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Atlantic Behavioral Response Study: Experimental Design, Analytical Methods, and Preliminary Results

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Atlantic Behavioral Response Study: Experimental Design, Analytical Methods, and Preliminary Results

Topic
Controlled exposure experiments (CEE) or Behaviour response studies (BRS) in the field

Sound source
Sonar

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The Atlantic Behavioral Response Study (BRS) is quantifying the behavioral responses of cetaceans to military mid-frequency (~3-4 kHz) active sonar (MFAS) systems. Our multi-institutional collaboration leverages extensive baseline monitoring of Cuvier's beaked whales (*Ziphius cavirostris*) and short-finned pilot whales (*Globicephala macrorhynchus*) off Cape Hatteras, NC and employs experimental methods developed in previous BRS work. Our research approach is facilitated by a high density of Cuvier's beaked whales in this region. The experimental design is a before-during-after controlled exposure experiment (CEE), but there are several unique aspects of the study. Notably, we combine the use of short-term, high-resolution archival tags and longer-term, coarser resolution satellite-linked tags to examine responses at different temporal and spatial scales. Furthermore, the study occurs in an area outside an active military range, where MFAS training exercises occur relatively infrequently. Our approach is designed to test for specific responses in: horizontal avoidance; foraging behavior; and social affiliation. In our first field season (2017) we deployed satellite tags on 14 beaked and 12 pilot whales as well as high resolution archival tags on individual beaked and pilot whales. We also conducted 21 unique CEE sequences on tagged whales, with both simulated and operational MFAS. Preliminary analyses suggest some short-term behavioral responses (horizontal avoidance, cessation of feeding) from some, but not all, individuals. We found no large-scale abandonment of habitat or long-term cessation of feeding. Our subsequent field efforts will increase sample size and address contextual variables relevant to response probability, including: source-animal range, received level, and behavioral state.

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