Session 2pABb

Animal Bioacoustics: Noise Impacts on Marine Life

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Contributed Papers

3:30

2pABb1. Passive acoustic monitoring for marine mammals during Navy explosives training events off the coast of Virginia Beach, Virginia. Cara F. Hotchkin, Mandy Shoemaker, Anurag Kumar (Naval Facilities Eng. Command, Atlantic, 6506 Hampton Blvd., Norfolk, VA 23508, cara.hotchkin@navy.mil), Carl Hager (U.S. Naval Acad., Annapolis, MD), David MacDuffee, Jene Nissen, and Ronald Filipowicz (U.S. Fleet Forces Command, Norfolk, VA)

Navy training events involving the use of explosives pose a potential threat to marine mammals. This study used passive acoustic and visual monitoring data to evaluate marine mammals' behavioral responses to noise from explosive events. Monitoring was conducted during five training events in the Virginia Capes (VACAPES) Range Complex during August/September of 2009–2012. Passive acoustic monitoring methods ranged from a single hydrophone to an array of sonobuoys monitored in real time. Visual monitoring effort over the five events totaled approximately 34 h (day before events: 10.1 h; days of events: 22.3 h; day after events: 1.5 h), yielding a total of 27 marine mammal sightings. Approximately 54 h of acoustic data were collected before, during, and after the five events. Behavioral changes were evaluated based on analysis of vocalizations detected before, during, and after explosions and concurrent data from visual sightings. For time periods with both visual and acoustic monitoring data, detection methods were compared to evaluate effectiveness. Continuing use and evaluation of both visual and passive acoustic methods for monitoring of explosive training events will improve our knowledge of potential impact resulting from explosive events and help improve management and conservation of marine mammals.

3:45

2pABb2. Use of Automated passive acoustic monitoring methods for monitoring for marine mammals in conjunction with US Navy Mid-frequency Active Sonar training events. Stephen W. Martin, Roanne A. Manzano-Roth, and Brian M. Matsuyama (SSC PAC, 53560 Hull St., Code 71510, San Diego, CA 92152, steve.w.martin@navy.mil)

Automated passive acoustic detection, classification, and localization (DCL) methods are employed to deal with large volumes of acoustic data to support estimating the sound pressure levels (SPLs) that marine mammals are exposed to from mid-frequency active sonar (MFAS) during US Naval training events. These methods are applied to a training event involving MFAS conducted February 2012 in Hawaiian waters with thirty one hydrophones of data collected continuously over an 11 day period. The automated methods detect and determine locations of marine mammals, specifically minke and beaked whales, and the times of the MFAS transmissions utilizing custom C++ algorithms. Streamlined manual validation methods are employed which utilize custom MATLAB display routines. Animal locations uncertainties are addressed for the two different species. Once the transmitting ship and animal locations are determined acoustic propagation modeling is utilized to estimate the sound pressure levels (in dB re 1 micro Pascal) that an animal, or group of animals, were exposed to. Surface ducted propagation conditions can result in species such as beaked whales being exposed to over 30 dB higher SPL's when they return to the surface to breathe compared to when at depth foraging.

4:00

2pABb3. Impact of underwater explosions on cetaceans. Simone Baumann-Pickering (Scripps Inst. of Oceanogr., Univ. of California San Diego, 9500 Gilman Dr., La Jolla, CA 92093, sbaumann@ucsd.edu), Amanda J. Debich, Ana Širović (Scripps Inst. of Oceanogr., Univ. of California San Diego, San Diego, CA), James V. Carretta (Southwest Fisheries Sci. Ctr., National Oceanic and Atmospheric Administration, San Diego, CA), Jennifer S. Trickey, Rohen Gresalfi (Scripps Inst. of Oceanogr., Univ. of California San Diego, San Diego, CA), Marie A. Roch (Dept. of Comput. Sci., San Diego State Univ., San Diego, CA), Sean M. Wiggins, and John A. Hildebrand (Scripps Inst. of Oceanogr., Univ. of California San Diego, San Diego, CA)

Use of seal bombs to deter sea lions from being caught in nets and preying on catch is a common practice for a number of fisheries. Purse seine fisheries in Southern California target primarily squid, but also scombrids and baitfish such as sardine and anchovy, while set gillnet fisheries' primary catch are halibut and white seabass. All of these fisheries use seal bombs as deterrents. Continuous passive acoustic recordings at several sites in the Southern California Bight collected since 2007 revealed an extensive use of smaller explosives, most likely seal bombs, during nighttime hours with a seasonal occurrence matching fishery activities. During several months of the year they were used all night, every night. The median occurrence of explosions when detected was 8 per hour; however, during periods of high fishing effort they reached up to 480 explosions per hour. From behavioral response and opportunistic studies we know that beaked whales as well as endangered blue whales react negatively to anthropogenic sound sources. We are testing the hypothesis that these underwater explosions have a suppressive effect on the acoustic behavior and therefore the communication and foraging of cetaceans, possibly leading to impacts on the individual fitness and overall population health.

4:15

2pABb4. Monitoring of marine mammal occurrence and acoustic behaviors in relation to mid-frequency active sonar using autonomous recorders deployed off the undersea warfare training range, Florida. Thomas F. Norris, Julie Oswald, Tina M. Yack, Elizabeth Ferguson (Bio-Waves, Inc., 144 W. D St., Ste. #205, Encinitas, CA 92024, thomas.f.norris@bio-waves.net), Anurag Kumar (Naval Facilities Eng. Command Atlantic, U.S. Navy, Norfolk, VA), Jene Nissen (U.S. Fleet Forces Command, U.S. Navy, Norfolk, VA), and Joel Bell (Naval Facilities Eng. Command Atlantic, U.S. Navy, Norfolk, VA)

Passive acoustic data were collected from nine Marine Autonomous Recording Units (MARUs) deployed 60–150 km in an area that coincides with the U.S. Navy's planned Undersea Warfare Training Range (USWTR) off Jacksonville FL. MARUs were deployed for 26 days during fall 2009, and 37 days in winter 2009–2010. Data were manually reviewed for marine mammal vocalization events, man-made noise, and mid-frequency active sonar events, which were logged using TRITON software. Seasonal and diel patterns were characterized qualitatively. Patterns and probabilities of vocalization events by species, or species groups, were related to sonar events. Vocalizations were detected for minke whales, North Atlantic right