

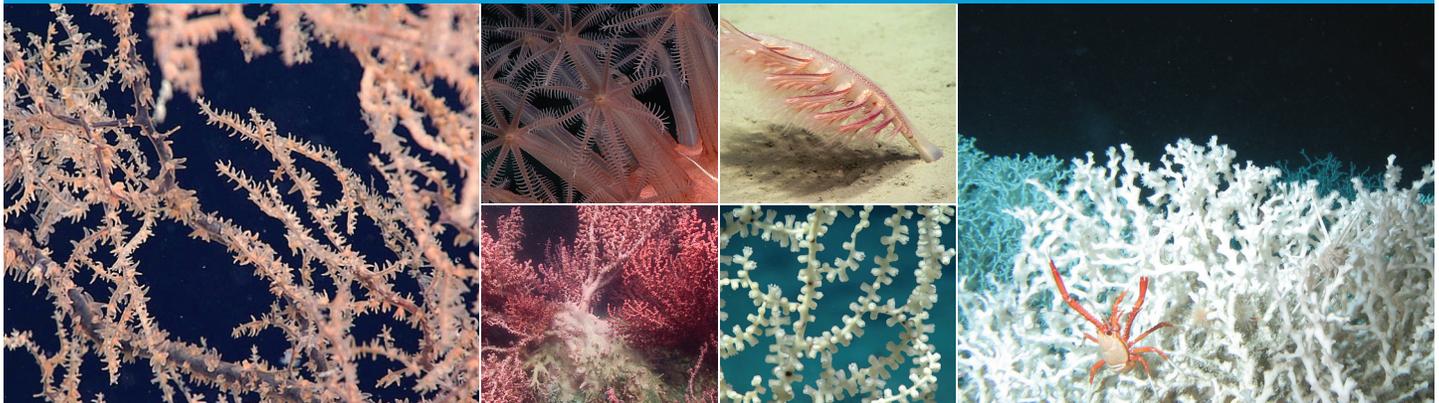


Deep-Sea Corals: Rainforests of the Deep

Deep-Sea Coral Diversity

There may be just as many varieties of deep-sea corals as shallow-water corals. Scientists have discovered over 3,000 species to date! Colonies of deep-sea corals can form a variety of different shapes, including fans, mounds, spirals, or ribbon-like, or branching structures, depending on the species. Some coral species can be expected to occur at certain ocean depths. In fact, depth is among the best predictors of coral species occurrence.

Examples of Deep-Sea Coral Diversity



Black corals are a type of soft coral, meaning they do not make a hard, calcium-carbonate skeleton. Surprisingly, black corals rarely look black because colorful polyps surround their black skeletons. Some species are white, red, green, or yellow. *Image courtesy of NOAA Ocean Exploration.*

Octocorals are a diverse group of soft corals that have polyps with eight hollow tentacles (top left). Sea pens (top right) are one type of colonial octocoral. Sea fans, bubblegum coral (bottom left), and bamboo coral (bottom right) are three other groups of octocorals. *Images courtesy of NOAA Ocean Exploration.*

Hard corals include cup corals and the genus *Lophelia*. Many species of hard corals, like *Lophelia pertusa* pictured above, grow on top of the skeletons of deceased corals, building a reef over time. *Image courtesy of NOAA Ocean Exploration.*

Why Are Deep-Sea Corals Important?

Deep-sea reefs, made up of coral colonies and sponges, provide habitat that rivals that of shallow-water coral reefs in biodiversity. Like trees and forests, deep-sea corals and sponges act as a [foundation species](#). Sea stars, sponges, and crabs perch on corals and sponges to feed in the fast-flowing ocean current. Fields of *Lophelia pertusa*, found worldwide, are especially rich habitats. Commercially important fishes, such as snapper and sea bass, are associated with deep-sea coral reefs.

Deep-sea corals and sponges are also important for biomedical reasons. For example, one type of sea fan contains powerful anti-inflammatory compounds. Scientists are also exploring the uses of bamboo corals, a species that makes a calcium-based skeleton, for human bone grafts. Some researchers are even sampling and testing some deep-sea coral and sponge species looking for the compounds that provide these long-lived organisms immunity against pathogens in the water. Current research suggests that some of these compounds could be used to fight cancer and/or viruses in humans. Learning more about these organisms will help us better understand deep-sea ecosystems and discover other possible benefits.

What Are Threats to Deep-Sea Coral Habitat?

Deep-sea corals and sponges are vulnerable to human impacts, including damage from fishing, energy exploration and development, cable deployment, and other activities that disturb the seafloor. Of the human activities that threaten deep-sea coral and sponge habitat, seafloor trawling (dragging heavy fishing equipment across the seafloor) is widely considered to have the greatest potential for damage. Marine debris, such as fishing gear and plastic waste, can also get tangled in the fragile branches of deep-sea corals.

Given that most deep-sea corals grow only a few millimeters per year, damaged coral gardens and the communities they support can take hundreds of years to recover, if ever. Scientists continue to explore these environments to best inform resource management efforts and protections, such as national marine sanctuaries, so that they include areas with significant biodiversity.



Discarded fishing gear caught on stony corals on Manning Seamount, part of the New England Seamount Chain. *Image courtesy of DSV Alvin, Medusa Cruise on Manning Seamount, 2003.*

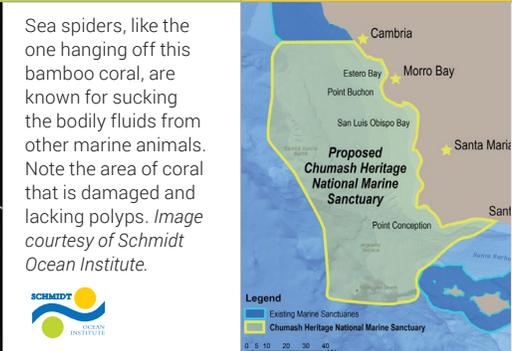


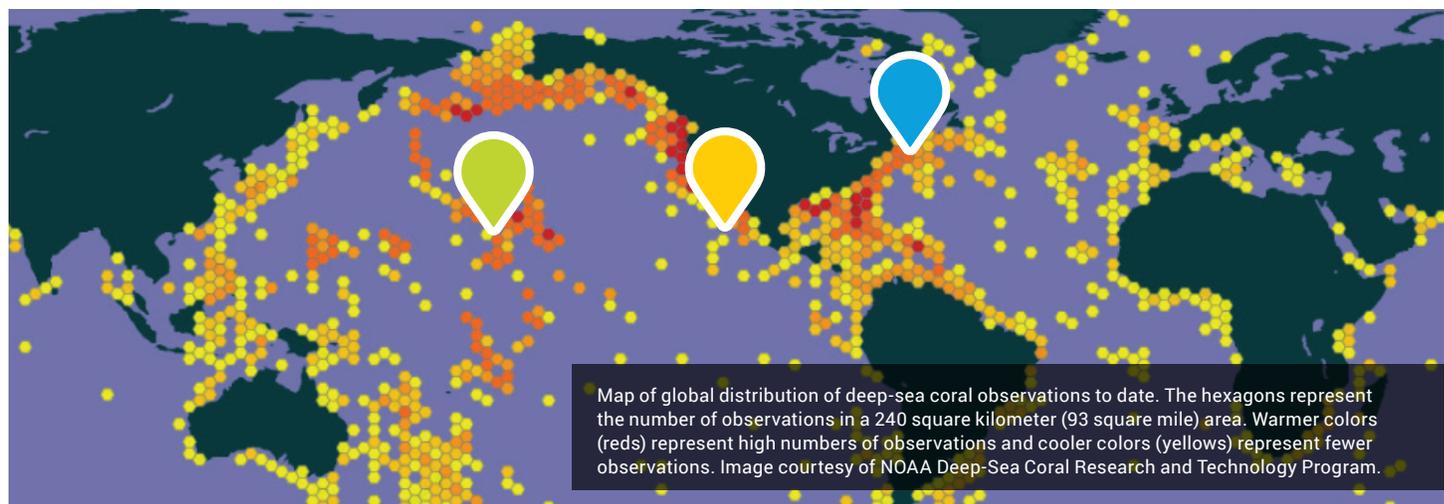
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Where Are Deep-Sea Coral and Sponge Communities Found?

Deep-sea coral and sponge communities are found across the globe, especially on continental margins. These communities are located in deep waters that require specialized equipment, such as remotely operated vehicles (ROVs) and exploration vessels, to view and explore. The hard to reach nature of deep-sea coral and sponge communities makes them ripe for discovery!

Recent discoveries made by mission personnel aboard ocean exploration vessels like NOAA Ship *Okeanos Explorer*, Exploration Vessel (E/V) *Nautilus*, and Research Vessel (R/V) *Falkor*, led scientists to conclude that deep-sea corals are much more abundant than previously thought! Exploration data and observations are critical to understanding the fascinating world of deep-sea coral and sponge communities. Explore a few expeditions below.

<p>Discovering Deep-Sea Corals of the Phoenix Islands 2 (2021)</p> <p>RESEARCH HIGHLIGHTS: R/V <i>Falkor</i> returned to the Phoenix Islands Archipelago to map and dive on unexplored seamounts, in order to better understand the biodiversity in the High Seas. During the expedition scientists documented dozens of coral predators on different species of corals and observed many predator-prey interactions and behaviors that had not yet been documented.</p>	<p>Channel Islands National Marine Sanctuary & Santa Lucia Bank (2020)</p> <p>RESEARCH HIGHLIGHTS: E/V <i>Nautilus</i> explored the deep waters off the coast of California with multibeam sonar and ROV dives to better understand the habitats located within the nominated Chumash Heritage National Marine Sanctuary. Scientists found incredibly diverse habitats that included large bubblegum corals, many species of sponges, and an octopus with eggs.</p>	<p>North Atlantic Stepping Stones: New England and Corner Rise Seamounts (2021)</p> <p>RESEARCH HIGHLIGHTS: Mission crew aboard NOAA Ship <i>Okeanos Explorer</i> voyaged to the New England and Corner Rise Seamount chains located off of the U.S. east coast. Mapping and ROV dives revealed...many coral communities at sites never explored before, some 3,400 meters (11,155 feet) — over 2 miles — deep! Several new species of jellyfish, sea pen, and sponges were also discovered and sampled for additional research.</p>
 <p>Sea spiders, like the one hanging off this bamboo coral, are known for sucking the bodily fluids from other marine animals. Note the area of coral that is damaged and lacking polyps. Image courtesy of Schmidt Ocean Institute.</p> 	 <p>The proposed Chumash Heritage National Marine Sanctuary (pictured left) is located off the west coast of central California. Image courtesy of NOAA.</p> 	 <p>Pictured left, remotely operated vehicle (ROV) <i>Deep Discoverer</i> collects a sample of bamboo coral. Image courtesy of NOAA Ocean Exploration.</p> 



Black corals (image): <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1903/dailyupdates/june27/media/black-coral-800.jpg>
 Octocoral coral 1 (image): <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1504/logs/sept25/media/coral-hires.jpg>
 Octocoral coral 2 (image): <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1903/dailyupdates/july4/media/sea-pen-800.jpg>
 Octocoral coral 3 (image): <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1903/dailyupdates/july10/media/bubblegum-800.jpg>
 Octocoral coral 4 (image): <https://oceanexplorer.noaa.gov/okeanos/explorations/ex1907/dailyupdates/nov4/media/bamboo-coral-hires.jpg>
Lophelia pertusa (image): <https://oceanexplorer.noaa.gov/explorations/19deepsearch/background/corals/media/img2-hires.jpg>
 Foundation Communities factsheet (pdf): <https://oceanexplorer.noaa.gov/edu/materials/DSC-foundation-species-fact-sheet.pdf>
 Fishing net on coral (image): <https://oceanexplorer.noaa.gov/okeanos/explorations/ex2104/features/management/media/net-500.jpg>
 Schmidt Ocean Institute (expedition): <https://schmidtocean.org/cruise/discovering-deep-sea-corals-of-the-phoenix-islands-2/>
 Ocean Exploration Trust (expedition): <https://nautiluslive.org/cruise/NA123>
 NOAA Ocean Exploration (expedition): <https://oceanexplorer.noaa.gov/okeanos/explorations/ex2104/welcome.html>