Environmental Studies Program: Studies Development Plan FY 2015-2017

Region: Gulf of Mexico

Planning Area(s): Gulfwide

Title: Deepwater Coral and Chemosynthetic Atlas and Modeling Program: Gulf of Mexico

Approximate Cost: (in thousands) $500 Period of Performance: FY 2015-2018

BOEM Information Need(s) to be Addressed: BOEM needs to characterize the known distribution of deepwater corals and chemosynthetic communities and predict their occurrence in the GOM. This achievement will support the ability to protect these sensitive benthic habitats from potential impacts of oil and gas exploration and development and promote accurate environmental descriptions in National Environmental Policy Act documents.

Description:

Background: In 1984, the first dense chemosynthetic communities were discovered in the Northern GOM as part of an ongoing study funded by BOEM. Recognized as unique and sensitive biological communities, BOEM has protected these communities since their discovery and has sponsored numerous research initiatives to identify and characterize these habitats. Coral communities have also been found in the deep waters of the GOM, frequently in association with chemosynthetic communities. Hard bottom areas in the deep Gulf are, in virtually all cases, created through biogenic precipitation of carbonate by chemosynthetic bacteria. Carbonate deposits can subsequently become exposed above surrounding sediments providing substantial substrate for attached animal communities to develop at these chemo sites. Coral communities have also been found on shipwrecks in the deep GOM. Remarkable discoveries were made on some World War II wrecks. *Gulfpenn*, sunk in 1942, lies at a depth of 1,820 ft and supports numerous large colonies of *Lophelia* coral. Some offshore oil and gas structures also serve as substrate for deepwater *Lophelia* coral.

A significant amount of information for chemo and coral communities in the GOM exists in a variety of formats and in scattered repositories, many of which are not readily available for use in assessments because they have not been reviewed and digitized in a common format. While the BOEM has conducted major studies, so have numerous other entities including academic and other Federal institutions. A more accurate and useful understanding of the available information could be produced if the information were reviewed, collated, analyzed, and organized for

consistency and ease of access. A major benefit of collating data of GOM chemo and coral communities would be the ability to produce better models for predicting their occurrence. Many locations with significant areas of hard bottom in the deep GOM are correlated with faulting associated with the movement of salt diapirs and the migration of hydrocarbons to the seabed. These areas are well represented in 3D seismic surface amplitude anomaly data. Recent BOEM analysis of industry 3D seismic seabed amplitude anomaly data has revealed over 20,000 separate features that likely represent carbonate hard bottom (BOEM, 2014). By combining these newly available 3D seismic data and other environmental predictors derived from hydrodynamic models, oceanographic databases, and multibeam bathymetry with a comprehensive deepwater coral and chemosynthetic community data atlas, a new generation of predictive maps will be developed that synthesize all of the best available information on the likelihood of deepwater coral and chemo communities throughout the Gulf OCS. Deepwater coral habitats are internationally recognized for their value as unique fish habitat, high biodiversity, and as sources for discoveries of compounds with biotechnology potential. The new database, predictive models, and resulting maps will help avoid potential impacts to these vulnerable habitats.

Objectives: The objective of this project is to (1) locate, review, collate and organize georeferenced ecological information for deepwater chemosynthetic and coral communities in the northern GOM into a geodatabase and (2) use this geodatabase in combination with environmental predictors to model habitat suitability, occurrence probability and/or relative abundance of deep water coral and chemo communities and important component species.

Methods: This project will be conducted as a collaboration among research groups who have performed deepwater habitat research in the GOM. An interagency agreement will be created with the NOAA National Centers for Coastal Ocean Science (NCCOS). The NCCOS is building the database for NOAA's National Inventory of Deep Coral Distribution (NCCOS, 2014), and as such, will be collating information from numerous sources for GOM deepwater communities for this effort. NCCOS also has expertise in predictive modeling of deepwater corals, having produced models based on historical presence-only data for the GOM and Atlantic OCS in the past, and applied these models to research, exploration, conservation and management. NOAA/NCCOS will handle the bulk of the work, coordinating with BOEM, USGS, several other NOAA offices and numerous research institutions.

Data will be extracted from a variety of formats. These include sources such as video from manned submersibles and ROV, sonar and imagery from AUV, 3D seismic data, cruise reports, maps, museum records, and even old deepwater trawl data. The data targeted will be information that provides the locations and other ecological information for any structure-forming habitats in the deep GOM. This will specifically include all types of deep coral habitats, chemosynthetic communities, sponge communities, and relevant deep artificial reef information. The information will be processed for the objectives of the project and to maximize usefulness for environmental assessment. It will be quality-controlled and formatted into a usable database system. Data will be analyzed and predictive models and maps will be developed that synthesize all available spatial information on the distribution of sensitive GOM deepwater benthic communities.

Revised Date: March 17, 2014