

## Lesson 21

# Water Studies

How can streams and rivers be monitored?  
How do water characteristics, riparian banks and watershed habitats indicate stream health?

**GOAL** To examine and record physical characteristics of specific body of water and surrounding land to assess a more complete picture of overall health of water body.

**OBJECTIVES** Students will:

- ✓ examine and record observations of riparian banks
- ✓ measure velocity, take temperature, measure depth of water body
- ✓ determine human impact

**MATERIALS** data recording sheets, clipboards, pencils, plastic containers, stop watch, meter sticks or another type of measuring stick, measuring tape, water thermometer

### CORE CURRICULUM CONTENT STANDARDS

- Math 1(1,2), 2(2,3)
- Science 1(1-6), 3(4), 5(3), 7(1,5-7), 8(2-4,6), 14(1,2,7)
- Social Studies 9(1-3), 10(1-4,6), 11(1,5), 12(1-3,5)

**VOCABULARY** velocity, riffle, pool, run

### PROCEDURES

1. Prior to lesson, choose three sites students will study. Group students into three teams. Each team will be responsible for collecting data that will later be shared with classmates. Have students design a presentation based on the data collected. Have them determine the health of the stream through their observations.
2. The three data collecting teams include:
  - A. General Water Characteristics
  - B. Bank and Sediment Characteristics
  - C. Watershed Habitats and Human Impact
3. Distribute appropriate forms and equipment (forms located at the end of lesson).
4. Teams will examine the three sites and use the data to compare the areas.
5. After data is collected, discuss results with students.

## **EXTENSIONS**

1. Have students participate in an adopt-a-stream or stream watch program and monitor certain sections of the river. Local monitoring programs are offered through Project Search and FRWA.

## **RESOURCES**

Rosselet, Dale A., *New Jersey WATERS, A Watershed Approach to Teaching The Ecology of Regional Systems*, New Jersey Audubon Society, 1999, Bernardsville, New Jersey 07924.

## **GLOSSARY**

**pool** - a deep or still place in a stream

**riffle** - a shallow, gravelly area of a streambed with a swift current; used by spawning of trout or other fish

**run** - straight course of a river

**velocity** - rapidity or speed of motion; swiftness



**FRESHWATER STREAM OR RIVER  
Group A Data Collection Form  
Water Characteristics**

**Water body Name** \_\_\_\_\_

**Watershed Name** \_\_\_\_\_

**Team Members:**

**1. Circle stream habitats present (more than one may be applicable)**

Riffle

Pool

Run

Riffle – shallow areas with fast, running water over rocks Pool – deep area with slow water Run – deep area with fast water
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**2. Water Appearance (Circle the best description)**

Clear

foamy

oily

brown

Other color, describe \_\_\_\_\_

**3. Odor**            \_\_\_\_\_yes            \_\_\_\_\_no

If yes, describe \_\_\_\_\_

**4. Water Temperature**

Sunny area \_\_\_\_\_degrees Fahrenheit or Celcius

Shady area \_\_\_\_\_degrees Fahrenheit or Celcius

## 5. Volume

a. Measure a length of a stream (stream reach) to calculate volume. \_\_\_\_\_ ft

b. Calculate the average width of the stream reach

Width at upstream end of test site \_\_\_\_\_ ft.

Width at midpoint of the test site \_\_\_\_\_ ft.

Width at downstream end of test site \_\_\_\_\_ ft.

Average = \_\_\_\_\_ ft.

c. Calculate the average depth of the stream reach. Take three measurements.

Depth at upstream end of test site \_\_\_\_\_ in.

Depth at midpoint of test site \_\_\_\_\_ in.

Depth at the downstream \_\_\_\_\_ in.

Average depth \_\_\_\_\_ in.

Convert average depth to feet. \_\_\_\_\_ ft.

d. Multiply **length** x **average width** x **average depth** to determine volume of water in test section.

Volume = \_\_\_\_\_ cu.ft.

d. Convert cubic feet to gallons. One cubic foot equals eight gallons of water:

\_\_\_\_\_gallons of water in test section

## 6. Water Velocity

Measure a 50 foot section of the stream.

Select a small object that will float (stick, leaf, tennis ball)

Measure the time it takes the object to float to the selected section.

Repeat the process three times and average times.

Time #1 \_\_\_\_\_

Time #2 \_\_\_\_\_

Time #3 \_\_\_\_\_

Average \_\_\_\_\_ (add the times together and divide by 3)

Divide the distance (50 ft.) by the average time to determine the velocity (in feet per second)

Stream velocity = \_\_\_\_\_ ft./sec.

## **FRESHWATER STREAM OR RIVER**

### **Group B Data Collection Form**

### **Valley Profile, Stream Bank, Channel and Sediment Characteristics**

**Water body Name** \_\_\_\_\_

**Watershed Name** \_\_\_\_\_

#### **Team Members:**

1. From the furthest area downstream in your study area, look upstream to the left and to the right to determine the stream valley's profile. Circle the letter that best describes the profile.

- a. U - shaped – glacially scoured
- b. V – shaped – young stream
- c. floodplain valley – mature stream

2. From the same point, pick the description that best fits the stream and stream channel.

a. stream bank	left bank	right bank
vertical cut	?	?
steeply sloping (more than 30 degrees)	?	?
gradual, no slope (less than 30 degrees)	?	?

b. stream channel (width - bank to bank; depth - top of bank to bottom of channel)

narrow, deep (width less than 6 ft.; depth more than 3 ft.)

narrow, shallow (width less than 6 ft.; depth less than 3 ft.)

wide, deep (width more than 6 ft.; depth more than 3 ft.)

wide, shallow (width more than 6 ft.; depth less than 3 ft.)

5. Describe the stream side cover. Circle the one that fits the best.

a. Along the stream's edge and bank

	not present	present	plentiful
trees	?	?	?
bushes, shrubs	?	?	?
grasses, ferns	?	?	?
lawn	?	?	?
rocks/boulders	?	?	?
gravel/sand	?	?	?
bare soil	?	?	?
pavement, structures	?	?	?

b. Measure out 25 yards from stream bank.

	not present	present	plentiful
trees	?	?	?
bushes, shrubs	?	?	?
grasses, ferns	?	?	?
lawn	?	?	?
rocks/boulders	?	?	?
gravel/sand	?	?	?
bare soil	?	?	?
pavement, structures	?	?	?

6. Circle the category that best describes the percentage of shade that the stream provides

0%            25%            50%            75%            100%

7. From the same point in the study site, look upstream and check if the following conditions are present. Circle if applicable to site area.

Plant cover degraded	Bank collapsed, eroded	garbage
Foam on bank	yard waste	livestock
Discharging pipes	ditches	other pipes

8. Are there any logs or large woody debris in the stream (“wood is good”)?

9. Are there organic materials in the stream? (leaves, twigs etc.)



## FRESHWATER STREAM OR RIVER

### Group C Data Collection Form

### Watershed, Habitat, and Human Impact Characteristics

Water body Name \_\_\_\_\_

Watershed Name \_\_\_\_\_

#### Team Members:

1. Describe the visible impact on the stream.

Present	Impact
<input type="checkbox"/> Single family housing	_____
<input type="checkbox"/> Multifamily housing	_____
<input type="checkbox"/> Lawns	_____
<input type="checkbox"/> Commercial	_____
<input type="checkbox"/> Other	_____
<input type="checkbox"/> Paved roads/bridges	_____
<input type="checkbox"/> Unpaved roads	_____
<input type="checkbox"/> Housing development	_____
<input type="checkbox"/> Commercial development	_____
<input type="checkbox"/> Road construction	_____
<input type="checkbox"/> Grazing land	_____
<input type="checkbox"/> Cropland	_____
<input type="checkbox"/> Boating	_____
<input type="checkbox"/> Golfing	_____
<input type="checkbox"/> Camping	_____

- Swimming \_\_\_\_\_
- Hiking \_\_\_\_\_
- Logging \_\_\_\_\_
- Landfill \_\_\_\_\_
- Industry \_\_\_\_\_

2. Note the types and number of structures that alter the natural flow of the stream.

\_\_\_\_\_ none          \_\_\_\_\_ dams          \_\_\_\_\_ bridges  
\_\_\_\_\_ waterfalls      \_\_\_\_\_ beaver dams

3. Any evidence of:

\_\_\_\_\_ litter                                  \_\_\_\_\_ erosion

4. Any special problems?

\_\_\_\_\_ chemical spills      \_\_\_\_\_ flooding      \_\_\_\_\_ fish kills  
\_\_\_\_\_ periods of no flow      \_\_\_\_\_ wildlife kills

5. wildlife

- a. wildlife around water body
  - amphibians
  - waterfowl
  - reptiles
  - mammals
  - invertebrates
- b. fish
  - barriers to fish
- c. aquatic plants