

ACOUSTICS2008/3161
Estimates of chronic SNR exposure levels of sperm whales
(*Physeter macrocephalus*) to airguns in the Gulf of Mexico

Aaron Thode^a, Martha Winsor^b, Bruce Mate^b, Matt Howard^c, Katherine Kim^d, John Diebold^e and Maya Tolstoy^e

^aMarine Physical Laboratory, Scripps Institution of Oceanography, 9500 Gilman Dr, MC 0238, La Jolla, CA 92093-0238, USA

^bHatfield Marine Science Center, Oregon State University, Newport, CA 97365, USA

^cDept. of Oceanography, Texas A&M University, 3146 TAMU, College Station, TX 77843, USA

^dHLS Research, Inc., 3366 N. Torrey Pines Ct., Ste. 310, La Jolla, CA 92037, USA

^eLamont-Doherty Earth Observatory of Columbia University, 61 Route 9W, Palisades, NY 10964-8000, USA

A synthesis effort by the Sperm Whale Seismic Study (SWSS) has estimated chronic levels of low-level, long-term acoustic exposures of sperm whales in the Gulf of Mexico due to seismic airgun activity. Between 2002 and 2005, satellite-tags were attached to 53 whales of both sexes in the northern Gulf, with an average tag viability of 187 days. Data provided by the International Association of Geophysical Contractors (IAGC) permitted the range estimation of active seismic vessels to each whale location. The ray-tracing model BELLHOP was used to estimate received levels from each seismic vessel for every space-time data point at frequencies between 10 to 1000 Hz, using simulated source signatures from a 3590 in³ seismic array. Winds speeds from numeric models at each space-time location were converted into ambient noise levels, and shipping noise levels were crudely estimated. The preliminary synthesis using a simple spherical spreading transmission loss model suggests that over 95% of the whale positions reported during times of airgun activity occurred in circumstances where the received airgun pulses had 0 dB signal-to-noise ratio (SNR) or greater compared to ambient levels, and between 25-60% of all locations have received SNRs of 20 dB or greater, depending on the SNR definition used. [Sponsored by US Minerals Management Service].