



DESCRIPTION OF MAP UNITS

UNCONSOLIDATED CONTINENTAL SHELF SEDIMENTS

Ss(s)m_r<u>u</u>	Soft, unconsolidated, rippled sediment (sand and mud)
Ss(s)m_h_e<u>u</u>	Pockmarks or depressions, in soft, unconsolidated sediment (sand and mud)
Ss(s)m_h_r<u>u</u>	Rippled scour depression (sand and mud)
Ss(s)m_u?	Terrace, or possibly delta or fan, made up of soft, unconsolidated sediment (sand and mud); inferred
Ss(s)_r<u>u</u>	Soft, unconsolidated sediment (sand), predominantly rippled
Ss(s)_r_r<u>u</u>	Terrace, or possibly delta or fan, made up of soft, unconsolidated, rippled sediment (sand)
Ss(s)g_l_<u>u</u>	Soft, unconsolidated sediment (sand and gravel), on flat shelf
Ss(s)g_h_w_h_r<u>u</u>	Rippled scour depressions (sand and gravel)
Ssg_<u>u</u>	Gully of soft, unconsolidated sediment
Ssd_h<u>u</u>?	Sediment-covered tar flow; inferred
Ssm_y_<u>u</u>	Hummocky mounds of soft, unconsolidated delta sediment
Ssr_<u>u</u>	Rills of soft, unconsolidated sediment

MIXED SUBSTRATE ON CONTINENTAL SHELF

Sme_c/u	Mixed habitat of soft, unconsolidated sediment, overlying hard, consolidated sedimentary bedrock
Sme_c/l/u	Mixed habitat of soft, unconsolidated sediment, covering edges of hard, carbonate mounds
Smh_c/e/u	Hydrocarbon-seep depression, in soft, unconsolidated sediment

HARD SUBSTRATE ON CONTINENTAL SHELF

Shd_c/d	Deformed and differentially eroded, consolidated sedimentary-bedrock
Sh(b)p_c	Hard, consolidated sedimentary rock, boulders, or pinnacle
Sh(b)p_?_1?	Hard, consolidated boulders or pinnacles of exposed asphalt; inferred
Shm_e/f	Hard mound composed of carbonate rock

ANTHROPOGENIC FEATURES

Sh _a m _a -u _a -(q)	platform-generated shell hash mixed with soft, unconsolidated sediment (sand and mud)
Sh _a -a ₁₀	Trawl grooves and marks, in soft, unconsolidated sediment
Shm _a -p ₁₀	Mixed habitat of soft, unconsolidated sediment, in linear trough overlying hard, anthropogenic feature (pipeline)
Shm _a -s ₁₀ -(q)	Oil-platform structural-foundation framework (legs and pipes) and shell mound
Sh _a -p	Hard anthropogenic feature (pipeline)
Sh _a -g	Hard anthropogenic feature (groyne or jetty)
Sh _a -w	Hard anthropogenic feature (shipwreck)

EXPLANATION OF MAP SYMBOLS

Contact

Area of "no data"—Areas near shoreline not mapped owing to insufficient high-resolution seafloor mapping data; areas beyond 3-nautical-mile limit of California State Waters were not mapped as part of California Seafloor Mapping Program

3-nautical-mile limit of California's State Waters

Bathymetric contour (in meters)—Derived from modified 10-m-resolution bathymetry grids. Contour interval: 10 m

DISCUSSION

This map shows 'potential' marine benthic habitats in the Offshore of Santa Barbara map area. Marine benthic habitats represent a particular type of substrate, geomorphology, seafloor process, or any other attribute that provides a habitat for a specific species or assemblage of organisms. Such maps are based largely on seafloor morphology and map integrated seafloor geology (sheet 10) with information derived on several other thematic maps of the Offshore of Santa Barbara map area: high-resolution bathymetry (sheet 1), shaded-relief imagery (sheet 2), backscatter (sheet 3), seafloor character (sheet 5), and ground-truth information (sheet 6). This map also uses information from the usFABED bottom-sampling compilation by Reid and others (2006). The combination of remotely observed data (for example, multibeam bathymetry and backscatter, seismic-reflection profiles) and directly observed data (for example, camera transects, sediment samples) translates to higher confidence in the ability to interpret broad areas of the seafloor.

To avoid any possible misunderstanding of the term "habitat," the term "potential habitat" (as defined by Greene and others, 2005) is used herein to describe a set of distinct seafloor conditions that in the future may qualify as an "actual habitat." Once habitat associations of a species are determined, they can be used to create maps that depict actual habitats, which then need to be confirmed by "ground-truth" surveying using in situ observations, video, and/or photographic documentation.

Marine benthic habitats are classified using the Benthic Marine Potential Habitat Classification Scheme, a mapping-attribute code developed by Greene and others (1999, 2007). In this map series, habitat-classification codes are based on the deeperwater habitat-characterization scheme developed by Greene and others (1999), which was created to not only easily distinguish marine benthic habitats but also to facilitate ease of use and queries within GIS and database programs. The code, which is summarized in chapter 6 in the accompanying pamphlet, is derived from several categories of the Benthic Marine Potential Habitat Classification Scheme (Greene and others, 1999, 2007), and it can be subdivided on the basis of the spatial scale of the data.

others, 1997, 2001], and it can be subdivided on the basis of the spatial scale of the data. High resolution data (e.g., ≤ 100 m) are typically derived from aerial or satellite remote sensing methods, while low resolution data (>100 m) are derived from ground-based observations. The two types of data are essential to development of the habitat map. Shaded-relief images (Figure 2) allows for visualization of seafloor terrain, providing a foundation for interpretation of submarine landforms. Areas of seabed exposure are identified by their common sharp slopes and high relative relief. These may be contiguous outcrops, isolated parts of outcrop protruding through sediment cover (pinnacles or knobs), or isolated, highly resistant, low-relief features. The latter are often associated with the presence of coarse sediment in many locations. Areas within or around a rocky feature appear to be covered by a thin veneer of sediment, identified on the habitat map as "mixed" (underlain) (in other words, containing both rock and sediment). Broad, generally smooth areas of the seafloor that lack sharp and angular edge characteristics are mapped as "sediment" and are further defined by various sedimentary features such as erosional scarps and depressions, as well as depositional features such as dunes, mounds, or sand waves. Low backscatter, indicative of fine-grained sediment, is mapped as "fine-grained sediment" (Figure 3).

The offshore of Santa Barbara map area contains 26 potential marine benthic habitat types, which range from predominantly soft, unconsolidated sediment (mud to sand and gravel) to areas of hard bedrock exposures, including flat carbonate substrate and asphalt (tar) mounds. Differentially eroded, well-bedded sedimentary-bedrock outcrops (some partly covered with soft, unconsolidated sediment to produce a mixed hard-soft habitat type), as well as pockmarks, rills, and possible hummocky tar flows, complete the variety of habitats identified in the map area. Significant anthropogenic features associated with oil production, such as platforms, pipelines, and shell mounds beneath platforms, as well as riprap and a shipwreck, all produce artificial habitats for rockfish.

The soft, unconsolidated sediment habitat, which includes pockmarks and inferred sediment-covered tar flows, covers 97.41 km² of the map area, representing 86.6 percent of all the potential habitat types identified. Sediment-covered bedrock, which includes the mixed hard-soft habitat type, covers 11.84 km² (10.5 percent). Hard bedrock exposures cover 3.08 km² (2.7 percent), whereas anthropogenic features cover about 0.17 km² (<0.15 percent). The mix of potential marine benthic habitat types provides the varied relief, in addition to the rugosity and substrate hardness, that contribute to the concentration of a diverse ecosystem within an otherwise

Of special interest in the Offshore of Santa Barbara map area is the role of fluid flowing up to the seafloor from petroleum reservoirs at depth, which is inferred to have caused the formation of locally exposed hard, carbonate-cemented sediment substrate, carbonate mounds, pockmarks, and tar asphalt flows. Notably, an extensive (7.09 km²) area of carbonate hardground (Sme_c/dlu), locally covered by sediment, is exposed about 5 km offshore in the southwestern part of the map area, providing potential habitat for sessile organisms. In addition, the sediment-covered tar asphalt flow (Sme_c/dlu) is possibly covered by an interval, up to 1 m thick, of sediment-covered tar drain deposition (Ssg/dm/cr), 0.37 km in area, is present due south of Santa Barbara, on the northwest flank of a prominent, differentially eroded, east-west-trending bedrock platform (Shd_c/d).

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Map showing video-observation locations and sample localities for Offshore of Santa Barbara.

Potential Marine Benthic Habitats, Offshore of Santa Barbara Map Area, California

By
Bryan E. Dieter,¹ Charles A. Endris,¹ H. Gary Greene,¹ Nadine E. Golden,² and Mercedes D. Erdey²
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²U.S. Geological Survey

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