

Ocean Acoustics Experimental Support Services for ONR's Ocean Battlespace Sensing Department

Clayton H. Spikes
4100 N. Fairfax Drive, Suite 730
Arlington, Virginia 22203
phone: (703) 465-8404 fax: (703) 465-8420 email: Clay.Spikes@marineacoustics.com

Cheryl L. Schroeder
4100 N. Fairfax Drive, Suite 730
Arlington, Virginia 22203
phone: (703) 465-8404 fax: (703) 465-8420 email: Cheryl.Schroeder@marineacoustics.com

Kathleen J. Vigness Raposa
809 Aquidneck Avenue
Middletown, Rhode Island 02842
phone: (401) 847-7508 fax: (401) 847-7864 email: Kathleen.Vigness@marineacoustics.com

Stanley Labak
4100 N. Fairfax Drive, Suite 730
Arlington, Virginia 22203
phone: (703) 465-8404 fax: (703) 465-8420 email: Stan.Labak@marineacoustics.com

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LONG-TERM GOALS

The collection of *in-situ* acoustic and oceanographic data is critical to achieving a complete understanding of underwater acoustic propagation as marine environmental conditions affect acoustic transmissions. At-sea experiments provide the requisite data and performance measurements that are essential to developing underwater acoustic systems, improving sound propagation models, and accurately characterizing the underwater acoustic environment. Legislative and regulatory requirements dictate that a thorough analysis of potential impacts on the marine environment associated with the transmission of anthropogenic sound be conducted prior to at-sea experiments that involve active acoustic transmissions. Our goal is to support the Ocean Battlespace Sensing Department's mission of ongoing at-sea experimentation and testing by providing the analytical rigor needed to ascertain potential environmental impacts associated with Ocean Acoustics' sponsored at-sea experiments and comprehensively document the process to satisfy Federal legislative and Navy requirements.

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OBJECTIVES

The specific objective of this contract effort is the preparation of environmental compliance documentation that demonstrates that the Ocean Acoustics Program has followed all Navy guidance (e.g., CNO), ONR Ocean Battlespace Sensing policies, and all applicable Federal and State legislative mandates to conduct at-sea experiments that will not significantly affect the marine environment.

APPROACH

For each of the Ocean Acoustic Program's planned at-sea experiments, our marine biologists, acousticians, and analysts work closely with the experimental team to acquire the information and data necessary to completely understand the experiment's objectives, specific design metrics, and characteristics of any active acoustic sources to be deployed during the experiment. After carefully reviewing the scientific literature, marine biologists verify the protected marine species occurring in the experimental locale and compile or derive marine mammal densities for the appropriate experiment season. Marine Acoustic's (MAI's) acousticians and analysts use the densities, propagation characteristics of the acoustic source(s), and animal movement information, which is derived using the Acoustic Integration Model (AIM) or other ONR-approved calculation methodologies, to calculate or model sound exposure levels for individual marine animals and estimate the potential for harassment using the appropriate acoustic threshold criteria.

WORK COMPLETED

The completion of thorough environmental impact analyses and appropriate environmental compliance documents by MAI enabled ONR to authorize and conduct the following Ocean Acoustics-sponsored at-sea experiments during the 2009 fiscal year:

- North Pacific Acoustic Laboratory (NPAL) Philippine Sea 2009 Pilot Study/Engineering Test;
- Quantifying, Predicting, and Evaluating (QPE) Uncertainty Geoacoustics 2009 Experiment;
- Quantifying, Predicting, and Evaluating (QPE) Uncertainty Intensive Observation Period 2009 Experiment; and
- Cooperative Array Performance Experiment (CAPEx).

RESULTS

MAI facilitated the ability of the ONR Ocean Acoustics Program to conduct four at-sea experiments and support the department's ongoing scientific research mission by providing robust and rigorously detailed environmental documents prepared in accordance with Navy (CNO and ONR) guidelines, which also comply with the regulatory and legislative requirements to thoroughly analyze potential impacts to the marine environment.

IMPACT/APPLICATIONS

The environmental analyses and associated compliance documents that were produced for four at-sea experiments were required by U.S. Federal and State statutes, as well as internal Navy policy. Compliance with the regulatory requirements allowed ONR to conduct four important underwater

acoustic experiments and collect valuable oceanographic and acoustic data in a variety of marine environments that will help resolve outstanding scientific and technical issues and lead to the development of improved underwater acoustic systems.

RELATED PROJECTS

The NPAL program is an ongoing collaborative underwater acoustics research effort of 13 scientific universities and organizations sponsored by ONR and the Ocean Acoustics Program for which MAI has conducted impact analyses and prepared environmental documentation. MAI will be working directly with NPAL scientists to obtain information for a planned large-scale experimental effort in 2010 and 2011. More information about past NPAL experiments can be found at: <http://www.npal.ucsd.edu/>.

PUBLICATIONS

- Acoustic Impact Analysis for the North Pacific Acoustic Laboratory (NPAL) Philippine Sea 2009 Pilot Study/Engineering Test. Final Technical Report. February 2009. Ocean Battlespace Sensing Science and Technology (Code 32); Ocean Acoustics Program (Code 321OA). 42 pages. [not published]
- Acoustic Impact Analysis for the Quantifying, Predicting, and Exploiting (QPE) Uncertainty 2009 Geoacoustics Experiment. Final Technical Report. May and July 2009. Ocean Battlespace Sensing Science and Technology (Code 32); Ocean Acoustics Program (Code 321OA). 28 pages. [not published]
- Acoustic Impact Analysis for the Quantifying, Predicting, and Exploiting (QPE) Uncertainty 2009 Intensive Observation Period Experiment. Final Technical Report. July 2009. Ocean Battlespace Sensing Science and Technology (Code 32); Ocean Acoustics Program (Code 321OA). 33 pages. [not published]
- Acoustic Impact Analysis for the Cooperative Array Performance Experiment (CAPEx). Final Technical Report. August 2009. Ocean Battlespace Sensing Science and Technology (Code 32); Ocean Acoustics Program (Code 321OA). 33 pages. [not published]