



Ecology in Classrooms & Outdoors

# SALMON STORIES

## TEACHER GUIDE

### Introduction

In this lesson, students study the life cycle of salmon and read two articles related to recent events in salmon conservation in the Pacific Northwest. Then, students reflect on the readings by making a systems diagram or mind map, drawing connections between the articles and the system in which the salmon life cycle takes place.

#### Materials

- Blank paper
- Pencil
- Links or copies of articles:
  - [Article I \(Seattle Times\)](#)
  - [Article II \(The Oregonian\)](#)
- Colored pencils, markers, crayons (optional)

#### Lesson Length

40-60 minutes, asynchronous or synchronous

#### Standards

##### NGSS

3-LS1-1 From molecules to Organisms: Structures and Processes  
Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

5-ESS3-1 Earth and Human Activity  
Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

MS-LS2-4 Ecosystems: Interactions, Energy, and Dynamics  
Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

##### ELA

6.RI.7 Integrate information presented in different media or formats as well as in words to develop a coherent understanding of a topic or issue.



### Lesson Procedure

#### BEFORE YOU BEGIN:

To become more familiar with the five species of Pacific salmon, or to refresh your knowledge on the life cycle of salmon and their importance to ecosystems in the Pacific Northwest, visit [this web page from the Togiak National Wildlife Refuge, Alaska](#).

To learn about the cultural significance of salmon to tribes of the Columbia River Basin in the Pacific Northwest, [this resource from the Columbia River Inter-Tribal Fish Commission](#) is available, among many others.

#### 1. INTRODUCE THE IMPORTANCE OF SALMON

Explain to students that salmon are both culturally and ecologically important in the Pacific Northwest. Because of their unique life cycle and migratory patterns, as well as their historical abundance, salmon are a **keystone species** in their habitats and are an important food source and spiritual symbol for Indigenous nations across the region.

However, due to changes in the environment caused by human activities (habitat loss, pollution, damming of rivers for hydropower, changes in climate, irrigation for farms) and the removal and erasure of Indigenous peoples, salmon populations are getting smaller each year and are at risk of disappearing.



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### Lesson Procedure, cont.

Tell students that this lesson will get them thinking about how salmon are connected to the environment and the culture of both Indigenous and non-Indigenous people who call the Pacific Northwest home.

#### 2. DRAW ALONG ACTIVITY: THE SALMON LIFE CYCLE

**NOTE:** For students in grades K-5, we recommend spending more time on this section before moving on.

For students in grades 6 and above, we recommend using this as a review or short activity and spending more time on the article reflection activity.

Instruct students to get out a piece of blank paper and a pencil. If you are teaching in person, use a whiteboard or document camera so students can draw the salmon life cycle along with you as you describe each stage. If you are teaching online, share your screen or use a webcam to do the same.

Begin at the top of the page by drawing salmon **eggs**. Salmon eggs are typically orange or red in color, but can be other colors. Salmon lay their eggs in slow-moving creeks and streams, higher up in the **watershed**. Females create a shallow nest among the pebbles called a **redd**. "Although thousands are laid, up to 85% of the eggs can be lost before hatching." Make a note on your drawing that they are in a creek or a stream at this stage.

Next, the salmon grow to a stage called **alevin** (ah-lee-vin), in which they are not fully developed and rely on the yolk sac still attached to the belly for their nutrients. They are still in their redds, in slow-moving cold water. Draw the alevin on the page and an arrow from the egg to the alevin. Make a note on your drawing that they are in creeks or streams at this stage.

Juvenile salmon are called **fry** and at this stage begin to move downstream towards the ocean and eat very small aquatic invertebrates. Depending on the species, fry will spend weeks to years in freshwater. Fry often develop dark lines called **parr marks** on their sides to help them camouflage in more open water. Draw the fry on the page and draw an arrow from the alevin to the fry. Make a note on your drawing that they are still in rivers or streams at this stage.

Fry develop further into **smolts**, which are young salmon that form **schools** (groups) in order to avoid predation in more open water, such as large rivers, estuaries, or eventually the ocean. The smolt stage is also where their bodies are undergoing physical and physiological changes that will allow them to live in saltwater after living in freshwater their entire lives. This is one of the reasons why salmon are so remarkable; very few fish go between salt and freshwater throughout their lifecycle (this is described as being **anadromous**). Draw a few smolts together in a school, and draw an arrow from the fry to the smolts. Make a note on your drawing that they are changing from freshwater to saltwater.

The **adult salmon** live in the ocean, eating plankton and smaller fish to help them grow big and strong. The amount of years the adult salmon live in the open ocean depends on the species. Adult salmon are silver in color to camouflage with the marine environment, and are a food source for larger fish, sharks, whales, dolphins, sea lions, seals, and humans! Draw an adult salmon and draw an arrow from the smolts to the adult salmon. Make a note on your drawing that they are in the ocean habitat.

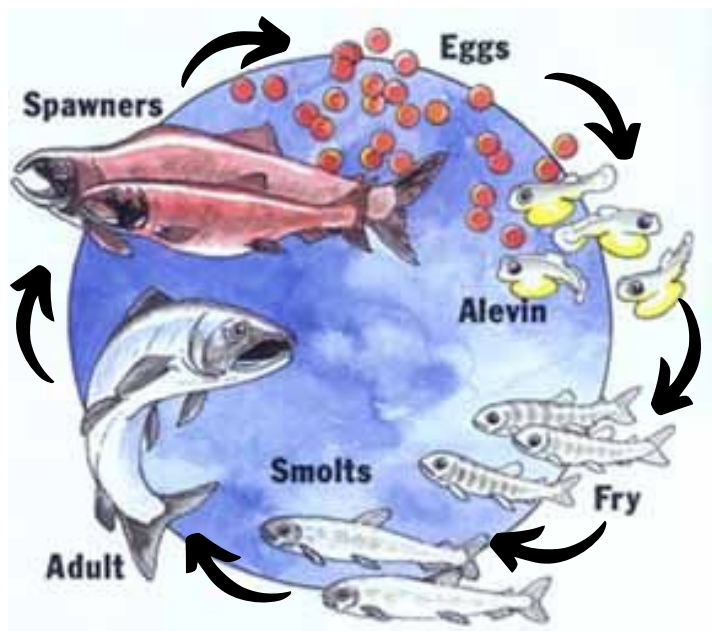
Adult salmon prepare to return back to the exact spot where they hatched to reproduce, or **spawn**. Adult salmon returning home are called **spawners**, and undergo further physical changes to be able to make the journey. Some salmon species will turn bright red, and some males develop a hump on their back and/or a hooked jaw called a **kipe**. Most salmon do not eat anything after leaving the ocean and spend all of their energy to swim upstream, lay or fertilize eggs, and protect the redd until they die. Then, their bodies remain in the river to return nutrients to their young and other animals. This is where the cycle begins again! Draw a spawner, and complete your drawing by adding an arrow from the spawner to the eggs. Make a note that they have returned to the freshwater creek or stream.

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### Lesson Procedure, cont.

Your drawing will look something like this:



### 3. BRAINSTORM

Now that you have gone through the salmon life cycle, have a discussion with students about possible reasons why salmon populations have been going down historically.

Specifically, have them think about how much physical space salmon need to complete their life cycle, and the type of habitats they live in.

For example, you might ask the following:

- Is there something you can think of that would restrict or stop a salmon from moving from their place of birth to the ocean, or the other way around?
- What are common sources of pollution in a stream?
- What different food sources do salmon depend on?
- Can you think of any animals that depend on salmon (or salmon eggs) for food?

### 4. ARTICLE I: CAR TIRES AND SALMON DEATHS

Have students read (or read out loud) this 2020 article from the Seattle Times. For younger students, interpretation may be necessary.

When students have finished reading or listening to the article, invite them to take out a separate piece of paper and write down a few thoughts about the article. Some prompts for students may include:

- What is the main takeaway from the article?
- What part(s) of the salmon life cycle does the story seem to impact the most? The ecosystem as a whole?
- How do you think people should react to the science in this article?

### 5. ARTICLE II: RETURNING SALMON TO THE UPPER COLUMBIA

Have students read (or read out loud) this 2020 article from The Oregonian. For younger students, interpretation may be necessary.

When students have finished reading or listening to the article, invite them to write down a few thoughts about the article. Some prompts for students may include:

- What is the main takeaway from this article?
- How do you feel after reading this article? Why?
- Which groups are involved in this project? Why is this project “exciting” to the groups involved?
- What are further steps or actions people should take to continue seeing salmon return?



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### 6. REFLECTION ACTIVITY

For this activity, students have ample freedom to choose how they want to reflect on the articles and incorporate their reflections into their original salmon life cycle drawing/diagram.

For example, they may choose to add drawings, full paragraphs, or one-word labels with arrows or connecting lines onto the diagram to show how different changes to the environment such as dams and pollution impact salmon.

Alternatively, they may add more imagery and create a timeline to tell the story of salmon in the Pacific Northwest.

Think of this activity as a systems diagram or mind map, where the student has control over how they want to present their thoughts.

### 7. SHARE

Have students share their work with the class, either through an online platform or as a short presentation. Encourage peers to ask clarifying questions about their diagrams.

