

**Grade Level:**3rd – 5th**Time:**

100 Minutes

Season:

All

Objectives:

Students will be able to...

- Describe features of a healthy salmon ecosystem
- Recall ways in which threats to an ecosystem impact salmon habitat

Key Concepts:

- Salmon are an indicator of the overall health of an ecosystem
- Healthy salmon habitats have key biotic and abiotic factors

Salmon Habitat – Build A Healthy Salmon Stream

Lesson 1 of 2

Background & Summary

This lesson teaches about salmon from an ecological perspective. Instead of addressing salmon habitat, students will learn about the biotic and abiotic factors that constitute a healthy salmon ecosystem and how those factors influence habitat. Students apply their knowledge of salmon life cycle, anatomy, and adaptations to investigate ecosystem requirements for each life stage. The first activity establishes the role of salmon as an indicator species and demonstrate how disruptions to the ecosystem affect salmon habitat. Next students incorporate the information they learned from the first activity to develop their own version of a healthy salmon stream.

This is a fairly long lesson, if you are short on time, consider doing the first two activities (Steps 1-6) on Day 1 and the last two activities (Steps 7-8) on Day 2.

This lesson is supplemented with an outdoor activity where students take a field trip to a stream bed and assess biotic and abiotic features to determine whether it's suitable habitat for salmon. That activity concludes by having students make recommendations for improving the habitat, providing students with career insight into the job duties of a habitat restoration biologist or fish passage engineer.

Procedure

Warm-Up Activity: Habitat vs Ecosystem

1. Ask students what they need to survive. They have one minute to write down as many things as they can think of. Examples include food, shelter, warmth, water, oxygen, family, etc. Discuss their lists by having students share out some of the things they wrote down.

Key messages to share with students:

The things they wrote down can be classified as biotic (living factors) or abiotic (non-living factors).

Other biotic factors besides food include the microorganisms living in your gut that help you digest food, fungi that make life saving antibiotics such as penicillin, or trees that produce the oxygen we breathe

Abiotic factors include the soil we grow our food in (which contain biotic factors we also benefit from), clean water we drink, nutrients we get from the food we eat.

An ecosystems is made of all the interacting biotic and abiotic parts.

Explain to students that the list they just made can be thought of as their ecosystem. (5 minutes)

Courtesy of Columbia River FWCO Information and Education, 2022



Procedure (Continued)

2. Looking at their list, give students another minute to write down the names of places that play vital roles in their survival, learning and development.

Examples include home, school, doctor/dentist office, etc.

Key messages to share with students:

A habitat is a place where an organism naturally lives and grows.

Explain that the second list they made can be thought of as their habitat. (3 minutes)

3. Apply the definitions of habitat vs ecosystem by asking students to think about fish (in general, not necessarily salmon) and share out examples of fish habitat followed by examples of fish ecosystems. Examples of habitat include ocean (open ocean, or reefs), rivers, streams, lakes, estuaries. Examples of ecosystems include salt- or freshwater, prey items, parasites, temperature and sunlight, or shelter (reef, abandoned shell). (5 minutes)

Salmon Ecosystem Requirements

Learning objectives:

a. Each life stage has a different ecosystem requirement

b. Salmon face ecosystem threats at all life stages

4. Ask students to share what they think would happen if there were changes to an aquatic ecosystem. For example, what would happen if the water in a river or lake started to get warmer? Student answers might fall into the following categories:

- Loss of biodiversity (e.g. fish or other animals dying)
- Unchecked growth (e.g. toxic algal blooms, mosquito abundance)
- Degraded habitat (e.g. receded banks or shorelines, muddy/turbid water)

Explain that all living organisms are impacted when an ecosystem is altered but not all organisms are impacted at the same time or to the same degree. Some are sensitive to changes will others tolerate them. (5 minutes)

Key messages to share with students:

Indicator species are organisms whose presence, absence or abundance reflects the health of an ecosystem.

The presence of some indicator species reflect a healthy ecosystem while the presence of others reflect an unhealthy ecosystem.

Note: See “Extension Activities” for ideas about exploring this topic further

Salmon are an indicator species that are negatively impacted by threats to their ecosystem. As an ecosystem degrades and disappears, so do salmon.

5. Split students into groups of 5 and provide each student in the group with a different “Salmon Ecosystem Worksheet”. You should decide how you want to divide the workload between groups of four or six. Explain to students that an ecosystem must have certain features in order to be considered healthy for salmon and those features



Procedure (Continued)

vary by life stage. Instruct students to use their computers to fill in the worksheet with information about ecosystem requirements for their assigned life stage. (20 minutes)

Teaching Tip:

Review the “Salmon Ecosystem Answer Key” for search engine terms that can assist students who struggle to find information.

6. Review the worksheet with the class using the “Salmon Ecosystem Presentation” as a guide. Call on students to share out as time permits. Instruct students to add the information from the presentation to the answers they provided on their worksheets. (15 minutes)

Build A Healthy Salmon Stream

Learning objectives:

- a. Healthy salmon habitats have recognizable features
7. Students will work in their groups to build their version of a healthy salmon stream using the information from the previous activity to set parameters necessary for salmon survival.

Provide each group with a corrugated cardboard sheet, a “Salmon Stream Build Kit”, markers/crayons/color pencils, scissors, tape and glue.

Groups are free to draw their own system boundaries on the cardboard sheet. It can be simple (Figure A) or complex (Figure B) as they deem fit, and can feature systems such as oceans, estuaries, rivers or streams.

The only requirement is that all their diagrams must include a key (like on a map) that explains the components of their stream. (45 minutes)

Figure A: A system boundary showing a single aquatic system (river/stream) with no branching

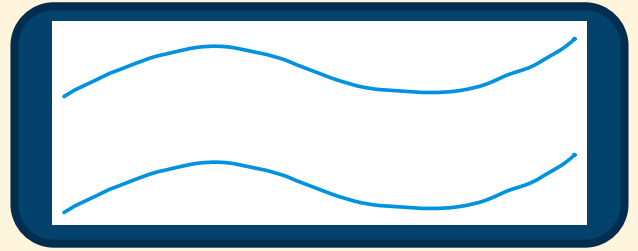
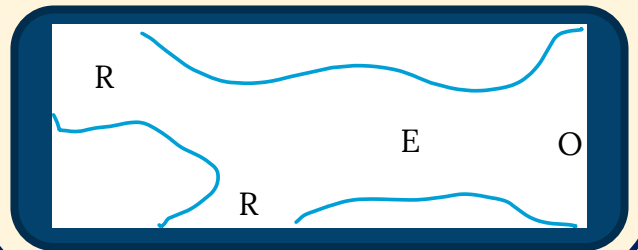


Figure B: A system boundary showing three aquatic systems (ocean [O], estuary [E], river/stream [R]) with multiple branch points



Wrap-Up

8. Reflect on the activity by having students share their thoughts. Use the prompts below to guide the discussion.

- What are the needs and threats for a salmon throughout its life cycle?
- What makes the best environment for a salmon?
- How can we as humans keep salmon and their habitat safe?
- When a salmon habitat is threatened, who is responsible for fixing it?

The last prompt can be used to explain the duties of a habitat biologist or fish passage engineer. Explain to students that there are people whose jobs are to restore habitat for salmon and other aquatic organisms. See “Extension Activities” for ideas on how to further explore that topic. (5 minutes)



Extensions

Additional Activities

Salmon Stream Walk

Have the class walk along a stream or lakeshore and identify feature that are good or bad for salmon. Use the lesson plan (included) from Alaska Department of Fish and Game to guide the activity. Contact the Columbia River FWCO about borrowing water quality testing components. about borrowing water quality testing components. Invite a biologist or naturalist to lead the visit.

Chat with a Biologist

Reach out to the Columbia River FWCO about a class visit or video chat from biologist in the region that does habitat restoration work or salmon habitat research.

Salmon Stream Build Kit

If time allows, have students go outside and collect moss, twigs, grass or other components to use when building their salmon stream

Dig Deeper

Indicator Species

Have students research indicator species for a given habitat. Encourage them to identify which species are present in a healthy ecosystem and which are present in an unhealthy ecosystem.

Macroinvertebrates and Water Pollution

Macroinvertebrates are popular indicator species for the health of an aquatic system. Students can research how the presence and absence of certain species are used to monitor water pollution.

Vocabulary to Know

Abiotic – a nonliving part of an ecosystem that shapes its environment

Biotic – living or once living components of an ecosystem

Ecosystem – the interactions and relationships between biotic and abiotic factors in a physical environment

Habitat – the home, or environment, of a plant, animal or other organism

Indicator Species – an organism whose presence, absence or abundance reflects the condition of a particular ecosystem

Organism – a living biological entity



Materials

Included:

Salmon Ecosystem Presentation
Salmon Ecosystem Worksheet
Salmon Ecosystem Answer Key
(Optional) Salmon Stream Walk Activity

Request to Borrow from Columbia River FWCO:

Note: Requests are pending availability and geographical location

5 sets – Salmon Stream Build Kit

- Dry rice, beans and/or pasta
- Pom poms
- Construction paper
- Popsicle sticks
- Beads
- Pipe Cleaners

Not Included:

5 – Corrugated cardboard sheets. You decide the size.
Glue, tape and/or glue sticks (enough for each group)
Scissors (enough for each group)
Instructor laptop and projector
Pencil and Paper (Loose Leaf, Notebook or Journal)
Laptops connected to WiFi (1 for each student)
Markers, color pencils and/or crayons

Next Generation Science Standards

Life Science

LS1- From Molecules to Organisms: Structures and Processes

4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

LS4- Biological Evolution: Unity and Diversity

3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.



Next Generation Science Standards (Continued)

Earth and Space Sciences

ESS2- Earth's Systems

5-ESS2-2: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Common Core Standards

English Language Arts

Reading: Informational Text

3.4/4.4/5.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area

3.5 Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently

3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur)

4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears

4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

Speaking and Listening

3.1/4.1/5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade level topics and texts, building on others' ideas and expressing their own clearly

3.2/4.2/5.2 Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.



Common Core Standards (Continued)

3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

4.4 Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace

5.4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

Language Standards

3.4a/4.4.a/5.4.a Use context (e.g., definitions, examples, or restatements in text) as a clue to the meaning of a word or phrase.

Acknowledgements

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