Roll, Muddy River (Turbidity in our Local Watersheds)

Name _____ Per. ___

Lincoln High School students and staff learned that the turbidity of the water (the amount of cloudiness caused from sediment in the creek) can tell us about the health of a creek. The Streamkeepers of Clallam County measure the turbidity of our local creeks at different spots upstream and downstream from human developments. Lincoln High School students and Streamkeepers worked together to study turbidity of Tumwater Creek upstream and downstream of the 8th Street bridge construction project. They did the following investigation.

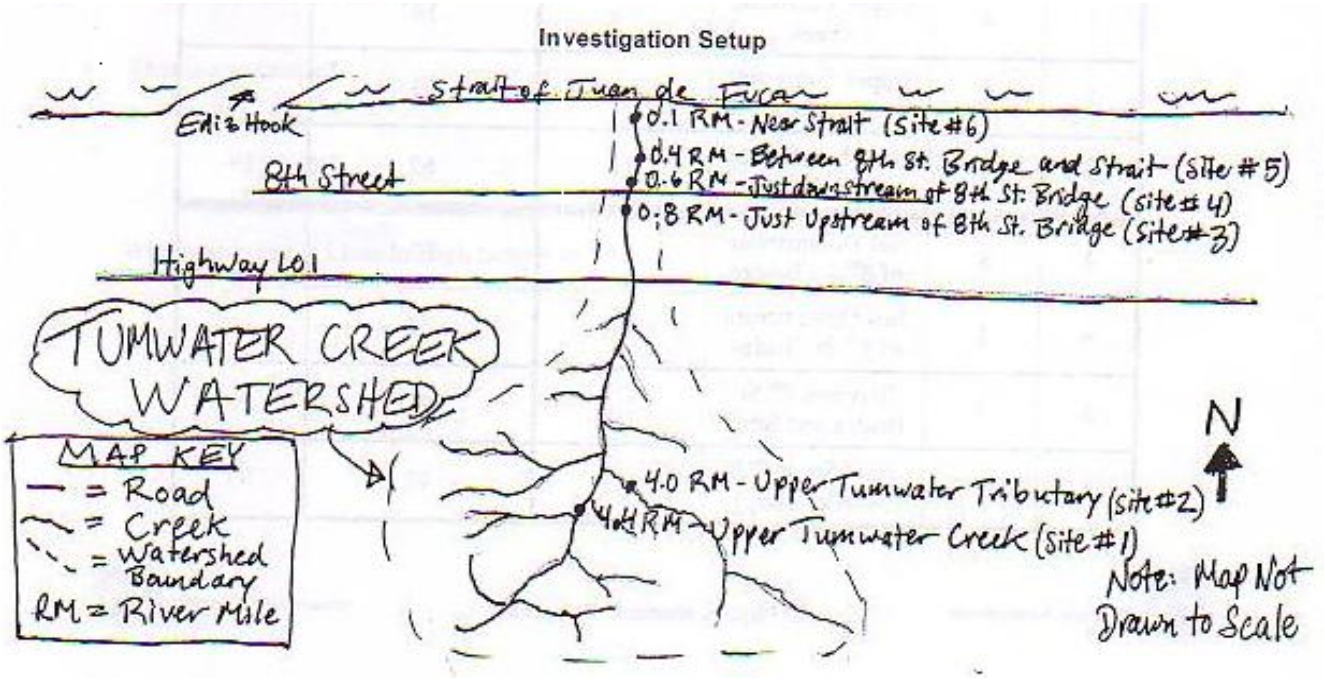
Question:
How is the turbidity different upstream versus downstream of the 8th Street bridge construction project?

Hypothesis:
As we move from upstream of the 8th Street bridge construction site to downstream of the 8th Street bridge construction site, the turbidity level will _____ *(increase or decrease)* because *(a cause-effect statement based on what you know about turbidity and/or the 8th Street bridge construction site)*

_____

_____

Materials:
Waterproof Gloves
Water Sample Collection Bottles, one on a 2m pole for collection and one to hold and transport sample
Refrigerator for Water Sample Storage
Turbidity Meter (including wipes to clean sample vials
Journals and pencils to record the site location and weather



Procedure:

1. Go to a site on Tumwater Creek that is either upstream or downstream from the 8th Street bridge construction site.
2. Record the time, weather and location on the Streamkeepers data sheet.
3. Collect a water sample by first submerging both collection bottles in the creek, filling and dumping them in the creek three times, and then using the bottle on the 2m pole to fill the other bottle (when collecting the sample with the bottle on the 2m pole, position the bottle in the middle of the creek at half the depth of the creek).
4. Travel to another site on Tumwater Creek that is on the other side of the 8th Street bridge construction site from the first site visited.
5. Repeat steps 2 and 3.
6. Travel back to Lincoln High School and put the samples in the refrigerator immediately.
7. The next day, use the turbidity meter to calculate the turbidity for each site and record this data.

Data: Table 1.

Overall Site Location on Tumwater Creek vs. Turbidity					
Site Location				**Turbidity (NTU)**	
Site #	Sample Bottle Number	Site Location	River Mile (miles away from Strait)	Turbidity Reading of Sample Bottle	Site Average
1	6	Upper Tumwater Creek	4.4	14	14
1	4	Upper Tumwater Creek	4.4	14	
2	5	Upper Tumwater Tributary	4.0	13	13
3	7	Just Upstream of 8th St. Bridge	0.8	89	89
4	8	Just Downstream of 8th St. Bridge	0.6	93	86
4	1	Just Downstream of 8th St. Bridge	0.6	79	
5	3	Between 8th St. Bridge and Strait	0.4	90	90
6	2	Near Strait (PA Muffler Shop)	0.1	93	93

1 What were two controlled (kept the same) variables in this investigation?

- o **A. Collection Time and Weather**
- o **B. Location and Weather**
- o **C. Weather and Turbidity**
- o **D. Size of the Creek and Turbidity**

2 What was the manipulated (changed) variable in this investigation?

- o **A. Turbidity**
- o **B. Collection Time**
- o **C. Weather**
- o **D. Location**

3 What was the responding (dependent) variable in this investigation?

- o **A. Collection Time**
- o **B. Turbidity**
- o **C. Weather**
- o **D. Amount of Pollution**

4 What is a watershed?

What watershed is Lincoln High School in?

What watershed do you live in?

5 Write a conclusion for this investigation.

In your conclusion, be sure to:
- Answer the investigative question.
- Include **supporting** data from the Overall Site Location on Tumwater Creek vs. Turbidity table.
- Explain how these data **support** your conclusion.

Question: How is the turbidity different upstream versus downstream of the 8th Street bridge construction project?
Conclusion:

6 Write a new scientific question that you would be interested in investigating.

In your question, be sure to:
- Use what you have learned through the 'How is the turbidity different upstream versus downstream of the 8th Street bridge construction project?

New Question:

7 What things cause turbidity in a creek?

- o **A. Soil**
- o **B. Sand**
- o **C. Tiny Organisms**
- o **D. All of the Above**

8 What things need water with a low turbidity level to survive?

- o **A. Aquatic Insects (bugs that live in the water)**
- o **B. Fish**
- o **C. Salamanders**
- o **D. All of the Above**

9 Please draw a diagram of how things in a watershed end up in a creek and cause high levels of turbidity. Include arrows showing the flow of materials in the system that you draw. You are welcome to draw Tumwater Creek watershed or any other watershed. *Use the space below for your labeled diagram.*

10 A few days later, Lincoln High School students and Streamkeepers worked together again to study turbidity in a local watershed. This time it was the Ennis Creek watershed, and the students were looking at the differences upstream and downstream of the former Rayonier Mill/Ennis Village site. They did the following investigation.

Question:
How is the turbidity different upstream versus downstream of the former Rayonier Mill/Ennis Village site?

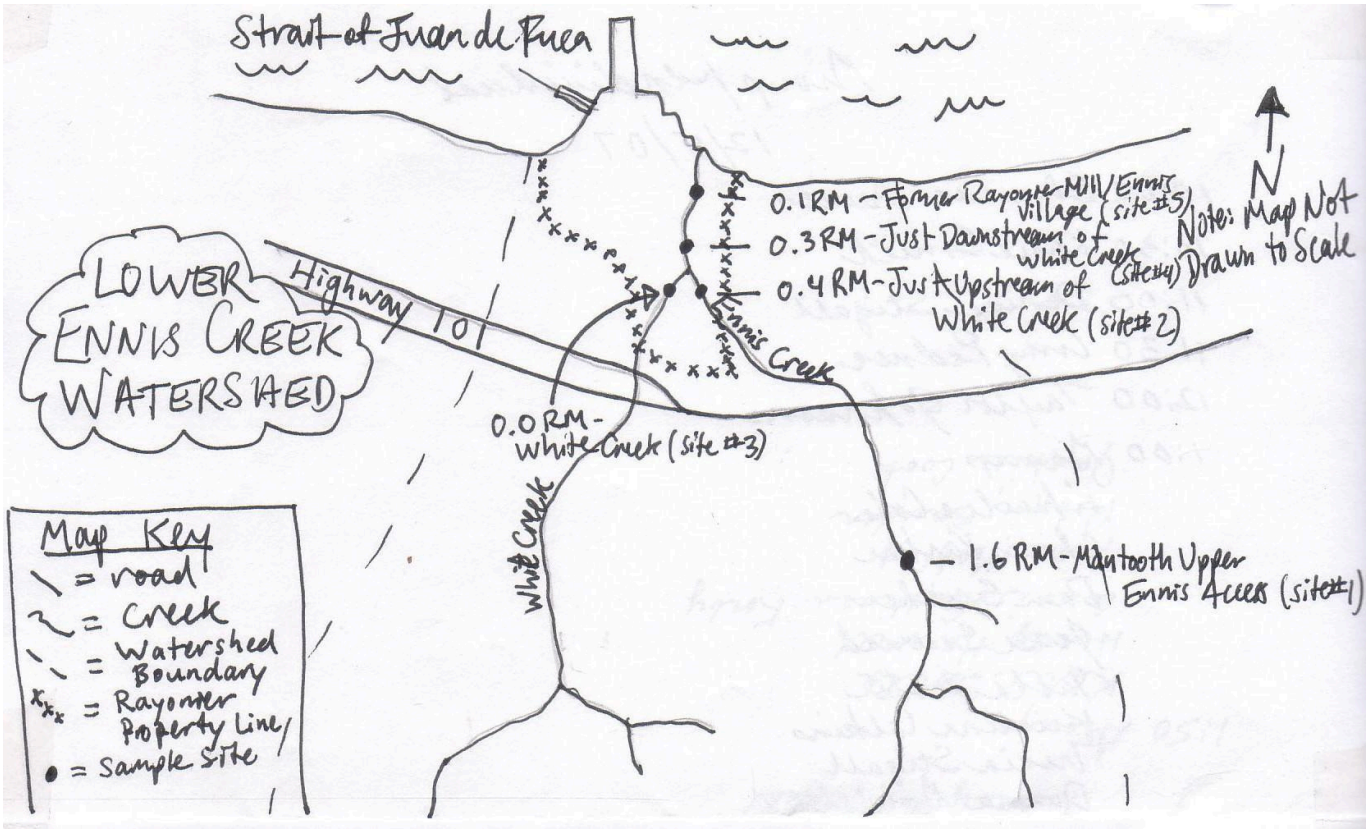
Hypothesis:
As we move from upstream to downstream of the former Rayonier Mill/Ennis Village site, the turbidity will _____ *(increase or decrease)* because *(a cause-effect statement based on what you know about turbidity and/or the former Rayonier Mill/Ennis Village site)*

_____

_____

Materials:
Same as Original Investigation on Page 1.

Investigation Setup



Procedure:

Same as Steps 1 – 7 of the procedure on page 2, substitute Ennis Creek for Tumwater Creek and former Rayonier Mill/Ennis Village site for 8th Street bridge construction site.

Data: Table 2.

Overall Site Location on Ennis Creek vs. Turbidity					
Site Location				**Turbidity (NTU)**	
Site #	Sample Bottle Number	Site Location	River Mile (miles away from Strait)	Turbidity Readings of Sample Bottles	Site Average
1	8	Mantooth Upper Ennis Access	1.6	15, 14, 16	
2	4	Just Upstream of White Creek	0.4	18, 16, 17	
3	3	White Creek	0.0 (0.35 from strait)	18, 18, 17	
4	6	Just Downstream of White Creek	0.3	15, 18, 19	
5	5	Former Rayonier Mill/Ennis Site	0.1	19, 16, 17	
5	7	Former Rayonier Mill/Ennis Site	0.1	18, 18, 18	

11 Write a conclusion for this investigation.

In your conclusion, be sure to:

- Answer the investigative question.
- Include **supporting** data from the Overall Site Location on Ennis Creek vs. Turbidity table.
- Explain how these data **support** your conclusion.

Question: How is the turbidity different upstream versus downstream of the former Rayonier/
Ennis Village site?
Conclusion:

12 As a scientist (which you are), write a recommendation to the city of Port Angeles for how to be prepared for dealing with excess water during storms.

In your answer, be sure to:

- Use what you have learned through these two investigations, particularly involving turbidity.

13. After doing their turbidity investigations and submitting their data to Streamkeepers, Lincoln High students were curious about rainfall might affect the levels of turbidity in a creek. They developed a new investigative question, "How does rainfall affect the turbidity level in Tumwater Creek?"

Plan an investigation that could answer their new question. In your plan, be sure to include:
- Hypothesis
- Materials
- Procedure that includes all of these elements □

- logical steps to do the investigation
- two controlled (kept the same) variables
- one manipulated (changed) variable
- one responding (dependent) variable
- an experimental control condition (when appropriate)
- how often measurements are taken and recorded

Question: How does rainfall affect the turbidity level in Tumwater Creek?

Hypothesis:

Materials:

Procedure: You may use this space for a labeled diagram to support your procedure.

Procedure (continued)**:**