BOEM ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

BOEM OCS Region: Gulf of Mexico

Planning Area: Western, Central and Eastern

Title: Digitization and Reanalysis of Northern Gulf of Mexico Continental Slope Study Seafloor Photographs (GM-92-42-140)

Total Cost: $117,281 **Period of Performance:** FY 2008-2012

Conducting Organization: Coastal Marine Institute, Louisiana State University

BOEM Contact: Michelle Nannen

Description:

Background: The largest and most intensive benthic photographic survey taken in the deep Gulf of Mexico resulted from a previous MMS-funded study, the Northern Gulf of Mexico Continental Slope Study (NGMCS) by LGL Ecological Research Associates between 1983 and 1985 (final year's report MMS 88-0053). Since this extensive survey was performed, there have been advances in image processing, digital imaging, data storage, and spatial statistics that have greatly enhanced the ability to carry out intensive benthic survey analysis. This project will digitize and reanalyze the approximately 45,000 NGMCS images.

Imaging of the Gulf of Mexico bottom has continued since the NGMCS study, but never with the same intensity or intent to survey large areas. A more recent MMS study, the Northern Gulf of Mexico Continental Slope Habitat and Benthic Ecology Study (final report in revision) used a Benthos digital camera at 45 sites resulting in 1,421 images.

Objectives: The objectives of this project are to:

- Digitize and examine all images rather than the subsets previously used.
- Estimate faunal abundance within each transect (station) from counts and extent of bottom photographed.
- Estimate the degree of patchiness along a 1.7 +/- 1.0 km stretch of bottom with particular emphasis on changes along and across the slope for each camera tow treated as a transect.
- Test two hypotheses: a) the composition and abundance of megafauna and traces are homogenous across all transects, and b) within transects, megafauna and traces are randomly distributed.

Methods: The image data set consists of a total of approximately 45,000 35 mm film transparencies (slides) taken close to the bottom at a total of 60 stations on the continental slope between depths of 300 and 3,000 m. The original rolls of film consisted of 800 images on 100 ft long rolls. All 60 rolls were cut into strips for another project that utilized the images, but they were not utilized in a comprehensive way (The Deep Sea

Gulf of Mexico: An Overview and Guide MMS 2001-065.)

The methods will be straightforward. An initial screening and assessment of all images will be made on a light table assessing the numbers of usable images from each transect. Based on this assessment, a digitization plan will be developed and initiated. Images will be digitized at 8- megapixel resolution using a Nikon Coolscan 4000 scanner. Files will be saved using uncompressed Tagged Image File Format (TIFF) which allows the incorporation of analysis results and notes as a tagged field. All images will be digitized prior to initiation of examination and categorization. Images will be stored on DVD-type optical disks. Summary statistics for each image will be calculated based on color and texture. These serve both as an indicator of altitude above bottom and the nature of the bottom.

Statistical analysis will utilize statistical packages that incorporate distances and variations between multiple-points. Aggregation will be examined through segmental pooling of image sequences and testing for departures from randomness at increasing scale.

Products: Final report and digital image archive.

Importance to BOEM: The BOEM has already funded the most extensive deepwater bottom image survey on record. The further utilization of this pre-existing image data set will increase understanding of the distribution of megafauna on the continental slope of the Gulf of Mexico. Most regulation is based on the distribution of observable megafauna along with consideration of habitat type. Results of this project are expected to add to the ability to design the best methods and set standards for the future use of image gathering and data analysis. Offshore oil and gas activity continues to increase in all deepwater areas sampled by this study.

Current Status: The deliverables of this study are currently overdue. A no cost extension until July 31, 2012 has been requested for this project. The BOEM will then review all deliverables and complete the project by December 2010. The transfer of all deep sea images from the LGL slope study has been made. All of the approximately 45,000 35 mm image frames are now in binders. The transfer was made face-to-face to avoid any loss or damage by mail carriers. Work outstanding includes: submission of final report, submission of archival digital files, and submission of the original film to an accepted archive.

Final Report Due:	December 2012
Publications:	None
Affiliated WWW Sites:	Coastal Marine Institute, Louisiana State University
Revised date:	December 2011
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