

Living Systems

INVESTIGATIONS GUIDE



Full Option Science System
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Investigation 1 - Systems

PART 3: The Kelp Forest Food Web

NGSS Standards:

5-PS3-1

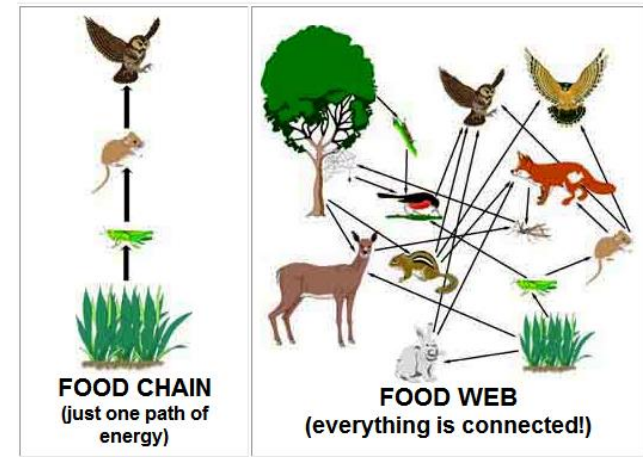
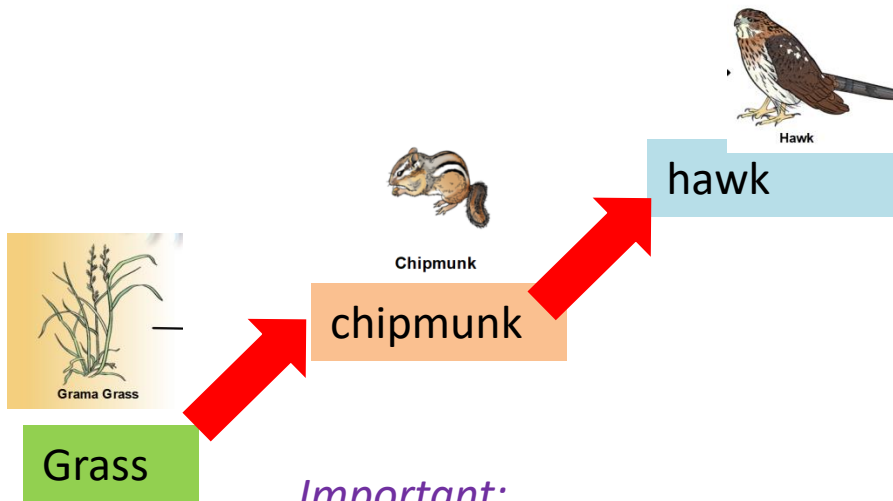
5-LS2-1

5-ESS2-1

2 sessions

food chain VS food web

REVIEW



Important:

The direction the arrow points shows the direction food (energy) moves through a food chain.

Producers	Organisms, such as plants or algae, that makes its own food.	grass, algae, trees, wild berries
Consumers	Organisms that eat other organisms. <u>Herbivores:</u> animals that eat plants. <u>Carnivores:</u> animals that eat other animals . <u>Omnivores:</u> animals that eat both plants and animals.	bears, chipmunks, hawks, fish, coyote <u>Predators</u> - an animal that hunts and catches other animals for food.
Decomposers	Organisms that break down plant and animal matter into simple chemicals.	Bacteria – microorganisms that decompose things.

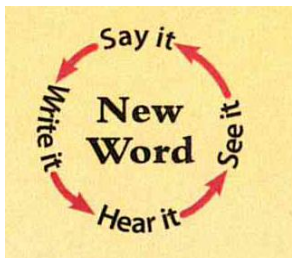


Part 1: Four Spheres

<https://www.youtube.com/watch?v=VMxjzWHbyFM>

Part 2: Four Spheres

https://www.youtube.com/watch?v=UXh_7wbnS3A



kelp forest – a subsystem of the biosphere.

*A **kelp forest** occurs in the ocean.*

Kelp is a kind of seaweed.

There is a kelp forest off the California coast.

*It is called the **Monterey Bay National Marine Sanctuary**. It is like a national park in the ocean. It is the largest of 13 national marine sanctuaries. It goes from San Francisco to Santa Barbara. The sanctuary extends from the shoreline out into the ocean an average of 50 kilometers.*

*A **marine ecosystem** is an ocean ecosystem.*



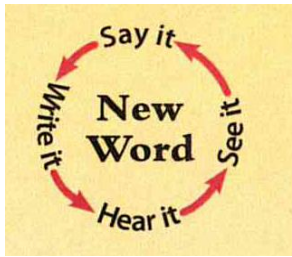
Marine Organisms:



What organisms are both predators and prey in the kelp forest ecosystem?



- Spread out the Monterey Bay Food Web cards.
- Take three cards and review the information on them.
- Work with your group to create **food chains** with your cards.
- In a few minutes, each group will report out one **food chain** they discovered.



plankton – “drifting” *microorganisms that drift in the water with current.*

Find the cards that include the name “plankton”. You should find two....

Phytoplankton - “phyto” – means plant-like.

Zooplankton – “zoo” means animal-like.

<https://www.youtube.com/watch?v=UjnYJVKysfo>

Based on what you have already learned about **producers and consumers**, *what is the difference between phytoplankton and zooplankton?*

Phytoplankton

Plant-like



Zooplankton

animals



Plankton – “drifting” *microorganisms that drift in the water with current.*

Phytoplankton

Plant-like



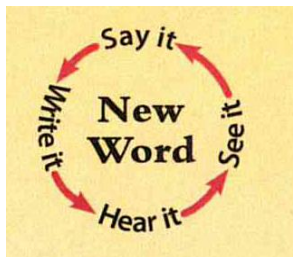
Phytoplankton make their own food using sunlight, water and carbon dioxide, therefore they are **PRODUCERS**

Zooplankton

animals



Zooplankton eat phytoplankton, therefore they are **CONSUMERS**



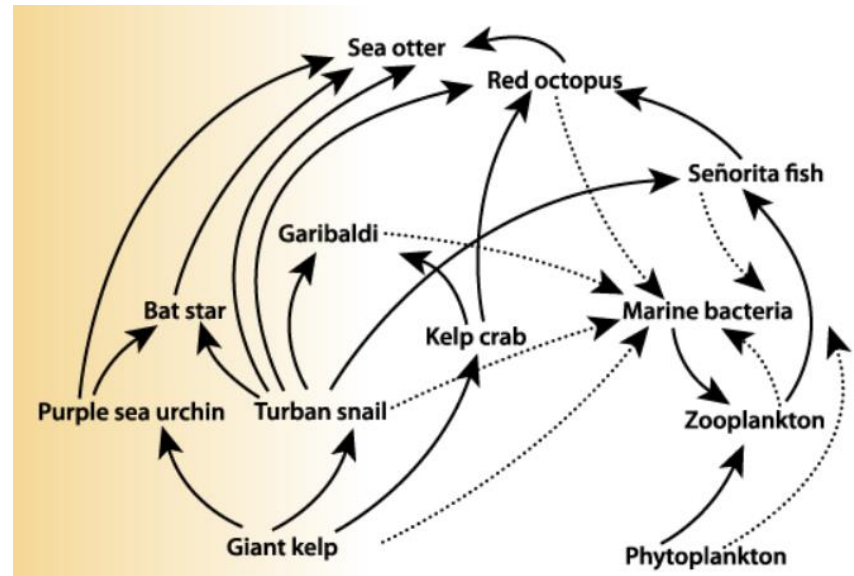
Prey: a living animal that is hunted and eaten by another animal.

Read aloud:

Many of the animals in the kelp forest eat more than one kind of organism. And some organisms are eaten by many animals. When you show **all the possible feeding interactions**, you no longer have a simple food chain but rather a food web, with lines going off in different directions.



TASK: In your groups, create one food web using all the Monterey Bay Food Web cards. Draw the food web in your notebook.



Read “**Monterey Bay National Marine Sanctuary**”.

(Article posted on our classroom website).

Answer “Thinking About” questions #1-3


Supplemental Video

<https://cptv.pbslearningmedia.org/resource/kqed07.sci.life.eco.kelp/kelp-forest/#.Xla8v6hKjcs>

<https://www.youtube.com/watch?v=u5vtuz3-Uwk>

<https://www.youtube.com/watch?v=Zs4uT8BAAfE>

<https://www.youtube.com/watch?v=HGMvPqfcD&feature=youtu.be>



Monterey Bay

Monterey Bay National Marine Sanctuary

Much of the northern California coast is rocks and cliffs. The ocean water is very cold all year. During the winter and spring, huge waves from the Pacific Ocean crash on the rugged shore. Can anything live in this difficult environment?

The answer is yes. The northern California coast is one of the most diverse and productive ecosystems on Earth. Thousands of different kinds of organisms live and interact in the cold ocean water. This ecosystem is protected in the Monterey Bay National Marine Sanctuary. *Marine* means “ocean” or “sea.” A sanctuary is a protected place. This is one place where scientists can study the interactions between ocean organisms and their environment.


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The Kelp Forest

Giant kelp grows in most of the 15,783-square-kilometer (km) sanctuary. Kelp looks like a plant, but it is actually algae. Like plants, algae make their own food.

Giant kelp are anchored to the seabed and reach clear to the ocean surface. In some places, the distance is more than 100 meters (m) to the surface. This makes the kelp taller than the tallest trees. For this reason, the California marine ecosystem is often called the kelp forest.

Like the rain forest, the kelp forest has a floor, an understory, and a large canopy. The canopy spreads across the water's surface. But, unlike the rain forest, most of the organisms do not live in the canopy. Most live in the understory and on the floor. Every bit of the rocky bottom has animals clinging to it. These include clams, scallops, mussels, barnacles, limpets, abalones, snails, sponges, sea urchins, sea stars, shrimp, and sea anemones. Every crack and cave shelters a fish, an eel, a crab, or an octopus.



A kelp forest

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Review What We Have Learned:



- A **marine ecosystem** is an ocean ecosystem. A kelp forest is a marine ecosystem. The main producer is kelp (seaweed).
- Plankton are microscopic organisms drifting in the water. The primary producer is phytoplankton; plantlike organisms that produce their own food. Zooplankton are microscopic animals.
- Some organisms are predators, others are prey. While others can be both predator and prey.

<https://www.youtube.com/watch?v=HGMvPqfcDOk&feature=youtu.be>



What organisms are both predators and prey in the kelp forest ecosystem?



What organisms are both predators and prey in the kelp forest ecosystem?



Web of Life: Life in the Sea

<https://www.fossweb.com/video?videoID=G3931945>

Video:

- Teaching the Module
- Interactive
- Investigation
- Guided Activity



Task “**Comparing Aquatic and Terrestrial Ecosystems**”. (**partner read**). Page 16 & 17.



A terrestrial ecosystem

Comparing Aquatic and Terrestrial Ecosystems

Aquatic and terrestrial ecosystems are very different. But they are the same in some ways. Let's compare.

The **nonliving** factors of the two environments are different. **Aquatic** ecosystems are in water. Terrestrial ecosystems are on land. The temperature in an aquatic ecosystem changes slowly. The temperature in a terrestrial ecosystem can change rapidly over a short period of time. The amount of water in an aquatic ecosystem is predictable. Water in a terrestrial ecosystem can vary widely.

The organisms are different in the two ecosystems. Most aquatic organisms can live only in water. If they were moved to a terrestrial ecosystem, they would die. The same is true for terrestrial organisms moved



In your notebooks....

1. Define “aquatic” and “terrestrial”.
2. What are some ways all ecosystems are the same?
3. Where do aquatic and terrestrial ecosystems get their energy?



Fabulous Food Chains!

<https://www.youtube.com/watch?v=MUKs9o1s8h8>

plankton – “drifting” *microorganisms*
that drift in the water with current.

phytoplankton - producers
“phyto” – means plant-like.
zooplankton – consumers
“zoo” means animal-like.

prey: *a living animal that is hunted
and eaten by another animal.*

marine ecosystem:
an ocean ecosystem
kelp forest:
a marine ecosystem



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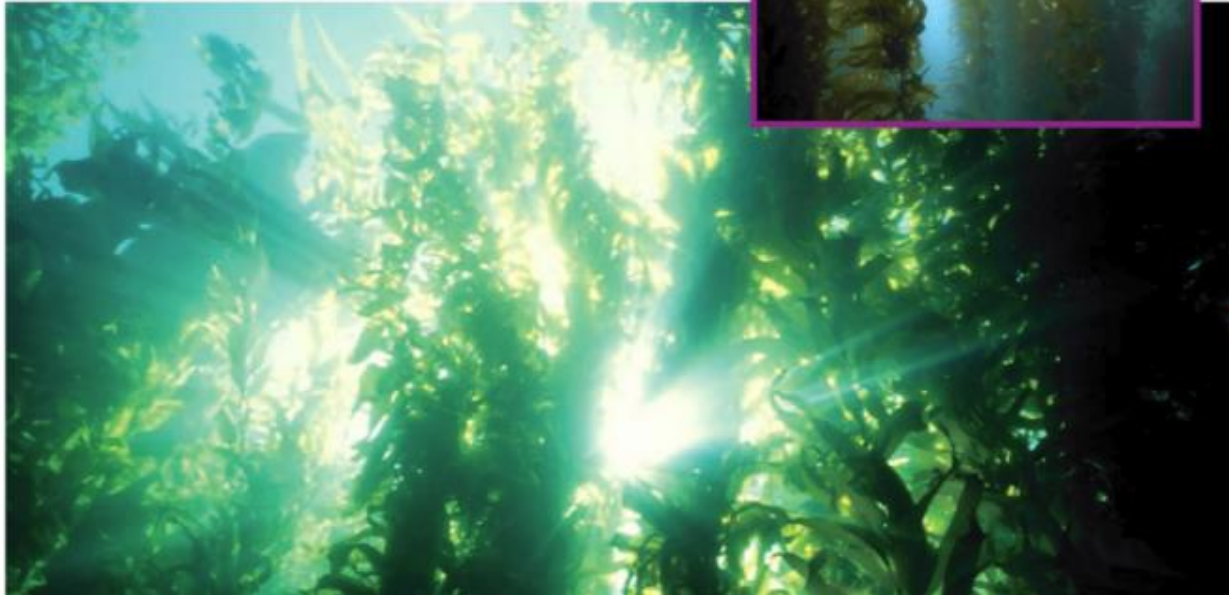
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A kelp forest



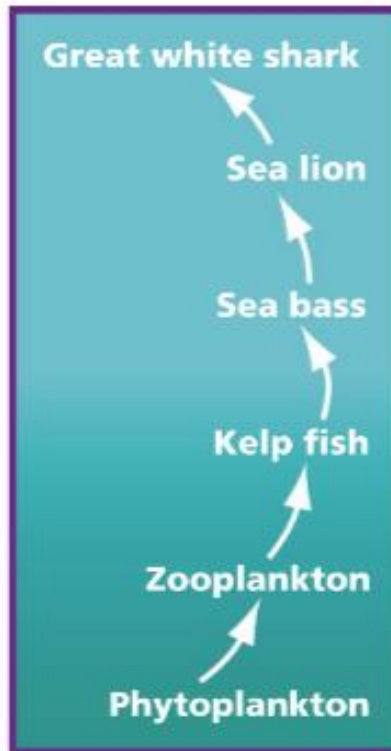
Fish live in the understory. There are small fish such as anchovies and sardines, medium-sized fish such as sea bass, snappers, and perch, and large fish such as groupers and sharks. The California state marine fish is the bright orange garibaldi. It also lives here. Other animals found in the understory are squids, jellyfish, seals, sea lions, and gray whales.

The canopy provides shelter for a number of small animals that live on and around the kelp. These include snails, crabs, barnacles, and kelp fish. The canopy is a resting and hunting place for sea otters, seabirds, gulls, terns, ospreys, and ducks.

Where do all these animals get the food they need to survive? Like all ecosystems, the kelp forest depends on producers. The giant algae provide matter and energy to the ecosystem, but only a small amount. Microscopic phytoplankton are the most important producers in this ecosystem. These tiny producers (the grass of the sea) are eaten by **zooplankton**. Zooplankton are eaten by baby fish (kelp fish), clams, crabs, and thousands of other organisms. Small fish and crabs are eaten by larger fish (sea bass). The food produced by the phytoplankton eventually feeds the sea lions and sharks at the top of the food web. Marine bacteria decompose all the dead organisms in the ocean ecosystem.



An orange garibaldi



**Monterey Bay
food chain**

Competition for Resources

There is a lot of competition for phytoplankton in the marine ecosystem. The zooplankton that have the best structures for catching phytoplankton will be most successful. This is one example of competition for food.

There is also competition for space. Waves and currents are very strong in the coastal environment. Many organisms must attach firmly to a solid surface or be washed away. The rocky bottom of the ocean is completely covered with organisms.

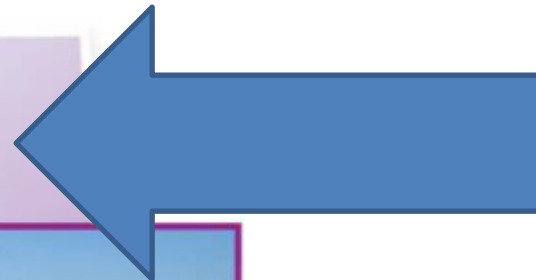
Kelp forest organisms compete for shelter. Caves, cracks, and old shells are used as hiding places. There is life-or-death competition for places to attach and hide.



This is a hermit crab. Hermit crabs live in empty snail shells. What kind of competition do you think they have in the ecosystem?

Thinking about Marine Ecosystems

1. What do you think happens to waste and dead animals in marine ecosystems?
2. What is the most important producer in both freshwater and marine ecosystems?
3. Identify three ways organisms compete in marine ecosystems.



Quizlet

[https://quizlet.com/ 3zwrsk](https://quizlet.com/3zwrsk)

Assigned in Google Classroom