

Project Number 5

**A Review and Reexamination of OCS Spatial-Temporal Variability as
Determined by Previous MMS Studies in the Gulf of Mexico**

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ABSTRACT

The purpose of this project is to develop improved methods of **benthic** fauna sampling design and analysis for the purpose of evaluating the possibility of **OCS** impacts. Rather than review existing data for the purpose of detecting impacts, existing data will be examined for the purpose of improved design. During the **first** two years of the **project**, the pace of work has been limited by delays in obtaining data files and in reverifying these data.

PROJECT GOALS AND OBJECTIVES

Goals and Objectives remain unchanged The project goal is to **identify** an improved design for **benthic** studies in the Northern Gulf of Mexico which will allow more definitive statements about possible environmental impacts. The primary objective towards meeting this goal is the description of spatial and temporal variability of the benthos. This study seeks to utilize existing study data to describe such variability. It is not expected that previous studies can provide an ideal data set. **It** is, however, important that these old studies provided be examined for any information possible. There have been two first year objectives. First, an appropriate computing environment was to be developed. Second, reliable data was to be located.

ACCOMPLISHMENTS TO DATE

Progress reported in the annual report of 1990 was largely limited to development of the computing environment. The configuration is as follows: A MicroVax 3600 serves as local host via Ethernet connections. Thirty-two megabytes of active memory was installed to be used for temporary storage of large arrays and program space. The workstation is a **MicroVax** 3500 with graphics. This station runs a scientific visualization program **PV-Wave**, and has 16 megabytes of active memory. This system has proven highly effective.

SIGNIFICANT FINDINGS

As of yet, few analyses have been finalized. It is important to note, however, that **benthic megafaunal** species abundance data fits a **lognormal** distribution. Therefore, this distribution can be used for purposes of simulation.

Data Visualization Programs

Data visualization programs have been developed within the **PV-Wave** environment thus allowing interactive examination of data These very **powerful** programs read NODC data files and convert NODC species and station codes into unique integers **from** 0 to n. They then create large integer arrays in which rows are stations and **columns** are species, using the integers as subscripts for positioning in the array. So long as the array is no larger than 800x 1000, it can be scaled and displayed as **an** image on the workstation screen.

For testing of the visualization programs, the California Monitoring Project (CAMP) data has been used. While not from the **Gulf** of Mexico, it is the best OCS data set now available and serves as an excellent test set. Simple display of the data set converted to an image with sorting by species and stations has proven to be a very powerful means of detecting patterns without any additional statistical analysis.

Identification of Trends of Impacts on Benthic Fauna

Using CAMP data and simulated data, it has been determined that **faunal** impacts can be examined in two different ways. Impacts and natural variation can be manifest in terms of

abundance and in terms of pattern. While the typical **OCS** study usually treats these separately, they can be linked when a "ranked abundance of **species**" approach is taken. Impacts may alter the abundance pattern of **species within** a sample or the abundance of a species over its range. Impacts may also alter the sequence of particular species within a station or the spatial pattern of a **species** over its range. In future analyses, the natural variation in ranked abundance and the species specific nature of the rankings will be determined.

PROBLEMS OR DELAYS ENCOUNTERED AND PROPOSED SOLUTIONS

The greatest **source** of delay in this project has been associated with the data sets. Obtaining **exactly what** one needs, even from **NODC**, requires considerable familiarity with the individual **project**. There is nothing **in** the NODC data format which explains the design of the sampling. Frequently, it is necessary to read annual reports of as **project** to determine what design changes were made in the course of the project.

In order to compensate for the very slow progress, a no-cost extension has been requested.

REVISED SCHEDULE FOR REMAINDER OF PROJECT

June 1991- March 1992- Final Analysis of Data Sets

April 1992- June 1992- Preparation of Final Report and Publications

PROJECT PARTICIPANTS

The participants remain unchanged. In addition to the PI, Robert S. **Carney**, Ms. Elaine **Evers** serves as the sole research technician on **the** project, No students are directly employed by the project. However, doctoral students Tina Miller-Way and Glen Larson have become familiar with program activities through **directed** readings.

RELATED PUBLICATIONS AND PRESENTATIONS

"The Value of Process Oriented Studies in the OCS. Plenary Address". **10th** Annual Information Transfer Meeting. Minerals Management **Service**. Dec. 1989, New Orleans, LA.

PROPOSALS SUBMITTED AND GRANTS RESULTING

Spatial Patterns of Deep-Sea Fauna on Scales of 10000 m². To **Office** of Naval Research. \$50,000. Proposed start: October 1, 1991; duration: 24 months. Pending.

A Joint Industry-University Initiative on Deep Hydrocarbon Seeps in the Gulf of Mexico. \$180,000. Proposed to Louisiana Board of Regents. Proposed start: July 1, 1991; duration: 24 months. **Pending**.

Ecosystem Studies of the **Gulf of Mexico Chemosynthetic** Communities. Submitted to **MMS** in response to **RFP**. \$100,000. Proposed **start**: July 1, 1991; duration: 36 months. Funded.