STUDY TITLE: Marine Benthic Fauna Including Demersal Fishes on the OCS from DeSoto Canyon, LA to Brownsville, TX.

REPORT TITLE: Ecological Aspects of the Upper Continental Slope of the Gulf of Mexico

CONTRACT NUMBERS: BLM: 08550-CT4-12

SPONSORING OCS REGION: Washington

APPLICABLE PLANNING AREAS: Eastern Gulf of Mexico; Central Gulf of Mexico; Western Gulf of Mexico

FISCAL YEAR OF PROJECT FUNDING: 1974

COMPLETION DATE OF REPORT: 1976

COST: FY 1974: $52,830

CUMULATIVE PROJECT COST: $52,830

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KEY WORDS: Eastern Gulf; Central Gulf; Western Gulf; Texas; Louisiana; Alabama; Florida; Mississippi; DeSoto Canyon; biology; slope; shelf; macrofauna; diversity; faunal zones; grain size; literature review; physicochemical

BACKGROUND: Deepwater biological investigations of the Gulf of Mexico commenced over a hundred years ago, but a hiatus of approximately 80 years followed before additional studies were conducted. Early studies were primarily concerned with species descriptions and little effort was expended on integrating findings into an overview of biological assemblages found at a given depth. In addition, samples were so sparse that few zoogeographical inferences could be drawn. Deepsea biology in the Gulf of Mexico was revitalized with the dedication of the Texas A&M University research vessel R/V ALAMINOS in 1963. This study was based on samples that were collected by the R/V ALAMINOS from 1967 through 1973 and which were studied by a cadre of scientists.

OBJECTIVES: (1) To describe the faunal assemblages of the upper continental slope (118 to 1,000 m) in the northern Gulf of Mexico; (2) to attempt an analysis of causation

with regard to community distribution; and (3) to synthesize important facts and to create a simple model of the ecosystem sustained on the upper continental slope.

DESCRIPTION: The study area extended from the region offshore of Brownsville, Texas to the De Soto Canyon area in the northeastern Gulf of Mexico. Depthwise, the study region was delimited roughly between the 118- to 1,000-m depth contours. Biologically the report dealt almost exclusively with the macrofauna, which were defined as organisms over 1 to 2 mm in length. The benthic samples on which this study was based were collected by the R/V ALAMINOS during 1967 through 1973. Samples from 111 stations were discussed. Methods of collection, sorting, preservation, and identification were not given. Organisms were arranged by major taxonomic groupings and a rank ordering of individuals was given. From this rank ordering, a second list contained the predominant species. Number of species per depth range was graphically presented for each taxonomic grouping. Vertical and horizontal distributions within the study area were shown for each species. Species diversity, as determined by the Sannon-Wiener function, was determined for each station and for selected depth ranges. A dendrogram showing fauna relationships was constructed using an index of similarity.

The biology of the deep Gulf of Mexico was the main emphasis of the report, but an environmental framework was give, consisting of literature review and ground-truthing samples for physical, geological, and chemical entities. Physicochemical samples for temperature, salinity, and oxygen were taken with Nanse or Niskin bottles at or near some of the biological stations. With the aid of a bottom-finding pinger, many of the samples were collected within 1 to 3 m of the bottom. Sediment samples, collected in conjunction with biological samples, were taken with a Phleger corer and were analyzed for grain size.

STUDY RESULTS: Within the geographic and depth range of this study, the following numbers of species were reported and discussed: 26 starfishes; 19 sea urchins; 15 sea cucumbers; 17 serpent stars; 1 isopod; 14 penaeid shrimps; 24 caridean shrimps; 6 macrurid crustaceans; 27 anomuran crabs; 43 brachyuran crabs; 249 bottom fishes; 25 gastropods; 19 clams; and 13 tooth shells. The following information was provided for most species: (1) total individuals collected during this study; (2) number of stations where the species was dominant; (3) depth range; (4) depth of maximum abundance; (5) rank order of abundance; and (6) map showing location of capture.

Based upon this study, the following assemblages were depicted: (1) inner shelf assemblage (from intertidal to 50 to 70 m depth); (2) outer shelf assemblage (from 50 to 70 m to about 118 m); (3) shelf-slope transition assemblage (118 to about 200 m); and (4) true slope assemblage (200 to >1,050 m). The true slope assemblage was further divided into four zones: (a) shallow zone (175 to 450 m); (b) intermediate zone (450 to 750 m); (c) middle zone (800 to 1,050); (d) deep zone (>1,050 m). Definition of the deep zone must await sampling of the deeper depths.

The value of species diversity indices in the context of this study was to evaluate samples and to add another point of corroboration to the existence of faunal zones on

the slope. The results of similarity index calculations appear to support that there are four major faunal zones on the upper continental slope of the Gulf of Mexico.

Based upon physical and biological factors, it is suggested that the slope ecosystem can be divided horizontally into three regions in the northern Gulf of Mexico: western region (essentially off the Texas coast); central region (off Louisiana, Mississippi, and Alabama); and eastern region (off northern Florida).

STUDY PRODUCTS: Pequegnat, W. E., R. M. Darnell, B. M. James, E. A. Kennedy, L. H. Pequegnat, and J. T. Turner. 1976. Ecological Aspects of the Upper Continental Slope of the Gulf of Mexico. A final report by TerEco Corporation for the U.S. Department of the Interior, Bureau of Land Management, Washington, D.C. Contract No. 08550-CT4-12. 305 pp. + app.

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