1:45

5pABa3. The behavioral response of humpback whales to seismic air gun noise. Rebecca Dunlop, Michael J. Noad (School of Veterinary Sci., Univ. of Queensland, Cetacean Ecology and Acoust. Lab., Gatton, QLD QLD 4343, Australia, r.dunlop@uq.edu.au), Robert McCauley (Curtin Univ., Perth, WA, Australia), and Douglas Cato (Univ. of Sydney, Sydney, NSW, Australia)

Four major experiments have been conducted off Australia to quantify the behavioral response of migrating humpback whales to various seismic air gun arrays. The first, using a 20 in^3 air gun, was used to develop the analysis framework, which was then applied to later experiments. The following two experiments tested a 4-step "ramp-up" procedure (20, 60, 140, and 440 in^3 array sequence) and a 140 in^3 array. Both studies found a change in movement behavior in response to the air guns, where groups deviated more from their course and made less progress towards the source. There was no evidence of any change in surface behaviors, including respiration rates. The final experiment involved ramp-up to a 3130 in full commercial array. In response, whales decreased their dive time and displayed an elevated respiration rate, more so to the full array phase. In this phase, they also changed their surface behavior, in that breaching rates were elevated but tail and pectoral slapping behaviors were reduced. Consistent with previous studies, whales also changed their movement behavior, more so during ramp-up. Therefore the full array elicited a greater variety and magnitude of behavioral changes than observed with the smaller air gun arrays.

2:05

5pABa4. Vocal response of dugongs (*Dugong dugon*) to playbacks of conspecific calls suggest ranging function of chirps. Kotaro Ichikawa, Nobuaki Arai (Field Sci. Education and Res. Ctr., Kyoto Univ., Kitashirakawa Oiwake-cho, Sakyo-ku, Kyoto, Kyoto 606-8502, Japan, ichikawa.kotaro.5r@kyoto-u.ac.jp), and Kongkiat Kittiwattanawong (Phuket Marine Biological Ctr., Phuket, Thailand)

Dugongs vocalize bird-like calls, such as chirps and trills but the functional definitions of the calls are yet to be clarified. A series of playback experiments was conducted in Thai waters to investigate their call-back behavior. The population was exposed to 4 different playback stimuli; a recorded wild dugong's chirp, a synthesized down-sweep sound having similar frequencies to the dugong chirp, a synthesized constant-frequency sound, and no sound as a control. Vocalizing dugongs were localized using an array of stereo-underwater-recording systems (AUSOMS-Ds). Total of 4068 calls were observed in reaction to the stimuli. Wild dugongs vocalized more frequently after the playback of dugong chirps (2.8 calls/min) than those of constant-frequency (0.55 calls/min) and control (0.2 calls/min). Ratio of the dugong chirps to all of the call type increased during the playback period. Dugongs were localized on 52 occasions within 25 m range from the playback source. Source level and duration of the chirps from wild dugongs responding to the playback showed positive correlation with distances between the caller and the playback speaker. These results suggest that dugongs can advertise their relative locations by exchanging chirps. Frequency-modulated chirps may have facilitated ranging between individuals.

2:25

5pABa5. Response to playback test in the captive Amazonian manatees (*Trichechus inunguis*) in Brazil. Mumi Kikuchi (Kyoto Univ., Wildlife Res. Ctr., 2-24 Tanaka-Sekiden-cho, Sakyo-ku, Kyoto 606-8203, Japan, mumikomo@gmail.com), Diogo de Souza, and Vera M. da Silva (National Inst. of Amazonian Res. (INPA), Aquatic Mammals Lab. (LMA), Manaus, Brazil)

Previous studies suggested that manatee calls were primarily for communication and not for navigational purposes. In this study, the vocal response of captive Amazonian manatees to playbacks of several acoustic stimuli was investigated. Experiments were conducted using nine captive Amazonian manatees at the National Institute of Amazonian Research (INPA), Brazil, in 2014. All manatees, except one, are orphan calves rescued from the illegal hunting or incidental catch. They were kept in the outdoor pool with a group of 2-3 individuals, which are considered to be related. Manatees were exposed to five different playback stimuli: a recorded vocal from a related manatee, a recorded vocal from an unrelated manatee, a synthesized constant frequency based on the fundamental frequency of a related manatee vocal, a synthesized sound which entirely different from manatee vocal, and silence. A total of 58 playback sessions was conducted and 22,590 calls were recorded. While manatees showed inter-individual variability in the response to the playback stimuli, they tended to produce more vocalization during the playback of the related manatee vocal. They also tended to vocalize more to the playback of the constant frequency sound. Some individual showed strong reactions; touching or staying near the speaker during the experiment.

Contributed Papers

2:45

5pABa6. Baleen whale responses to a high frequency active pinger: Implications for upper frequency hearing limits. E. E. Henderson (Navy Marine Mammal Program, SSC Pacific, 53560 Hull St., Bayside Bldg Rm. 205, San Diego, CA 92152-5001, elizabeth.e.henderson@navy.mil), Alison Stimpert (Moss Landing Marine Lab., Santa Cruz, CA), and Amanda Debich (Scripps Inst. of Oceanogr., San Diego, CA)

In order to test the possibility of using high frequency pinger tags to track baleen whales on Navy instrumented ranges, three blue (*Balaenoptera musculus*) and one humpback (*Megaptera novaeangliae*a) whales were exposed to two high frequency pingers. The pinger frequencies were 37 and 45 kHz, with estimated received levels between 106 and 134 dB re 1 μPa. The whales were monitored prior to the exposure in order to establish their behavioral state and to acclimate them to the presence of the boat. Two of the blue whales were deep feeding, while the third blue whale and the humpback whale were traveling with intermittent bouts of possible foraging near the surface. Each exposure lasted approximately 30—40 minutes, and the whales were observed for an additional two to three surfacing intervals post-exposure. None of the blue whales demonstrated any behavioral response. The humpback whale's response was inconclusive, as other foraging animals entered the area at the same time; however, it is likely there was no response. These data may begin to provide information on the upper frequency limits of baleen whale hearing, as these species have responded to Navy sonar-like sounds at lower frequencies but similar received levels and behavioral states.

3:00–3:15 Break

3:15

5pABa7. New parametric acoustic alarm proves effective at alerting wild manatees of approaching boats. Edmund R. Gerstein (Psych., Florida Atlantic Univ., 777 Glades Rd., Boca Raton, FL 33486, gerstein2@aol.com) and Laura Gerstein (Levaithan Legacy Inc., Boca Raton, FL)

The efficacy of a bow mounted parametric acoustic alarm for alerting manatees of approaching boats was demonstrated with wild manatees in Florida. Two experimental conditions were tested; (1) boat approaches with