

An overview of OCEAN ZONES + MARINE FOOD WEBS

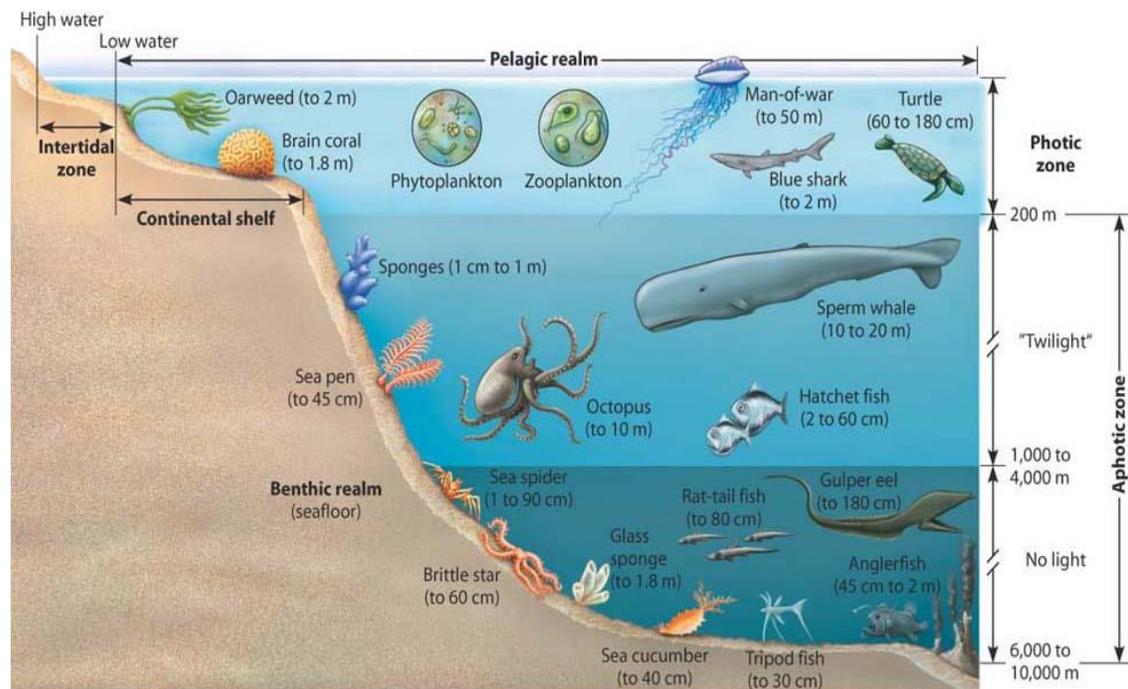
OCEAN ZONES

The shore is where the ocean meets the land. It contains a very important zone known as the intertidal zone. This intertidal zone is very shallow and light easily reaches the bottom of the ocean. Because the waves constantly move around mud and sand, it is very difficult for plants to grow in this zone. Also, as the tides rise (high tide) and fall (low tide) this zone is exposed to the air at low tide and submerged underwater during high tide.

In the intertidal zone, the most common organisms are small and most are fairly uncomplicated. Animals that live here include snails, small crabs, clams and marine worms. This is for a variety of reasons:

- 1) The supply of water which marine organisms require to survive is intermittent, or varies at different points of the day. When exposed to the air, organisms like mussels will tightly close their shells to keep from drying out. Clams, too, will tightly close their shells and dig down into the wet sand.
- 2) The wave action around the shore can wash away or dislodge poorly suited or adapted organisms.
- 3) Because of the intertidal zone's high exposure to the sun the temperature range can be extreme from very hot to near freezing in frigid climates (with cold seas).
- 4) The salinity is much higher in the intertidal zone because salt water trapped in rock pools evaporates leaving behind salt deposits.

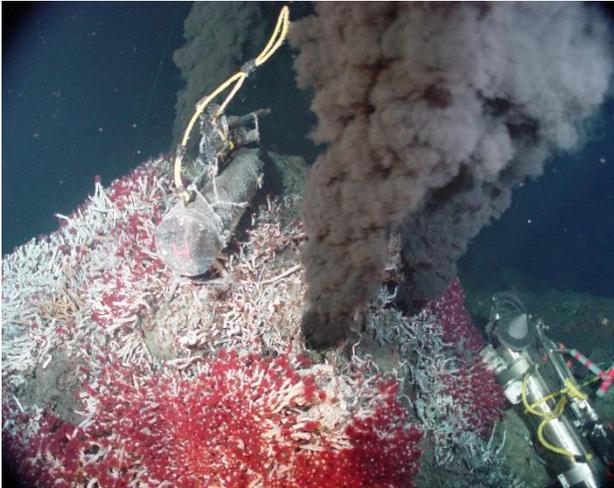
These four factors make the intertidal zone an extreme environment in which to live. However, that's not to say it is impossible to survive. Shorebirds such as sea gulls and sandpipers rely on this ecosystem for food. They follow the waves, feeding on organisms that are exposed when a wave moves out. Moving outward towards the open ocean we will land on the continental shelf. This area is permanently covered with generally well-oxygenated water, receives plenty of sunlight and has low water pressure; moreover, it has relatively stable temperature, pressure, light and salinity levels, making it suitable for photosynthetic life.



The open ocean, or pelagic zone, is the big, wide open area filled with a variety of organisms. Think of The Little Mermaid or Finding Nemo. The pelagic zone can be broken into different light zones - the photic zone, the twilight zone, and the aphotic (no light) zone. In the photic zone, sunlight can reach up to 200 meters below the surface. This allows this area to be warmed by the sun (temperatures range from 104 to 27 °F) and supports a VERY large population of producers such as phytoplankton and zooplankton. These two producers are absolutely essential marine food webs. Removing them means possibly wiping out the rest of the organisms in the food web.

In the twilight zone, sunlight is not as strong so the water is cooler (41 to 39 °F) and the pressure (downward pushing force) is greater. Organisms living here include whales, jellyfish, and squid. These

organisms feed on nutrients that drift down from above. The larger organisms, like whales, can dive down deeper to feed on animals in the deeper, dark part of the ocean.



As we descend deeper into the ocean we reach the deep ocean or aphotic zone. This zone is thousands of meters below the surface and there is no light here. No light means no photosynthesis. The pressure is very great and the water temperature is very cold (43 to 32 °F). In this zone, hydrothermal vents in the ocean floor can release heat from inside the Earth, which can create small areas of warmth. Ecosystems generally form around these areas. As mentioned before, photosynthesis is not possible because there is no light. Instead, organisms use energy stored in chemical bonds in a process called chemosynthesis. Microorganisms that do chemosynthesis provide energy for giant tubeworms, clams and other life forms like angler fish.

Hydrothermal vent surrounded by giant tubeworms

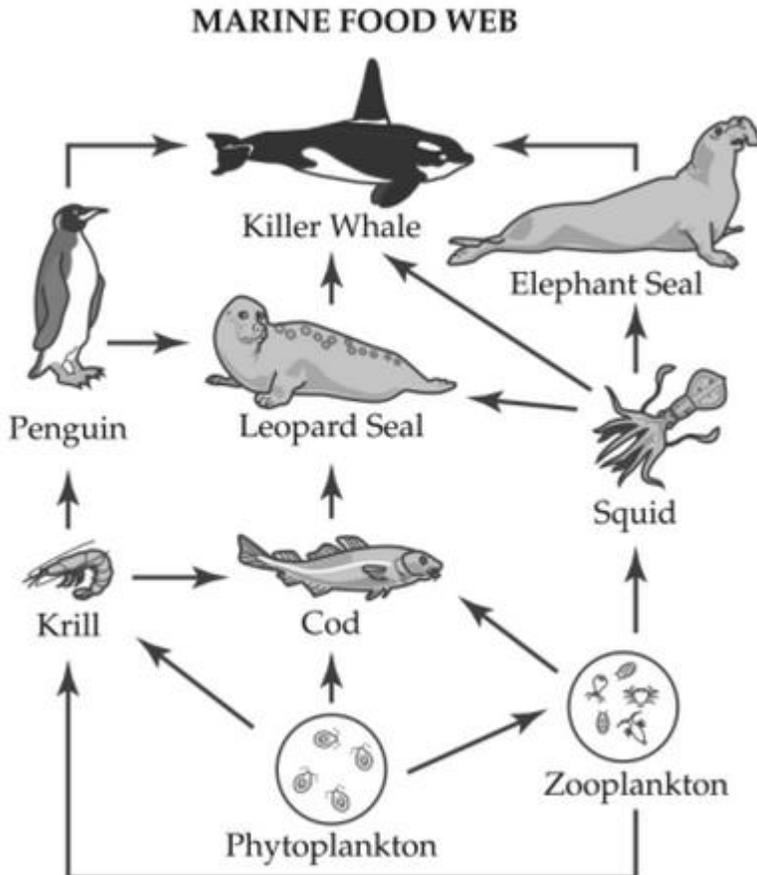
Question Focus: Light, temperature and pressure.

Fill in the blanks with increase or decrease

Moving deeper down into the depths of the ocean the amount of **light** will

-----, the temperature will ----- and the amount of pressure will -----.

MARINE FOOD WEBS:



Producers in marine or ocean environments are important to all life on Earth. The main producers in the ocean are algae and other microscopic organisms called phytoplankton. These producers live in the upper region of the ocean. There they receive enough light to perform photosynthesis.

In the ocean, as on land, energy flows directly or indirectly from producers to consumers. The food web below shows the role of producers in a marine ecosystem.

Recall that when producers perform photosynthesis, they release oxygen. Much of the oxygen that algae and phytoplankton produce is used by marine organisms. Some of it enters Earth's atmosphere where it is then used by organisms on land.

Often, many food webs in marine ecosystems are dependent on plankton such as phytoplankton and zooplankton. Without these producers, many, if not all, of the other organisms in the ocean would be wiped out.