Cathleen Dale
July 2007

What's in My Water?

Studying water samples from SOC

Grade Level: 8

Time: 2 Days (40 minute sessions)

Goals & Objectives:

Goals:

- Work collaboratively
- Interdisciplinary work
- Have student present findings to the class
- Analyze samples collected at the School of Conservation
- Calculate number of organisms in a given area of river

Objectives:

Students will be able to:

- Apply research methods
- Describe microorganisms in the water
- Explain how to determine water quality by studying water samples

Materials:

For each group of students

- Computer access http://www.epa.gov/bioindicators/html/stoneflies.html
- Microscope
- Small cup with water sample
- Activity sheets
- Indicator species list
- Rubbing alcohol with dropper (to slow organisms)
- Disposable pipettes
- Glass slides w/covers (each student)
- Test tube or cuvette
- Beaker with turbidity sticker on bottom
- Dissolved oxygen tabs
- pH paper

NJCCS:

4.1.8B1, 4.1.8C2, 4.1.8C3, 4.2.8D1, 4.2.8D4, 4.3.8A1, 4.4.8A2, 4.4.8A4, 4.5.8, 5.1.8A1, 5.1.8A2, 5.1.8B1, 5.1.8B3, 5.1.8C2, 5.3.8A1, 5.3.8B1, 5.3.8D1, 5.5.8B3, 5.6.8B1, 5.10.8B1

Procedures:

Day 1

1. Show pictures of indicator species and explain their importance in assessing water quality:
    - Use link for pictures/description: http://www.epa.gov/bioindicators/html/stoneflies.html
    - Lead class discussion on why these organisms are important. Allow students to come up with their own ideas.
2. Hand out microscopes, small cups with water, activity sheet, disposable pipettes, glass slides w/covers, and indicator species list.
3. Demonstrate how to prepare a slide with 1ml of samples.
4. Allow students to prepare their own slides. Instruct students to observe their slides under low power and takes notes on what they see (using activity sheet).
    - What do you see?
    - Are there any organisms?
    - Draw a picture of what you see.
4. Walk around and assist students with using the microscope
5. When there is approximately 20 minutes left, remind students to finish completing their activity sheets.
6. Lead class discussion about the activity:
    - What did you see under the microscope?
    - Did adding alcohol help?
    - Did you notice any of the indicator species? Which ones?
    - Was there anything unusual in the water? What?

Day 2

1. Lead class discussion about homework:
    - Have students share findings (the will be different from group to group)
    - Why might there results be different from group to group?
    - Would the results look different if each group looked at a larger sample?
2. Hand out test tubes/cuvettes, dissolved oxygen tabs, beaker with turbidity sticker and pH paper.
3. Go over procedure:
    - The student will perform four tests on their water sample to assess quality
    - pH: using litmus paper
    - dissolved oxygen: using color indicator tablets
    - Turbidity: using beaker with turbidity sticker
4. Allow students to complete tests in groups of 3-4 students.
5. Have students record all of their findings on the activity sheet.
6. Lead follow-up discussion:
    - Have students share findings.
    - What factors my affect pH and dissolved oxygen?

Accommodations:

SLD

- Assign groups
- Assign specific tasks (pH tester, DO tester, explainer)

- Provide activity sheet
- Enlarge pictures and data sheets on board/overhead
- Assist certain groups with using chemical tests, microscopes, and various tools

ELL

- Assign groups (allow students to work/communicate with bilingual students)
- Allow all students express data with drawings
- Use diagrams on board/overhead to express ideas
- Highlight key words; give explanation in native language, if possible.

Assessment:

- Make observations as students work together
- Collect activity sheets and homework
- Have students present results to their peers

Follow-up/Homework:

Day 1: Complete homework sheet

Day 2: Complete notes section from activity sheet. Share what you learned with someone else!

References:

Biotic Index of Water Quality was taken from
http://www.epa.gov/superfund/students/clas_act/spring/pics/critter2.gif

What's In My Water?

Using biology to study water

Name:_____

Partners names:_____

Notes:

Examples: *What do you see? Are there any organisms? Did you notice any indicator species (which ones)? How is the water quality (good/bad/intermediate)? What did you find interesting?*

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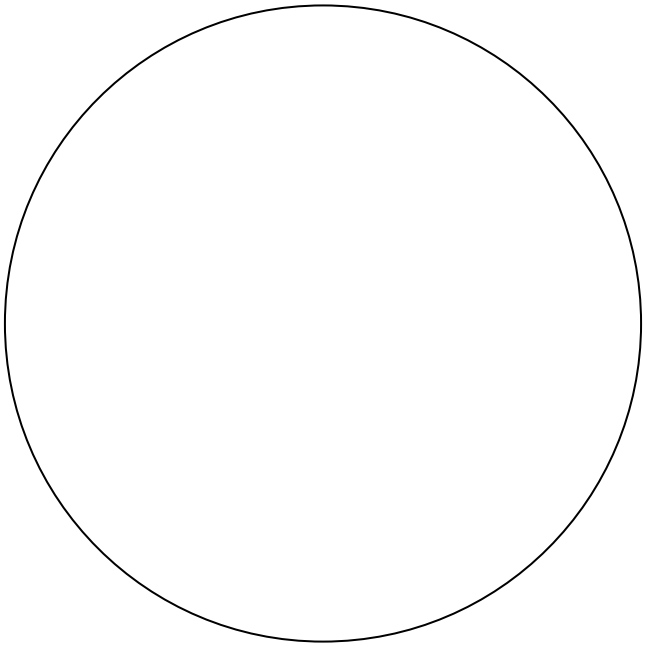
Draw what you observed **(remember to label!)**



Homework Assignment:

Calculating Abundance

Remember to show all your work!

Problem 1:

Number of organisms in your 1ml sample_____

Number of organisms in 100ml _____

Number of organisms in 1 liter_____

Problem 2:

Determine the number of organisms in a section of water with the following dimensions: Length = 10 ft Depth = 2 ft Width = 7 ft

Volume of water in cubic ft_____

There are approximately 30 liters per cubic foot of liquid: (1 ft^3 = 30 liters)

Volume of water in liters_____

Volume of water in ml_____

Number of organisms in section of water _____

What's In My Water?

Using chemistry to study water

Name:_____

Partners names:_____

pH_____

Dissolved Oxygen _____

Turbidity _____

Notes:

Examples: *What does the pH tell you about the water? What does the dissolved oxygen tell you? How is the water quality (good/bad/intermediate)? What did you find interesting?*

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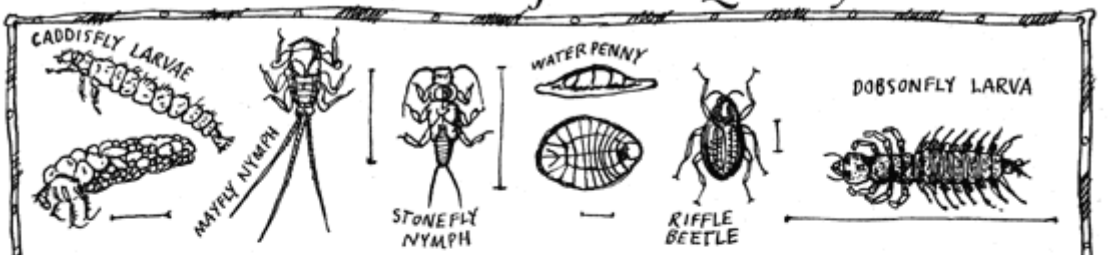
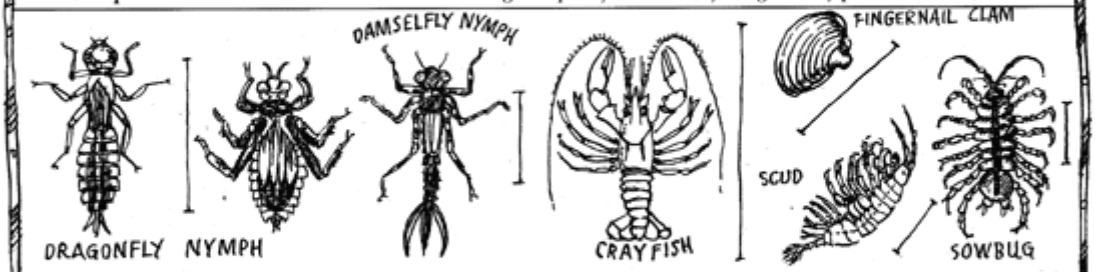
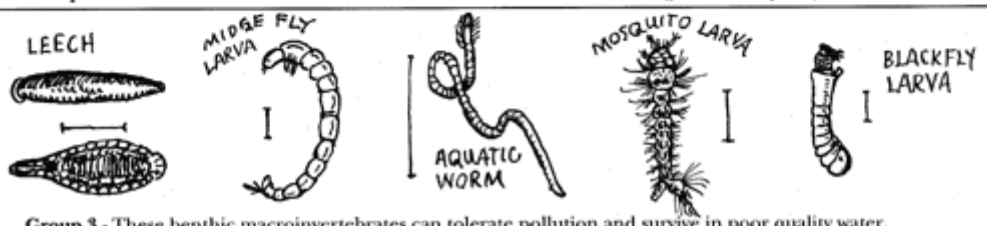
Biotic Index of Water Quality



Group 1 - These benthic macroinvertebrates need good quality water. They are generally pollution intolerant.



Group 2 - These are benthic macroinvertebrates who can live in a wide range of water quality conditions.



Group 3 - These benthic macroinvertebrates can tolerate pollution and survive in poor quality water.

I - bar line indicates actual size.