

ACTIVITY NINE:

WEB OF LIFE GAME

TIME: (1) 45-minute lesson

SCIENCE PROCESS SKILL: Inferring, predicting, and drawing conclusions

SCIENCE CONCEPT: Nonindigenous species will severely impact a native food web.

BENCHMARKS:

Students should:

Know that, for any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

Know that organisms interact with one another in various ways in addition to providing food.

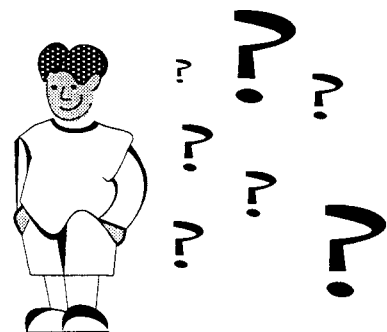
Know that, in all environments - freshwater, marine, forest, desert, grassland, mountain, and others- organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter. In any particular environment, the growth and survival of organisms depend on the physical conditions.

Know that models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly; that are too vast to be changed deliberately; or that are potentially dangerous.

Know that people can keep track of some things - see where they come from and where they go.

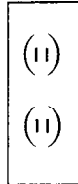
OBJECTIVE: Students will demonstrate the critical changes in a native river ecosystem due to the introduction of zebra mussels.

WHAT YOU OUGHT TO KNOW



A native river habitat is a fluid yet fragile community. Introduced species have altered, permanently in some cases, the natural food chain. The “Web of Life Game” actively demonstrates to students the impact zebra mussels have in a native river environment. You should discuss at length the food pyramid overhead provided. Students will understand the impact of zebra mussels better by playing the “Web of Life Game.”

Dissolved oxygen, the available oxygen needed for species to live underwater, is a critical ingredient in a river habitat. All plants use carbon dioxide and water to produce oxygen during photosynthesis. In a river ecosystem, plants in the water produce oxygen; and underwater animals, including zebra mussels, use this dissolved oxygen. When zebra mussel numbers increase rapidly, they use tremendous amounts of dissolved oxygen, which cause native fish to die.



WHAT'S THE CONNECTION??

TO LANGUAGE:

Students will record in their journal each of the three phases of the game.

TO ART

Students will draw a river habitat before the game and before looking at the river poster included. After the game, when they are more familiar with the food chain, students will redraw or add to their pregame picture, using the rivers and wetland poster included.

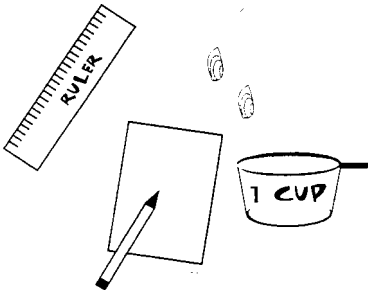
TO SOCIAL STUDIES:

Interview Department of Natural Resources staff specialists about other ecosystems or habitats in trouble. Students will report their findings to the class.



WORDS OF WISDOM

Biological diversity, dissolved oxygen, ecosystem, food chain, food web, habitat, larval fish, native species, organic matter, zooplankton, veligers (see also glossary on page 7)



RESOURCES AT THE READY

Character name tags (double sided) with zebra mussels on the back of all 30 tags

Names: larval fish (10)

native mussels (10)

larger fish (10)

3 diving ducks (name tags without zebra mussels on the back)

150 blue game pieces - indicates dissolved oxygen

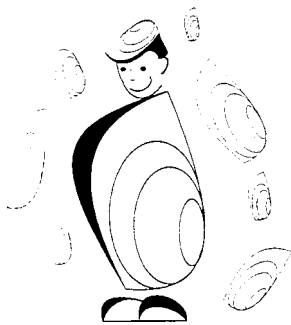
150 red game pieces - indicates zooplankton

Chalkboard, pad of paper, and pencil to record students' observations after the game has concluded

Food Pyramid overhead

Food Pyramid Teacher's Key 9.1

River and wetland posters



TIME TO EXPERIENCE ZEBRA MUSSEL MANIA!!

The following game is played in three rounds. As each round is completed, the teacher and students should discuss the changes that have occurred in this simulated ecosystem.

WEB OF LIFE GAME

SETTING UP THE GAME:

The following game instructions are based on using 30 students; the game may need to be adjusted for a different number of students. If possible, the game should be played in the gym or cafeteria, on the playground, or any other area with enough room to allow the students plenty of movement. Begin the game with 10 larval fish, 10 native mussels, and 10 larger fish.

OBJECT OF THE GAME:

To survive as long as possible.

DIRECTIONS FOR STUDENTS

ROUND ONE

1. Students put on the name tags, and the teacher scatters the game pieces in a large playing area so all students have easy access to the game pieces.
2. At a signal from the teacher, all students scramble to collect as many game pieces as possible.
3. Each species needs a certain amount of dissolved oxygen and zooplankton to survive. Students and teacher determine which species have survived based on the species needs in the following chart:

	DISSOLVED OXYGEN (blue game pieces)	ZOOPLANKTON (red game pieces)
larval fish	6	6
native mussels	6	6
larger fish	10	10
zebra mussels*	2	2
diving ducks*	14	14

*These two species will participate later in the game.

4. Species must have at least the required number of the specific game pieces to survive; survivors remain the same species for the next round. Species that do not have the required number of game pieces die and become zebra mussels in the next round (by turning their tag over).

ROUND TWO

5. Collect and rescatter the game pieces. Have the students again collect as many game pieces as possible.
6. Repeat step 3 to determine who survived. If many animals other than zebra mussels survive, repeat round two.
7. At the end of round two, each animal keeps the game pieces he/she collected in preparation for round three.

ROUND THREE

8. Select three students at random to become diving ducks. The diving ducks may “eat” any surviving animals by tagging them.
9. The diving ducks take all the game pieces from each animal as it is tagged. The tagged animal now has been “eaten” and is out of the game. The round concludes when all game pieces have been collected.
10. Students and teacher discuss who has survived and why (see chart in step 3).
11. Students and teacher discuss the game to illustrate the impact of zebra mussels on the native species, and the impact of diving ducks on zebra mussels and larval fish. Students should understand the effects of zebra mussels and how they can destroy an ecosystem and its biodiversity.
12. The results may be different each time the game is played. If you choose, play the game again.

WHAT DID YOU LEARN??

Chart the results from the first and second games. Compare the results to see how in nature the food web interactions are constantly changing. More zebra mussels will reduce the numbers of large fish because the zebra mussels are depleting necessary nutrients and life support.

WAIT, THERE'S MORE. . .

Play the game using different numbers of animals per species for different results.