

**DESCRIPTION OF MAP UNITS**

**DEPTH ZONE 2—INTERIDAL 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**

- 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

**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**

- 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, cobble, 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 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
- Bathymetric contour (in meters)—Derived from modified 2-m-resolution bathymetry grid. Contour interval: 10 m

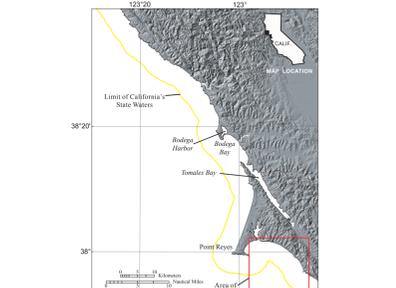


Figure 1. Fine- to medium-grained smooth sediment (sand and mud) makes up 87.8 percent (127.5 km<sup>2</sup>) of the map area. 35.7 km<sup>2</sup> is in Depth Zone 2, and 91.8 km<sup>2</sup> is in Depth Zone 3. Mixed smooth sediment (sand and gravel) and rock (that is, sediment typically forming a veneer over bedrock, or rock outcrops having little to no relief) make up 6.3 percent (9.2 km<sup>2</sup>) of the map area; 7.0 km<sup>2</sup> is in Depth Zone 2, and 2.2 km<sup>2</sup> is in Depth Zone 3. Rock and boulder, rugose (rock and boulder outcrops having high surface complexity) makes up 2.6 percent (3.7 km<sup>2</sup>) of the map area; 3.3 km<sup>2</sup> is in Depth Zone 2, and 0.4 km<sup>2</sup> is in Depth Zone 3. Medium- to coarse-grained sediment (in scour depressions consisting of material that is coarser than the surrounding seafloor) makes up 3.4 percent (4.9 km<sup>2</sup>) of the map area; 4.2 km<sup>2</sup> is in Depth Zone 2, and 0.7 km<sup>2</sup> 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.**

	Depth Zone 2 (water depth 0–30 m)		Depth Zone 3 (water depth 30–100 m)	
	percent	sq km	percent of total	sq km
Fine- to medium-grained smooth sediment	87.8	127.5	24.6	35.7
Mixed smooth sediment and rock	6.3	9.2	4.8	7.0
Rock and boulder, rugose	2.6	3.7	2.3	3.3
Medium- to coarse-grained sediment	3.4	4.9	2.9	4.2

**DISCUSSION**

This seafloor-character map of the Drakes Bay and Vicinity 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 in 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 Biological Classification Standard slope zones are shown in parentheses): Slope Class 1 (0° to 5° (flat)), and Slope Class 2 (5° to 30° (steep)). Depth Zone 1 (intertidal), Depth Zones 4 and 5 (greater than 100 m), and Slope Classes 3 to 5 (greater than 30° (steeply sloping to overhang)) are not present in this map area.

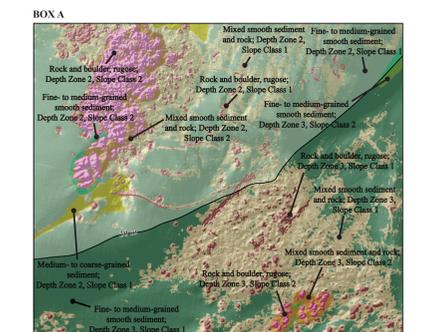


Figure 1. Detailed view of substrate classes mapped offshore of Point Reyes peninsula, southeast of Point Reyes headland (see Box A on map, for location). Depth Zone 2 (intertidal to 30 m), Depth Zone 3 (30 to 100 m), Slope Class 1 (0°–5°), and Slope Class 2 (5°–30°). Fine- to medium-grained smooth sediment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

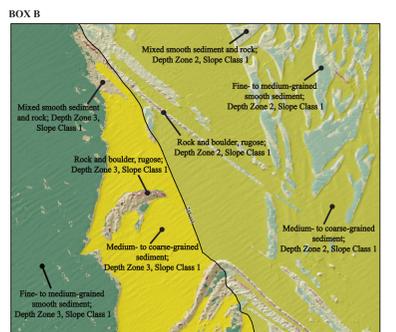


Figure 4. Detailed view of substrate classes mapped offshore of Double Point (see Box B on map, for location). Depth Zone 2 (intertidal to 30 m), Depth Zone 3 (30 to 100 m), Slope Class 1 (0°–5°). Fine- to medium-grained smooth sediment is shown in shades of green; mixed smooth sediment and rock is shown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

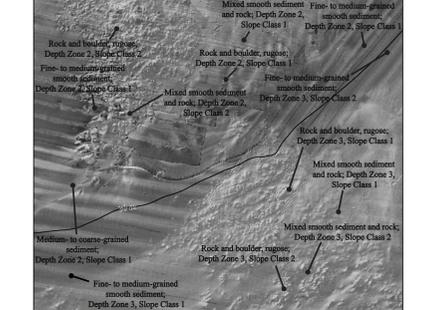


Figure 2. Acoustic backscatter image (see sheet 2) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 1 (Box A on map). Brighter areas indicate coarse-grained, rough, or hard seafloor; darker areas indicate unconsolidated (flocculent) sediment. Parallel light-gray lines and series of short dark-gray dashes are data-processing artifacts. Interpreted substrate classes from figure 1 included for comparison.

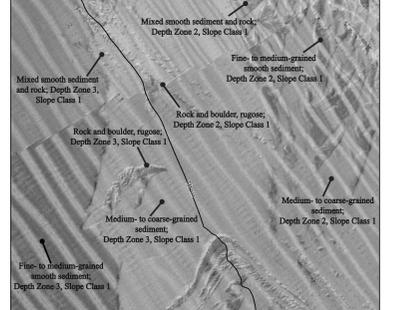


Figure 5. Acoustic backscatter image (see sheet 2) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 4 (Box B on map). Brighter areas indicate coarse-grained, rough, or hard seafloor; darker areas indicate unconsolidated (flocculent) sediment. Parallel light-gray lines and series of short dark-gray dashes are data-processing artifacts. Interpreted substrate classes from figure 4 included for comparison.

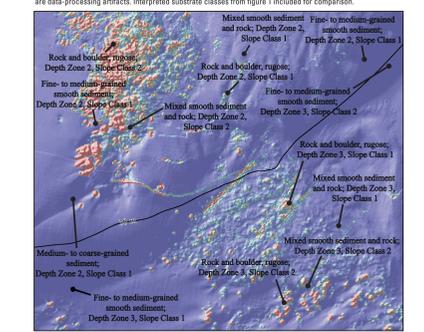


Figure 3. Rugosity (characterization of roughness derived from bathymetry) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 1 (Box A on map). Rugosity values are displayed in muted "rainbow" color spectrum that ranges from purple (low rugosity) through green (medium rugosity)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

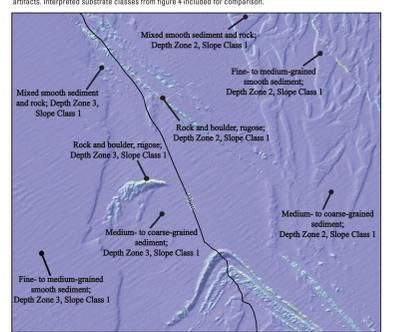
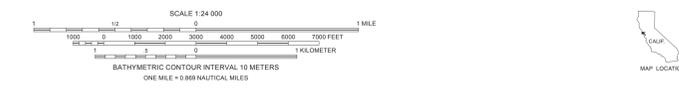


Figure 6. Rugosity (characterization of roughness derived from bathymetry) draped over shaded-relief bathymetry (see sheet 2) for same area as figure 4 (Box B on map). Rugosity values are displayed in muted "rainbow" color spectrum that ranges from purple (low rugosity) through green (medium rugosity)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

Drainage elevation data from U.S. Geological Survey's National Elevation Dataset (available at <http://ned.usgs.gov/>). Offshore shaded-relief bathymetry from map on sheet 2. This report California's State Waters link from NOAA Office of Coast Survey.

Universal Transverse Mercator projection, Zone 10N

NOT INTENDED FOR NAVIGATIONAL USE



Seafloor character mapped in 2013. Bathymetric contours by Mercedes D. Ervey, 2012. GIS database and digital cartography by Mercedes D. Ervey and Madeline E. Gustin. Manuscript approved for publication March 3, 2015.

**Seafloor Character, Drakes Bay and Vicinity Map Area, California**  
By Mercedes D. Ervey and Guy R. Cochrane  
2015

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