

BOEM ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

BOEM OCS Region: [Gulf of Mexico](#)

Planning Area: Central

Title: Evaluating the Importance of Shallow Water Rigs as Habitat for Newly Recruited Reef Associated Fishes in the OCS off Louisiana (GM-09-01-12)

Total Cost: \$681,520.00

Period of Performance: FY 2012-2016

Conducting Organization: [Louisiana Universities Marine Consortium](#)

BOEM Contact: [Bruce Baird](#)

Description:

Background: Gulf of Mexico (GOM) fishery habitat issues are entering a new era of consideration because of the DWH event. The northern GOM is one of the most valuable coastal marine ecosystems in the world because of its mineral resources, biological productivity, and habitat value for living resources created by a diverse coastal ecosystem. The coastal zone of Louisiana has a number of unique ecosystem attributes that provide the habitat quantity and quality required to sustain abundant fish populations. The unusual combination of natural and man-made/artificial reef habitat is one of those unique attributes.

Artificial reefs in the form of oil and gas structures significantly augment the abundance of natural hard substrates (2,571 km²) in the GOM from Pensacola, Florida to Pass Cavallo, Texas. Approximately 3,030 active oil and gas structures are currently operating in federal waters of the GOM adding about 12 km² of valuable “reef” habitat. Most of these are off Louisiana with Texas a distant second in numbers of total platforms. Many of the structures off coastal Louisiana are small and located in relatively shallow water. Even though, oil and gas structures may contribute a relatively small percentage of the total hard substrate on the shallow shelf, they may be especially critical because of the general paucity of hard substrate in the area surrounding the Mississippi River Delta.

Juveniles of reef associated fishes (such as red, lane and mangrove snapper) that settle to the bottom along the Gulf coast tend to recruit to bottom habitats inshore of their adult counterparts (because of currents that carry them as larvae) and also tend to seek bottom habitats with structure, but of low relief. Observations around small wellhead protective (SWP) structures in shallow water (5-12 m) revealed that these structures not only provide habitat for some adult fishes but appear to be especially important as recruitment sites for juvenile snapper during peak summer spawning. Although small compared to most oil and gas (O&G) structures (a few meters across at the base) SWP structures are numerous throughout the near shore coastal zone off Louisiana.

We hypothesize that because these structures are located in shallow waters, water quality is generally better suited to juvenile snapper recruitment than equivalent structures in slightly deeper water (12-25 m) where bottom waters are often hypoxic or low in oxygen. We also hypothesize that the shell material, sloughed from small O&G structures and accumulated over decades, provides an important juvenile habitat attractive to newly settled juvenile snappers. The overarching research goal of this projects to determine to what degree SWP structures serve as important recruitment sites and habitat for juvenile snapper throughout the near shore coastal zone adjacent to Louisiana.

Objectives: We will 1) identify existing structures in appropriate near shore coastal locations that might serve as suitable habitat for newly recruited juvenile snapper, 2) conduct a rapid coast-wide survey where we record water depth, water quality parameters, bottom sediment type, presence-absence of other structures and presence-absence of juvenile snapper in three zones of the coastal near shore area during periods of peak snapper settlement, 3) use results of the rapid survey to identify potentially important areas of recruitment for juvenile snapper in the US near shore coastal zone off Louisiana, 4) conduct habitat use studies on a subset of small shallow water structures in those three zones (east, central, west), 5) develop habitat suitability models for the juvenile life stage of the dominant snapper species encountered in the field surveys, and 6) estimate abundance of snapper juveniles in the near shore coastal zone associated with small O&G structures. We seek to develop a knowledge base that can assist resource managers to make informed decisions on habitat value of the many SWP structures and other O&G structures, especially for juvenile snapper.

Methods: Methods are listed by task:

Task 1. Coast-wide Nearshore Platform Review: A comprehensive analysis of the BOEM records (formerly MMS) will be complete. Potential platforms will be plotted in Arc/GIS and the plots used for planning field work. BOEM personnel and records will be consulted to make certain that selection is a representative sample of structures.

Task 2. Year-1 Hydrographic Survey: A rapid hydrographic survey (conductivity, temperature, and depth) of small structures in the shallow water zone across coastal Louisiana will be conducted. This survey will be the basis for planning the sampling in spawning season 1 of the following year (summer 2013). The goal of the year 1 rapid survey is to establish those structures that are representative and suitable for habitat studies and that can accommodate our sampling design. The year 1 rapid survey will consist of determining presence-absence and a general assessment of abundance (low, medium, and high) of juvenile snapper. Once the sampling sites are selected, a diver survey at structures in each zone on a monthly basis will occur between June and October 2013 and 2014 to follow recruitment of snapper. The initial hydrographic/diver survey data will then be used to select a representative cross section of platforms from the entire coast.

Task 3. Year-2 and 3 Hydrographic and Video Surveys: Regular monitoring of the environmental conditions and fish fauna associated with SWP structures will be an important tool for interpreting the seasonality, pattern of habitat use, and movement of juvenile snapper. A hydrographic profile of the water column will be taken each time traps or videotape are set around the base of a platform.

Task 4. Fixed Mount Camera Surveys: Two methods for estimating the abundance (census) of juvenile snapper and other fishes around SWP structures in fall 2012 will be tested. We will first estimate visibility near the bottom. Three camera setups will be used at each structure for the fixed camera video surveys. These camera arrays will record the fish fauna strongly associated with the platform and the bottom rubble surrounding the platform. In the laboratory each segment of videotape will be analyzed and the census methods will be compared to determine which works best under a given set of diving conditions. Rank order analyses will be used to compare fish community structure at each site and over time, and principal component analysis (PCA) will be used to relate the species assemblages to the environmental conditions.

Task 5. Diver Video Surveys: The fixed camera survey will be used to catch video of the behavior of predatory fishes and reef and non-reef associated fishes. Diver video surveys are hypothesized to be more efficient and more accurate at assessing juvenile snapper abundance (at locations with sufficient visibility) because the habitat is relatively small and simple in nature and snapper juvenile are strongly associated with the SWP structure and shell rubble.

Task 6. Trap studies around SWP Structures: Small fish traps suitable for capturing juvenile snapper will be deployed at each sampling site within a zone on a given sampling date as an alternative method to census juvenile fishes in this habitat and to provide samples to monitor cohort growth.

Task 7. Suitability Analyses for Juvenile Snapper Recruiting to Nearshore GOM Habitats: Essential fish habitat can best be described by adopting a microhabitat approach to yield a broad view of a species' habitat requirements. The proposed survey techniques are designed to sample a wide array of SWPs are compatible with the microhabitat approach. Sites are presumably selected by an individual to optimize their net energy gain while avoiding predators (i.e., tradeoffs of growth vs. mortality).

Products: The methodologies and techniques necessary to complete this research along with all project results will be described in detail and submitted to BOEM in quarterly, annual, and final reports. The PIs will also use the quarterly reports to inform the north central GOM regional research and management communities of the progress of this

research. Results of this research also will be submitted to the appropriate peer-reviewed scientific journal for publication and dissemination. The principal investigators (PIs) will present at Coastal Marine Institute (CMI) and BOEM Information Technology meetings. All of the data collected during this project will be submitted to BOEM and NODC in a format specified by BOEM in the award document. As with previous CMI projects, the PI will submit published products to BOEM.

Importance to BOEM: BOEM has a long history of funding projects on the habitat value of O&G structures but those studies have primarily focused on adult populations and fouling communities on larger structures in water depths of 15 meters or more. The number of rigs in the OCS of the GOM peaked in 2001 and has since declined in spite of continued new installations. The single objective is to increase the scientific knowledge of the importance of shallow water structures in the survival of juvenile red snapper. This increased value will be of use to BOEM in its role of structure permitting in the GOM waters.

Current Status: Second Annual Report has been delivered.

Final Report Due: August 2016

Publications: None

Affiliated WWW Sites: None

Revised date: January 2015

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