



ROV Transects of Deep Sea Coral Communities Habitat Type, Species Abundance and Diversity

The teacher may choose to explore species abundance and diversity in deep sea coral communities in several different ways with the available transects.

Channel Islands – Compare and contrast species abundance and diversity with eight transects from deep (>100 meters) and shallow (<100 meters) habitats.

Greater Farallones – Compare and contrast species abundance and diversity across three different habitats: soft bottom, rocky bottom and ledge.

Monterey Bay – Explore species diversity on the Davidson Seamount.

Cordell Bank – Explore species abundance and diversity within the soft and rocky habitats at the head of a deep sea canyon known as Bodega Canyon.

Olympic Coast – View a deep sea coral community in a transect of the northernmost national marine sanctuary on the West Coast.

Channel Islands National Marine Sanctuary

Channel Islands National Marine Sanctuary is an area of exceptional natural beauty and resources. It encompasses 1,470 square miles of water surrounding Anacapa, Santa Cruz, Santa Rosa, San Miguel and Santa Barbara Islands. The Channel Islands transects provide students with the opportunity to compare and contrast six sites to examine the abundance and diversity of marine life at different depths; there are three deep (>100 meters deep) and three shallow (<100 meters deep) transects. More specifically, the shallow transects take place in depths greater than 20-50 meters. Two additional deep sea transects are available for advanced species identification (For more information, see “Alternative Deep Sea Transects” on page 3.). Have students record and graph their data from each transect and compare species diversity and abundance between the deep and shallow transects.

Deep 1 The Footprint

Habitat type: Rocky Depth: 174 meters (570 feet) Temperature: 9.4°C

Few – Black coral, squat lobster, anemone, basket star, golden sea fan, barrel sponge

Many – Basket sponge

Abundant – Rockfish, brittle stars

Deep 2 The Footprint

Habitat type: Rocky Depth: 153 meters (501 feet) Temperature: 9.5°C
Single – Black coral, lingcod
Few – Barrel sponge, sea stars
Abundant – Rockfish, basket sponge

Deep 3 Piggy Bank

Habitat type: Rocky Depth: 309 meters (1,013 feet) Temperature: 8.7°C
Single – Bubblegum sea fan
Few – Black coral, basket sponge, rockfish, sea cucumber, sun star, sea star, anemone
Many – Squat lobster, basket star
Abundant – Brittle star

Shallow 1 Carrington

Habitat type: Rocky Depth: 65 meters (213 feet) Temperature: 12.1°C
Single – Lingcod
Few – Orange sea fan
Many – Rockfish, sea cucumber, red sea fan
Abundant – Purple sea fan

Shallow 2 Carrington

Habitat type: Rocky Depth: 68 meters (223 feet) Temperature: 10.9°C
Single – Lingcod, basket star
Few – Sea star, red sea fan, rockfish
Many – Sea cucumber, orange sea fan
Abundant – Purple sea fan

*Note: There is a dead *Eugorgia* purple sea fan colony at 0:33; the cause of death is unknown.

Shallow 3 San Miguel

Habitat type: Rocky Depth: 77 meters (252 feet) Temperature: 10.4°C
Single – Purple sea fan
Few – Sea cucumber
Abundant – Orange sea fan, rockfish (many very small young of the year rockfish)
*Note: There are a few branching sponges in this transect that are not on the ID guide and thus, should not be counted.

Alternative Deep Sea Transects: The next two transects are particularly dense with marine life, and students may find it more challenging to record data. These should be shown after students have completed several other transects and are familiar with species ID.

Deep Alternative 1 The Footprint

Habitat type: Rocky Depth: 176 meters (577 feet) Temperature: 8.7°C

Single – Lingcod

Few – *Lophelia*, rockfish, sea star, barrel sponge, anemone, black coral, basket sponge

Many – Golden sea fan, basket star

Abundant – Brittle star

Deep Alternative 2 Piggy Bank

Habitat type: Mixed, mostly rocky Depth: 288 meters (944 feet)

Temperature: 8.7°C

Single – Golden sea fan, Pacific sanddab/flatfish, anemone, yellow vase sponge, glass vase sponge, barrel sponge, sea star

Few – Bubblegum sea fan, black coral, basket sponge, squat lobster, sun star, rockfish

Many – Basket star

Abundant – *Lophelia*, *Desmophyllum* cup coral, brittle stars

*Note: Piggy Bank may be the most "acidic" seamount in the world for any reef building coral in terms of the lowest pH and lowest aragonite saturation state. Scientists know that coral can grow in these conditions, but it does not form big reefs as seen in other places around the world.

Researchers think that the acidic environment has a strong influence on the reef's framework, including both live and dead coral, and causes coral to crumble instead of building vertically upon itself.

Greater Farallones National Marine Sanctuary

Located just a few miles west and north of San Francisco, the waters of Greater Farallones National Marine Sanctuary encompass a diversity of highly productive marine habitats and an abundance of life around the Farallon Islands. In 2015, the sanctuary expanded northward from 1,282 to 3,295 square miles. There are three transects to choose from for Greater Farallones that represent three different habitats: (1.) soft bottom, (2.) rocky bottom and (3.) ledge. Have students record and graph species data in order to compare and contrast abundance and diversity between different deep sea habitats.

Soft Bottom

Habitat type: Soft bottom Depth: 250 meters (820 feet) Temperature: N/A

Single – Sea star

Few – Pacific sanddab, sea urchin, rockfish

Many – Sun star

Abundant – None

Rocky Bottom

Habitat type: Rocky bottom Depth: 270 meters (885 feet) Temperature: N/A

Single – Spotted ratfish

Few – Sea pen, lingcod, sea anemone, sea star, sea cucumber, sea urchin, feather star

Many – None

Abundant – Rockfish

Ledge

Habitat type: Ledge Depth: 270 meters (885 feet) Temperature: N/A

Few – Sun star, sea anemone, *Flabellum* cup coral, sea star

Abundant – Brittle star, feather star, rockfish

Monterey Bay National Marine Sanctuary

Davidson Seamount is a pristine undersea mountain habitat off the coast of Central California. At 23 nautical miles long and 7 nautical miles wide, it is one of the largest known seamounts in U.S. waters. From base to crest, the seamount is 7,480 feet tall, yet its summit is still 4,101 feet below the sea surface. Davidson Seamount is populated with a diversity of deep sea corals. It has been called "An Oasis in the Deep," hosting large coral forests, vast sponge fields, crabs, deep sea fishes, shrimp, basket stars and high numbers of rare and unidentified benthic species. Students can analyze a transect from Davidson Seamount to explore marine biodiversity and species abundance.

Davidson Seamount Transect

Habitat type: Rocky Depth: 1,692 meters (5,551 feet) Temperature: 2.4°C

Single – Golden sea fan, bubblegum sea fan

Few – *Primnoa* sea fan, sea anemone, sea star

Many – Basket star, brittle star

Abundant – None

*Note: There are several large unknown species of *Hexactinellida* sponges present; however, students do not need to identify or count them.

Cordell Bank National Marine Sanctuary

Cordell Bank National Marine Sanctuary borders Greater Farallones National Marine Sanctuary and protects a variety of seafloor habitats from continental shelf and slope, to a rocky bank (Cordell Bank) and deep sea canyon. From surface to seafloor, the region hosts a tremendous amount of biodiversity. With its southernmost boundary located 42 miles north of San Francisco, the sanctuary, 1,286 square miles, is entirely offshore. There are two transects from Cordell Bank

that demonstrate a small snapshot of the rich biodiversity found north of Cordell Bank and at the head of Bodega Canyon on the deep continental shelf.

Transect 1

Habitat type: Mixed, rocky and soft bottom Depth: 300 meters (984 feet)

Temperature: N/A

Single – Spotted ratfish

Few – Sun star, sea star, sea cucumber, shrimp

Many – Rockfish

Abundant – Feather star

Transect 2

Habitat type: Mixed, mostly soft bottom with a few rocks Depth: 300 meters (984 feet)

Temperature: N/A

Single – Spot prawn, spotted ratfish

Few – Sea anemone, sun star, Pacific sanddab

Many – Rockfish

Abundant – Feather star

Olympic Coast National Marine Sanctuary

Olympic Coast National Marine Sanctuary, the northernmost national marine sanctuary on the West Coast, protects 3,189 square miles of pristine ocean. This protected area boasts unique geology, including deep sea canyons and much of the continental shelf. The sanctuary also protects sandy beaches, rocky shores and a large expanse of open ocean. This transect offers students a brief exploration of the rich deep sea life found within Olympic Coast National Marine Sanctuary.

Olympic Coast Transect

Habitat type: Mixed, mostly soft bottom with some rocks Depth: N/A

Temperature: N/A

Single – Pacific Sanddab, bubblegum sea fan

Few – Red tree coral, rockfish, sea star, brittle star, anemone

Many – Feather star

Abundant – None