indicates that a measure based on this habituation shows significant diagnostic value. Preliminary results of a follow-up procedure probing habituation and dishabituation to auditory stimuli presented from multiple locations are also discussed. [Work supported by NSF Graduate Fellowship].

Contributed Papers

10:45

2aABa8. Preliminary investigation of sound reception in southern sea otters (*Enhydra lutris nereis*). Asila Ghoul and Colleen Reichmuth (Univ. of California, Santa Cruz, Long Marine Lab, 100 Shaffer Rd., Santa Cruz, CA 95060, asila@ucsc.edu)

Due to their dependence upon a highly restricted coastal habitat, sea otters are vulnerable to a variety of environmental and anthropogenic threats. Among these is the potential disturbance from human-generated sources of noise. Presently, there are no data on the auditory sensitivity of sea otters, and little evidence to suggest what sounds may be most relevant to these animals. As an initial step toward describing the acoustic sense of sea otters, we conducted a controlled exposure experiment, adapted from sound exposure studies used in behavioral field research, to efficiently measure the aerial frequency range of hearing in four captive sea otters. This approach was designed to determine which frequencies were audible to each animal, rather than to provide direct measures of auditory sensitivity. The maximum range of aerial hearing determined using this method was 0.125 to 32 kHz. These are the first direct measurements of hearing obtained for sea otters, and the results are relevant to improving understanding of their acoustic communication, evolutionary biology, and behavioral ecology, as well as in supporting ongoing conservation efforts. This research effort draws from the work of Kastak and Schusterman, especially with respect to the value of behavioral baselines in captive studies of marine mammals.

11:00

2aABa9. Developing auditory weighting functions in a bottlenose dolphin (Tursiops truncatus). Carolyn E. Schlundt (ITT Corp., 3276 Rosecrans St., San Diego, CA 92110) and James J. Finneran (Space and Naval Warfare Systems Ctr., San Diego, CA 92152)

The variation in susceptibility to noise as a function of frequency is handled by "weighting" sound exposures to emphasize frequencies where auditory sensitivity is highest. This technique allows the use of single, weighted numeric values for impact or damage-risk criteria, regardless of the sound frequency. Human weighting schemes were derived from measurements of equal loudness curves obtained from subjective experiments where listeners directly compare the loudness of sounds at different frequencies. Response times to acoustic detection tasks provide an indirect method to construct equal-latency contours in terrestrial mammals that are analogous to equal-loudness contours. The need for empirical measures of loudness contours or auditory weighting functions in marine mammals became especially apparent following experiments of temporary threshold shift (TTS) in dolphins that revealed frequency-dependent effects for onset-TTS levels. The objective of this effort was to develop auditory weighting functions for *Tursiops truncatus* by directly measuring subjective loudness as a function of the sound frequency. The resulting equal-loudness contours emphasize frequencies at which auditory sensitivity is highest and lessen the importance of other frequencies, similar to human A- and C-weighting networks. [Work supported by the ONR.]

11:15

2aABa10. The effect of age-related hearing loss on echolocation: Changes in click parameters and echolocation discrimination abilities are initiated by changes in auditory filters. Laura N. Kloepper, Paul E. Nachtigall, and Marlee Breese (Hawaii Inst. of Marine Biology Marine Mammal Res. Program/Dept. of Zoology, Univ. of Hawaii at Manoa, P.O. Box 1106, Kailua, HI 96734)

High-frequency hearing loss has been correlated with a reduction both in echolocation click parameters and in echolocation discrimination abilities in a false killer whale. During a 15-year time period, the whale demonstrated a significant decrease in peak frequency, center frequency, and source level of outgoing clicks between two studies. Echolocation clicks were analyzed from the most recent phase of the discrimination study to determine if there were significant differences for click parameters according to target condition. The whale consistently produced clicks with the same peak and center frequencies and source levels but varied the number of clicks according to experimental condition. The data suggest that the whale does not use spectral adaptations during discrimination. Likely, a gradual shift in click parameters resulted from a change in the auditory filtering processes initiated with age-related hearing loss.

TUESDAY MORNING, 24 MAY 2011 ASPEN, 8:00 A.M. TO 12:00 NOON

Session 2aABb

Animal Bioacoustics, Acoustical Oceanography, and Underwater Acoustics: Fish Bioacoustics I

Richard R. Fay, Cochair
Loyola Univ., Parmly Hearing Inst., 6430 N. Kenmore, Chicago, IL 60626

Joseph A. Sisneros, Cochair
Univ. of Washington, Psychology Dept., Seattle, WA 98195

Invited Papers

8:00

2aABb1. Speciation and sounds of fishes: Dividing up the bandwidth. Joseph J. Luczkovich (Inst. for Coastal Sci. and Policy and Dept. of Biology, East Carolina Univ., Greenville, NC 27858, luczkovichj@ecu.edu) and Mark W. Sprague (East Carolina Univ., Greenville, NC 27858)

Fishes in the drum family (Sciaenidae) make sounds to communicate, but they do not make the same sounds. The species-specific calls have different dominant frequencies, are produced in spawning aggregations at different times of the day and season, and there is spatial segregation among the spawning fish populations. We predicted that the pattern of bandwidth use by these species would show low overlap in space, time, and sound frequency. We monitored the seasonal pattern of sound production of Sciaenidae in Pamlico Sound (NC) using autonomous sound recorders that recorded 10 s of sound every 15 min during May–Nov. The observed bandwidth ranges and spawning season for species are weakfish 300–400 Hz in May–Aug, silver perch 800–1500 Hz May–Aug, spotted seatrout