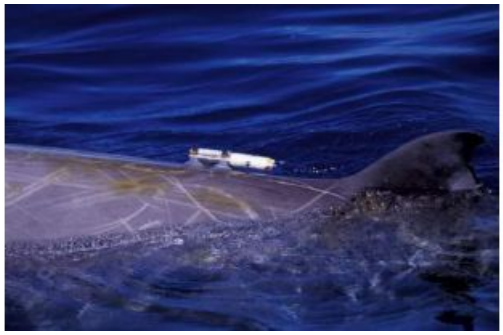
Sonar Linked to Whale Strandings



The first data on how beaked whales respond to naval sonar exercises appears in a new report from an international research team. Their results suggest that sonar affects the behaviour and movement of whales.

Scientists have long been aware of a link between naval sonar exercises and unusual mass strandings of beaked whales. Evidence of such a link triggered a series of lawsuits in which environmental groups sued the US Navy to limit sonar exercises to reduce risk to whales. In 2008, this conflict rose to the level of the US Supreme Court which had to balance potential threat to whales from sonar against the military risk posed by naval forces inadequately trained to use sonar to detect enemy submarines. The court ruled that the Navy could continue training, but that it was essential for the Navy to develop better methods to protect the whales.

The knowledge most critical to protecting these whales from risk of sonar involves measuring the threshold between safe and risky exposure levels, but until now it has not been known how beaked whales respond to sonar, much less the levels that pose a problem. "We know so little about beaked whales because they prefer deep waters far offshore, where they can dive on one breath of air to depths of over a mile for up to an hour and a half," said Peter Tyack, a senior scientist at Woods Hole Oceanographic Institution (WHOI).

Tyack and his colleagues used two complementary methods to investigate behavioural responses of beaked whales to sonar: "an opportunistic approach that monitored whale responses to multi-day naval exercises involving tactical mid-frequency sonar, and an experimental approach using playbacks of simulated sonar and control sounds to whales tagged with a device that records sound, movement, and orientation," the researchers report in the current issue of the journal PLOS (Public Library of Science) ONE.
Beaked whales use their own biosonar to find prey when they are foraging; this means that one can monitor cessation of foraging by listening for when they stop clicking. Once the researchers found that beaked whales responded to sonar by ceasing clicking, they were able to monitor reactions of beaked whales during actual sonar exercises on the range. The research was conducted on a naval testing range where an array of underwater microphones, or hydrophones, covered the seafloor, allowing whale sounds to be monitored over 600 square miles. "During actual sonar exercises, beaked whales were primarily detected near the periphery of the range, on average 16km away from the sonar transmissions. Once the exercise stopped, beaked whales gradually filled in the centre of the range over 2-3 days," they report.

A satellite tagged whale moved outside the range during an exercise, returning over two to three days post-exercise. "This suggests that beaked whales are particularly sensitive to sound. Their behaviour tended to be disrupted at exposure levels around 140 decibels (dB), so they may require a lower threshold than many current regulations that anticipate disruption of behaviour around 160dB," said Tyack. "But the observations on the naval range suggest that while sonar can disrupt the behaviour of the whales, appropriate monitoring and management can reduce the risk of stranding."

The research was supported by the United States Office of Naval Research, the U.S. Strategic Environmental Research and Development, the Environmental Readiness Division of the U.S. Navy, the U.S. Chief of Naval Operations Submarine Warfare Division (Undersea Surveillance), NOAA and the Joint Industry Program on Sound and Marine Life of the International Association of Oil and Gas Producers. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.