

BOEM ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

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

Title: Platform Recruited Reef Fish, Phase II: Do Platforms Provide Habitat that Increases the Survival of Reef Fishes? (GM-92-42-128)

Planning Area: Gulfwide

Total Cost: \$376,159

Period of Performance: FY 2006 – 2011

Conducting Organization: [Coastal Marine Institute, Louisiana State University](#)

BOEM Contact: [Dr. Maureen Mulino](#)

Description:

Background: To what extent do oil and gas platforms and artificial reefs contribute to the standing stocks of red snapper via their value as nursery grounds, or as adult feeding grounds? There is substantial literature dealing with the commonly observed association of biological communities with platforms but the nature and extent of fish dependency on platforms is not clearly defined. Tagging studies confirm that some red snapper do spend some periods of their lives in association with oil and gas platforms and with artificial reefs. But the key question of just how long, and at what life stages, red snapper spend time at or near oil and gas platforms and artificial reefs remains largely unanswered.

A potential method to answer this question is to find some marker in individual fish that correlates portions of a fish's life span to environmental parameters in its habitat. This is easier to accomplish for artificial habitats because they introduce detectable substances in concentrations different than the natural surroundings. In 2002, the Minerals Management Service (MMS) and Louisiana State University (LSU) successfully identified components of the microchemistry of the otolith in red snapper to differentiate between individual fish caught at oil and gas platforms, fish caught at artificial reefs, and fish not associated with artificial habitats.

This new study will expand the geographic range of the work and refine the otolith technique. We will sample substrates to compare with the otolith "platform fingerprint" and determine the source of the signature. We will examine otoliths of fish from Texas to Florida to determine the proportion of the red snapper population that have been associated at some life stage with platforms. In addition, we will sub-sample individual otoliths to distinguish which years of fish life spans are spent in association with oil and gas platforms. Combining these results with information on habitat affinities, juvenile abundances, growth rates, diet, and trophic dynamics will allow us to quantify the use and value of juvenile red snapper habitats.

Objectives: The objectives of this study are to test whether adult fishes containing the "platform fingerprint" in their otoliths contribute disproportionately to adult stocks, to

determine the source of the "platform fingerprint", describe yearly association of red snapper with platform habitat, and to synthesize information to evaluate juvenile red snapper use of habitat.

Methods: We will collect 1000 individual red snapper per year for two years from oil and gas platforms and a variety of other habitats (500 per year from platforms, 500 from other habitats); 500 total from Louisiana, 300 total from Texas, and 200 total from Mississippi/Alabama per year. In addition, we will collect 50 samples of barnacle and/or bivalve shells from platform legs and 50 samples of sediments using a Teflon®-coated Van Veen bottom grab during years 1 and 2 (100 total samples per year). In year 3, our focus will shift to adult snapper, where we will examine the otolith explicitly in annuli >2 (2+ years of age) to determine if fish that are recruiting to other habitats in the western, and especially the eastern Gulf appear disproportionately to have been reared on platforms during early life. We will collect 300 fish in year 3 from dockside locations in the eastern Gulf as far south as Tampa, FL, and 200 fish from Louisiana and/or Texas locations that were captured on habitats other than platforms. From a subsample of the adult otoliths, we will precisely mill material from individual annual increments (>2 to 10+) to determine the age at which red snapper move away from more structured habitats such as platforms.

Otoliths will be removed and analyzed for the measurement of metal isotope ratios. Barnacle shell and sediment samples will be prepared and analyzed in the same way. The procedures to be used in this study will use an inductively coupled plasma-mass spectrometer (ICP-MS) for measurement in the trace element concentration range 0 ppb – 20 ppb for isotopes of heavy metals recovered from high Ca background concentrations. Otoliths, barnacle and/or bivalve shells, and sediment samples will be analyzed in the ICP-MS using flow injection analysis (FIA). The flow injection system pulses a sample through the ICP-MS in a continuous flow of cleaning solution to reduce the amount of sample required and lessen the build up of deposits on the sampler and skimmer cones.

Data obtained will be analyzed with a variety of statistical techniques including multivariate analysis of variance, principle components analysis, linear discriminant analysis, and canonical discriminant analysis. Other techniques will be employed as deemed appropriate.

Products: Final report, various peer-reviewed scientific journal articles, data files, and image files.

Importance to BOEM: This study will enhance BOEM's understanding of the importance of oil and gas platforms as artificial reef habitat. It will contribute to evidence of the intrinsic value of platforms as essential fish habitat. It will add to our knowledge of the effects of the oil and gas industry on the ecology of the Gulf of Mexico. It will assist BOEM with management decisions concerning the decommissioning of oil and gas structures in the Gulf of Mexico.

Current Status: The study was completed in December 2009.

Final Report Due: August 2011

Publications: Cowan, J. and M. Zapp. 2009. Platform Recruited Reef Fish, Phase II: Do Platforms Provide Habitat that Increases the Survival of Reef Fishes? Proceedings: Twenty-fifth Gulf of Mexico Information Transfer Meeting, January 2009. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA

Affiliated WWW Sites: N/A

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