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Behavior and Habitat Use of Humpback Whales (*Megaptera novaeangliae*) on a US Navy Training Range

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A Time Difference of Arrival (TDOA) method was used to acoustically localize singing humpback whales (*Megaptera novaeangliae*) on the US Navy's Pacific Missile Range Facility (PMRF) in Hawaii. 2090 hours of recorded data were collected during non-training event periods between September and June, 2011-2014. Eighty-one three-dimensional tracks were obtained with one to six tracks occurring on 42 separate days. The minimum detection rate occurred in January 2012 with 0.01 dives per hour of effort, and a maximum detection rate of 0.18 dives per hour of effort occurred in March 2011. Tracks were determined to fall into three behavioral categories - Travel, Localized Dive, and Mill. Metrics including bearing, directivity, speed, and dive depths were measured and compared between behavior categories, as well as across the breeding season. While the mean track bearings were not statistically different across months, the range of bearings was more restricted in December-February (152° - 250°, S-SW) than in March-May (114° - 346°, SE-NNW). Tracks of Travel behavior had the highest mean speed, longest distances, deepest dives, and the most direct path. Localized Dives had the least direct path and occurred over the shortest distances. Most tracks started and finished during the daytime period with some continuing into the night, but no tracks started and ended at night, indicating some diel periodicity to the behavior in this area. This analysis can provide valuable information about the habitat use of an offshore portion of humpback whale breeding grounds and the baseline behavior of humpback whales on a US Navy range.

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