

Fish Release Field Trip

Congratulations! You've done an amazing job taking care of your baby salmon! They're now ready to swim free in the wild. Today, we will investigate this stream habitat to make sure it is a good place for salmon to live. Then we will release the salmon fry!

Station 1: Water Quality

We know that salmon need cold, clean, and clear water to survive in streams. Our goal today is to evaluate whether or not the water we are testing is good or bad for salmon. We will be testing dissolved oxygen, nitrates, temperature, pH, and turbidity.

Dissolved Oxygen (D.O.)

Dissolved oxygen is the most important indicator of the health of a water body and its capacity to support life. Salmon have gills to extract dissolved oxygen from water. D.O. can be impacted by many aspects of the environment, including temperature and turbidity (the cloudiness of the water).

Record your D.O. results here: _____ mg/L

D.O. levels for salmon:

Optimal	Acceptable	Poor
>9 mg/L	7-8 mg/L	<6 mg/L

Based on the values in the table above, would you describe your D.O. results as "optimal," "acceptable," or "poor?"

Nitrates

Nitrates are essential nutrients for plants. But too many nitrates can cause algal blooms which reduces the amount of oxygen available for salmon, as well as increase turbidity. Nitrates often come from plant fertilizers or animal waste.

Nitrates and Dog Waste

Dog waste contains nitrates and harmful bacteria that can negatively affect water quality when it is not picked up. Dogs create about $\frac{1}{2}$ pound of waste per day. How much dog waste does your group's dogs produce?

How many dogs does your group own? _____

Multiply that by 365 days. _____

Divide that by half (1/2 lb poop). _____

That's how many pounds of dog waste your group's dogs produce every year! How can you prevent those harmful bacteria from going into the water where salmon live?

Record your Nitrate results here: _____ mg/L

Salmon want water with Nitrate concentration lower than 1 mg/L. Is your site's water suitable for salmon?

Temperature

Salmon need cold water to survive in streams. Colder water holds more oxygen, which makes it easier for salmon to breathe. Colder water also lowers their metabolism so they don't have to find as much food as they would in very warm water.

Record your water Temperature here: _____ °C

Salmon want water colder than 12°C. Is your site's water suitable for salmon?

Turbidity

Salmon need clear water to survive. If water gets too turbid and murky, it can clog a salmon's gills and make it difficult to breathe. Just like how smoke makes it hard for us to breathe, dirty water makes it hard for fish to breathe.

Record your water Turbidity here: _____ JTU

Salmon want water with less than 20 JTUs. Is your site's water suitable for salmon?

pH

Salmon can only survive if the pH of their water is not too acidic and not too basic.

Record your pH result here: _____ pH units

Salmon want water that is between 7 and 8 pH units. Is your site's water suitable for salmon?

14
13
12
11
10
9
8
7
6
5
4
3
2
1

This is a pH scale, going from very acidic (0 pH units) to very basic (14 pH units). Label the following items next to the pH scale:

- Lemon juice (2 pH units)
- Bleach (13 pH units)
- Coffee (5 pH units)
- Baking soda (9 pH units)
- The pH result for the water you tested

Station 2: Stream Habitat Assessment

Mark an X next to each habitat feature that you observe at your stream.

- | | | |
|---|--|--|
| <input type="checkbox"/> Shade | <input type="checkbox"/> Big logs in the river | <input type="checkbox"/> No garbage in the stream |
| <input type="checkbox"/> Lots of trees | <input type="checkbox"/> Food (water bugs) | <input type="checkbox"/> No poop or fertilizer near the stream |
| <input type="checkbox"/> Beaver dams | <input type="checkbox"/> Deep pools | <input type="checkbox"/> No invasive plants |
| <input type="checkbox"/> Places to hide | <input type="checkbox"/> Riffles for oxygen in the water | <input type="checkbox"/> No culverts |
| <input type="checkbox"/> Meandering, curvy stream | <input type="checkbox"/> Cold water | <input type="checkbox"/> No man-made dam |
| <input type="checkbox"/> Consistent water | <input type="checkbox"/> Clear water | |
| <input type="checkbox"/> Boulders | <input type="checkbox"/> Side channels | |
| <input type="checkbox"/> Lots of gravel | | |

Count up how many items you marked at X next to and write that number below.

Total Stream Habitat Score: _____

Is it healthy for salmon?

Excellent (16-20) Good (11-15) Fair (6-10) Poor (0-5)

What would you change to make this stream better?

Station 3: Salmon Survival Math Game

Imagine your cup is your salmon redd. You start with 3,000 eggs in your redd.

Stage 1: You are a salmon egg, just laid in a redd (nest) of gravel (small rocks).

Roll the dice at the station. How many salmon do you have left? _____

Stage 2: You have developed (grown) into an eyed egg. Your eye can be seen through your eggshell.

Roll the dice at the station. How many salmon do you have left? _____

Stage 3: You've hatched into an alevin with a big yolk sac (belly full of food).

Roll the dice at the station. How many salmon do you have left? _____

Stage 4: Now you're a little fry with good camouflage. You eat little insects and hide a lot.

Roll the dice at the station. How many salmon do you have left? _____

Stage 5: When you become a smolt, your body changes so that you can live in salt water. You look all silvery (shiny) now.

Roll the dice at the station. How many salmon do you have left? _____

Stage 6: You spend years in the Pacific Ocean, growing to become a HUGE adult salmon. The ocean is full of good food.

Roll the dice at the station. How many salmon do you have left? _____

Stage 7: As a fully grown adult salmon, you start heading back from the ocean to the river you came from.

Roll the dice at the station. How many salmon do you have left? _____

Stage 8: You follow your sense of smell farther and farther up, looking for the stream where you hatched.

Roll the dice at the station. How many salmon do you have left? _____

Stage 9: Finally, you reach the stream where you hatched. You're so close! If you can get all the way home, you will spawn (lay eggs).

Roll the dice at the station. How many salmon do you have left? _____

Questions:

1. What happened to all your salmon?
2. Where did you lose the most salmon?
3. What kinds of predators did your salmon encounter?
4. Was there anything that humans did to hurt the salmon?
5. How many salmon did you have left at the end?
6. How many salmon are needed to build a redd and lay a new batch of eggs?

Station 4: Stream Bug ID

Benthic macroinvertebrates are important for salmon for two reasons: 1) they are a food source for juvenile salmon, and 2) they are used as indicators of pollution levels in the stream because some species of stream bugs do not tolerate pollution and only live in very clean streams.

Benthic means living on the bottom. These benthic macroinvertebrates were collected from the gravel on the bottom of the stream, where they live.

Look at the benthic macroinvertebrates in the water samples at this station. Check the box next to the different species you can identify and calculate a pollution tolerance index.

Pollution Tolerance Index

Check the box of every species present in your sample!

Group 1: Very Sensitive to Pollution ("We HATE pollution!")	Group 2: Mildly Sensitive to Pollution	Group 3: Mildly Resistant to Pollution	Group 4: Very Resistant to Pollution ("We can tolerate pollution!")
<input type="checkbox"/> Stonefly Nymph <input type="checkbox"/> Mayfly Nymph <input type="checkbox"/> Caddisfly Larva <input type="checkbox"/> Riffle Beetle <input type="checkbox"/> Dobsonfly Larva <input type="checkbox"/> Right-handed or Gilled Snail <input type="checkbox"/> Water Penny	<input type="checkbox"/> Damselfly Nymph <input type="checkbox"/> Dragonfly Nymph <input type="checkbox"/> Scud <input type="checkbox"/> Sowbug/Isopod <input type="checkbox"/> Cranefly Larva <input type="checkbox"/> Clam/Mussel	<input type="checkbox"/> Leech <input type="checkbox"/> Midge Larva <input type="checkbox"/> Flatworm <input type="checkbox"/> Black Fly Larva <input type="checkbox"/> Water Mite	<input type="checkbox"/> Tubifex worm <input type="checkbox"/> Blood midge larva <input type="checkbox"/> Rat-tailed Maggot <input type="checkbox"/> Left-handed or Pouch Snail

Group 1 total = (x4) Group 2 total = (x3) Group 3 total = (x2) Group 4 total = (x1)

Group 1 index = _____ Group 2 index = _____ Group 3 index = _____ Group 4 index = _____

POLLUTION TOLERANCE INDEX RATING =
(add all indexes together)

23 or greater = EXCELLENT 17 - 22 = GOOD
11 - 16 = FAIR 10 or less = POOR

Station 5: Gyotaku Art Print

Gyotaku is a form of art from Japan that means "fish" (gyo) and "rubbing" (taku). We will paint a fish carcass and press rice paper on it to create a fish rubbing art print.

Follow the station leader's instructions on painting your salmon and *GENTLY* pressing your sheet of rice paper onto the salmon. *VERY CAREFULLY* pull your rice paper away from the painted salmon. You just created a fish art print! Set it aside to dry and your teacher will hand them out back in the classroom.

Station 6: Release Your Salmon Fry!

Follow the station leader's instructions on how to safely release your salmon fry into the stream. Say farewell to your salmon fry and wish them luck on their journey.