

BOEM ENVIRONMENTAL STUDIES PROGRAM: Ongoing Studies

Region: Pacific

Planning Area(s): Southern California

Title: Biological Productivity of Fish Associated with Offshore Oil and Gas Structures on the Pacific OCS (PC-12-02)

BOEM Information Need(s) to be Addressed: Fish standing stock (biomass) and productivity estimates associated with oil and gas production platforms will provide needed information so that BOEM can specify any site-specific survey requirements to industry or other interested parties when they propose decommissioning.

Total BOEM Cost: \$100,000 **Period of Performance:** FY 2012-2013

Conducting Organization: University of California Santa Barbara and Occidental College Vantuna Research Group

Principal Investigator: Drs. Milton Love, Dan Pondella, and Jeremy Claisse

BOEM Contact: [Ann Scarborough Bull](#)

Description:

Background: In September of 2010, the Governor of California signed into law the California Marine Resources Legacy Act (CMRL Act) which, for the first time on the Pacific Coast, enables a “rigs-to-reefs” program that allows for reefing partially removed, decommissioned OCS oil and gas production platforms, as long as specific ecological criteria are satisfied. Partial removal means cutting the platform off 85 feet (~26 meters (m)) below the sea surface. One pivotal requirement for a proposed reefing project is that a net environmental benefit must be demonstrated for partial removal when compared to full removal. The CMRL Act specifies that the proposed reefed structure must provide for the protection and productivity of fish and other marine life. The State of California provided funding for an independent scientific team to produce a preliminary theoretical framework that estimates the standing stock and annual production of fishes on platforms in the Southern California Bight. Using this theoretical model, estimates for productivity have begun for a few platforms on the OCS. This study requires no field work as the data were acquired via previous BOEM studies.

Objectives: Using empirical data from completed and ongoing BOEM studies, and building upon the preliminary model approved by the State of California and by BOEM as a member of a 15-member Expert Advisory Committee, the goal of this study is to determine the patterns of total standing stock (fish biomass) and fish production at as many Pacific OCS Region platforms as the data will support. Model results will be interpreted to examine the effects of decommissioning options (complete or partial removal). Additionally, platform fish (all species) productivity estimates will be compared to nearby natural reefs for which similar production estimates are available, and will also be compared to production estimates in the literature of

other marine and terrestrial ecosystems. Once completed, study results will be published as a BOEM OCS Study Report and in a peer-reviewed journal(s).

Methods: A biological model will be further developed based upon existing empirical studies of these platforms to determine for all fish species (1) the standing stock, and (2) the larval production of fishes. This model starts with the current standing stock defined as the total biomass (B) of each species per platform. It then calculates the future production and standing stocks for all fish species based upon the two platform decommissioning options (complete or partial). The data used for this model were collected during scientific surveys by observers using either submarines or SCUBA to record the frequency and size class of fishes along fixed transect lengths based upon the dimensions of the platform (Love et al. 2003).

Stock Assessment

The stock is the amount of biomass for all fish species observed on each platform. The mean biomass density will be calculated for each platform and for each of three depth strata (i.e., lowest 2 m of a platform, 2 m off the bottom to 26 m from the surface, and from 26 m to the surface). The total stock estimate will multiply these depth-zone specific biomass densities by an estimate of the surface area of each depth zone, and summing those estimates for each platform.

Production Estimate

Production is the change in biomass over time (Clarke et al. 1946). The total yield (Y) is a function of two factors: the standing stock biomass (B), plus the surplus production (Y'). Surplus production is the annual growth (G) in the adult stock (i.e., gonadal and somatic growth) plus recruitment (R), such that for any production component (Ricker 1975):

$$Y = B + Y' \text{ and } Y' = G + R$$

The model will then estimate annual rates of somatic fish production (g/m²/yr) for each platform for each decommissioning scenario (partial or complete removal). Somatic growth for each species will be estimated based on its standing stock and the species-specific von Bertalanffy growth function. As there are no available estimates of immigration (I) and emigration (E) rates of platform fishes, the model will assume I = E for subadult and adult life history stages. Larval/pelagic juvenile emigration is measured by recruitment to the platform and larval immigration rates can be calculated by fecundity and adult density and size distribution. The standing stock is also a factor of fishing and natural mortality. Fishing mortality is considered negligible as most platforms are currently acting as de facto closures due to security. Natural mortality is incorporated using mortality rate estimates from the literature. Currently only recruitment (R) for young-of-year (YOY) bocaccio is incorporated into the model based on available data for which recruit density and depth were reported (Love & York 2006). No other fishes were added to the recruitment component of the production model, which results in a conservative juvenile production estimate. The model will estimate productivity levels over a time frame of 5 years. A standing stock and production estimate for all fish species will be produced for as many Pacific OCS Region platforms as the data will support.

Current Status: Kickoff meeting and 6-month progress meeting held at BOEM. Study progress is good and we expect completion on time.

Final Report Due: September 2013

Publications Completed: None at this time.

Affiliated WWW sites: None at this time.

Revised Date: January 3, 2013