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TITLE: Shallow-Water Seismic Surveys ¿ How Much Noise Are We Introducing Into the Ocean?

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ABSTRACT:

Seismic reflection equipment is commonly used for scientific research, site suitability surveys, seafloor mapping and identification of natural, economic resource reserves. High-power, low-frequency sonar systems can produce noise levels that impact marine mammals based on increasingly evidence from strandings and behavioral research, Various governmental regulatory measures are currently in place to mitigate negative impacts from anthropogenic activities on marine mammals, including those associated with noise. These regulations were developed to implement statutory guidelines established under the US Marine Mammal Protection Act (MMPA), the US Endangered Species Act (ESA), and the National Environmental Policy Act (NEPA). In late September 2006, we will conduct an experiment to characterize the acoustic signatures of two commonly used mid-frequency seismic systems under realistic survey conditions. These systems are used primarily on the inner/middle continental shelf because of their high resolution and ability to penetrate thick, unconsolidated sedimentary sequences. System 1 is a surface-towed, catamaran-mounted boomer developed by Applied Acoustics Engineering (AAE). System 2 is an AAE near-surface towed mini-sparker (squid). Distances to the 160 dB isopleth have been determined using simple spherical spreading models for each system. The theoretical distances are 500 m and 550 m for the boomer and mim-sparker, respectively. The acoustic signatures of the two sources will be characterized by supplementing an acoustic monitoring array deployed by the Gerry E. Studds Stellwagen Bank National Marine Sanctuary (SBNMS) whose primary purpose is to monitor ambient noise and vessel traffic and record whale vocalizations throughout Sanctuary waters. We will select which ARUs from the array utilize in the experiment to generate data from two different substrate types and to minimize acoustic contact with the protected marine mammals known to frequent Sanctuary waters. The additional ARUs will be deployed in close proximity to the chosen ARUs' locations. Each of the ARUs and their hydrophones were calibrated by the United States Navy before deployment. Our experimental design consists of survey transits over the ARUs. Timings of each survey transect will be recorded to correlate acoustical records from each of the four ARUs in the study. Additionally, all ARUs in the SBNMS array will be examined for the signature of the seismic systems at the times of survey transects. The goals of this experiment are to: (1) describe the acoustic signature of each seismic system; (2) determine the distance from each source to isopleths of interest; (3) generate empirical estimates of horizontal sound spreading for these surface towed systems in shallow water; (4) determine how far away from these sources their signatures are detectable, within the range of frequencies utilized by vocalizing marine mammal species; and (5) provide information to federal regulatory agencies to aid their continuing assessment of permitting for seismic surveys

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