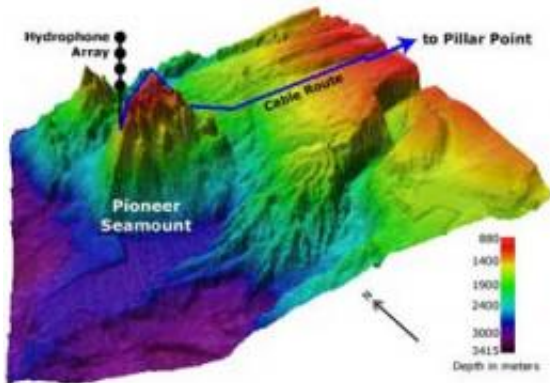


# Blue whales have perfect pitch

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The topography at Pioneer Seamount Underwater Observatory, 50 miles off the shore of Half Moon Bay, where Professor Roger Bland captured recordings of blue whale songs. Pioneer Seamount is an underwater mountain which was used to support a vertical hydrophone array (underwater microphones at different height intervals). Credit: NOAA PMEL Vents Program

Blue whales have the remarkable ability to synchronize the pitch of their songs so that they all hit the exact same note, according to a new study. Professor of Physics Roger Bland recorded thousands of whale songs off the coast of California and found that whales in the eastern North Pacific are tuning into a common frequency--behavior that may help these giant creatures find potential mates.

"A synchronized pitch is surprising since we would expect animals of different sizes to produce sounds at a different pitch, for example a small dog with a high-pitched bark or a large dog with a low bark," said

Bland, an underwater acoustics expert.

Using underwater microphones installed off the coast of northern California's Half Moon Bay, Bland captured 4,378 blue whale songs and analyzed the whales' B calls, the long, sad moan that forms the second half of the song used by whales in the eastern North Pacific. Scientists believe that whale populations have their own signature tunes.

The analysis revealed that the whales all produce the B call at a frequency of 16.02 Hertz, exactly four octaves below middle C.

"We found that [blue whales](#) are capable of very fine control over the pitch of their call -- both in reproducing their call at the same pitch every time and in synchronizing their pitch with others," Bland said.

The study found a very slim margin of error from call to call. In musical terms, the half-tone change of pitch between the notes C and C Sharp is a 6 percent increase in pitch, whereas the variation observed between the blue whale's B calls was only a 0.5 percent change in pitch.

Bland believes that tuning in to a uniform pitch might help individual whales locate potential mates, particularly since the songs appear to only be sung by males.

"If whales are so super accurate in always calling at the exact same pitch, then it's possible that they could be able to detect tiny shifts in other whales' calls caused by the [Doppler shift](#)," said Bland, referring to the change in pitch that is heard when the source of sound is moving toward or away from an individual -- the same effect when we hear the whistle of a passing train.

"Given that blue whales can travel up to 5 meters per second, it's feasible that females could locate calling males by swimming toward or away

from a male and listening for the changes in the male's [pitch](#)," Bland said. "There's certainly something very deliberate and strategic about their songs."

The study was published in the July 2010 issue of the Journal of the Acoustical Society of America and can be found on [Bland's website](#).

Provided by San Francisco State University

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