Understanding and managing underwater vessel noise: supporting recovery of the Southern Resident killer whale and other endangered whales

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Overview

• Why action is needed
• What we have done so far
• What we are working on now
• Lessons learned
• Next Steps
Why Action is Needed

• Underwater noise is a key threat to two endangered marine species in Canada - the Southern Resident killer whale and the St. Lawrence Estuary beluga:
  – Interferes with predator avoidance, foraging, feeding, migration and other vital life functions
• Extremely complex issue – vessel noise varies substantially depending on design, speed, size and a host of other factors – while marine species will react differently to each range of noise
• Meanwhile, commercial shipping, ferry services, fishing, eco-tourism, and the marine industry at large are important contributors to the Canadian economy and vital to most coastal communities
• Key marine routes to larger ports often intersect important marine mammal habitat
• The Government of Canada has committed to understanding and addressing the primary stressors on endangered whales, including underwater noise, as part of the Oceans Protection Plan
## 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
- 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
- Noise metrics workshop with Coastal Ocean Research Institute to establish appropriate metrics
- Canadian Scientific Advisory Secretariat process to evaluate noise mitigation effectiveness
- Symposium involving broad range of Indigenous groups and stakeholders focused on challenges, opportunities, and solutions with respect to the Southern Resident killer whale
Ship Noise Mitigation Risk Assessment

- Evaluated 18 mitigation scenarios under 4 broad categories: lateral displacement, quiescence periods, redirection and speed reductions
- Assessed incremental risks to safe navigation:
  - 7 scenarios flagged for further consideration
  - 4 scenarios were deemed unsafe outright
  - Remaining 7 scenarios were flagged as unsafe but with a margin of uncertainty that could be explored through new risk mitigation, including advancements in technology
Computer Modelling of Mitigation Measures

- Delivered by JASCO Applied Sciences to test effectiveness of different mitigation scenarios
- Some options (speed reduction, lateral displacement) demonstrate positive results, while others (convoying, periods of quiescence, reduction by vessel type) are less effective or require more research
- Assists in learning more about noise characterization – e.g., Southern Resident killer whale audiogram weighting can change vessel noise ranking significantly
Research and Development

- A number of research projects are being considered to help us better understand the problem as well as potential solutions:
  - Currently analyzing results from the 2017 ECHO slowdown trial
  - Running models and simulations of the threshold for the lowest safest speeds for vessel classes in different environments
  - Reviewing ISO propeller blade manufacturing tolerances including the impacts on noise resulting from certain ranges of defects within these tolerances
  - Collecting baseline data of a BC Ferry before dry dock and retrofitting
  - Collecting baseline data of a Canadian Coast Guard vessel ahead of hull and propeller cleaning
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 Marine Environment Protection Committee (MEPC)
- July 2017 MEPC 71 - returned underwater noise to discussions
- April 2018 MEPC 72 - Canada highlighted recent studies and need for a commitment to additional international collaboration and action
- October 2018 MEPC 73 - Canada to propose a new work output on underwater noise
- Informal contact group established to continue discussion on measures to address underwater noise
Underwater Noise and IMO

• Voluntary guidelines for the reduction of underwater noise from commercial shipping released in 2014
  – Identifies means to measure and monitor noise levels
  – Provides advice and guidance on ship design (e.g., hull, propellers) and ship operations that can reduce noise

• Since the guidelines were released there has not been any formal follow-up

• Canada is proposing a new work item at IMO to review and assess the effectiveness of the guidelines, and identify opportunities to update them to reflect new science, technology and operational practices

• Engagement with the shipping industry is critical – it is a first step towards development of new international standards on quiet ship design and operations

• The results of Green Marine’s underwater noise performance indicator – the first of its kind in the world – will be an invaluable source of information in support of the proposed evaluation
Key lessons learned

- Solutions must reflect complexity of the issue and differences in vessels
- There can be co-benefits between reducing noise and improving fuel efficiency – e.g., Maersk ship design retrofits
- Feasibility of measures must include consideration of the economic, cultural, safety, and environmental perspectives
- Testing of new measures allows for real-time learning and the implementation of an adaptive approach
- Industry, governments, ports, NGOs and Indigenous communities have already been playing an important role in identifying, analyzing and testing potential solutions
- Collaboration is key - a solution requires everybody to be involved
Next Steps

• Research, modelling, testing, and assessing noise mitigation measures
• Analysis of 2017 Haro Strait slowdown trial data
• Support to ECHO program trials in summer 2018
• Collaboration with key US State and Federal partners (e.g., Washington State, US Coast Guard)
• Leadership at the IMO for quiet ship designs
• Encourage adoption of port underwater noise incentives at the global level
Thank you

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