

# Transport Canada Marine Research, Development, & Demonstration FY 2019-20 – Request for Proposals Overview

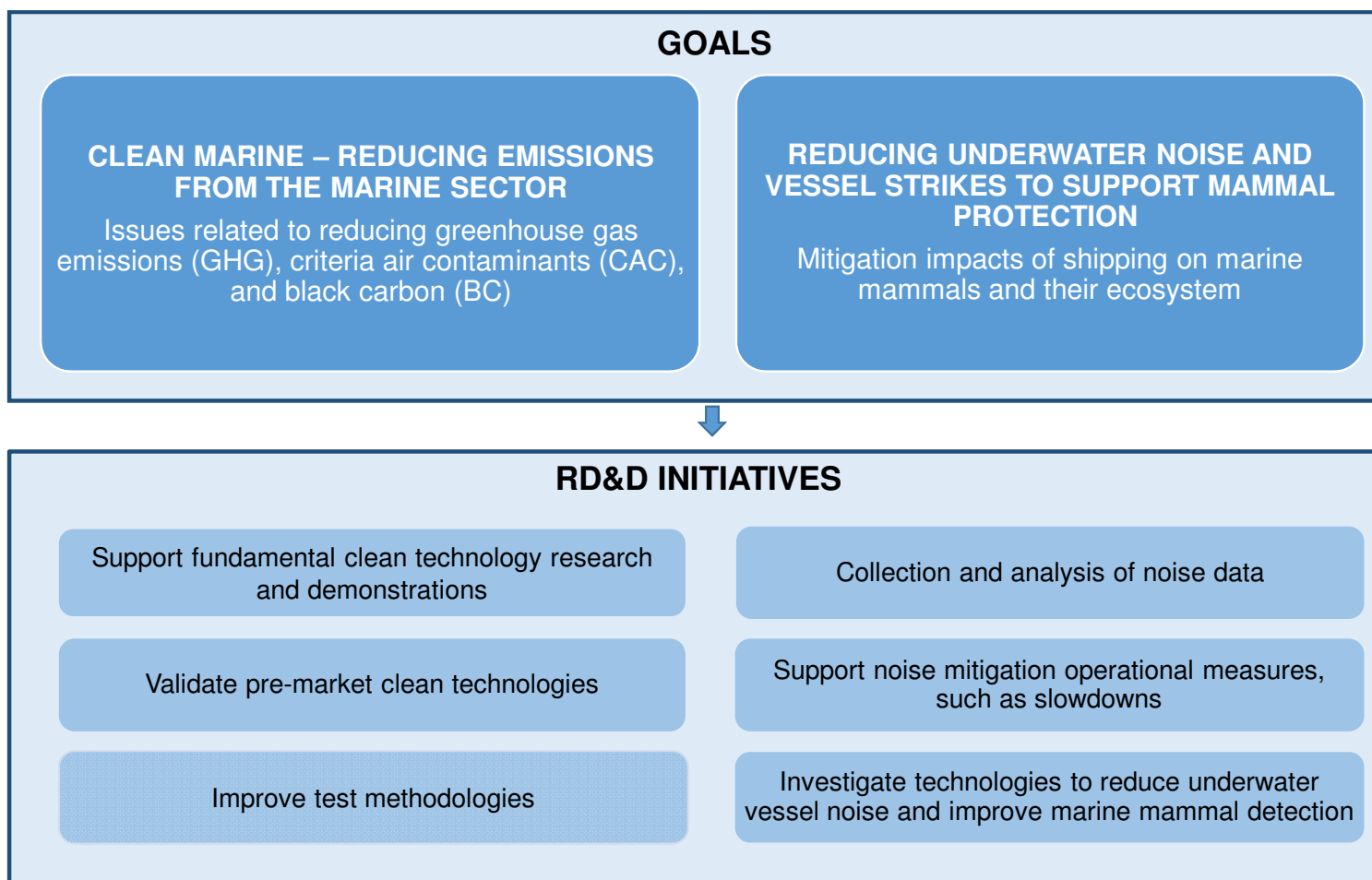


# INTRODUCTION

- Transport Canada (TC)'s Innovation Centre is an engineering and science research branch within TC.
- We undertake research to enhance the safety, security, efficiency, and environmental performance of Canada's transportation system.
- Our Marine Research, Development and Demonstration (RD&D) is comprised of engineers, policy analysts, naval architects, and marine biologists.



# Innovation Centre Marine RD&D



## BACKGROUND

# Clean Marine Background

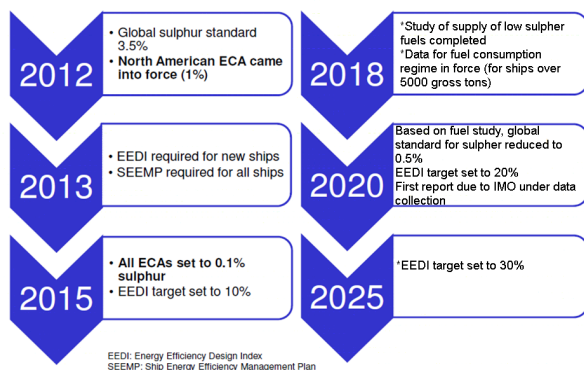
## International

- International Maritime Organization's (IMO) Air Emission Standards
- Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC)

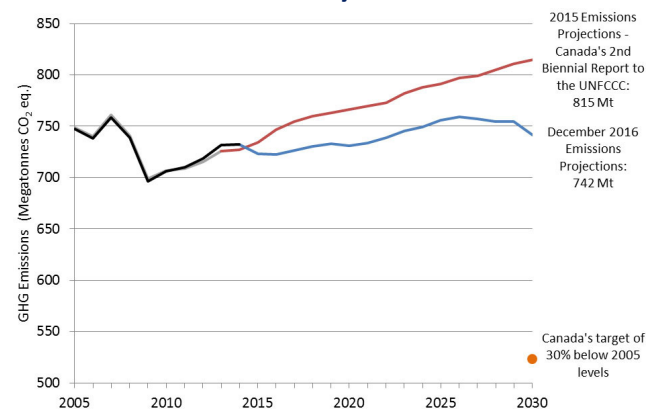
## Domestic

- Canadian Fleet Averaging Regulatory Regime
- Pan-Canadian Framework
- Transportation 2030

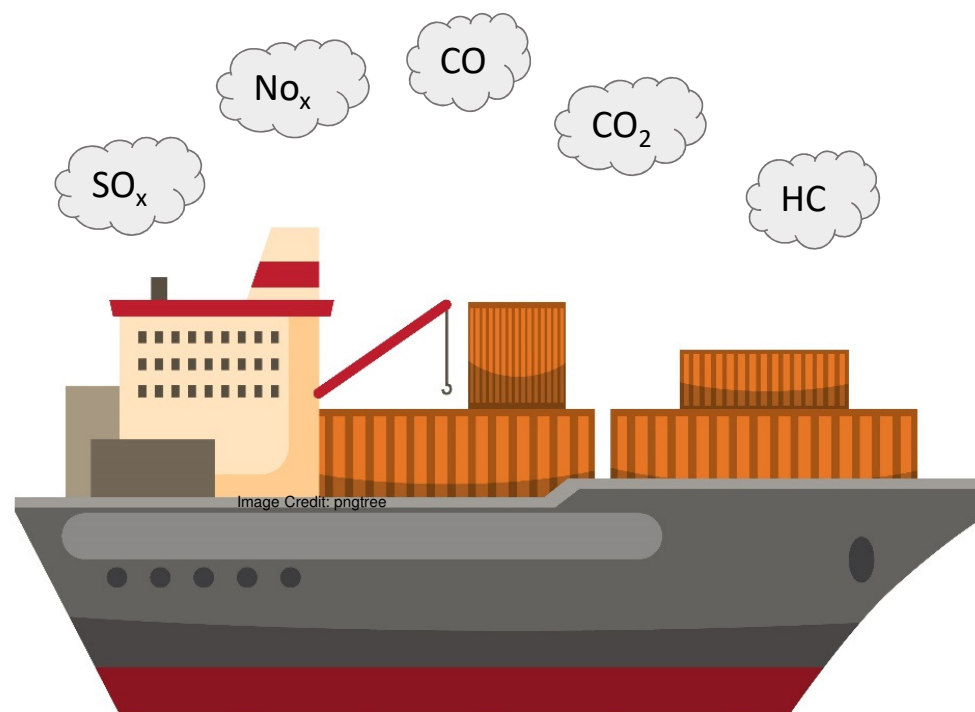
### Timeline for IMO Air Emissions Standards



### Emissions Projections to 2030



Credit: Canadian Intergovernmental Conference Secretariat



- International shipping emitted 796 million tonnes of  $\text{CO}_2$  in 2012
- Emissions from international shipping could grow between 50% and 250% by 2050

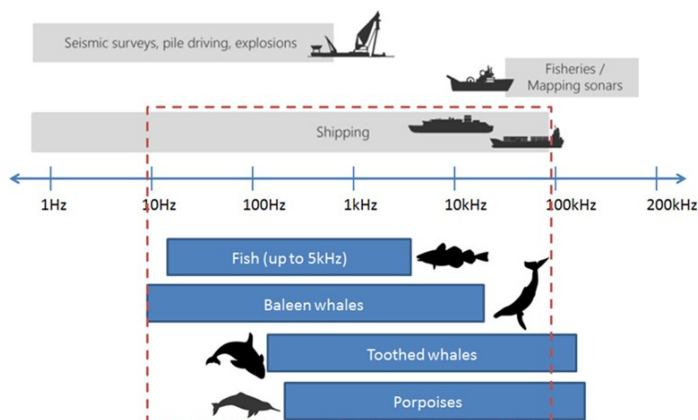
## Drivers for Marine Mammal Protection

### International

- 2014 IMO Guidelines
  - Ship Design
  - On-board machinery
  - Operational and maintenance recommendations
- IMO Marine Environment Protection Committee (MEPC)
  - Underwater radiated noise (URN) as a work output *\*pending*

### Domestic

- Impacts on Marine Mammals
  - Masking
  - Behavioural Responses
  - Physiological Stress
- *Species At Risk Act*
  - Southern Resident Killer Whale
  - St. Lawrence Estuary Beluga
  - North Atlantic Right Whale

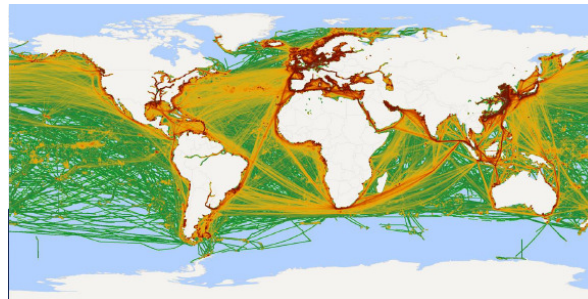




## Human Influence

Sources of anthropogenic noise:

- **Shipping**
- Seismic surveys
- Sonar
- Explosions
- Pile driving



Credit: Centre for Environment Fisheries and Aquaculture Science

## Ecological Context

Marine mammals have evolved over millions of years to use underwater sound for:



Credit: Centre for Environment Fisheries and Aquaculture Science

- Communication
  - Socializing and mating
  - Care and minding of offspring
- Navigation
- Predator/prey detection

# Effects of Shipping Noise

## Masking

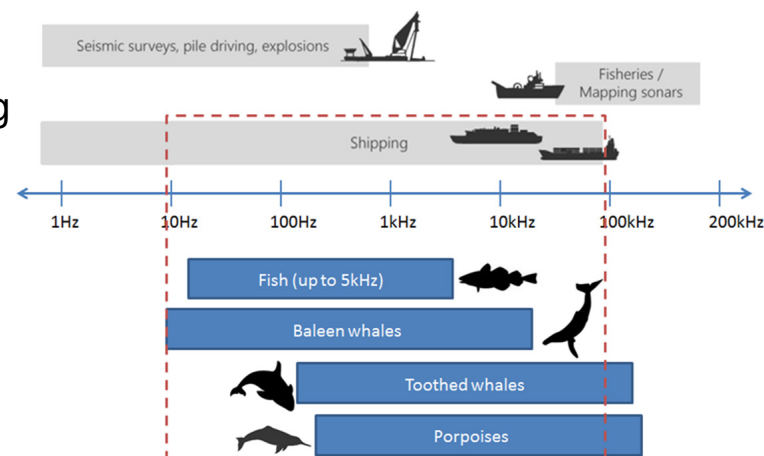
- Reduction of communication distance
- Reduction of echolocation distance, important for foraging

## Behavioural responses

- Fleeing from important habitat
- Cessation of and reduced foraging

## Physiological stress

- Possibly reduced fertility
- Reduction of general health



## Marine Mammal Population At Risk

### North Atlantic Right Whale (NARW)

- ~400 remaining
- Present in the Gulf of St. Lawrence (GoSL) in summer months
- 20 deaths in Canadian waters since 2017
- Key threats include vessel strikes and entanglement in fishing gear

### Southern Resident Killer Whale (SRKW)

- Population of ~73
- Frequent the Salish Sea in summer months
- Key threats are underwater noise, lack of prey, contaminants
- Areas of critical habitat overlaps with shipping lanes and recreational boating traffic

### Saint-Lawrence Estuary Beluga (SLEB)

- ~900 individuals
- Range covers the St. Lawrence Estuary, Saguenay Fjord and Northwest GoSL
- Population declining 1% per year since early 2000s
- Underwater noise and physical disturbance a primary threat



## Emerging Trends and Pressures

- **Domestic and international commercial shipping** is creating pressure on marine species at risk (unique to Canada).
- **Shipping in the Arctic** is expected to increase as rapidly changing climate provides more navigable waters, impacting sensitive marine ecosystems.
- Increased recognition of need to address cumulative effects of marine shipping.
- **International nature of marine shipping** poses a challenge in addressing environmental impacts in Canada's marine environment – 95% of ships calling to the Port of Vancouver are foreign flagged.

## EXAMPLES OF PROJECTS: CLEAN

## Green Ship Hybrid Electric Propulsion System Modeling, Design and Control Optimization Tools

- In partnership with the University of Victoria, TC created an industry-collaborated modeling platform validated by real operational data.
- The project virtually tested and optimized new hybrid powertrains to assess effectiveness in reducing energy consumption, lowering emissions, and increasing efficiency while meeting all the required operational power demands.
- This research led to:
  - a better understanding of key differences between automotive and marine HEV system requirements; and
  - An invaluable quantitative tool for assessing the benefits of ship hybridization and electrification.

## Liquefied Natural Gas Supply Chain

- Study in partnership with a wide range of stakeholders: Canadian Natural Gas Vehicle Alliance, Provinces, Indigenous Groups, etc.
- Developed a comprehensive understanding of all issues relating to the introduction of natural gas as a marine fuel in Canada.
- The main focus was on liquefied natural gas (LNG), however, many of the findings are applicable to compressed natural gas and "hybrid" gas containment systems.
- The study looked at its applicability to vessels operating on the west coast, then the east coast and Great Lakes area.
- Looking to extend a 3<sup>rd</sup> phase of LNG regional implementation in the Arctic.

**Liquefied Natural Gas:**  
A Marine Fuel for Canada's Great Lakes and East Coast

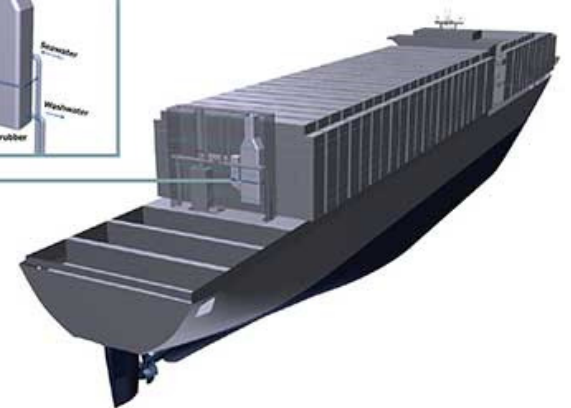
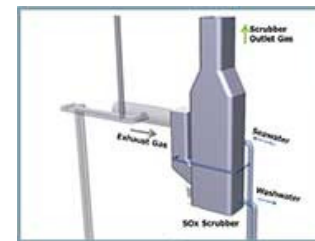




CENTRE  
D'INNOVATION  
CENTRE

## Ionic Liquid for Scrubbers

- In partnership with NRC, explored the possibility of replacing current scrubber absorbents with reusable ionic liquids (ILs) to remove  $\text{SO}_x$  from flue emissions.
- A highly promising ionic liquid was screened in as the best IL candidate due to:
  - high  $\text{SO}_2$  absorption capacity at low temperature ( $35^\circ\text{C}$ );
  - recyclability after desorption at high temperature ( $75^\circ\text{C}$ );
  - resistance to foaming;
  - tolerance to water; and,
  - good selectivity towards  $\text{SO}_2$  versus  $\text{CO}_2$ .
- A lab scale prototype has been completed with a vessel prototype to be developed.



## Optical, Physical, and Chemical Characterization of Maritime Black Carbon Emissions

- Project in partnership with NRC to better define black carbon emissions and identify proper methods for the measurement of black carbon, including:
  - Evaluating black carbon mitigation strategies;
  - Developing measurement capabilities for direct exhaust measurements; and,
  - Developing a measurement method, including sampling, dilution and treatment, for marine samples.



Optical, Physical, and Chemical Characterization of Maritime Black Carbon Emissions (NRC)

## Study on the Capabilities of Data Analytics for Reducing GHG Emissions in Port Drayage Operations

- Study in partnership with the Port of Montreal and the NRC
- Analysis of truck, vessel and rail data for the entire Port of Montreal to develop recommendations to reduce congestion, and possibly develop intelligent learning algorithms for entire port.
- Results identified timeframes where the Port of Montreal experienced a large volume of truck traffic, and which terminals experienced heavier truck activity.
- Recommendations were made on better scheduling for truck pick up times and how to redistribute the truck pick ups to different terminals.

## Comparative Analysis of Emissions from Cape Islander Vessel with Electric and Diesel Propulsion Systems

- The project involved taking a traditional/conventional diesel Atlantic fishing vessel and installing a side-by-side electric system - can operate in diesel or pure electric mode.
- Compared emissions (air and underwater noise) when operating under each of the installed propulsion systems.
- Assessed the feasibility and payback period for using electric propulsion for small vessel operations as passenger shuttle and fishing vessel.
- Partners included Glas Ocean Electric, Nova Scotia Power, Nova Scotia Department of Energy, Sterling Plan B Energy Storage, Nova Scotia Community College, Ambassatours, Canadian Maritime Engineering, JASCO Applied Sciences, EYE Marine, Solutionsmith Engineering and Lunenburg Foundry.



Comparative Analysis of Emissions with Electric and Diesel Propulsion Systems  
(Glas Ocean)

## Canadian Coast Guard Ship: Cygnus Impacts of Cleaning on Performance and Underwater Noise

- Project in partnership with the NRC and the Canadian Coast Guard (CCG)
- The objectives of the project are to:
  - determine the emission reduction and vessel noise reduction associated with a clean hull and propeller; and,
  - increase the scope of acoustic data available within Canada through the deployment of an underwater acoustic recorder.
- Trials were done pre-cleaning, post-hull cleaning, and post-propeller cleaning.
- Results showed minimal effects on noise reduction but more studies need to be done for conclusive results.

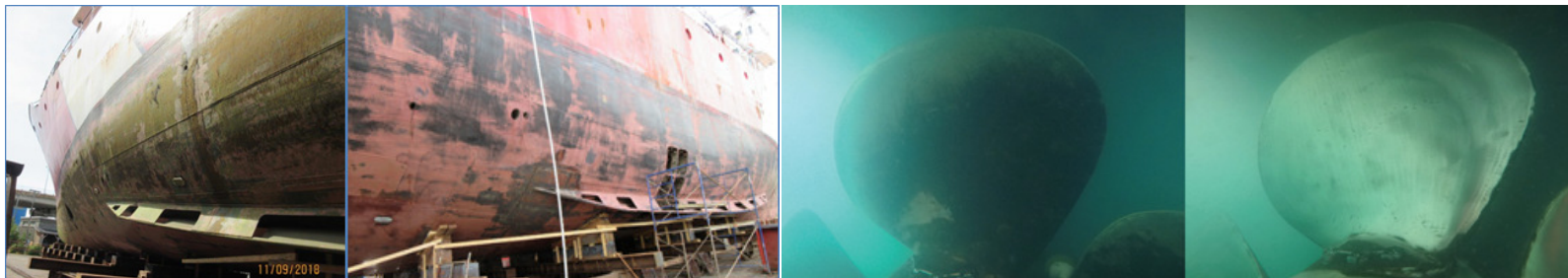


Photo Credits: NRC

## Queen of Oak Bay Performance Monitoring

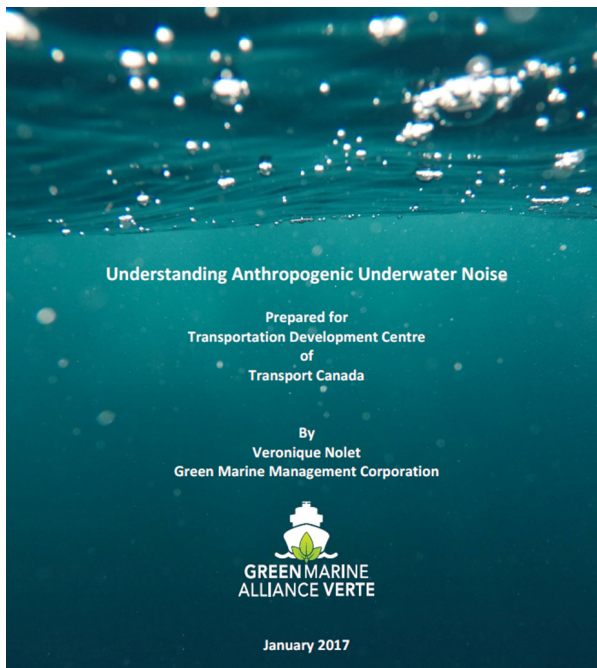
- Project is in partnership with the National Research Council (NRC) and BC Ferries
- Sensors installed on vessels to collect performance data (2019)
- Application of a new, low-friction hull coating (January 2020)
- Deployment of hydrophones to collect noise emissions data before and after application of the new hull coating (December 2019 – February 2020)
- Evaluate what effect the coating had on performance and noise emissions
  - Performance data for a year before and after refit
  - Noise signature for a month before and after refit
- Report to be delivered in 2022



Queen of Oak Bay Performance Monitoring (BC Ferries and NRC)

## **EXAMPLES OF PROJECTS: MARINE MAMMAL PROTECTION**

- Green Marine is focused on improving the shipping industry's environmental performance
- This report summarizes the underwater noise situation



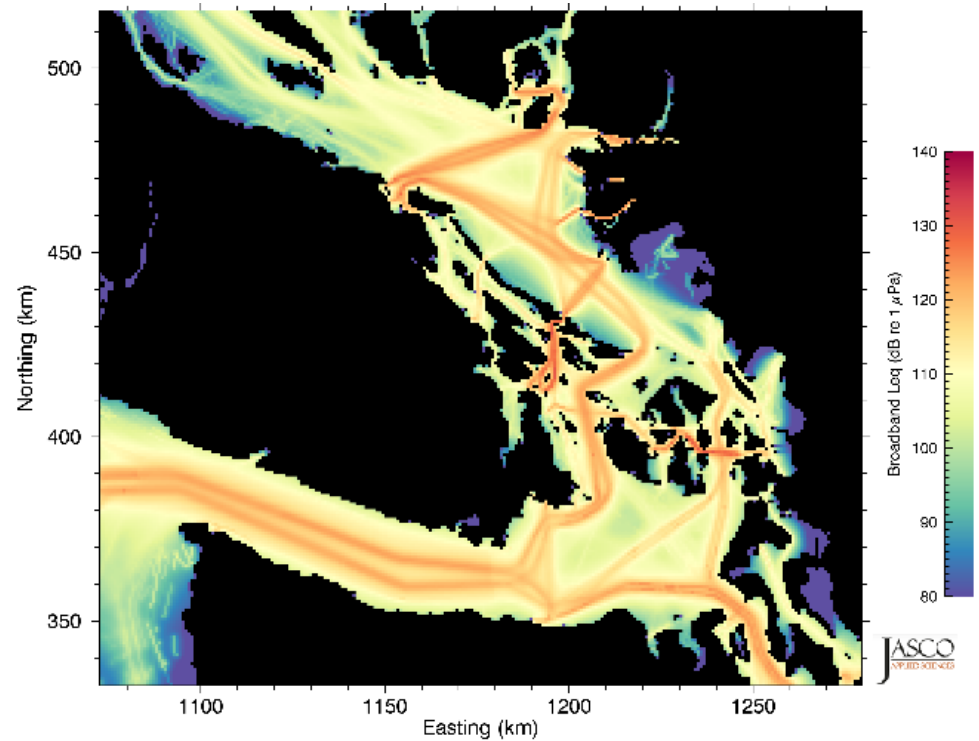
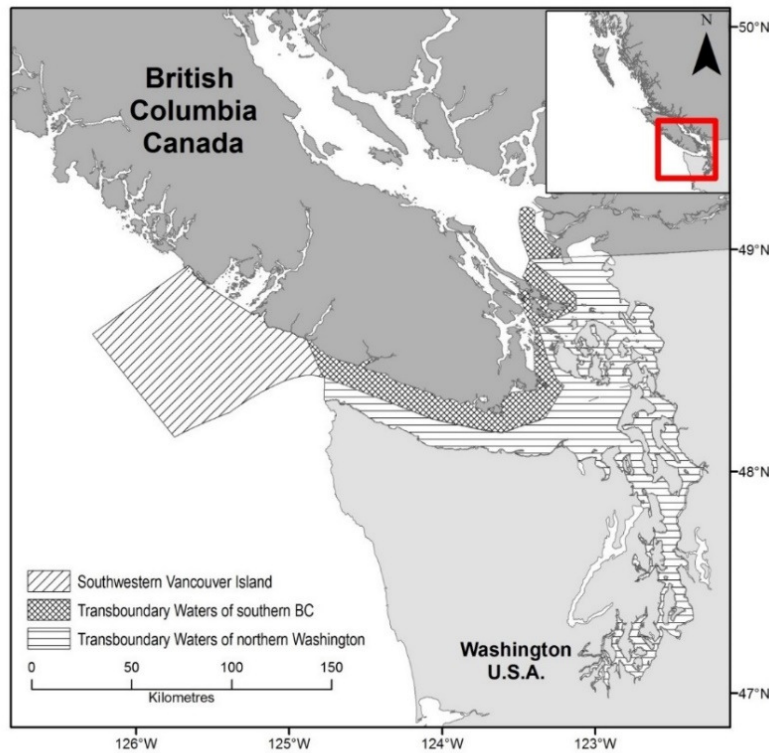
### KEY FINDINGS

- Underwater noise originates from a range of sources – both natural and anthropogenic.
- It is essential to have a recording system to monitor ambient noise in locations considered to be ecologically important.
- Behavioural observations of the marine animals are difficult to interpret, and likely not the best metric for impacts.
- Identifying acoustic thresholds is difficult, especially in the case of chronic and continuous noises, such as those produced by vessels.
- Underwater noise has been a major concern for more than ten years in Canada and is identified as a major threat for marine mammals at risk.

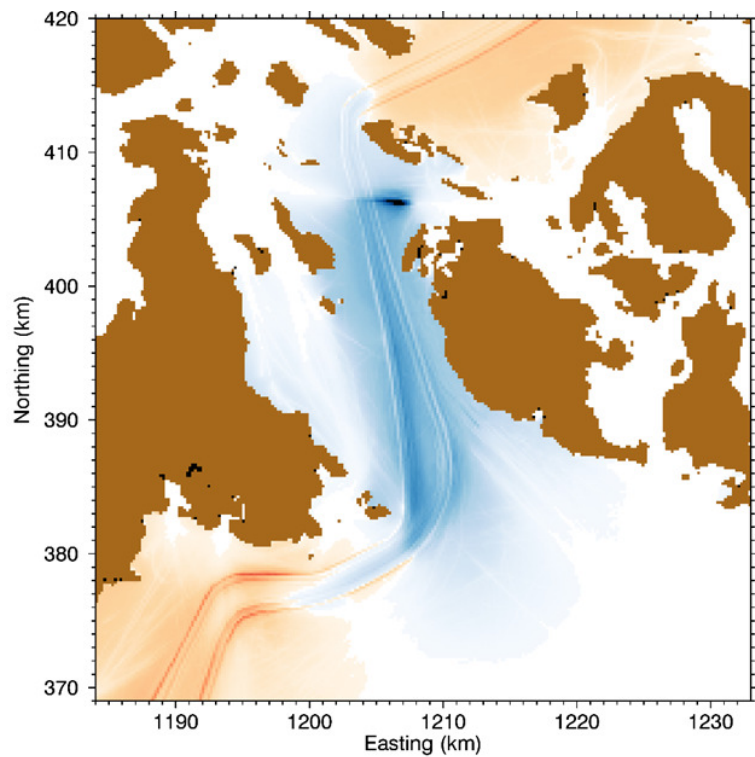


# Salish Sea Underwater Noise Modelling

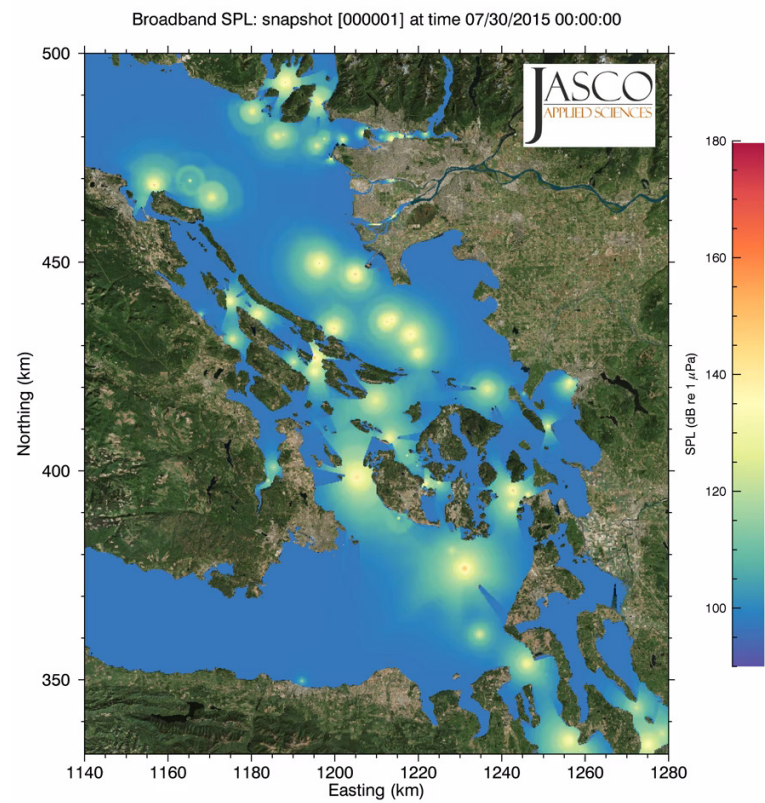
## Vessel Noise Map



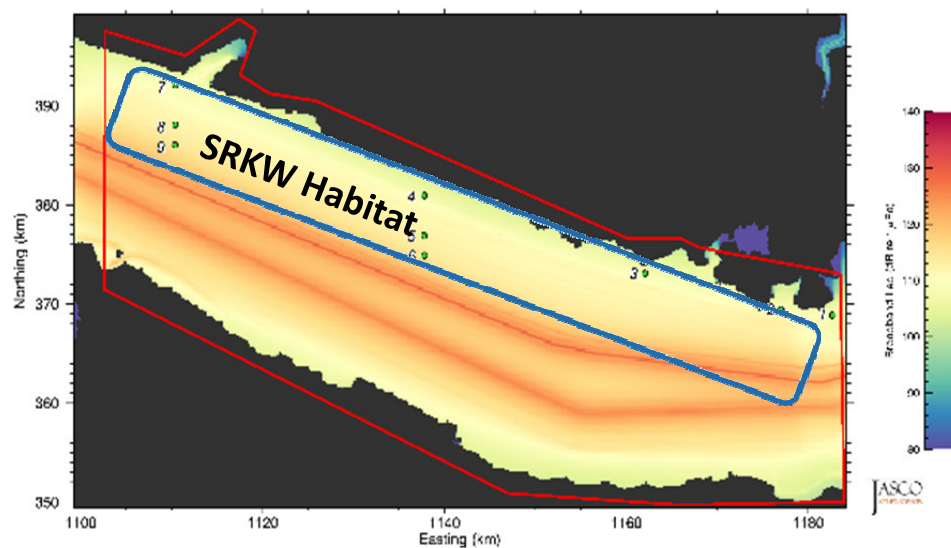
Vessel noise map, averaged over month of July 2015



Credit: JASCO Applied Sciences

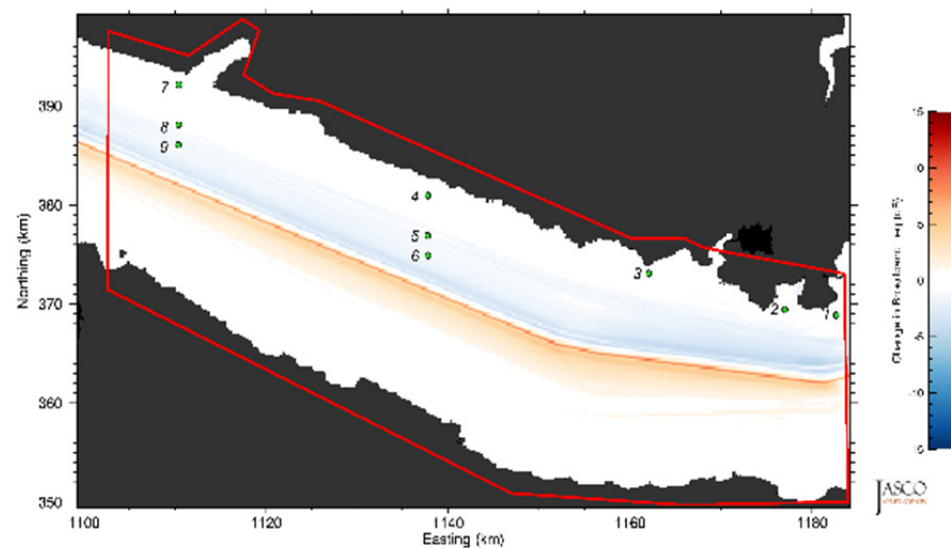


**Baseline**



Credit: JASCO Applied Sciences

**Difference**

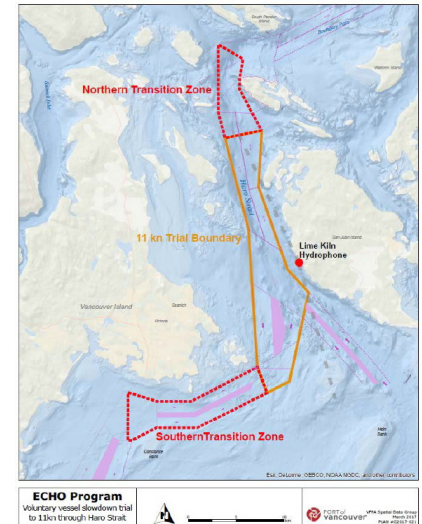


## 2017 Voluntary Vessel Slowdown Trial Results

- 61% of transits participated in the trial to some degree
  - 44% achieved a speed of less than 12 knots
- Reduced mean broadband vessel source levels between 5.9 dB for bulk/cargo ships and 11.5 dB for container ships
- Model indicated reduction of 0.6 dB to 1.5 dB at Lime Kiln
  - Actual results were median noise reduction of 1.2 dB at Lime Kiln

## 2018 Voluntary Vessel Slowdown Trial Results

- Modified voluntary slowdown trial in Haro Strait
  - July 1 – October 31, 2018
  - ≤15 knots for vehicle carriers, cruise, and container vessels
  - ≤12.5 knots for bulkers, tankers, Washington State Ferries, and government vessels
  - Participation rate of 88% versus 2017's 61%
- Juan de Fuca voluntary lateral displacement trial
  - August 20 – October 31, 2018
  - 56% participation rate among deep-sea vessels

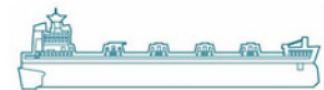


**15kn**

or less for vehicle carriers,  
cruise and container vessels

**12.5kn**

or less for bulkers, tankers, Washington  
State Ferries and government vessels.



Credit: Vancouver Fraser Port Authority

Building on results from previous projects and initiatives to better understand and mitigate underwater vessel noise, Transport Canada will continue to work with the VFPA ECHO Program over the next five years, under three themes:

1. Regional ambient noise and vessel noise collection and analysis ;
2. Evaluation and analysis of operational and technological mitigations; and,
3. Project management and stakeholder engagement.



## Simulation of Lowest Safe Navigation Speed

- Research project with Lantec Marine to determine environmental conditions (wind and current) in 4 navigational areas
  - 1) Strait of Juan de Fuca;
  - 2) Haro Strait/Boundary Pass;
  - 3) Saguenay Estuary; and,
  - 4) Strait of Honguedo.
- Use simulation (desktop computer and full-mission simulator) to assess lowest safe speed of navigation for a variety of vessel types, loading conditions, and weather conditions

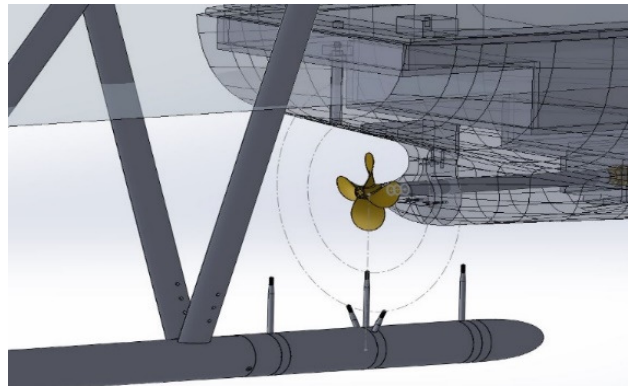


## Propeller Induced Noise and Vibration Study

4 year R&D project with NRC and Memorial University to:

- conduct simulations (CFD, FE, and acoustic analogy);
- conduct experimental measurements; and,
- develop a software tool

to predict the on-board and far-field noise and on-board vibration parameters of a hull induced by the propeller(s) in a non-cavitating condition.



PINOV- 3D model of test setup with improved shaft drive system  
(Photo Credit: NRC)

## North Atlantic Right Whale Detection Trials in the Honguedo Strait

- In support of the mandatory mitigation measures implemented by Transport Canada, we have initiated a study to determine whether NARW can be acoustically detected within the Honguedo Strait.



Underwater Glider in the Honguedo Strait (Photo Credit: UNB)

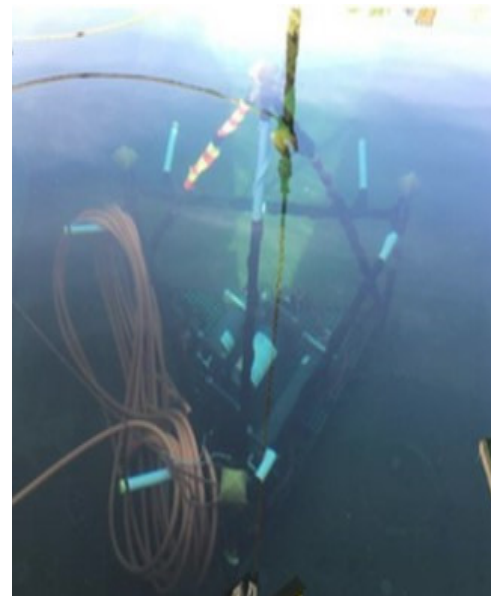


## Underwater Listening Station

- Through Jasco Applied Sciences, Transport Canada is deploying an Underwater Listening Station (ULS) in Boundary Pass to collect, in real time, vessel source levels from both the inbound and outbound shipping lanes, ambient noise and marine mammal calls.
- It is anticipated that the ULS will be in the water in early 2020.



Hydrophone array before being deployed

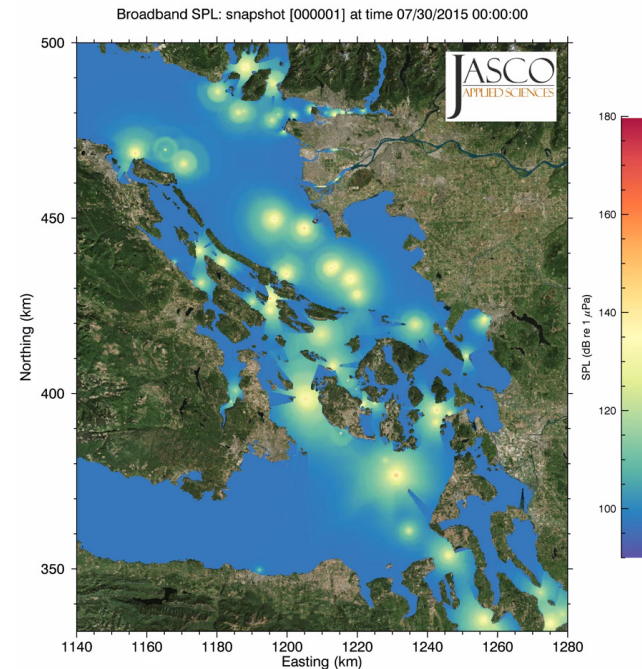


Hydrophone array deployed in the water

## QUIET VESSEL INITIATIVE BACKGROUND

## Quiet Vessel Initiative (QVI)

- Making vessels quieter is a relatively new consideration for shipbuilders and operators. There are significant knowledge gaps about what vessel designs and technologies can be the most effective in reducing underwater vessel noise.
- QVI will assess safe, environmentally-responsible and effective “quiet vessel” technologies, retrofits, designs, and operational practices, and promote international standards to increase adoption.
- It will also provide an **opportunity to engage stakeholders** in a dialogue about quiet vessel solutions.
- A **compendium** of possible technologies and measures will be created to help vessel owners identify solutions to reduce noise.



- 1) Validate interest in the QVI through the Indigenous Advisory and Monitoring Committee (IAMC) Marine Shipping Sub-Committee (December);
- 2) Ensure opportunities for participation are incorporated into Phase IV consultations (Ongoing);
- 3) Ensure funding is available to support attendance at QVI workshops (Annual);
- 4) Conduct follow-up bilateral discussions with communities that have expressed interest; and
- 5) Ensure operational funding is available to support collaborative research, development and deployment activities under the QVI, e.g. monitoring, testing, information exchange, travel to observe R&D trials, participation in program governance, etc. (Ongoing)

- **Participation in annual QVI workshops** in order to help guide program implementation and provide input about the feasibility of operational practices, design standards and technologies.
- **Support for Indigenous-led / Indigenous-participation in research or testing projects** aimed at evaluating “quiet vessel” technologies and operational practices.
- **Support capacity** to monitor the marine environment for underwater noise in traditional territories to assess the effectiveness of operational and technical mitigations.

# REQUEST FOR PROPOSALS

## Marine RD&D Request for Proposals (RFP)

The objectives of this Request for Proposal (RFP) are to:

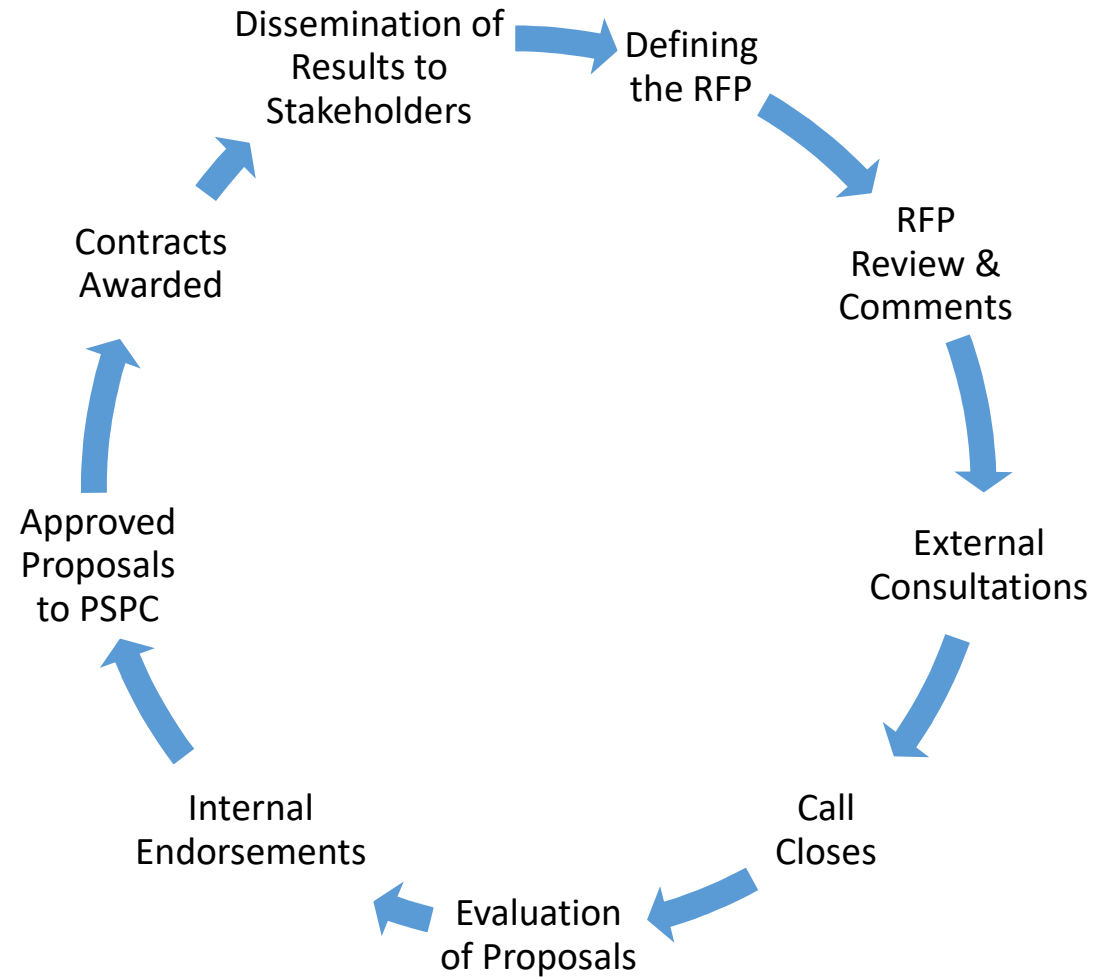
- inform the sector of Transport Canada's research goals;
- provide an opportunity for the sector to put forward projects that they think will help meet the research goals; and
- ensure a transparent and competitive process.

Up to \$21.1M for projects  
under three streams over  
the next four years.

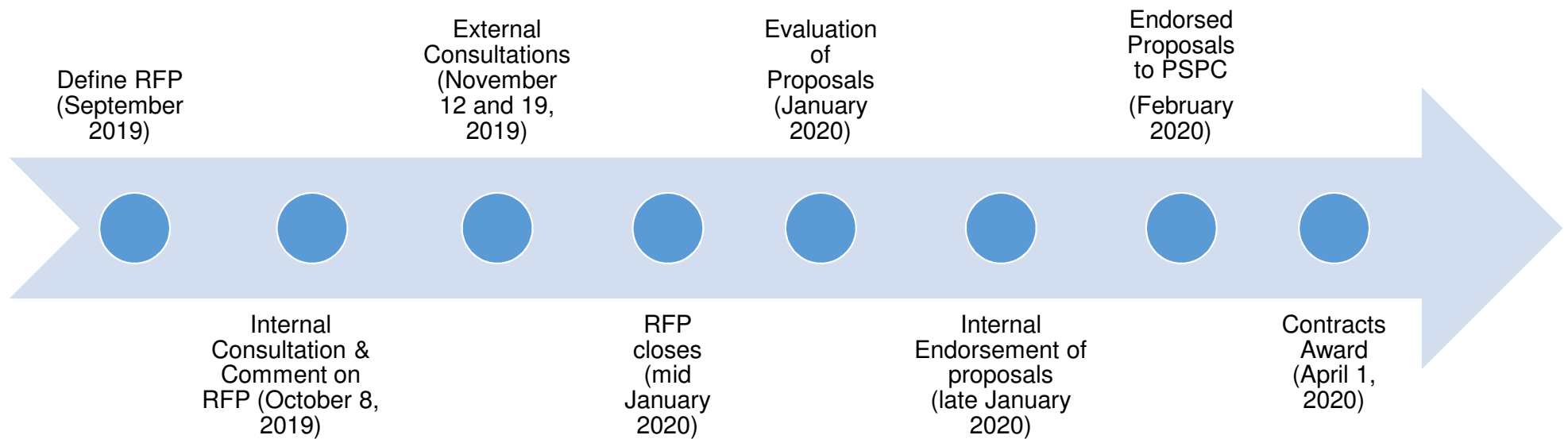
Open to Indigenous groups  
and Canadian marine  
stakeholders, including  
industry, not-for-profit  
groups, and academia

Closes mid-January 2020  
(date to be confirmed)  
with anticipated contract  
award dates of April 1,  
2020

## Annual Planning Cycle for Request for Proposals



## Request for Proposals





## Marine RD&D Request for Proposals (RFP)

### MARINE MAMMAL PROTECTION STREAM

(\$16.4M)

- 1) **Safety Assessments and Technology Scans:**
  - Impact of URN on Compliance with Energy Efficiency Design Index (EEDI) criteria
  - Operational feasibility and potential effectiveness of real-time shipboard cavitation monitoring and management
- 2) **Development of Models and Predictive Tools:**
  - Standards for measurement of underwater noise from ships in shallow water
- 3) **Testing and Evaluation of Technologies:**

Reduce URN through testing of technologies and/or designs that apply to ferries, tugs, fishing and whale watching vessels

### CLEAN MARINE STREAM

(\$4.7M)

- 1) **Emerging Technologies:** conduct fundamental science and research to adapt or develop emission reduction and energy efficient technology
- 2) **Testing & Validation of Pre-Commercial and Commercial Technologies:** Test and evaluate technologies and/or designs to better understand their performance in revenue operations, the associated emission reductions and, in some cases, the opportunities for further development

### COMBINED STREAM

- TC seeks to identify, test and validate technologies and/or designs that result in both efficiency improvements and/or emission reductions (GHG and CAC) **and** URN reduction

- The objective of the Clean Marine stream is to decrease GHG and CAC emissions from Canadian vessels
- This is accomplished through efficiency improvements and/or conducting fundamental clean technology research and validation of clean technologies or design changes.
- At this time, the Clean Marine stream will focus on two themes within the Canadian marine sector.

## CM1A: Emerging Technologies:

Projects under this theme will support fundamental science and research to adapt or develop new technologies (TRL 2-5) to reduce GHG and CAC emissions from the marine sector, and/or contribute to improving vessel energy efficiency.

Technologies at a higher TRL but have had limited implementation in the marine sector and require testing in order to be adopted will also be considered.

## CM1B: Testing and Validation of Pre-Commercial and Commercial Technologies:

Projects under this theme will support testing of pre-commercial and early commercial technologies (TRL 6-9).

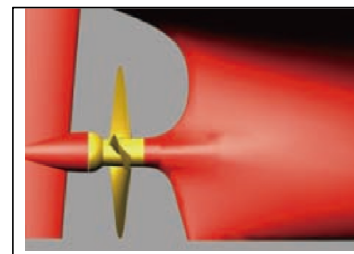
The purpose of this theme is to test and evaluate technologies and/or designs to better understand their performance in revenue operations, their emission reduction potential and, in some cases, the opportunities for further development.



Technologies to monitor emissions  
(Photo cred: EmSys Maritime)



Alternative Fuels  
(Photo cred: Maritime Executive)



Novel Vessel Design/Retrofits  
(Photo cred: Nakashima Propeller)

## Marine Mammal Protection Stream

The objective of the Marine Mammal Protection stream is to accelerate the deployment of technologies and practices that mitigate the impact of vessel-sourced URN on marine species and improve the detection of marine mammal presence in order to reduce the risk of acoustical and physical disturbances. It will achieve this by:

- advancing targeted research, development and demonstration (RD&D) projects;
- develop the scientific and technical evidence needed to identify, model, predict, test and validate the most promising noise reduction technologies, designs and practices and marine mammal detection systems; and,
- providing guidance to industry, academia and the IMO to influence and develop vessel design standards, in order to achieve meaningful long-term noise reductions.

### **MMP2A Safety Assessments and Technology Scans:**

Under this theme, TC seeks to undertake assessments and/or scans to analyze the safety, noise, energy and economic implications stemming from noise reduction and strike mitigation technologies and novel designs in support of the Government of Canada's marine mammal protection efforts. This theme includes two defined project areas:

- **MMP2A1:** Impact of URN Reduction On Compliance With EEDI Criteria

The objective of this work is to evaluate the impact of oil tanker ship design and retrofit measures to reduce URN at the vessel's design speed on compliance with energy efficiency criteria of MARPOL, Ch 4.

- **MMP2A2:** Feasibility of Real-Time Shipboard Cavitation Monitoring and Management

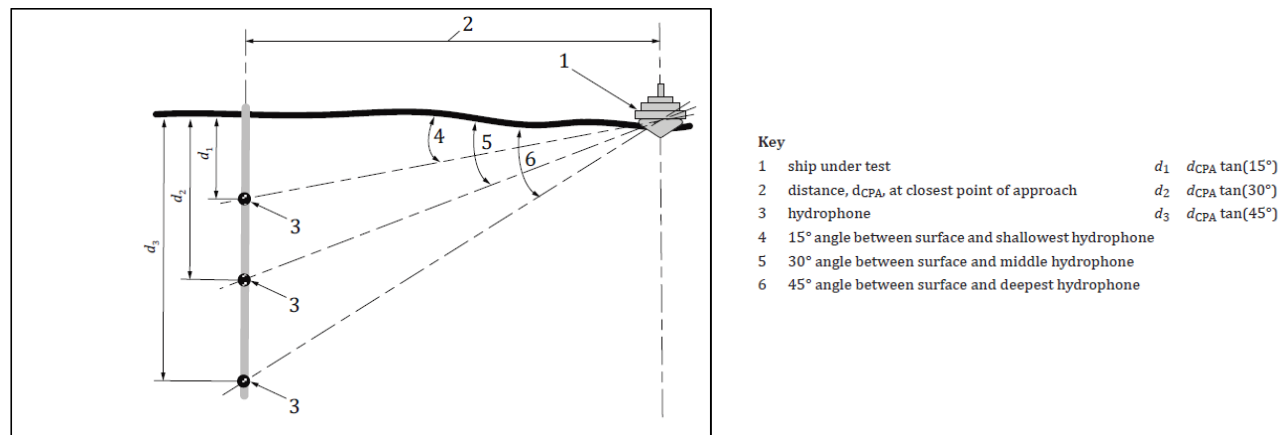
The objective of this work is to evaluate the operational feasibility and impact on operations (safety, cost, effectiveness) for the Master to take measures to minimize cavitation when operating in at-risk whale species critical habitat and evaluate the potential to reduce the vessel's noise contribution to the environment were such a system to be employed.

### MMP2B Development of Models and Predictive Tools:

Under this theme, TC seeks to advance the development of models and tools to support reductions in URN and/or marine mammal strikes.

A project has already been identified for this stream: Standards for Measurement of Underwater Noise from Ships in Shallow Water.

The objective of this is to support and advance the work of the ISO technical committee TC 43/SC 3 in the development of standard ISO 17208-3 Requirements for Measurements in Shallow Water, which is defined as any shallow depth not addressed by the earlier standard.



Current deep-water hydrophone deployment standards by ISO

## Marine Mammal Protection Stream: Themes Cont.

### MMP2C Testing and Evaluation of Technologies:

Under this theme, TC seeks to support the identification and validation of technologies (TRL 6-9) and designs to reduce URN (including retrofits and/or new builds), and improve the detection of marine mammal presence, in order to reduce the risk of acoustical and physical disturbances.

Only technologies applicable to at least one of the following vessel classes will be considered:

1. Ferries/Tugs
2. Fishing Vessels
3. Whale Watching vessels



Anti-singing edge  
Photo Cred: Subsea Solutions



Acoustic Enclosure  
Photo Cred: Alara lukagro



Pump Jet  
Photo Cred: Natchan World

- Projects that are submitted under this Stream should meet the objectives of both Streams 1 and 2. Testing and validation of technologies projects are preferred.
- In previous research, it was identified that designing for efficiency improvements may result in additional benefits of noise reductions, or vice-versa.
- TC seeks to identify these technologies that result in both efficiency improvements and URN reduction, conduct testing and validation of the technologies, in order to quantify linkages between efficiency improvement and/or emission reductions (GHG and/or CAC) and URN reduction.



Electric/Hybrid Electric Vessels  
Photo Cred: Safety4Sea



Hull Lubrication System  
Photo Cred: Safety4Sea





## Clean Marine Stream

ID	Title	Short Description	TRL	Estimated Timeline	Estimated Budget	# of projects per year	Maximum yearly budget per project
(1a)	<i>Emerging Technologies</i>	Projects under this theme will address fundamental science and research to adapt or develop new technologies to reduce GHG and CAC emissions from the marine sector, and/or improve vessel efficiency	2-5	1-10 years	1.2 M/4 years	1-2	\$150,000
(1b)	<i>Testing and Evaluation of Pre-Commercial and Commercial Technology</i>	Projects under this theme include the testing and validation of pre-commercial and commercially ready technologies that have the potential to reduce GHG and CAC emissions from the marine sector, and/or improve vessel efficiency.	6-9	1-5 years	3.5 M/4 years	1-2	\$500,000

## Marine Mammal Protection Stream

ID	Title	Short Description	TRL	Estimated Timeline	Estimated Budget	# of projects per year	Maximum yearly budget per project
(2a)	<i>Safety Assessments and Technology Scans</i>	Projects under this theme include assessments and/or scans to analyze the safety, noise, energy and economic implications related to noise reduction and marine mammal detection technologies and novel designs in order to reduce acoustical and physical disturbances.	NA	1-2 years	1.4M/4 years	1-2	\$175,000
(2b)	<i>Development of Models and Predictive Tools</i>	Projects under this theme include the development of models and tools for the prediction and reduction of vessel URN.	2-9	1-4 years	2.0 M/4 years	1-2	\$500,000
(2c)	<i>Testing and Evaluation of Technologies</i>	Identification and validation of technologies and designs to reduce URN (retrofit or new build), and improve the detection of marine mammal presence in order to reduce the risk of acoustical and physical disturbances.	6-9	1-4 years	\$13M/4 years	3-5	\$1,000,000

## Combined Stream

ID	Title	Short Description	TRL	Estimated Timeline	Estimated Budget	# of projects per year	Maximum yearly budget per project
3	<i>Combined Stream – Technologies to reduce both Emissions and URN</i>	Projects under this theme include the testing and evaluation of technologies that have been identified to reduce or have the potential to reduce emissions and URN of the marine sector.	6-9	1-4 years	\$16.5 M/4years	2-5	\$1,500,000

**EVERY PROPOSAL SHOULD HAVE THE FOLLOWING SECTIONS:**  
**PROJECT GOALS, OBJECTIVES, SCOPES, MILESTONES, AND BUDGET**

**MMP2A1**

- Specific technology/design/measure of study
- Constraints and assumptions to establish URN-compliant design
- Description of each factor that would contribute to a vessel's noise signature

**MMP2A2**

- Evaluation methodology for the operational impacts and noise reduction potential of real-time cavitation monitoring system

**MMP2B**

- Demonstration of plan how the work will advance and support the ISO technical committee
- Show experience relating to the work
- Project Risk Analysis

**CM/MMP2C/COMB**

- The technology of the study
- The applicable vessel classes
- Commercial market potential
- Adoption/integration costs for vessel design/retrofit
- Barriers to technology implementation
- Project Risk Analysis

**Ryan Klomp**

Director, RD&D, Innovation Centre  
Transport Canada

[Ryan.Klomp@tc.gc.ca](mailto:Ryan.Klomp@tc.gc.ca)

(613) 513-7012

**Tabitha Takeda**

Chief Marine RD&D, Innovation Centre  
Transport Canada

[Tabitha.Takeda@tc.gc.ca](mailto:Tabitha.Takeda@tc.gc.ca)

(343) 996-2168

**Véronique Nolet**

Principal Scientific Analyst  
Transport Canada

[Veronique.Nolet@tc.gc.ca](mailto:Veronique.Nolet@tc.gc.ca)

(613) 299-1605



[www.canada.ca/innovation-centre](http://www.canada.ca/innovation-centre)



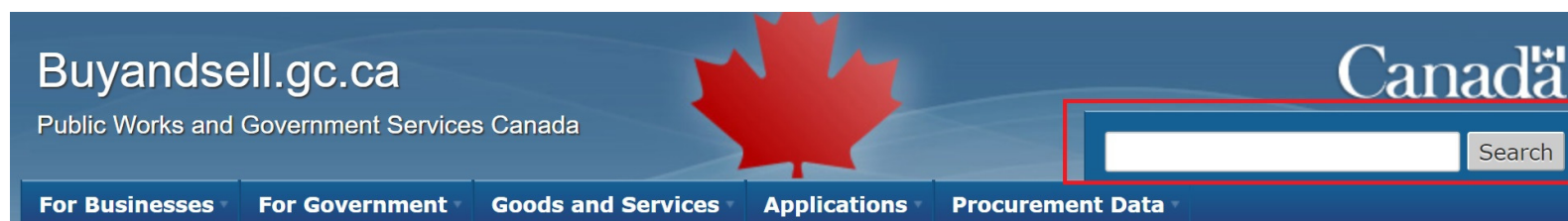
[www.canada.ca/centre-innovation](http://www.canada.ca/centre-innovation)

**[BUYANDSELL.GC.CA](http://BUYANDSELL.GC.CA)**

# Public Services and Procurement Canada

## How to find the Call for Proposal and other Processes

- Go to: <https://buyandsell.gc.ca>
- Enter file number in Search field: T8009-190223
- Click on Link on resulting file.



## Public Services and Procurement Canada

### T8009-190223 – TC-IC – Marine RD&D – Call for Proposal

- **Proposal Preparation – Part 3.1**
- **Canadian Content – Part 3.1.1**
- **Technical Proposal – Part 3.2**
- **Financial Proposal – Part 3/3**
- **Proposal Selection Process – Part 4**



## Public Services and Procurement Canada

Three process streams for proposal submission:

- **T8009-190192** – RFP 1 – Clean marine
- **T8009-190191** – RFP 2 – Marine Mammal Protection
- **T8009-190185** – RFP 3 – Combined

## Public Services and Procurement Canada

**All Enquiries on RFP submission and processing should contact:**

**Eric Zwarich**

Supply Team Leader, Acquisitions Marine, Procurement Branch / Pacific Region

Public Services and Procurement Canada / Government of Canada

[Eric.Zwarich@pwgsc-tpsgc.gc.ca](mailto:Eric.Zwarich@pwgsc-tpsgc.gc.ca) / Cell: 250-661-2347

**Chukwudi Chinye**

Supply Specialist, Atlantic Region Acquisitions

Public Services and Procurement Canada / Government of Canada

[Chukwudi.Chinye@pwgsc-tpsgc.gc.ca](mailto:Chukwudi.Chinye@pwgsc-tpsgc.gc.ca) / 902-401-6704