For Creative Minds

Deep Ocean Habitats

Things change the deeper you go in the ocean: light disappears, temperatures grow increasingly colder, and pressure gets much higher. The amount of oxygen in the water decreases with depth but then gets higher again at the bottom! Because these changes affect the types of organisms that can survive there, the ocean is divided into five layers by depth called life zones.

Only the **sunlight zone** receives enough sunlight for algae to convert light into energy (photosynthesis). Because almost all food webs start with plants or algae, this is the zone where the most animals live.

The **twilight zone** still gets some sunlight, but not enough for photosynthesis. The animals that live here either travel to the sunlight zone to feed or depend on food falling from above.

There is no light in the **midnight zone**. Most of the animals that live here produce their own light through bioluminescence.

The **abyssal zone** is pitch black, almost freezing cold, and has little oxygen and incredibly high pressure, yet animals still live here.

In the deep trenches is the **hadal zone**. It is like the abyssal zone, except with even more immense pressure.

Match the Animal to its Life Zone

If you found these living things at each of these depths, which zone would you be in?

0-660 feet (0-200 meters): sunlight zone
660-3300 feet (200-1,000 meters): twilight zone
3300-13,100 feet (1,000-4,000 meters): midnight zone
13,100-19,700 feet (4,000-6,000 meters): abyssal zone
19,700 feet (6,000 meters) and deeper: hadal zone

anglerfish
5000 feet / 1520 meters

frilled shark
2500 feet / 762 meters

vampire squid
2500 feet / 762 meters

spookfish
3000 feet / 914 meters

plankton
1500 feet / 457 meters

marlin
500 feet / 152 meters

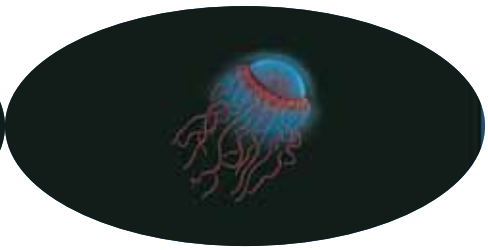
pelican eel
4000 feet / 1219 meters

sargassum (brown algae)
surface

headlight fish
2000 feet / 610 meters

cookie cutter shark
500 feet / 152 meters

viperfish
1000 feet / 305 meters



Atolla jelly
4500 feet / 1372 meters

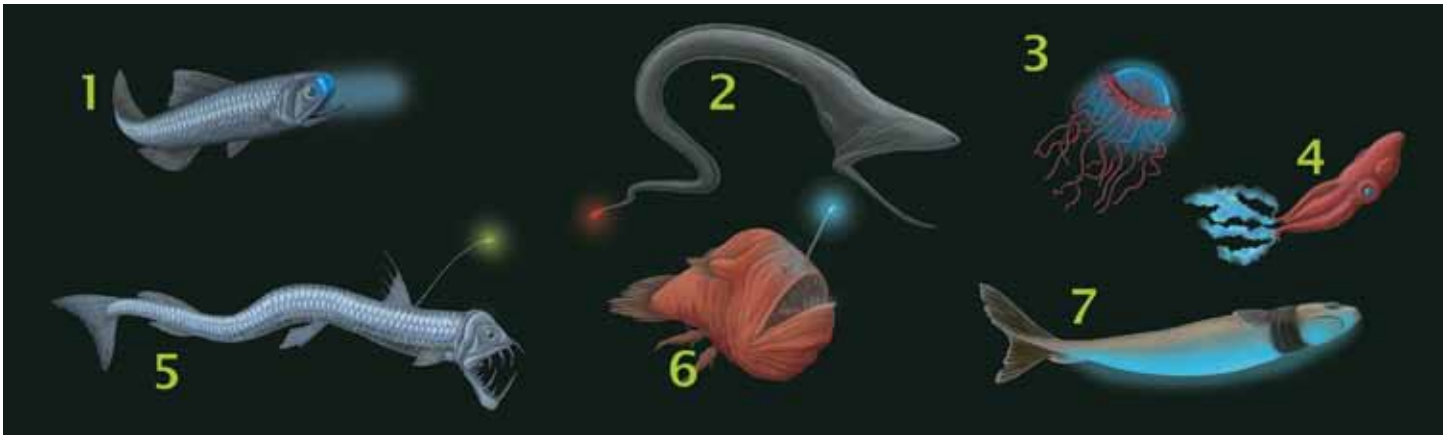
Answers: Sunlight zone: cookiecutter sharks, marlin, *Sargassum*
Twilight Zone: plankton, frilled shark, headlight fish, spookfish, vampire squid, viperfish
Midnight Zone: anglerfish, *Atolla* jellies, pelican eels

Glowing in the Dark

Because sunlight cannot reach deep into water, most of the ocean is pitch black. The deep ocean is so black that if you were down there, you could not even see your own hands or feet. Many animals that live in the dark make their own light—similar to how fireflies light up. The parts of the bodies that make the light are called photophores. When living things make light, it is called bioluminescence.

Deep-sea animals use bioluminescence to lure prey and to find mates. They also can use it to attract, startle and hide from predators. Because the deep ocean is pitch black, you would not see the animal's body there, but just the lights they make.

Match the deep-sea animals to the descriptions. Answers are upside down, below.



Cookiecutter sharks attract large predators with dark patches on their glowing bellies. The larger animals think they are getting a meal but the cookiecutter sharks bite them instead. Cookiecutters get enough food out of the bites, but the bites don't kill the other animals.

Many animals are attracted to flashing lights. **Viperfish** flash lights along their bellies and at the end of the first long spines just behind their heads. When other animals come to check it out, the viperfish catch their prey.

Vampire squid escape predators by shooting glowing mucus. The predators will see the mucus but not the animal as it swims away.

Just as drivers use car headlights to see at night, **headlight fish** turn on their "headlights" to find prey.

***Atolla* jellyfish** light up with blue lights to attract prey. They also light up when threatened by predators, attracting other predators to chase the first ones away.

If you've ever gone fishing, you've probably used a lure to attract the fish. **Anglerfish** do the same thing using light-filled "lures" on top of their heads.

Pelican eels use lures too. Their lures are at the end of their tails and flash pink and red. They pull their tails around close to their mouths so they can grab the animals checking out the lights.

Answers: 1. headlight fish, 2. pelican eel, 3. *Atolla* jellyfish, 4. vampire squid, 5 viperfish, 6. leafvent anglerfish, 7. cookiecutter shark.

Living Under Pressure

Squeeze your left arm with your right hand. The force you feel from your hand is called pressure. Whenever one thing pushes against another, it creates pressure. As air is pulled towards the earth by gravity, it creates pressure too! At sea level, air creates 14.7 pounds of pressure per square inch. Scientists call these 14.7 pounds per square inch an "atmosphere." That's like having a fat cat standing on each square inch of your body!

Water causes even more pressure than air. The deeper you dive into the ocean, the more pressure there is. The pressure you feel increases by one atmosphere every 33 feet farther down you go. The deepest part of the ocean has a pressure of more than 8 tons per square inch. That is too much pressure for humans! But there are still animals that live there, even at that pressure! There are animals living at every depth in the ocean.

One Square Inch

What does pressure feel like in the deep ocean?

Depth below sea level:		PSI (Pounds per Square Inch)	Imagine that this is standing on *every* square inch of your body!
feet	meters		
at sea level	at sea level	14.7 psi	fat cat
500	152.4	223 psi	professional football player
1000	304.8	445 psi	lion
1500	457.2	668 psi	motorcycle
2000	609.6	890 psi	polar bear
2500	762.0	1,114 psi	manatee
3000	914.4	1,335 psi	tiger shark
3500	1066.8	1,558 psi	Holstein cow
4000	1219.2	1,780 psi	smart car and its driver
4500	1371.6	2,003 psi	bison