

Evolution & Behavior

The Arctic's singing whales

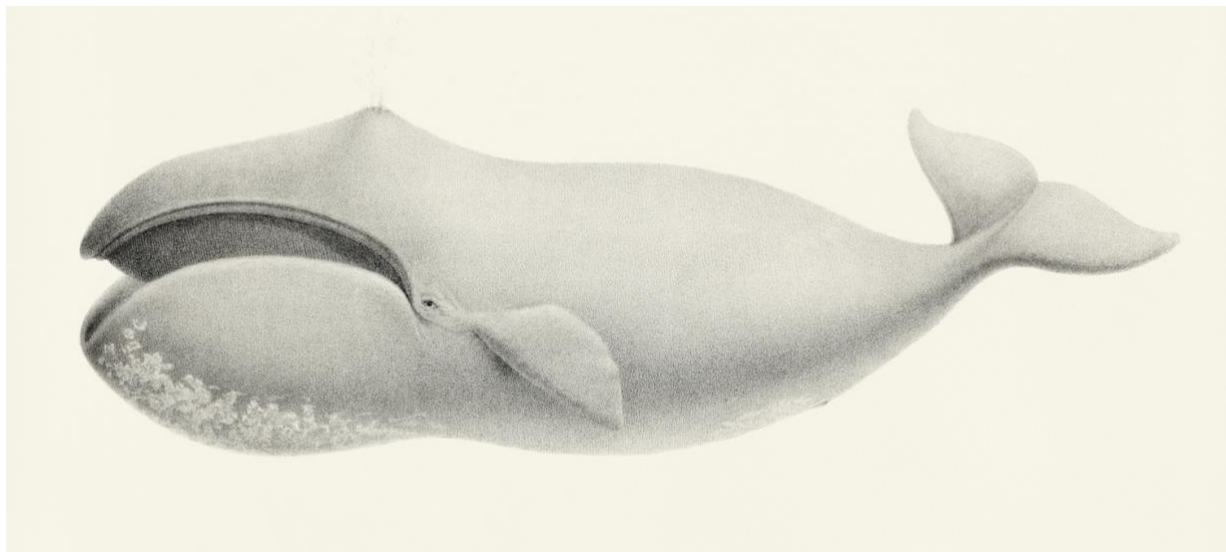
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ABSTRACT

Almost all mammals communicate using sound, but few produce complex songs. Bowhead whales are one of only two of the great whales to do so. Spitsbergen bowhead whales produce dozens of different songs every winter; this acoustic repertoire is unique among mammals.



The [bowhead whale](#) is above all, a whale of superlatives. It is the only large whale to live year-round in the Arctic, its “bowed head” allows it to push up through half a meter of ice, it can live up to 200 years and it has the thickest blubber and longest baleen of any whale. It is for these last two extremes that bowhead whales were the preferred target of whalers, even as early as the 1600s. The blubber of bowhead whales was used for light, fuel and lubrication and soap. [Baleen](#) was the plastic equivalent of the 1600-1800s. It was used for buggy whips and corset stays, anything that required strength and flexibility. Because whale oil and baleen were so valuable, by the mid-1700s in the North Atlantic, whalers had driven bowhead whales along both sides of Greenland to near extinction.

Because bowhead whales spend their lives in the Arctic, where sea ice can be impenetrable, temperatures a bitterly cold and there is no light for four months of the year, usual methods of studying whales don't work well in the Arctic. One method that does, though, is eavesdropping underwater. Sound travels far and efficiently underwater so you can monitor a larger area than you could by looking at the surface for animals that spend most of the time under water (or ice). Sounds can be recorded year-round, regardless of overhead sea ice, lack of light, storminess, or bitter cold. My co-authors and I first put an underwater recorder in [Fram Strait](#) off northeast Greenland in the hopes of hearing a few grunts and moans of the Spitsbergen population of bowhead whales to give us an idea if, when, and where they might still be found. The instrument was deployed underwater for a year and recorded

acoustic data for 15 minutes every hour. To find the bowhead sounds, we had to get the instrument back, download the data, display the sounds as pictures, and listen to many, many hours of song and then characterize each different song by the “notes” of which it was composed.

What we discovered was that bowhead whales were not only off northeastern Greenland for many months of the year, but that they were singing. They were singing all day long for months at a time under heavy ice and during the [polar night](#), and their songs were constantly changing. Over multiple years of data not only did we record many dozen songs a year, but we never recorded the same song in more than a single year.

This discovery was unexpected. First, we never expected to hear bowhead whales nearly year-round, and over many years now, in a remote region in the middle of Fram Strait. Second, while we knew that bowheads sing, it was assumed that like humpback whales, all whales sing the same song in the same year. Song in whales (and birds and frogs and bats, and even mice) is a male reproductive display that can be used by males to size each other up and/or by eavesdropping females to determine if the singer might be a good choice for a mate. In many species, song is culturally transmitted among

animals and all males in a population sing the same song in a year or over a lifetime. Song is often stereotyped so that individuals can identify themselves to a species or population or reproductive state. The high diversity in different song types sung by bowhead whales both within and between years suggests that they are doing something completely different. We know that some whales share a song, at least over short time periods, but others sing completely different songs, using entirely different notes. The rapid turnover of songs over a winter and between years suggests that bowhead whales are constantly changing their tune. And for now, we can only make guesses as to why. Do bowhead whales innovate because there is reduced selection pressure to all sound the same? Is song diversity related to population size? Or does their dynamic under-ice habitat drive novelty?

We don't know. What we do know is that Fram Strait is likely a mating ground for bowheads and as such, is critical habitat. A much larger interdisciplinary study of bowhead whales has recently been undertaken by the Norwegian Polar Institute and it now appears that the Spitsbergen population of bowhead whales is much larger than believed (although still relatively small in numbers) before this study. And it all started with a song (or sixty).