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PROJECT MANAGER: P. Parker

AFFILIATION: University of Texas Marine Science Institute

ADDRESS: Port Aransas Marine Laboratory, Port Aransas, Texas 78373

PRINCIPAL INVESTIGATORS*: R. Casey, C. Giam, J. Holland, E. Park, P. Parker, B. Presley, W. Sackett, R. Scalan, N. Smith, C. Van Baalen, J. Winters, D. Wohlschlag

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BACKGROUND: In 1974, the U.S. Department of the Interior initiated the Marine Environmental Studies Plan for the South Texas Outer Continental Shelf (STOCS) which commenced with a three-year benchmark investigation. This report presents the results from the first study year.

OBJECTIVES: (1) To characterize the water mass of the STOCS region; (2) to assess its primary, secondary, and benthic productivity; (3) to determine baseline hydrocarbon levels in biota, water, and sediment; and (4) to determine trace metals levels in biota.

DESCRIPTION: This study sought to establish baseline information on pelagic and benthic environments of the STOCS region and provide information needed to establish new stations for the second study year. The study area was bounded on the east by 96°W Long, to the Texas coast on the west, and south to the Mexican border. Field sampling was conducted from December 1974 to September 1975. All laboratory analyses were completed by January 1976. A total of 12 sampling stations were

located along four transects (three stations per transect) perpendicular to the coastline ranging from 18-m to 134-m water depths. Each station was occupied three times during the first study year.

The stations were sampled for hydrography, primary production, zooplankton, neuston, hydrocarbons, and trace metals. Hydrographic samples consisted of temperature and salinity profiles taken with a Plessey profiling system. Water collected in 30-l Niskin bottles from the surface and at one-half the distance to the photic zone was subsampled for phytoplankton taxonomy, nutrients, chlorophyll, adenosine triphosphate (ATP), dissolved oxygen, and low molecular weight hydrocarbons. Water samples for dissolved high-molecular weight hydrocarbons were collected with 10-l glass carboys. Zooplankton were collected using a 1-m diameter, 0.250 mm mesh net towed obliquely (day and night). Vertical tows were taken with a 30-cm Nansen net for microplankton studies. Neuston samples were made using a 1-m diameter, 0.250 mm mesh net towed at the surface by a sled. Seven replicate bottom grabs were collected with a Smith-MacIntyre grab sampler (0.125 m^3); four were reserved for taxonomy, one was archived, and two were reserved for chemical analyses. Fishes and macroepifauna slated for taxonomic and chemical analyses were collected using a 10.7-m otter trawl. Biota (zooplankton, neuston, epifauna, demersal fish, and macronekton) were analyzed for trace metals using atomic absorption spectrophotometry.

SIGNIFICANT CONCLUSIONS: The STOCS area is generally pristine with respect to hydrocarbon and trace metal occurrences in the water column, sediments, and organisms. There was no evidence of petroleum hydrocarbon contamination in benthic fauna. However, neuston and macronekton (fish) exhibited definite hydrocarbon contamination, probably related to floating micro-tarballs. Microbenthic organisms may be good indicators of stress. Infaunal and epifaunal invertebrates were distributed in relation to sediment grain size and water depth, respectively. These inferred patterns may have been related to sampling bias.

STUDY RESULTS: Separate hydrographic seasons were evident for the STOCS study area. In late winter and early spring, the water column begins to stratify and the thermocline descends to 30 to 40 m by late August. Maximum surface temperatures reach 28 to 29°C. The thermocline disappeared in fall when overturn occurred. Minimum temperatures ranged between 17 and 22°C. Seasonal changes on the inner shelf were related to climatic patterns and continental runoff. Conditions on the outer shelf were more stable throughout the year.

Phytoplankton species diversity was highest during the winter cruise; diversity values for the spring and summer cruises were similar. The yearly average diatom concentrations were 4.1×10^5 cells l^{-1} at inshore stations, 7.8×10^4 at middle stations, and 2.6×10^3 at offshore stations. Zooplankton numbers and biomass decreased in a seaward direction; this decrease was pronounced during spring and summer months. Copepods were the most abundant group, comprising 70% of the zooplankton by number. A total of 182 copepod species were found; *Paracalanus indicus, P. quasimoto*, and *Clausocalanus furcatus* were numerically dominant.

Infaunal distribution was apparently related to sediment particle size. The richest sites in terms of taxa or numbers were in coarse sediments. Infaunal samples were numerically dominated by polychaetes. Approximately 29% of the species collected were found during all seasons. Distribution of epifaunal invertebrates was related to depth but clear patterns did not exist. Benthic fish catches were not unusually variable; there were no day-night trends of numbers or weights that persisted seasonally. Species lists from day and night collections were different. There was a general trend for larger fish to be found in deeper waters, except for strictly shallow water species.

Low molecular weight hydrocarbon concentrations in the water column were variable. Concentrations of methane as high as 4,000 nl l^{-1} were observed at mid-depths during the spring sampling of Transect III. Most low molecular weight hydrocarbons detected during the study were naturally occurring. High molecular weight hydrocarbon concentrations did not exhibit any trends among stations. No indications of petroleum contamination of organisms were found; most samples were biogenic in origin with high pristane values.

Zooplankton samples showed considerable hydrocarbon contamination presumably associated with floating micro-tarballs. Water column levels of particulate and dissolved hydrocarbons were similar, and concentrations of both components decreased in an offshore direction. Most high molecular weight hydrocarbons in fishes and macroinvertebrates were biogenic in origin and characterized by a general lack of aromatic compounds. Aliphatic hydrocarbons appeared to have distinct distribution profiles within species. These profiles were consistent enough to be considered as future baseline values for the detection of petroleum contamination. Levels of heavy aliphatic hydrocarbons vary from an average of 0.066 ppm for shrimp to 2.640 ppm for lizardfish. Phytane was found in only 11 of the 151 samples analyzed at concentrations of 0.001 to 0.196 ppm. In seawater samples, concentrations of n-paraffins were high (average = 1.63 ug l^{-1}) during spring, apparently reflecting the higher productivity during this season. Summer samples yielded the lowest concentrations of n-paraffins (0.09 ug l^{-1}). Percent composition of n-paraffins did not show appreciable change with distance offshore and only slight changes with season.

Trace metal levels in biota were lower or similar to literature values. Most apparent seasonal effects were due to species composition of the samples. Trace metal concentrations were fairly constant within species groups with the exception of zooplankton which were highly variable.

STUDY PRODUCTS: Parker, P. L. (ed.). 1976. Environmental Studies, South Texas Outer Continental Shelf, 1975, Biology and Chemistry. A final report by the University of Texas, Texas A&M University, and Rice University for the U.S. Department of the Interior, Bureau of Land Management Gulf of Mexico OCS Office, New Orleans, LA. Vol. I (Final Report, 598 pp.)-NTIS No. PB81-137689; Vol. II (Data Appendix I, 500 pp.); Vol. III (Data Appendix II, 500 pp.); Vol. IV (Supplemental Report, 196 pp.)-NTIS No. PB81-127706. Contract No. 14-12-0001-29124.

*P.I.'s affiliation may be different than that listed for Project Manager.