The Amazing Undersea Food Web

A Reading A–Z Level X Leveled Book
Word Count: 1,493

Connections

Writing

Imagine being an oceanographer exploring the twilight zone. Write a journal entry about your findings, including details from the book.

Science

Choose one of the four ocean zones. Research to learn more about this zone and write a paper sharing your findings.

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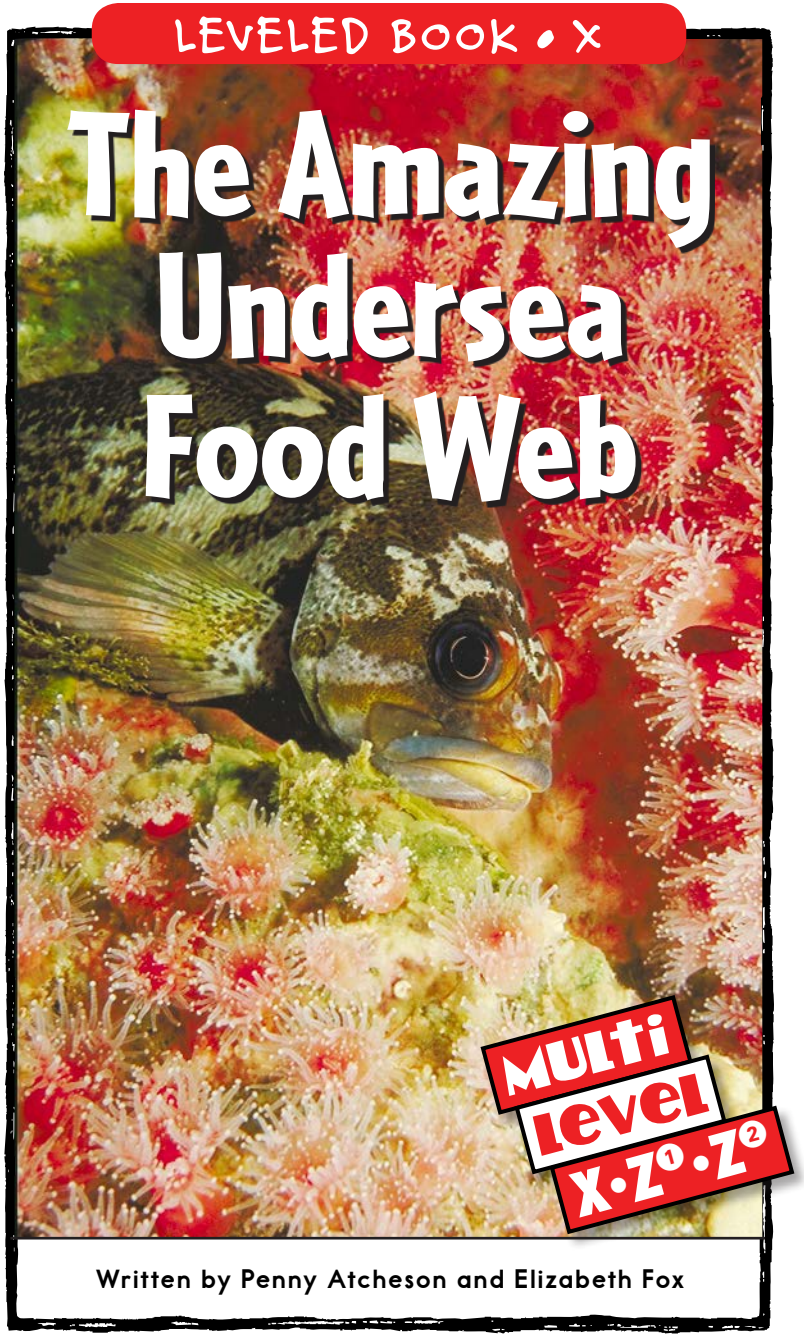

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The Amazing Undersea Food Web

Written by Penny Atcheson
and Elizabeth Fox

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Focus Question

How are animals from the four ocean zones connected by the undersea food web?

Words to Know

abyssal zone
anemone
aphotic zone
bioluminescence
chlorophyll
disphotic zone
euphotic zone
faults
photosynthesis
phytoplankton
trenches
zooplankton

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Written by Penny Atcheson
and Elizabeth Fox
Illustrated by Cende Hill

Correlation

LEVEL X	
Fountas & Pinnell	S
Reading Recovery	40
DRA	40

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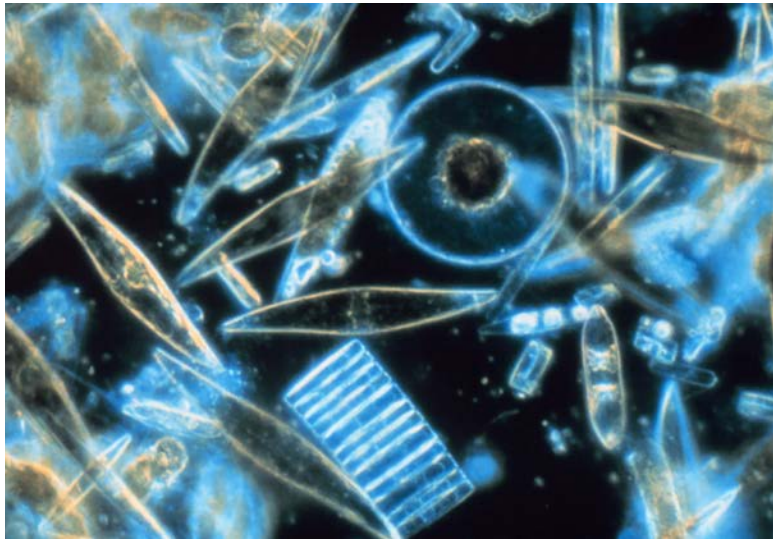
Let Me Introduce Myself

The ocean is a huge feast for everything in it and for many land animals, including humans. When you think of the ocean food web, you might think of great white sharks devouring their prey or enormous blue whales eating tons of krill. But did you know that more than 90 percent of all sea creatures end up being eaten by other sea creatures? That means that almost every organism in the ocean ends up being eaten by another sea creature at some point.

There are little organisms that almost always get eaten but do not actually eat anything themselves. They are the most microscopic species in the ocean, yet they form the center of the ocean's food web. Some people might think it's a raw deal to be food for everybody else. However, I find it to be quite a powerful job.

The blue whale is the largest animal on Earth.



These microscopic phytoplankton are called *diatoms.*

Let me introduce myself properly. **Phytoplankton** (FY-tow-plank-ton) is my name. I'm an algae, which is almost like a very tiny plant. But unlike plants, I have no roots. I'm free to float around with the ocean currents. I prefer to remain near the surface of the sea in the sunlight. I can be found in every ocean on Earth.

Like plants, I make my own food through a process called **photosynthesis**. I use **chlorophyll** to capture the Sun's energy to change minerals and nutrients from seawater into food. Chlorophyll makes me green, the same way it makes plants green. Since phytoplankton is so tiny, you can only see the color when there are billions upon billions of us in one place.

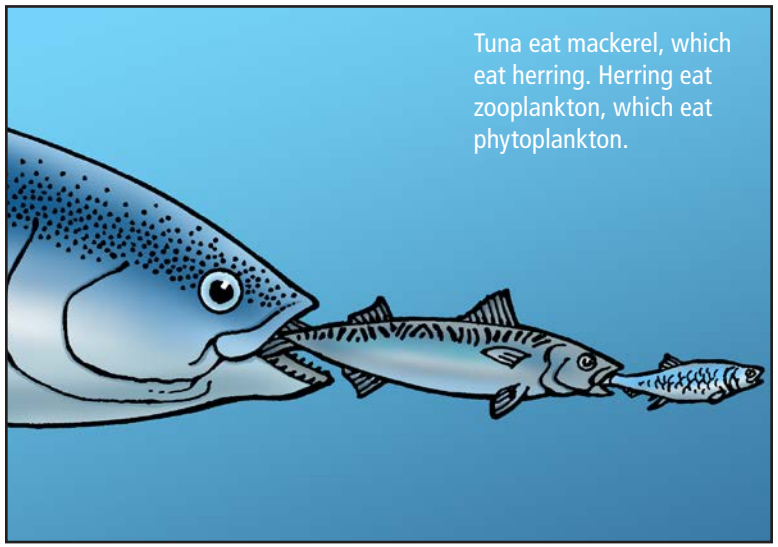
Thousands of phytoplankton can be found in one cup of seawater. Phytoplankton photosynthesis provides the Earth's atmosphere with more than half of its oxygen. We are also a good indicator of the ocean's health. Scientists can see large groups of phytoplankton from space. They can get information about the levels of pollution in the water when they see us struggling or dying off.

Our most important job, though, is being at the center of the food web for the entire ocean. We feed all ocean life forms, from the smallest creature to the largest.

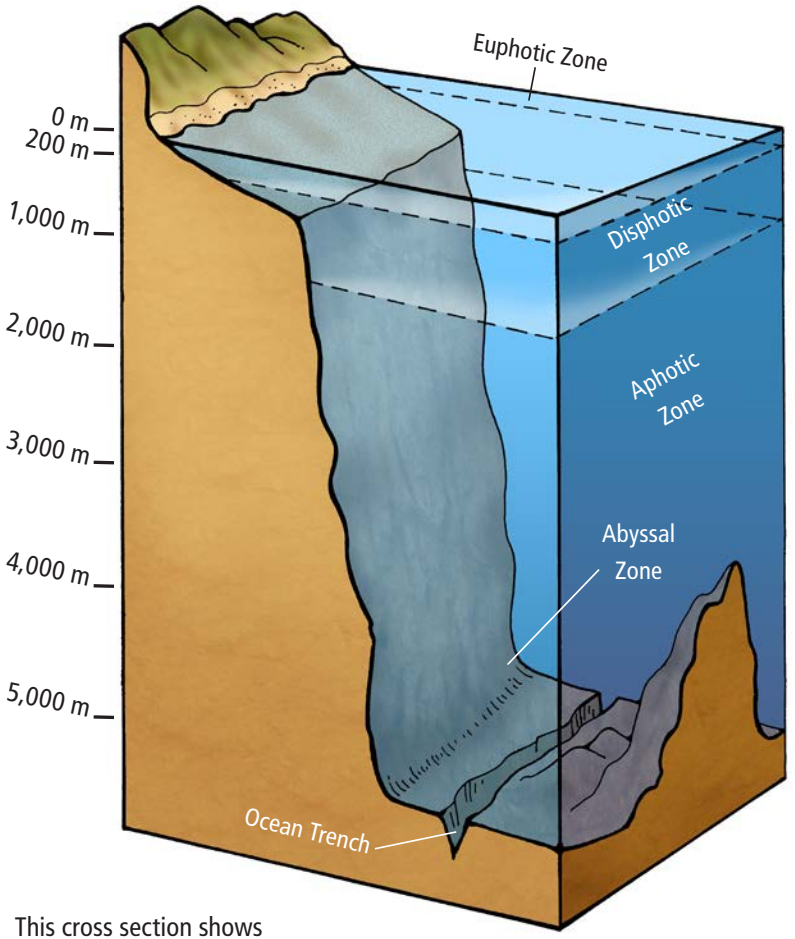
A phytoplankton and zooplankton bloom shows up as light streaks in this photo taken from space.

The Food Web

Here's how it works. Think about a simple tuna fish sandwich. Tuna are large fish, and they eat smaller fish called *mackerel*. To make 1 kilogram (2.2 lbs) of tuna flesh, the tuna had to eat about 10 kilograms (22 lbs) of mackerel. Those 10 kilograms of mackerel had to eat 100 kilograms (220 lbs) of an even smaller fish called *herring*. And those 100 kilograms of herring devoured a full 1,000 kilograms (2,200 lbs) of **zooplankton**. Zooplankton are microscopic animals. They include tiny animals such as krill, which look like little shrimp, and the larvae and babies of crabs, jellyfish, shrimp, and other fish. To support those 1,000 kilograms of zooplankton, 10,000 kilograms (22,000 lbs) of phytoplankton were eaten.



Tuna eat mackerel, which eat herring. Herring eat zooplankton, which eat phytoplankton.



This cross section shows the different zones of the ocean.

To give you an idea of just how much life I support, I'll take you through the ocean. We'll explore the surface, where I live, down to the ocean floor.

Life in the Sunlit Zone

The euphotic (yoo-FOE-tic) zone, or sunlit zone, is the top level of the ocean. It extends about 200 meters (660 ft) down from the surface. There's lots of sunlight here. This zone is where most of the animal species in the ocean are found.

Almost all the seafood eaten by humans comes from the **euphotic zone**. Clams, mussels, and oysters live on shallow ocean floors. Lobsters and crabs scuttle about in coral reefs and among seaweed beds. Most species of fish, including salmon, tuna, mackerel, cod, and swordfish, stay up in the sunlight where there is plenty to eat and good light for hunting.

The euphotic zone is also home to coral reefs, which hold most of the ocean's plant and animal species. These fragile and beautiful areas are formed by the skeletons of small animals called *coral polyps.* Sea fans, brain coral, angelfish, sharks, shellfish, and crabs all make the coral reef a colorful and busy place. **Anemones**—animals that look like beautiful flowering plants—catch zooplankton with their stinging tentacles. Jellyfish swarm in massive numbers, attracting the sea turtles that love to eat them. Coral reefs also provide shelter for young creatures that will live in the open ocean as adults.

Colorful coral reefs are the sunlit zone's most popular areas.

The beauty of the coral reefs attracts humans to the euphotic zone. They take thousands of tons of fish, both for food and for pets in tropical aquariums. This human activity, along with pollution, threatens the well-being of coral reefs. Coral polyps are killed by pollution. Boat motors break them, and divers crush them. Once the corals die, all the other reef life suffers, too.

One nondestructive way to see ocean life in the euphotic zone is to visit a tide pool. A tide pool is a small pool of water that remains on land when the tide goes out. Here you can find mussels, sea stars, urchins, clams, barnacles, and snails. You may spot a hermit crab scurrying about in another animal's shell. All of this sea life depends, directly or indirectly, on phytoplankton.

If you visit a tide pool, you may get a glimpse of a spiny sea urchin.

The Twilight Zone

As you go below the euphotic zone, the water begins to get darker, colder, and heavier. You are now entering the twilight zone, also called the **disphotic** (dis-FOE-tic) **zone**. It begins at about 200 meters (656 ft) and goes to a depth of about 1,000 meters (3,280 ft). The pressure in this zone would crush a person, but the life forms that live here have adapted to this environment. The twilight zone doesn't have enough light to support photosynthesis and plant life, but some animals do make their homes here. Others, such as whales, visit from the euphotic zone.

Permanent residents include strange-looking hatchet fish and viperfish. The fish that live here often have huge mouths with big, curved teeth. Because it is too dark to see well, the fish don't actively hunt. They simply hold open their frightening mouths, waiting for something to swim in. Many of them are black or dark red to blend in with the dark water.

Octopuses live in both the euphotic and disphotic zones.

Octopuses and squid, including the famous giant squid, live here as well. Until fairly recently, no giant squid had ever been seen alive. Few people have seen it at the surface, and a handful of scientists have seen it in the disphotic zone. Still, little is known about the giant squid.

Many animals in this zone depend on a diet of what scientists call "marine snow." This is a nice name for dead phytoplankton and zooplankton! When we die, our bodies drift slowly down through the ocean layers to the bottom of the ocean like snow falling through the air. So even where we don't live, phytoplankton are eaten.

The Midnight Zone

This totally dark region of the ocean contains 90 percent of the ocean's water, but little life. The midnight zone, or **aphotic** (ay-FOE-tic) **zone**, extends from 1,000 to 5,000 meters (3,280–16,404 ft) and below. The pressure is so great here that it can crush almost anything, including most submarines. The water is very dark and cold. But if you look closely, there is some life in the midnight zone.

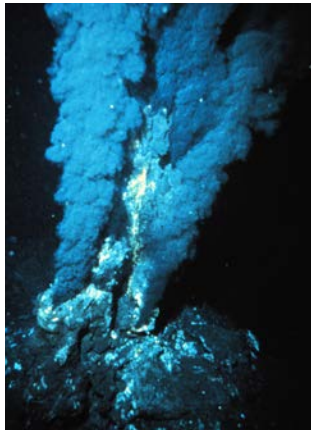
Many of the tiny animals that live here, such as the lantern fish, have glowing bodies. The light comes from a special process called **bioluminescence**. This is the same process that makes light in fireflies. Jellyfish, squid, fish, and even bacteria are bioluminescent in this zone. Since there is no sunlight, this light makes it possible for animals to see and communicate with each other. The light also helps them find mates and food.

Tiny bioluminescent animals glow beautifully in the pitch-black depths.

Some oceanographers divide the midnight zone into two more zones: the **abyssal zone** and ocean **trenches**. The abyssal zone is totally dark. It covers much of the ocean floor, including vast plains, mountains, valleys, and canyons.

Ocean trenches are found along **faults** where large plates of the Earth's crust come together. The colliding plates create canyons and cracks of up to 10,000 meters (32,808 ft) deep. You would think that nothing could survive in the darkness, cold, and extreme pressure at the bottom of a trench.

Openings at the bottom of the trenches spew hot water and minerals from deep within the Earth. Animals living in this zone rely on the warmth and nutrients. Special kinds of bacteria can use these nutrients in the same way that phytoplankton use sunlight. Tube worms, shrimp, and giant clams can all be found feeding on these bacteria around the openings, or chimneys. These chimneys were only recently discovered. Only a few submarines have been built strong enough to withstand the enormous pressure at the bottom of a trench.



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So you see, even though phytoplankton are only at the top of the ocean, we're at the center of the food web, supporting all other life in the sea. Whether you enjoy the ocean for the beauty of coral reefs, the mystery of the abyssal zone, or some tasty fish and chips, you have us phytoplankton to thank.

Glossary

abyssal zone *(n.)* the part of the aphotic zone that includes the deep ocean floor (p. 14)

anemones *(n.)* plantlike, marine animals whose tentacles often look like flower petals (p. 9)

aphotic zone *(n.)* the bottom ocean zone, which receives no sunlight (p. 13)

bioluminescence *(n.)* the light or the emission of light created by a biochemical process within a living thing (p. 13)

chlorophyll *(n.)* a substance in plant cells that transforms water, air, sunlight, and nutrients into food (p. 5)

disphotic zone *(n.)* the middle ocean zone, which receives very little sunlight and contains no plants and few animals (p. 11)

euphotic zone *(n.)* the top ocean zone, which contains almost all of the ocean's life (p. 9)

faults *(n.)* cracks in Earth's crust along which movement occurs (p. 14)

photosynthesis *(n.)* the process by which chlorophyll in plant cells transforms sunlight, water, air, and nutrients into food (p. 5)

phytoplankton *(n.)* single-celled algae that live in a body of water (p. 5)

trenches *(n.)* cracks in the seafloor; long ditches (p. 14)

zooplankton *(n.)* microscopic animals that live in a body of water (p. 7)