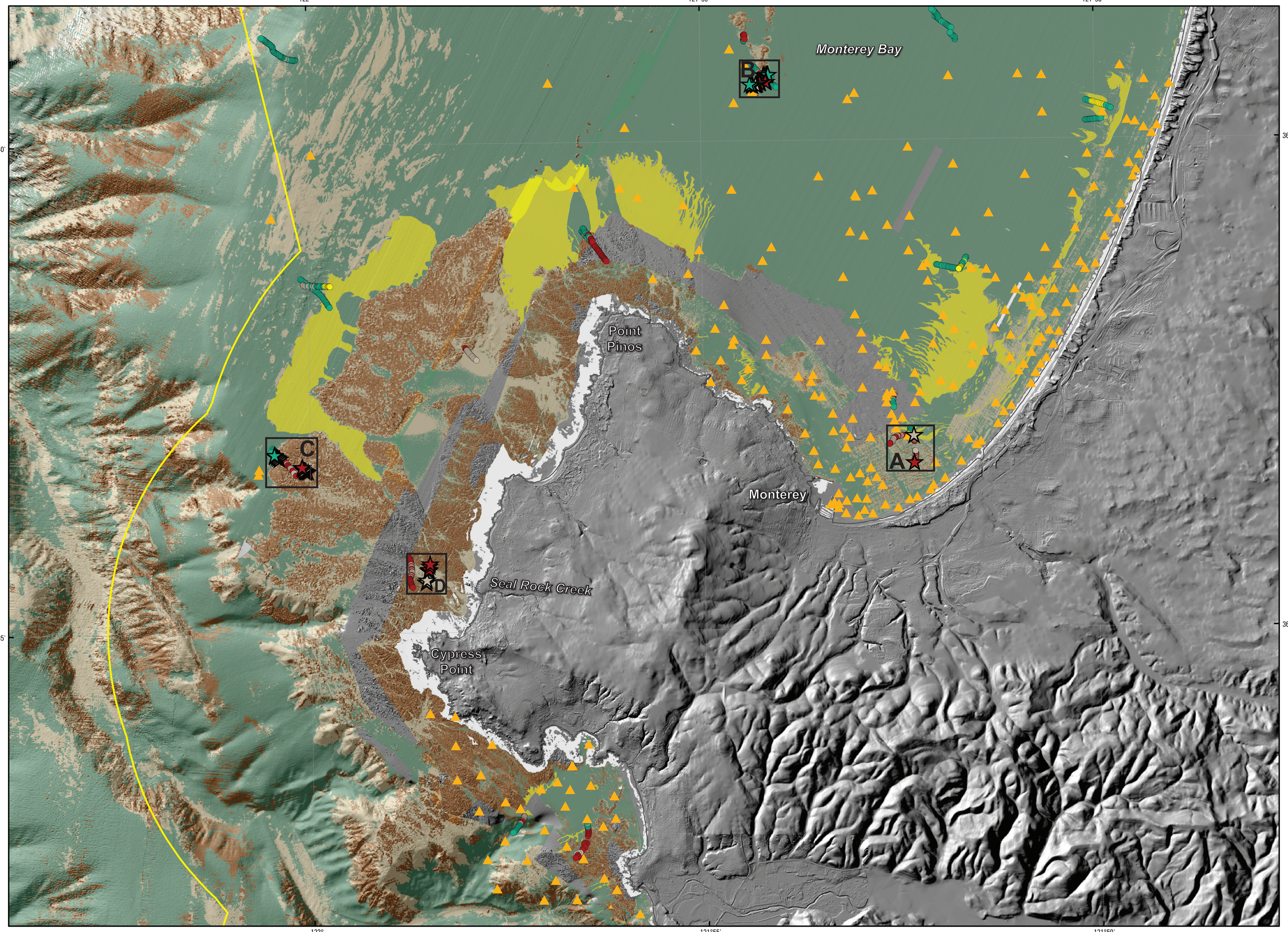


Onshore elevation data from National Oceanic and Atmospheric Administration (NOAA) Office for Coastal Management's Digital Coast (available at http://www.csc.noaa.gov/digitalcoast/data/coastallidar/) and from U.S. Geological Survey's National Elevation Dataset (available at http://ned.usgs.gov/). Offshore shaded-relief bathymetry from map on sheet 2, this report. California's State Waters limit from NOAA Office of Coast Survey

Universal Transverse Mercator projection, Zone 10N

NOT INTENDED FOR NAVIGATIONAL USE

APPROXIMATE MEAN DECLINATION, 2016 (13½°; TRUE NORTH, MAGNETIC NORTH)

SCALE 1:50 000
2 1 0 2 MILES
7000 3500 0 7000 FEET
1 0.5 0 1 KILOMETER
ONE MILE = 0.869 NAUTICAL MILES

MAP LOCATION (CALIF.)

Seafloor-character map simplified from map on sheet 5, this report. Video observations recorded and digital still photographs taken in 2010 and 2012. Sample localities from usSEABED (Reid and others, 2006)

GIS database and digital cartography by Nadine E. Golden

Manuscript approved for publication June 27, 2016

Figure 1A. Detailed view of seafloor character mapped northeast of Monterey, approximately 700 m offshore (see Box A, on map, for location), showing locations of periodic real-time video observations (dots) and digital still photographs (stars; see figs. 1B through 1D) from camera line 47, cruise S–22–10–MB.

Figure 1B. Digital still photograph no. A1 (see fig. 1A for location). Rock outcrop and cobbles (water depth, 17 m). Abiotic complexity is high, biotic complexity is absent, and biocover is low. Biocover includes bat star, *Patiria miniata* (bas); leather star, *Dermasterias imbricata* (ls); encrusting coralline algae, *Calliarthron* spp. (ca); and blackeye goby, *Rhinogobiops nicholsii* (beg). Distance between lasers (green dots) is 15 cm.

Figure 1C. Digital still photograph no. A2 (see fig. 1A for location). Rock outcrop, coarse sand, and shell hash (water depth, 27 m). Abiotic complexity is high, biotic complexity is absent, and biocover is low. Biocover includes sunflower star, *Pycnopodia helianthoides* (suss). Distance between lasers (green dots) is 15 cm.

Figure 1D. Digital still photograph no. A3 (see fig. 1A for location). Coarse sand, gravel, shell hash, and cobbles (water depth, 27 m). Abiotic complexity is moderate, biotic complexity is absent, and biocover is low. Biocover includes juvenile rockfish, *Sebastes* spp. (rf); and brittle star arms (bs). Distance between lasers (green dots) is 15 cm.

Figure 3A. Detailed view of seafloor character mapped northwest of Cypress Point, approximately 3.5 km offshore (see Box C, on map, for location), showing locations of periodic real-time video observations (dots) and digital still photographs (stars; see figs. 3B through 3R) from camera line 54, cruise SS–22–10–MB.

Figure 3B. Digital still photograph no. C1 (see fig. 3A for location). Boulders, cobbles, and coarse sand (water depth, 66 m). Abiotic complexity is high, biotic complexity is absent, and biocover is moderate. Biocover includes cup corals (cc), sea stars (sst), red gorgonian (g), and encrusting sponge (spo). Distance between lasers (green dots) is 15 cm.

Figure 3C. Digital still photograph no. C2 (see fig. 3A for location). Rock outcrop (water depth, 66 m). Abiotic complexity is high, biotic complexity is absent, and biocover is high. Biocover includes sea star (sst), cup coral (cc), and sponge (both upright and encrusting) (spo). Distance between lasers (green dots) is 15 cm.

Figure 3D. Digital still photograph no. C3 (see fig. 3A for location). Rock outcrop, cobbles, coarse sand, and shell hash (water depth, 67 m). Abiotic complexity is high, biotic complexity is absent, and biocover is moderate. Biocover includes vermillion star, *Mediaster aequalis* (vs); cup coral (cc); encrusting sponge (spo); painted greenling, *Oxylebius pictus* (pg); and brittle star arms (bs). Distance between lasers (green dots) is 15 cm.

Figure 3E. Digital still photograph no. C4 (see fig. 3A for location). Rock outcrop, cobbles, and coarse sand (water depth, 69 m). Abiotic complexity is moderate, biotic complexity is absent, and biocover is low. Biocover includes vermillion star, *Mediaster aequalis* (vs); and brittle stars (bs). Distance between lasers (green dots) is 15 cm.

Figure 3F. Digital still photograph no. C5 (see fig. 3A for location). Boulders and cobbles (water depth, 68 m). Abiotic complexity is high, biotic complexity is absent, and biocover in moderate. Biocover includes vermillion star, *Mediaster aequalis* (vs); halfbanded rockfish, *Sebastes semicinctus* (hbrf); cup coral (cc); and encrusting sponge (spo). Distance between lasers (green dots) is 15 cm.

Figure 3G. Digital still photograph no. C6 (see fig. 3A for location). Rock outcrop and coarse sand (water depth, 68 m). Abiotic complexity is moderate, biotic complexity is absent, and biocover is moderate. Biocover includes encrusting sponge (spo); cup coral (cc); and vermillion star, *Mediaster aequalis* (vs). Distance between lasers (green dots) is 15 cm.

Figure 3H. Digital still photograph no. C7 (see fig. 3A for location). Rock outcrop (water depth, 70 m). Abiotic complexity is high, biotic complexity is absent, and biocover is high. Biocover includes upright sponge (spo); red gorgonian (g); vermillion star, *Mediaster aequalis* (vs); rosy rockfish, *Sebastes rosaceus* (rorf); blackeye goby, *Rhinogobiops nicholsii* (beg); brittle star (bs); and cup corals (cc). Distance between lasers (green dots) is 15 cm.

Figure 3I. Digital still photograph no. C8 (see fig. 3A for location). Rock outcrop and coarse sand (water depth, 68 m). Abiotic complexity is moderate, biotic complexity is absent, and biocover is moderate. Biocover includes brittle stars (bs); vermillion star, *Mediaster aequalis* (vs); cup corals (cc); and encrusting sponge (spo). Distance between lasers (green dots) is 15 cm.

Figure 3J. Digital still photograph no. C9 (see fig. 3A for location). Coarse sand (water depth, 67 m). Abiotic complexity is low, biotic complexity is absent, and biocover is high. Biocover includes brittle stars (bs); vermillion star, *Mediaster aequalis* (vs); cup corals (cc); and young-of-the-year rockfish (rfY). Distance between lasers (green dots) is 15 cm.

Figure 3K. Digital still photograph no. C10 (see fig. 3A for location). Rock outcrop (water depth, 65 m). Abiotic complexity is high, biotic complexity is absent, and biocover is high. Biocover includes encrusting and upright sponge (spo); strawberry anemone (sta); hydroids (h); hydrocoral, *Stylaster californicus* (hyc); sea star (sst); and red gorgonians (g). Distance between lasers (green dots) is 15 cm.

Figure 3L. Digital still photograph no. C11 (see fig. 3A for location). Rock outcrop (water depth, 93 m). Abiotic complexity is high, biotic complexity is absent, and biocover is low. Biocover includes cup coral (cc) and encrusting sponge (spo). Distance between lasers (green dots) is 15 cm.

Figure 3M. Digital still photograph no. C12 (see fig. 3A for location). Rock outcrop and coarse sand (water depth, 94 m). Abiotic complexity is high, biotic complexity is present, and biocover is moderate. Biocover includes crinoids (cr); vermillion star, *Mediaster aequalis* (vs); cup corals (cc); and encrusting sponge (spo). Distance between lasers (green dots) is 15 cm.

Figure 3N. Digital still photograph no. C13 (see fig. 3A for location). Coarse sand (water depth, 100 m). Abiotic complexity is low, biotic complexity is absent, and biocover is low. Biocover includes vermillion star, *Mediaster aequalis* (vs); and driftweed (dw). Distance between lasers (green dots) is 15 cm.

Figure 3O. Digital still photograph no. C14 (see fig. 3A for location). Rock outcrop and coarse sand (water depth, 100 m). Abiotic complexity is high, biotic complexity is absent, and biocover is moderate. Biocover includes cup coral (cc); encrusting sponge (spo); and vermillion star, *Mediaster aequalis* (vs). Distance between lasers (green dots) is 15 cm.

Figure 3P. Digital still photograph no. C15 (see fig. 3A for location). Rock outcrop (water depth, 102 m). Abiotic complexity is high, biotic complexity is present, and biocover is moderate. Biocover includes crinoid (cr), cup coral (cc), and encrusting sponge (spo). Distance between lasers (green dots) is 15 cm.

Figure 3Q. Digital still photograph no. C16 (see fig. 3A for location). Rock outcrop and coarse sand with megaripples (water depth, 103 m). Abiotic complexity is high, biotic complexity is absent, and biocover is moderate. Biocover includes cup coral (cc); rosy rockfish, *Sebastes rosaceus* (rorf); and brittle stars (bs). Distance between lasers (green dots) is 15 cm.

Figure 3R. Digital still photograph no. C17 (see fig. 3A for location). Coarse sand with megaripples (water depth, 103 m). Abiotic complexity is low, biotic complexity is absent, and biocover is absent. Distance between lasers (green dots) is 15 cm.

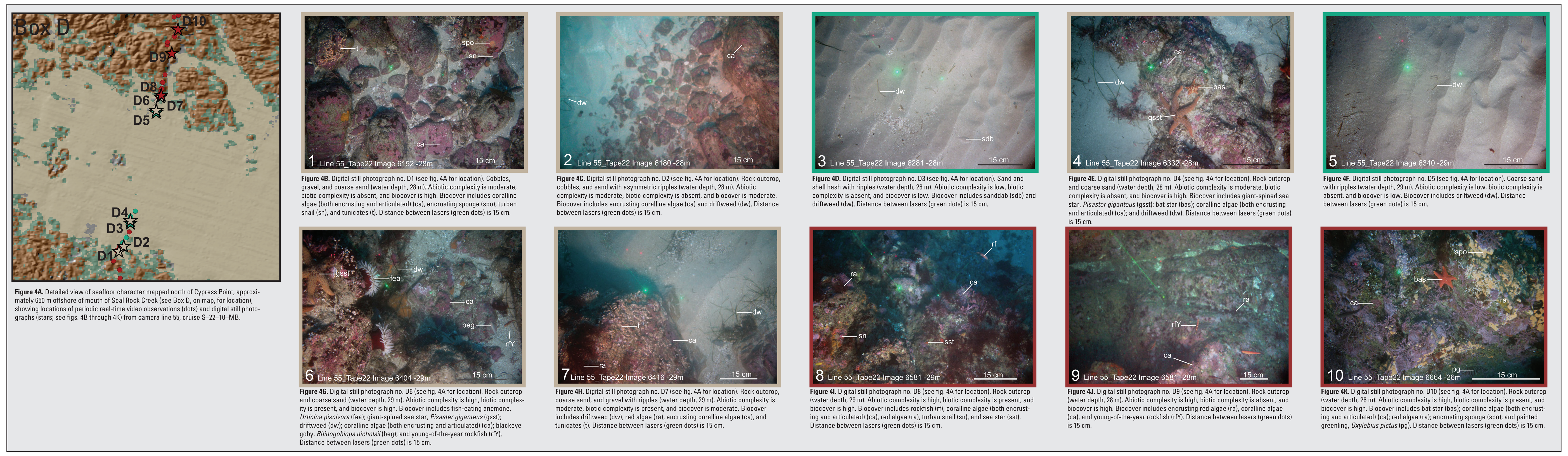


Figure 4A. Detailed view of seafloor character mapped north of Cypress Point, approximately 650 m offshore of mouth of Seal Rock Creek (see Box D, on map, for location), showing locations of periodic real-time video observations (dots) and digital still photographs (stars; see figs. 4B through 4K) from camera line 55, cruise S–22–10–MB.

Figure 4B. Digital still photograph no. D1 (see fig. 4A for location). Cobbles, gravel, and coarse sand (water depth, 28 m). Abiotic complexity is moderate, biotic complexity is absent, and biocover is high. Biocover includes coralline algae (both encrusting and articulated) (ca), encrusting sponge (spo), turban snail (sn), and tunicates (t). Distance between lasers (green dots) is 15 cm.

Figure 4C. Digital still photograph no. D2 (see fig. 4A for location). Rock outcrop, cobbles, and sand with asymmetric ripples (water depth, 28 m). Abiotic complexity is moderate, biotic complexity is absent, and biocover is moderate. Biocover includes encrusting coralline algae (ca) and driftweed (dw). Distance between lasers (green dots) is 15 cm.

Figure 4D. Digital still photograph no. D3 (see fig. 4A for location). Sand and shell hash with ripples (water depth, 28 m). Abiotic complexity is low, biotic complexity is absent, and biocover is low. Biocover includes sanddab (sdb) and driftweed (dw). Distance between lasers (green dots) is 15 cm.

Figure 4E. Digital still photograph no. D4 (see fig. 4A for location). Rock outcrop and coarse sand (water depth, 28 m). Abiotic complexity is moderate, biotic complexity is absent, and biocover is high. Biocover includes giant-spined sea star, *Pisaster giganteus* (gsst); bat star (bas); coralline algae (both encrusting and articulated) (ca); and driftweed (dw). Distance between lasers (green dots) is 15 cm.

Figure 4F. Digital still photograph no. D5 (see fig. 4A for location). Coarse sand with ripples (water depth, 29 m). Abiotic complexity is low, biotic complexity is absent, and biocover is low. Biocover includes driftweed (dw). Distance between lasers (green dots) is 15 cm.

Figure 4G. Digital still photograph no. D6 (see fig. 4A for location). Rock outcrop and coarse sand (water depth, 29 m). Abiotic complexity is high, biotic complexity is present, and biocover is high. Biocover includes fish-eating anemone, *Urticina piscivora* (fea); giant-spined sea star, *Pisaster giganteus* (gsst); driftweed (dw); coralline algae (both encrusting and articulated) (ca); blackeye goby, *Rhinogobiops nicholsii* (beg); and young-of-the-year rockfish (rfY). Distance between lasers (green dots) is 15 cm.

Figure 4H. Digital still photograph no. D7 (see fig. 4A for location). Rock outcrop, coarse sand, and gravel with ripples (water depth, 29 m). Abiotic complexity is moderate, biotic complexity is present, and biocover is moderate. Biocover includes driftweed (dw), red algae (ra), encrusting coralline algae (ca), and tunicates (t). Distance between lasers (green dots) is 15 cm.

Figure 4I. Digital still photograph no. D8 (see fig. 4A for location). Rock outcrop (water depth, 29 m). Abiotic complexity is high, biotic complexity is present, and biocover is high. Biocover includes rockfish (rf), coralline algae (both encrusting and articulated) (ca), red algae (ra), turban snail (sn), and sea star (sst). Distance between lasers (green dots) is 15 cm.

Figure 4J. Digital still photograph no. D9 (see fig. 4A for location). Rock outcrop (water depth, 28 m). Abiotic complexity is high, biotic complexity is absent, and biocover is high. Biocover includes encrusting red algae (ra), coralline algae (ca), and young-of-the-year rockfish (rfY). Distance between lasers (green dots) is 15 cm.

Figure 4K. Digital still photograph no. D10 (see fig. 4A for location). Rock outcrop (water depth, 26 m). Abiotic complexity is high, biotic complexity is present, and biocover is high. Biocover includes bat star (bas); coralline algae (both encrusting and articulated) (ca); red algae (ra); encrusting sponge (spo); and painted greenling, *Oxylebius pictus* (pg). Distance between lasers (green dots) is 15 cm.

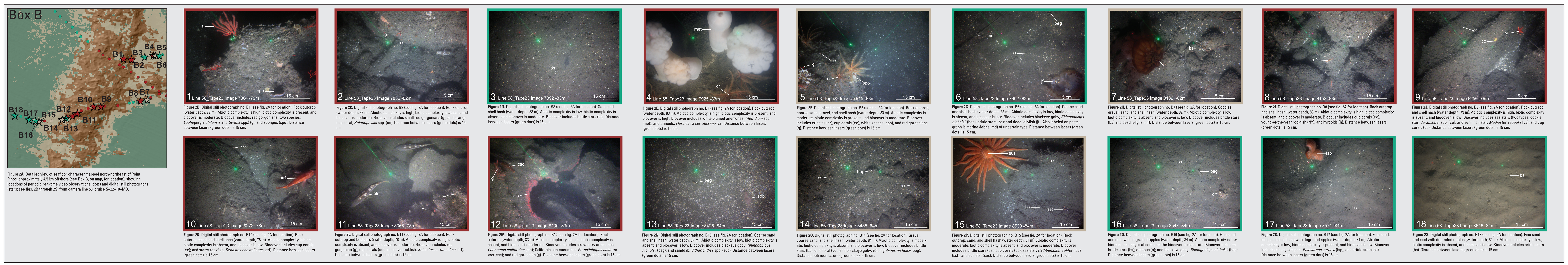


Figure 2A. Detailed view of seafloor character mapped north-northeast of Point Pinos, approximately 4.5 km offshore (see Box B, on map, for location), showing locations of periodic real-time video observations (dots) and digital still photographs (stars; see figs. 2B through 2S) from camera line 58, cruise S–22–10–MB.

Figure 2B. Digital still photograph no. B1 (see fig. 2A for location). Rock outcrop (water depth, 79 m). Abiotic complexity is high, biotic complexity is present, and biocover is moderate. Biocover includes red gorgonians (two species: *Lophogorgia chilensis* and *Swiftia* spp.) (g); and sponges (spo). Distance between lasers (green dots) is 15 cm.

Figure 2C. Digital still photograph no. B2 (see fig. 2A for location). Rock outcrop (water depth, 82 m). Abiotic complexity is high, biotic complexity is absent, and biocover is moderate. Biocover includes small red gorgonians (g); and orange cup coral, *Balanophyllia* spp. (cc). Distance between lasers (green dots) is 15 cm.

Figure 2D. Digital still photograph no. B3 (see fig. 2A for location). Sand and shell hash (water depth, 83 m). Abiotic complexity is low, biotic complexity is absent, and biocover is moderate. Biocover includes brittle stars (bs). Distance between lasers (green dots) is 15 cm.

Figure 2E. Digital still photograph no. B4 (see fig. 2A for location). Rock outcrop (water depth, 83 m). Abiotic complexity is high, biotic complexity is present, and biocover is high. Biocover includes white plumed anemones, *Metridium* spp. (met); and crinoids, *Florometra serratissima* (cr). Distance between lasers (green dots) is 15 cm.

Figure 2F. Digital still photograph no. B5 (see fig. 2A for location). Rock outcrop, coarse sand, gravel, and shell hash (water depth, 83 m). Abiotic complexity is moderate, biotic complexity is present, and biocover is moderate. Biocover includes crinoids (cr), cup corals (cc), white sponge (spo), and red gorgonians (g). Distance between lasers (green dots) is 15 cm.

Figure 2G. Digital still photograph no. B6 (see fig. 2A for location). Coarse sand and shell hash (water depth, 83 m). Abiotic complexity is low, biotic complexity is absent, and biocover is low. Biocover includes blackeye goby, *Rhinogobiops nicholsii* (beg); brittle stars (bs); and dead jellyfish (jf). Also labeled on photograph is marine debris (md) of uncertain type. Distance between lasers (green dots) is 15 cm.

Figure 2H. Digital still photograph no. B7 (see fig. 2A for location). Cobbles, gravel, sand, and shell hash (water depth, 82 m). Abiotic complexity is low, biotic complexity is absent, and biocover is low. Biocover includes brittle stars (bs) and dead jellyfish (jf). Distance between lasers (green dots) is 15 cm.

Figure 2I. Digital still photograph no. B8 (see fig. 2A for location). Rock outcrop and shell hash (water depth, 83 m). Abiotic complexity is high, biotic complexity is absent, and biocover is moderate. Biocover includes cup corals (cc), young-of-the-year rockfish (rfY), and hyrdoids (h). Distance between lasers (green dots) is 15 cm.

Figure 2J. Digital still photograph no. B9 (see fig. 2A for location). Rock outcrop and shell hash (water depth, 79 m). Abiotic complexity is high, biotic complexity is absent, and biocover is low. Biocover includes sea stars (two types: cookie star, *Ceramaster* spp. [co]; and vermilion star, *Mediaster aequalis* [vs]) and cup corals (cc). Distance between lasers (green dots) is 15 cm.

Figure 2K. Digital still photograph no. B10 (see fig. 2A for location). Rock outcrop, sand, and shell hash (water depth, 78 m). Abiotic complexity is high, biotic complexity is absent, and biocover is low. Biocover includes cup corals (cc); and starry rockfish, *Sebastes constellatus* (strf). Distance between lasers (green dots) is 15 cm.

Figure 2L. Digital still photograph no. B11 (see fig. 2A for location). Rock outcrop and boulders (water depth, 78 m). Abiotic complexity is high, biotic complexity is absent, and biocover is moderate. Biocover includes red gorgonian (g); cup corals (cc); and olive rockfish, *Sebastes serranoides* (olrf). Distance between lasers (green dots) is 15 cm.

Figure 2M. Digital still photograph no. B12 (see fig. 2A for location). Rock outcrop (water depth, 83 m). Abiotic complexity is high, biotic complexity is absent, and biocover is moderate. Biocover includes strawberry anemones, *Corynactis californica* (sta); California sea cucumber, *Parastichopus californicus* (csc); and red gorgonian (g). Distance between lasers (green dots) is 15 cm.

Figure 2N. Digital still photograph no. B13 (see fig. 2A for location). Coarse sand and shell hash (water depth, 84 m). Abiotic complexity is low, biotic complexity is absent, and biocover is low. Biocover includes blackeye goby, *Rhinogobiops nicholsii* (beg); and sanddab, *Citharichthys* spp. (sdb). Distance between lasers (green dots) is 15 cm.

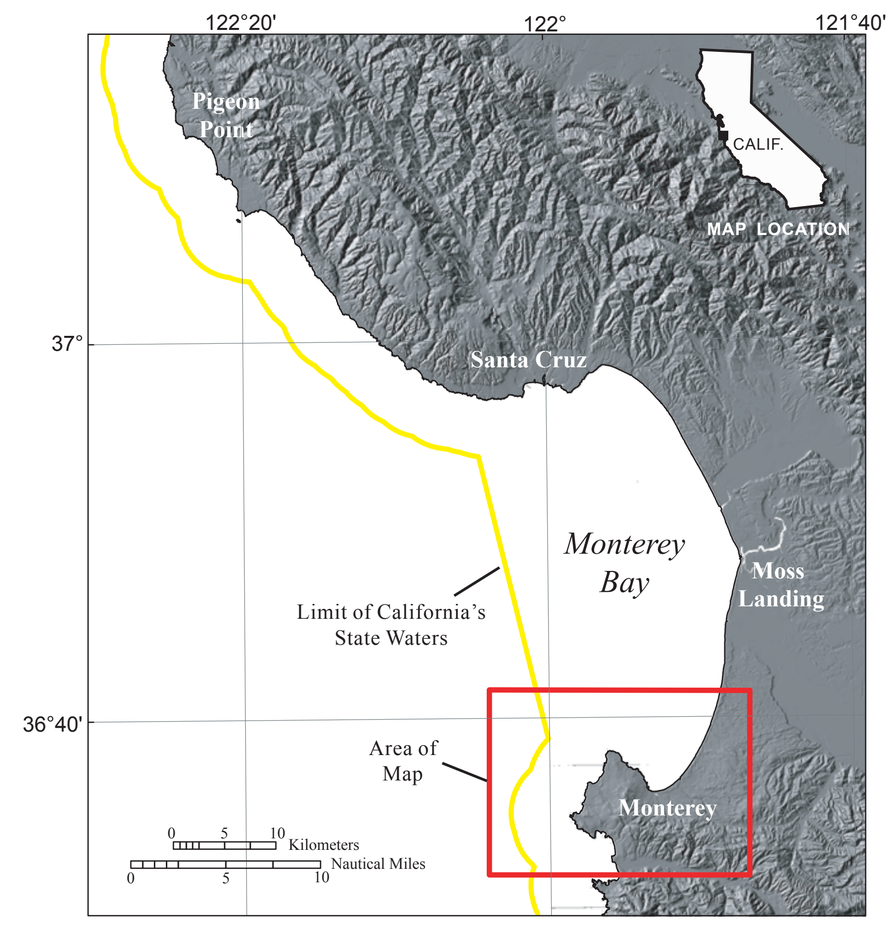
Figure 2O. Digital still photograph no. B14 (see fig. 2A for location). Gravel, coarse sand, and shell hash (water depth, 84 m). Abiotic complexity is moderate, biotic complexity is absent, and biocover is low. Biocover includes brittle stars (bs); cup coral (cc); and blackeye goby, *Rhinogobiops nicholsii* (beg). Distance between lasers (green dots) is 15 cm.

Figure 2P. Digital still photograph no. B15 (see fig. 2A for location). Rock outcrop, sand, and shell hash (water depth, 84 m). Abiotic complexity is moderate, biotic complexity is absent, and biocover is moderate. Biocover includes brittle stars (bs); cup corals (cc); sea star, *Rathbunaster californicus* (sst); and sun star (sus). Distance between lasers (green dots) is 15 cm.

Figure 2Q. Digital still photograph no. B16 (see fig. 2A for location). Fine sand and mud with degraded ripples (water depth, 84 m). Abiotic complexity is low, biotic complexity is absent, and the biocover is moderate. Biocover includes brittle stars (bs); octopus (o); and blackeye goby, *Rhinogobiops nicholsii* (beg). Distance between lasers (green dots) is 15 cm.

Figure 2R. Digital still photograph no. B17 (see fig. 2A for location). Fine sand, mud, and shell hash with degraded ripples (water depth, 84 m). Abiotic complexity is low, biotic complexity is present, and biocover is low. Biocover includes fleshy sea pen, *Ptilosarcus gurneyi* (fsp); and brittle stars (bs). Distance between lasers (green dots) is 15 cm.

Figure 2S. Digital still photograph no. B18 (see fig. 2A for location). Fine sand and mud with degraded ripples (water depth, 84 m). Abiotic complexity is low, biotic complexity is absent, and biocover is low. Biocover includes brittle stars (bs). Distance between lasers (green dots) is 15 cm.



DISCUSSION

Between 1998 and 2012, the seafloor in the Offshore of Monterey map area in central California was mapped by California State University, Monterey Bay (CSUMB) and by Monterey Bay Aquarium Research Institute (MBARI), using multibeam echosounders, bathymetric sidescan-sonar systems, and bathymetric-lidar systems (see sheets 1, 2, 3). These mapping missions combined to collect bathymetry and acoustic-backscatter data from about the 10-m isobath to out beyond the limit of California's State Waters. In order to characterize the bathymetry and acoustic-backscatter data into geologically and biologically useful information, the USGS ground-truth-surveyed the data by towing a camera sled (fig. 5) over specific locations throughout the map area in 2010 and 2012.

During the ground-truth-survey cruises, the camera sled was towed 1 to 2 m above the seafloor, at speeds of between 1 and 2 nautical miles/hour. The sled housed two standard-definition (640×480 pixel resolution) video cameras (one forward looking, the other downward looking), a high-definition (1,080×1,920 pixel resolution) video camera, and an 8-megapixel digital still camera, which captured a digital still photograph once every 30 seconds. The video was relayed in real time to the research vessel, where USGS and National Oceanic and Atmospheric Administration (NOAA) scientists recorded both the geologic and biologic character of the seafloor once every minute, using programmable keypads. The locations and directions of the camera-sled tracklines were chosen in order to visually inspect areas thought to represent the full range of bottom hardness and rugosity in the map area.

In the context of marine-fisheries management, benthic-habitat complexity can be divided into abiotic (geologic) and biotic (biologic) components. Benthic-habitat complexity refers to the visual classification of local abiotic and biotic vertical relief and structure that may provide potential refuge for both juvenile and adult forms of various species. Only abiotic attributes (primary- and secondary-substrate composition) were used in the production of the seafloor-character map on sheet 5. Classifications of primary and secondary substrate are based on the Wentworth (1922) scale of sediment grain-size categories, and the sand, cobble, and boulder sizes are classified as in Wentworth (1922). However, the difficulty in distinguishing the finest divisions in the Wentworth (1922) scale during video observations made it necessary to aggregate some grain-size classes: the granule and pebble sizes have been grouped together into a class called "gravel," and the clay and silt sizes have been grouped into a class called "mud." In addition, hard bottom and clasts larger than boulder size are classified as "rock." Primary and secondary substrate, by definition, constitute greater than 50 and 20 percent of the seafloor during an observation, respectively.

This sheet contains a smaller, simplified (depth-zone symbology has been removed) version of the seafloor-character map (sheet 5), on which the camera-sled tracklines used to ground-truth-survey the sonar data are indicated by aligned colored dots, each dot representing the location of a recorded observation. Primary- and secondary-substrate compositions are shown by differently colored dots. The map also shows the locations of the detailed views of seafloor character along some of the tracklines (Boxes A through D) that are highlighted on this sheet (figs. 1A, 2A, 3A, 4A). Also shown are locations of samples (triangles) from usSEABED (Reid and others, 2006) that were used to supplement the ground-truth surveys.

Each detailed view (figs. 1A, 2A, 3A, 4A) shows the locations of camera-sled tracklines (aligned colored dots), as well as of the photographs (colored stars) taken along the tracklines. These photographs, which are representative of the seafloor, are displayed with a description of the observed seafloor characteristics recorded by USGS and NOAA scientists (figs. 1B through 1D; 2B through 2S; 3B through 3R; 4B through 4K). Only primary and secondary substrates are reported, although individual photographs may show more substrate types. Organisms, when present, are labeled on the photographs.

Ground-truth surveys in the Offshore of Monterey map area include approximately 24 trackline kilometers of video and 7,400 still photographs, in addition to 818 seafloor observations of abiotic and biotic attributes. A visual estimate of slope also was recorded.

GLOSSARY

Rugosity—A GIS-derived characterization of seafloor roughness, calculated as the ratio of the three-dimensional surface area of seafloor to the two-dimensional planar-base area, for each cell in the bathymetry grid.

Backscatter intensity—The amplitude of the reflected sonar signal (see sheet 3) used to infer the hardness of the bottom, determined after sonar-data processing has removed (as much as possible) the effects of water depth, angle of reflection, and bottom roughness.

Biotic complexity—The assessment of the presence or absence of biological structures that have the potential of providing shelter for fauna, determined by estimating the scale, the amount, and the morphology of biological relief (as described by Tissot and others, 2006).

Biocover—The visual estimate of the proportion of biologic cover by encrusting organisms: high, greater than 50 percent; moderate, between 50 percent and 10 percent; low, less than 10 percent.

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Tissot, B.N., Yoklavich, M.M., Love, M.S., York, K., and Amend, M., 2006, Benthic invertebrates that form habitat on deep banks off southern California, with special reference to deep sea coral: Fishery Bulletin, v. 104, p. 167–181.

Wentworth, C.K., 1922, A scale of grade and class terms for clastic sediments: Journal of Geology, v. 30, p. 377–392.

EXPLANATION

Substrate class

- **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
- **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
- **Rock and boulder, rugose**—High backscatter, high rugosity; typically boulders and rugose bedrock

Location of real-time video observation and interpreted substrate class of seafloor

- **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
- **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
- **Rock and boulder, rugose**—High backscatter, high rugosity; typically boulders and rugose bedrock

Location of digital still photograph and interpreted substrate class of seafloor

- **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

Interpreted substrate class depicted in digital still photograph—Indicated by colored frame around photograph (not shown on map; shown in figures only)

- **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

Sample localities

- **From usSEABED (Reid and others, 2006)**

Area of "no data"—Areas near shoreline not mapped owing to insufficient high-resolution seafloor mapping data or gaps in data collection

Limit of California's State Waters

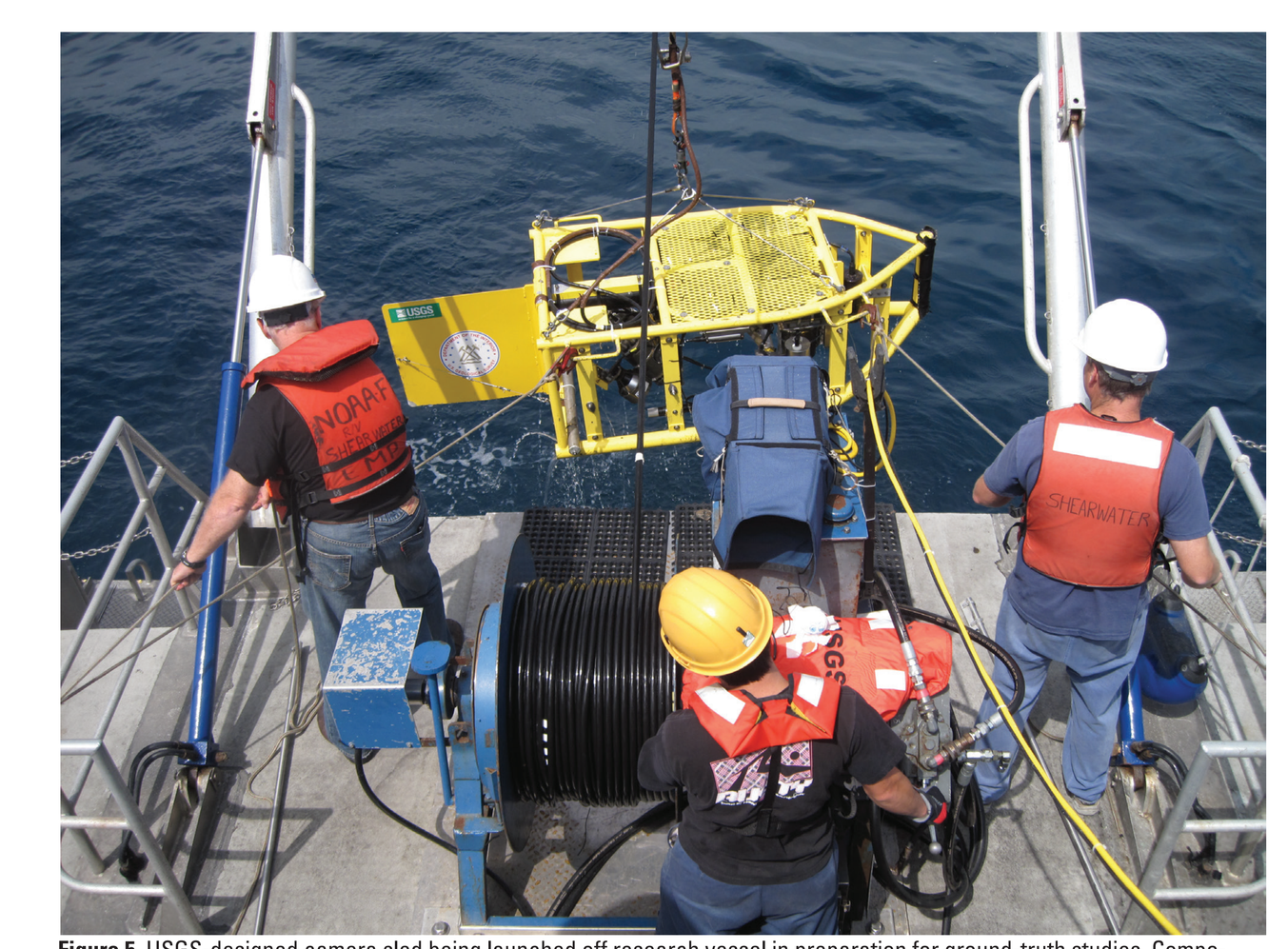

Figure 5. USGS-designed camera sled being launched off research vessel in preparation for ground-truth studies. Components onboard sled include four digital video camcorders, one 8-megapixel digital SLR camera, lasers for scale, and various strobe and video lights, as well as telemetry instrumentation that records depth, altitude, and compass heading.

Ground-Truth Studies, Offshore of Monterey Map Area, California

By

Nadine E. Golden,[1] Guy R. Cochrane,[1] and Lisa M. Krigsman[2]

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[1]U.S. Geological Survey;
[2]National Oceanic and Atmospheric Administration, National Marine Fisheries Service

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