Applied Physics Laboratory
College of Ocean and Fishery Sciences, University of Washington

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To: Dr. Eric Schulenberger
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Ballston Tower #1
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From: Darrell R. Jackson, Principal Electrical Engineer

Subj: ONR Grant N00014-95-1-1300

Encl: (1) Final Annual Technical Report, "High Resolution Benthic AcousticMeasurement System"

Enclosed please find three copies of last annual technical report for the subject grant.

Darrell R. Jackson

cc: ONR Administrative Grants Officer (June Hawley), 1 copy
Director, Naval Research Laboratory, Code 2627, 1 copy
Defense Technical Information Center, 2 copies

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XBAMS: ACCELERATED BENTHIC ACOUSTIC MEASUREMENT SYSTEM

Principal Investigators: K. L. Williams, P.A. Jumars, and D.R. Jackson

Title of Grant: High-Resolution Benthic Acoustic Measurement system

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LONG-TERM GOALS:

This is a one-year project to improve methods of acoustic observation of benthic change.

SCIENTIFIC/TECHNICAL OBJECTIVES:

To develop a bottom-mounted, circularly-scanning sonar that permits remote observation of benthic biological activity at sampling rates as high as 10 scans/hour.

APPROACH:

Development of the XBAMS system was primarily a task of interfacing commercially available components, software development, and design and construction of the tripod platform. Key commercially available components are: interferometric side-scan sonar transducers, stepper motor capable of rapid rotation and millidegree accuracy, PC, hard disk, and storage batteries. The operating frequency of 300 kHz was dictated by the requirements of small size and 50-m range capability.

TECHNICAL ACCOMPLISHMENTS:

A new sonar system has been constructed and successfully fielded. The system, designated the Accelerated Benthic Acoustic Measurement System (XBAMS), is an autonomous, bottom-mounted, circularly-scanning sonar that permits remote observation of benthic biological and physical processes over a large area (100 m diameter circle) and long times (weeks to months) in the littoral zone. The system is mounted on a 3-m tripod and operates at 300 kHz with horizontal beamwidths of about 1 degree. The system completes a scan of 360 steps in 6

minutes. This sampling rate makes it possible to monitor benthic biological activity without aliasing problems encountered with the older BAMS system. XBAMS can be deployed in water depths as shallow as 15 meters with a 2 ton crane. XBAMS was deployed off the coast of California in about 60 meters of water in June 1996 during the STRATAFORM project. It successfully captured over 200 acoustic scans during its one month deployment.

IMPACTS FOR SCIENCE AND TECHNOLOGY:

The new system provides the capability of conducting laboratory-like observations of physical and biological benthic processes in real environments.

TRANSITIONS EXPECTED:

Data acquired with this system will be relevant to mine countermeasures in several regards: biological false contacts, biological modification of mine acoustic signatures, and development of models for bottom acoustic scattering.

RELATIONSHIPS TO OTHER PROJECTS:

The XBAMS system was used in the STRATAFORM project and is available for use in proposed and planned new biological and acoustic projects such as the High Frequency Acoustics Bottom Interaction DRI.