Unit 4
How Can a Dam Affect a River?
Activity B

Do the same plants and animals that live in a reservoir live in a river?

Introduction

As students consider the parameters of the data and consider how to use that information, they gain knowledge about the conditions affecting different species in the river and reservoir ecosystems. Based on their evaluations, students then act as scientists to build a food pyramid for river and reservoir ecosystems.

Students will use scientific data to help test the accuracy of their food pyramid. Using information provided by scientists studying river and reservoir ecosystems, students discover some important facts about and differences between river and reservoir systems. For example, reservoirs share many functional similarities with natural lakes. Like lakes, most reservoirs will demonstrate thermal stratification during summer (the season of comparison in this activity). Rivers, on the other hand, do not thermally stratify because of the current's speed.

Scientific Learning Goals and Objectives in this Activity:

(Goals from Washington State Commission on Student Learning — Essential Learning Requirements for Science)

Goals

- Students will understand and apply scientific concepts and principles.
- Students will conduct scientific inquiry.
- Students will communicate scientific understanding.

Objectives

- Students will gain knowledge about conditions that affect many species' survival in model river and reservoir ecosystems.
- Students will apply knowledge about species by placing them in an appropriate ecosystem.
- Students will apply knowledge of appropriate habitats for species through development of a food pyramid for the model ecosystems.

Teacher Preparation

Preparation Time:
10 minutes

Materials

Prepare for the Entire Class:

- overhead transparency of river/reservoir ecosystem completed from previous activity
- overhead transparency of Environmental Species Spreadsheet

Prepare for Each Team:

- River/Reservoir Ecosystem handout from previous activity
- copy of the Environmental Species Spreadsheet

Prepare for Each Student:

- copy of journal page

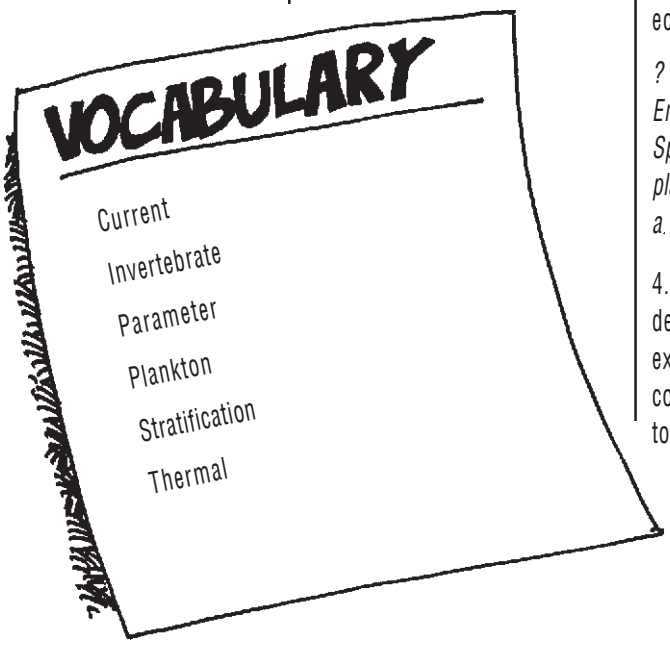
Student Involvement

Activity Time:
50 minutes

Activity Processes:

? How could you determine if the master list of plants and animals generated by the class contains all the organisms actually found in a river/ reservoir ecosystem?

1. Brainstorm ways that a scientist could determine if the plants and animals are actually in a particular river/reservoir ecosystem. List on board or overhead both the methods they would use (such as observation, examining feces to look for prey bones, feathers, etc.) and parameters they would need to consider (such as length of time for study, number of species studied, area to study, etc.). Each student should list two possible methods and four parameters in their journal.



2. Each team takes out their river/reservoir handout from previous activity. If teams have not mentioned the presence of current in their parameters, elaborate on the fact that most reservoirs have a very slow current (flow rate at an average 1.5 ft/sec.), while rivers have a current between 1 and 9 ft/sec (average 5 ft/sec.). This is shown on their river/reservoir handout.

3. Hand out the Environmental Species Spreadsheet to each team. Explain that scientists studying the environmental effect of dams on rivers and reservoirs have observed and collected this data. This list of organisms includes some, not all, of the animals and plants found in and near rivers and reservoirs. Teams will use the information about habitat preference and food source presented in the spreadsheet to create, test, and compare food pyramids for river and reservoir ecosystems.

? How can you use the Environmental Species Spreadsheet to determine if a plant or animal prefers to live in a river or reservoir?

4. From the Spreadsheet, demonstrate how teams can examine the Habitat Preference column of each organism listed to predict whether the organism prefers a river or reservoir habitat. The speed of the current and presence or absence of still and flowing water are the parameters used to make this determination. Teams should place a check in the river or reservoir column that they think the organism would prefer based on the habitat preferences listed. Some organisms may be found in both the river and reservoir habitat, and could receive checks in both columns (see Teacher Notes).

The Food Source column provides additional information that can help students in their prediction. Using this column is optional. After teams have predicted where organisms will prefer to live, place transparency of Environmental Species Spreadsheet on overhead and utilizing teacher master, check correct habitat preference for each organism. Encourage class to discuss discrepancies between predicted and actual habitat preferences.

? Based on the preferences checked, can you create a river food pyramid and a reservoir food pyramid?

5. Each team draws two food pyramids, one for the river and one for the reservoir, using the preferences checked on the Environmental Species Spreadsheet.

Student Involvement Continued

? What effects do you think creating a reservoir in the river had on the ecosystem and why?

6. Teams share their observations of differences in the food pyramids between a river and reservoir habitat.

? What other factors affect the river ecosystem?

Examples include pollution, logging, grazing, mining, development, etc. Also, how does this occur and who should be responsible for monitoring it (government, industry, etc.)?

Students answer journal questions.

Notes

Step 2: When attempting to determine the accuracy of their pyramids, students will invariably mention "tests" or some variation on that theme. They will soon realize that tests are conducted using parameters. The goal at this point is for the students to understand that parameters—or limits—are necessary to a focused inquiry. They will list the parameters they can think of for habitat, such as light, nutrients, depth of water, etc. **If they omit season (summer), temperature, and current, be sure to add them to the list. Those are the parameters that will be used in this activity.**

Step 5: As student teams discuss habitat preference, they may realize that scientific information can be interpreted differently based on how each student thinks about the data given. Encourage students to express the reasons for their decision and the thought processes involved. In a well-functioning team, the collective wisdom and ability to check each other's reasoning will lead to the most accurate interpretations.

Step 6: Students may add organisms to the Environmental Species Spreadsheet using the blank spaces in each category. Any additions must be properly researched in light of the parameters to determine river or reservoir habitat preference. The Environmental Species Spreadsheet is not exhaustive; many plants and animals are not included so as to keep the activity manageable.

Step 8: You can also use the class river/reservoir overhead so students can compare what they originally predicted to what their food pyramids now show.

Journal 4B
Do the same plants that live in the reservoir live in a river?

Name _____

Team Name _____

Date _____

Describe a test a scientist could use to determine if the plants and animals listed by the class actually live in or near a selected river or reservoir.

List four parameters a scientist would need to establish for the test. For example: number of days to observe, size of area to study, etc.

What effect do you think creating a reservoir on the river had on the ecosystem?

What other factors might affect the river ecosystem?