# OPEN OCEAN

## What is the Open Ocean?

The open ocean is the largest ecosystem on the planet. All the other marine ecosystems are tiny compared to this huge habitat that covers over 70% of the Earth's surface. Unlike many ecosystems, the open ocean is not only wide; it is also very, very deep. The open ocean extends from the seafloor to the ocean's surface and includes trenches far deeper than the highest mountains on land. Although the open ocean is so huge, it is also

## One Big Ocean

Students used to learn about Earth's five "oceans," but now we know better. Earth has one huge ocean divided into five ocean basins: Pacific, Atlantic, Indian, Southern, and Arctic. Although each of these ocean basins has unique characteristics, they all flow into and each other. That means that what happens in one ocean basin can affect all the others. Because Earth's ocean is so big, it has a wide range of conditions at the surface (temperature, saltiness, oxygen, etc.), but below the waves, the open ocean is very similar no matter where it is. Despite having plenty of room, there aren't many resources in the open ocean, and organisms that live there constantly drift or swim in search of food.

## Ocean Voyagers

Organisms that live in the open ocean fall into two groups. Plankton are tiny animals that drift wherever the currents take them. There are both plant and animal types of plankton. Nekton are animals that can swim and choose where they go. Nekton that live in the open ocean include some of the largest animals on the planet.

**Ocean Soup:** The vast majority of organisms in the open ocean are microscopic plants and animals called plankton. Phytoplankton are tiny plants that form the base of almost every ocean food chain. Zooplankton are tiny animals that eat the phytoplankton and each other. Zooplankton can be single-celled organisms; baby, or larval, forms of bigger animals like clams, squid, and fish; or even larger animals like krill or jellyfish.

**Pizza Pals:** Have you ever had anchovies on your pizza? Though you may think anchovies sound disgusting, they are one of the most popular foods in the sea for many open ocean predators. Anchovies are small fish that travel the open ocean in search of zooplankton to eat. Anchovies travel in large groups called schools. Staying in a group helps the anchovies catch food, find mates, and avoid predators. In the open ocean, there is nowhere to hide, so swimming in a large, constantly moving group helps the anchovies confuse and evade their predators.

**World's Fastest Fish:** With a top speed of 68 miles per hour, sailfish are the fastest animals in the ocean. This sleek fish has a long pointed upper jaw that look like spear and is called a bill. The dorsal fins on their back are very tall and give the sailfish its name. These giant fish can be up to 11 feet long and use their "sails" to herd prey like sardines, anchovies, and squid towards the surface where they can slash into the school with their bill and injure and eat individual fish.

**Jaws:** One of the most feared animals in the ocean is the great white shark, and it's easy to see why. With 300 teeth and an average adult length of 15 feet, no one wants to see a great white swimming towards them. However, these skillful predators are not mindless killing machines. Scientists have learned that they are intelligent and curious, and humans are much more dangerous to sharks than sharks are to people. Great white sharks migrate across Earth's ocean, sometimes thousands of miles, in search of their next meal. Because the open ocean is so huge, scientists still know very little about these perfect predators.

**A Fish That Fishes:** Anglerfish live deep in the open ocean far beyond the reach of sunlight. In the deep open ocean, there is no light so many animals create their own through a process called bioluminescence. Anglerfish use bioluminescence to attract prey close to their rows of needle-like teeth. Many kinds of anglerfish are blind because there is no need to see in the dark waters where they live.

## Lights Out

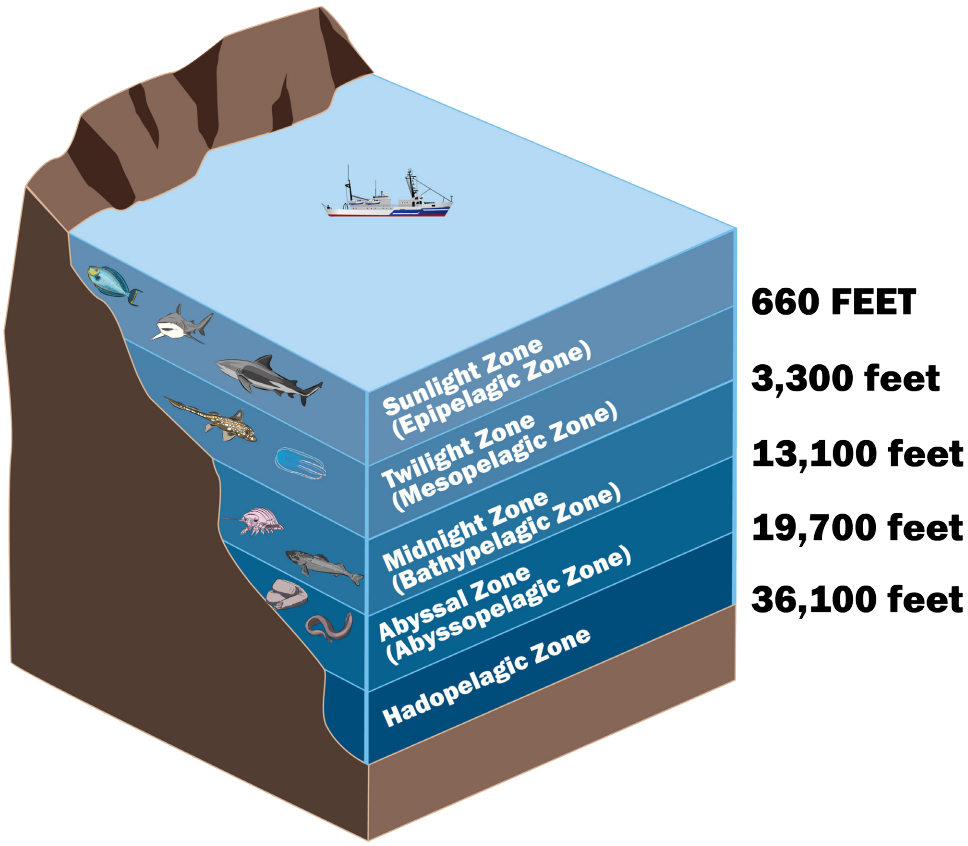
In most of the open ocean, there is little light. Scientists have divided the ocean into three zones according to how much sunlight reaches the water.

**The Sunlight Zone** goes from sea level to about 650 feet. This is the zone scientists know the most about because it is the easiest to explore. This zone is where coral reefs, kelp forests, and many other marine ecosystems exist. This is the only zone where there is enough light for photosynthesis, so all ocean plants live here.

**The Twilight Zone** exists between 650 and 3,280 feet. Sunlight rarely reaches this zone and there is no photosynthesis. Many animals spend time in this zone and travel up to the sunlight zone to

find food. Other organisms in the twilight zone survive by eating the things that drift down from the sunlight zone. Often animals that live here have huge eyes to help them see with the small amount of light available. Some organisms are transparent so they can "hide" by disappearing into the dim water.

**The Midnight Zone** extends from 3,280 feet to the ocean floor. Animals that live here generally spend their entire lives in total darkness. Because there is no light, few animals have eyes because there is nothing to see. Most organisms that live in the midnight zone eat dead animals and plants that sink from the sunlight zone. Scientists have explored very little of the midnight zone, and we have better maps of Mars than we do of the ocean floor!




## Life in the Open Ocean

If there is one thing that is plentiful in the open ocean, it's space. Some open ocean organisms live their entire lives without ever seeing land. Despite its size, the open ocean is often compared to a harsh desert ecosystem because there are few resources and only about 10% of all marine organisms live there. The animals that do live in the open ocean have adapted to travel long distances looking for food and mates. They include some of the world's fastest, longest, biggest, deepest diving, furthest migrating, and strangest looking animals.

## Open Ocean Challenges

The most difficult thing about living in the open ocean is finding other organisms. Open ocean animals have to constantly move in search of food. Although there is plenty of sunlight in the open ocean, there often aren't many nutrients available for phytoplankton. There is nowhere to hide in the open ocean, so animals have adapted behaviors like schooling to protect themselves. Predators often have coloring called countershading with darker colors on their backs and lighter colors on their bellies. This makes the animals hard to see because their dark colors blend in with the murky waters when seen from above and with the sunlight surface when seen from below.

**Sources:**
http://www.biologyreference.com/Oc-Ph/Ocean-Ecosystems-Open-Ocean.html
http://visual.ly/time-now-lets-explore-ocean
http://marinebio.org/oceans/zooplankton/
https://en.wikipedia.org/wiki/Shoaling_and_schooling
http://ocean.si.edu/great-white-shark
http://wwf.panda.org/about_our_earth/blue_planet/open_ocean/

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