

ACCESS NUMBER: OCS Study 2011-010

STUDY TITLE: High Resolution Seafloor Mapping and Bottom Characterization of the Eastern Santa Barbara Channel and Offshore the Long Beach Area, California

REPORT TITLE: Bathymetry, Acoustic Backscatter, and Benthic Habitats of the Eastern Santa Barbara Channel and Offshore the Long Beach Area, California

CONTRACT NUMBER: NA Biological Resources Division Study

SPONSORING OCS REGION: Pacific

APPLICABLE PLANNING AREA(S): Southern California

FISCAL YEAR(S) OF PROJECT FUNDING: 2004-2005

COMPLETION DATE OF REPORT(s): 2005, 2007

COSTS: FY 2004 \$268,000; FY 2005 \$82,000

PROJECT MANAGER(S): Guy R. Cochrane

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KEY WORDS: bathymetry, acoustic backscatter, seafloor, benthic habitats, mapping

BACKGROUND: The Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE) is interested in maps of hard-bottom habitats, particularly natural outcrops, that support reef communities in areas affected by oil and gas activity. The Bureau is also interested in maps near offshore oil platforms in order to study fish that use the platforms and the sea floor beneath them as habitat. In support of these efforts the BOEMRE initiated a cooperative project with the U.S. Geological Survey (USGS) to map the seafloor around offshore OCS platforms in the Eastern Santa Barbara Channel and worked with the USGS on an existing mapping project offshore Long Beach.

OBJECTIVES: The objectives of the project were to collect high-resolution bathymetry and backscatter data around deeper-water OCS platforms Habitat, Grace, Gilda, Gail, and Gina, as well as the shallower nearshore OCS platforms Hogan, Houchin, Henry, Hillhouse, A, B, and C and to work with the USGS on an existing project characterizing the San Pedro shelf, offshore the Long Beach area.

DESCRIPTION: The USGS conducted two mapping surveys in 2004 and 2005. The first survey was taken place from August 8 to 15, 2004 aboard the UNOLS vessel *R/V Maurice Ewing*. The survey collected bathymetry and co-registered acoustic backscatter using a Kongsberg Simrad EM1002 multibeam echosounder that was mounted on the hull of the *R/V Maurice Ewing*. Three main regions were mapped during the survey including: (1) the Eastern Santa Barbara Channel adjacent to an area previously mapped with multibeam-sonar by the Monterey Bay Aquarium Research Institute, (2) the Footprint area south of Anacapa Island, and (3) part of the submarine canyons along the continental slope south of Port Hueneme.

The second survey took place from August 8 to 27, 2005 aboard the Channel Islands National Marine Sanctuary vessel *R/V Shearwater*. The survey collected bathymetry and co-registered acoustic backscatter using a SEA (AP) Ltd. SWATHplus-M phase-differencing sidescan sonar system that was pole-mounted to the *R/V Shearwater*. Immediately after the sonar mapping, the USGS collected seafloor video and recorded real-time geologic and biologic observations by towing a USGS designed camera sled over selected areas of the mapped region. Interpretation of the processed sonar data and video observations resulted in predictions of benthic habitat distribution in the region.

In 2004, the USGS was working on a cooperative project with the Sanitation Districts of Los Angeles County and the Orange County Sanitation District to characterize the San Pedro shelf, offshore the Long Beach area. Using existing multibeam data as basemap information, the USGS collected seafloor video and recorded real-time geologic and biologic observations by towing a USGS camera sled over selected areas of the shelf. The project also collected sediment samples throughout the shelf. Interpretation of the processed sonar data, video observations, and sediment samples resulted in seafloor character and grain-size distribution maps of the San Pedro Shelf.

SIGNIFICANT CONCLUSIONS: These data provided BOEMRE with the background needed to review several offshore projects including OCS pipeline surveys and other marine projects in relation to existing OCS operations. These data also helped in the discovery of a new species, the "Christmas Tree" coral by researchers from the University of California and NOAA.

STUDY RESULTS: The 2004 deeper-water multibeam mapping covered approximately 880 km² (340 mi²) of seafloor in water depths ranging from 25m to over 1000m. Full coverage was obtained over a very diverse seafloor including broad, flat continental shelf, submarine canyons, steep slopes, and rugose seafloor. Backscatter imagery that provide an indication of seafloor texture and sediment type show higher backscatter intensities that are potentially harder or coarser grained seafloor beneath the platforms. The data collected over the Footprint area have been used by biologist to assist in characterizing the habitats of the region. Also, the data collected in the vicinity of the

submarine canyons have been used to assess the potential geologic and seismic hazards of the region.

The 2005 nearshore mapping and video ground-truth cruise covered approximately 77 km² (30 mi²) of seafloor in water depths ranging from 8m to 80m. Full seafloor coverage was obtained from the coast near Rincon Point to out beyond the nearshore OCS platforms. Nearly 14 hours of both vertical and oblique underwater video were collected and logged real-time along 14 transects. The bathymetry and acoustic backscatter data were compiled with the video observations in an ESRI Geographic Information Systems database (ArcGIS) and used to construct maps of geologic substrate and habitat distribution. Approximately 98% of the mapped seafloor is covered by unconsolidated sandy mud. The sand content increases in the nearshore waters and video observations suggest mud is lacking in waters less than 20m deep. There are hard and mixed areas with bedrock outcrop along the ridge of an east west trending bathymetric high in waters ranging in depth from 35 to 50m. This area is of interest as rockfish habitat in an area near oil platforms that provide artificial habitat. Another rocky area was found off Rincon Point. This rock is an extension of the point into the marine environment and appears to consist of a wide range of angular clasts boulder size and up.

The San Pedro Shelf project collected 190 line-km (156 hours) of seafloor video (78 hr from each of two cameras running simultaneously), over 13,000 photographs, and 182 sediment samples over the entire shelf. The project produced a seafloor character map showing the distribution rock, mixed (rock and sand), and sand over the shelf as well as grain-size distribution maps.

STUDY PRODUCT(S): The USGS produced on-line reports of both the 2004 deep-water mapping and the 2005 nearshore mapping. The 2004 deep-water report has a project description, the multibeam bathymetry and acoustic backscatter data in a number of different formats, Federal Geographic Data Committee (FGDC) metadata, maps, and oblique views of particular areas of interest. The report is available at <http://pubs.usgs.gov/of/2005/1153/ci-index.html>. A seafloor character map should be available in 2011 or 2012. The 2005 nearshore habitat mapping report has a project description, the bathymetry and acoustic backscatter data, the seafloor geologic and biologic observations, habitat map, and Federal Geographic Data Committee (FGDC) metadata. The report is available at <http://pubs.usgs.gov/of/2007/1271/index.html>. The San Pedro Shelf report should be available in 2011 and will include a project description, character map, grain-size distribution map, geologic and biologic observations, and selected seafloor photographs.

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