

12

Modeling the Introduction of a New Species

MODELING

WHAT HAPPENS WHEN a new species is introduced into an ecosystem? Does it change the availability of food and, therefore, the matter and energy available to other organisms?

Consider the zebra mussel. As you know by now, this species has been causing many problems in the United States since humans unintentionally introduced it in the 1980s. How can such a tiny organism, which averages around an inch long, cause such serious problems?

To answer this question, we need to look at how a zebra mussel gets its food. Like all animals, zebra mussels acquire their food by eating other organisms. They feed by filtering microscopic plants and animals out of the water. A one-inch zebra mussel can filter 1 L of water a day. If you had a number of zebra mussels that totaled 1 kg of mass, they could filter 180 L each day. That's the equivalent of a 45-kg (100-lb) person filtering 8,100 L per day. (Imagine over 4,000 2-L bottles!) Zebra mussels are so efficient at filtering out food from the environment that other animals that feed the same way can't compete with them.



Zebra mussels feeding.

In this activity, you will model what happens to matter and energy when a new species is introduced into an ecosystem.

GUIDING QUESTION

How does a new species affect the flow of energy and cycling of matter through an ecosystem?

MATERIALS

For each group of four students

- 1 set of 9 Food Web cards

PROCEDURE

Part A: Constructing your food web

1. Work with your group to examine all nine of the Food Web cards in your set.
2. As a group, choose at least four cards and construct a simple food chain. Record your food chain in your science notebook.
3. Identify the producers and consumers, and show how energy flows and matter cycles through the ecosystem.
4. Work with your group to create a food web using all of the cards in your set, identifying what happens to energy and matter for each interaction. Record your food web in your science notebook.
5. Discuss your work with another group of students with the same set of Food Web cards. How similar or different are your ideas?
6. Look at the food webs created by groups that have a different set of Food Web cards, and make note of any similarities and differences.

Part B: Introducing a species to your food web

7. Your teacher will give you a new species to add to your food web. Identify what type of organism it is and its role in the ecosystem.
8. Use your model to explore how this new species affects the flow of energy and cycling of matter through your ecosystem, and record your revised food web in your science notebook.

9. As instructed by your teacher, share and discuss your new model with another group.

ANALYSIS

1. Explain how the introduction of your new species affected your ecosystem. Be sure to address which interactions were affected.
2. What would happen if
 - a. the top predators disappeared from your ecosystem? This might happen if the predators were overhunted. How does this affect the flow of energy through your ecosystem?
 - b. the producers disappeared from your ecosystem? This might happen if a disease caused the producers to die off. How does this affect the flow of energy through your ecosystem?
3. **Introduced Species Research Project:** Explain how the introduction of the species you are investigating impacts the flow of energy and cycling of matter in the ecosystem.