

How community leadership is directing underwater noise mitigation in Canada's Arctic



Beluga whales (*Delphinapterus leucas*) in Gascoyne Inlet. Credit: Brian Beanlands

The Canadian Arctic is home to the Inuit of Canada, and to the marine life and resources which they depend on. Respected and cared for by the Inuit for thousands of years, the habitats and animals that thrive here are important parts of Inuit history and modern-day culture, spirituality, and livelihoods. The sub-zero waters of the often ice-covered Arctic Ocean give this area a unique soundscape where noise travels differently compared to warmer, non-ice-covered waters.

Rapid changes in climate are resulting in new challenges for the Arctic region. Warming temperatures and melting ice are creating new routes and longer seasons.¹ More ice-free waterways are reducing the need for specialized icebreakers and increasing access for mining, oil and gas exploration, commercial fishing, research, and tourism activities.² More human activity will increase underwater ocean noise (hereafter “ocean noise”) and intensify its impacts on local wildlife, including important whale species such as beluga, bowhead, and narwhal.³

The offshore marine waters of the Beaufort Sea are particularly important summer foraging grounds for the populations of Eastern Beaufort Sea beluga and Bering-Chukchi-Beaufort bowhead whales,^{4,5} while Tasiujaq (Eclipse Sound, Nunavut) is an important summering habitat for narwhal.⁶ Unfortunately, ocean noise from marine transportation has increased in all of these areas, and there have been impacts detected on these and other important species. For example, local harvesters, Indigenous communities, and scientists consider the displacement of narwhal from their summer habitat in

Tasiujaq to be increased ocean noise generated by large carriers and tankers. This, in turn, has negative impacts on harvesting activities.⁶

In part as a response to the increasing stressors on marine life in the Arctic, and in keeping with the principles of protection and preservation of Arctic wildlife, the environment, and biological productivity set out in the [Inuvialuit Final Agreement](#), the Inuvialuit Regional Corporation and the Inuvialuit Game Council initiated the establishment of the Tasiujaq Marine Protected Area (TNMPA) in 2010, and the Anguniaqvia niqiqyuam Marine Protected Area (ANMPA) in 2016. The conservation objectives for both MPAs were established using Indigenous traditional and local knowledge, and both MPAs were created through collaborative efforts by Fisheries and Oceans Canada, the Inuvialuit, stakeholders, and the Government of the Northwest Territories. Despite these protections, however, wildlife continue to be at risk vessels travelling at high speeds through these areas.¹

To help address increased vessel traffic in these MPAs and in response to a suggestion made by the Regional Coordinating Committee of the Beaufort Sea Partnership, the Canadian Coast Guard issues an annual [Notice to Mariners \(NOTMAR\)](#) detailing voluntary, vessel slowdowns and avoidance areas in important bowhead and beluga whale habitat. The Association of Arctic Expedition Cruise Operators distributes the NOTMAR to its Arctic members, and the Northwest Territories Department of Industry, Tourism and Investment includes the NOTMAR in its operator licensing packages.

The NOTMAR is updated annually in collaboration with Inuvialuit organizations to ensure the recommendations and zones are current and accurate. The Government of Canada also regularly solicits partner and stakeholder feedback on the NOTMAR and is working to broaden awareness by contacting other marine users based on suggestions received since its publication. Preliminary research has shown that some vessels, particularly research vessels and cruise ships, have begun to plan their routes to avoid the boundaries of the MPAs voluntarily. Although more monitoring is required to confirm this apparent outcome, preliminary ship tracking data suggest that vessels are compliant with the NOTMAR advice.

Ongoing scientific research and community input continue to inform and update the NOTMAR. For example, the team at [Wildlife Conservation Society Canada](#) (WCSC) annually measures vessel conformity with the NOTMAR using seasonal Automatic Identification System data. Small-vessel information has been opportunistically available through Inuvialuit community-based programs such as the [Enhanced Maritime Situational Awareness](#) (EMSA) initiative operated by the Tuktoyaktuk Hunters and Trappers Committee. Based on data from these various monitoring initiatives and updated bowhead tracking data, the NOTMAR was modified in 2021 to include an expansion of the whale slowdown boundaries. **Figure 1** shows the new boundaries and measures.

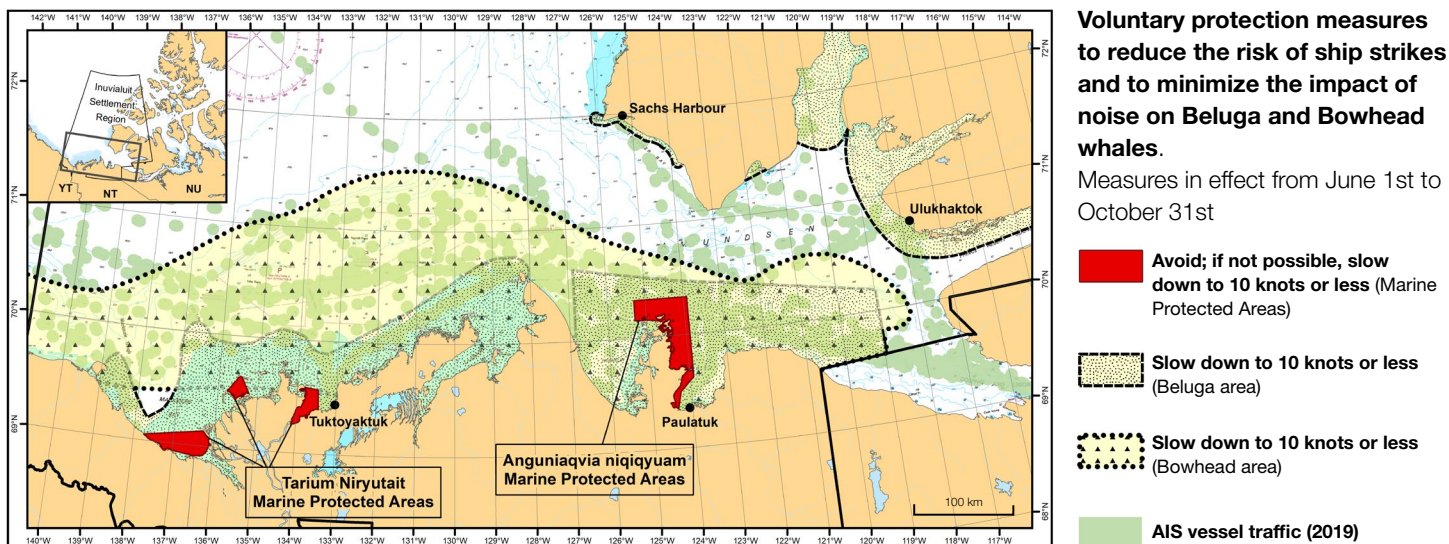
The Eastern Arctic has also seen significant increases in vessel traffic. Between 1990 and 2015, Cambridge Bay had the third-highest increase in vessel traffic in Nunavut due to an increasing number of passenger vessels, cargo vessels, tankers, and pleasure vessels traversing the Northwest Passage.⁷ Residents and communities expressed a need to better understand the risks and cumulative

The Enhanced Maritime Situational Awareness (EMSA) initiative was co-developed with Indigenous communities and industry to provide near real-time vessel activity and other marine environmental information in local waters through a user-friendly web platform. Since its launch in 2019, many Indigenous and coastal communities across Canada have adopted the technology, improving their situational awareness on the water.

effects posed by marine shipping activities in the region.⁷ As a pilot project under the [Cumulative Effects of Marine Shipping](#) (CEMS) initiative, the local Ekaluktutiak Hunters and Trappers Organization partnered with Transport Canada, Oceans North, and the WCSC to jointly conduct a CEMS assessment.

The results of that study provided measurements of ship noise in the region and estimates of the exposure of various marine mammals to ship noise.⁷ These data helped identify ways to improve future research efforts and guide recommendations for the management of vessel traffic. WCSC researchers are also providing the Ekaluktutiak Hunters & Trappers Organization with training on how to construct, deploy, and retrieve the acoustic recorders as well as how to analyze the data.⁷ The equipment records acoustic data such as whale calls continuously throughout the open-water season. It may then be left beneath the sea ice to detect marine-mammal vocalizations and record noise from spring icebreaking activities. This training on the construction and use of acoustic recorders is intended to build the capacity of the Cambridge Bay community to monitor ocean noise into the future.

Figure 1. NOTMAR whale slowdown areas in and near ANMPA and TNMPA based on new bowhead telemetry data and local and community observations (2023): Voluntary Avoidance and Slowdown Areas in the Inuvialuit Settlement Region.



Voluntary protection measures to reduce the risk of ship strikes and to minimize the impact of noise on Beluga and Bowhead whales.

Measures in effect from June 1st to October 31st

- Avoid; if not possible, slow down to 10 knots or less (Marine Protected Areas)**
- Slow down to 10 knots or less (Beluga area)**
- Slow down to 10 knots or less (Bowhead area)**
- AIS vessel traffic (2019)**

Ocean noise remains an ongoing and developing threat that will require effective research, increased policy attention, and ongoing co-management. The Government of Canada and its partners in the region are working through the Oceans Protection Plan on several initiatives to gather data and information on ocean noise and investigate opportunities for its mitigation and reduction. Improved coordination of shared efforts to better protect Arctic marine life and ecosystems is needed to complement the kind of partnerships that have led to the establishment of the western Arctic MPAs, the NOTMAR, and the CEMS and EMSA projects.

Next steps will include additional research and continued partnership and consultations with northern communities on a wide range of projects to better understand the impacts of ocean noise on Arctic habitats, species biodiversity, and ecosystem functions. The successes of the NOTMAR, EMSA and CEMS have highlighted the importance of effective collaboration, coordination, communication, and local adaptation of noise-related mitigation strategies by Inuit communities.



Scientist listening for real-time sounds of marine mammals and other marine fauna; Arctic Ocean, Canada Basin. Credit: Jeremy Potter NOAA/OAR/OER.

References

1. McWhinnie, L. H., Halliday, W. D., Insley, S. J., Hilliard, C., & Canessa, R. R. (2018). Vessel traffic in the Canadian Arctic: Management solutions for minimizing impacts on whales in a changing northern region. *Ocean & Coastal Management*, 160(March), 1–17. <https://doi.org/10.1016/j.ocecoaman.2018.03.042>
2. Jones, J. M., Westdal, K. H., Ootoowak, A. J., Wiggins, S. M., & Hildebrand, J. A. (2023). Impact of ship noise on the underwater soundscape of Eclipse Sound in the northeastern Canadian Arctic. *Marine Pollution Bulletin*, 195, 115534. <https://doi.org/10.1016/j.marpolbul.2023.115534>
3. Halliday, W. D., Barclay, D., Barkley, A. N., Cook, E., Dawson, J., Hilliard, R. C., Hussey, N. E., Jones, J. M., Juanes, F., Marcoux, M., Niemi, A., Nudds, S., Pine, M. K., Richards, C., Scharffenberg, K., Westdal, K., & Insley, S. J. (2021). Underwater sound levels in the Canadian Arctic, 2014–2019. *Marine Pollution Bulletin*, 168, 112437. <https://doi.org/10.1016/j.marpolbul.2021.112437>
4. Clark, C. W., Berchok, C. L., Blackwell, S. B., Hannay, D. E., Jones, J., Ponirakis, D., & Stafford, K. M. (2015). A year in the acoustic world of bowhead whales in the Bering, Chukchi and Beaufort seas. *Progress in Oceanography*, 136, 223–240. <https://doi.org/10.1016/j.pocean.2015.05.007>
5. Mayette, A., Marcoux, M., Iacozza, J., Ferguson, M., Brower, A., & Loseto, L. (2023). Summer distribution and habitat preference of beluga whale social groups in the Eastern Beaufort Sea. *Arctic Science*. <https://doi.org/10.1139/as-2022-0035>
6. Mittimatalik HTO. (2023). Interim Protections for Narwhal in Eclipse Sound: A proposal from the Mittimatalik HTO with support from Oceans North. *Prairie and Northern Region Canadian Marine Advisory Council*.
7. Transport Canada. (2022). *National Framework for Assessing the Cumulative Effects of Marine Shipping*. https://publications.gc.ca/collections/collection_2023/tc/T29-171-2022-eng.pdf

Published by:

Fisheries and Oceans Canada, Ottawa, Ontario K1A 0E6

Également disponible en français.

© His Majesty the King in Right of Canada, as represented by the Minister of the Department of Fisheries and Oceans, 2024

Issue number: 23-2340

Cat. No. Fs23-736/2024E-PDF

ISBN 978-0-660-71691-6