



Fish Are Animals Too

Students create a kelp forest or coral reef food web, then research related shark species to learn about species interactions. Posters illustrate the shark's role as key predator in the ecosystem.

SUBJECTS

Science, language arts

GRADE LEVEL

Grades 5–8

TIME

2 hours (plus research time)

OBJECTIVES

Students will be able to

- identify food web relationships in coral reef and/or kelp forest ecosystems.
- research specific questions relating to sharks in those ecosystems.
- speculate on the impact of decreasing the population of a particular shark species with an ecosystem.

MATERIALS

- One large ball of string or yarn
- Scissors
- Small cardboard signs
- Poster boards or chart paper (one per student)
- Markers
- Ecosystem Food Web teacher sheet #1
- Shark species teacher sheet #2

BACKGROUND

Fish are a critical part of the ocean's web of life. Yet we often forget or are unaware of the essential role they play as wildlife. Rather, we are more likely to think of fish purely as a commodity and an unlimited resource for human consumption and recreation. Fish are part of a community of living things in the same way that other wild animals are, such as bears and lions and deer and squirrels. Because the ocean seems so vast, it is difficult to imagine that there is a limit to its capacity and resources.

Although some people may have firsthand experience with marine life through recreational activities such as snorkeling, diving or sport fishing, for many the ocean is often less accessible than wilderness areas on land. Without firsthand experience or contact with the marine environment, it may be difficult for students to appreciate the ocean's complexity and beauty and the important role fish play in its health and the health of the planet.

The following activities give students a chance to add an important dimension to their understanding of fisheries by deepening their knowledge and understanding of fish as wildlife and as integral components of natural communities.

TEACHER PREPARATION

Prepare a cardboard sign for each of the organisms listed in one of the ecosystem food web tables (*kelp forest and coral reef*) that follow (*see teacher page*). (As an option, you can prepare a cardboard sign for both ecosystems and compare results.)

STANDARDS

National Science Education Standards Grades 5–8

(<http://www.nap.edu/catalog/4962.html>)

Unifying Concepts and Processes:

Systems, order and organization
Evidence, models and explanation

Life Science –

Content Standard C:

Structure and function
Populations and ecosystems

Ocean Literacy: Essential Principles and Fundamental Concepts

<http://coexploration.org/oceanliteracy/>

Essential Principle #5:

The ocean supports a great diversity of life and ecosystems.

- a. Ocean life ranges in size from the smallest virus to the largest animal that has lived on Earth, the blue whale.
- d. Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (symbiosis, predator-prey dynamics and energy transfer) that do not occur on land.

PROCEDURE

1. **Introduce food webs:** Ask students if they know what a food web is. Ask for examples.
2. **Demonstrate marine food web:** Introduce this activity with the following demonstration of a marine food web (*another way to create the web is to have students brainstorm what the connections are*):
 - Choose one of the ecosystems in the tables that follow. Assign a student to each of the organisms (*and one to the sun*) within the ecosystem you have chosen. Provide each student with a cardboard sign with the corresponding name of their organism or the sun.
 - Have the students form a large circle. Starting with the sun, have each student read out which other organism directly interacts, as listed (*see teacher page*), with the one the student represents. As each relationship is called, the student representing that organism holds on to the end of the string and passes the ball of string to the organism that was read out. When the entire table has been read, a “web” will have been created with string.
 - Ask the students to carefully lay the string on the ground without disturbing the patterns.
3. **Discuss the results:** Use these questions to conduct a discussion about the food web they created: What is the importance of each individual species? Why is it a web and not a chain? What would occur if one element were removed? What would occur if another species were introduced?
4. **Conduct shark research:** Ask students to choose a shark species from the list provided and to conduct research to answer some or all of the following questions. Be sure they answer the last question.
 - Where does the species live?
 - What type of habitat does it require?
 - What are the predators of this species?
 - What is this species' prey?
 - How does this species feed?
 - What other creatures exist in this ecosystem?
 - What is your species' interaction with the other species? (*Keep in mind that fish can interact in ways that do not include predation, such as cleaner fish, but that instead demonstrate mutualism.*)

- What is the life cycle of this species? (Include details on breeding, reproduction, survival rates, etc.)
- What is unique about this species (e.g., behavior, physical characteristics, etc.)?
- What would be the possible consequences to the ecosystem if the population of the selected shark species were to decrease significantly? Describe the direct and indirect effects on other species.

5. Create informative posters: Have each student create a poster, for display, about his or her shark, incorporating elements of its individual characteristics and relationships within its ecosystem. Focus can be placed on the food web of which it is part, including predator-prey relationships and other interactions. As an alternative, a PowerPoint presentation can be created.

6. Review posters and reflect: Have students review the posters and PowerPoint presentations. As a group, discuss the following questions:

- Is one part of a food web more important than another (e.g., large fish versus small fish)?
- Are we as humans part of a food web?
- Why is understanding food webs so important?

EXTENSIONS

- Visit your local aquarium.
- Invite a marine biologist to talk about food webs and biological diversity.
- Discuss and illustrate other ecosystem food webs.

FURTHER RESOURCES

Additional educator resources for *Jean-Michel Cousteau Ocean Adventures* can be found at pbs.org/oceanadventures.

Also try:

- FishBase
<http://www.fishbase.org/search.cfm>
- Ichthyology at the Florida Museum of Natural History <http://www.flmnh.ufl.edu/fish>
- National Marine Fisheries Service
<http://www.nmfs.noaa.gov>
- Starfish
<http://www.starfish.ch/index.html>

CREDITS

Adapted with permission from *Fish Trouble: A Teachers Guide*.

For more information, contact The University of Miami Rosenstiel School of Marine and Atmospheric Science, K-12 Science Education, 4600 Rickenbacker Causeway, Miami, FL 33149, (305)421-4937, ambient@rsmas.miami.edu. Similar publications can be downloaded at <http://www.rsmas.miami.edu/groups/niehs/ambient/>

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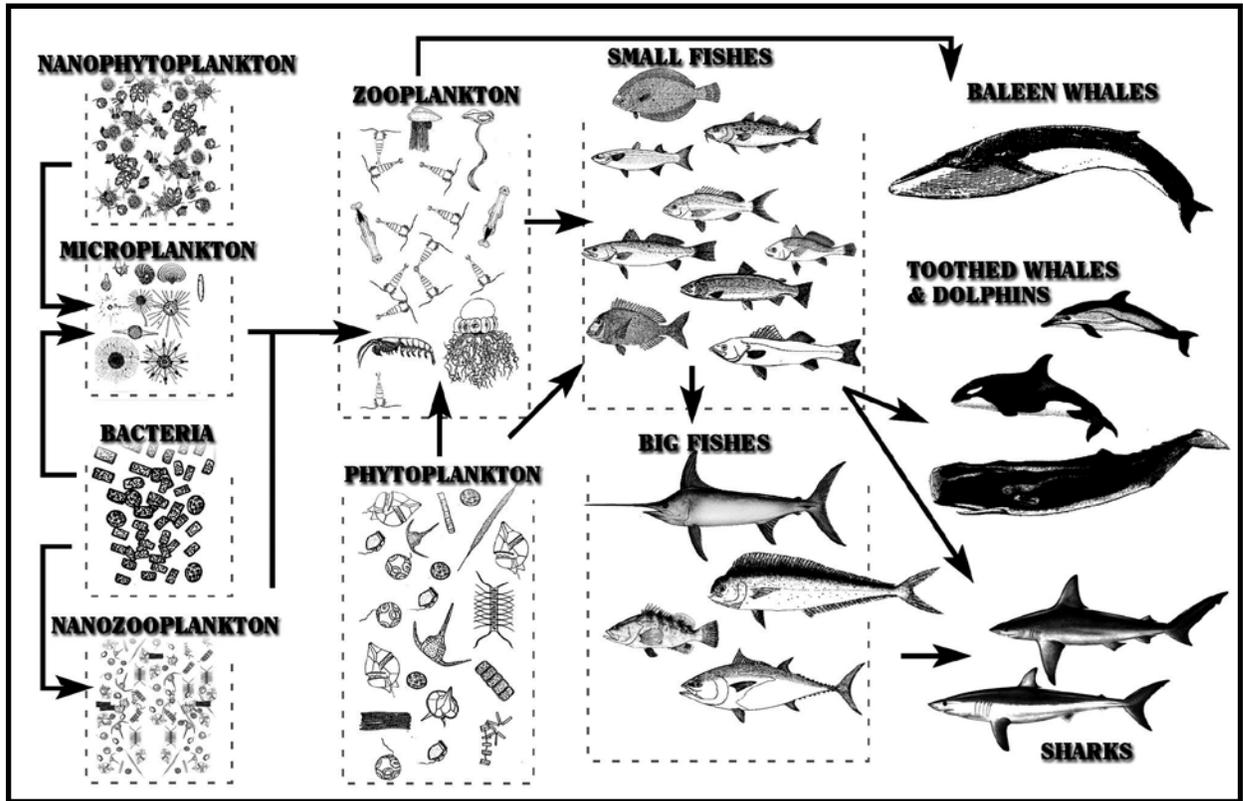
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Ecosystem Food Webs

Kelp Forest Ecosystem	Prey (Food Source)	Predator
Sun	n/a	n/a
Kelp	Sun (photosynthesis)	Sea urchins, small fish, humans
Sea urchins	Kelp	Sea otters
Sea lions	Small and large fish	Sharks
Sharks	Sea lions, small and large fish	Humans
Sea otters	Sea urchins, small and large fish	Humans
Plankton	Sun (photosynthesis)	Small fish
Small fish	Kelp, plankton	Large fish, sea otters, sea lions, sharks
Large fish	Small fish	Sea lions, sharks
Humans	Small fish, large fish, sharks, kelp	None

Coral Reef Ecosystem	Prey (Food Source)	Predator
Sun	n/a	n/a
Small fish	Algae, coral	Large fish, sharks
Crustaceans (crabs, lobsters, etc.)	Sea urchins, zooplankton	Eels, sharks
Coral polyps	Zooplankton	Snails, butterflyfish
Large fish	Small fish	Sharks
Sharks	Small and large fish, sea turtles	Humans
Phytoplankton	Sun (photosynthesis)	Zooplankton, jellyfish
Zooplankton, jellyfish	Phytoplankton	Coral, small fish
Eels	Small fish, crustaceans	Large fish, sharks
Sea turtles	Crustaceans, sea grass and algae, jellyfish	Sharks, humans

Ecosystem Food Webs (continued)



Shark Species

For their research projects, students can choose from the following shark species. Note that multiple students can select the same species.

Kelp Forest Sharks

- Basking shark
- Horn shark
- Angel shark
- Blue shark
- Great white shark

Coral Reef Sharks

- Whale shark
- White tip reef shark
- Gray reef shark
- Galapagos shark
- Great white shark