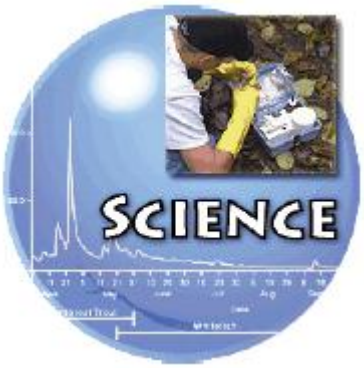
LESSON 11: HABITAT REQUIREMENTS FOR PACIFIC SALMON



ESSENTIAL QUESTION:

What combination of factors both natural and manmade is necessary for healthy river restoration and how does this enhance the sustainability of natural and human communities?

GUIDING QUESTION:

Salmon are survivors; nevertheless, they have very specific habitat requirements, what are the important habitat needs of the anadromous fish of the Elwha River watershed?

OVERVIEW:

This lesson focuses on the specific habitat requirements for each Pacific salmon species, as well as, other anadromous fish of the Elwha River watershed. The ecological habitat of each salmon species includes their adult range in the ocean and the specific parts of the river, and its tributaries, that are critical spawning habitat.

TIME:

One class period

MATERIALS:

- **Lesson 11- Habitat Requirements for Pacific Salmon.pptx**
- **Lesson 11a- Habitat Requirements for Pacific Salmon.pdf**
- **Predator-Prey Interactions.pdf**
- **Predator-Prey Calculator.xls**
- Reflection Journal Pages (printable handout)
- Vocabulary Notes (printable handouts)

PROCEDURE:

1. Review Essential Question; introduce Guiding Question.
2. Students should take a few minutes to respond to the first reflection prompts. Discuss their answers and any questions they've generated.
3. Hand out the Vocabulary Notes. With this lesson you may want to define the words before presenting the PowerPoint Lesson.
4. Present the PowerPoint Lesson
5. Predator-Prey Interactions Lab Activity

6. Hand out the second Reflection Journal Page. Allow time for a final reflection the lesson.

WASHINGTON STATE STANDARDS:

SCIENCE

1. **EALR 4: 6-8 LS3A** The scientific theory of evolution underlies the study of biology and explains both the diversity of life on Earh and similarities of all organisms at the chemical, cellular, and molecular level. Evolution is supported by multiple forms of scientific evidence.
    a. Explain and provide evidence of how biological evolution accounts for the diversity of species on Earth today.
2. **EALR 4: 6-8 LS3E** Adaptations are physical or behavioral changes that are inherited and enhance the ability of an organism to survive and reproduce in a particular environment.
    a. Give an example of a plant or animal adaptation that would confer a survival and reproductive advantage during a given environmental change.
3. **EALR 4: 6-8 LS2D** Ecosystems are continuously changing. Causes of these changes include nonliving factors such as the amount of light, range of temperatures, and availability of water, as well as living factors such as the disappearance of different species through disease, predation, habitat destruction and overuse of resources or the introduction of new species.
    a. Predict what may happen to an ecosystem if nonliving factors change (e.g., the amount of light, range of temperatures, or availability of water or habitat), or if one or more populations are removed from or added to the ecosystem.

READING

1. **EALR 1:** The student understands and uses different skills and strategies to read.
    a. **Component 1.2** Use vocabulary (word meaning) strategies to comprehend text.

SOCIAL STUDIES

1. **EALR 5:** The student understands and applies reasoning skills to conduct research, deliberate, form, and evaluate positions through the processes of reading, writing, and communicating.
    a. **Component 5.2:** Uses inquiry-based research.

WRITING

1. **EALR 2:** The student writes in a variety of forms for different audiences and purposes.
    a. **Component 2.1:** Adapts writing for a variety of audiences.

ADDITIONAL RESOURCES AND ENRICHMENT:

http://www.psmfc.org/habitat/fishfacts.html
http://www.terendipity.com/enviroscape/shea.pdf
http://adventure.howstuffworks.com/outdoor-activities/fishing/freshwater-tips/salmon/salmon-spawn.htm
http://whatcomsalmon.wsu.edu/virtualtour/index.html

VOCABULARY TERMS:

- **Run (of fish)** -- A group of fish of the same species that migrate together up a stream to spawn, usually associated with the seasons, e.g., fall, spring, summer, and winter runs. Members of a run interbreed, and may be genetically distinguishable from other individuals of the same species of different seasons or tributaries.

- **Riffle**- A shallow section of stream with small gravel and higher flow velocity, which forms ripples on the surface. Sort of like a small set of rapids.

- **Stock** - The fish spawning in a particular lake or stream(s) at a particular season, which to a substantial degree do not interbreed with any group spawning in a different place, or in the same place at a different season.

- **Stray** - An individual that breeds in a population other than that of its parents

- **Stray rate** - The proportion of a population that consists of strays

Elwha River Restoration
Habitat Requirements for Pacific Salmon
Reflection Journal 1

The life of a salmon seems to be tough and complicated, how do you think they manage to survive?

What questions do you have about salmon survival?

Elwha River Restoration
Habitat Requirements for Pacific Salmon
Vocabulary Notes

Run (of fish):

Riffle:

Stock:

Stray:

Stray rate:

Elwha River Restoration
Habitat Requirements for Pacific Salmon
Reflection Journal 2

What must the anadromous fish of the Elwha River have in order to return and thrive? What can you do to help?

What questions do you have about salmon habitat or what you can do to help them survive? Where can you find answers to these questions?

MODELING NATURAL SELECTION IN PREDATOR-PREY INTERACTIONS

MATERIALS

- Two “River Habitats”: Foam pad with bumps for “Rapids”, table top for “Pool”
- A carpet can be used in place of a foam pad, but then it can be called the “Riffles”
- Three dried beans “zooplankton prey” types: Garbanzos, soy beans, and lentils (others can be used).
- Three utensils “fish predator” types (having different mouths): Forks, spoons, and knives
- 10 Participants per round: 9 predators and 1 scorekeeper per habitat
- Small paper cups
- Scorekeeper data recording sheet

You download the excel file labeled Predator-Prey Calculator.xls from the Lesson Packet

METHODS

1. Place 500 of each bean-type "prey" into each "habitat". Disperse prey evenly within the habitat.

2. 9 predators, in each habitat, will hunt for two minutes per round. We will start with three forks, three spoons, and three knives. There may be more of one type of predator and less of another in the next round, depending on how successful each type of predator is at hunting.

3. Each round will last for two minutes. During this time, each predator must pick up as many prey items as possible and place them into the corresponding cup "stomach". However, you can ONLY pick up ONE prey item at a time… no scooping to get many prey items at once. Also, do not decide ahead of time that you will only hunt a certain prey type. In the beginning, try hunting all prey and then you can choose to hunt the prey that is most easily caught.

4. At the end of 120 seconds, count how many of each prey item is in your cup and give the numbers to the score keeper.

5. The scorekeeper keeps track of how many prey items of which type were captured by each predator. Those figures are placed into the computer calculation program. The scorekeeper must consult with the statistician about how many of each predator and how many of each prey go on to the next round.

6. At the end of round 1, approximately five predators in each habitat will switch with five students each, who have not played yet. Then following round two, approximately five students who have played two rounds will switch and allow the students who played round one to come back into the game. In the end, each student will have played two rounds, except for the scorekeeper.

7. Add additional beans/utensils as directed by the statistician and repeat for rounds 2, 3, and if time allows, round 4.

8. Discuss the results.

PREDATOR-PREY SCORESHEET

Round 1	Garbanzos		Soybeans		Lentils	
Spoons		total		total		total
Forks		total		total		total
Knives		total		total		total

Round 2	Garbanzos		Soybeans		Lentils	
Spoons		total		total		total
Forks		total		total		total
Knives		total		total		total

Round 3	Garbanzos		Soybeans		Lentils	
Spoons		total		total		total
Forks		total		total		total
Knives		total		total		total

Round 4	Garbanzos		Soybeans		Lentils	
Spoons		total		total		total
Forks		total		total		total
Knives		total		total		total

THOUGHT QUESTIONS

1. Which predator was most successful in obtaining prey? Why?

2. Which prey was most successful at avoiding capture? Why?

3. Which predator was the least successful in obtaining prey? Why?

4. Which prey was the least successful at survival? Why?

5. What does the steady reduction in foraging time represent?

6. Were your predictions correct about which type of predator and prey would be most and least successful? Explain why you predicted the way you did.

7. What happens to the types of prey over time?

8. What happens to the types of predators over time?

9. Describe the advantage or disadvantage an environment gave the predators.

10. Describe the advantage or disadvantage an environment gave the prey.