authority cuts harbour dues in half for quiet ships](#)
Business Vancouver, February 2017
 - [Time is running out for Salish Sea orcas](#)
WWF Canada, February 2017
 - [Eco-Friendly Carrier Lines Awarded by Port of Vancouver](#)
Port Technology International, April 2017
- **Launch of the *Mariner's Guide to Whales, Dolphins and Porpoises in the Northwest Pacific***
 - [Mariner's guide to B.C. whales urges ship captains to slow down](#)
Vancouver Sun, February 2017
 - [Whale ahoy! New guidelines aim to help ships avoid whale collisions](#)
Vancouver Metro, February 2017
- **ECHO Program vessel slowdown trial**
 - [Ships slowing in busy West Coast channel to protect endangered orcas](#)
Associated Press, September, 2017
 - [Ships Voluntarily Slow Down For Underwater Noise Reduction Trial](#)
NPR, August 2017
 - [Slowing down navigation to protect marine life](#)
Ship Technology International, September 2017

Projects and initiatives

Since inception, the ECHO Program has initiated or provided support to 17 projects in three vessel-related threat categories that are identified in Fisheries and Oceans Canada's Species at Risk action plans: acoustic disturbance, physical disturbance and environmental contaminants. Availability of prey is identified as another key threat category for at-risk whales. While this threat category is not a focus area for the program, this threat is being addressed by the port authority through our [Habitat Enhancement Program](#).

The ECHO Program's advisory working group helped identify underwater noise as a priority focus area based on impacts to species-at-risk, in particular the southern resident killer whales. A few of the projects advanced in 2017 are highlighted below.

Acoustic disturbance/underwater noise



Haro Strait vessel slowdown trial area, including hydrophone locations.

Voluntary vessel slowdown trial – ANALYSIS UNDERWAY

To study the relationship between slower vessel speed and vessel noise and the resultant effect on killer whales, the ECHO Program undertook a first-of-its-kind voluntary vessel slow trial between August 7 and October 6, 2017. The voluntary trial was planned and coordinated by the ECHO Program with input and assistance from the ECHO vessel operators committee. During the trial period, all piloted commercial vessels were requested to reduce their speed through the water to 11 knots for a distance of approximately 16 nautical miles through Haro Strait, an important feeding ground for southern resident killer whales.

Two temporary hydrophones were deployed on the seafloor under the inbound and outbound shipping lanes allowing for the evaluation of the relative change in vessel source levels as a result of slower speeds. Changes in ambient noise were studied using a hydrophone at Lime Kiln State Park off San Juan Island in Washington State.

Visual observations and acoustic detections were recorded at Lime Kiln before and during the trial period to estimate killer whale presence, however, the core evaluation of whether slower vessels benefit the behaviour and foraging of killer whales will be undertaken using computer models.

At the conclusion of the nine week trial, the overall reported vessel participation rate was 60% of all commercial vessels transiting Haro Strait. We are pleased with this result and want to express our sincerest gratitude to all those who supported and participated in the planning and execution of the volunteer trial. A [preliminary results report](#) was published in November 2017 indicating overall positive noise reduction results. The final study results will be available in spring 2018.

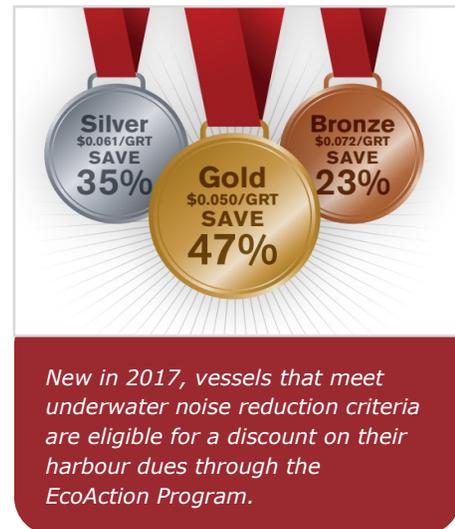


JASCO Applied Sciences team prepare the hydrophone for deployment into the shipping lane in Haro Strait during the vessel slow down trial.

Vessel noise reduction incentives criteria – COMPLETE

Hemmera Envirochem Inc. was commissioned to conduct a desk-based study to identify vessel quieting options that could be incorporated into Vancouver Fraser Port Authority's existing [EcoAction](#)¹ incentive program. Based on this study's [findings](#), the port authority added new incentive criteria to include harbour dues rate discounts for quieter ships on Jan 01, 2017. This makes Vancouver Fraser Port Authority the first port in the world to develop and implement an incentive to reduce underwater vessel noise.

Vessels with a quiet notation from ship classification societies such as Bureau Veritas, DNV-GL and RINA are eligible for a gold level (47 percent) discount in harbour dues. Vessels with cavitation and wake flow reduction technologies such as Propeller Boss Cap Fins, Schneekluth duct and Becker Mewis duct are eligible for a bronze level (23 percent) discount. Thirty-five vessels took advantage of the bronze level discount in 2017.



Underwater listening station - testing and analysis of regional vessels - ONGOING

In 2017, regional operators, including ferries and tugs, have been taking the opportunity to better understand the sound of their fleet by transiting a number of their vessels over the underwater listening station (ULS) in the Strait of Georgia. The ULS is a collaborative research project between the ECHO Program, Ocean Networks Canada, JASCO Applied Sciences, Transport Canada and Fisheries and Oceans Canada.

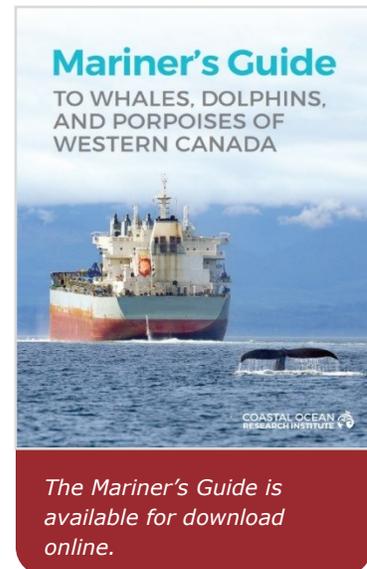
Vessels have been making repeated planned passes of the ULS to measure their underwater noise signatures and evaluate how those signatures vary for different speeds, vessel characteristics, under different operating conditions and different fuel types. Findings will help identify measures and methods that could reduce underwater noise in the region.

¹ The Vancouver Fraser Port Authority's use of the name "EcoAction" refers to a program specifically intended to promote improved environmental performance within the shipping industry and is not related to the EcoAction Community Funding Program administered by Environment Canada.

Physical disturbance/strike risk

Mariner's Guide to Whales, Dolphins, and Porpoises of Western Canada – COMPLETE

This guide was designed for mariners of large commercial vessels and aims to inform them about the common cetacean species along the coast of British Columbia. The guide also identifies threats that vessels pose to these species and how mariners can minimize them. Developed by the Coastal Ocean Research Institute, Vancouver Fraser Port Authority and the Prince Rupert Port Authority, over 1,000 copies were printed and distributed to mariners along the British Columbia coast in 2017. Feedback and interest from vessel operators was so high that another 1,000 guides were printed and will be distributed in 2018. Download the online version of the guide [here](#).



Environmental contaminants

Coastal Ocean Research Institute (CORI) PollutionTracker - ONGOING

The CORI PollutionTracker Program successfully sampled ten ECHO Program-funded locations in and around the Vancouver Fraser Port Authority's jurisdiction, and southern resident killer whale critical habitat, as part of the Vancouver Aquarium's [PollutionTracker](#) project. This project aims to establish a baseline of environmental conditions in British Columbia's coastal waters through the sampling of sediment and shellfish. These sampling media represent the health of the habitat and food web for at-risk whale species in the region. Samples of sediment and mussels will be analyzed for an extensive suite of chemicals to help determine current contaminant loadings, identify priority contaminants and sources, and provide a baseline for assessing trends into the future. The ECHO Program-funded sites are part of a coast-wide project, for which the Vancouver Aquarium will publish a report in 2018.

ECHO Program – project list

Below is a complete list of the projects completed, underway or being evaluated by the ECHO Program since 2015:

1. Regional ambient acoustic monitoring
2. Regional ocean noise contributors
3. Vessel noise reduction options
4. The underwater listening station
5. Underwater noise education initiative
6. Summary paper on underwater noise impacts to whales
7. Estimating the effects of noise from commercial vessels and whale watch boats on southern resident killer whales
8. Effect of ship noise on vocal behaviour of humpback whales in BC
9. Underwater listening station sea trials
10. Voluntary vessel slowdown trial
11. Feasibility study of underwater listening station locations in the Salish Sea
12. Large whale vessel strike risk assessment
13. Fisheries and Oceans Canada whale tagging and additional aerial transect surveys
14. Mariner's Guide to Whales of Western Canada
15. Whale sightings notification system
16. Coastal Ocean Research Institute PollutionTracker Project
17. Management of contaminants during underwater hull cleaning

Looking ahead to 2018

In its fourth year, the ECHO Program will continue to make progress on current projects and will be initiating new studies to advance research that informs potential threat reduction solutions. Highlights of the 2018 ECHO Program work plan are summarized below:

Acoustic data analysis

The ECHO Program has accumulated multiple years of valuable acoustic data from three hydrophone locations (Boundary Pass, Haro Strait, and Strait of Georgia) including the vessel slowdown trial data. In 2018, the program will dive deeper into these ambient noise and vessel source level datasets to analyze trends, key drivers of vessel noise and inform potential vessel noise reduction options. The acoustic technical committee will support the program team in determining the appropriate methodologies for analysing these datasets. The vessel operators committee will support the program team's analysis of the effectiveness of the vessel slowdown trial and provide advice on next steps, including the possibility for testing/trialing additional voluntary vessel noise reduction measures in 2018.

Acoustic data collection

The Strait of Georgia Underwater Listening Station was maintained and redeployed in November 2017 and will stay in the water until October 2018. Data will continue to be collected at this location and regional vessel operators may continue to use the underwater listening station as needed to conduct noise analysis on their fleets and inform the development of potential noise reduction solutions. In 2018 the ECHO Program also hopes to install a hydrophone in Burrard Inlet to begin mapping the soundscape of the inner harbour.



Underwater listening station being deployed in the Strait of Georgia.

Mariners education outreach

In 2018, the Vancouver Fraser Port Authority's harbour patrol will be boarding 100 vessels that call on the Port of Vancouver most often and will be providing captains with a *Mariner's Guide to Whales, Dolphins and Porpoises of Western Canada* and other marine mammal education materials. Mariners will also be encouraged to transit the underwater listening station and report whale sightings using the [WhaleReport App](#) developed by Ocean Wise. In 2018, the ECHO Program also hopes to explore the possibility of making Ocean Wise's whale sightings data available to select regional commercial mariners in relative real time.

EcoAction program review & updates

In 2018, the ECHO Program will evaluate the success of the inclusion of vessel noise reduction criteria into the [EcoAction](#) incentive program in 2017 and will compare the relative noise outputs of EcoAction-rewarded vessels to other vessels of their class. The ECHO Program team will also evaluate potential additional noise reduction technologies/options for future inclusion in the incentive program.

Conclusion

In 2017, the population of southern resident killer whales dropped to 76 individuals, from 83 in 2016. The loss of each whale reminds us of the urgency and importance of a regional collaborative approach to better understand and address the threats affecting this iconic species and other at-risk whales in the Salish Sea.

The research is telling us that solutions exist to help minimize the impact of shipping on marine life. The ECHO Program strives for a science-based approach to environmentally responsible and sustainable shipping while safeguarding and promoting the protection of local wildlife. We are especially appreciative of the support, engagement and efforts of our advisors, collaborators and research participants who continue to make this goal a priority.



Southern resident killer whale population dropped to 76 individuals in 2017.

Thank you to our collaborators

Funding contributors

Fisheries and Oceans Canada
Fraser River Pile and Dredge
Trans Mountain
Transport Canada
Vancouver Fraser Port Authority

Significant in-kind contributors

Fisheries and Oceans Canada
JASCO Applied Sciences
Oceans Networks Canada
Vancouver Aquarium

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
Department of National Defence
Fisheries and Oceans Canada
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Federal government advisory committee

Environment Canada
Fisheries and Oceans Canada
Transport Canada
Vancouver Fraser Port Authority

Project collaborators

All-Sea Enterprises
BC Coast Pilots
BC Ferries
Chamber of Shipping
National Oceanic and Atmospheric
Administration
Prince Rupert Port Authority
Seaspan

Other engagement

Achieve Quieter Oceans (AQUO)
Green Marine
Marine Environmental Observation Prediction
and Response Network (MEOPAR)
Nanaimo Port Authority
Ports of Seattle and Tacoma
Scripps Institution of Oceanography

Independent facilitation

Fraser Basin Council



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