Energy from the Sun Activity Sheet

Name: Teacher Guide **Date:** _____

Answers will vary. We have provided examples of possible answers and ideas of what to look for in students' thinking.

Instructions:

1. Gather your materials to build a food web!
    a. Clothes hanger, creature cards (included in this worksheet), single hole puncher, scissors, string or yarn, blank paper, glue stick, coloring utensils, optional: construction paper and index cards

2. Before building an ocean food web, think about what you ate today and make a list.
Students might describe their breakfast, snack, and/or lunch. For example, today I ate a fried egg, poi, salt, and sprouts for breakfast. For snack, I had a sliced apple and carrots with peanut butter. For lunch, I had leftovers from last night: steak, chickpea noodles, and asparagus, with macadamia nuts and cereal flakes for desert.

3. Pick two food items that you or someone you know ate and trace back the origin of it's energy. (*Hint: If you are unsure of the ingredients of some of your food items, find a food label and explore some of the ingredients.*)

    a. Think of a meat item, what did it eat?
    I ate two meat items today: egg and steak. For the egg, it did not eat yet, but according to the package, the chicken who laid it ate a vegetarian grain diet. The steak came from a cow on Kaua'i that ate grass.

    b. What about a plant, where did it get it's energy?
    The poi that I ate came from a kalo plant, which got its energy from the sun. The sprouts, apple, carrots, peanut butter, chickpea noodles, asparagus, macadamia nuts, and cereal flakes that I ate are also plant products that got their energy from the sun. **Note**: many foods, like noodles or energy bars or pizza or soup, are often a mixture of both plant and meat/animal products.

Build a Food Web Mobile:

4. Draw and color a large sun or create it out of construction paper.

5. Tie the sun to the center of the hanger to start off the web.

6. Print out the last five pages in your worksheet packet (creature card images and descriptions in student worksheet). Color in the organism images if you want!

7. Cut out the pictures and descriptions.

8. Lay out all of the images where you think they fit in the food web.

9. Match the descriptions to the organism images, confirm the placement in the web, and glue the descriptions to the back of the matching organism.

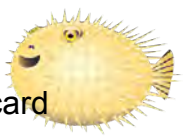
10. Hole punch all of the cards in the top middle

11. Attach everything to the hanger. Start with the primary producer level:

    a. Fold the paper in half and glue the two sides together.

    b. Hole punch the top corners.

    c. Thread some string through the holes and tie them to the bottom of the hanger.



12. Optional: If you want to add different organisms than provided, write your own creature card and attach it to your mobile.

Life-sized Food Web:

1. Now that you've explored your own food and a food web in the ocean, create a large web with your classmates!
2. Stand in a circle with your group or class.
3. Choose one person to start with the ball of yarn - they represent the sun!
4. Have the sun hold on tightly to the end of the string, and toss to ball to another person in the circle.
5. Whoever catches the yarn ball represents the next level of the food web, and calls out an organism that uses energy from the sun.
6. That person then clasps the string with one hand and tosses the rest of the ball of yarn on to another student in the circle.
7. The next person then calls out a name of an organism that eats the one before it.
8. Continue until all students in the circle are connected with the ball of string at least once.
9. Take a look at and discuss the web you have created!

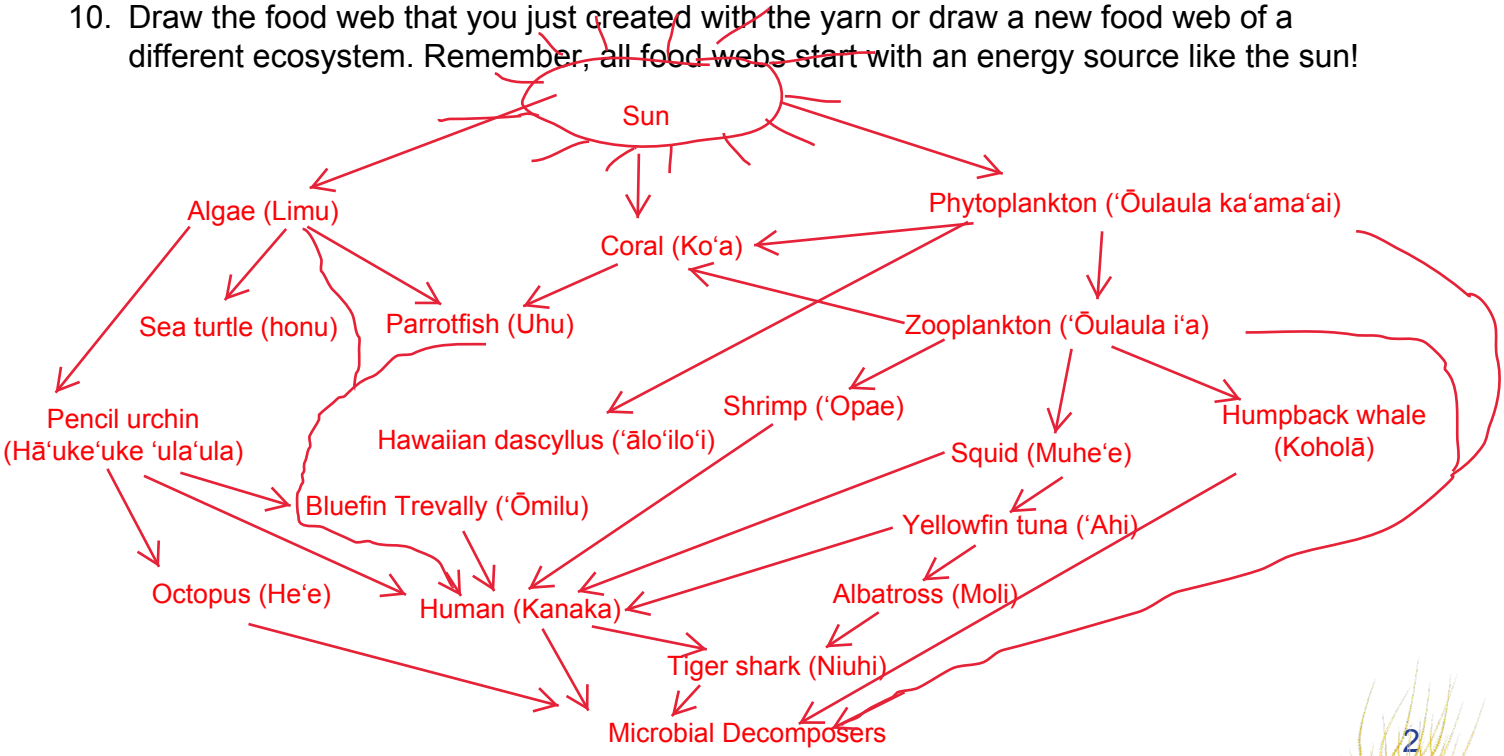
   a. How does the web look?

      My web is pretty complicated. It looks a bit like a spider web with connections between the different organisms. I also notice that it tends to flow from the top to the bottom (**NOTE** that if students colored organisms by trophic level, the colors change from top to bottom.

   b. Can you see where all the parts of the string go?

      I cannot see just by looking where all the parts of the string go because some are overlapping. I actually have to follow the string with my fingers to see which organisms are connected.

10. Draw the food web that you just created with the yarn or draw a new food web of a different ecosystem. Remember, all food webs start with an energy source like the sun!



Activity Questions:

1. What did you learn about where your food comes from?

   I learned that I eat a big variety of food. Most of it comes from plants, but some comes from animals. All of my food can be traced back to the sun!

2. Can you trace your food back to the sun?

   Yes. I cannot think of anything that I eat that is not traced back to the sun.

   NOTE: there are food webs that originate with chemoautotrophs, like those at deep sea hydrothermal vents or in sulfuric hot springs, but I cannot think of human food that comes from these sources.

3. In your food web, who are the:

   a. Primary producers?

      Algae (limu), Phytoplankton (ʻŌulaula kaʻamaʻai), and Coral (Koʻa) — but note that it is the symbiotic photosynthetic organisms inside the coral that are primary producers; the coral animals are primary consumers.

   b. Primary consumers (herbivores)?

      Pencil urchin (Kāʻukeʻuke ʻulaʻula), Sea turtle (Honu), Parrotfish (Uhu) because it eats algae, Zooplankton (ʻŌulaula iʻa), Coral (Koʻa) because they eat phytoplankton, and Humans (Kanaka) because they eat Algae (limu).

   c. Secondary consumers (carnivores)?

      Octopus (Heʻe), Parrotfish (ʻUhu) because they also eat coral (Koʻa), Coral (Koʻa) because they eat zooplankton, Shrimp (ʻOpae), Humpack whales (Koholā), Squid (Muheʻe), Hawaiian dascyllus (ʻĀloʻiloʻi), Bluefin Trevally (ʻŌmilu), Yellowfin tuna (ʻAhi), Human (Kanaka), Octopus (Heʻe), Albatross (Moli), and Tiger shark (Niuhi)

   d. Decomposers?

      microscopic decomposers. Look for students to try and name some relevant categories, such as bacteria, fungi, and unicellular organisms or examples like an amoeba.

4. What do you notice about the size of of prey items of the largest predator, the humpback whale (koholā)?

   The largest animal (the whale) feeds on some of the smallest prey — the zooplankton, which is low on the trophic levels.

5. Which organism is the top predator in your food web? *hint: which organism eats at every trophic level.*

   Humans! Humans eat the most varied diet and eat at every trophic level. We eat primary producers like plants and algae. We eat primary consumers like urchins and parrotfish. We eat secondary consumers like octopus and tuna. We also eat decomposers, but mainly large ones like crabs from the sea and mushrooms on land (although we also eat some microbial ones on accident).

6. Think of an organism that you would like to add to your food web (or that you did add in #12!). How does this new organism interact with the food web?

   I added some, like the bluefin trevally and the Hawaiian dascyllus. I would like to add a large decomposer, like a crab or a sea star that eat dead things. I think that would be interesting because they would be at the bottom like the tiny decomposer microbes, but then they also get eaten by lots of other animals like humans, fin fishes and sharks.

1. Lives in shallow areas where it can get plenty of sunlight.
2. Tiny (microscopic) one-celled algae.
3. A primary producer (plant) that uses energy from the sun.
4. Part of the first level of the marine food web.
5. Eaten by small organisms like shrimp and krill

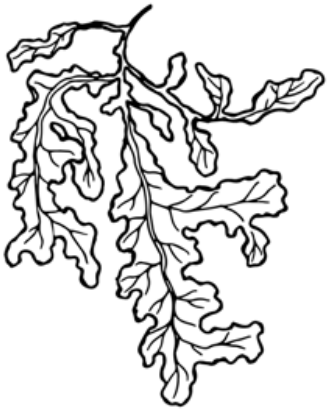
Fold along this line

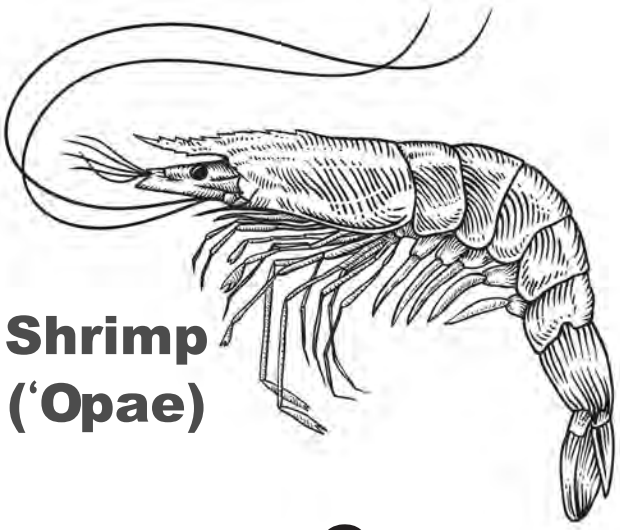
Phytoplankton (ʻŌulaula kaʻamaʻai)

1. Lives in shallow areas where it can get plenty of sunlight.
2. A primary producer that uses energy from the sun to grow through a process called photosynthesis.
3. Eaten by turtles, urchins, and even parrotfish.
4. Some specie are used by humans for medicine, cosmetics, and food.

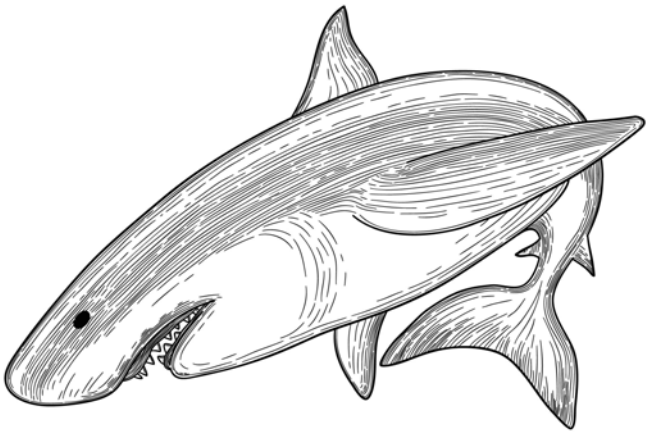
Fold along this line

Algae (Limu)

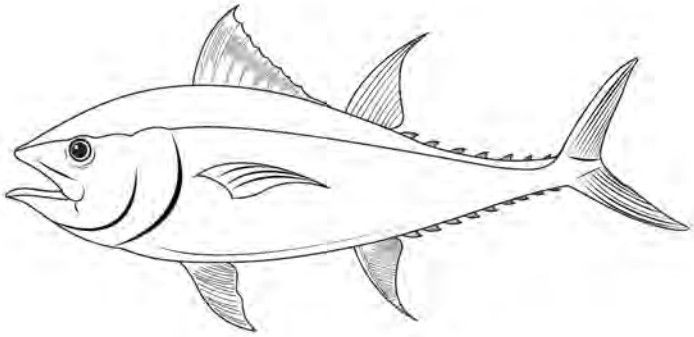




Shrimp (ʻOpae)

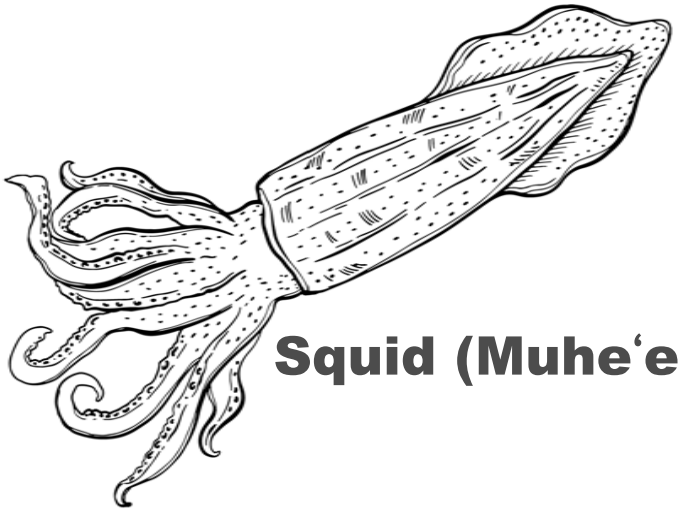


Tiger Shark (Niuhi)

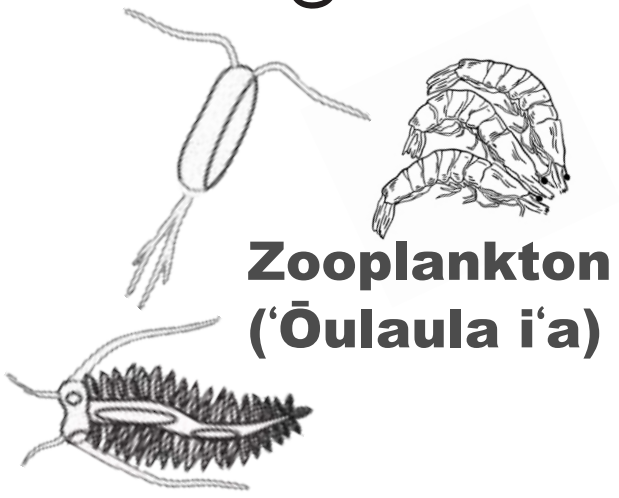


Yellow Fin Tuna (ʻAhi)

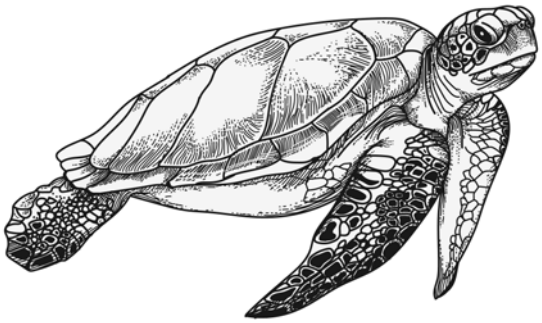
Coral (Koʻa)



Squid (Muheʻe)

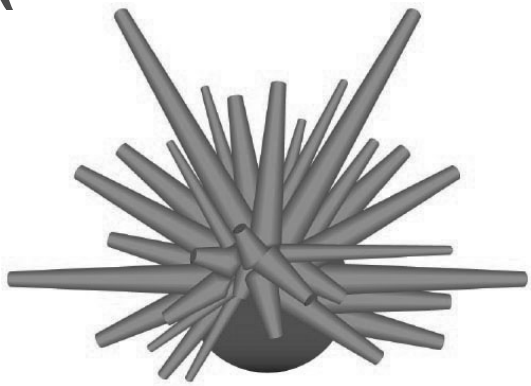


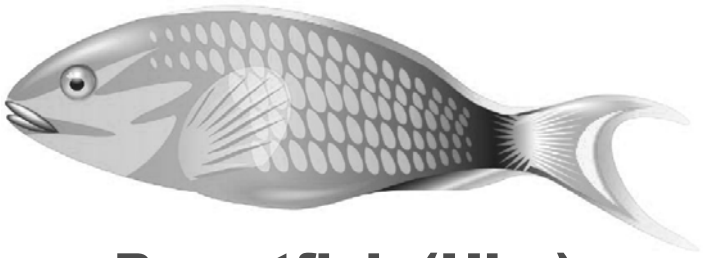
Zooplankton (ʻŌulaula iʻa)



Sea Turtle (Honu)

Pencil Urchin (Hāʻukeʻuke ʻulaʻula)





Parrotfish (Uhu)

Humpback Whale (Koholā)

Draw your own!

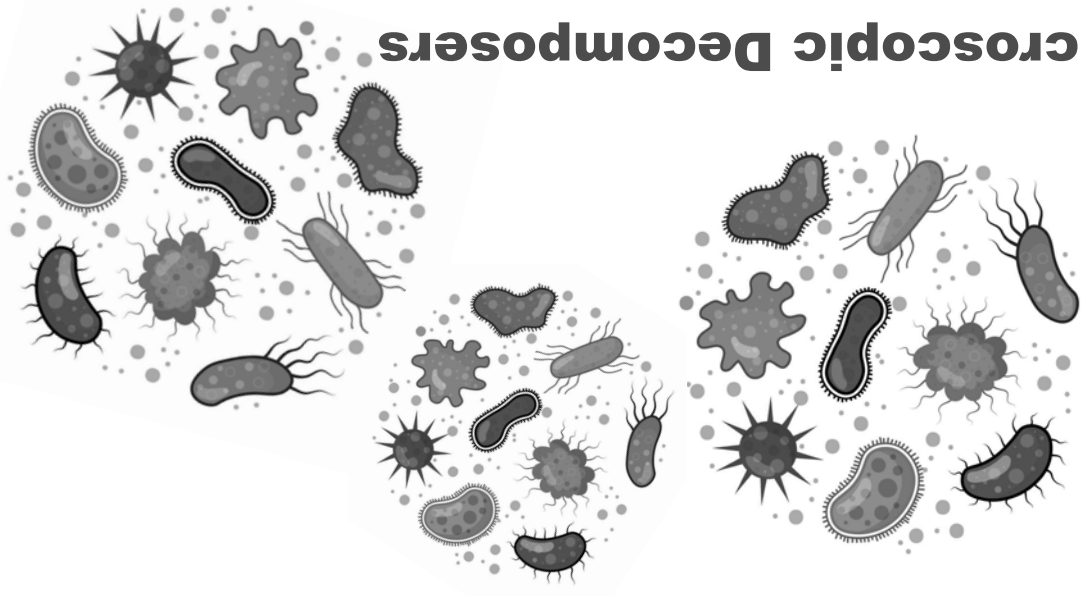
Human (Kanaka)

Albatross (Moli)

1. **Bacteria and fungi, that break down the dead material through a biochemical reaction.**
2. **By breaking down dead things, returns nutrients to the environment to help plants grow.**
3. **Necessary part of a food web as they help to keep material and matter cycling.**
4. **non-microbial decomposers, such as worms and some invertebrates and insects, eat dead plants and animals.**

Fold along this line

Microscopic Decomposers



Zooplankton

1. Small, often microscopic animals that drift and/or swim throughout the ocean.
2. Many of them eat phytoplankton.
3. Krill, a type of them, are shrimp-like “see-through” animals that swim together in groups called swarms.
4. Some of the largest organisms on earth, like humpback whales, eat these tiny creatures.
5. Corals eat these animals by filtering them from the water.

Tiger Shark

1. Live in warm seas, and tend to swim near the surface.
2. They rely on a keen sense of smell to find their prey.
3. Can swim really fast to catch their prey.
4. They have distinct striped markings on the body.
5. They will eat almost any marine animal, including seals, turtles, seabirds, and a variety of fish using their sharp serrated teeth.

Humpback Whale

1. They are mammals, warm-blooded, and must come to the surface to breathe air.
2. Has “bristles” instead of teeth, to capture krill (tiny shrimp), and other zooplankton.
3. Moves from one place to another every year.
4. Eats in cold waters in the summer, and travels to warm waters in the winter to give birth.

Sea Turtle

1. Large flippers for quick moving and swimming.
2. Eats algae (herbivore) and sometimes jellyfish.
3. Brownish to black on top and yellowish underneath, to blend into open ocean waters.
4. Hard shell protects them from predators.
5. They can swim up to 35 mph.
6. Nest on sandy beaches.

Yellow Fin Tuna

1. Metallic blue/black on top and silvery white down to the belly for blending into ocean waters.
2. Torpedo shaped body for fast swimming and long yellow pectoral (side fins) for sharp turning.
3. Eats on the surface but can go down to the deeper waters to find food.
4. Swims in schools with other fish of similar size for safety.
5. Eats smaller fish and squid.

Squid

1. Sometimes found in schools, they live in open ocean areas from deep to shallow.
2. Move by using jet-propulsion, by squirting water through the siphon.
3. When in danger, they squirt a cloud of dark ink to confuse their attacker and allow them to escape.
4. Eat shrimp and some fish.
5. Many animals eat them, including many sharks and tuna, some whales, and people.

Parrotfish

1. Lives in coastal areas feeding on algae and sometimes corals.
2. Their hard beak-like jaws may crunch up pieces of coral skeleton or rock, pooping it out later to create white sand.
3. Their brightly colored bodies may look different depending on their age.
4. They are food to larger fish, sharks, and humans.

Coral

1. These animals live in groups called colonies and are often confused as rocks.
2. Algae live in their tissues, which contribute to their color and provide some food through photosynthesis.
3. Eat zooplankton that drift or swim by in the water.
4. Some fish, like parrotfish, may eat them.

Shrimp

1. Small organisms that live in the shallow areas of the ocean.
2. Many animals, like squid and tuna, eat them.
3. Feed on different things at different life stages. Will eat phytoplankton and some algae.
4. Some live in fresh water areas and others live in salty water like the ocean.
5. They have ten pairs of legs and move by flicking their tails.

Human

1. These animals live on land, but a large number of them eat from the sea.
2. They have a very large brain and walk upright on two legs.
3. Because of their ability to cook, they can eat a wide variety of plants and animals and have the most varied diet known to scientists.
4. Their global distribution, use of tools, and efficient hunting has resulted in the extinction or near extinction of many species.

Albatross

1. These animals fly long distances to capture prey out at sea before returning to land where they nest.
2. Can have a wingspan greater than 10 feet (3.3 m).
3. They eat squid, fish, and krill mostly by scavenging or hunting at the surface but some species have been found to dive 15 feet or more.
4. They may have trouble feeding their chicks due to plastics in the ocean where they forage.

Sea Urchin

1. Lives in shallow, coastal regions and are often found in between rocks
2. Feeds by moving slowly along surfaces grazing on algae.
3. Uses hard spines for protection against predators.
4. Can regrow body parts, such as the spines.
5. Octopus, fish, and humans eat them.