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STUDY TITLE: South Atlantic Hard Bottom Study.

REPORT TITLE: South Atlantic Hard Bottom Study.

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PROJECT MANAGER(S): R. Stevens, Jr.

AFFILIATION: Continental Shelf Associates, Inc.

ADDRESS: P.O. Box 3609, Jupiter, Florida 33458.

PRINCIPAL INVESTIGATOR(S)*: D. Gettleson, T. Neurauter.

KEY WORDS: South Atlantic; Georgia Bight; biology; geohazards; hard-bottom; videotapes; photographs; survey; geophysical; faunal zones; epifauna.

BACKGROUND: Hard-bottom areas in the Georgia Bight support valuable recreational and commercial fisheries and are considered sufficiently sensitive and unique so as to require protection from possible deleterious effects of oil and gas drilling operations. Stipulations for Oil and Gas Lease Sale 43 required that geophysical data collected during routine geologic hazards surveys of each lease block be interpreted for hard bottom within 1,820 m of proposed drillsites. To evaluate the adequacy of geophysical techniques in identifying hard-bottom areas, the Bureau of Land Management selected four blocks from those offered in Sale 43 for comparative study using geophysical and remote photographic methods.

OBJECTIVES: (1) To determine whether geologic hazards survey records would be adequate for delineating hard-bottom areas in the Georgia Bight; (2) To characterize substrates comprising hard bottom through petrographic analyses; and (3) To identify epibiota and demersal fishes associated with hard-bottom areas.

DESCRIPTION: Four lease blocks in the Georgia Bight were characterized during September-October 1978 using a combination of geophysical and remote photographic methods and collections of biological and geological samples. The blocks included James Island Area Blocks 198 (32 to 33 m depth), 380 (44 to 194 m depth), and 463 (44 to 78 m depth); and Brunswick Area Block 912 (29 to 35 m depth). Each block was initially surveyed using a recording fathometer, side-scan sonar, and subbottom profiler. The survey grid consisted of east-west lines spaced at 150-m intervals and north-south tie lines at 1,000-m intervals. Following preliminary interpretation of these results, areas of suspected hard bottom were examined using a towed television/still camera system. Bathymetric and geophysical records, videotapes, and photographs were examined to describe and map the substratum and associated biota. Rock samples were collected at several stations within each block using a Benthos rock dredge and preserved for later analyses. Representative pieces of the samples were examined in thin section under a petrographic microscope to describe and characterize the major lithologies present. Biological dredge

samples encompassing a towed distance of about 100 m each were collected in several hard-bottom areas in each block using a Kahlsico triangular dredge. Samples were preserved and specimens were later identified to the lowest possible taxonomic level. Normal and inverse cluster analyses were conducted for samples from each block and from all blocks using the Czekanowski coefficient and flexible sorting methods.

SIGNIFICANT CONCLUSIONS: Results of geophysical and remote photographic surveys showed that hard-bottom areas could be successfully mapped through the conservative interpretation of side-scan sonar records and the identification of areas of apparent outcropping of subbottom reflectors by the subbottom profiler. Geophysical techniques were least successful in delineating small, discontinuous patches of hard bottom and in distinguishing exposed hard-bottom areas from those that were covered by a thin veneer of sand. Visual inspection of the bottom was necessary to map small patches of hard bottom, to distinguish exposed vs. sand-covered hard bottom, and to describe the abundance and composition of associated epibiota.

STUDY RESULTS: Bathymetric data were not adequate to identify hard-bottom areas, except where ridges or scarps were present or where depressions were clearly associated with hard-bottom areas.

Petrographic analyses of 43 rock samples showed that the hard bottom was principally a Recent to Subrecent biostromal reef. Six lithologic types (sandstone, biomicrite, sandy biomicrite, biosparite, biolithite, and algal biolithite) were identified from dredge samples. No significant variations in their distribution in rock samples were noted between the four blocks.

Examination of videotapes and color photographs of the bottom revealed 10 distinct biological assemblages, each of which was described by its characteristic organisms. Four assemblages were noted in James Island Area Blocks 380 and 463, the most distinctive and abundant being typified by dense tube mats formed by the gregarious polychaete, Phyllochaetopterus socialis. Three assemblages were described from James Island Area Block 198 and two from Brunswick Area Block 912. The latter appeared to have the lowest abundance of epibiota of the four blocks studied. In general, abundance of epibiota appeared to be higher in areas of exposed hard bottom than in areas that were covered by a thin veneer of sand.

A total of 499 taxa (including 33 fish species) were collected in 68 dredge samples from hard-bottom areas. James Island Area Block 198 had the highest number of taxa (274), followed by James Island Area Blocks 463 (257) and 380 (214), and Brunswick Area Block 912 (71). Major groups of organisms collected were Porifera (sponges), Cnidaria (hydroids, corals, anemones, sea feathers, and sea fans), Bryozoa, Ascidiacea (sea squirts), Chlorophyta (green algae), Phaeophyta (brown algae), and Rhodophyta (red algae). Many species collected were tropical (Caribbean/West Indian) forms. Results of cluster analyses for samples within each block revealed some groupings, but these were believed to reflect sampling artifacts. Cluster analysis of samples from all four blocks indicated that James Island Area Block 198 was most biologically distinct from the others and that James Island Area Blocks 380 and 463 were the most similar to each other in composition.

STUDY PRODUCT(S): Continental Shelf Associates, Inc. 1979. South Atlantic Hard Bottom Study. A final report for the U.S. Department of the Interior, Bureau of Land Management Atlantic OCS Office, New York, NY. NTIS No. PB300821. Contract No. AA551-CT8-25. 356 pp.

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