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STUDY TITLE: Comparison of the Assemblage of Organisms at Two Artificial Reefs and a Production Platform in the Northern Gulf of Mexico

REPORT TITLE: Rigs and Reefs: a Comparison of the Fish Communities at Two Artificial Reefs, a Production Platform, and a Natural Reef in the Northern Gulf of Mexico

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BACKGROUND: Most of the natural substrate in the northern Gulf of Mexico (GOM) from Destin, Florida to Brownsville, Texas is silty with approximately 2800 km² of naturally occurring hard bottom. During the last 60 years, the area of hard substrate in this region has increased through the development of infrastructure for a thriving oil and gas industry, creating the largest de facto artificial reef system in the world. These platforms not only increase the surface area of hard substrate available, but they arguably have a substantial impact on regional fisheries. The addition of petroleum platforms has doubtless affected many regional ecosystem processes such as energy (food) availability, habitat, recruitment, competition, and predation.

In response to both the federally mandated removal of obsolete platforms, and to the popularity of petroleum platforms as fishing destinations, Louisiana, Texas, and other states along the northern GOM now convert retired oil and gas platforms into artificial

reefs. To date, these states have established over 170 artificial reefs from converted oil and gas platforms.

The proximity of the two Rigs to Reefs projects and an operating oil and gas platform to the natural coral formations of the Flower Gardens (WFGB) afforded us the opportunity to not only compare several platform reef configurations, but also to compare the fish communities at "artificial reefs" to that of a neighboring natural system.

OBJECTIVES: It was the purpose of this study to compare the fish communities associated with an operating oil and gas platform, two artificial reef configurations, and the West Flower Garden Banks (WFGB). Reef configurations included a production platform toppled in place as a deep water artificial reef (West Cameron 617A), a nearby partially removed platform (High Island A355), and an operating production platform (High Island A350). We sought to identify species composition at each site and to estimate the fish biomass/density associated with each site; to determine the effects of side, depth, and distance from each site on fish biomass. Comparisons were then made between these sites and to other sites that had been surveyed.

DESCRIPTION: Dual beam hydroacoustic surveys were used to estimate fish density and biomass at all sites. Survey design consisted of a stationary array of four transducers at the standing platform and mobile surveys at the remaining sites. The mobile survey of the two reefs sites consisted of multiple vessel passes over each structure and the mobile survey of WFGB consisted of twenty-seven transects spaced 300 meters apart running along the long axis of the WFGB, from northeast to southwest. Visual surveys were conducted with a Deep Ocean Engineering Phantom HD2 ROV with standard visual census techniques recorded onto S-VHS video tape.

SIGNIFICANT CONCLUSIONS: Overall, we found that fish biomass per cubic meter and density around the standing oil and gas platform were higher than the artificial reefs or natural reefs. Comparison of the mean biomass per cubic meter (Sv) found at the standing platform and over and immediately around the two reef sites and the WFGB terraces clearly indicate an order of magnitude difference between the standing platform and other sites, suggesting that standing platforms supported greater fish biomass per cubic meter. Our results are in support of previous findings that when a platform is converted into an artificial reef by toppling in place or by partial removal, it loses a significant portion of the fish community. Fish biomass per cubic meter at the artificial reef sites was similar to the upper terrace of the nearby natural reef. In each habitat, we tended to find higher fish densities in habitats with more vertical structure.

STUDY RESULTS: This research continues to support the working hypothesis that platforms make useful artificial reefs since they tend to support a population of fish that can be 10 to over 1000 times greater in density than the adjacent sand and mud bottom habitats, and are equal to or even exceed that of natural hard reef-like habitat (WFGB). The species associated with the artificial reefs (including standing platforms) do

however, differ from those found on natural reef habitats. Future research efforts might be directed toward determining the reasons for this difference. Integration of these types of study results into a comprehensive spatial database will go far in improving management of these resources.

STUDY PRODUCT(S): Wilson, C.A., A. Pierce, and M.W. Miller. 2003. Rigs and Reefs: a Comparison of the Fish Communities at Two Artificial Reefs, a Production Platform, and a Natural Reef in the Northern Gulf of Mexico. Prepared by the Coastal Fisheries Institute, School of the Coast and Environment. Louisiana State University. U.S. Dept. of the Interior, Minerals Mgmt. Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2003-009. 105 pp.

Pierce, Aaron. 2002. Do platforms make good artificial reefs? Comparison of fisheries value of standing, toppled, and partially removed platforms in the northern Gulf of Mexico M.S. Thesis Department of Oceanography and Coastal Sciences. Louisiana State University