

STUDY TITLE: Benthic Reconnaissance of Central and Northern California OCS Areas.

REPORT TITLE: Benthic Reconnaissance of Central and Northern California OCS Areas.

CONTRACT NUMBER(S): 14-12-0001-30388.

SPONSORING OCS REGION: Pacific.

APPLICABLE PLANNING AREA(S): Southern California; Central California; Northern California.

FISCAL YEAR(S) OF PROJECT FUNDING: 1987; 1988; 1989.

COMPLETION DATE OF REPORT: July 1989.

COST(S): FY 1987: \$934,168; Cumulative Project Cost: \$934,168.

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Quality Review Board (QRB): D. Boesch, P. Dayton, G. Jones.

KEY WORDS: Pacific OCS; benthic invertebrates; hard substrate communities; soft substrate communities; multivariate analysis; new species; biogeography; effects of oil and gas development; photographic methods; remotely operated vehicles; field sampling and methods.

BACKGROUND: The program is intended to increase the knowledge of marine benthic communities and habitats within the three California OCS Planning Areas. As part of the overall study, this report presents the results from a November/December 1987 field survey of selected hard substrate and soft substrate sites, discussing species and community distributions and abundances and selected environmental variables that affect the biological patterns. The study results will aid the MMS in making environmental assessments and management decisions associated with potential leasing and oil and gas exploration and development activities.

OBJECTIVES: (1) Conduct field surveys of hard substrate communities at selected sites within the three California OCS Planning Areas and of soft substrate communities at the selected sites within the Central and Northern California Planning Areas, respectively, to obtain quantitative data on species distributions and abundances, on community structure, and selected environmental variables that may affect the biological communities; and (2) analyze statistically the community structure and variability within and among the sampling sites, and integrate information from previous studies to provide area-wide mapping, comparisons, and interpretations.

DESCRIPTION: The program consisted of a reconnaissance survey conducted in November/December 1987 of selected hard and soft substrate habitats of the California OCS from approximately 50-m to 600-m depth (165 ft to 1850 ft),

laboratory and data analysis, and report preparation to characterize the benthic communities, particularly as related to differences in geographic range (e.g., latitude), bottom depth, and substrate type. Survey methods included a ROV outfitted with photographic and video recording systems to study hard substrate areas and box corers to collect soft substrate samples. The study sites were planned for areas that may be included in oil and gas lease sales from the planning areas and for which there was little or no information on the benthic biological communities. Due to weather constraints sites were surveyed only in the Central and Northern Planning Areas.

#### SIGNIFICANT CONCLUSIONS:

Hard Substrate. (1) The majority of the target hard substrate sites, based on side-scan sonar records, were characterized primarily by soft substrate, presumably representing a sediment veneer over hard substrate; (2) common taxa were highly representative of major differences in substrate type (hard versus sediment veneer); (3) characteristic hard substrate taxa included anemones, feather stars, cup corals, sponges, brachiopods, ophiuroids, and rockfish; (4) characteristic sediment veneer taxa included octopus, sea pens, sea stars, and flatfish; (5) depth, substrate type, and substrate relief were important factors affecting the communities, although the depth relationship was influenced strongly by the predominance of hard substrate only at the shallower survey depths and in some basins; and (6) qualitative comparisons of results from the present study with the MMS Phase I and II programs indicate a high similarity of many of the taxa and communities throughout these California offshore regions.

Soft Substrate. (1) Sediment grain size generally increased with distance from shore, in contrast to commonly observed patterns; (2) major differences in the abundance and composition of infaunal communities were related primarily to depth and secondarily to sediment type; and (3) combined analyses of data from the present study, MMS Phase I, and the BLM Southern California Bight Program indicate that these communities also differed primarily with depth; differences with geographic location were less pronounced.

#### STUDY RESULTS:

Hard Substrate. The majority of the survey sites were characterized primarily by soft substrate. These soft substrate areas were presumed to represent hard substrate overlain by sediment veneer, based on side-scan sonar records and additional evidence including hard substrate visible at the bottom of 0.3-1 m depth holes in some sediment veneer areas and hard substrate organisms apparently "stranded" on sediment veneer. Areas of exposed hard substrate generally were characterized by low (< 15 cm) relief; relief greater than 3 m was observed only along two transects. Sediment veneer areas were characterized by flat muddy bottoms with a range of burrows suggesting extensive bioturbation in some areas, furrows suggesting trawl tracks, and ripples suggesting some areas of significant near bottom currents.

Common hard substrate taxa included anemones, feather stars, cup corals, several sponge taxa, and rockfish, and particularly in low relief areas, brachiopods and ophiuroids. Sediment veneer areas generally were characterized by sea pens, octopus, sea stars, various flatfish, Pacific hake, and poachers. Some sea pen species which typically retract into the bottom generally were absent from the deeper (e.g., > 200 m) transect areas, potentially indicating shallow sediment depths or, alternately, to limitations in their depth distribution.

Multivariate analyses focusing separately on the hard substrate and sediment veneer data indicated broad differences in the communities based on depth and to a lesser extent substrate type and relief; however, the depth trends were influenced strongly by the predominance of hard substrate only at the shallower survey depths and in some of the basins. Qualitative comparisons of the results from the present study with those from the MMS Phase I and II programs indicate that many of the taxa and communities are similar, apparently representing species which are distributed over broad geographic ranges. General conclusions are that, at the level of taxonomic resolution and enumeration possible using photographic and video techniques, the taxa and communities of the offshore benthic environment are very similar from at least the Point Conception area to near the California-Oregon border.

Soft Substrate. Sediment grain size generally increased with distance from shore (hence, water depth), in contrast to the commonly observed pattern of finer-grained sediments with increasing depth and distance. Sediments in the Eel River Basin were characterized by smaller (finer) grain sizes than sediments in the other basins. Four species were among the five most abundant species in at least two of the three basins: the polychaete worms Nephtys cornuta franciscana, Levinsenia gracilis, and Spiophanes berkeleyorum; and the bivalve mollusc Huxleyia munita. Species very abundant in only one of the basins or at only one depth included the polychaetes Chloeia pinnata, Myriochele gracilis, Myriochele sp. M, Pholoe minuta, and Chaetozone setosa; the snail Mitrella permodesta; and the brittle star Amphiodia urtica.

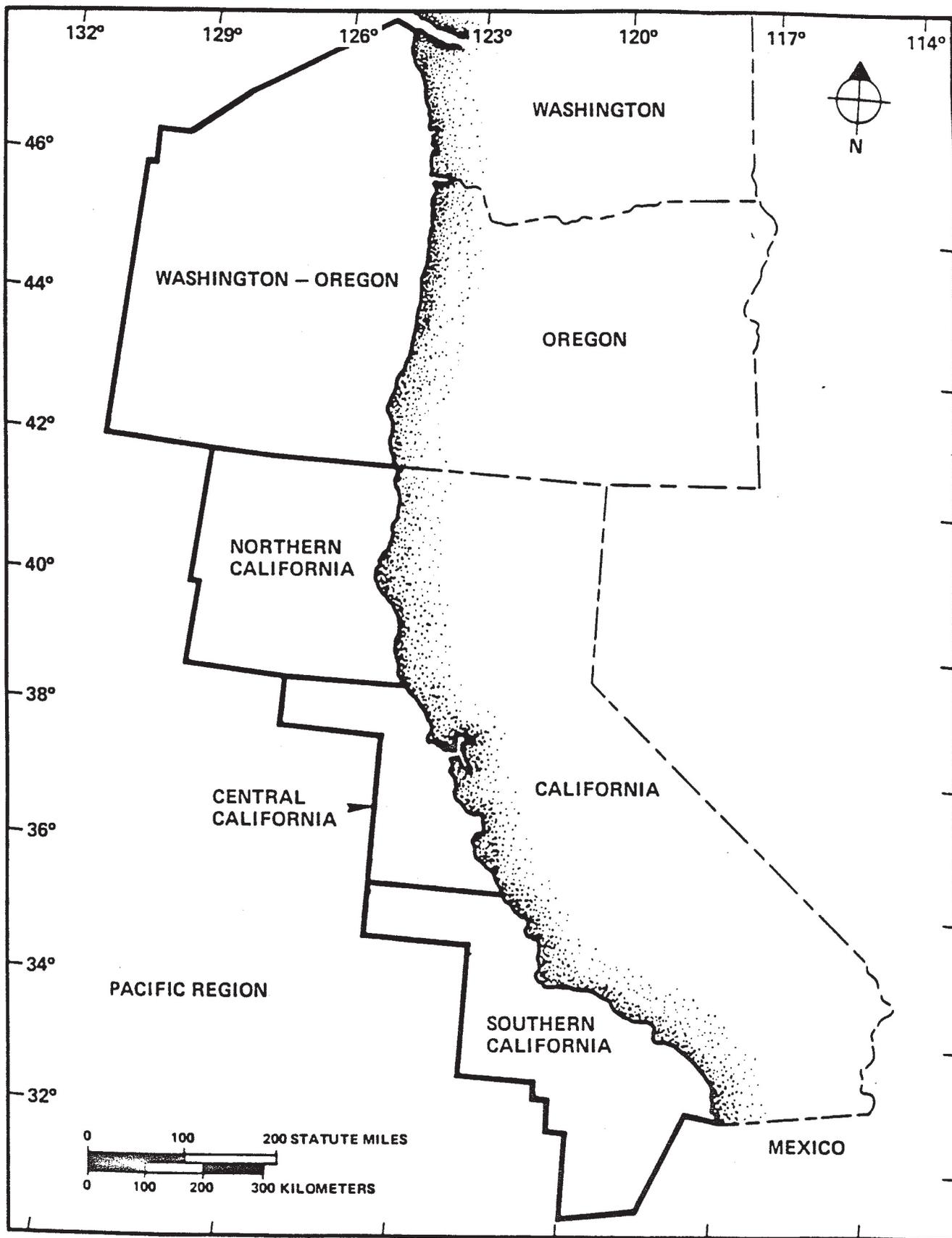
The major differences in the abundance, composition, and distribution of the soft substrate infauna, both in this study and in a combined analysis with two other studies (MMS Phase I and BLM Southern California Bight Program), were related more to depth than geographic location. For all the studies, the 100-m and 200-m stations in all basins were different from the 400-m and 600-m stations. Total abundance and number of species were higher at the shallow (100-m and 200-m) stations than at the deeper stations. Sediment type was a secondary influence in the present study: the communities characteristic of the fine-grained sediments were different from those characteristic of the coarse-grained sediments, but the differences were not as great as those attributable to depth. Abundances were significantly higher in fine-grained sediments than in the coarser sediments. The Eel River Basin communities were different from those of the Pt. Arena and Bodega Basins, apparently due to differences in sediment type among basins; mean total abundance was higher in the Eel River Basin than in the other two basins.

An analysis of within-station variability showed that collecting more than one sample per station in a reconnaissance program would not provide significant additional information on benthic community distribution patterns.

STUDY PRODUCT(S): Lissner, A. (ed.) 1989. Benthic Reconnaissance of Central and Northern California OCS Areas: Final Report, Vols I and II. Report prepared for U.S. Department of the Interior, Minerals Management Service, Pacific OCS Region, Los Angeles, CA. Contract No. 14-12-0001-30388. OCS Study MMS 89-0039 and 89-0040.

Lissner, A. (ed.) 1988. Review of Recovery and Recolonization of Hard Substrate Communities of the Outer Continental Shelf: Final Report. Report prepared for U.S. Department of the Interior, Minerals Management Service, Pacific OCS Region, Los Angeles, CA. Contract No. 14-12-0001-30388. OCS Study MMS 88-0034.

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MMS NORTHERN, CENTRAL, AND SOUTHERN CALIFORNIA PLANNING AREAS.