

How Size Influences Predatory Habits in an Aquatic Food Web

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. The mechanism for capture also determines predator-prey relationships. This activity explores prey size and the techniques predators use to capture prey. Various types of balls will represent prey, and students (the predators) will have different tools to capture the different balls (prey).

Materials

- Wiffle balls
- Tennis balls
- Basket balls or soccer balls
- Hacky sack balls
- Rubber bouncy balls
- Masking tape or duct tape
- Tongs (chemistry/food tongs)
- Tweezers
- Spoons (two per person)

Procedure

1. Students will be assigned a partner.
2. Select one type of food-capturing tool per pair of students. If using masking tape make sure the sticky side is exposed in order to pick up the prey. If using the spoons, place one in each hand and use them together to capture prey. Each student will play the part of a predator but only one at a time. While one student is the predator the other student will hold the captured prey.
3. Move the desks from the center area of the classroom or go to a gym or outdoor space such as a tennis court.
4. All students stand as far away from the prey as possible, within the boundaries of the room or court. The prey will be in the center of the room.
5. When the teacher yells "GO" only the predator WALKS to the prey to capture one ball at a time using only the food-capturing tool. YOU CANNOT USE YOUR HANDS or FEET. Once the prey is captured, carry it back to the partner to hold. The predator then returns to capture more prey.
6. Predators must work individually and not in teams.

7. A predator must capture at least three prey in order to survive to a reproductive age. Fewer than three prey caught will result in death.
8. If running violations as well as excessive physical injustices occur, then a prey will be deducted from your team's total prey count.
9. After all the prey is captured, the feeding cycle is over and prey consumption is recorded in the data table. Record both the amount and type of prey.
10. Students holding the captured prey will return the prey to the center area. Balls should be mixed and randomly placed.
11. Repeat once more with the same food-capturing tool and predator. Record data.
12. Students will switch roles and use a **different** tool. Complete two trials and record data both times.
13. Answer analysis questions.

Data Table

Food-capturing Tool	# Prey Caught	Type of Prey	Survive/Death
1.			
2.			
1.			
2.			

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?
1. 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?
2. Besides the method of how you captured your prey what other issues affected your ability to catch prey?
3. If your prey capture tools were the only ones being used by the entire class, what would happen to the prey 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?
4. 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)?

5. What if other predators were able to remove most of you and your peers who were hunting for certain prey items. In other words, you, the predators, were “overfished”? Would the prey item you were able to collect become more or less abundant compared to other prey items over time?

6. 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 the Explore section for answer)?