



**ENVIRONMENTAL  
SCIENCE CENTER**

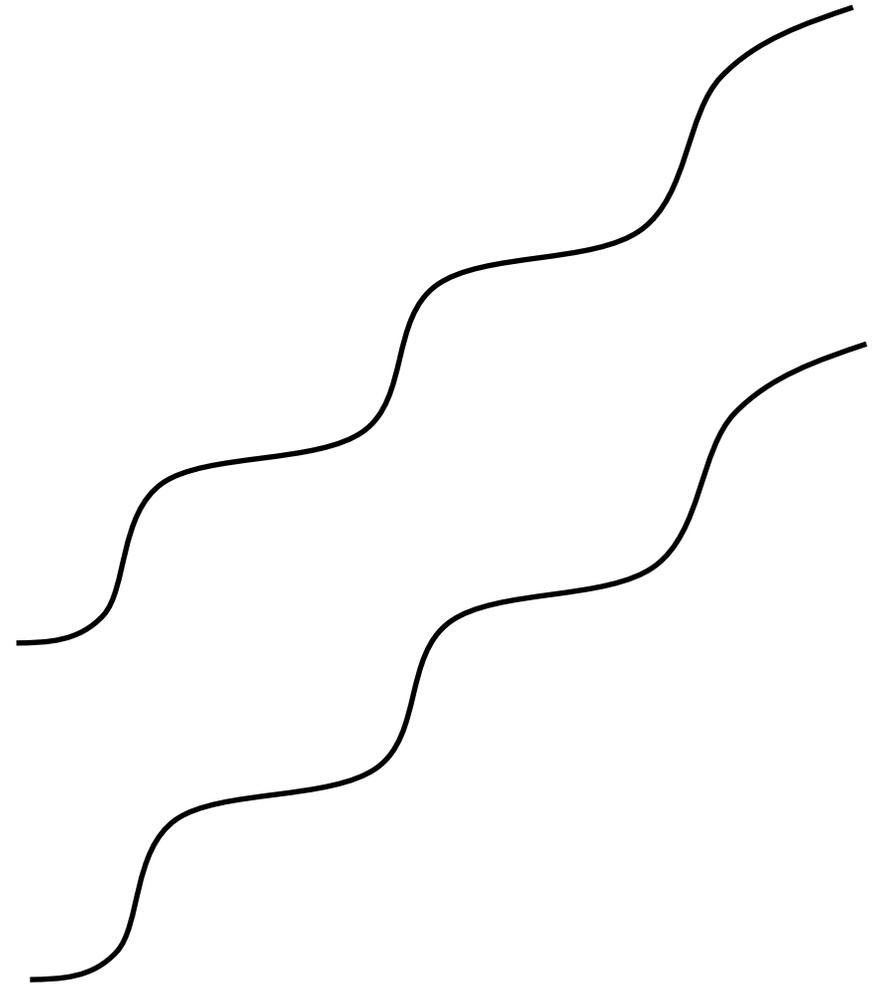
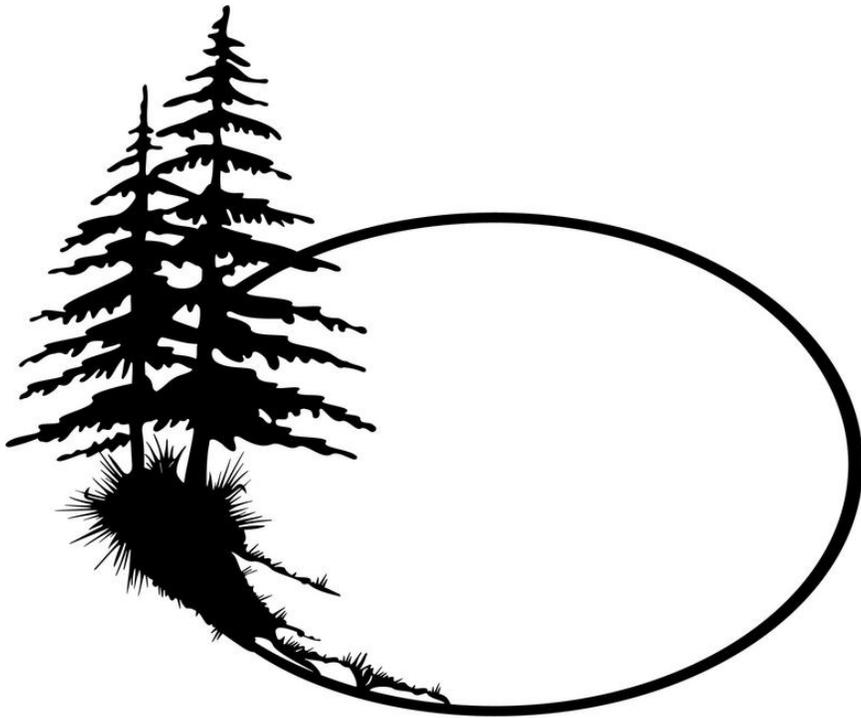
# **Salmon Heroes Field Journal**

This field journal belongs to:

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# Welcome to Salmon Heroes!

This booklet, or field journal, has been created to help guide your Salmon Hero Journey. For hundreds of years, journals have been used by scientists, artists, philosophers and more to record thoughts, experiences, questions and experiments. Over the next few weeks, you will use your field journal to help record your thoughts and observations.



## How can I use this field journal?

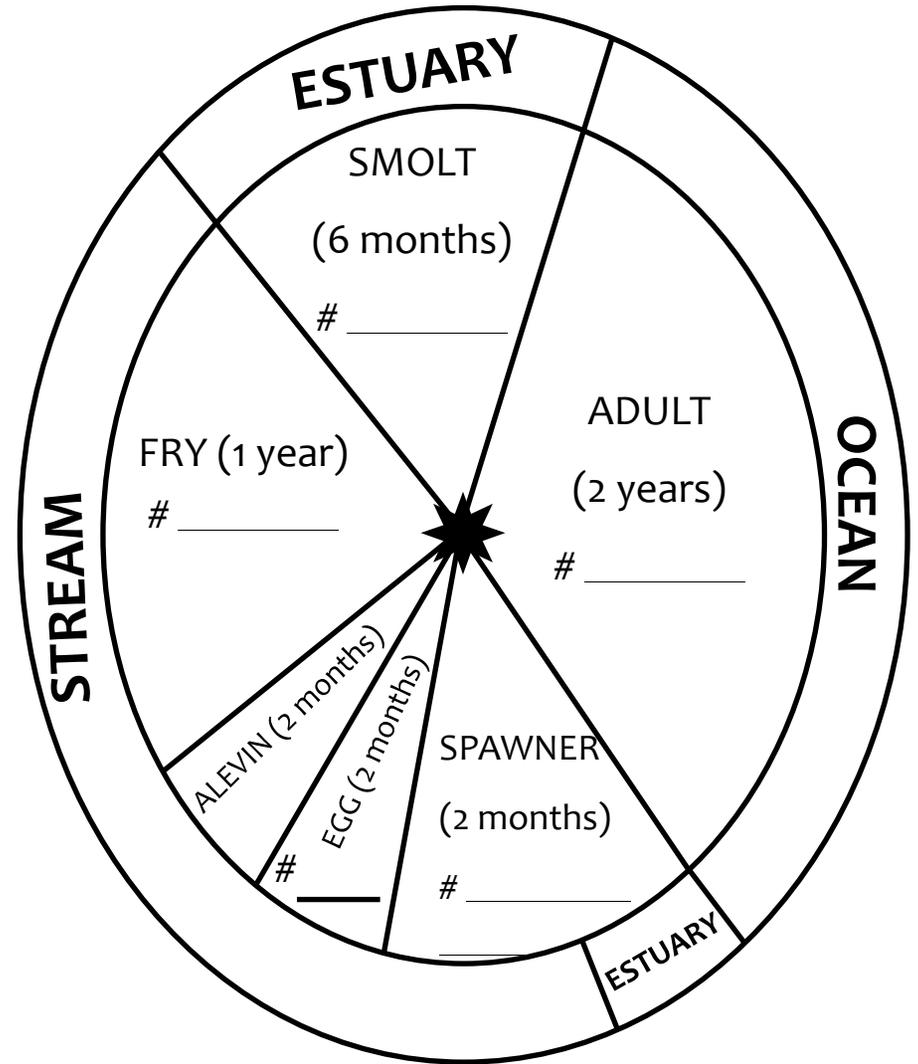
This is YOUR journal, so be creative and use pages in ways that work best for you. You can draw symbols for the weather, write a poem to describe something, use colors to show how something feels, and more. A nature journal is meant to help YOU explore the environment, so make it personal and have fun!

# Draw a Salmon Habitat

## A Stream Habitat

# The salmon wheel!

Follow along with your ESC Naturalist to track how many salmon survive at each life-cycle stage.

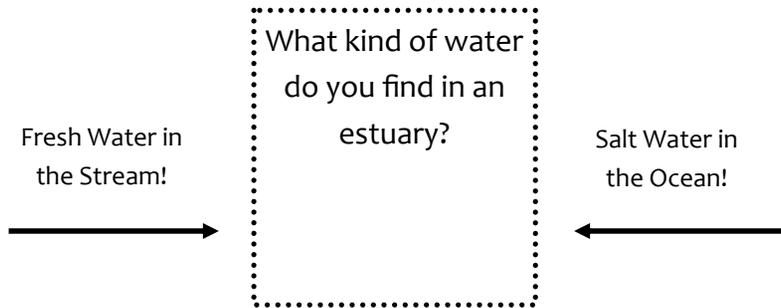


What are the 3 C's?

- 
- 
-

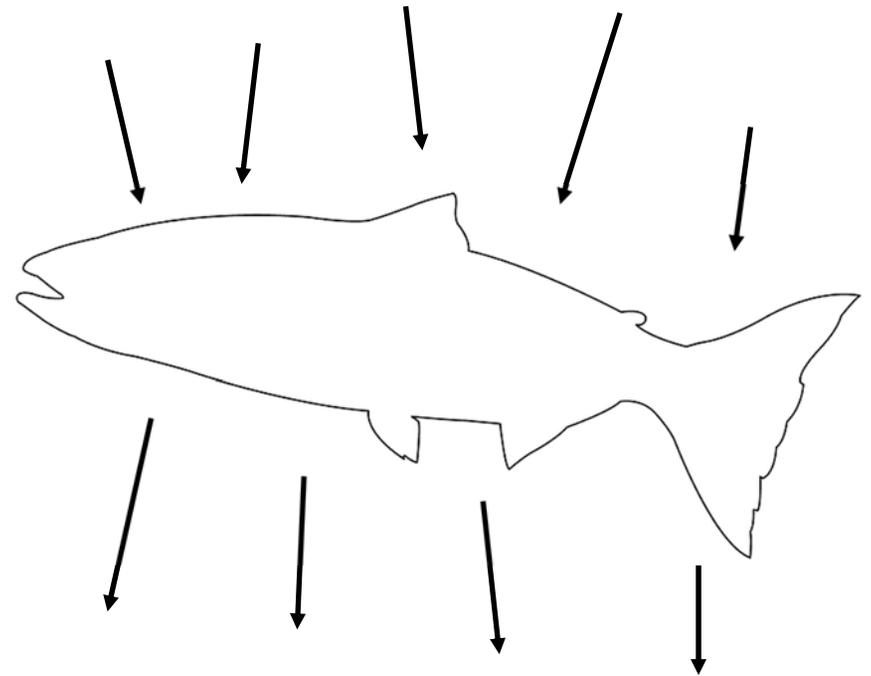
# Draw a Salmon Habitat

## *An Estuary Habitat*



# The Salmon Ocean Food Web

Fill in the salmon food web! What do salmon eat? What eats salmon? Draw or write your answers below. And you can color your salmon to look like the species of your choice.



# The 5 Pacific Salmon Species



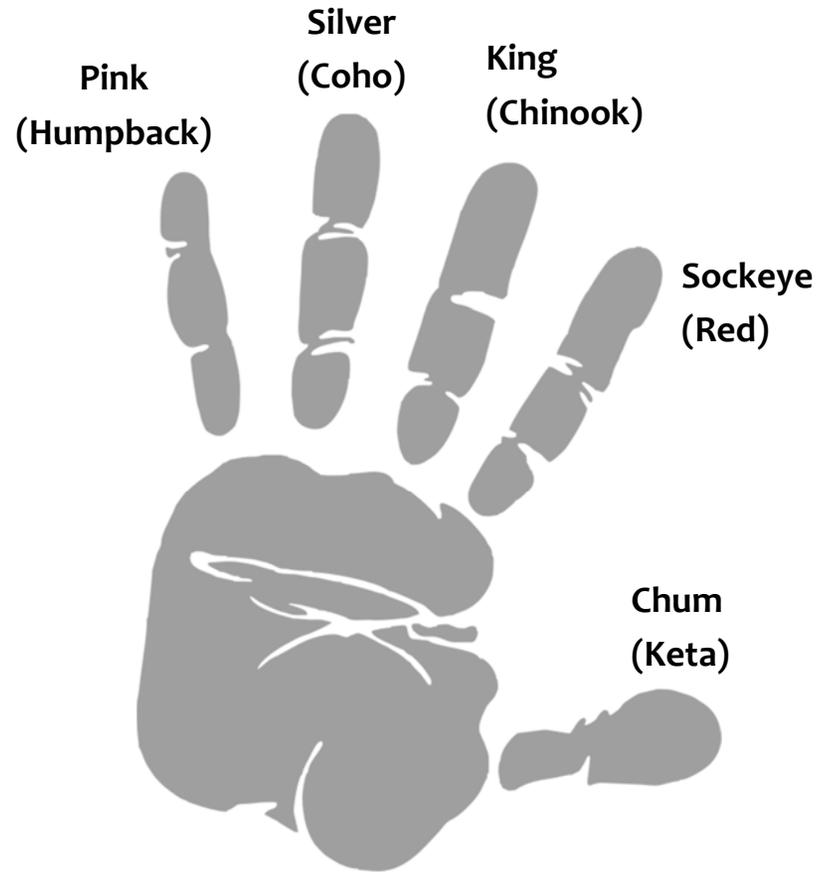
Images from *The Behavior and Ecology of Pacific Salmon and Trout* by Thomas P. Quinn, University of Washington Press

What is one physical feature that all 5 species have in common?

What is one feature that is unique (only one species has it?)

What are your other observations? How are salmon different from other fish you've seen?

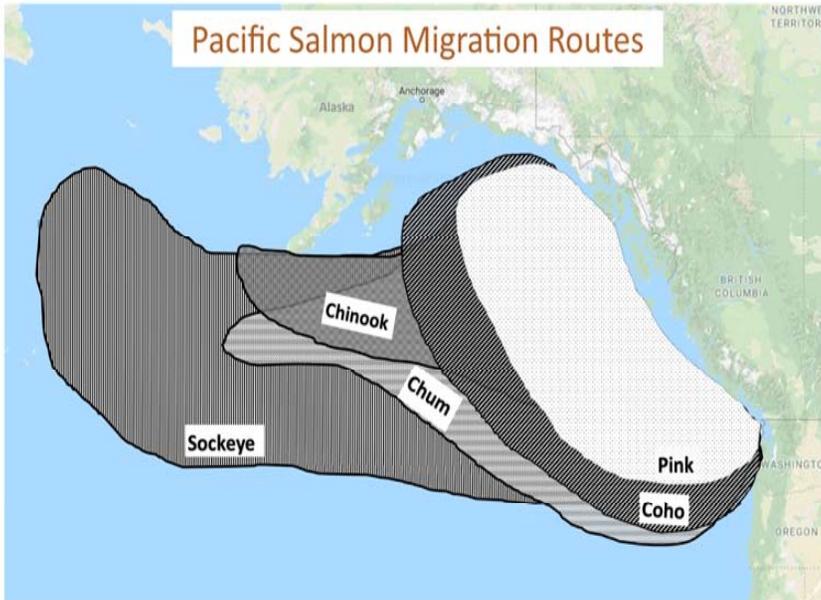
You can use the five fingers on a hand to remember the 5 Pacific salmon species!



These are just SOME of the names for the different types of salmon—there are many others, including *yubáč*, the name for King salmon in Lushootseed, the language of many of the Indigenous Peoples of the Puget Sound region.

What other names or words for salmon do you know?

# Where do salmon go in the ocean?



Which kind of salmon travels the farthest?

Can you find the Puget Sound on the map above?

Fun fact: The world record for a human swimming in the open sea (without wearing flippers) is 139.8 miles!

Make a scientific illustration of a salmon

Anatomy Vocabulary
Dorsal Fin
Caudal Fin
Nare
Lateral Line
Countershading

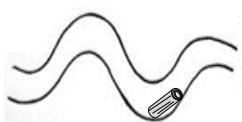
# Stream Survey

Use the scale below to help grade the stream and find out if it is a healthy habitat. For each question, choose a number between 10 (which is excellent) and 0 (which is really bad).

## #1. Does the stream have lots of curves?

Lots of curves. 	A few curves. 	Mostly straight. 
😊 10 9 8 7	6 5 4 3	2 1 0 ☹️

## #2. Does the stream have logs and big rocks?

Lots of logs and big rocks. 	A few logs or big rocks. 	Almost no logs or big rocks. 
😊 10 9 8 7	6 5 4 3	2 1 0 ☹️

## #3. Is there gravel?

Lots of gravel. 	A little bit of gravel. 	Almost no gravel. Lots of dirt in stream. 
😊 10 9 8 7	6 5 4 3	2 1 0 ☹️

## #4. Are there lots of trees?

A lot of trees and shade. 	Some trees and shade. 	Almost no shade. 
😊 10 9 8 7	6 5 4 3	2 1 0 ☹️

## #5. How wide is the forest?

Lots of forest on each side. 	Some forest next to stream. 	Buildings and roads are close to stream. 
😊 10 9 8 7	6 5 4 3	2 1 0 ☹️

*Adapted from the Georgia Adopt-A-Stream Visual Stream Survey*

**Total Stream Habitat Score** \_\_\_\_\_

Is it healthy for salmon?:

Excellent (39-50)    Good (26-38)    Fair (13-25)    Poor (0-12)

What would you change to make this stream better?

## Site Observations

What did you notice during the site walk? What did you see or hear? Use the space below to write or draw about your experience.

## Your Watershed

What is a watershed?

What watershed do you live in?

What are some features of your watershed?

What are some of the potential problems or issues in your watershed?

# Stream Water Quality

## Temperature - How COLD is the water?

**What causes TEMPERATURE to increase or decrease?**

Many things can change water temperature: weather, stormwater runoff, and how many trees are near the river.

**Why do we test for TEMPERATURE?**

When humans remove trees and plants along streams there is less shade. More sunlight reaches the river and warms the water.



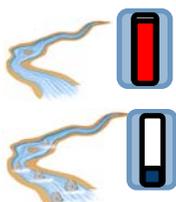
## Dissolved Oxygen

**What is DISSOLVED OXYGEN and how does it get in the water?**

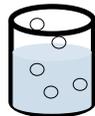
Dissolved oxygen is the oxygen that has been absorbed into the water. Waterfalls or water moving around rocks or other objects in a stream act to mix the air oxygen with water.

**What affects the amount of DISSOLVED OXYGEN in the water?**

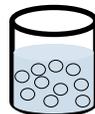
Water temperature and the speed of water moving down a river affect dissolved oxygen levels. Cold water can hold more oxygen than warm water. A river with a lot of fast flowing water can hold more oxygen.



WARM + SLOW WATER = LESS OXYGEN



COLD + FAST WATER = MORE OXYGEN



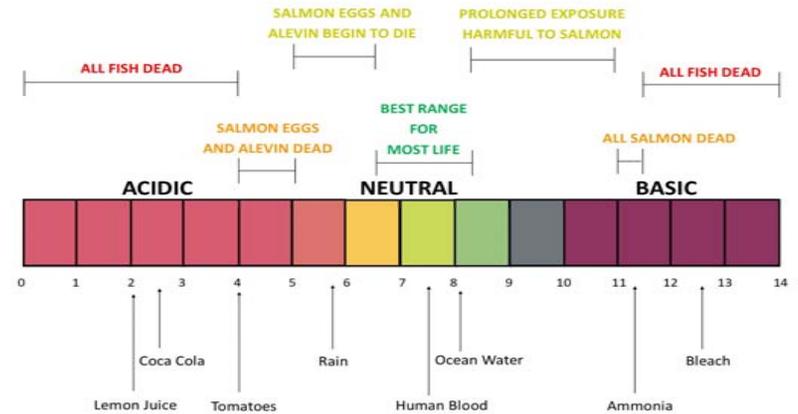
## Phosphate, Nitrate, and pH - How CLEAN is the water?

**What are PHOSPHATE and NITRATE?**

Phosphate and nitrates are chemical nutrients needed for plant growth.

**What is pH?**

pH measures if the liquid is an acid or a base. Look at the chart below to see the pH of common liquids.



**How do they get in the water?**

Phosphate comes from many sources including farming runoff, some soaps, and human and animal waste. The main human sources of nitrates are sewage, fertilizers, and runoff wastes from barnyard animals or pets. pH can change with wastewater discharge from companies. Increases in carbon dioxide are also causing water to become more acidic.



**Why test for these pollutants?**

Too much nitrate in the water makes it difficult for a fish's red blood cells to carry enough oxygen to their tissues. Too much phosphate or nitrate in the water starts a chain reaction that leads to less oxygen in the water. Many animals are sensitive to big pH changes in the water.

## Turbidity - How CLEAR is the water?

### What is TURBIDITY?

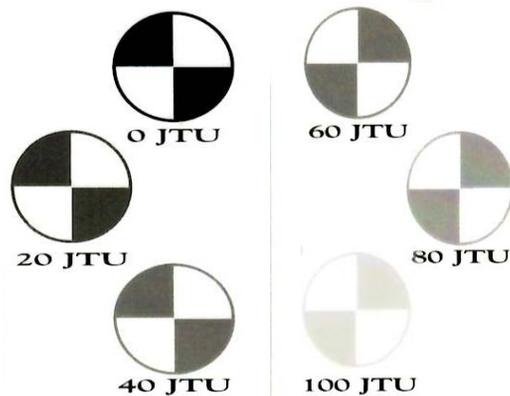
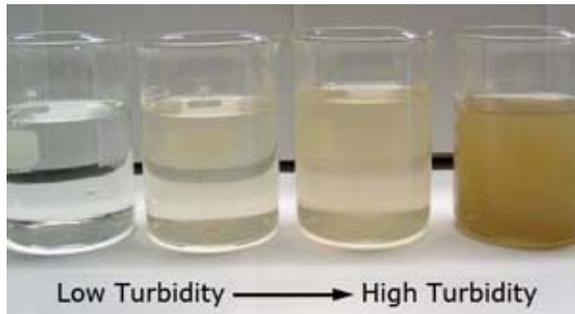
Turbidity is how scientists measure if the water is clear and not cloudy.

### How does TURBIDITY change in the water?

Water gets more turbid with heavy rains, flooding, erosion, stormwater runoff, or algae blooms. Tree roots along the river's edge help to stabilize soil; less trees means more turbid water.

### Why test for TURBIDITY?

Salmon have trouble breathing in muddy water. Soil particles can clog fish gills, making it hard to get oxygen. Turbid water makes it harder for salmon to see the insects they hunt for food. Sediment can cover salmon eggs and stop them from getting the oxygen they need.



## Water Quality at Home!

The black and white circle below is called a secchi disk, and it is one tool we can use to measure the turbidity of water (how clear the water is). You can use it yourself!

### Steps:

1. Get a clear container (such as a plastic cup, or a glass jar) and fill it with water.
2. Place the container on top of the picture of the secchi disk and measure the turbidity according to the chart on the previous page.
3. You can change the turbidity of your water by carefully adding some dirt to the water and stirring it in. Try mixing in just a small amount at first, then adding more! Record your data as the turbidity changes.



# Water Quality Testing Notes

Where did your naturalist test the water?

Stream \_\_\_\_\_

When did they test the water?

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

What else do we notice about our test site?

Air Temperature: \_\_\_\_\_ °C or °F

Recent Weather (circle one): Clear Cloudy Rain Trace

Stream Issues: Trash Soap Oil Low Water

Other Notes:

Fill in the test results as you watch the naturalist test the water in the stream or river!

Turbidity (JTU)	Water Temperature (°C)
pH	Nitrates (ppm)
Phosphates (ppm)	Dissolved Oxygen (ppm)



Is it healthy for salmon?



Use the box below to find out if the test results are healthy for salmon. Circle the results that your naturalist measured!

Test	Water Quality Result			
	Excellent	Good	Okay	Unhealthy
Temperature	7-12 °C	4-6 °C	13-17 °C	< 4 °C OR >17 °C
Dissolved Oxygen: Spawners	>8 ppm	5-8 ppm	3-4 ppm	0-2 ppm
Dissolved Oxygen: eggs & alevin	>11 ppm	8-11 ppm	6-7 ppm	0-5 ppm
Turbidity	0 JTU	1-40 JTU	41-100 JTU	>100 JTU
Phosphate	0-1 ppm	2 ppm	3 ppm	>3 ppm
Nitrate	<2 ppm	2-5 ppm	5 ppm	20 ppm
pH	6.5-8.2	5-6.5 OR 8.2-9	4-5 OR 9-11	<4 OR >11

### What is JTU?

JTU stands for Jackson Turbidity Units. The scientist who created the test was named Jackson. Maybe one day there will be a scientific test named after you!

### What is PPM?

PPM stands for parts per million. For example, if your test best matched 2 ppm on the chart, that means that in every 1 million molecules in your water sample, 2 of those molecules are phosphate. Nitrate and dissolved oxygen are also measured in ppm.

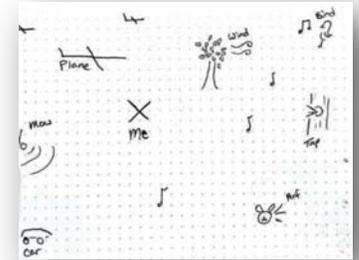
## Continue Your Observations at Home!

Choose a window in your home as your study location. Over time, make observations about this study area and track any changes. Whatever and however you draw is OK!!! Scientists come back to the same study area or monitoring site again and again to record patterns and changes, which helps them make connections.

*Draw a square or rectangle on your page to show the window frame. Now draw what you see on the other side of it! You can sketch as simple or detailed as you like. Make sure you write down the date and time for each observation!*

## Sound Mapping

Find a comfortable spot near a window or outside. In the space below, mark an **X** in the center of your page. This represents YOU! Spend 4-10 minutes listening and drawing your 'sound map.' For each sound you hear, mark something simple that represents the sound (a wavy line could represent wind, dots could be rain, swirls could be a chattering squirrel, a big blotch could be a horn). Draw what feels right to you, and close your eyes if it helps.



Example of a sound map.

## Pollution Solutions

**Stormwater** is rain that falls on streets or other developed land and flows into nearby streams and rivers. It can pick up pollutants as it runs off the streets and take that to the river through a storm drain. You will get the chance to brainstorm with your class ideas on how to stop stormwater pollution from entering our local streams.

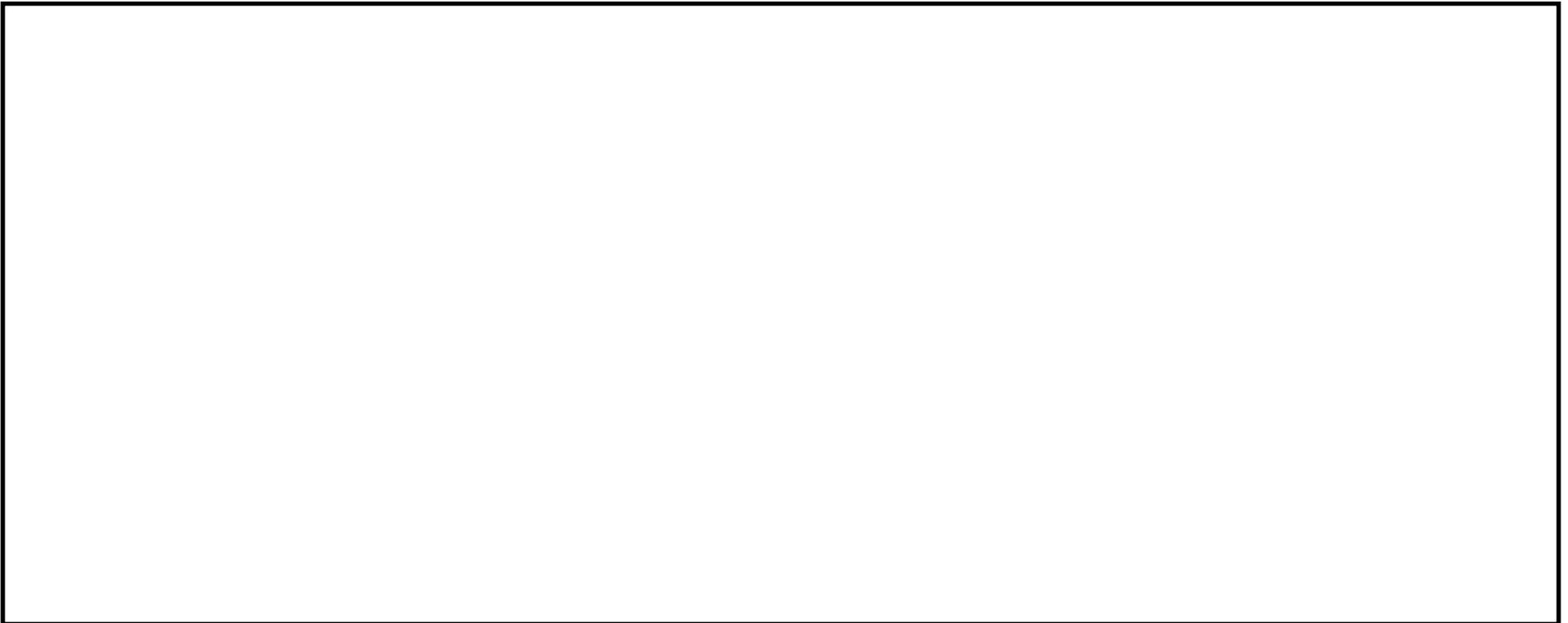
1. What is your group's **stormwater pollutant**?
2. How does it get into the river/Puget Sound?
3. What are some **solutions** to keep your group's pollutant out of Puget Sound?
  - What can you do today at home? What could you do at your school?
  - What could you design for the future?

## Congratulations!

You are now an official Salmon Hero. You can cut out your Salmon Hero badge below. There are two sides to the badge. Be sure to write in your pledge for what you are going to do to help salmon!



You have learned so much about salmon and their habitat. Use the space in the box below to make another drawing of the best salmon habitat you can imagine!



*This badge certifies that I pledge:*

-  To help protect wild salmon populations by keeping our watersheds clean and healthy.
-  To educate my family and friends about the important role that salmon play in our ecosystem.

I pledge to help Pacific Salmon

\_\_\_\_\_

Signature

Date

Continue your salmon explorations! Every fall is salmon SEE-son in King County. You find more places to see salmon by looking at the following website:

<http://bit.ly/salmonseeson>

Salmon Heroes is generously supported with funding from:



**King County**

Department of  
Natural Resources and Parks

**Wastewater Treatment Division**



**KING COUNTY  
FLOOD CONTROL  
DISTRICT**



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