

# Water Quantity Station

## 1. Intro/Objective

- This video is going to help guide you through the process of hosting the KITC Streamflow Measurement Station.
- The objective of the Streamflow Measurement Station is for students to learn an approachable method for measuring and calculating stream discharge, while drawing important connections between water quantity and watershed health.
- The discharge measurement activity is a platform for the discussion of stream morphology, the hydrologic cycle, climate change, and how humans use and alter our natural waterways.

## 2. Field Day Intro

- When the students arrive go through the process of introducing yourself; including your name, agency, and occupation. Have other station members that are assisting you do the same.
- Briefly state that the objective of the Streamflow Measurement station is to both determine the amount of water flowing in the stream and how it is integral to understanding the health of a watershed.

## 3. Field Day Overview

- Introduce the concept of stream discharge by discussing the common units of measure, cubic feet per second. We stress the fact that units are critical in conveying ideas in math and science.
- Students tend to be more familiar with flow rates in the units of gallons per minute. Make comparisons of what a stream flowing at one cubic feet per second may look like. An example we often use is that one cubic foot per second is equal to 299 kitchen faucets.
- It is important throughout the day that the students are thinking about broad concepts that will guide their thinking during Watershed Wonders. Pose the question: How does watershed health depend on streamflow??
- Next we discuss how stream discharge is calculated. Utilizing the supplied visual aids, discuss the concept (and units) of average stream velocity and the average cross sectional area as components of stream discharge. Attempt to frame the discussion of each equation in the form of a question.
- Using visual aids, we discuss how the streamflow measurement will be conducted in the field.
  - Explain the field site layout.
  - Familiarize the students with the field data worksheet.
  - Then explain the tools that will be used to conduct the measurement.

- Divide the students into appropriately-sized groups and have them measure stream length, stream width at three locations, and stream depth at three locations. Finally lead the students through three timed trials of floating a raft through the stream reach.
  - Once all of the observations have been recorded, have all of the students share information.
  - Distribute calculators and guide the students through the calculation of stream discharge.
  - After a value has been determined lead a discussion comparing their value to what previous groups or you have calculated.
  - Using visual aids, discuss with the students some potential limitations in the method they have used. In general this method over estimates both cross sectional area and velocity, but is simple and inexpensive to conduct.
4. Concluding Discussion
- Finally we lead the students in a summary discussion prompted by the following questions:
    - Where does the water that we measured come from, and why does it flow at the velocity we measured?
    - How do continual changes in discharge affect the stream corridor?
    - Give examples of how humans use and alter the natural flow of creeks or rivers.
    - How might climate change impact the hydrologic cycle, and therefore our daily lives?
  - In conclusion we hope that the students leave this station understanding the following concepts:
    - The flow of the Entiat River is primarily controlled by the melting of mountain snow.
    - Creeks and rivers constantly adjust their shape to inputs of water, sediment, and woody debris.
    - Humans use and alter the natural flow of creeks and rivers in many ways. Many uses are dependent on the gradual melting of mountain snow throughout the summer.
    - Climate change could dramatically reduce mountain snowpack therefore affecting power generation, water available for agriculture, and recreation.