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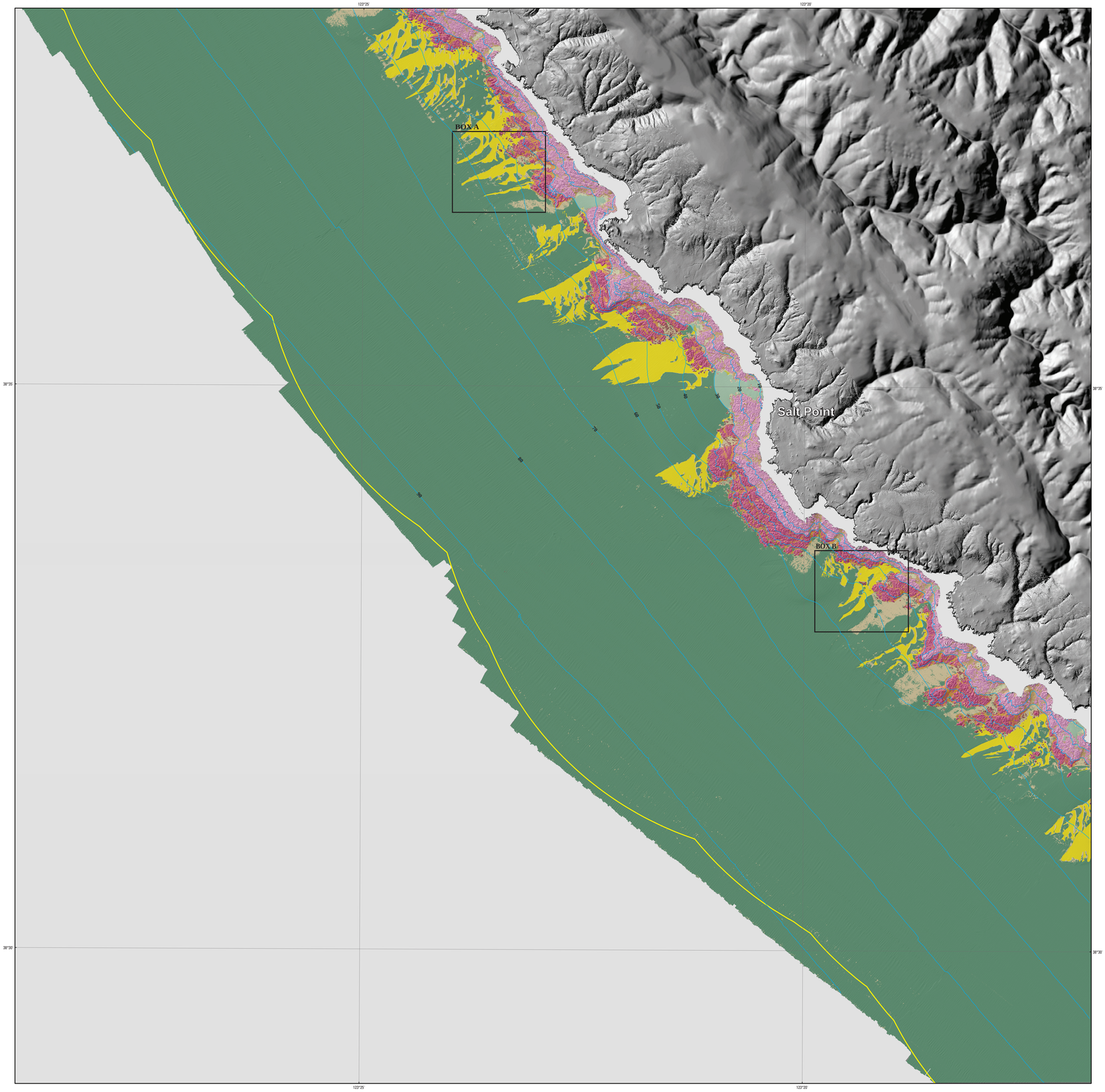
U.S. Geological Survey

Open-File Report 2015–1098
Sheet 5 of 10
Pamphlet accompanies map



Onshore elevation data from National Aeronautics and Space Administration and U.S. Geological Survey, available at http://www.opentopography.org/, and from U.S. Geological Survey, National Elevation Dataset, available at http://ned.usgs.gov/. California's State Waters limit from NOAA Office of Coast Survey
Universal Transverse Mercator projection, Zone 10N

NOT INTENDED FOR NAVIGATIONAL USE

APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:24 000

1 1/2 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

BATHYMETRIC CONTOUR INTERVAL 10 METERS
ONE MILE = 0.869 NAUTICAL MILES

Seafloor character mapped by Mercedes D. Erdey and Guy R. Cochrane, 2013
GIS database and digital cartography by Mercedes D. Erdey and Nadine E. Golden
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Seafloor Character, Offshore of Salt Point Map Area, California

By
Mercedes D. Erdey and Guy R. Cochrane

2015

DESCRIPTION OF MAP UNITS

DEPTH ZONE 2—INTERTIDAL TO 30 METERS WATER DEPTH

SLOPE CLASS 1—0 TO 5 DEGREES

Fine- to medium-grained smooth sediment—Low backscatter, low rugosity; typically mud to medium-grained sand; often rippled and (or) burrowed
Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock
Rock and boulder, rugose—High backscatter, high rugosity; typically boulders and rugose bedrock
Medium- to coarse-grained sediment—Very high backscatter, low rugosity; typically medium- to coarse-grained sediment, with varying amounts of shell hash; in scour depressions

SLOPE CLASS 2—5 TO 30 DEGREES

Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock
Rock and boulder, rugose—High backscatter, high rugosity; typically boulders and rugose bedrock

DEPTH ZONE 3—30 METERS TO 100 METERS WATER DEPTH

SLOPE CLASS 1—0 TO 5 DEGREES

Fine- to medium-grained smooth sediment—Low backscatter, low rugosity; typically mud to medium-grained sand; often rippled and (or) burrowed
Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock
Rock and boulder, rugose—High backscatter, high rugosity; typically boulders and rugose bedrock
Medium- to coarse-grained sediment—Very high backscatter, low rugosity; typically medium- to coarse-grained sediment, with varying amounts of shell hash; in scour depressions

SLOPE CLASS 2—5 TO 30 DEGREES

Mixed smooth sediment and rock—Moderate to very high backscatter, low rugosity; typically coarse-grained sand, gravel, cobbles, and bedrock
Rock and boulder, rugose—High backscatter, high rugosity; typically boulder and rugose bedrock

EXPLANATION OF MAP SYMBOLS

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

DISCUSSION

This seafloor-character map of the Offshore of Salt Point map area in northern California was produced using video-supervised, maximum-likelihood classification of the bathymetry and backscatter (intensity of return) signals from sonar systems (a summary of the video data collected for the purpose of supervising the classification is shown on sheet 6). Rugosity (a GIS-derived characterization of roughness) and backscatter intensity were used as variants in the classification. The interpreted classifications were then draped over shaded-relief bathymetry (see sheet 2).

The substrate classes mapped in this area have been divided into the following California Marine Life Protection Act depth zones: Depth Zone 2 (intertidal to 30 m) and Depth Zone 3 (30 to 100 m). In addition, the following slope classes are represented on this map (Coastal and Marine Ecological Classification Standard slope zone is shown in parentheses): Slope Class 1, 0° to 5° (flat) and Slope Class 2, 5° to 30° (sloping). Depth Zone 1 (intertidal), Depth Zones 4 and 5 (greater than 100 m), and Slope Classes 3 and 4, greater than 30° (steeply sloping to vertical) are not present in this map area.

Fine- to medium-grained smooth sediment (sand and mud) makes up 86.9 percent (106.5 km²) of the map area: 0.4 km² is in Depth Zone 2, and 106.1 km² is in Depth Zone 3. Mixed smooth sediment (sand and gravel) and rock (sediment typically forming a veneer over bedrock, or rock outcrops having little to no relief) make up 3.6 percent (4.4 km²) of the map area: 1.1 km² is in Depth Zone 2, and 3.3 km² is in Depth Zone 3. Rock and boulder, rugose (rock and boulder outcrops having high surficial complexity) makes up 5.8 percent (7.2 km²) of the map area: 3.9 km² is in Depth Zone 2, and 3.3 km² is in Depth Zone 3. Medium- to coarse-grained sediment (rippled sedimentary depressions of coarser material than the surrounding seafloor) makes up 3.7 percent (4.5 km²) of the map area: <0.1 km² is in Depth Zone 2 and 4.5 km² is in Depth Zone 3 (table 1).

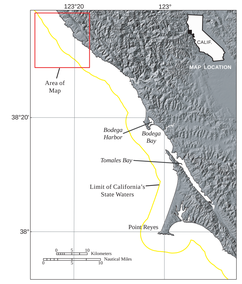

Table 1. Coverage of classified seafloor, in square kilometers (sq km) and percent of total area, broken into California Marine Life Protection Act Depth Zones 2 and 3.

	Total		Depth Zone 2 (water depth 0–30 m)		Depth Zone 3 (water depth 30–100 m)	
	percent	sq km	percent of total	sq km	percent of total	sq km
Fine- to medium-grained smooth sediment	86.9	106.5	0.3	0.4	86.5	106.1
Mixed smooth sediment and rock	3.6	4.4	0.9	1.1	2.7	3.3
Rock and boulder, rugose	5.8	7.2	3.1	3.9	2.7	3.3
Medium- to coarse-grained sediment	3.7	4.5	<0.1	<0.1	3.7	4.5

NOAA
SEAFLOOR MAPPING LAB
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BOX A

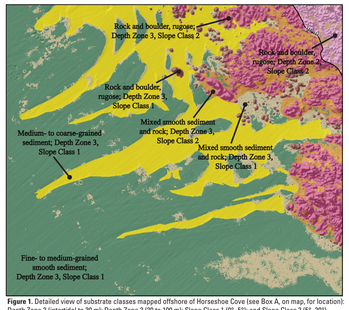

Figure 1. Detailed view of substrate classes mapped offshore of Horseshoe Cove (see Box A, on map, for location): Depth Zone 2 (intertidal to 30 m); Depth Zone 3 (30 to 100 m); Slope Class 1 (0°–5°); and Slope Class 2 (5°–30°). Fine- to medium-grained smooth sediment is shown in shades of green; mixed smooth sediment and rock is shown in shades of tan; medium- to coarse- grained rippled sediment is shown in shades of yellow; and rock is shown in shades of pink.

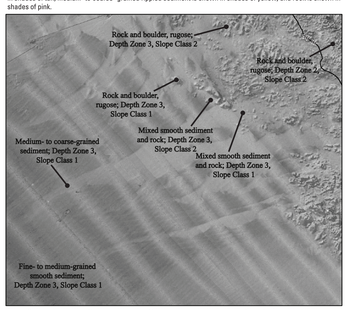

Figure 2. Acoustic-backscatter image (see sheet 3) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 1 (Box A on map). Brighter areas indicate coarse-grained, rough, or hard seafloor; darker areas indicate unconsolidated (loosely packed) sediment. Northwest-southeast-trending lines are data processing artifacts. Interpreted substrate classes from figure 1 included for comparison.

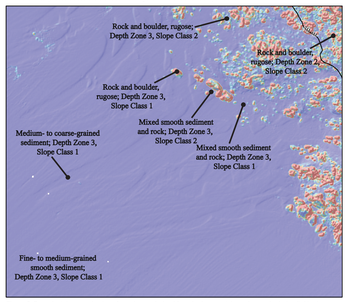

Figure 3. Rugosity (characterization of roughness derived from bathymetry) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 1 (Box A on map). Rugosity values are displayed in muted "rainbow" color spectrum that ranges from purple (low rugosity) through green (medium rugosity) to red (high rugosity). Interpreted substrate classes from figure 1 included for comparison.

BOX B

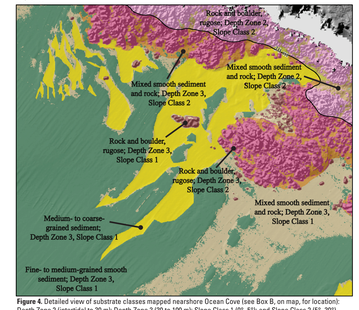

Figure 4. Detailed view of substrate classes mapped nearshore Ocean Cove (see Box B, on map, for location): Depth Zone 2 (intertidal to 30 m); Depth Zone 3 (30 to 100 m); Slope Class 1 (0°–5°); and Slope Class 2 (5°–30°). Fine- to medium-grained smooth sediment is shown in shades of green; mixed smooth sediment and rock is shown in shades of tan; medium- to coarse- grained rippled sediment is shown in shades of yellow; and rock is shown in shades of pink. Bathymetric contour (30 m) added for depth reference.

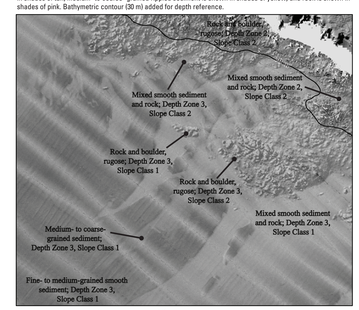

Figure 5. Acoustic-backscatter image (see sheet 3) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 4 (Box B on map). Brighter areas indicate coarse-grained, rough, or hard seafloor; darker areas indicate unconsolidated (loosely packed) sediment. Northwest-southeast-trending lines are data-processing artifacts. Interpreted substrate classes from figure 4 included for comparison.

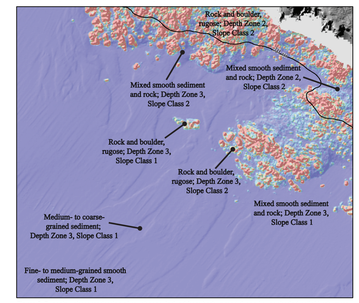

Figure 6. Rugosity (characterization of roughness derived from bathymetry) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 4 (Box B on map). Rugosity values are displayed in muted "rainbow" color spectrum that ranges from purple (low rugosity) through green (medium rugosity) to red (high rugosity). Interpreted substrate classes from figure 4 included for comparison.

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