



Santa Monica Bay's Open Ocean Habitat

You can help protect the open ocean by:

Learning more about the current problems that face our ocean environment, and sharing that information with your friends and families.

Making better choices about the products you buy and the ways we dispose of them (plastics and toxic chemicals are two of the biggest examples).

Supporting environmental organizations and legislation, and respecting fishing laws and other regulations.

Keeping trash off the beaches and city streets by recycling, reducing and reusing as many of our resources as we can.

The word ocean brings visions of crashing waves, sandy beaches, and quiet bays. Most of the ocean, though, isn't coastal at all—it's the open ocean, or pelagic realm.

Since most open ocean organisms live below the waves and out of sight, the open ocean may seem barren and uniform to the casual observer. But don't be deceived; this pelagic environment is an outstanding natural habitat divided into vertical zones. It harbors amazingly diverse creatures—from the blue whale (the largest animal that has ever lived) to the microscopic diatom. It also provides food and resources, controls climate, and contains almost all the liquid water on earth. The open ocean doesn't have the solid physical structures found in habitats like kelp forests and coral reefs, or places for organisms to attach, burrow, or hide behind. Organisms that live here hardly ever touch the ground, but instead spend their existence floating in the largest habitat on earth.

While the open ocean is divided into two main zones (neritic and oceanic—above and beyond the continental shelf, respectively), it's also divided into three different vertical zones that are defined by the amount of sunlight that penetrates them.

The first vertical zone is the **epipelagic zone**. It is the shallowest zone that starts at the surface and descends to about 200 meters (this depth will vary depending upon water clarity). This zone has an ample amount of light for photosynthesis to take place and therefore, there is a high density of phytoplankton (photosynthetic plankton) present. Because this area receives the most sunlight, it generally is also the warmest zone.

The second vertical zone is the **mesopelagic zone**, which descends down to about 1000 meters. It does not receive the amount of light needed to conduct photosynthesis. This area is bordered by the epipelagic zone above and the darkness below. Often referred to as the "twilight zone," primary producers cannot live here and food becomes something of a scarcity. Some animals migrate up to the surface at night to feed, and others rely on food that falls down from above, in addition to eating each other. Because sometimes the only things to eat may be bigger than the hunter, many animals have developed long sharp teeth, and expandable jaws and stomachs.

The last vertical zone is actually comprised of a few different zones, collectively known as the deep sea. The **bathypelagic zone**, the **abyssopelagic** and **hadopelagic zone** reach from 1000 meters to the deepest part of the ocean (the Marianas Trench, located in the Western Pacific at about 11,000 meters or more than 36,000 feet). This area receives absolutely no sunlight, is quite cold, has low levels of dissolved oxygen in the water, and is under intense pressure from the amount of water pushing down from above.

Plankton make up an incredible amount of the life in the open ocean. Plankton actually simply refers to an organism that drifts rather than swims—so plankton can refer to anything from microscopic algae to a sea jelly that's almost 100 feet long. One of the most important species in the open ocean is the phytoplankton. Phytoplankton support nearly all life in the ocean, as they are the primary producers at the base of the food web. They also produce up to 60% of the oxygen on the planet. In order for them to survive they need sunlight to photosynthesize, so they stay near the surface of the water. They often possess specialized long fibers, oil filled body cavities, and irregular body shapes to aid them in slowing down the rate of sinking.



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Zooplankton, or animal plankton, also live in this habitat. Some of these organisms eat phytoplankton, while others consume other species of zooplankton, fish, or shrimp. While zooplankton are unable to swim against the current, many of them will undergo a vertical migration of hundreds of feet on a daily basis.

Drifting is also a great way to disperse young. Many large, free swimming ocean species produce planktonic larvae. As the mortality rate is extremely high amongst larval organisms, the nektonic adults will often release thousands to millions of these larval young into the water only to have a small handful survive. A prime example of this is the largest bony fish in the world, the ocean sunfish (*Mola mola*). The sunfish can grow be 11 feet from top to bottom and weigh up to 5000 lbs; yet they start life as tiny planktonic larvae barely more than a millimeter in length. Sunfish are broadcast spawners – meaning the eggs are not fertilized until after they are released from the females. A single sunfish can release up to 300 million eggs, and yet only a few of the resulting larvae will survive and grow to reach adulthood.

Pelagic swimming animals overcome the challenges of the open ocean differently. These organisms have adapted to avoid predation and to chase down prey. They are usually streamlined in body structure (which helps them to reduce drag), are muscular, and have crescent shaped tails to aid them in powerful swimming. They usually lack protruding body structures or appendages that would slow them down (things like long spines, projections, or bulging eyes). Fishes usually produce mucus allowing them to move quickly through the water by aiding as a body lubricant (as well as protecting them from bacteria or other pathogens). Because these animals are developed to attain high speeds of swimming for extended periods of time, they expend a lot of energy. This energy is obtained by consuming large amounts of food. These species seek out areas that have an overabundance of food or will migrate to areas seasonally to seek out food rich communities.

PROTECTING THE OPEN OCEAN

The ocean covers most of the earth's surface, and its vastness and biological bounty were long thought to be immune to human influence. We know this is no longer the case. More than 70% of commercial fish stocks are now considered fully exploited, overfished or have collapsed. And 90% of our oceans' large predators, like tuna, swordfish and sharks, are gone. Sea birds and mammals are endangered and a growing number of marine species are reaching the low levels where extinction is considered a possibility. It is our responsibility not to waste our resources and to keep the delicate web of life intact.

Trash, oil, chemicals, and herbicides all make their way to the open ocean via the storm drain system, rivers, or when released from sewage treatment plants. We are still studying the long-term effects that these substances have on the open ocean environment. Some of the chemicals may affect the productivity of the phytoplankton, and reduce the amount of oxygen they produce. Oil slicks can float endlessly on the surface of the water, blocking the sunlight that phytoplankton need in order to photosynthesize. Oil can also kill zooplankton (because it also floats near the surface of the water). When populations of plankton drop, it doesn't just affect the reduced species, but because they are the foundation of the food chain, this drop can disrupt the entire ocean ecosystem.



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Trash has more visible effects on the marine environment because larger animals can easily get tangled in fishing line, discarded nets, six-pack ring holders, and balloon strings. Open ocean animals, such as the ocean sunfish and sea turtles, sometimes ingest items such as balloons and plastic bags mistaking them for sea jellies. When an animal has a stomach full of plastic, it can get a false sense of being full and will stop eating and starve to death. Sea birds, like albatross and pelicans, often ingest plastic that they cannot digest, which makes them ill and can kill them.

There is now a growing concern that the harmful substances we've allowed to reach our oceans are ending up back on our dinner plates. Chemicals like DDT, PCBs and mercury are showing up in dangerous levels in the seafood we eat.

OPEN OCEAN ANIMALS

Ocean Sunfish (*Mola mola*)

Habitat: Found globally in temperate and tropical environments.

Size: Can grow to be 11 feet from the tip of the dorsal fin to the base of the ventral fin.

Food: Feeds on sea jellies, ctenophores and salps.

Interesting Facts: This is the heaviest bony fish with the average adult reaching a weight of 2,000 pounds

California Flying Fish (*Cypselurus californicus*)

Habitat: Found from Oregon to Baja California.

Size: Can grow to be 18 inches in length.

Food: Feeds on plankton and small fish

Interesting Facts: This fish's distinguishing characteristic is its long pectoral fins that aid it in gliding over the surface of the water. The tail of the flying fish has a longer, lower lobe and a shorter upper lobe that aids in propelling it out of the water. They can glide for hundreds of feet, staying airborne for up to 20 seconds to escape predation.

Bottlenose Dolphin (*Tursiops truncatus*)

Habitat: Found globally in temperate and tropical environments.

Size: Can grow to be 12 feet in length.

Food: Feeds on fishes, shrimp, crab and squid.

Interesting Facts: Dolphin are very adept at locating prey using echolocation, using a sound beam to project off an item as they listen to the echo.



Heal the Bay

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Common Dolphin (*Delphinus delphis*)

Habitat: Found globally in temperate and tropical environments.

Size: Can grow to be 7.5-8.5 feet in length.

Food: Feeds on small fish and squid.

Interesting Facts: They often travel in pods that can number in the thousands and frequently ride the bow waves of boats for long periods of time.

Gray Whale (*Eschrichtius robustus*)

Habitat: Coastal Pacific waters between Alaska and Baja California.

Size: Can grow to be 45 feet in length.

Food: Feeds on plankton, krill, and benthic crustaceans.

Interesting Facts: Gray whales make the longest migration of any mammal—traveling 16,000-22,530 km (10,000-14,000 miles) roundtrip, migrating in fall and spring.

Moon Jelly (*Aurelia aurita*)

Habitat: Found globally in temperate and tropical environments.

Size: Can grow to be 15 inches in diameter.

Food: Feeds on zooplankton.

Interesting Facts: Like other cnidarians, moon jelly tentacles are covered with stinging structures called nematocysts, which are used for defense as well as collecting food.



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Blue Shark (*Prionace glauca*)

Habitat: Found globally in temperate and tropical environments.

Size: Can grow to be 12.5 feet in length.

Food: Feeds on squid, octopuses, crabs and fish.

Interesting Facts: Blue sharks have live birth and can deliver more than 100 pups per litter.