Stream Study Physical Data

Description: The students will be measuring temperature, depth, width and velocity of the stream.

Objectives: Students will be able to

Discuss the relationships between air temperature and water temperature.
Accurately measure and map the stream against a baseline.
Divide the width into 5 equal sections and measure the depth at 4 different points.
Determine the streams velocity.
Discuss erosion as it pertains to velocity and depth.
Considering the entire length of the stream, decide where the next major bend will occur and why.

Area of Activity: Take the path behind the environmental center. Once at the stream, take a right. The baseline is set up as five, 3 foot high stakes connected with twine.

Materials Provided: Thermometer, measuring tapes, a stop watch, Physical Data worksheets, a fishing bobbin, a rope with moveable markers on it for dividing the width of the stream, scrap paper for math, pencils. Grab a couple clipboards to take with you.

Procedures: Introduction (10 minutes)

Before arriving at the stream have the students sit and introduce them to the lesson. This is Stream study with a physical focus. What does that mean? Have someone descibe you physically. Now what things might be considered physical measurements for a stream? If the discussion starts to include things actually in the water itself explain that these are parts of the chemical and biological make up of the stream, not part of our lesson today.

Also go over the worksheet and assign students to measure certain things.
One record keeper is needed at all times. (clipboard and worksheet)
One person to record air and water temperature. (thermometer)
Groups of three are required to measure the width at each of the five stakes. (tape measure)
One person to map the stream on the grid. (clipboard and worksheet)
One person needed to divide the width at one point into 5 equal sections. (math clipboard)
Three for the depth (at four points). (rope with markers and measuring tape)
For velocity the whole group should be involved, but there must be one person to drop the bobbin and one to run the stopwatch.

Beside the velocity all measurements can take place simultaneously. If the group is a bit excited, you may want to run one thing at a time to insure accuracy and discussions.

continued

CENTER ACTIVITY (20-30 minutes)

TEMPERATURE

Make your way to the baseline. The person measuring air and water temperature can begin with the water. Leave the thermometer resting at the bottom of the stream for five minutes. Record it. Have that person also solicit the group for ideas concerning why the temperature is very different or nearly the same. This depends on the time of year, whether it has rained or snowed recently, surface area of the stream exposed to the air, etc. The other measurements can be a bit time consuming and keeping the students engaged can limit the amount of bored, destructive behavior that occurs.

STREAM MAPPING

During the stream mapping, the record keeper will be marking points on a graph and then connecting the dots. Each group of three positions one person at the stake, one person at the near edge of the stream and one person at the far edge. The tape measure must cross the stream perpendicular to the baseline to have an accurate result. By looking down on the tape the student then tells the record keeper the measurement where water ends and land begins. Once measurements have been taken at all five stakes the dots can be connected and the stream mapping is complete.

DEPTH

To measure the depth, two people measure the width of the stream (not from the baseline). The width must be divided by 5, and the 6 markers on the string must be placed equidistant with one marker at the near edge and far edge of the stream. The third person then measures down into the stream directly underneath each of the four middle markers. Let the record keeper know the depth at each point.

VELOCITY

This is the fun one. Have students spread out along both banks of the stream. Have them remove obvious debris, such as twigs and sticks (not rocks), from the streams surface. The person with the bobbin starts at stake 1 and when the person with the stopwatch is positioned at stake 5 (the finish line), the bobbin is dropped into the water. When it hits the water the watch is started. The bobbin may get stuck along the way which is why all students are available to nudge it back on course if it gets stuck. Time stops when the bobbin passes the finish line. As many trials as the students have time for is fine. In the end the times must be averaged and then 20 feet must be divided by the average number of seconds. The result is the stream's velocity in feet per second.

CONCLUSION (10 minutes)

Pack all of the equipment up and begin to walk along the stream banks. So we just looked at temperature, depth, width and velocity. Which of these things affect the shape of our stream? (all but temperature). Can they pick one of these physical qualities that will most affect the shape of our stream in the future? Think of a larger river with tons more water in it moving at fast speeds. What would the fast water flow do to the banks of the river? Erode them away. Take out the stream map. Have the kids imagine that our stream is a large river. Where will the bends in the stream become more pronounced and why? Even though we are thinking big, so that we can picture the process happen more rapidly, all moving water changes shape over time.

Stream Study – Physical Data Worksheet

School –
Grade(s) -
Date –
Time – am 1 am 2 pm 1 pm2

Stream Temperature_____degrees Fahrenheit
Air Temperature_____degrees Fahrenheit

Stream Width (where depth will be taken)_____Inches

Stream Depth (inches)
Point A_____
Point B_____
Point C_____
Point D_____

Stream Velocity (seconds)
Trial 1_____
Trial 2_____
Trial 3_____
Trial 4 _____
Trial 5_____
Trial 6_____

Average Time_____sec

15 feet Divided by Ave Time = Stream Velocity in feet per second.