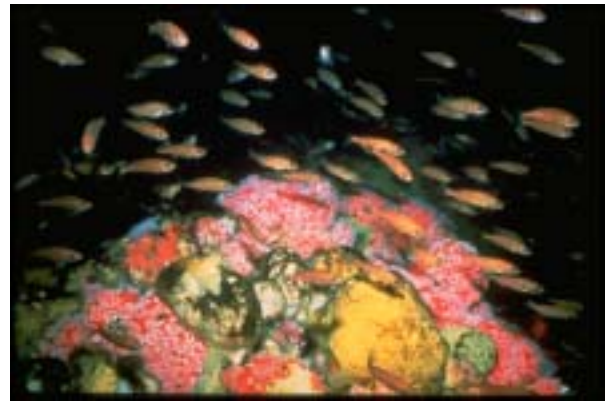




The geological landscape off the coast of California is varied and beautiful, much like the land above the water. The three National Marine Sanctuaries off the central California coast include geological features that form special habitats where interesting biological communities thrive. Whales and seabirds from around the world are attracted to these unique areas by an abundance of food in the Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries. Sponges, anemones, and other invertebrates compete for space on the top of Cordell Bank. White sharks patrol the Farallon Islands each fall for elephant seals.



Life abounds on the pinnacles of Cordell Bank

FEATURES ON THE EDGE OF THE CONTINENT

Traveling from the shoreline to the open ocean, seawater covers the gently sloping *continental shelf*. It is a broad submarine plain with few rocky outcrops. Sand and silt cover much of the continental shelf, with some gravel, clay, and broken shell deposits. Just outside of San Francisco Bay is the widest part of the continental shelf along the Oregon and Northern California coast.

Continuing on a journey seaward, the shelf ends at 100-150 meters below the surface. Here the seafloor, now called the *continental slope*, becomes much steeper, up to a 3° grade. The slope is covered uniformly with mud sediment and extends to about 3000 meters deep, cut by submarine canyons.

Well known for causing earthquakes, the San Andreas Fault runs below the Gulf of the Farallones National Marine Sanctuary, splitting Tomales Bay. To the east of the Fault, most of Marin County is on the North American Plate, and to the west, Point Reyes, the Farallon Islands, and Cordell Bank all ride on the northward moving Pacific Plate. These tectonic plates move in different directions, causing the shaking of earthquakes and the shifting of geologic features over millions of years.

The seafloor has many features that stick up or protrude from the smooth continental shelf. The vertical structure of these features provide important habitat for invertebrates and increase the surrounding biological productivity. The most obvious feature in this area are the Farallon Islands. Five peaks rise 60-70 meters above the seafloor, breaking the

surface to form the Islands that are visible from the Golden Gate Bridge. They provide important habitat that is protected below the water as a National Marine Sanctuary and above as a National Wildlife Refuge. The Farallon granite peaks were formed by the cooling of igneous rock deep in the crust, uplifted, and moved by tectonic forces.

Similar in size and shape to islands, but not breaking the surface are geologic features called *seamounts*. To the west, past the Monterey Bay National Marine Sanctuary are Pioneer and Guide Seamounts. Seamounts are isolated mountains, rising up from the seafloor like islands but not reaching the sea surface. Seamounts often reach only to 1000 meters depth and are round when viewed from above. They are commonly of volcanic origin, unlike banks that generally have a continental affinity.

Another coastal geological feature are *banks* that are well known by fishermen worldwide as good fishing grounds. Cordell Bank, perched on the edge of the continental shelf, is 9.5 miles long by 4.5 miles wide. It rises up from the shelf at 125 meters to pinnacles just 35 meters below the sea surface. The Salinian bedrock of Cordell Bank was created 93 million years ago as part of the southern Sierra Nevada Range. This granitic block originated in southern California and has been carried north with the Pacific Plate. The Bank is washed with nutrients from the prevailing California Current and seasonal upwelling. A unique combination of undersea topography and oceanic conditions join to create an extremely productive marine environment which is protected by the Cordell Bank National Marine Sanctuary.

<u>Geologic Feature</u>	<u>Definition</u>	<u>Central California Example</u>
Island	a small body of land, continental or oceanic origin, surrounded by water	Southeast Farallon Island
Seamount	a relatively isolated mountain, volcanic in origin, rising from the seafloor to 1000 m.	Pioneer Seamount
Bank	an undersea hill on the continental shelf, large in diameter, but short in height, generally a continental affinity, separated from the mainland during rifting, compression, or some other event.	Cordell Bank

