

STUDY TITLE: South Texas OCS Fisheries Investigation Study

REPORT TITLE: Environmental Studies of the South Texas Continental Shelf, 1976 Ichthyoplankton/Mackerel Eggs and Larvae, Environmental Studies of the South Texas Continental Shelf, 1976-1977 Historical Zooplankton and Environmental Studies of the South Texas Continental Shelf, 1977, Ichthyoplankton/Mackerel Eggs and Larvae, and Environmental Studies of the South Texas Outer Continental Shelf, 1977, Snapper/Grouper

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APPLICABLE PLANNING AREAS: Western Gulf of Mexico

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CUMULATIVE PROJECT COST (IA7-21): \$158,662

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BACKGROUND: Broad, interdisciplinary surveys of neritic and oceanic waters off the south Texas coast were initiated in January 1975 under sponsorship of the U.S. Department of the Interior. Coordinated research efforts were undertaken to establish baseline information on specific marine parameters prior to mineral exploration in the offshore area extending from Matagorda Bay to the Mexican border. The primary purposes of the plankton studies were to determine species composition, relative abundance, and seasonal and areal distribution of ichthyoplankton, and to examine temporal and spatial variability of zooplankton.

OBJECTIVES: (1) To document spawning times and locations of major fish species; (2) to provide data on the ecology of the area; (3) to determine general locations of main spawning sites and to classify selected fish families according to egg developmental stages; (4) to compare ichthyoplankton data from oblique bongo net tows and neuston net tows to document differences between surface and subsurface ichthyoplankton; and (5) To document the occurrence of various species and taxa of zooplankton.

DESCRIPTION: A major change in the ichthyoplankton program during 1976, and continued in 1977, was the increase in sampling frequency from three to nine cruises a year. Seasonal coverage in 1976 was continued at all 12 stations originally sampled in 1975. In addition, monthly sampling was conducted along Transect II where coverage was increased from 3 to 7 stations. In this study, sampling gear was changed to a paired bongo sampler and a neuston net to enable comparisons of sampling effort with similar gear and procedures in plankton studies throughout the world. Addition of three transects in two adjacent study areas extended sampling coverage of the Texas coast from Port Isabel to Galveston. Zooplankton samples were collected using step-oblique tows from just off the bottom to the surface. Surface neuston tows followed the bongo net collections. In the laboratory, fish larvae and eggs were sorted to the lowest possible taxon from the entire sample. All fish larvae were counted, identified to the lowest possible taxon, and measured. All eggs were counted, but few were identified to family. Larvae of the king and Spanish mackerels were removed from the samples for the special mackerel study. Larval penaeids had been removed by other investigators prior to receipt of the zooplankton samples at the laboratory. After splitting the remaining sample, organisms were identified and sorted into appropriate taxonomic categories; adult female copepods were identified to the species level.

SIGNIFICANT CONCLUSIONS: In general, the northwestern Gulf of Mexico is an important spawning and nursery area for marine fishes. Highest numbers of larvae and eggs were collected in May; eggs were more abundant, and larvae less abundant in water depths less than 45 m. At least 50% of the mackerel larvae were captured in September. Total zooplankton exhibited seasonal and spatial variability with density peaks occurring in spring and fall. Variation was generally greatest at inshore stations.

STUDY RESULTS: The baseline ichthyoplankton survey showed that the northwestern Gulf of Mexico is an important spawning and nursery area for marine fishes. Pelagic larvae represented 69 families, 117 genera, and 80 species. The greatest number of species occurred in the myctophids (lantern fishes) followed by the sciaenids (drums) and scombrids (tunas and mackerels). Larvae of the Spanish mackerel, king mackerel, bluefin tuna, cobia, pompano, red snapper, and bluefish were documented for the first time. The highest numbers of larvae were captured in May and the lowest in December; the highest number of eggs was also collected in May but the lowest were during March and April. Fish eggs were more abundant in water depths less than 45 m and became less abundant as water depth increased. Fish larvae generally were less abundant in inshore waters; it was speculated that spawning for many pelagic species probably occurred in water depths seaward of the continental shelf. Ichthyoplankton species diversity was highest in spring and lowest during late fall and early winter; seasonal occurrence of eggs followed a similar pattern. Generally, spawning patterns,

locations, and intensity varied between genera, species, and years. No specific spawning grounds were noted for fishes. During each year of the mackerel survey, king mackerel larvae were captured in increasing numbers from May through September with at least 50% of the larvae being captured in September. Spanish mackerel followed a similar pattern but was less abundant than king mackerel. King mackerel larvae were more abundant at night over the shelf (32 to 183 m) and in waters ranging from 23 to 29°C. Spanish mackerel were most abundant during the day in waters ranging from 20.2 to 29.8°C. No precise larval and egg abundance differences were noted between the original BLM study area and those additional northern areas. Direct comparisons of selected zooplankton and ichthyoplankton indicated some linear correlations which suggested that fish egg and larval abundance may be related to zooplankton abundance. In comparing bongo and neuston catches, marked differences were noted in the catch of the two years. Species diversity was greater in bongo than in neuston tows. In terms of relative abundance, greater numbers of anchovies, drums, goatfishes, mullets, jacks, and pompanos were taken in the neuston net while greater numbers of codlets, lizardfish, and gobies were caught in the bongo gear. Total zooplankton and copepods exhibited high seasonal and spatial variability over the sampling period and area; seasonal density peaks occurred in spring and fall. A general decrease in density with increasing distance from shore was detected; however, when standing crop was calculated on a per m² basis, total abundances in the water column increased as distance from shore increased. In the total samples analyzed on the three study transects, five dominant groups made up 85.8% of the zooplankton, including Copepoda (58.5%), Larvacea (8.6%), Mollusca (8.1%), Ostracoda (5.9%), and Chaetognatha (4.8%). Molluscs were most abundant at inshore stations and ostracods were generally abundant offshore. Chaetognaths and larvaceans exhibited a fairly even spatial distribution at the 11 stations examined. Calanoids and cyclopoids numerically dominated the copepod fraction of the zooplankton. When data from all samples were analyzed, seven species combined to make up 55.4% of the adult female copepods, including *Paracalanus indicus* (16.8%), *P. quasimodo* (12.8%), *Acartia tonsa* (7.1%), *Oncaea media* (7.0%), *Clausocalanus furcatus* (7.0%), *Paracalanus crassirostris* (6.2%), and *Oithona nana* (4.7%). *Paracalanus indicus* and *P. quasimodo* were distributed evenly over the sampling area. The other dominant species could be classified into an inshore group (*A. tonsa*, *P. crassirostris*, and *Oithona nana*) and an offshore group including *Oncaea media* and *C. furcatus*. The number of species, the Shannon-Wiener diversity indices, and the equitability indices all increased as distance from shore increased. Seasonal variations in these values were generally greatest at inshore stations.

STUDY PRODUCTS: Angelovic, J. W., J. H. Finucane, L. A. Collins, and J. D. McEachran. 1977. Environmental Studies of the South Texas Outer Continental Shelf, 1976. Ichthyoplankton/Mackerel Eggs and Larvae. A final report by U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service for the U.S. Department of the Interior, Bureau of Land Management Gulf of Mexico OCS Office, New Orleans, LA. NTIS No. PB283-873/AS. Contract No. AA550-IA7-03. 484 pp.

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