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Lesson plan for School of Conservation.

## **Stream Volume of Flow Determination**

Trip Activity # 2

### **Goals:**

1. Encourage group work.
2. Encourage interdisciplinary work.
3. Having students practice measuring.
4. Develop skills in estimating.

### **Objectives:** Students will be able to:

1. Measure stream depth and width in inches.
2. Convert from inches, and gallons, to the SI units.
3. Take average of value.
4. Calculate stream speed.
5. Determine the volume of water flowing in the stream.

### **Materials:**

Tape measure  
Meter stick  
Pencil  
Calculator  
Stopwatch  
Two big sticks  
Three short sticks  
Data sheet  
Boots

### **NJCCCS:**

5.1.8.A-C, 5.3.8.A, 5.3.8.B, 5.3.8.D, 4.1.8.B, 4.1.8.C, 4.2.8.D, 4.2.8.E, 4.5.8.A-F

### **Activities and Procedures:**

1. Arrive at the location and review the activities with the class.
2. Review safety techniques prior to entering the water.
3. Have the students estimate the daily volume of water flow in gallons.
4. Two students enter the water and measure the distance of 10 feet to be tested in stream area.
5. Place the big sticks to mark the start and end points of the 10-foot parameter.
6. Measure the width of the stream in three different locations, upstream, midpoint, and downstream along the marked 10-foot area.
7. Have some students record the measurements on the data sheets.
8. Measure the depth of the stream along the marked 10-foot area. Take at least 6 measurements.
9. Float a short stick through the 10-foot length.

10. Measure (in seconds) how long it takes for the stick to float through the 10 foot area. Record the time. Repeat three times.
11. Every student has to have a data sheet and calculate on his/her own the average width, average depth in inches and feet, the average speed, and do calculations on a daily volume of water flow in gallons.
12. Compare the results for accuracy.
13. Have them compare the actual results with one that they had estimated before the activity. Are they surprised?
14. Discuss with students the daily volume of water flow, and compare results of each group.

**Accommodations:**

1. Hand-out data sheet before the trip.
2. Clarify instructions before the activity.

**Assessments:** *To be completed at home:*

1. Convert values on the worksheet into SI units.
2. Write a reflection to answer the following:
  - a. What happens in places where the stream width is smaller?
  - b. What happens in locations where the stream width is larger?
  - c. Where you surprised at your calculated results?
  - d. Compare calculated results to that of Niagara falls?

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Hydrology

**Length:** 10 feet

**Width:** Upstream \_\_\_\_\_ feet

Midpoint \_\_\_\_\_ feet

Downstream \_\_\_\_\_ feet

Average Width = \_\_\_\_\_ feet

**Depth:** Section 1 \_\_\_\_\_ inches

Section 2 \_\_\_\_\_ inches

Section 3 \_\_\_\_\_ inches

Section 4 \_\_\_\_\_ inches

Section 5 \_\_\_\_\_ inches

Section 6 \_\_\_\_\_ inches

Average Depth = \_\_\_\_\_ inches

Average Depth = \_\_\_\_\_ feet (divide inches by 12)

**Speed:** Trial 1 \_\_\_\_\_ seconds

Trial 2 \_\_\_\_\_ seconds

Trial 3 \_\_\_\_\_ seconds

Average Speed = \_\_\_\_\_ seconds

### Daily Volume of Water Flow in Gallons

Length of Stream                      10 feet

Average Width of Stream                   feet

       feet<sup>2</sup>

Average Depth of Stream                  feet

Volume                                        feet<sup>3</sup>

There are approximately 8  
gallons per cubic foot of liquid.

x 8 gallons

=        Volume in Gallons

To get the total volume per one second, you divide the above volume in gallons by the total number of seconds of the average speed you measured.

       speed (in seconds)

       gallons per second

60 (# seconds in a minute)

       gallons per minute

60 (# minutes in an hour)

       gallons per hour

24 (# hours in a day)

       gallons per day