

STUDY TITLE: Platform Debris Fields - Extent, Composition, and Biological Utilization

REPORT TITLE: Platform Debris Fields Associated with the Blue Dolphin (Buccaneer) Gas and Oil Field Artificial Reef Sites Offshore Freeport, Texas: Extent, Composition, and Biological Utilization

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KEY WORDS: Western Gulf, Buccaneer Gas and Oil Field, artificial reefs, side-scan sonar, multibeam echosounder, remotely operated vehicle, diver surveys, debris, platform removal, fish populations

BACKGROUND: The goal of this study was to document the extent, composition, and reef value of debris fields around two sets of production and quarters platforms (GA-288A, AQ; GA-296B, BQ) in the Blue Dolphin Gas and Oil Field (formerly the Buccaneer Gas and Oil Field) that were partially removed and "reefed" in place in August 2003. These sites are now maintained as artificial reefs. These platforms had been in place since the 1960s, and, because the sites were designated as artificial reefs, the seafloor at these locations was not "cleaned-up" when the platforms were partially removed. These sites, therefore, were believed to offer an unusual opportunity to document the composition, extent, and fish habitat value of the debris fields associated with structures that had been in place for more than four decades. The site is unusual in that extensive historical investigations had been conducted at these platforms in the late 1970's, thereby providing a qualitative assessment of the debris fields present at that time. Further, additional debris was added in the form of platform sections of various sizes that were cut and dropped in place. Lastly, because the sites have been designated as artificial reef sites by the Texas Parks and Wildlife Department (TPWD), matching funds were available to support studies of these reefs.

OBJECTIVES: To map these new artificial reefs and their associated debris fields using side-scan sonar and multibeam echosounder technology and to survey fish populations using divers, remotely operated vehicle (ROVs), and hydroacoustic technology to document the biological utilization of these reefs.

DESCRIPTION: The Buccaneer Gas and Oil Field (BGOF) is located in the northwestern Gulf of Mexico and lies approximately 50 kilometers south of the entrance to Galveston Bay, Texas. The water depth in the field is approximately 21 meters. A total of 24 platform structures were installed over the life of the field. By mid 2003, all but two small satellite platforms and the two main production/quarters platform complexes (GA-288 and GA-296) had been removed. GA-288 and GA-296 complexes were partially removed in August of 2003 with the top sections cut and placed on the bottom around the base sections left in place. During the period 2003 to 2005, we conducted side-scan sonar, dual-beam hydroacoustic, multibeam echosounder, and remotely operated vehicle (video) surveys of the debris piles to determine any changes in the vertical relief, extent and distribution of the debris piles (artificial reefs) and the fish utilizing them.

SIGNIFICANT CONCLUSIONS: The debris piles around GA-288 and GA-296, two partially removed production platforms being used for artificial reefs, each covered about 5,300 m² and, in 2005, each had a maximum vertical relief of about 6 m. Outside these piles, the seafloor was relatively clean; i.e., very little, if any, material was located outside a radius of about 150 m.

The total fish populations at these two sites in 2004 ranged from about 6,000 to 9,500 individuals. The dominant species included red snapper, Atlantic spadefish, blue runner, and sheepshead. These species were among the dominants when the platforms were standing (Galloway et al. 1981). The tomtate was initially abundant, but largely disappeared after one year.

STUDY RESULTS: Results of the multibeam surveys at both GA-288 and GA-296 in June 2005 suggest little change in the minimum depths or distribution of reef materials described from sidescan sonar and hydroacoustic surveys conducted in October 2003 (Appendices A.13 and A.14). Measurements of minimal depth recorded during hydroacoustic surveys for GA-288 were approximately 18 m deep, compared to 17.7-17.8 m for the multibeam data set in June 2005. Seafloor depth was reported to be 23 m for the hydroacoustic surveys in October 2003, which compares to 22.4-22.9 m depths recorded during the June 2005 multibeam surveys. Minimal and surrounding depths reported for GA-296 were also in agreement, with 16 m reported for the crest of the reef feature from the hydroacoustic survey (16.6-16.9 m in the multibeam data set) and 22-23 m for the surrounding sea bottom (22.9-23.4 m in the multibeam survey). Despite different survey methods, tidal corrections, etc., the agreement in depths suggests little if any change in the vertical structure of reef materials and depth of the surrounding seafloor. The minor differences observed in depths are most likely due to differences in the areas which were averaged on each survey for individual soundings.

Comparison of the sidescan sonar mosaic for each reef site with the gridded multibeam dataset also reflected little change in the distribution of reef materials between the 2003 and 2005 surveys. Minor differences in position of features in the sidescan sonar mosaics is most likely due to inaccuracies of location resulting from layback of the sidescan towfish, errors generated during production of the mosaic, or differences in GP and motion sensor capabilities and settings during each survey. Multibeam surveys conducted in 2005 utilized the highest quality positioning equipment available, and were conducted during fairly calm (1-3 ft) seas. Therefore this dataset should set the standard for future comparisons.

Overall, we were struck by how clean the seafloor appeared outside the immediate vicinity of the debris piles. There were virtually no materials outside a 100- to 150-m radius of the debris piles of each site. The materials that were represented outside the main debris piles were relatively small and isolated.

At site GA-288, tomtate, sheepshead, Atlantic spadefish, grey triggerfish, and gray snapper, dominated the September 2003 collections. The red snapper comprised about 4% of the total observations included in the analysis. The total population size in September 2003 was estimated to be about 9,000 fish (i.e., the same as measured in October 2003), the total number of red snapper was estimated to be on the order of 361 fish.

By the next year (August 2004), the population at this site was on the order of 6,198 fish. The population was dominated red snapper which comprised about 70% of the total ROV observations. Thus, the red snapper population had increased from about 361 fish to on the order of 4,300 snapper even though the overall population had declined. In contrast, tomtate comprised only 10.2% of the total observations in 2004 (as compared to 38.1% in 2003). In a similar fashion, Atlantic spadefish comprised 0.2% of the total observations in 2004 as compared to 13.4% in 2003. The observed decline in total abundance at site GA-288 in 2004 as compared to 2003 corresponded to a decline of species normally residing in the upper part of the water column around standing oil platforms.

In 2004, the dominant fishes at GA-296 included the Atlantic spadefish (29.1%), the blue runner (28.1%), and the red snapper (25.2%). The red snapper population was estimated to be on the order of 1,792 fish. A video drop was also made at a rock ridge or rip-rapp covered pipeline located just northwest of the main debris pile at GA-296. Visibility conditions were very poor at this site and "unidentified" fish comprised 26% of the observations. The lookdown was the dominant identified fish comprising 30% of the total observations. The sheepshead also comprised 20% of the total observations made along this rock ridge.

STUDY PRODUCT: Gallaway, B.J., J.G. Cole, and L.R. Martin. 2008. Platform debris fields associated with the Blue Dolphin (Buccaneer) Gas and Oil Field artificial reef sites offshore Freeport, Texas: extent, composition, and biological utilization. Prepared for U.S. Dept. of the Interior, Minerals Management Service Gulf of Mexico OCS Region, Metairie, LA. OCS Study MMS 2008-048. 113 pp.

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