OOEY GOOEY ANIMAL GUTS

This lesson plan developed by:

Monterey Bay Aquarium®

Overview:

How is energy transferred through organisms in an ocean food web? What does an octopus eat? What is the favorite food of a sea otter? Students find out by dissecting a gelatin-dessert-filled, plastic glove "stomach" of a marine consumer. They identify what kind of consumer their marine animal is by examining the prey items they discover in the stomach. Students draw a food chain for their animal and then use it to construct a marine food web as a class.

Key Concepts:

Students will be able to:

- Identify what kind of consumer an animal is based on what it eats.
- Construct a marine food web.
- Understand that every organism has a role in a food web.

Materials:

To make "stomachs":

- Gelatin dessert (like JELL-O®, enough for about ½-¾ cup per stomach)
- Cups or glasses
- Pitcher with pour spout
- Disposable plastic gloves (check for latex allergies)
- Rubber bands
- **Marine Prey** (lamination optional)
- Permanent marker

For each student group:

- Copies of **Marine Consumers**
- Forceps or tweezers

- One JELL-O® "stomach"
- Scissors

For each student:
- Copy of Ooey Gooey Animal Guts student handouts

Set-up Prior to Activity:

1. Gather enough plastic gloves to make one "stomach" per student group. Assign a letter to each of the eight marine consumers (see the included **Marine Consumers**) and label each glove with a letter to represent one of the consumers.
2. Make copies of **Marine Prey** and cut out the prey items (you may want to laminate them). See the key to what prey items should be in the stomach of each marine consumer. There are enough for each of the eight marine consumers to have five prey items. If you have multiple "stomachs" for each consumer you will need to make more copies of the prey items. Leave the prey items in one piece or cut them in half to simulate partially digested prey and to make the activity more difficult.
3. Prepare the gelatin and while still liquid pour the gelatin dessert into a pitcher or other container with a pour spout. Place the glove, fingers pointing down, into the cup or glass and place the open end of the glove around the mouth. (To make the dissection easier for the students, you may choose to rubber band the fingers together.) Chill the filled glove in a refrigerator until almost firm (this will keep the prey items better separated). Next slip the appropriate prey items into each glove "stomach." There will be five prey items in each stomach. Use a rubber band to close the open end. Repeat for each of the glove stomachs. (If you have enough cups, chill all the stomachs at the same time.) Store in a refrigerator until ready to use.
4. Make copies of Marine Consumers for each student group and copies of Ooey Gooey Animal Guts student sheet for each student. They can reference these to help them identify the marine consumer their "stomach" belongs to and complete the student sheet.

Duration:

45 minutes (preparation is an additional 1 hour)

Physical Activity:

Moderate

Background:

Oceans are vast, complex worlds, teeming with life of all shapes, colors and sizes. From tiny plankton to enormous whales, there's a lot to eat and nearly all of it, living or dead, is used as food. Animals have a variety of adaptations to help them find, catch and eat their food.

What and how an animal eats depends on where it lives and its body parts. Fast swimming fishes

like tuna can overtake slower ones like sardines. Octopuses are able to overtake marine snails and other bottom-dwelling invertebrates.

All animals must eat, and all are potential food for other animals. Plants and animals are connected to each other in predator-prey relationships called food chains and food webs.

A **food chain** is the transfer of energy in the form of food from one organism to another. Food chains begin with a producer. A **producer** is an organism that uses energy from the sun during photosynthesis to produce its own food. A **consumer** is an organism that needs to eat other living things for energy. There are several types of consumers. A consumer that eats only plants is an **herbivore**. Consumers that eat other animals are **carnivores**, and consumers that eat plants and animals are **omnivores**. Along with producers and consumers, an ecosystem also has detritivores and decomposers. A detritivore eats dead and decaying matter. A decomposer is an organism (microbe) that breaks down the remains of dead organisms into simpler substances. Mushrooms, yeasts and some bacteria are decomposers. Decomposers return nutrients to the ecosystem and producers use these nutrients again.

An example of a food chain is a sea otter that eats abalone, which feeds on kelp (a producer). Food chains are simplistic representations of the relationships between organisms because organisms often eat a variety of food. That's why a **food web**, a system of overlapping food chains, more accurately depicts the movement of matter and energy through an ecosystem. Food webs also allow scientists to study how a change in one population may affect the entire ecosystem.

Vocabulary:

- **carnivore**: an organism that gets its energy by eating meat
- **consumer**: an animal that gets its energy from consuming other organisms
- **food chain**: a path of food consumption in an ecosystem
- **food web**: a system of interrelated food chains in an ecosystem
- **herbivore**: an organism that gets its energy by eating plants
- **omnivore**: an organism that gets its energy by eating plants and animals
- **producer**: an organism that makes its own food using light and/or chemical energy

Activity:

Part 1: Introduction

1. Introduce the idea of food sources and energy to the students. You may engage the students with questions like; *Who likes to eat? Why DO we eat? (gives us energy) Where do you get your energy from? (food) What are your favorite foods? Where do you get those foods? (grocery store, restaurant) What about animals that live in the ocean? What are their favorite foods? Where do marine animals get those foods? (from other animals, seaweeds)*
2. Pose the question: *How is energy transferred through organisms in an ocean food web?* You may write it up on the whiteboard or have students add it to their science notebook. Give students time to write their initial thoughts down or discuss with a partner.

Ooey Gooey Animal Guts (cont.)

3. Talk about producers and consumers with the class. *Are there any living things that don't get energy from eating other things? (plants) Where do plants get energy? (They produce their food using energy from the sun.) Are there any producers in the ocean? (seaweeds such as kelp) A consumer is an organism that gets its energy by eating other living things. What kinds of consumers live in the ocean? (sharks, fish, whales, otters and so on) What are different kinds of consumers? (herbivores, carnivores, omnivores)*

Part 2: "Dissect" an Animal Stomach

1. Tell students they are going to dissect a model of the stomach of a marine consumer to find out what it eats. Pass out the student sheet, stomach, scissors, and tools to each student group. Have them use the scissors to cut open the stomach. Warn them that the stomachs may "pop." Then using the forceps, tweezers or fingers, challenge students to carefully remove all stomach contents. They should sort any food items they find (there will be five in each stomach) and record them on the student sheet.
2. Students predict the identity of their animals by analyzing the contents of their stomach. Have students predict the identity of their consumer as well as consumer type (herbivore, carnivore, omnivore) based on their stomach's contents. Pass out Marine Consumers to each student group and have students refer to it to figure out the identity of their marine consumer. They should then complete the student sheet.
3. As a group, use individual food chains to build a marine food web.Have students draw or write the name of their consumer up on a whiteboard or chart paper. Then they should draw or write the names of its predators and prey items. Have them draw arrows representing energy transfer. The arrow should point from their animal to its predators and to the animal from its prey items. As the groups share the identity of their animal, its predators and prey, have them use animals already on the board or paper to include in their food chain. Once all groups have shared, they should have constructed a giant marine food web.

Discussion:

1. Discuss the importance of every organism in the food web. Use the food web as a starting point for discussion. Sample questions may include: *Where does most energy begin? (sun) What producers are in the marine food web? (plant plankton, kelp, other seaweeds) What would happen if one of the organisms was suddenly gone from the food web? How might that happen? (natural events like storms and warming water; human activities like overfishing, pollution, coastal development and so on) Which organisms use more energy—those at the top of the marine food web (humans, sharks, tunas) or those at the base (producers like kelp)? Why?*
2. Now that the students dissected a stomach and created an ocean food web, have them revisit the focus question: *How is energy transferred through an ocean food web?* Students may think on their own or discuss with a partner. Then in their science notebook, you may have them draw a line of learning and under it add to their original thoughts about the question.Discuss student findings. Ask questions like: *Which materials and methods worked the best?*

Ooey Gooey Animal Guts (cont.)

Ocean Literacy Principles:

Ocean literacy is an understanding of the ocean's influence on us, and our impact on the ocean. There are seven Ocean Literacy Essential Principles that all people of our blue planet should have an opportunity to learn and understand. This activity touches upon the following Essential Principles:

5. The ocean supports a great diversity of life and ecosystems
6. The ocean and humans are inextricably interconnected
7. The ocean is largely unexplored

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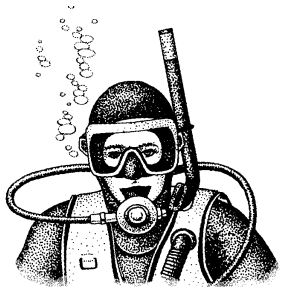
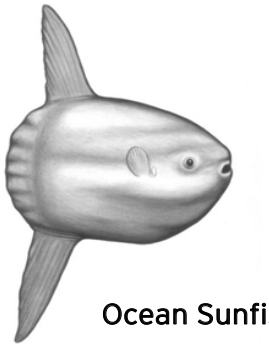
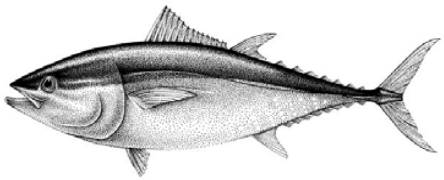
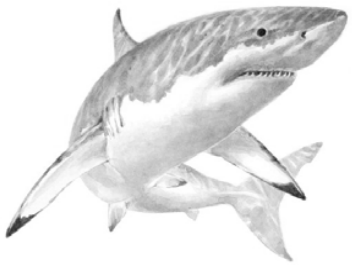
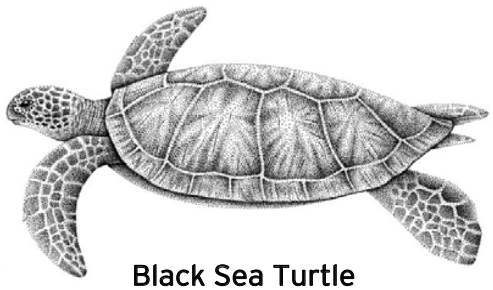
Marine Consumers

 Human	**Human** *Homo sapiens* size: to 7.0 ft (2 m) Humans are creative animals that communicate in language and create and appreciate art and music. They have also invented elaborate and effective tools to help them survive, though sometimes at the expense of other species. **Diet:** sharks, tunas, squids, sardines, clams, kelp and other marine animals **Predators:** none **Habitat:** land
 Ocean Sunfish	**Ocean sunfish** *Mola mola* size: to 14 ft. (4.3 m), 5,000 lbs.(2,268 kg) (up to 1,000 lbs. in Monterey Bay) This fish hatches from a tiny egg and grows up to be the size of a small pickup truck. Ocean sunfish live in almost all of the world's oceans and often swim at the surface sometimes appearing to sunbathe! **Diet:** jellies, plankton, small fishes like anchovies **Predators:** humans, orcas, sea lions **Habitat:** open water
 Pacific Blue Fin Tuna	**Pacific Blue Fin Tuna** *Thunnus orientalis* size: to 10 ft. (3 m), 1,200 lbs. (555 kg) Unlike most fishes, blue fin tuna are warm-blooded and can heat their bodies to temperatures warmer than the surrounding water. They can swim in bursts of speed of 50-55 miles per hour and swim thousands of miles every year. **Diet:** anchovies and other fishes, plankton, crab, squid **Predators:** humans, orcas, sharks, marlin **Habitat:** open water
 Great White Shark	**Great White Shark** *Carcharodon carcharias* size: to 30 ft. (9.1 m) These sharks are fast, efficient swimmers. Their torpedo-shaped bodies and tails are adapted for speed. People fear them, but great white sharks do not eat humans. **Diet:** sea lions, harbor seals, rockfish, anchovies, sardines and other fishes **Predators:** humans **Habitat:** open water

Marine Consumers

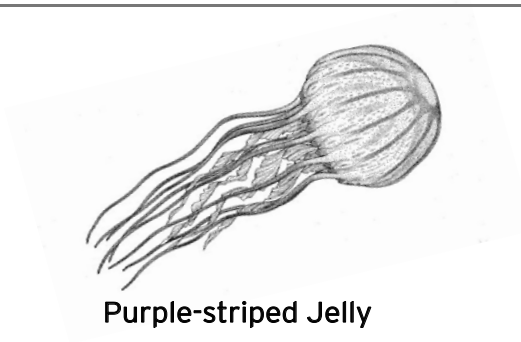


Black Sea Turtle

Black sea turtle
Chelonia agassizii size: to 4 ft. (1.2 m)

This sea turtle is actually a type of green sea turtle. Females travel thousands of miles back to the beach where they were born to lay eggs. The temperature of a nest determines how many eggs are males and how many are females.

Diet: jellies, sea grass, algae
Predators: humans, sharks
Habitat: open water

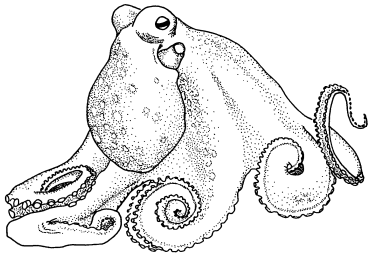


Purple-striped Jelly

Purple-striped jelly
Chrysaora colorata size: to 3 ft. (1 m) diameter of bell

Like other jellies, this animal drifts with ocean currents. It catches food with its stinging tentacles (painful to people). Crabs often cling to this jelly and eat parasites that would otherwise injure this animal.

Diet: plankton, small fishes like anchovies and sardines
Predators: ocean sunfish, sea turtles, other fishes
Habitat: open water

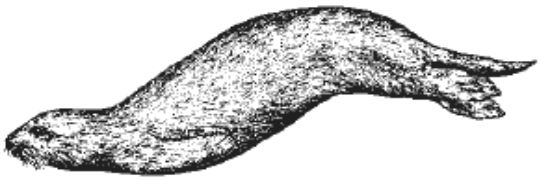


Giant Pacific Octopus

Giant Pacific octopus
Enteroctopus dofleini size: to 50 lbs. (23 kg) and 15-ft. (4.5 m) wide

This octopus has over 2,000 suckers through which it grips, smells and tastes. It is able to change its color to camouflage into its surroundings.

Diet: clams, abalone, rockfish, other octopuses
Predators: harbor seals, sea otters, sperm whales, fishes, humans
Habitat: reefs and pilings



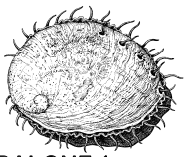
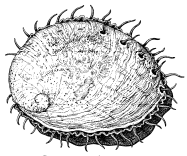
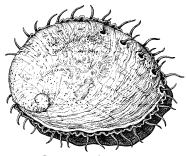
Southern Sea Otter

Southern sea otter
Enhydra lutris size: to 5.5 ft. (1.7 m)

This marine mammal relies on a dense fur coat instead of blubber to keep itself warm. One-square inch has up to one million hairs. That's ten times the number people have!

Diet: sea urchins, crabs, abalones
Predators: sharks, orcas
Habitat: kelp forest and nearshore

Marine Prey

 ABALONE (a sea snail)	 ABALONE (a sea snail)	 ABALONE (a sea snail)	 ABALONE (a sea snail)
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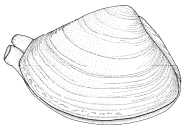
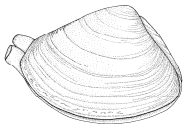
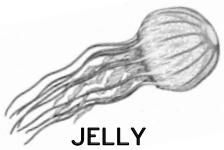
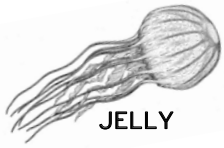
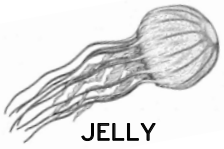
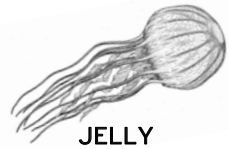
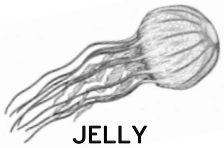
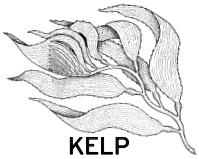
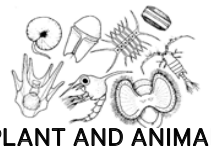
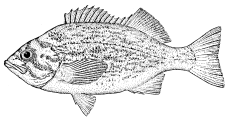
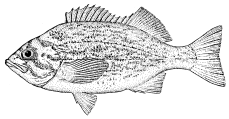
 CLAM	 CLAM	 CLAM	 CRAB
 CRAB	 CRAB	 HARBOR SEAL	 JELLY
 JELLY	 JELLY	 JELLY	 JELLY
 KELP	 PLANT AND ANIMAL PLANKTON	 PLANT AND ANIMAL PLANKTON	 PLANT AND ANIMAL PLANKTON
 PLANT AND ANIMAL PLANKTON	 PLANT AND ANIMAL PLANKTON	 ROCKFISH	 ROCKFISH

Marine Prey


SARDINE


SARDINE


SARDINE

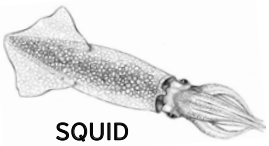

SEA GRASS


SEA GRASS


SEA LION


SEA URCHIN


SHARK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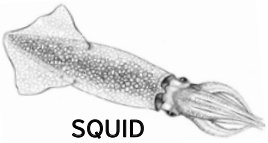
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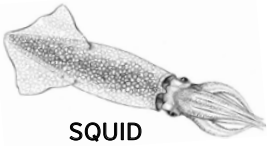
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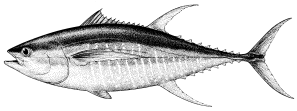
TUNA

Marine Consumer and Prey Key

eats = *also part of natural diet* x # = *number of marine prey images to place in each stomach*

	Black Sea Turtle	Blue Fin Tuna	Giant Pacific Octopus	Great White Shark	Human	Ocean Sunfish	Purple-striped jelly	South-ern Sea Otter
abalone			x2		eats			x2
anchovy		x1		x1		x1	x1	
clam			x2		x1			
crab		x1			eats			x2
harbor seal				x1				
jelly	x3					x2		
kelp					x1			
plankton		x1				x1	x3	
rockfish			x1	x1	eats			
sardine				x1	x1		x1	
sea grass	x2							
sea lions				x1				
sea urchins					eats			x1
shark					x1			
squid		x2			x1			
tuna					x1			

Ooey Gooey Animal Guts

Name:

1. Record the contents of your stomach below. Write the name of the prey item and the number you find. Then use a checkmark to show if it is a plant or animal.

Stomach Contents

Name of Prey Item (e.g., sardine)	Quantity (e.g., 2)	Is it a plant? (e.g., ✓)	Is it an animal? (e.g., ✓)

- What type of consumer is your animal (herbivore, carnivore, omnivore)?

- What do you think your animal might be? Why?

2. Look at **Marine Consumers** to match the stomach contents to a marine consumer. Fill out the chart below.

Animal Name	Diet	Consumer Type (carnivore, herbivore or omnivore)	How does it catch or eat its food?

3. Draw your animal's food chain. You may use words or illustrations to represent the organisms in your food chain. Be sure your arrows are showing energy transfer (should point from prey to predator).

4. Discussion:
   - Were you surprised by what your animal ate? Explain.

   - What would happen to the food web if your animal disappeared or became extinct?

   - What are some natural events that may affect the food web? What are some human activities that may affect the food web?