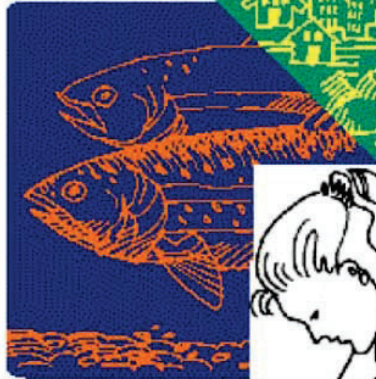


# Kids in the



# CREEK



# Invert Investigator

River or Creek: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Weather: \_\_\_\_\_

Part of River (circle one):

Pool







Riffle



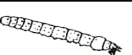



Glide




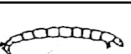


Group 1: Intolerant

Group 2: Somewhat Tolerant

Group 3: Tolerant

| Common Name   | # Found |
|---|---------|
| stonefly     |         |
| mayfly       |         |
| caddisfly    |         |
| beetle       |         |
| water penny  |         |
| dobsonfly   |         |
|   |         |
|   |         |
| <b>Total:</b>   |         |

| Common Name   | # Found |
|---|---------|
| damsely        |         |
| dragonfly      |         |
| crane fly      |         |
| clams/mussels  |         |
| scud           |         |
| crayfish      |         |
|   |         |
|   |         |
| <b>Total:</b>   |         |

| Common Name  | # Found |
|--|---------|
| aquatic worm  |         |
| leech         |         |
| snail         |         |
| midge         |         |
| planarian     |         |
| mosquito     |         |
|  |         |
|  |         |
| <b>Total:</b>  |         |

Group 1 total x 3:  
(index value)

Group 2 total x 2:  
(index value)

Group 3 total x 1:  
(index value)

Pollution Tolerance Index (PTI):   
(Group 1 index + Group 2 index + Group 3 index)

## Pollution Tolerance Index Rating

|            |                  |
|------------|------------------|
| 23 or more | <i>Excellent</i> |
| 17 - 22    | <i>Good</i>      |
| 11 - 16    | <i>Fair</i>      |
| 10 or less | <i>Poor</i>      |

| River Section | PTI | Rating |
|---------------|-----|--------|
| <i>Pool</i>   |     |        |
| <i>Riffle</i> |     |        |
| <i>Glide</i>  |     |        |

1. Are there any differences in the PTI between the river sections?

2. What can you say about the overall health of the river based on this data?

3. In addition to being an indicator of water quality, what other relationship do these macroinvertebrates have to salmon?

4. If you were a salmon or other fish, would this be a good place to live? Why or why not?

**Habitat Sense**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Stream: \_\_\_\_\_ Time: \_\_\_\_\_

Location Description: \_\_\_\_\_

Water Temperature: \_\_\_\_\_ Weather: \_\_\_\_\_

1. Habitat Type (circle): Pool      Riffle      Glide

2. Unit Length: \_\_\_\_\_

3. Unit Widths:    1) \_\_\_\_\_    2) \_\_\_\_\_    3) \_\_\_\_\_

Average Width: \_\_\_\_\_

4. Unit surface area: Length \_\_\_\_\_ x Width \_\_\_\_\_ = \_\_\_\_\_ square ft

5. Max Depth: \_\_\_\_\_

6. Dominant Substrate (circle):

|                    |                 |                        |                          |
|--------------------|-----------------|------------------------|--------------------------|
| Sand/Silt <2mm     | Gravel 2-64 mm  | Cobble 64-256 mm       | Boulder >256mm           |
| Smaller than a pea | pea to baseball | baseball to basketball | bigger than a basketball |

7. Subdominant Substrate (circle):

|                    |                 |                        |                          |
|--------------------|-----------------|------------------------|--------------------------|
| Sand/Silt <2mm     | Gravel 2-64 mm  | Cobble 64-256 mm       | Boulder >256mm           |
| Smaller than a pea | pea to baseball | baseball to basketball | bigger than a basketball |

8. Number of pieces of large woody material:

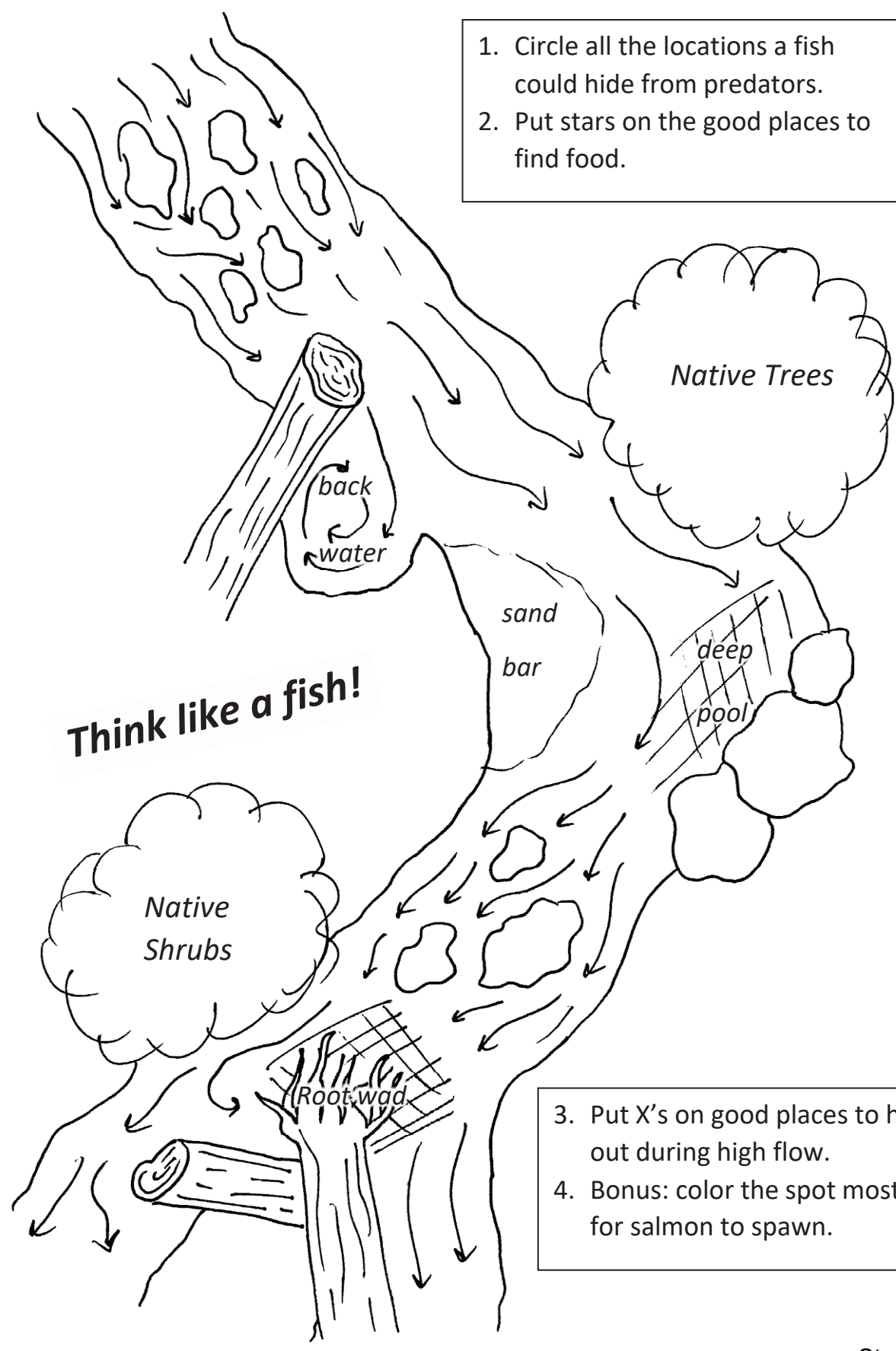
Small (6" diameter, 20 ft long): \_\_\_\_\_

Medium (12" diameter, 35 ft long): \_\_\_\_\_

Large (20" diameter, 35 ft long): \_\_\_\_\_

Log jams present?      Yes      No

1. Circle all the locations a fish could hide from predators.
2. Put stars on the good places to find food.



3. Put X's on good places to hang out during high flow.
4. Bonus: color the spot most likely for salmon to spawn.

# Stream Flow

River of Creek: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_

|                | Stream Length (Ft) | Float Time (s) | Stream Width (ft) | Stream Depth (ft) |
|----------------|--------------------|----------------|-------------------|-------------------|
| Group 1        |                    |                |                   |                   |
| Group 2        |                    |                |                   |                   |
| Group 3        |                    |                |                   |                   |
| <b>Total</b>   |                    |                |                   |                   |
| <b>Average</b> |                    |                |                   |                   |

## Calculating Flow

Q --> Flow

V --> Average Velocity (ft/s)

A --> Cross Sectional Area (ft<sup>2</sup>)

$$Q = V \times A$$

$$V = \frac{\text{Average Length(ft)}}{\text{Average Float Time (s)}} \Rightarrow V = \frac{\text{_____ ( )}}{\text{_____ ( )}} \Rightarrow V = \text{_____ ( )}$$

$$A = \text{Avg. width(ft)} \times \text{Avg. depth(ft)} \Rightarrow A = \text{_____ ( )} \times \text{_____ ( )} \Rightarrow A = \text{_____ ( )}$$

$$Q = V \times A \Rightarrow Q = \text{_____ ( )} \times \text{_____ ( )} \Rightarrow Q = \text{_____ ( )}$$

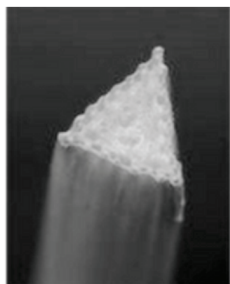
1. Where does the water that we measured come from, and why does it flow at the velocity we measured?
2. How do continual changes in discharge affect the stream corridor?
3. Give examples of how humans use and alter the natural flow of creeks or rivers.
4. How might climate change impact the hydrologic cycle, and therefore our daily lives?

# Riparian Rx

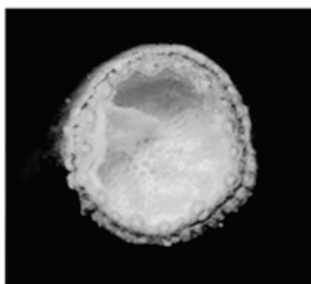
What would you prescribe for an unhealthy riparian zone?

| Evaluating Erosion Resistance of a Stream Bank   |                    |                |                       |       |             |
|--|--------------------|----------------|-----------------------|-------|-------------|
| 1. Use each flag as the center of your circle plot<br>2. Only tally when you observe one of the vegetation categories<br>3. Do not count each individual plant; one tally per category per circle plot | Deep Rooted Plants |                | Shallow Rooted Plants |       | Bare Ground |
|  | Sedges & Rushes    | Shrubs & Trees | Grasses               | Forbs |             |
| <b>Row 1.</b> Record tally in box that describes your plant's category   |                    |                |                       |       |             |
| <b>Row 2.</b> Total # of observations for each category  |                    |                |                       |       |             |
| <b>Row 3.</b> Total # of observations (sum all categories in Row. 2)   |                    |                |                       |       |             |
| <b>Row 4.</b> Proportion of each category = (Row 2 ÷ Row 3)  |                    |                |                       |       |             |
| <b>Row 5.</b> Multiply each value in <u>Row 4</u> by the factor in each category - record in <u>Row 6</u>  | x10                | x8             | x6                    | x3    | x1          |
| <b>Row 6.</b> Score for each category  |                    |                |                       |       |             |

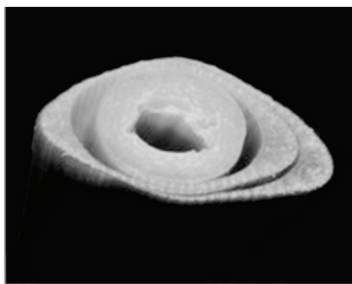
## Plant Identification Tips



Sedges have edges,



rushes are round,



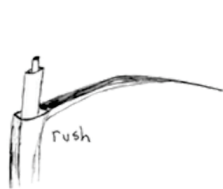
grasses are hollow right up from the ground.



Sedge



grass



Rush

**Forbs** are herbaceous flowering plants that are not grasses, sedges, or rushes.

**Total Score (add all values in Row 6:**

\_\_\_\_\_

**Site Scores:**

**7-10 healthy banks**

**4-7 somewhat healthy banks**

**0-4 unhealthy banks**

\*The higher the score, the more the stream bank will resist erosion!



# Evaluating Erosion Resistance of a Stream Bank - Discussion

Why do some plant categories score higher than others & bare ground?

How do these measurements help us to understand how well this section of Entiat River riparian zone will resist erosion?

How can erosion negatively impact salmon?

## Vegetation Structure & Function

| Plant structure or function | *Impact(s)<br>There can be more than one! | Increases or Decreases Impact? | Explain | *Impacts<br><b>Word Bank:</b><br>erosion<br>temperature<br>habitat<br>food<br>water quality |
|-----------------------------|---|--------------------------------|---------|---|
| Shade                       |   |                                |         |   |
| Trunks/limbs                |   |                                |         |   |
| Roots                       |   |                                |         |   |
| Leaves                      |   |                                |         |   |

How do anadromous fishes, like salmon and steelhead, contribute to riparian health?

# Water Quality

Date \_\_\_\_\_ Time: \_\_\_\_\_

Name of River or Creek: \_\_\_\_\_

Weather: \_\_\_\_\_

## Temperature

My Prediction: \_\_\_\_\_ Results: \_\_\_\_\_ °C or °F (circle one)

What could change the temperature of our creek?

## pH

My Prediction: \_\_\_\_\_ Results: \_\_\_\_\_

At what pH do most organisms prefer to live?

What could change the pH of our creek?

## Turbidity

My Prediction: \_\_\_\_\_ Results: \_\_\_\_\_ NTU

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

How is turbidity related to temperature?

## **Dissolved Oxygen (DO)**

My Prediction: \_\_\_\_\_ Results: \_\_\_\_\_ ppm

What factors contribute to this level of DO?

Does the creek have adequate DO for salmon and trout?

## **Connecting to our environment**

### **Point Source Pollution:**

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

### **Non-Point Source Pollution:**

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



# Fish Health

## External Anatomy

Species:

Adipose Present? : Yes or No

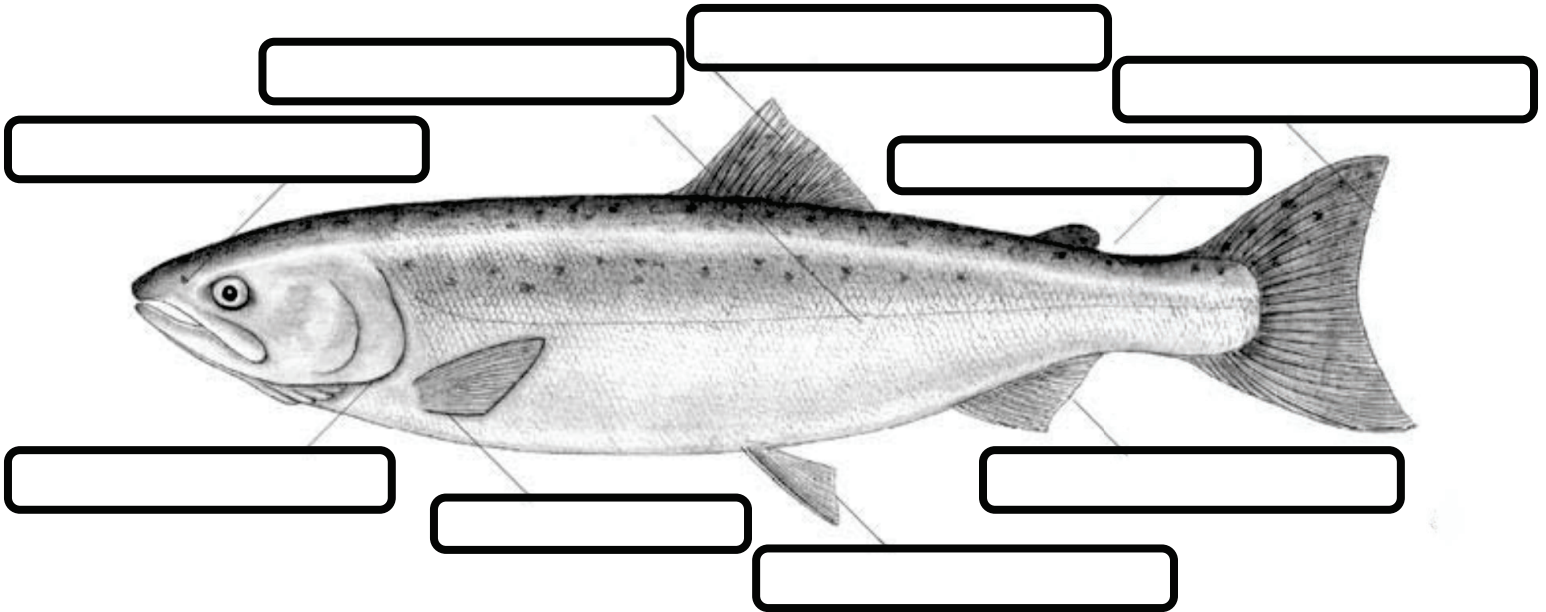
Length:

Observations:

Any external injuries or signs of illness?

Looking only at the outside of the fish, can you determine if it is Male or Female? How do you know?

Anything else notable?



1. Which fin is removed from hatchery fish? Why?
2. What is the function of the lateral line?
3. Which fin(s) help with forward momentum?
4. Which fin(s) help with stabilization?

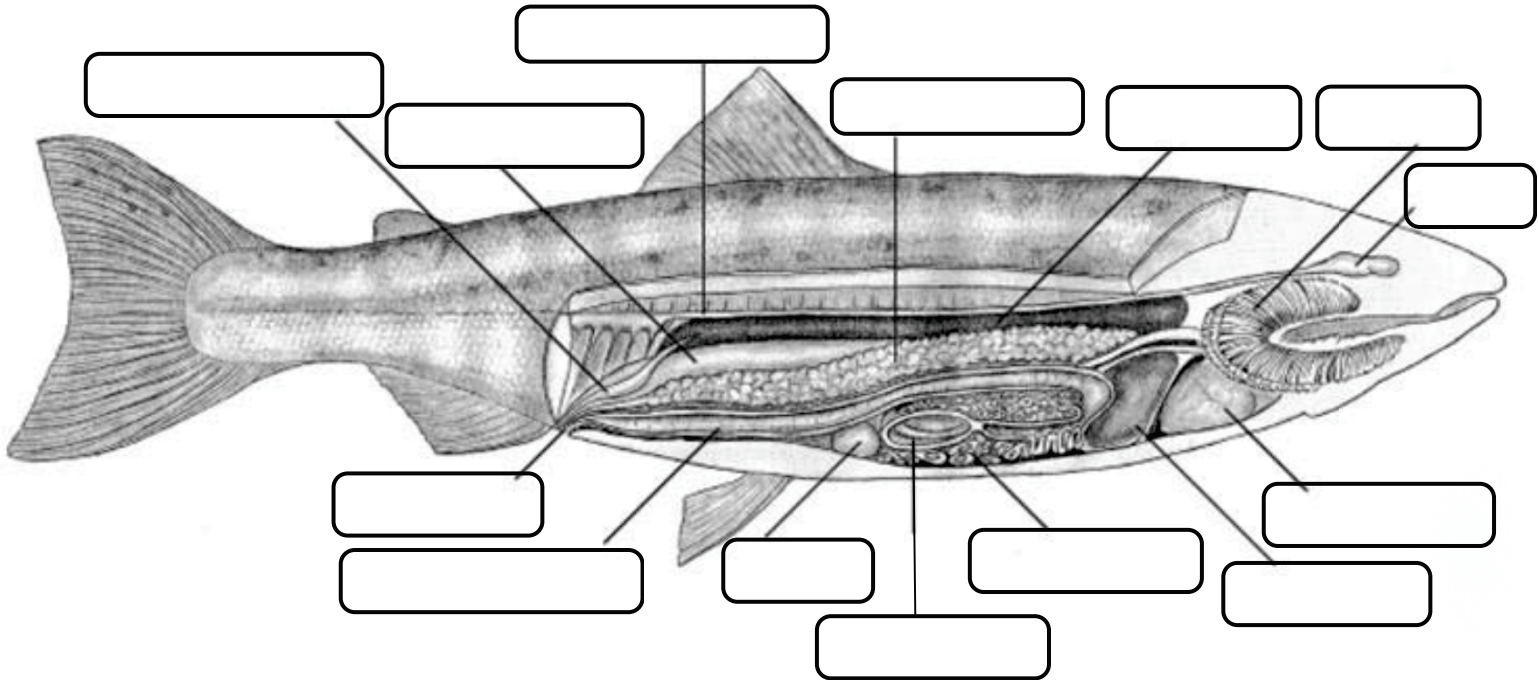
# Internal Anatomy

Observations:

Any internal injuries or signs of illness?

Male or Female? How do you know?

Anything else notable?



1. What are some common symptoms of sick fish?
2. What is the name for a bundle of eggs? What is milt?
3. How are salmon kidneys different from other kidneys?
4. What is the function of the swim bladder?
5. What does the liver do?
6. What's an advantage of having a pyloric caeca (the worm-like bundle of intestines)?
7. What stage of life was this specimen in when it died? What observations of the internal anatomy support your conclusion?