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KILLER WHALES IMITATE SOUNDS OF BOTTLENOSE DOLPHINS, STRONG EVIDENCE FOR VOCAL PLASTICITY ACROSS SPECIES

(San Diego CA, Oct 7, 2014)– A team of scientists from Hubbs-SeaWorld Research Institute (HSWRI) has found that killer whales living with bottlenose dolphins can learn to modify their vocalizations to be more like those of dolphins. This is the first time vocal learning across species has been studied in toothed whales whose vocal repertoires differ greatly from those of dolphins.

<http://scitation.aip.org/content/asa/journal/jasa/136/4/10.1121/1.4893906>

The study, which will appear in the next issue of *Journal of the Acoustical Society of America*, found that three young killer whales at different marine parks changed the kinds of sounds they made so that their repertoires were more like those of dolphin companions. The whales, which shared the same living environment with dolphins, developed repertoires that were significantly different from those of whales interacting only with other killer whales.

Different kinds of whales and dolphins have different vocal repertoires. Study bottlenose dolphins used whistles as their primary social signals and also produced clicks frequently. Killer whales, on the other hand, predominantly used pulsed calls, complex combinations of bursts and tones that sound like screams to the human ear. The research team found that killer whales that had lived with dolphins clicked and whistled more than their counterparts that had only lived with killer whales, and they used fewer pulsed calls. One whale learned to make novel chirps and whistles from the dolphins. The whales' ability to change their repertoires in different ways was a measure of what scientists call vocal plasticity.

Vocal plasticity is limited or non-existent in most social mammals other than humans, and it has been difficult to demonstrate even in our closest primate relatives. Previous research by students and scientists from the HSWRI Bioacoustics Program, led by Dr. Ann Bowles (the corresponding author), have already shown that killer whales can learn new types of calls when there is a change in their social association (<http://bit.ly/1nLumzR>). This new study shows that killer whales, at least from birth to early adulthood, can learn not only new vocalizations but new patterns of usage if they associate with animals that have very different repertoires, such as bottlenose dolphins. This suggests that larger toothed whales may have substantial vocal plasticity. The work further suggests that social interactions are critical to learning. The whales didn't learn to imitate arbitrary sounds that would have been within their capabilities, such as training whistle sounds.

The HSWRI study, which was possible only because researchers had access to animals in a controlled zoological setting, took advantage of a unique experimental opportunity to observe killer whales in three different marine parks (two SeaWorld parks and Six Flags Discovery Kingdom) where it was possible to monitor and study vocal behavior of killer whales with and without dolphin social partners.

Over a 20-year period, Dr. Bowles and University of San Diego graduate student Whitney Musser studied three killer whales that, as juveniles to young adults, had lived with dolphins. They compared the

vocalizations of these subjects to those of seven killer whales that had only lived with other killer whales. Because the sounds made by the two species are very different, they made comparisons based on general classes of vocalizations, such as clicks, whistles and pulsed calls.

Knowing that killer whales can learn, and that they are motivated to do so, sheds important light on how wild populations of whales might interact. Scientists still don't know if and how groups of killer whales can merge after group size declines, as has been seen recently in the Pacific Northwest where one population of killer whales is now considered endangered. Recent studies, including this one by HSWRI scientists and collaborators, are showing that killer whales might be able to learn new repertoires that could allow them to integrate with other groups. Future research will be directed at learning more about the conservation and management implications of killer whale vocal plasticity.

About Hubbs-SeaWorld Research Institute

Hubbs-SeaWorld Research Institute (HSWRI), founded in 1963 to conduct research in the tradition of world-renowned scientists Dr. Carl L. and Laura C. Hubbs, is an independent 501(c)(3) public charity. The Institute's scientists are dedicated to addressing the complex conservation challenges facing our oceans and coasts. Hubbs-SeaWorld Research Institute scientists seek effective solutions that protect and conserve marine animals and habitats while balancing the needs of humans and their reliance on marine resources. HSWRI also recognizes the critical importance of science literacy as a foundation for competing in the highly technical and competitive global economy and strives to provide innovative education programs for our children and young scientists. In 2013, HSWRI celebrated 50 years of its mission "*to return to the sea some measure of the benefits derived from it.*" Information about Hubbs-SeaWorld Research Institute can be found at www.hswri.org.

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