

Military sonar can alter blue whale behavior

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Duke research scientist Ari Friedlaender plants a suction cup tag on the back of a blue whale off the coast of Southern California. Credit: Ari Friedlaender, Duke Marine Lab (NMFS Permit 14534)

Some blue whales off the coast of California change their behavior when

exposed to the sort of underwater sounds used during U.S. military exercises. The whales may alter diving behavior or temporarily avoid important feeding areas, according to new research.

The Southern California Behavioral Response Study exposed tagged [blue whales](#) in the California Bight to simulated mid-frequency (3.5-4 kHz) sonar sounds significantly less intense than the military uses.

"Whales clearly respond in some conditions by modifying diving behavior and temporarily avoiding areas where sounds were produced," said lead author Jeremy Goldbogen of Cascadia Research. "But overall the responses are complex and depend on a number of interacting factors," including whether the whales were feeding deep, shallow or not at all.

The study, funded by the U.S. Navy Chief of Naval Operations Environmental Readiness Division and the U.S. Office of Naval Research, appears July 3 in the *Proceedings of the Royal Society B*.

The scientists tagged the whales with non-invasive suction cups, which recorded [acoustic data](#) and high-resolution movements as the animals were exposed to the controlled sounds.

"The tag technology we use offers a unique glimpse into the underwater behavior of whales that otherwise would not be possible," said Ari Friedlaender, a research scientist at the Duke Marine Laboratory.

The scientists found that some of the whales engaged in deep feeding stopped eating and either sped up or moved away from the source of the noise. Not all of the whales responded to the noise, and not all in the same way.

"Blue whales are the largest animals that have ever lived. Populations

globally remain at a fraction of their former numbers prior to whaling, and they appear regularly off the southern California coast, where they feed," said John Calambokidis, one of the project's lead investigators of Cascadia Research.

That area of the ocean is also the site of military training and testing exercises that involve loud mid-frequency sonar signals. Such sonar exercises have been associated with several unusual strandings of other marine mammal species (typically beaked whales) in the past. Until this study, almost no information was available about whether and how blue whales respond to sonar.

"These are the first direct measurements of individual responses for any baleen whale species to these kinds of mid-frequency sonar signals," said Brandon Southall, SOCAL-BRS chief scientist from SEA, Inc., and an adjunct researcher at both Duke and the University of California Santa Cruz. "These findings help us understand risks to these animals from human sound and inform timely conservation and management decisions."

A related [paper](#) published July 3 by the same research team in *Biology Letters* has shown clear and even stronger responses of Cuvier's [beaked whales](#) to simulated mid-frequency sonar exposures. Beaked whales showed a variety of responses to both real, military sonar in the distance and nearby simulated [sonar](#). What the beaked [whales](#) were doing at the time appeared to be a key factor affecting their reactions.

More information: "Blue whales respond to simulated mid-frequency military sonar," Jeremy Goldbogen, Brandon Southall, et al. *Proceedings of the Royal Society B*, July 3, 2013. [DOI 10.1098/rspb.2013.0657](https://doi.org/10.1098/rspb.2013.0657)

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