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Salish Sea Ecosystem Conference

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Understanding and managing underwater noise from vessel activities

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Understanding and Managing Underwater Vessel Noise

Supporting Recovery of the Southern Resident Killer Whale
and Other Endangered Whales

Jeff Pelton
Transport Canada
April 2018



SRKW Challenge: Growth & Shared Waters

- Canadian and US shipping lanes go through SRKW critical habitat
- Expansion projects will result in additional vessel traffic
- Also expected increases in a wide variety of vessel traffic in Salish Sea, including ferries, commercial shipping, whale-watching, and pleasure craft



Why is this important?

- Whales are vital components of healthy marine ecosystems & SRKW are culturally significant
- Canadians rely on marine transportation and trade
- This will require TC to work collaboratively with other Federal Government departments to address the threats.



What is the Oceans Protection Plan?

5 year national Oceans Protection Plan (OPP) will:

- Improve marine safety and responsible shipping
- Protect Canada's marine environment
- Strengthen partnerships with Indigenous communities
- Invest in science for evidence-based decision-making

Between 2017-2022, over 50 initiatives will be delivered to meet these goals.



Recent Action: Advancing Understanding

Underwater listening capacity



- Support for underwater listening station in Strait of Georgia
- Feasibility study on future options for hydrophone placement in the Salish Sea
- Support for analysis of noise baseline data in the Salish Sea

Studies on sources and strategies



- Study on anthropogenic sources of noise (Final report available now)
- Modelling of potential noise mitigation measures to quantify effectiveness
- Simulation and desktop analysis of mitigation measures to assess feasibility
- Risk assessment to identify navigation safety risks of potential mitigation measures
- Voluntary slowdown trial in Haro Strait to 11 knots (Aug – Oct 2017)

Building knowledge base through engagement



Government
of Canada

- Noise metrics workshop with Coastal Ocean Research Institute to establish appropriate metrics
- Canadian Scientific Advisory Secretariat (CSAS) process to evaluate noise mitigation effectiveness
- SRKW Symposium involving broad range of Indigenous groups and stakeholders focused on challenges, opportunities, and solutions

Recent Action: International Collaboration

Developing US partnerships



- Establishment and monitoring of Salish Sea Ecosystem Indicators with US EPA
- Annual meetings on health of whales; on-going collaboration and information sharing on science and research on prey availability, underwater noise
- Agreement to work together to identify collaborative actions to mitigate noise and ensure consistency on approach across borders

Engaging the International Maritime Organization



- Leadership at the Maritime Environmental Protection Committee (MEPC)
- July 2017 MEPC 71 returned underwater noise to discussions
- April 2018 MEPC 72 Canada will highlight recent studies and seek a commitment to additional international collaboration and action
- Informal-contact group established to continue discussion on measures to address underwater noise

Key lessons learned

- Collaboration is key. Finding solutions to the challenge of underwater noise is not something that one group, port, country or level of government can tackle on its own
- Industry, governments, ports, NGOs and Indigenous communities have already been playing an important role in identifying, analyzing and testing potential solutions
- Different solutions are required for different vessel types given the complexity of the issue
- Feasibility of measures must be assessed from a variety of angles, including economic, cultural, risk to navigation, environmental, etc. and we have to figure out how best to weave those considerations together in decision making and implementation
- Testing of new measures allows for real-time learning and the implementation of an adaptive approach
- There are co-benefits between reducing noise and improving fuel efficiency



Key lessons learned

- Jasco Phase 1 findings
 - Results quantify the noise reductions possible with proposed CSAS operational changes
 - Some options (speed reduction, lateral displacement) were effective, while other options (convoying, periods of quiescence, reduction by vessel type) were less effective or require more research
- Jasco Phase 2 findings
 - Analysis of more geographic areas and different bathymetry
 - Learning more about noise characterization – SRKW audiogram weighting changes vessel ranking significantly
- Collaboration and Innovation go hand in hand
 - International interest in underwater noise
 - BC Ferries – Speed/noise relationship varies with vessel design
 - Haro Strait Slow down – Extensive results and learning
 - Maersk – Overlap between noise reduction and fuel savings



Key Results

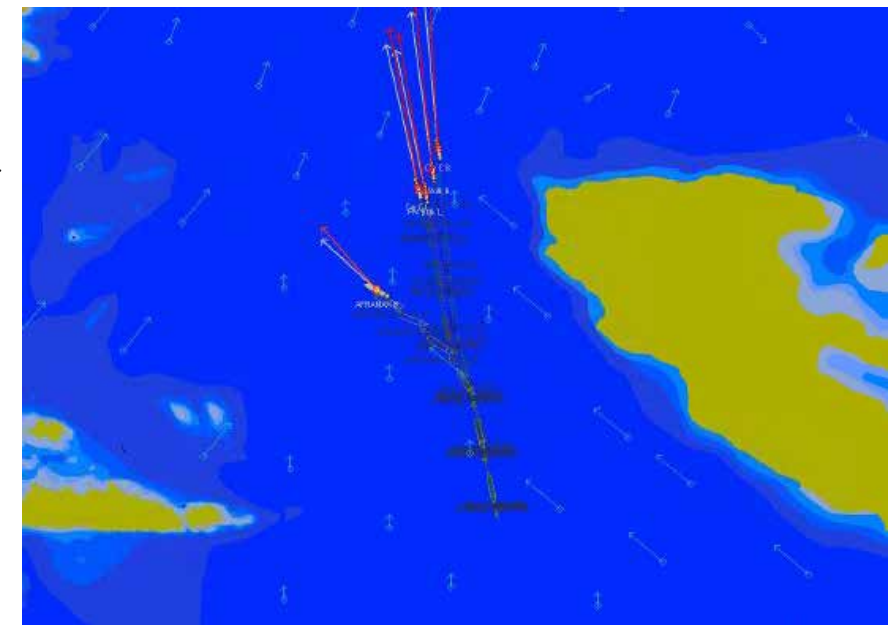
- PRMM Risk Assessment

- Evaluated 18 scenarios under 4 broad categories
- Assessed incremental risk (probability x consequence)
- Identified many potential mitigations under 8 broad categories
- With mitigation applied
 - 8 scenarios were flagged for further consideration
 - 7 scenarios were deemed unsafe for future implementation
 - 3 scenarios were flagged as unsafe but with a margin of uncertainty that could be explored through new risk mitigation, including advancements in technology.

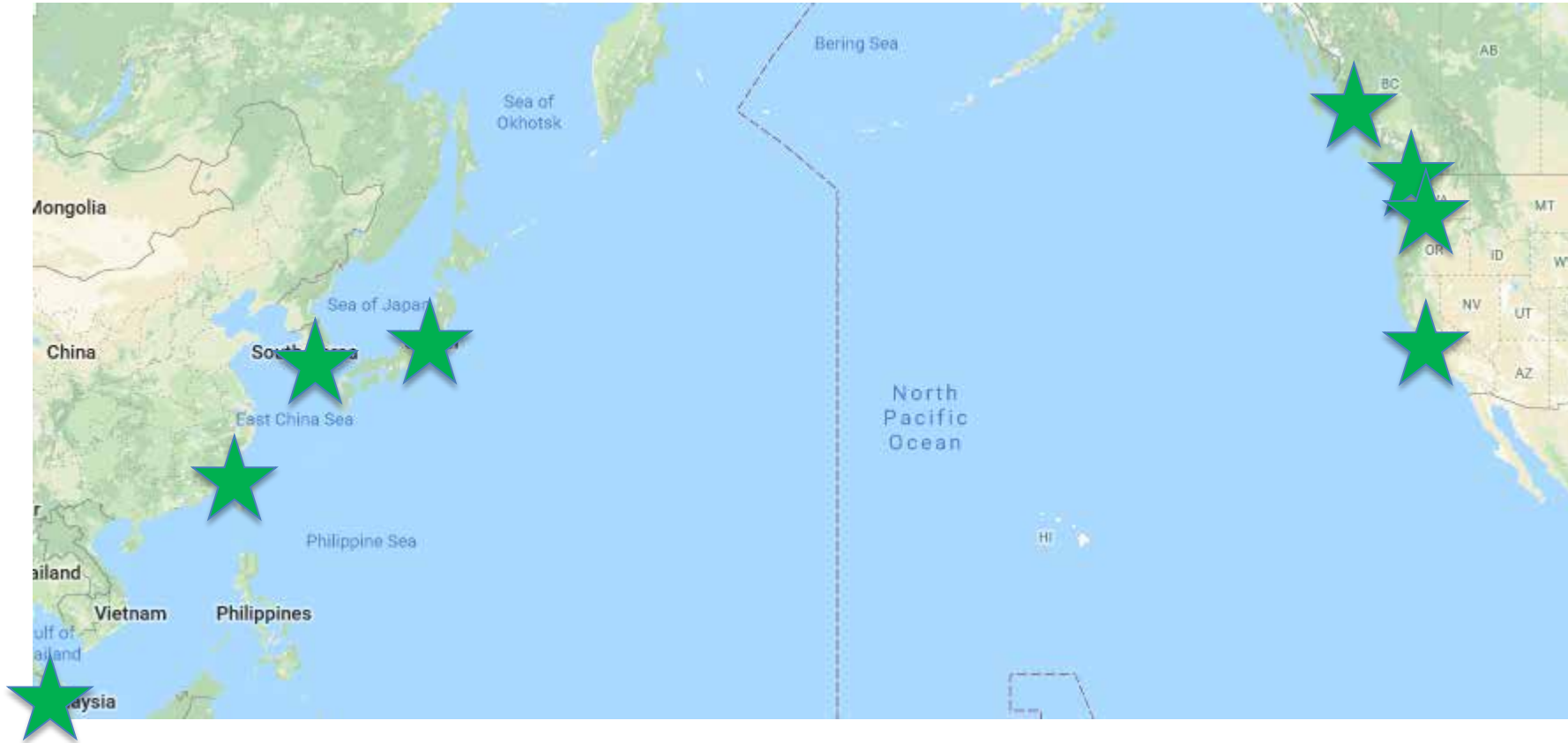
- Simulation and analysis

- Early stages, but will help us determine limits/cutoffs of what can safely be expected with operational changes.

Measure	Mitigated Probability			Mitigated Consequence			Mitigated Risk				Std Dev	% Off from 2014 Q4	
	Highest	Lowest	Mean	Highest	Lowest	Mean	Highest	Lowest	Mean	Std Dev			
10. Status Quo													
10a. Current Operations in Haro Strait	2.0	1.0	1.5	3.0	1.0	2.0	6.0	2.0	3.0	4.0	1.0	1.8	
11. Lateral Displacement													
11a. Protected area E in Haro Str	1.0	1.0	1.0	3.0	1.0	2.0	3.0	1.0	2.0	3.0	1.0	1.7	10.24%
11b. SC route west of Haro Str lane	1.0	1.0	1.0	3.0	1.0	2.0	3.0	1.0	2.0	3.0	1.0	1.8	-0.70%
11c. SDA - Haro Str One-way	4.0	1.0	2.0	3.0	1.0	2.0	12.0	2.0	4.0	6.0	2.0	3.2	44.87%
11d. S/D/F - Shift outbound to of SB	1.0	1.0	1.0	3.0	1.0	2.0	4.1	1.0	2.0	3.1	1.0	1.8	25.87%
11e. S/D/F - Shift all lanes further S of SB	1.0	1.0	1.0	3.0	1.0	2.0	3.7	1.0	2.0	3.0	1.0	1.7	7.69%
11f. Shift S/D/F TSS off Soile to south	1.0	1.0	1.0	3.0	1.0	2.0	4.0	1.0	2.0	3.0	1.0	1.8	19.23%
12. Quiescence													
12a. Quiet Periods	4.0	1.0	2.0	3.0	1.0	2.0	12.0	2.0	4.0	6.0	2.0	3.2	25.84%
12b. Schedule transits	4.0	1.0	2.0	3.0	1.0	2.0	4.0	1.0	2.0	3.0	1.0	1.8	66.67%
12c. Manage transits	4.0	1.0	2.0	3.0	1.0	2.0	4.0	1.0	2.0	3.0	1.0	1.8	66.67%
12d. Tide transits	4.0	1.0	2.0	3.0	1.0	2.0	3.0	1.0	2.0	3.0	1.0	1.8	50.00%
13. Redirection													
13a. Redirection through Rosario	4.0	1.0	2.0	3.0	1.0	2.0	4.4	1.0	2.0	3.4	1.0	1.8	72.03%
13b. Conditional redirection to Rosario	4.0	1.0	2.0	3.0	1.0	2.0	4.5	1.0	2.0	3.5	1.0	1.8	75.84%
13c. One-way Rosario-Haro (V/O)	4.0	1.0	2.0	3.0	1.0	2.0	4.4	1.0	2.0	3.4	1.0	1.8	56.43%
14. Speed Reduction													
14a. Fixed SP Limit in Haro	1.0	1.0	1.0	3.0	1.0	2.0	4.0	1.0	2.0	3.0	1.0	1.8	0.00%
14b. Circumstantial SP Limit in Haro (SR KW)	1.0	1.0	1.0	3.0	1.0	2.0	4.1	1.0	2.0	3.1	1.0	1.8	11.54%
14c. Conditional SP Limit in Haro (Vessels)	1.0	1.0	1.0	3.0	1.0	2.0	4.0	1.0	2.0	3.0	1.0	1.8	0.00%
14d. Circumstantial SP Limit in S/D/F	1.0	1.0	1.0	3.0	1.0	2.0	3.0	1.0	2.0	3.0	1.0	1.8	26.92%



Port Incentives – Opportunity for future collaboration



PORT OF PRINCE GEORGE

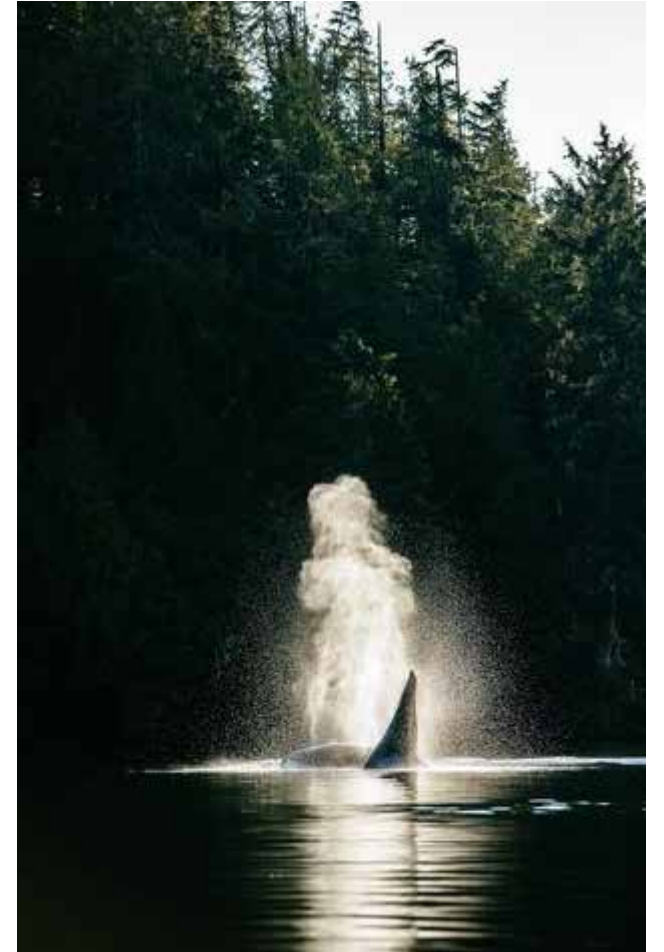
	TECH 1 (10%)	TECH 2 (20%)	TECH 3 (30%)
ENVIRONMENTAL PROGRAMS			
Clean Airline	Level 3 (GRI) and minimum Level 2 in all other indicators	Level 4 (GRI) and minimum Level 2 in all other indicators	Level 5 (GRI) and minimum Level 2 in all other indicators
Signage	Verified GRI B	Verified GRI A+	Verified GRI A
Environmental Ship Index	Score 21 - 30	Score 31 - 35	Score 36
Clean Cargo Handling Group	CO ₂ eq score 148 - 28	CO ₂ eq score 128	
Clean Shipping Index	CS 1	CS 4	CS 5
Energy Efficiency Design Index	Achieved ESD 10% better than required *		
Clean Asset	Asset certificate		
UNIVERSITY FEE WAIVER CLASSIFICATION SCHEMES			
Car Rental Vehicle - Semester Long (20+ hrs.)			50% off tuition or Certificate of Completion
Busday Vehicle (20+ hrs.)			10% tuition
Regional State Vehicle (20+ hrs.)			50% off tuition
UNIVERSITY FEE WAIVER TECHNOLOGY			
Recycling Station	ISO 14001		
Powerful Best Cap Price	ISO 9001		
International State Equipment	ISO 9001		

*Necessary efforts to achieve one of the three disclosed technical standards. Vessels need only satisfy one criterion to achieve the corresponding fee discount.



Where do we go from here?

- Government of Canada is committed to playing a meaningful role in solutions; recently announced an additional \$167.4M in Budget 2018 to support whale recovery
- TC is looking at results of modelling work, studies and trials, and will continue discussions with stakeholders and Indigenous partners, in order to implement mitigation options
- TC would like to see more trials to provide real time benefits and important data on effectiveness and other challenges



Thank you

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