Lesson 3: Cain Creek Water Quality and Macroinvertebrates

Subject

Water Quality

Objectives

The students will:

- Assess how water quality impacts organism populations in an ecosystem.
- Understand the concept of indicator organisms

Materials

- Macroinvertebrates
    - o   Hand lenses
    - o   Macroinvertebrate keys
    - o   Sample trays
    - o   Ice cube trays
    - o   Forceps
    - o   Kick net
    - o   Spoons
    - o   Hand sanitizer
- Water Quality
    - o   Thermometers
    - o   Pocket pH meter
    - o   Hach pH kit
    - o   Hack dissolved oxygen kit
    - o   Turbidimeter
    - o   Live tank (for water sample)

Size/setting/duration

Entire class/Outdoors, Mitchell Street Apron/30 minutes

Background

By conducting a walking field trip students gain perspective on how close they are to the ecosystems they have been learning about. Comparing the information they interpret from the macro-invertebrate population to the water quality tests enables students to see the direct correlation been organisms and the chemistry.

Procedure

- Site Assessment (5 minutes)
  - o As students arrive to the site have them make observations of the location. Each student should have at least three written observations. These can include: storm drains (number and location), vegetation (native and invasive), and pollution sources.
- Biological indicators: (15 minutes)
  - o Have students look through the macro-invertebrate samples with scientific keys to identify as many organisms as possible. Have a teacher keep a running list of all organisms found.
  - o Use pollution indicator groupings to have the class classify the health of the creek based on the organisms found and the quantity.
- Water quality (10 minutes)
  - o Instructor will have tests set up and ask for volunteers to add a reagent or read a result while the rest of the groups records results. GSSC will photograph the white boards and compile pooled data. If the weather in the field is not conducive to data recording, students should copy testing results from the whiteboard to their science notebooks in field sheet format when they get back to the classroom.
  - o Tests include: temperature, dissolved oxygen, pH, and turbidity.
    - If you use a turbidity tube use a conversion chart to convert cm to NTUs.
  - o Each test result should be compared with water quality standards to determine the health of Cain Creek. Compare this information to the water quality tests done on the creek that day. Did the results agree with each other? Discuss as a class why or why not.
  - o Grade level data will be pooled which can be compared with data collected by local agencies.
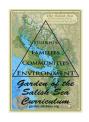
Performance Expectations
MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]

Scientific and Engineering Practices	Disciplinary Core Ideas	Cross-cutting Concepts
Analyzing and interpreting data Engaging in argument from evidence	LS2.A: Interdependent Relationships in Ecosystems	Cause and effect System and system models

Worksheet

Cain Creek Water Quality Field Data Sheet - BMS 8ᵗʰ grade

Excellent Quality Aquatic Life Use Criteria Marine water designated uses and criteria for Washington State salmonid and other fish migration, rearing, spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

Temperature	< or = to 16°C (60.8°F)
Dissolved oxygen	> or = to 6.0 mg/L (milligrams per liter)
pH units	7.0-8.5 (above 8.0 protects formation of shells in shellfish larvae).
Fecal coliform bacteria	Geometric mean of 14 colonies or less and not more than 10% of samples greater than 43 colonies.
Turbidity	Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU

Date:_____   Time:_____   Weather:_____

Site Name: Cain Creek park, between CC 0.4- CC0,8_____

GPS Coordinates: Latitude (N to S)_____   Longitude (E to W)_____

Test	Air temperature	Water temperature	Dissolved Oxygen	pH	Fecal bacteria density	Turbidity
Measurement	°C	°C	mg/L (parts per million)		(colonies per milliliter)	
Meets standards? Yes or No						