

McWhinnie L, Halliday WD, Hilliard C, Insley SJ, Canessa R (2018) Vessel traffic in the Canadian Arctic: management solutions for minimizing impacts on whales in a changing northern region. *Ocean and Coastal Management* 160: 1-17.

What is the research about?

- Approaches to managing vessel traffic varies throughout the world. We looked at measures that have been successful in reducing impacts on whales.
- Vessel traffic in the ISR is predicted to increase with a warming Arctic.

What we did:

- We reviewed vessel management tools used to reduce the impacts of vessels that are being applied in 33 MPAs, including at least one Arctic MPA.
- We identified multiple tools, but two tools could be applied in the immediate future in the eastern Beaufort Sea: voluntary exclusion zones and voluntary speed reduction zones.
- We addressed *voluntary exclusion zones* by modelling buffer zones (10 km, 50 km, 100 km) around the AN MPA and TN MPA.
- We considered *speed reduction schemes* of 15, 10, and 5 knot speed restrictions given mean and/or maximum speed.
- We used satellite Automated Identification System (AIS) data between 2012 and 2016 to quantify how many and what kind of vessels were in the area and what routes they took.
- We derived vessel use areas and calculated overlap within each MPA and buffer zone and quantified speed traveled by vessels in each buffer.
- We examined three vessels as a case study: a tug boat, a cruise ship (Crystal Serenity), and a bulk carrier. We then assessed how these vessels would be affected if voluntary avoidance and slow down schemes were implemented near important marine mammal areas and MPAs in the region.

What we found:

- Despite the known impacts of vessels on marine mammals, vessel management plans have been developed in implemented in only a few MPAs.
- We identified 14 tools used worldwide to reduce the impacts of vessels on whales in MPAs.
- There were 67 vessels in the study area in the ISR between 2012 and 2016: 18% were government/research vessels; 18% were tug boats; 15% were passenger vessels; 13.5% were recreational vessels; 10.5% were container vessels; 6% were naval vessels; 4.5% were tankers; as well as a dredger and fishing vessel.
- Buffer zones would affect 3-40% of the vessel use area around Arctic MPAs if implemented. The 100 km buffer zone was not practical given geographical and navigational issues.
- Over half of the vessels transiting through MPAs were traveling at more than 10 knots and would be affected by the most restrictive voluntary speed reduction.
- Reductions in speed had different effects on journey times for each of the three types of vessels examined.
- The most effective tool would be a mandatory exclusion zone for vessels within MPAs. However, a total ban would be difficult in the ISR since communities rely on shipping for resupply and the TN MPA is part of the community supply route between Inuvik and Tuktoyaktuk. As well, the AN MPA is directly outside of Paulatuk, and many smaller resupply vessels regularly travel through it.
- A combination of voluntary avoidance within the AN MPA and slowdowns for vessels that must travel through the AN MPA would be a good way to reduce vessel impacts on marine mammals within the AN MPA.

Key Result:

Overview of tools used to manage vessels in and near MPAs.

Spatial	Vessel	Monitoring	Outreach
Mandatory Exclusion Zone	Pilotage	Passive acoustic monitoring	On Ship
Restricted Access	Code of Conduct	Marine Mammal Observers	Industry
Voluntary Exclusion Zone	Reporting	Vessel Automatic Identification System	General Public
Vessel Re-Routing	Speed Reduction		

Our recommendations:

- MPA management plans require multiple tools for managing vessels in or near the MPA or other important areas for marine mammals.
- In the Arctic, ice cover and remoteness will affect the implementation and enforcement of any of these tools. However, the governance of MPAs by Inuvialuit communities and co-management institutions can be used to implement and enforce regulations on domestic vessels and drive changes in vessel behaviour through various tools.
- Our research suggests the largest buffer possible (given vessels can be audible when more than 100 km away) together with slowdown schemes would be most effective in AN MPA and TN MPA. These tools will most likely be taken up if they are voluntary, but require monitoring.
- Our research suggests vessel management is best targeted at larger vessels that travel farther from shore and at greater speeds than vessels like tugs that resupply communities. We show that large slow down areas may be more feasible management tools.

Why is this research relevant to the Inuvialuit people?

- Marine mammals such as bowhead whales, beluga whales, bearded seals and ringed seals live in the region and use sound to communicate, find food, mates, and avoid predators. They are also a critical part of Inuvialuit food sovereignty and have been managed by Indigenous communities for millennia.
- Any increase in marine vessel traffic has implications not only for the conservation of marine mammals, but all the Inuvialuit communities that depend on these mammals for nutrition, cultural, and spiritual values.
- The Inuvialuit are actively engaged in management planning for the two MPAs and the AN MPA plan is still in progress. Both consider the impact of vessel activities in the future. This review provides a preliminary overview of tools that the Inuvialuit can consider and suggests two voluntary tools as well as monitoring approaches that may be useful tools to start with in reducing vessel impacts to marine mammals.

How was the community involved?

No community involvement as this was an examination of practices in other jurisdictions.

Where can I get more information about this project?

- Stephen Insley and William Halliday are scientists with Wildlife Conservation Society (WCS) Canada (wccanada.org). You can reach them at sinsley@wcs.org and whalliday@wcs.org.
- Other information:
 - <http://data.nwtresearch.com/Scientific/16330>
 - <http://data.nwtresearch.com/Scientific/15470>
 - www.arcticnoise.ca