Stream Study

LIFE SCIENCE STANDARDS

LEVELS K-4	LEVELS 5-8	LEVELS 9-12
Characteristics of organisms	Structure and function in living systems	Interdependence of organisms
Life cycles of organisms	Populations and ecosystems	Behavior of organisms
Organisms and environments	Diversity and adaptations of organisms	

Objectives:

- To observe and understand stream habitat
- To learn how aquatic organisms can be indicators of water quality

Materials:

- Collecting Jars and Tin Pie Plates
- Sieves and Kick Net
- Survey Ribbon (Variety of Colors)
- Thermometer on a String
- Orange
- Stop Watch
- Tape Measure and Yardstick
- Magnifying Glasses
- Waders

Activity:

1. Have a discussion with the students before the trip about what they might expect to find in and around a stream.

2. Point out the physical properties of the stream and discuss its probable developmental history.

3. Help students discover and identify the main rock types in the area.

4. Have students carefully investigate vegetation and other forms of aquatic life found in the stream, especially under stones.

5. Direct students to use the sieves, collecting jars, and other equipment to catch live specimens. Have students take the specimens to the stream bank and look at them with the magnifying glass. (Mud scooped up in strainers and examined in tin pie plates yields many finds). Return all specimens to the stream at the end of the activity. You can mark specific locations with different colors of plastic survey ribbon.

6. Record the time it takes for an orange to float downstream ten feet. Repeat the experiment at various places along the stream. Make comparisons. Discuss changes in habitat that occur as the speed of the stream increases.

7. Choose a cross-section of creek in the middle of the 10-foot section of creek and calculate the cross-section area. Combine this information with water velocity to calculate stream flow.

8. Measure the temperature of the stream at various depths and locations. Compare the results.

9. Use the biotic index to compare life in different stream habitats and the quality of the water.

Stream Vegetation

1. Describe the vegetation in and around the stream, including the banks.

2. Sketch a picture of one plant or tree that you found interesting.

3. Take photographs.

Photo Journal	
Photograph	Description
1	
2	
3	
4	
5	
6	
7	

Rock Identification Guide

Igneous	Sedimentary	Metamorphic
		
Basalt	Conglomerate	Marble
		
Diorite	Limestone	Quartzite
		
Granite	Sandstone	Schist
		
Obsidian	Shale	Slate

There are three groups of rocks, igneous, sedimentary, and metamorphic. Rocks are big and small. Rocks are of many colors even colors mixed together. Igneous rocks were formed by heat. Sedimentary rocks were formed by sediment from rivers and streams. Metamorphic rocks began as one kind of rock and later were changed into another kind. This guide provides a few examples from each group. To learn more about rocks, visit the U.S. Geological Survey site at http://geomaps.wr.usgs.gov/parks/rxmin/.

Cyberbee Learning

Stream Data Sheet

Name_____

Stream Name _____

Location _____

Collection Date _____

Weather Conditions (Last 3 Days)

Measuring Stream Velocity

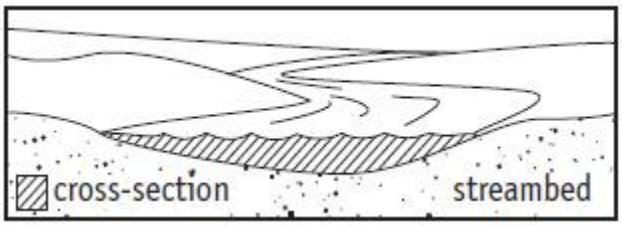
Record the time it takes for an orange to float downstream 10 feet. Repeat the experiment at various places along the stream. Make comparisons. Discuss changes in habitat that occur as the speed of the stream increases.

Stream Velocity Worksheet			
Tries	Distance	Time	Velocity
1	10 ft	÷ s=	ft/s
2	10 ft	÷ s=	ft/s
3	10 ft	÷ s=	ft/s
4	10 ft	÷ s=	ft/s
		Total =	ft/s
			÷ 4
		Average Velocity	ft/s

This worksheet was adapted from the National Park Service.

Calculate the Cross-section Area

Choose a cross-section of creek in the middle of the 10-foot section of creek and calculate the cross-section area.



Result: _____ft x _____ft = _____ft²
(width) (average depth) (area)

Average Depth Work Area			
	Depth	Convert to feet	
1	in	÷ 12=	ft
2	in	÷ 12=	ft
3	in	÷ 12=	ft
		Total =	ft
			÷ 3
		Average Depth	ft

This worksheet was adapted from the National Park Service.

Calculate Stream Flow

Multiply velocity times area to calculate flow.

_____ft/s x _____ft² = _____cfs (cubic feet per second)
(velocity) (area) (flow)

Water Clarity ☐ Clear ☐ Cloudy ☐ Muddy

Temperature

Measure the temperature of the stream at various depths and locations. Compare the results.

Location 1 F°_____ C° _____ Location 3 F°_____ C° _____

Location 2 F°_____ C° _____ Location 4 F°_____ C° _____

Average Temperature F°_____ C° _____

Water Quality

Use the biotic index to compare life in different stream habitats and the quality of the water. You will collect macroinvertebrate samples and determine the water quality of the stream.

Stream Life: Macroinvertebrate Sampling

Step 1: Collect Samples

Wade into the stream and scoop material from the bottom of the stream. Push and pull the kick net through the stream. Hand pick organisms from under and on top of rocks and logs.

Step 2: Prepare Samples

Rinse the sediment from your sieve. Hold your kick net over a plastic pan and use a bucket of water to wash the material into the pan.

Step 3: Sort Samples

Sort and identify the macroinvertebrates using the biotic index and collection jars. Record the number of the types of organisms on the macroinvertebrate stream data worksheet.

Macroinvertebrate Count

Put a check in the box next to the organism you find. Multiply the number of organisms by the points for each class. Add the index values for each class.

Class 1: Sensitive (3 Points Each)		Class 2: Somewhat Tolerant (2 Points Each)		Class 3: Tolerant (1 Point Each)	
☐	Caddisfly Larvae	☐	Crane Fly Larvae	☐	Aquatic Worms (Tubifex)
☐	Dobsonfly Larvae	☐	Crayfish	☐	Black Fly Larvae
☐	Fairy Shrimp	☐	Damselfly Nymphs	☐	Drone Fly Larvae
☐	Fish & Other Invertebrates	☐	Dragonfly Nymphs	☐	Leeches
☐	Gilled Snails	☐	Fingernail Clams	☐	Lung Snail
☐	Mayfly Larvae	☐	Flatworms	☐	Other Snails
☐	Riffle Beetle Adult	☐	Scuds	☐	Midge Larvae
☐	Salamanders	☐	Sowbugs	☐	Mosquito Larvae
☐	Stonefly Nymphs	☐		☐	
☐	Water Penny Larvae	☐		☐	
Boxes checked x 3 = _____ index value Class 1		Boxes checked x 2 = _____ index value Class 2		Boxes checked x 1 = _____ index value Class 3	

Water Quality Rating

Total Index Value = _____

☐ Excellent (>22) ☐ Good (17-22)

☐ Fair (11-16) ☐ Poor (<11)

Biotic Index

Class 1

Not to Scale

Salamander

Gilled Snail

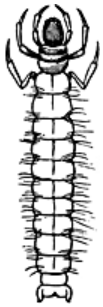
Stonefly Nymph

Mayfly Nymph

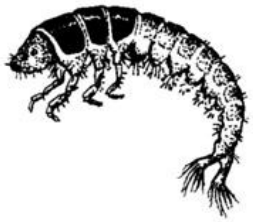
Dobsonfly Larva

Water Penny

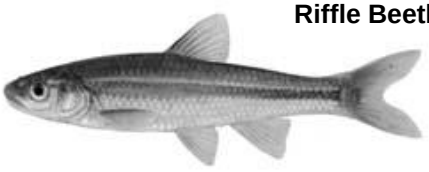
Riffle Beetle



Caddisfly Larva



Fairy Shrimp



Fish & other invertebrates

These organisms are pollution sensitive and can be found in good water quality.

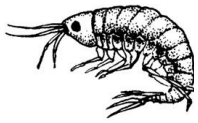
Class 2

Aquatic Sowbug

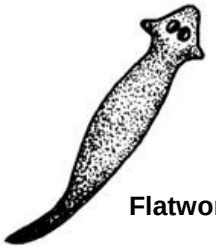
Crayfish

Dragonfly Nymph

Damselfly Nymph

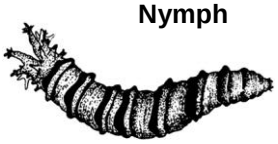


Scud



Flatworm

Fingernail Clam



Cranefly Larva

These organisms are somewhat pollution tolerant and can be found in good or fair water quality.

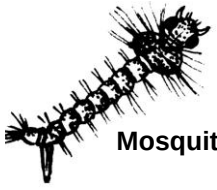
Class 3

Tubifex Worms

Drone Fly Larva

Midgefly Larva

Lung Snail



Mosquito Larva

Leech

Black Fly Larvae

These organisms are pollution tolerant and can be found in any quality of water.