Student Section

Aquatic Invertebrate Survey

Name _____

River or Creek _____ Date_____

KEEP A RECORD OF EACH TYPE OF ORGANISM YOU FIND IN YOUR SEARCH.

- ❏ Observe and record the descriptive features of the invertebrate you are investigating.
- ❏ Determine if they are tolerant or intolerant to pollution; note the number of each found and its habitat (pool, riffle, glide).
- ❏ Note the stage of development of the macroinvertebrate you find: adult, nymph or larva.
- ❏ To what functional feeding group does it belong? Shredder, collector, scraper, or predator? Look closely at anatomical adaptations for clues.
- ❏ Use the handouts provided by your teacher to help with some of the answers.

COMMON NAME	TOLERANT/INTOLERANT & Habitat Each was Found	STAGE OF DEVELOPMENT	FUNCTIONAL FEEDING GROUP
Total _____	Totals Intolerant: Intolerant habitats: Tolerant: Tolerant habitats:	Totals Nymphs: Larvae: Adults:	Totals Scrapers: Shredders: Collectors: Predators:

Adapted from: *A Look at the Salmon's Environment*, Bonneville Power Administration.

The Case of the Skink River

Catkin Creek, tributary to the meandering and slow Skink River, has a steeply graded watershed at the upper end, and a large wood processing plant and several retail farm and garden chemical stores at the lower end. In August, there was a partial kill of fish and aquatic insects in the Skink River. When investigators arrived at 11:00 a.m., many carp were seen swimming about at the surface, but all other fish seen were dead. Closer observation revealed live black fly larvae and aquatic beetles, but no other macroinvertebrates.
The water had been dark green earlier in the week, but had suddenly turned dark and odorous. On the preceding day, a heavy rain fell in the area. The city, whose drinking water comes partially from the river, was concerned that a toxic substance might have washed into the waterway from the chemical companies or the wood processing plant. They hired water specialists to take steps necessary to identify the compound. At 1:00 p.m., the dissolved oxygen was 2 ppm. The river level had risen after the rain and there was a strong odor of rotten eggs.

What initial conclusions can be reached after reading the above scenario?

What steps should an investigator take to learn what happened?

What tests should be taken to ascertain how the aquatic ecosystem was affected (remember what you learned at Kids in the Creek)?

The lab and field work produced these results:

- When the carp were picked up, aneurysms were evident on the gills. In many fish, the gills were chocolate brown instead of bright red.
- Water samples showed high levels of hydrogen sulfide, CO2, nitrites, and nitrates.
- Blood samples were highly acidic.
- Upper reaches of the tributary had caddisflies and mayflies, while lower areas did not.

What are your final conclusions? Use the back of the page if necessary.

RIPARIAN RAMBLE

Name _____ Date _____

1. **Linear Vegetation Transect:**
Plot size ____ Interval _____

	Estimate Percent Cover by Vegetation Type Plot 1	Plot 2
Grasses		
Mosses		
Forbs		
Organic (leaf litter, dead grass, twigs)		
Inorganic (rock, sand)		
Total	100%	100%

2. **Circle plot**:
Plot size _____

	Percent Cover by Vegetation Type
Grasses	
Shrubs	
Forbs	
Organic (leaf litter, needles, twigs)	
Inorganic (rock, sand)	
Total	100%

3. **Overhead Canopy Measurement**

Direction (facing)	Percent Canopy Cover Observed
North	
East	
South	
West	
Mean (average) of 4 observations	

Student Section

Stream Habitat Survey Form

Fill out the form below, everyone should be involved.
Include units of measurement (i.e. 5.3 m, 7°C)

Names _____ Date _____

Stream / site: _____

Water Temperature: Estimated_____ Measured _____

Air Temperature: Estimated_____ Measured _____

1.Habitat Type: Pool, Riffle, or Glide.....____

First estimate the 3 dimensions of your habitat unit. Remember there are no right answers, it is an estimate. Estimate and measure in metric.

2. Unit Length: Estimated_____ Measured _____

3. Unit Width Estimated_____

4. Measured Widths: 1) _____ 2) _____ 3) _____Mean:_____

5. Maximum Depth: Estimated_____ Measured _____

If you have a pool, complete #6 and #7. Otherwise, skip to #8.

6. Depth at Pool Tail-Crest..... _____

7. Residual Depth of Pool (Max minus depth at Pool Tail-Crest) _____

8. Substrate Composition: % (or can just do #9 and #10)

Sand/Silt_____	Gravel_____	Cobble_____	Boulder_____
< 2mm	2-64 mm	64-256 mm	>256mm

9. Dominant Substrate: sand, gravel, cobble, or boulder _____

10. Sub-Dominant Substrate: sand, gravel, cobble, or boulder_____

11. Embeddedness: >35% (Yes or No)……_____

12. # Pieces Woody Material (over 5 cm diameter, 1 m length, # and sizes)_____

13. Cover types present:

undercut banks
substrate
depth
overhanging vegetation
woody material
turbulence
instream vegetation

14. Dominant Cover: ..... _____

15. Sub-Dominant Cover: ..... _____

16. %Total Cover: 0-5%, 6-20%, 21-40%, or >40%..... _____

17. Length of actively eroding streambank ..... _____

18. % Bank Cover (0-24%, 25-40%, 50-74%, 75-100%) ..... _____
This % of the streambank surface is covered by vegetation in vigorous condition or by boulders and rubble. If the streambank is not covered by vegetation, it is protected by materials that do not allow bank erosion.

Questions for thought:

- How do the different habitat components you looked at and measured, the stream complexity, in your unit function for fish? Think about what sizes and numbers of fish that might use it, how getting food, water, shelter, and space would be.
- How does the watershed health contribute to the stream habitat conditions of your unit?

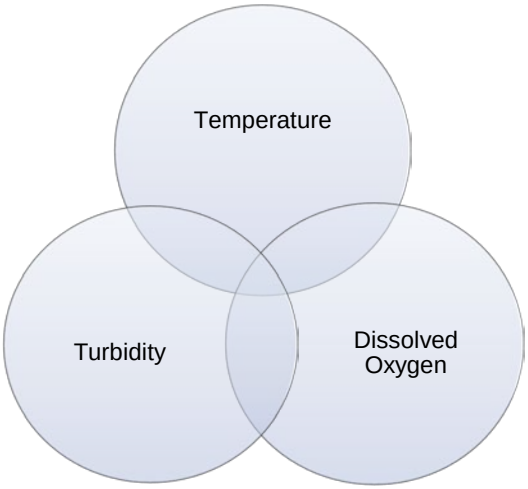
Stream Mapping

Draw a map of your stream reach here or on another sheet.

Water Quality Section

Name _____ Date _____

River or Creek _____



The above Venn Diagram represents how the Turbidity, Temperature and Dissolved Oxygen are related when it comes to the quality of the water in our stream. The very center where all circles intersect represents ideal conditions in our stream.

Temperature

My Prediction: _____ Results: _____ Unknown: _____

What could change the temperature of our creek?

Turbidity

My Prediction: _____ Results: _____ Unknown: _____

What could raise the level of the turbidity in the creek?

How is turbidity related to temperature?

Dissolved Oxygen (DO)

My Prediction: _____ Results: _____ Unknown: _____

What factors contribute to this level of DO?

How is the DO related to temperature?

pH

My Prediction: _____ Results: _____ Unknown:_____

At what pH do most organisms prefer to live?

What could change the pH of our creek?

Connecting to our environment

Give an example of point source pollution and list a water quality indicator it may affect.

Give an example of non-point source pollution and list a water quality indicator it may affect.

Fish Health Data Sheet

Field Study Section:

You are going to conduct a field study to see how fish habitat and contaminants both affect a fish's risk of being caught by a predator. There are 4 fish aquariums with different habitat in each. One tank has a contaminant.

1. Fill in for the two independent and one dependent variable.

Manipulated / Independent Variable #1:	
Manipulated / Independent Variable #2:	
Responding /Dependent Variable #1:	

2. State two field study questions, one for each independent variable (*How does the independent variable affect the dependent variable?*):

1.
2.

3. For each tank, what about the habitat will affect the amount of time it takes for the predator to capture the fish. PREDICT from # 1 - # 4, #1 the shortest to #4 the longest time to capture the prey. Sketch or note what is in aquarium A-D.

A	A) What is expected to affect catch time:		Observations:	
	Predicted order to catch:		Time to catch:	
B	B) What is expected to affect catch time:		Observations:	
	Predicted order to catch:		Time to catch:	
C	C) What is expected to affect catch time:		Observations:	
	Predicted order to catch:		Time to catch:	
D	D) What is expected to affect catch time:		Observations:	
	Predicted order to catch:		Time to catch:	

4. Describe your **procedure** – can include: logical steps, conditions to be compared, data to be collected, method for collecting, how often measurements should be taken and recorded, and environmental conditions to be recorded.

Procedure:

5. **Results:** record in boxes above.

Discuss: How close were your predictions for each tank? How might you explain any unexpected results? How many measurements do you think you should take? How can you better control the experiment? What else could you do to test for presence of contaminants in one of the aquariums?

6. Write a Conclusion for this experiment.

Answer the experimental **question.** Include supporting data from the Manipulated (Independent) Variable vs. Responding (Dependent) Variable table. Explain how these data support your conclusion. Provide a scientific explanation for the trend in the data.

Question: What is the effect of the different habitat types on the time to catch the fish?
Conclusion:

Question: What is the effect of a contaminant on the time to catch the fish?
Conclusion:

7. How would you use this information in the development planning of property that is located along or near a river or body of water?

_____

_____

Fish Health Glossary:

Fish Health-
Lethal-
Sublethal-
Disease-
Adaptation-
Contaminant-
Acclimation-
Predation-
Behavior-

8. Identify the preferred habitat _____. What makes this habitat most suitable for fish?

_____

_____

9. When a predator tries to capture a fish in tank **A**, what will make it difficult to do so?

_____

Predict the amount of time it will take the predator to capture the fish_____seconds

10. When a predator tries to capture a fish in tank **B**, what will make it difficult to do so?

_____

Predict the amount of time it will take the predator to capture the fish_____seconds

11. When a predator tries to capture a fish in tank **C**, what will make it difficult to do so?

_____

Predict the amount of time it will take the predator to capture the fish_____seconds

12. When a predator tries to capture a fish in tank **D**, what will make it difficult to do so?

_____

Predict the amount of time it will take the predator to capture the fish_____seconds

13. State the hypotheses for the fish tank experiment:

H_o:_____

_____

H_a:_____

_____

14. What can you conclude about appropriate habitat for fish based on these experiments?

_____

_____

_____

15. How would you use this information in the development planning of property that is located along or near a river or body of water?

_____

_____

Anatomy section:

Compete in the internal and external anatomy **Jeopardy**!

Internal Anatomy

Kidney
Gills
Liver
Eggs
Heart
Esophagus
Swim Bladder
Urinary Bladder
Intestine
Stomach
Pyloric Caeca
Spleen

External Anatomy

Head (eye, nostril and mouth)
Skin/Scales
Caudal Fin
Anal Fin
Pectoral Fins
Pelvic Fins
Adipose Fin
Dorsal Fin
Operculum
Lateral Line

Streamflow Measurement: Field Data Worksheet

Name _____

River or Creek _____ Date _____

Observation Table:

	Stream Length (feet)	Float Time (seconds)	Width (feet)	Depth (feet)
Station #1				
Station #2				
Station #3				
Total				
Average				

Streamflow (Q) Calculation:

$$Q = V \times A$$

V= Average Velocity (ft/s)
A= Cross Sectional Area (ft^2)

$$V = averageLength(ft) \,/\, averageFloatTime(s)$$

$$V = \_\_\_\_ / \_\_\_\_ = \_\_\_\_\_ (\quad)$$

$$A = averageWidth(ft) \times averageDepth(ft)$$

$$A = \_\_\_\_\_ \times \_\_\_\_\_ = \_\_\_\_\_ (\quad)$$

$$Q = \_\_\_\_\_ \times \_\_\_\_\_ = \_\_\_\_\_ (\quad)$$

1. Where does the water that we measured come from, and why does it flow at the velocity we measured?

2. How do continual changes in discharge affect the stream corridor?

3. Give examples of how humans use and alter the natural flow of creeks or rivers.

4. How might climate change impact the hydrologic cycle, and therefore our daily lives?