

## Researchers Collaborate to Study Marine Mammal Behavior

*Tagging and monitoring project off Southern California leads to increased understanding of whales and dolphins, including reactions to sound*

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A team of researchers recently completed an intensive and extremely productive two-month research project off the Southern California coast, part of a collaboration to study marine mammal behavior and measure how animals on the U.S. West Coast respond to sounds in the ocean.

The interdisciplinary collaboration of biologists and acousticians specializing in marine mammal biology, ecology and behavior-called SOCAL-10 (Southern California 2010)-is extending ongoing studies of basic biology, feeding behavior and responses to human activity in a number of marine mammal species, including large whales and several smaller cetacean species. The project is part of a five-year study funded by the U.S. Navy and coordinated with NOAA, but primarily being conducted by independent academic and research groups.

"The overall objective is to provide a direct scientific basis for estimating risk and minimizing the impact of human sound, and particularly those from military sonars, for navies and regulators," said Brandon Southall of Southall Environmental Associates (SEA), Inc. and the University of California, Santa Cruz.

SOCAL-10 included tagging, tracking and acoustic experiments on nine different marine mammal species, designed to study basic behavioral patterns and how these animals may change their behavior when they hear different sounds, including Navy sonar.

A scouting trip and extremely productive first experimental phase of the project focused primarily inshore and on behavior and responses of blue, fin and sperm whales.

Favorable weather conditions and an unusual abundance of large whales off Southern California led to a tremendous amount of data being collected during these phases in August and early September. More than 50 acoustic, dive and location-orienting sensors were attached to individuals of seven different marine mammal species (blue, sei, fin, sperm, killer and Baird's beaked whales, in addition to bottlenose dolphin), resulting in a large set of basic biological and behavioral data. The deployments of tags on sei and Baird's beaked whales were the first of their kind on the U.S. West Coast and will provide critical data about the movement and behavior of these little known species.

The second experimental phase commenced Sept. 21 from the Scripps research vessel *Sprout* in collaboration with John Hildebrand, a Scripps Institution of Oceanography at UC San Diego professor of oceanography, and focused on offshore species including beaked whales, sperm whales and Risso's dolphins. Researchers tagged and conducted the first-ever controlled sound exposure experiment with a Cuvier's beaked whale, which is the species most commonly present in sonar-associated marine mammal strandings. Additionally, the first-ever successful acoustic tag and exposure study on a Risso's dolphin was conducted.

"By working with the Navy in the instrumented Southern California Offshore Range, we were able to readily locate Cuvier's beaked whales, elusive animals, that are primarily found in deepwater offshore areas," said Hildebrand.

"The researchers involved in SOCAL-10 hope the project contributes to a greater understanding of biologically important areas, how marine mammals dive and communicate and to understand how Navy activities impact them," said John Calambokidis of Cascadia Research Collective (CRC).

Preliminary results based primarily on observed behavior were variable, suggesting overt responses in some conditions and indicated variation by species, behavioral state and type of sound. However, researchers will take months to analyze and interpret the nearly 400 hours of tag data from the project, as well as thousands of marine mammal observations and photographs. The data from the tags will provide a more clear and objective way to assess reactions, pending additional analysis.

Most importantly this provides the first data on the reaction of some of these species to specific types of sound and fills a critical gap in knowledge. SOCAL-10 is the first project to rigorously measure marine mammal response to the types of military sonar sounds that have been associated with previous marine mammal stranding events in specific circumstances.

Overall, SOCAL-10 had 62 successful tag attachments (using six kinds of tags) on 44 individual animals representing nine marine mammal species. Scientists also conducted 28 controlled sound exposure experiments. In these experiments, animals were monitored with suction cup acoustic sensors, remote listening devices and specialized observers with high-powered binoculars. Sounds were played to the animals under specific protocols and protective measures to ensure the animals were not harmed and any changes in behavior were measured.

The project was lead by Southall and Calambokidis, and included scientists from CRC, SEA, Scripps Institution of Oceanography, Woods Hole Oceanographic Institution, NOAA, Duke University, Naval Undersea Warfare Center and SPAWAR Systems Pacific.

For additional information on this project see the: [SOCAL-10 website](#) [SOCAL-10 blog](#) [SOCAL-10 Facebook page](#)

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