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Turbidity Data Sheet

Turbidity indicates the amount of dirt in the water. Dirt, or sediment, hurts the river many ways. It makes it more expensive to clean our drinking water. It can coat the gills of small organisms. It can keep organisms from attaching to gravel or rocks, which may cause them to get swept away in fast water.

Transparency measurement	Turbidity Turbidity = 100 cm/meter / Transparency (cm)	Scale
1 ___68___ cm 2 ___10___ cm 3 ______ cm	1 ___1.5___ m^{-1} 2 ___10___ m^{-1} 3 ______ m^{-1} ______ m^{-1} Average turbidity (add the 3 measurements, divide the sum by 3)	A turbidity of 1.0 m^{-1} or less is quite good—very clear water. Between 1.0 and 2.0 is pretty good. From 2.0 to 5.0 is a bit muddy. From 5.0 to 10.0 is quite muddy. Greater than 10 means that the water is really bad.

1. How would you rate this water in terms of its turbidity?
2. What do the measurements tell us about the health of this stream today?
3. What conditions could cause the measurements to be different?
4. What are some results of high turbidity?
5. What can people do to reduce stream turbidity?

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amount of salt in H_2O

pH Data Sheet

river h2O ← First pH reading: 8.0 distilled H2O ← Second pH reading: 7.0 Third pH reading: ________ Sum of all ~~3~~ 2 readings 15 Average pH reading - 7.5 (Sum of readings divided by 3 or number of readings)	A pH of 7 is neutral. A pH below 7 is acidic. A pH above 7 is basic. It is best for fish and other aquatic life if the pH is greater than 6.5 and less than 8.0. If the pH of the water of a stream is less than 4.5 or greater than 9.0, just about everything dies.

1. Is the pH of this stream such that the stream can support aquatic life?

2. What are some human sources of acid in streams?

3. What are some human sources of bases in streams?

4. What can you and your family do to help the river have a healthy pH?

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Benthic Macroinvertebrates Worksheet (Secondary)

HR = Huron River (Hudson Mills)
ORC = Ore Creek

Put the different kinds of animals into different compartments in the ice cube trays.
Use the bug identification chart <u>Macroinvertebrates of the Huron River Basin</u> to figure out their names. Get help from an adult if you're not sure.
Make a mark beside the right name below to keep track of the number of each kind of animal.
When you're done, count the marks and write down the total for each animal.

<u>Group 1</u>. *Very sensitive* to pollution

Critter Name	Total (HR | ORC)	Critter Name	Total (HR | ORC)
1. Caddisfly larvae	✓ | x	4. Gilled Snails (right-handed)	✓ | X
2. Clubtail Dragonfly nymphs	| X	5. Stonefly nymphs	
3. Dobsonfly larvae		6. Watersnipe Fly larvae	

<u>Group 2</u>. Can *tolerate a little* pollution

Critter Name	Total (HR | ORC)	Critter Name	Total (HR | ORC)
7. Alderfly larvae		13. Mayfly nymphs	✓
8. Caddisfly larvae (without cases)	✓ | X	14. Pea (Fingernail) Clam	
9. Cranefly larvae	| X	15. Riffle Beetles	✓
10. Crayfish	| X	16. Scud	✓ | X
11. Damselfly nymphs	✓ | X	17. Sowbug	
12. Dragonfly nymphs (most)	| X	18. Water Penny Beetle	✓

Zebra mussel ✓
Whirligig Beetle X ✓
Asiatic Clam
Predaceous Diving Beetle ✓ X

<u>Group 3</u>. Pollution tolerant—can *live in quite polluted* water

Critter Name	Total (HR | ORC)	Critter Name	Total (HR | ORC)
18. Aquatic Worms		21. Midge larvae	| X
19. Blackfly larvae	| X	22. Pouch Snails (left-handed) lungs!	✓
20. Leeches	| X		

*If you have any critters from Group 1, the water quality is excellent.
*If you have no critters from Group 1, but do have critters from Group 2, the water quality is fair to good.
*If you have no critters from Group 1 or Group 2 but do have critters from Group 3, the water quality is poor.
*If you found no critters at all, the water quality is bad.

1. **Calculate a taxon-averaged water quality index:**

A. Write down the number of taxa (kinds) (e.g. all mayflies together are one taxa, all midge larvae count as "1", etc.) of critters found in each of the three groups above; N_1 = number of kinds in Group 1, N_2 = number of kinds in Group 2, N_3 = number of kinds in Group 3.

HR	URE
2.8	3.2

N_1 = 2 (2) N_2 = 9 (8) N_3 = 1 (3)

B. Calculate the sum $N_1 + N_2 + N_3 = N_{total}$ = 12 13

C. Calculate the water quality index

$Q_{taxa} = [1 \times N_1 + 3 \times N_2 + 5 \times N_3] / N_{total}$ = 2.8 (34/12; 41/13)

2 27 5   2 24 15

This index lies in the range 1 to 5. The <u>smaller</u> the index you calculate, the higher the water quality is.

4. **In general, what do benthic macro-invertebrates tell us about water quality over time?**

5. **What was the water quality in this spot, as indicated by the animals your group found?**

6. **What can you do to improve this condition?**

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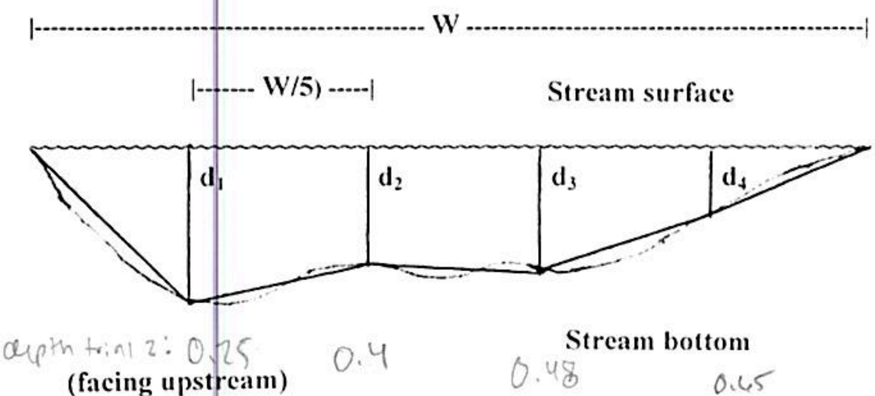
Stream Discharge Data Sheet Date 9/28/2017 Time________ Location Fleming Creek

Team members ____

1. Stream width (W) 15 ft Length of stream reach (L) 10 ft



depth trial 2: 0.25 0.4 0.48 0.65

Based on marks (clips)

Depth in feet .3ft d1 .3ft d2 .5ft d3 .7 d4

	Time (t)	Velocity (v) = L/t
2 t_1	8.28	1.21 ft/s
3 t_2	6.62	1.51
4 t_3	8.25	1.21
1 t_4	15.63	0.64

trial 2:

	Time (t)	Velocity (v) = L/t
t_1	8.75s	1.14 ft/s
t_2	18.62s	0.54
t_3	5.97s	1.68
t_4	6.42s	1.56

2. Calculate.

$A = (1/5)*W*(d_1 + d_2 + d_3 + d_4)$ = 1: 5.4 ft^2 trial 2: 5.34 ft^2 $v_{ave} = (1/4) * (v_1 + v_2 + v_3 + v_4)$ = 1.14 ft/sec trial 2: 1.23 Stream discharge $Q = A * v_{ave}$ = 6.156 ft^3/sec	Note: 1 cubic feet per sec is the equivalent of about 7.8 gallons per second. ≈48 gallons How much water per second is passing by you right now?

2: v_{ave} = 6.57

3. How do varying amounts of water affect this stream?

4. How do human activities contribute to "flashiness" or fast variations in stream discharge amounts? pavement, run off can increase amount of water

5. What can ordinary citizens do to improve this?
plant rain gardens, plant native trees next to streams.

6. How do people use stream discharge data?

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Stream Electrical Conductivity Data Sheet

Conductivity tests the amount of ions in the water. It tells us if there might be salt in the stream. If there is too much salt, it hurts the organisms that live in the water.

1st reading: 980 **2nd reading:** 410 **3rd reading:** ______________ **4th reading:** ______________ **Average =** ______________ **(Sum of readings divided by 4, or number of readings)**	The unit for measuring conductivity in water is the microsiemen per centimeter (µs/cm). The conductivity of pure water is in the range 0.5 to 3 µs/cm. Lake and river water in the U.S. is much higher, generally ranging from 50 to 1500 µs/cm. Streams that support good populations of freshwater fish have conductivities in the range 150 to 800 µs/cm. Conductivities outside this range tend to be unsuitable for some species of fish and aquatic macro-invertebrates.

1. **Does the conductivity suggest the presence of pollution?**
   (Recall that a conductivity in the range 150 to 800 µs/cm is OK for most critters.

2. **On the basis of your average conductivity reading, is high salt concentration a problem in this stream?**

3. **How can people keep the conductivity of the stream in a healthy range?**

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Stream Temperature Data Sheet

Temperature Readings	Species	Highest Range Preferred temperature Degrees F	Degrees C
59.5°F	Catfish	74-78	23.3 – 25.5
	Bluegill	73-77	22.7 - 25.0
	Smallmouth bass	68-72	20.0 – 22.2
	Northern pike	62-71	16.6 – 21.6
	Steelhead	58-60	14.4 – 15.5
	Coho salmon	54-55	12.2 – 12.8
	Lake trout	48-52	8.9 – 11.1
Sum of temperature readings ____________________			

Average temperature reading = Sum of readings divided by 3 (or number of readings): 59.5

1. On the basis of your average temperature reading, which of the fish listed could live comfortably in this stream today?

The steelhead would live comfortably in this stream today.

2. How do warmer temperatures affect the amount of dissolved oxygen in the water?

The warmer the temperature, the lower the capacity to hold oxygen

3. In addition to fish, what other organisms are affected by lower oxygen levels?

Bugs + Plants

4. What human actions can affect the temperature of this stream?

Roads, dams, deforestation

upstream bridge biotic

Dissolved Oxygen (DO) Data Sheet

First run: Drops of thiosulfate solution added to decolorize **one** measuring tube of sample: 10 DO concentration = 10 mg/L Drops of thiosulfate solution added to decolorize **two** measuring tubes of sample: (DO concentration = half # drops added) _____DO concentration = ______ mg/L **Second run:** Drops of thiosulfate solution added to decolorize **one** measuring tube of sample: _____DO concentration = ______ mg/L Drops of thiosulfate solution added to decolorize **two** measuring tubes of sample: (DO concentration = half # drops added _____DO concentration = _____ mg/L	Minimum DO requirements for some aquatic organisms Trout 6.5 mg/L Smallmouth bass 6.5 mg/L Caddisfly larvae 4.0 mg/L Mayfly larvae 4.0 mg/L Catfish 2.5 mg/L Carp 2.0 mg/L Mosquito larvae 1.0 mg/L

1. Does this water meet the Michigan state requirement of 5.0 mg/L as the minimum acceptable DO concentration?

   Yes

2. Could trout and smallmouth bass live in this stream?

   Yes

3. Name 3 factors that affect Dissolved Oxygen concentration.

   1) Temperature
   2) Rapids
   3) Living things

4. What can people do to improve the DO concentration in our watershed? control sprav gain + remove