



This lesson and accompanying student handout, are the work of a COSEE Coastal Trends Scientist-Educator Team that conducted research on aquatic food webs at Horn Point Laboratory in Cambridge, MD during the summer of 2011.

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Overview

A lower level aquatic food web contains photosynthesizing phytoplankton or algae, various sizes and types of zooplankton, and carnivorous small fish as well as phytoplankton eating fish. The consumer relationships among these organisms are often based on size, larger organisms eat smaller organisms, and the mechanism for consumption also determines the predator-prey relationships. This activity explores the mechanisms of prey size and the method of how predators capture prey. Various types of balls will represent prey and students, the predators; will have different tools to capture the different balls (prey).

Instruction Time

One 45-minute class period.

Objectives

- Students will physically experience the predator's ability to capture prey, based on the prey's size.
- Students will have various adaptations that enable them to only select and capture certain prey based on prey size, which simulates predator prey interactions within a food web.
- Students simulate the competition for food within a food web.

Materials

- Ten wiffle balls
- Ten tennis balls
- Five basket balls or soccer balls
- Ten hacky sack balls
- Ten rubber bouncy balls
- Masking tape or duct tape
- Five tongs (chemistry/food tongs)
- Five tweezers
- Ten spoons (two per person)
- Size Selective Predators Handout

Procedure

1. Assign student partners.
2. Move desks out of center area of the classroom or use a gym or outdoor space such as a tennis court.
3. Each pair of students is given a tong, tweezers, spoons, or masking tape that is used as a food capturing apparatus. Students may not use their hands to capture the balls (prey). The masking tape will be folded in a way that the sticky side of the tape is used to pick up the prey. The spoons are placed in each hand and used together to capture prey.
4. The balls are randomly placed in the center of the room and the students' stand at the perimeter of the classroom either in a circle or on either side.
5. When the teacher yells "GO" the predator student in the pair will WALK to the balls to capture one ball at a time using only their food-capturing tool. YOU CANNOT USE YOUR HANDS. Once the student picks up the prey they must carry it back to their partner, who holds the prey. The predator student returns to capture more prey.
6. Predators must work individually and can't kick or move the prey other than using their specific tool.
7. After all the prey are captured; students will record their capture numbers and type of prey in their data table.
8. Repeat once more with the same food-capturing tool and same predator. Record data.
9. Students will then switch roles and the former predator will now hold the prey. Students will also obtain a different food-capturing tool. Repeat trials. Record data.
10. Answer analysis questions.

Analysis Questions

1. List the types of prey that you caught. Compared to the total number of available prey species, what percentage were you able to collect?
2. What challenges did you encounter while hunting prey, relative to the food-capturing tool? Did these challenges influence your ability to survive?
3. Did your food-capturing tool allow you to catch a single type of prey or many different species of prey? What type of tool would allow for a better chance of survival, one that catches many types or a tool, which catches a single species?
4. Besides the method of how you captured your prey what other issues affected your ability to catch prey?
5. If your prey capture tools were the only ones being used by the entire class, what would happen to the prey if you were able to collect over time? In other words, would the species you were catching become more or less abundant relative to others? Harder or easier to find and collect amongst the pile of prey balls?
6. Imagine now that there were predators attempting to catch and eat you, and further, that you became easier to catch when you yourself were hunting prey. Would this likely affect the number of prey you were able to capture (increase or decrease)?
7. What if predators were able to remove most of you and your peers who were hunting for certain prey items. In other words, you, the predator were "overfished"? Would the prey

item you were able to collect become more or less abundant compared to other prey items over time?

8. Consider a situation where nutrients were not limiting, in other words they were available in excess abundance. If the prey balls were phytoplankton, then this would stimulate their growth and could lead to more prey items than you could reasonably eat. If these nutrient additions were the result of human activities, what is the scientific term that describes such a situation (see “How are food webs changing” in explore section for answer)?

Lesson Resources



[Student Handout](#)

National Science Education Standards

K-12 Unifying Concepts and Processes

- Systems, order, and organization
- Evidence, models, and explanation
- Form and Function

9-12 C Life Science

- Interdependence of organisms