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STUDY TITLE: The fidelity of red snapper (*Lutjanus campechanus*) to petroleum platforms and artificial reefs in the northern Gulf of Mexico

REPORT TITLE: Fidelity of red snapper (*Lutjanus campechanus*) to petroleum platforms and artificial reefs in the northern Gulf of Mexico

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SPONSORING OCS REGION: Gulf of Mexico

APPLICABLE PLANNING AREA: Central Gulf of Mexico

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COMPLETION DATE OF REPORT: April 2006

COSTS: FY 2002: $62,733; FY 2003: $26,784. FY 2004: $33,297

CUMULATIVE PROJECT COST: $122,814

PROJECT MANAGER: Charles A. Wilson

AFFILIATION: Professor, Department of Oceanography and Coastal Studies, Louisiana State University

ADDRESS: Louisiana State University School of the Coast and Environment, Coastal Fisheries Institute, Baton Rouge, LA 70803

PRINCIPAL INVESTIGATOR: Charles A. Wilson

KEY WORDS: Central Gulf; Louisiana; red snapper, rigs to reefs, biology; habitat; telemetry, site fidelity, migration

BACKGROUND: The habitat value of petroleum platforms for red snapper, *Lutjanus campechanus*, is poorly understood. However, it is widely recognized by both scientists and fishermen that the presence of platforms in the northern Gulf of Mexico (GOM) has affected the distribution of red snapper by the addition of hard substrate habitat. Studies have shown that there is high diversity and biomass of fishes around platforms compared to the community that would normally inhabit sandy and muddy substrate if platforms were not present.

Federal and international law requires the removal of all decommissioned platforms to minimize hazards to navigation. Over time, this removal of platforms could result in loss of recreational and commercial fishing opportunities. Some of these retired platforms have been converted into artificial reefs to preserve their habitat value. Although artificial reefs are viewed as a useful fisheries management and enhancement tool, not

enough is known about the life history and stock structure of fishes that use these habitats to address specific management objectives with artificial reefs.

Acoustic telemetry can be used to obtain fishery independent data collection of fish presence/absence. Continuous acoustic tracking of red snapper is here used to investigate diel movements, habitat use, and site residence times.

OBJECTIVES: The objectives of this study were:

1. To develop a protocol for at sea surgical implantation of acoustic transmitters into red snapper.

2. To use acoustic telemetry to investigate the short- and long-term site fidelity of red snapper to petroleum platforms and artificial reefs on the OCS of the GOM off the coast of Louisiana, thereby evaluating the habitat value of these platforms.

3. To determine if uniform directional movement is undertaken by red snapper departing from the study area.

4. To estimate fishing mortality on the red snapper population.

5. To determine if any diel movement patterns are exhibited by red snapper around petroleum platforms and artificial reefs.

DESCRIPTION: The study area was a 35-km^2 portion of the South Timbalier oil and gas lease blocks (128, 134, 135, 151, and 152), 50 km south of Port Fourchon, LA. This area was chosen due to the close proximity of 12 standing platforms and numerous artificial reefs in a circle configuration, and the high frequency with which commercial and recreational fishermen visit the area. The closest platforms to the “circle rigs” are approximately eight km to the east in the South Timbalier 130 lease block.

125 red snapper were captured by hook and line at the platforms. Following anaesthetization with MS-222, an individually coded acoustic pinger was surgically implanted into the peritoneal cavity of each fish. After a short recovery period the red snapper were released at five platforms in the study area. Presences of individual snapper were recorded with omnidirectional acoustic receivers attached to seven platforms, and to one artificial reef, a toppled platform.

SIGNIFICANT CONCLUSIONS: Analysis of fish recapture and acoustic data revealed lower site fidelity and less uniform directional movement than shown by previous research on red snapper. The estimates of instantaneous fishing mortality were generally greater than the current value predicted by red snapper stock assessment. Red snapper at platforms exhibit diel movements away from the platforms during the night that may be explained by offsite foraging behavior.

STUDY RESULTS: The mass tagging procedures developed in this study were extremely successful. It was possible to tag as many fish as could be captured by 10-12 people fishing at all times.

Red snapper exhibited little movement between platforms in the study area. However, logistic regression showed a high initial fidelity to release location which subsequently decreased over time, thus site fidelity was found to be high in the short-term, but much lower in the long-term. Relocated fish showed no evidence of homing behavior to original capture locations. Red snapper recaptured outside of the study area showed little uniform directional movement.

The results of the Fourier analysis and the LOESS procedure show that red snapper undergo a diel movement away from the receivers and platforms at night. The most likely explanation for the nocturnal movement away from the platform to feed on benthic organisms.

Estimates of instantaneous fishing mortality on this population were higher than those predicted by the most recent stock assessment. The various combinations of natural mortality and tag reporting rates yielded a wide range of estimated instantaneous fishing mortality (F) values, ranging from 0.36 to 6.7. The most recent red snapper stock assessment panel report predicted a current F ranging between 0.292 and 0.474 and an MSY F ranging from 0.097 to 0.118, values much lower than any of the F estimates in this study.

Some scientists believe that dense networks of reserves should be established as protection against management failure without assessing whether or not the reserves are likely to function as desired. Red snapper are not good candidates for marine reserves, as they are highly mobile and exhibit little long-term site fidelity; therefore management efforts should be focused on other methods. Knowledge of red snapper fidelity to petroleum platforms will lead to more effective management of this species by clarifying both the specific function of these structures as habitat and their importance to the red snapper population in the GOM.

STUDY PRODUCTS: Peabody, M.B. and C.A. Wilson. 2003. The fidelity of red snapper (*Lutjanus campechanus)* to petroleum platforms and artificial reefs in the northern Gulf of Mexico. Poster Presentation. 56th Annual Meeting, Gulf and Caribbean Fisheries Institute. Tortola, British Virgin Islands, November 2003.

Peabody, M.B. 2004. The fidelity of red snapper (*Lutjanus campechanus*) to petroleum platforms and artificial reefs in the northern Gulf Of Mexico. M.S. Thesis. Louisiana State University. Department of Oceanography and Coastal Sciences

Peabody, M.B. and C.A. Wilson. 2006. Fidelity of red snapper (*Lutjanus campechanus*) to petroleum platforms and artificial reefs in the northern Gulf of Mexico: final report. Prepared by the Coastal Fisheries Institute, School of the Coast and Environment. Louisiana State University. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2006-005. 73 pp.

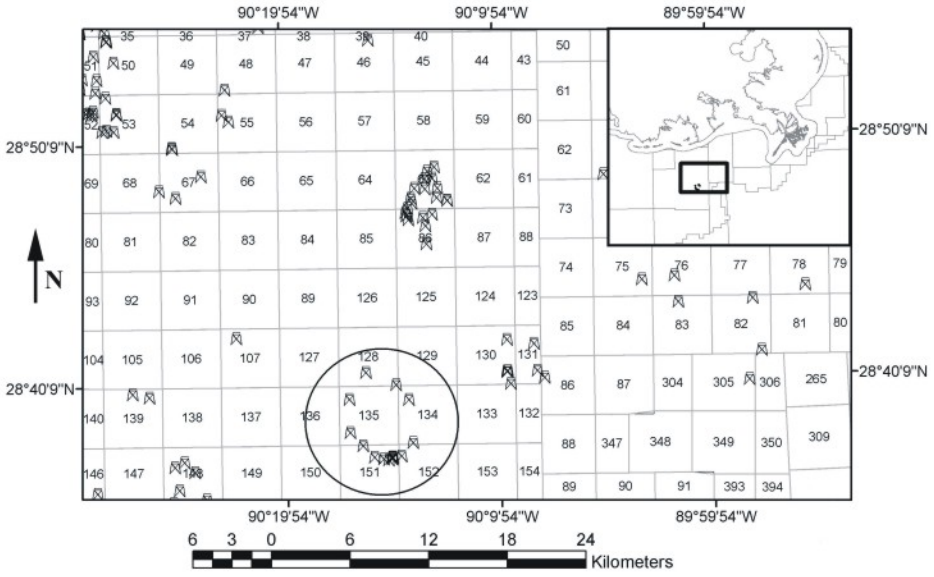

Figure 1. Map of study area. Circled area in main figure indicates the location where red snappers were tagged and released.