10:55

4aAB9. Songlike vocalizations from a Sumatran rhinoceros calf (*Dicerorhinus sumatrensis*). Elizabeth von Muggenthaler (Fauna Commun.s Res. Inst., P.O. Box 1126, Hillsborough, NC 27278) and Paul Reinhart (Cincinnati Zoo, Cincinnati, OH)

Within the last ten years the Sumatran rhino population has dropped 50%, and only 200–300 individuals exist, with five in captivity. Their native habitat is dense tropical forest and they are solitary, therefore much of their behavior remains unknown. Sumatrans are the smallest living rhino, standing 0.9–1.5 m tall, and are covered in coarse, reddish-brown hair. The first Sumatran rhinoceros born in captivity in 112 years, and the first calf ever recorded, is 17 months old and weighs 448 kg. At the Cincinnati Zoo this male calf was recorded from 1–3 m, using two Statham radio microphones, and one TCD-D8 Sony DAT recorder (9 Hz–22 kHz). Analysis, including power spectrums, spectrographic functions, and cross correlations were performed using National Instrument's Polynesia. Preliminary analysis indicates that the calf's vocalizations are similar in structure to adult Sumatran vocalizations, although there are some distinctions. ''Eeps'' and ''whales'' that are found in adult repertoires are produced by the calf. However, signals from the calf are higher in frequency, and the calf does not vocalize as consistently as the adults. The calf has yet to produce a ''whistle blow,'' which is an adult vocalization that has a strong infrasonic component.

11:10

4aAB10. Comparison of St. Lawrence blue whale vocalizations with field observations. Catherine Berchok (Grad. Prog. in Acoust., Penn State Univ., P.O. Box 30, State College, PA 16804, cberchok@yahoo.com), David Bradley, Thomas Gabrielson (Penn State Univ., State College, PA 16804), and Richard Sears (MICS, Inc., St., Lambert, QC J4P 1T3, Canada)

During four field seasons from 1998–2001, vocalizations were recorded in the presence of St. Lawrence blue whales using a single omnidirectional hydrophone. Both long duration infrasonic calls (~18 Hz, 5–20 s) as well as short duration higher frequency calls (85–25 Hz, ~2 s) were detected and compared with field observations. Two trends were noted. First, the long infrasonic call series were concentrated primarily in the deep (300 m) channel. These call series appear to compare well with blue whale vocalizations recorded by others in the deep open ocean. Second, the shorter audible calls were more evenly distributed over bathymetry and seem to be a form of short distance communication with at least one case occurring during an agonistic interaction. A comparison of these calls with biological parameters such as density of whales in the area, percentages of paired versus single whales, and numbers of males versus females will also be discussed. [Project supported by ARL/PSU, NSF, and the American Museum of Natural History.]

11:25

4aAB11. The acoustic field of singing humpback whales in the vertical plane. Whitlow W. L. Au (Marine Mammal Res. Prog., Hawaii Inst. of Marine Biol., P.O. Box 1106, Kailua, HI 96734), Adam A. Pack (Kewalo Basin Marine Mammal Lab., Honolulu, HI 96814), Marc O. Lammers (Hawaii Inst. of Marine Biol.), Louis Herman (Kewalo Basin Marine Mammal Lab.), Kimberly Andrews (Hawaii Inst. of Marine Biol.), and Mark Deakos (Kewalo Basin Marine Mammal Lab.)

A vertical array of five hydrophones was used to measure the acoustic field of singing humpback whales. Once a singer was located, two swimmers with snorkel gear were deployed to determine the orientation of the whale and to position the boat so that the array could be deployed in front of the whale at a minimum standoff distance of 10 m. The spacing of the hydrophones was 7 m with the deepest hydrophone deployed at depth of 35 m. An 8-channel TASCAM recorder having a bandwidth of 24 kHz was used to record the hydrophone signals. The location of the singer was determined by computing the time of arrival differences between the hydrophone signals. The maximum source level varied between individual units in a song, with values between 180 and 190 dB. The acoustic field determined by considering the relative intensity of higher frequency harmonics in the signals indicate that the sounds are projected in the horizontal direction with the singer's head canted downward 45 to 60°. High-frequency harmonics extended beyond 24 kHz, suggesting that humpback whales may have an upper frequency limit of hearing as high as 24 kHz.

THURSDAY MORNING, 1 MAY 2003 ROOMS 110/111, 9:00 A.M. TO 12:00 NOON

Session 4aAO

Acoustical Oceanography: General Topics in Acoustical Oceanography

Mohsen Badiey, Cochair
College of Marine Studies, University of Delaware, Robinson Hall, Newark, Delaware 19716

Kathleen E. Wage, Cochair
Department of ECE, George Mason University, 4400 University Drive, Fairfax, Virginia 22030

Contributed Papers

9:00

4aAO1. Measuring ambient ocean bubble fields using a multibeam sonar. Steve Adelman, David L. Bradley, R. Lee Culver, and Thomas C. Weber (Appl. Res. Lab., Penn State Univ., P.O. Box 30, N. Atherton St., State College, PA 16804-0030, sga121@psu.edu)

For two weeks in July 2002 off the coast of San Diego, a 240 kHz SeaBat 8101 Multibeam Echosounder System was used to measure the backscatter from ambient bubble fields in the near surface layer. The sonar system was mounted approximately 12.5 meters below the surface on the hydraulic orientation unit of the research platform FLIP and was oriented so that its fan of 101 1.5 degree beams were looking at the surface at an angle of 45 degrees from the vertical. Data collection was part of a joint experiment involving the Applied Research Laboratory (ARL)/The Pennsylvania State University (PSU) and the Marine Physical Laboratory (MPL)/Scripps Institute of Oceanography (SIO). Although sea conditions were benign for most of the test period, wind wave activity near the end provided a number of opportunities to observe near surface bubble entrainment. The sonar system proved to be an effective tool for the observation of the lifetime, spatial structure and dimensions of the ambient bubble fields. [Work supported by ONR under Award No. N00014-02-1-0156.]