

Heimrich AF, Halliday WD, Frouin-Mouy H, Pine MK, Juanes F, Insley SJ (2021) Vocalizations of bearded seals (*Erignathus barbatus*) and their influence on the soundscape of the western Canadian Arctic. *Marine Mammal Science* 37: 173-192.

What is the research about?

- Bearded seals are highly vocal throughout their mating season and can produce calls of long duration and large frequency ranges.
- Bearded seal vocalizations might even be an important driver of underwater sound levels during the mating season, as their vocalizations seem to be a dominant source of underwater sound.
- Given that ice-free periods in the Arctic might get longer, vocalization periods of bearded seals might also change. Therefore, monitoring of bearded seal vocalizations is required to track any changes in their vocalizations and in the timing of their mating season.

What we did:

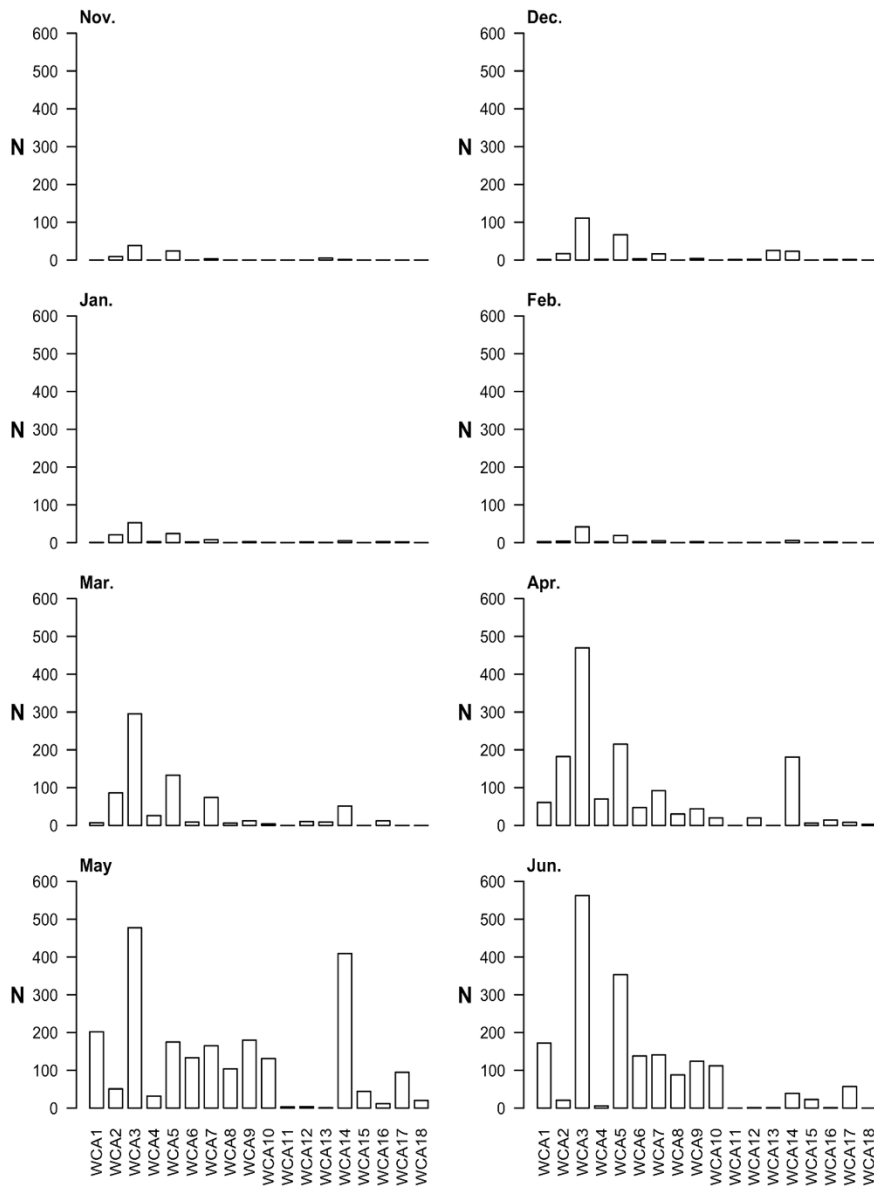
- We recorded underwater acoustic data near Sachs Harbour, southern Banks Island between August 2015 and July 2016.
- Data were analyzed manually and automatically using a 'bearded seal' detector.
- All clearly visible vocalizations were manually measured in 10% of the recordings.
- All vocalizations were compared based on their parameters to previous studies from other areas and consequently classified into different call types.
- Underwater sound levels were measured and the influence of bearded seal calls on sound levels was examined.

What we found:

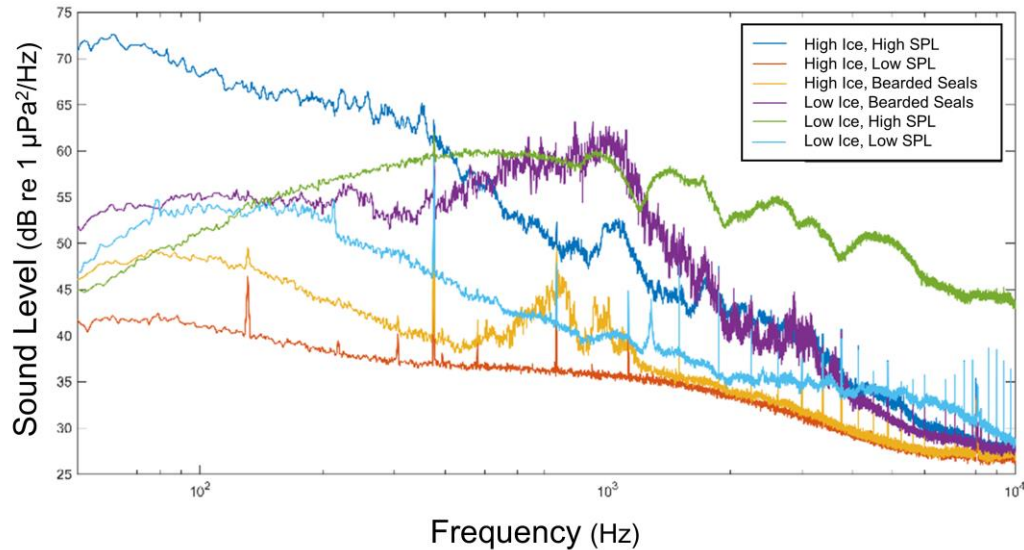
- We identified 18 different call types for bearded seals at Sachs Harbour, and 7 of these call types were new additions for the region.
- Bearded seals made 4 broad types of calls: trills, moans, ascents, and sweeps. Trills were the most common type of call, and one particular type of trill was only detected during the mating season.
- Vocalizations throughout the mating season impacted the underwater sound environment, especially on calm days when wind and ice noise were absent.
- Sea ice dynamics play a key-role in regulating underwater sound levels, and are highly related to the timing bearded seal vocal behaviour.

Key results:

This figure shows the prevalence of different call types (WCA1 to WCA18) in each month between November and June, with very clear peaks in call counts in April to June. The trill labelled WCA3 is the dominant call type in all months. Listen to sounds of bearded seals and other marine animals at <http://www.arcticnoise.ca/arctic-sounds.html>.



This figure shows the distribution of sound levels over different frequencies in low and high sea ice conditions compared to the absence and presence of bearded seal vocalizations. Bearded seal vocalizations during the mating season (purple line) show a very clear spike in underwater sound levels that can even surpass the levels caused by high wind during the open water season.



Our recommendations:

- Maintain long-term acoustic monitoring for bearded seal vocal behaviour to track any changes in how this species responds to changes in sea ice dynamics.

Why is this research relevant to the Inuvialuit people?

- Bearded seals are an important focus of Inuvialuit subsistence hunting.
- Changes in sea ice dynamics could negatively affect the population status of bearded seals and therefore have an impact on the Inuvialuit people who rely on them.

Was the community involved?

- Yes. This work was conducted with the help of the people of Sachs Harbour, specifically the Sachs Harbour Hunters and Trappers Committee, W. Gully, B. Hoagak, T. Lennie, J. Kudak, and J. Kuptana.