

Scripps Oceanography Research Studies Shed New Light on Blue Whales and Their Calls

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Using a variety of new approaches, scientists at Scripps Institution of Oceanography at UC San Diego are forging a new understanding of the largest mammals on Earth.

In one recently published study on blue whales, Scripps researchers used a combination of techniques to show for the first time that blue whale calls can be tied to specific behavior and gender classifications. In a separate study, researchers used recordings of blue whale songs to determine the animal's population distributions worldwide.

While the specific function of songs and calls produced by whales remains a mystery to a large degree, the sounds are thought to mediate social interactions between the animals.

The first study, led by Scripps postdoctoral researcher Erin Oleson and Scripps scientist John Hildebrand, describes the behavioral context of calls produced by eastern North Pacific blue whales. Few researchers have attempted to link sound production with specific behaviors or environmental conditions to attempt to determine the significance of whale calls.

"This is the first study that has been able to study the calls by directly observing the animal while it is calling and gathering key information such as depth and body orientation-getting a sense of what the animal is doing underwater," said Oleson. "Once you understand the context of specific types of sounds, then you can use those sounds to infer something about what they are doing when you are not there to actually see them doing it."

Using a blend of approaches that included attaching miniature acoustic recording tags to whales, Oleson and her colleagues were able to find clear patterns tied to whale behavior, sex type and group size with specific call types. The tags included the National Geographic "Critttercam," an integrated video-camcorder and data-logging system, and the "B-probe," an electronic data-logging tag attached to the animal via suction cup. Those data were supplemented with analysis of whale tissue samples and visual observations from ships.

The researchers found that only males produced sounds known as "AB" calls while "D" calls were heard from both sexes, typically during foraging. The researchers note in the paper, published in the January 25 issue of the *Marine Ecology Progress Series* journal, that the sex bias evident in AB callers suggests that those calls probably play a role in reproduction.

Oleson hopes such call and behavior information will eventually be used for better understanding whale habitats and calculating species abundances.

The second study, published in a recent issue of the *Journal of Cetacean Research Management*, describes the first attempt at determining worldwide blue whale populations by analyzing nuances of their songs.

Hildebrand and his colleagues used acoustic recordings from around the world, including data from his own instrument deployments and recordings from other scientists and the U.S. Navy, to create a new map that geographically categorizes blue whale species types into nine regions around the world based on their song "dialects."

Map geographically categorizing blue whale species types into nine regions based on their song "dialects."

While certain regional designations are concentrated in areas close to one coastal area, such as the map's "type 1" classification primarily off the North American coast, others, such as "type 4," are spread over broad areas, in this case throughout the Northern Pacific Ocean.

The blue whale saw its numbers dwindle dangerously before whaling moratoria were enacted. Now the new study may become a tool for representing its true population stocks. The paper suggests that the stock structures of blue whales, traditionally based on International Whaling Commission boundaries, should instead be reconstructed based on song, which would more accurately represent their true population distributions.

"By listening to the animals, you can tell something about the areas in which they are interacting to breed and that's important to know for managing and conserving the animals," said Hildebrand, who coauthored the paper with Mark McDonald of Whale Acoustics and Sarah Mesnick of the Southwest Fisheries Science Center, National Oceanic and Atmospheric Administration.

Coauthors of Oleson's study, in addition to Hildebrand and McDonald, include John Calambokidis of the Cascadia Research Collective, William Burgess of Greeneridge Sciences and Carrie LeDuc of the Southwest Fisheries Science Center.

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