

Bowhead whales, the 'jazz musicians' of the Arctic, sing many different songs

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A bowhead whale surfaces in Fram Strait, to the northwest of Norway. Credit: Kit Kovacs/Norwegian Polar Institute

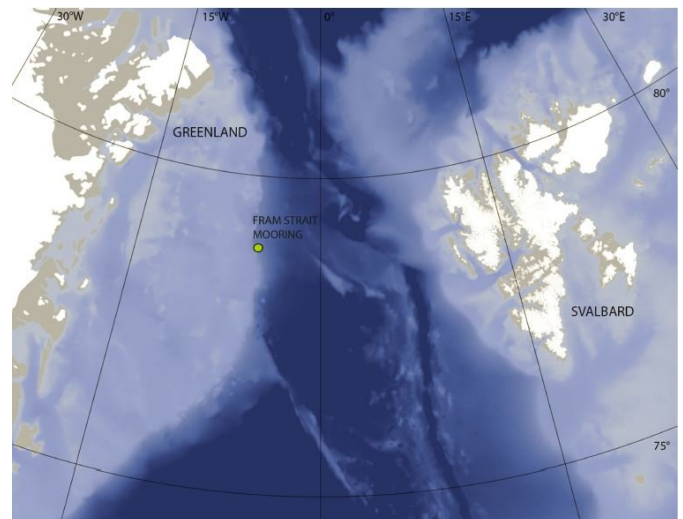
Spring is the time of year when birds are singing throughout the Northern Hemisphere. Far to the north, beneath the ice, another lesser-known concert season in the natural world is just coming to an end.

A University of Washington study has published the largest set of recordings for [bowhead whales](#), to discover that these marine mammals have a surprisingly diverse, constantly shifting vocal repertoire. The study published April 4 in *Biology Letters*, a journal of the United Kingdom's Royal Society, analyzed [audio recordings](#) gathered year-round east of Greenland. This population of bowhead whales was hunted almost to extinction in the 1600s and was recently estimated at about 200 animals. Audio recordings gathered from 2010 to 2014 indicate a healthy population, and include 184 different songs.

"If humpback whale song is like classical music, bowheads are jazz," said lead author Kate Stafford, an oceanographer at the UW's Applied

Physics Laboratory. "The sound is more freeform. And when we looked through four winters of acoustic data, not only were there never any song types repeated between years, but each season had a new set of songs."

Stafford has recorded whales' sounds throughout the world's oceans as a way to track and study marine mammals. She first detected bowhead whales singing off the other side of Greenland in 2007. A previous study by Stafford of the Spitsbergen whales off west Greenland reported in 2012 that the whales were singing continuously during the winter breeding season, the first hint that there may be a healthy population in that area.



Map of Fram Strait with a green dot showing where the hydrophone was located from 2010-2014. This region is only accessible to ships in late summer. The hydrophone was moored about 80 meters below the surface in water 1,020 meters deep. Credit: Kate Stafford/University of Washington

"We were hoping when we put the hydrophone out that we might hear a few sounds," Stafford said of

the earlier study. "When we heard, it was astonishing: Bowhead whales were singing loudly, 24 hours a day, from November until April. And they were singing many, many different songs."

The new paper extends that initial five-month dataset, and confirms that bowhead whales sing in this region regularly from late fall to early spring. In fact the hydrophones, which are underwater microphones, picked up slightly more singing in the later years of the study. But what was most remarkable was the relentless variety in the animals' songs, or distinct musical phrases.

The only other whale that sings elaborate songs—humpback whales—are widely studied in their breeding grounds off Hawaii and Mexico. The humpback's melodious [song](#) is common to each population of males and shifts slightly during the winter breeding season. Each population debuts a new tune in the spring.

"It was thought that bowhead whales did the same thing, based on limited data from springtime," Stafford said. "But those 2008 recordings were the first hint, and now this data confirms that bowhead whale songs are completely different from the humpbacks'."

Animal songs are not the same as animal calls because songs are complex, distinct musical phrases that must be learned. Many birds and mammals use songs to identify themselves as individuals or as members of a group, among other uses.

"For marine mammals, acoustics is how they do everything," Stafford said. "Humans are mostly visual animals, but marine mammals live in a three-dimensional habitat where sound and acoustic information is how they navigate, how they find food, how they communicate."

Singing whales, like birds, may be doing some combination of acoustic competition with other animals and attracting mates, Stafford said. But little is known about the bowhead whales' singing: whether only males make these sounds, whether individuals can share songs, and, most importantly, why their tune changes all the time.

"Why are they changing their songs so much?" Stafford said. "In terms of behavioral ecology, it's this great mystery."

The new data suggest bowhead whales may be similar to cowbirds and meadowlarks, birds that learn a diverse, ever-changing repertoire of songs, maybe because novelty offers some advantage.

"Bowhead whales do this behavior in the winter, during 24-hour darkness of the polar winter, in 95 to 100 percent sea ice cover. So this is not something that's easy to figure out," Stafford said. "We would never have known about this without new acoustic monitoring technology."

Current research placing radio tags on bowhead [whales](#) may someday explain why this whale has evolved to become such a versatile virtuoso.

"Bowheads are superlative animals: they can live 200 years, they've got the thickest blubber of any whale, the longest baleen, they can break through ice," Stafford said. "And you think: They've evolved to do all these amazing things. I don't know why they do this remarkable singing, but there must be a reason."

More information: Extreme diversity in the songs of Spitsbergen's bowhead whales, *Biology Letters*, [rsbl.royalsocietypublishing.org/.../1098/rsbl.2018.0056](https://rsbl.royalsocietypublishing.org/doi/10.1098/rsbl.2018.0056)

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