ACCESS NUMBER: 17912

STUDY TITLE: Estimation of Fisheries Impacts Due to Underwater Explosions Used to Sever and Salvage Petroleum Platforms

REPORT TITLE: Estimation of Fisheries Impacts Due to Underwater Explosives Used to Sever and Salvage Oil and Gas Platforms

CONTRACT NUMBER: IA-17912

SPONSORING OCS REGION: Gulf of Mexico

APPLICABLE PLANNING AREAS: Eastern, Central, and Western

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COMPLETION DATE OF REPORT: 2000

COSTS: FY 1992: $250,000; FY 1993: $516,000; FY 1995: $135,000; FY 1996: $246,300; FY 1997: $446,600; CUMULATIVE PROJECT COSTS: $1,593,900

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KEY WORDS: Gulf of Mexico; fisheries; platform removal; biological impacts; mortality estimates; fish tagging; population estimates; transect surveys; stock assessment: red snapper.

BACKGROUND: As of January 31, 2000 there were 3,967 oil and gas structures present in federal waters of the Gulf of Mexico. Federal regulations require removal of these structures within one year of lease termination. From 1989-98 nearly 1,000 structures were salvaged in both federal and state waters using explosives. In the most common explosive removal method, 40-50 lb charges are detonated inside the pilings and well conductors at a minimum depth of 5 m below the sea floor (MMS requirement). Consequently, hundreds of pounds of explosives, primarily Comp-B and C-4, are often used at offshore platform removals. Since offshore platforms function as artificial reefs attracting a wide variety of marine life, one obvious consequence of explosive structure removal is a negative impact on fish. Although offshore platforms have been the subject of much scientific study over the years, there has previously been no attempt to quantify the impacts of explosive platform removal on fish populations. Of special concern is the commercially and recreationally important red snapper (*Lutjanus campechanus*) which occurs at many of these structures. The red snapper continues to

be the subject of intense government regulation as this species is severely overfished and there are significant problems in the long-term viability of the stock.

OBJECTIVES: (1) Determine the abundance of fish populations, fish mortality resulting from explosives use, and other factors contributing to the mortality of fish populations at sampled platform removal sites; (2) Estimate the total at-risk population abundance and potential mortality from explosive platform removal in the Gulf of Mexico as well as the effects on fish stock productivity for those populations (with special emphasis on red snapper); compare this to other anthropogenic sources of mortality; statistically evaluate strategies for mitigating the impact of removal on at-risk fish populations in terms of their short and long term reproductive potential.

DESCRIPTION: Sampling sites included ten platforms extending from the upper Texas coast to the Mississippi River. Data collection allowed estimates of total fish mortality at nine of ten sites. Prior to detonation of explosives, fish were captured, tagged and released alive. After explosives were detonated, dead fish floating on the surface were collected from inflatable boats using dip nets. Divers manually sampled dead fish that sank to the sea floor using transect lines, circular surveys, and sampling frames. Dives were delayed a minimum of 30 minutes after detonation to allow fish to die and sink to the bottom. Transect lines radiating out from the platform provided continuity of sampling generally to a distance of 100 m. Circular surveys measuring 6.7 m in diameter produced discrete samples around the platform. Sampling frames of various dimensions were used to collect dead fish on the sea floor beneath the platform. Fish were identified, weighed, measured, and checked for tag presence. Pre-detonation fish populations were estimated for tagged species by equating the ratios of tagged to total fish present before detonations with the ratio of tagged to total fish present in samples collected after detonations and solving for the unknown parameter. Mortality of fish that sank to the sea floor was estimated by multiplying fish density from samples by sea floor area. Addition of mortalities collected at the surface provided an estimate of total mortality. Using the mean number of red snapper killed per platform, total mortality of red snapper resulting from all explosive structure removals in the U.S. Gulf of Mexico was calculated. Results were used in stock assessment analyses to determine the relative contribution of mortality from explosive structure removals with other anthropogenic sources of mortality.

SIGNIFICANT CONCLUSIONS: The most severely impacted fish species at explosive structure removals in order of abundance were Atlantic spadefish (*Chaetodipterus faber*), blue runner (*Caranx crysos*), red snapper (*Lutjanus campechanus*), and sheepshead (*Archosargus probatocephalus*). These four species accounted for 86% of estimated mortality. Numbers of all other impacted species were far below those of the top four. Of the species encountered in these field studies, only red snapper, gag and red drum have stock assessments conducted on them by the National Marine Fisheries Service. For red snapper, even when the mortality estimate was doubled, impacts were estimated to be small, well within the variation of our current assessments, and would not alter current determinations of status or current management recovery strategies.

Similarly, current methods of assessment would not detect the even smaller changes in magnitude of gag and red drum.

STUDY RESULTS: Mean red snapper mortality was 515 fish per platform based on sampling conducted at nine study sites from 1993-1999 during May-September in water depths of 14-32 m. Results indicated no significant difference in estimated mortality of red snapper by water depth, longitude, platform age, season, surface salinity, and surface temperature. If a wider range of water depths, seasons, etc. were studied, some of these analyses would undoubtedly have shown a significant difference. Red snapper population estimates at seven platforms ranged from 503-1943 with a mean of 905. Fish density for all species combined decreased with increasing distance from the platform. Significant differences in fish density occurred between 0-7 and 18-25 m as well as between 0-25 and 25-50 m samples. Results refer to fish greater than or equal to 8 cm in total length.

STUDY PRODUCTS: Gitschlag, G. R., M. J. Schirripa, and J. E. Powers. 2001. Estimation of fisheries impacts due to underwater explosives used to sever and salvage oil and gas platforms in the U.S. Gulf of Mexico. A final report prepared by the National Marine Fisheries Service for the U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. Contract No. IA-17912. OCS Study MMS 2000-87 94p.

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