

## **Analysis of a Blainville's beaked whale movement response to playback of orca calls**

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Increasing evidence links exposure to Navy mid-frequency active (MFA) sonar and certain mass strandings of odontocetes, particularly deep diving beaked whales. Although the cause of these strandings is unknown, one theory suggests the animals confuse the sonar signals with vocalizations of orcas, a known predator. Here we analyze the movement patterns of a female Blainville's beaked whale (*Mesoplodon densirostris*) in reaction to playbacks of MFA sonar and orca signals.

The study was conducted in 2007 at the Atlantic Undersea Test and Evaluation Center on Andros Island, Bahamas. The study animal was tagged with a suction cup digital archival tag that recorded acoustic and movement data. After completing one foraging dive, the animal was exposed to a playback of MFA sonar with an initial source level (SL) low enough that the signal was inaudible at the whale. The SL was gradually increased over 15 minutes until reaching a maximum received level at the whale of 147 dB re 1 $\mu$ Pa. During the next foraging dive, the whale was exposed to a playback of orca vocalizations, which were also slowly ramped up over 10 minutes to a maximum received level of 129 dB re 1 $\mu$ Pa.

The movement data were analyzed using a randomization test with a nonparametric density estimate. We found a significant difference in heading distribution after the cessation of the orca playback ( $p < 0.01$ ), with the animal maintaining a relatively straight course away from the sound source for an extended period of time. For a beaked whale to be at risk of stranding it must swim a considerable distance from its deep-water habitat towards shore. The prolonged avoidance response observed here suggests a behavioral reaction that could pose a risk factor for stranding. Further analysis will reveal what signal types and received levels may induce a prolonged avoidance reaction in beaked whales.