

Lesson: Marine Life Zones



Where in the vastness of the ocean can marine organisms be found? Marine life zones are divided into specific zones that have unique biological and physical features that support different marine organisms and plant life. All of the zones have a great diversity of species.

Overview:

The bottom of the ocean is known as the **benthic zone**. The pelagic zone extends from the ocean floor to the surface. It is divided according to its proximity to land and the depth of water. The **neritic zone** is that part of the pelagic zone which extends from the high tide line to the ocean bottom less than 200 m deep while water deeper than 200 m feet is called the oceanic zone.

The neritic zone is divided into separate bands based on tide levels. The upper band is called the **intertidal zone**, that makes up the region from the wave splash zone to the low tide mark. The highest zone within the intertidal is known as the **supralittoral zone** and is the area above the high tide mark that receives only wave splash and sea-water mist.

Below the supralittoral zone is the **supralittoral fringe**, or "**splash zone**", which receives a regular splashing from waves at high tide. The next zone is the **midlittoral zone**, which includes most of the intertidal zone and receives some exposure and submersion by tides. The lowest zone, the **infralittoral zone**, includes the lowest levels exposed by extreme spring tides and extends into the subtidal zone, marking the beginning of the marine environment.

The oceanic zone is subdivided into the epipelagic, mesopelagic, and bathypelagic zones. **The epipelagic (euphotic) zone** receives enough sunlight to support photosynthesis. The **mesopelagic (disphotic) zone**, where only small amounts of light penetrate, lies below and while 90% of the ocean lies in the **bathypelagic (aphotic) zone** into which no light penetrates.

A **life zone** is a region that contains characteristic organisms that interact with one another and with their environment. One important coastal life zone is the intertidal zone.

The **intertidal zone** is the area located between high tide and low tide. At high tide the ocean reaches its highest point along a beach, and at low tide the ocean is at its lowest level. High tide is marked by the strandline, a long line of seaweed and debris deposited

on the beach during each high tide. If you were to turn the seaweed over, tiny crustaceans called beach hoppers, or beach fleas, would dart and jump about. When the tide is low, you can walk in the intertidal zone and find a variety of marine invertebrates, including other crustaceans, worms, and mollusks.

The intertidal zone is covered twice a day by the high tides. Many different types of organisms live here, and some of their complex interactions have only recently become known. Gooseneck barnacles and mussels live toward the top of the zone, where it is the driest; sea anemones live in the middle; and sea stars stay toward the bottom. Organisms that live in the intertidal zone are well adapted to meeting the challenges of living in an area that has alternating periods of wet and dry, as the tides come in and go out each day.

When you go to the beach, you put your blanket or towel down in a life zone called the **supratidal zone**, which is the area above the intertidal zone, up to the sand dunes. Even though you may be a good distance from the ocean, you can smell it because the supratidal zone gets a fine mist of salt spray from the crashing waves.

The supratidal zone is moistened by the splash and spray from the waves below on most days. It is flooded only a few days of the year during the very highest tides. This is a tough environment whose inhabitants must withstand both the challenges of the sea, like salt water and waves, and the challenges of the land, like freshwater, and the drying effects of wind, air, and sun. Dime-sized periwinkles, acorn barnacles, and limpets are common creatures here.

However, the salt spray limits the growth of plants in the lower supratidal zone. In the upper supratidal zone, where there is less salt spray, many species of grasses, shrubs, and trees grow.

Below the low tide line is the **subtidal zone**, the coastal life zone that remains underwater. The subtidal zone includes an area of heavy wave impact, and the sandy area beyond that, which is affected by underwater turbulence.

The subtidal zone lies underwater most of the time, except on the few days of the year during the very lowest tides. At this time, this area is accessible and you can see large solitary anemones, sea stars, and sea urchins. Surfgrass-stringy, bright emerald-green marine grass-is found in this zone as well as algae and seaweed. Waves and keen competition are still challenges in this zone, but it also faces the threats common to more open marine environments.

Some organisms in this zone have structures that help them cling to hard substrates on a sandy beach. This prevents their being swept away by waves and currents. For example, encrusting sponges secrete an acid that enables them to bore into rocks and shells. These shells are often found on the beach, pockmarked with holes from the sponges.

Many organisms that live in the subtidal zone possess flattened bodies. A flat body minimizes exposure to wave impact. Flat fish such as the flounder avoid turbulence, as

well as their enemies, by burying themselves in the sand. Only their gill cover and eyes poke through the sand. While buried, the flounder might happen to see its prey, the sand dollar, another flat inhabitant of the subtidal zone.

The sand dollar uses its tube feet to move slowly along the sandy seafloor, where it feeds on algae and dead organic matter. Other inhabitants of the subtidal zone are crabs, shrimp, clams, snails, and worms, which are eaten by fish swimming above the sandy bottom.

The largest life zone in the ocean is the **pelagic zone**. The pelagic zone covers the entire ocean of water above the sea bottom—that vast region where large schools of fish and pods of marine mammals swim freely. The pelagic zone includes the neritic zone (fewer than 200 meters in depth) and the oceanic zone (more than 200 meters in depth).

Beyond the subtidal zone is a life zone called the **neritic zone**. The neritic zone is the region of water that lies above the continental shelf, the relatively shallow part of the seafloor that adjoins the continents. When people go deep-sea fishing, they are actually in the neritic zone.

In fact, most of the world's commercial fishing takes place in the neritic zone. Why is the neritic zone so productive? Rivers that contain runoff from the land flow into the neritic zone, thus providing nutrients for plankton. In addition, much of the neritic zone's depths are sunlit, so algae, phytoplankton, and marine plants can carry on photosynthesis, the food-making process on which most living things depend.

The oceanic zone is the life zone that extends beyond the neritic zone and includes most of the open ocean. The upper part of the oceanic zone receives light, whereas the lower part (most of the ocean) is in darkness. The part of the ocean that light penetrates is called the photic (meaning "light") zone, which is the area most suitable for supporting life. (This is also called the euphotic zone.)

The **photic zone** or **euphotic zone** (Greek 'well lit') is the depth of the water in a lake or ocean, that is exposed to sufficient sunlight for photosynthesis to occur. The depth of the photic zone can be greatly affected by seasonal turbidity.

It extends from the atmosphere-water interface downwards to a depth where light intensity falls to 1 percent of that at the surface (also called euphotic depth), so its thickness depends on the extent of light attenuation in the water column. Typical euphotic depths vary from only a few centimetres in highly turbid eutrophic lakes, to around 200 metres in the open ocean.

Since the photic zone is the only zone of water where primary productivity occurs (apart from the productivity connected with abyssal hydrothermal vents along mid-oceanic ridges), the depth of the photic zone is generally proportional to the level of primary productivity that occurs in that area of the ocean. About 90% of all marine life lives in this region.

Most of the ocean is completely dark. This is called the **aphotic zone**. The aphotic zone begins at a depth of 0.9 km (3,000 ft) and continues to the bottom, which usually maxes out at a depth of 5.5 km (18,000 ft), except for ocean trenches, which can be as deep as 11 km (6.8 mi). In the aphotic zone, photosynthesis cannot occur, so the usual foundation of food webs, plants and cyanobacteria, are absent. Instead, animals have to subsist on carcasses that fall from above, other animals, and in some rare cases, bacteria that use chemical energy sources such as sulfides and methane.

The aphotic zone is further broken into two levels, the bathypelagic zone, which extends from around 1 km (3300 ft) below the surface to 4 km (13000 ft) below. Below this is the abyssopelagic zone, also called the abyssal zone, where pressures are extremely high (400 atmospheres and up) and biodiversity drops sharply. Even below the abyssopelagic zone is the hadopelagic zone, which is used to refer to ocean trenches.

Some animals that live in the aphotic zone include the gulper eel, giant squid, smaller squids, anglerfish, vampire squid, and numerous jellyfish. Some of the ugliest and most evil-looking fish in the world are found here, including the viper fish, fangtooth, dragonfish, lizardfish, and many others. These fish often have hinged jaws, black scales, piercing eyes, and extremely sharp teeth.

The deepest part of the ocean floor is the **ocean basin**, or **abyssal plain**, which is also home to a variety of organisms. Many fish and invertebrates inhabit the bottom and rarely swim near the surface. Bottom-dwelling organisms that live on the seafloor inhabit an area called the **benthic zone**. The benthic zone actually includes the entire ocean floor, from the shallow intertidal zone to the deep ocean basin. Organisms that inhabit the benthic zone are called **benthos**. The benthos that live in the ocean basin are adapted to regions of very low temperatures and very high pressure.