

WATER QUALITY - FIELD TRIP TO A RIVER October

I. Describe the location of your sampling (near shore? Shade? Sun? quiet pool? Current? Etc.)

II. Water Quality Tests: Each group will gather data on 16 different river attributes.

1. **Volume and Velocity of Flow:** get a kit from the central station; return when finished

Procedure

- a. Stream width: stretch a measuring tape across the stream and mark the spot at the water's edge on each side of the stream.
- b. Stream depth: Use a meter stick or sounding line to measure the depth. Measure at four points across the stream, at approximately 1/5, 2/5, 3/5, and 4/5 of the distance across. Record as points A, B, C, and D.
- c. Compute an average of the four measurements and record the average on your data table.
- c. Stream Velocity: Measure the stream velocity at each of the four points where stream depth was measured.
- d. Measure a distance of 5 meters along the river bank. One person stands at the beginning of the 5 meters (starting point) and another stands at the end of the 5 meters, downstream (end point).
- e. Set the stop watch. Toss the orange **gently** into the water, making sure it gets into the current upstream of the starting point. Start the stopwatch as soon as the orange passes the starting point.
- f. As soon the orange passes the end point, stop the watch. Retrieve the orange and repeat three times. Record the times as A, B, C, and D.
- g. Compute the average of the four times recorded. $[(A + B + C + D) / 4 =$ average time in seconds]
- g. Compute the average velocity: $v = d / t$
[Average velocity in m/sec = 5 meter distance / average time in seconds]
- h. Record the average velocity on your data table.
- i. Volume of flow: calculate the flow using the formula
Volume of Flow = (Width of stream)(average depth)(average velocity)(0.85)
- j. Record the volume of flow on your data table.

2. **Color, Odor and Turbidity Procedure**

- a. Fill a bottle with a sample of water.
- b. Allow it to settle (2 to 5 minutes) until the particles fall to the bottom.
- c. Hold the bottle up to the light and identify the color by selecting one of the choices:

Colorless green	yellow	tan
Gray	blue	brown
Milky	red	straw
Rust	black	
Colorless with particles		
- d. Record the color on your data table.
- e. Smell the sample and describe any odor. If any odor is noticed, record the odor on your data table. Possible odors might be fishy, musty, or woody.
- e. Once the sample of water has settled in the bottle, place these instructions behind the bottle and attempt to read these words.
- f. Describe the turbidity by using one of the following choices:
Clear: print clearly readable through sample
Slightly cloudy: print can be read, but it is fuzzy
Cloudy: print can be seen, but not read
Very cloudy: print can barely be seen
Opaque: print cannot be seen

3. **Chemical Tests Procedure:** testing kits (Note: all used color vials are to be placed in the plastic bag at the central station)

	Dissolved Oxygen	
Total Hardness		Phosphates
Nitrates		Nitrites

- a. Complete each of the chemical tests according to directions in the kit.
- b. Repeat until the other four chemical tests have been performed at your location.
- c. Record your data in your data table.

4. **Trekker tests:** temperature, conductivity BE CAREFUL (expensive!!!)

Using the Trekker, measure the above stream characteristics, and record the data on your data table.

5. **pH test:** Using the Extech BE CAREFUL – expensive!!!!)

measure the stream pH and record the data on your data table.

6. **Macroinvertebrates Procedure:**

- a. Select a riffle (a shallow {3-12 inches} fast-moving area with stones larger than 2 inches across.

- b. Place the kick screen at the downstream edge of the riffle. Be sure that the bottom of the screen fits tightly against the stream bed so that no insects escape under the net.
- c. Walk 3 feet upstream from the kick screen. Firmly and thoroughly rub your hands over all rock surfaces (top, sides and bottom) to dislodge any attached insects. Stir up the bed with hands and feet until the entire 3 foot square area has been stirred up. Then for at least 60 seconds, kick the stream bed with a sideways shuffling motion towards the net. Disturb the first few inches of sediment to dislodge burrowing organisms.
- d. Remove the screen with a forward-scooping motion. Firmly grab the bottom of the net so that your sample does not fall from the net.
- e. Place the net on a flat, well-lit area, with a white trash bag under it. Pick all the insects from the net and place them in the collecting container, which is half-full of stream water. Any creature that moves, even if it looks like a worm, is part of the sample.
- f. Use the Identification card and a magnifying glass to identify specimens. Ask yourself the following questions:
 1. How large is the organism?
 2. Is the body long and slender, round, or curved?
 3. Does the organism have any tails? How many?
 4. Does the organism have any antennae?
 5. Does the organism have legs? How many? Where?
 6. Is the body smooth and all one section or is it segmented?
 7. Does the organism have gills (fluffy or plate-like appendages)?
 8. Where are the gills located? Sides, back, underside, under its legs?
 9. Does it have pinching jaws like a beetle larva?
- g. Record your results on the data table. Return the specimens to the riffle where you found them. Tabulate your results to determine the water quality using the instructions on the data table.

7. Complete the Save Our Streams Survey.

Stream width	
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Stream depth	Pt. A=	Pt. B=	Pt. C=	Pt. D=	Average=
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Stream Velocity	Pt.A=	Pt.B=	Pt.C=	Pt.D=	Average=
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Average Velocity	d= 5 meters	t=	v=5/t	
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Volume of Flow	width=	avg depth=	avg v=	Flow=
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Water Color	
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Smells	
--------	--

Salinity	
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Dissolved O2	
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Total Hardness	
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Nitrate-nitrogen	
------------------	--

pH	
----	--

Phosphates	
------------	--

Nitrites	
----------	--

Temperature	
-------------	--

Conductivity	
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Save Our Streams

Stream Quality Survey

October ██████

Name of reviewer: _____
Date reviewed: _____
Data sent to: _____

The purpose of this form is to aid you in gathering and recording important data about the health of your stream. By keeping accurate and consistent records of your observations and data from your macroinvertebrate count, you can document changes in water quality. Refer to the SOS insect card and monitoring instructions to learn how to trap and identify stream macroinvertebrates and how to complete this form.

Stream _____ Station # _____ # of participants _____

County _____ State _____ Group or individual _____

Location _____

Weather conditions (last 72 hours) _____

Date _____ Average stream width _____ ft. Average stream depth _____ ft.

Start Time _____ End Time _____ Flow rate: High _____ Normal _____ Low _____ Negligible _____

If conducting rocky bottom sampling, select a riffle where the water is not running too fast, the water depth is between 3-12 inches, and the bed consists of cobble-sized stones or larger. Monitored riffle area (3' x 3' square) _____ Water depth _____ in., in riffle. Water temperature _____ F° ? C° ? Take 3 samples in the same general area. Count each separately and report the highest-scoring sample below. Sample _____ reported of 3.

If conducting muddy bottom sampling, take the required number of scoops from each habitat type: steep banks/vegetated margin (10 scoops), woody debris with organic matter (4 scoops), rock/gravel/sand substrates (3 scoops), and silty bottom with organic matter (3 scoops).

MACROINVERTEBRATE COUNT

Use the stream monitoring instructions to conduct a macroinvertebrate count. Use letter codes (A = 1-9, B = 10-99, C = 100 or more) to record the numbers of organisms found in a 3 foot by 3 foot area. Add up the number of letters in each column and multiply by the indicated index value. The following columns are divided based on the organism's sensitivity to pollution.

SENSITIVE	SOMEWHAT SENSITIVE	TOLERANT
_____ caddisfly larvae	_____ beetle larvae	_____ aquatic worms
_____ hellgrammite	_____ clams	_____ blackfly larvae
_____ mayfly nymphs	_____ crane fly larvae	_____ leeches
_____ gilled snails	_____ crayfish	_____ midge larvae
_____ riffle beetle adult	_____ damselfly nymphs	_____ pouch (and other) snails
_____ stonely nymphs	_____ dragonfly nymphs	
_____ water penny larvae	_____ scuds	
	_____ sowbugs	
	_____ fishfly larvae	
	_____ alderfly larvae	
	_____ atherix	
_____ # letters times 3 =	_____ # letters times 2 =	_____ # letters times 1 =
_____ index value	_____ index value	_____ index value
Now add together the three index values from each column for your total index value. Total index value = _____		

Compare this total index value to the following ranges of numbers to determine the water quality of your stream. Good water quality is indicated by a variety of different kinds of organisms, with no one kind making up the majority of the sample. Although the A, B, and C ratings do not contribute to the water quality rating, keep track of them to see how your macroinvertebrate populations change over time.

WATER QUALITY RATING

_____ Excellent (>22) _____ Good (17-22) _____ Fair (11-16) _____ Poor (<11)



Fish water quality indicators:

- scattered individuals
- scattered schools
- trout (pollution sensitive)
- bass (somewhat sensitive)
- catfish (pollution tolerant)
- carp (pollution tolerant)

Barriers to fish movement:

- beaver dams
- man-made dams
- waterfalls (>1 ft.)
- other
- none

Stream: _____
 Station #: _____
 Date: _____

Surface water appearance:

- clear
- clear, but tea-colored
- colored sheen (oily)
- foamy
- milky
- muddy
- black
- grey
- other _____

Stream bed deposit (bottom):

- grey
- orange/red
- yellow
- black
- brown
- silt
- sand
- other _____

Odor:

- rotten eggs
- musky
- oil
- sewage
- other _____
- none

Stability of stream bed:

- Bed sinks beneath your feet in:
- no spots
 - a few spots
 - many spots

% bank covered by plants, rocks and logs (no exposed soil) is:

Good	Fair	Poor
>70%	30%-70%	<30%

Stream banks (sides) _____
 Top bank (slope and floodplain) _____

Algae color:

- light green
- dark green
- brown coated
- matted on stream bed
- hairy

Algae located:

- everywhere
 - in spots
- _____ % of bed covered

Stream channel shade:

- >80% excellent
- 50%-80% high
- 20%-49% moderate
- <20% almost none

Stream bank composition (=100%):

- _____ % trees
- _____ % shrubs
- _____ % grass
- _____ % bare soil
- _____ % rocks
- _____ % other _____

Stream bank erosion:

- >80% severe
- 50%-80% high
- 20%-49% moderate
- <20% slight

Riffle composition (=100%):

- _____ % silt (mud)
- _____ % sand (1/16"-1/4"grains)
- _____ % gravel (1/4"-2" stones)
- _____ % cobbles (2"-10" stones)
- _____ % boulders (>10" stones)

MUDDY BOTTOM ONLY: Record the number of scoops taken from each habitat type. Provide any details (mostly sand, little silt, etc.) to best describe the habitat!

- Steep bank/vegetated margin _____
- Woody debris with organic matter _____
- Rock/gravel/sand substrates _____
- Silty bottom with organic matter _____

Land uses in the watershed: Record all land uses observed in the watershed area upstream and surrounding your sampling site. Indicate whether the following land uses have a high (H), moderate (M), slight (S), or none (N) potential to impact the quality of your stream. Refer to the SOS stream survey instructions to determine how to assess H, M, S, or N. If the land use is not present in your watershed, leave the space blank.

- Oil & gas drilling
- Housing developments
- Forest
- Logging
- Urban uses (parking lots, highways, etc.)
- Sanitary landfill
- Active construction
- Mining (types) _____
- Cropland (types) _____
- Trash dump
- Fields
- Livestock pasture
- Other _____

Are there any discharging pipes? no yes if yes, how many? _____
 What types of pipes are they? runoff (field or stormwater) describe: _____
 sewage treatment _____ industrial: type of industry _____

Did you test above and below the pipes to determine any change in water quality? Were changes noticed? NOTE: If you answer Yes, you must submit two different survey forms, one for above the pipe and one for below the pipe, to document your claim.

Describe amount of litter in and around the stream as % of ground cover. Also describe the type of litter in and around the stream.

Comments Indicate what you think are the current and potential future threats to your stream's health. Feel free to attach additional pages or photographs to better describe the condition of your stream.



Hands On Save Our Streams

Stream Walk Survey

Student's Name: _____

Date of Stream Walk: _____ Name of Stream: _____

Does the stream flow in a straight line or does it curve? _____

Using the following guide, describe what the stream bed is made of. Check all that apply.

- Bedrock (large area of rock covering streambed, cannot be moved)
- Boulders (watermelon-size and larger)
- Cobbles (orange-size)
- Gravel (grape-size)
- Sand (smaller than grapes and feels gritty)
- Silt (smaller than sand and feels silky)

What color is the water?

- Clear
- Tea-colored
- Oily
- Milky
- Muddy
- Black
- Grey
- Other: _____

Is there foam on the surface of the water? _____

Is the stream the same color or does the color change? _____

Do you see trash in or around the stream? Describe the kinds of trash you see. _____

Do you smell any unusual smells such as oil, sewage or rotten eggs? Yes No

Describe the smells. _____

What do you see on the streambanks? Concrete Soil Rock Vegetation/roots

If there is vegetation growing on the streambanks, what types do you see?

- Trees (woody plants 6 feet tall or taller)
- Shrubs (woody plants shorter than 6 feet)
- Grasses and Vines

Is the land along the stream:

- Paved
- Lawn
- Trees
- Other _____

Circle the land uses you see while walking along the stream:

roads	houses	apartments	schools
shopping malls	crop fields	golf courses	pastures
parks	mining	sewer manholes	landfill
forest	discharge pipes	construction sites	cut trees

Are there any other land uses not listed above? _____

Indicate the location and describe each land use on the stream map.

Do you see any animal tracks? Yes No

Draw pictures of the animal tracks.

Do you see animal houses, such as beaver dams or bird nests? Yes No

If yes, describe: _____

Describe the animals, birds and other wildlife you see. _____

Do you see fish? Yes No How large are the fish? ___ inches How many fish do you see? _____

Do you see or hear insects? Yes No

What kinds of insects do you see? _____

What other observations can you make about your stream? Describe them. _____



Save Our Streams Science Project Guide for Students
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 Save Our Streams Program
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