



**Science Unit: *The Journey of the Pacific Salmon***

**Lesson 8: *Salmon Eggs and Redds***

School Year: 2010/2011

Developed for: Thunderbird Elementary School, Vancouver School District

Developed by: Linda Hanson (scientist); Kelly Tait and Shantelle Dixon (teachers)

Grade level: Presented to grade 5/6; appropriate for grades k – 7 with age appropriate modifications

Duration of lesson: 1 hour and 20 minutes

Notes: This experiment is a modification of the Lesson *Making a Redd* which is part of Fisheries and Oceans Canada's *Salmonids in the Classroom* program.

<http://salmonidsintheclassroom.ca/>

Frozen salmon eggs can be purchased from any large bait store e.g. Barry's Bait and Tackle located in Richmond B.C. <http://www.berrysbait.com/>. For easier clean up modeling clay can be used for the activity in place of real salmon eggs.

**Objectives**

1. Learn about salmon redds and what characteristics are important to ensure egg survival.
2. Observe the various stages of salmon egg development.

**Background Information**

Female salmon lay their eggs in a nest-like depression in the riverbed gravel known as a redd. Upon arriving at the spawning grounds a female finds an area with the appropriate water flow and gravel characteristics and then uses her tail to scoop out a depression in the gravel. By situating herself upstream of the redd she is able to use her tail to flick the rocks up from the riverbed and utilize the current to move the rocks out of the redd and slightly downstream. There is fierce competition amongst the male salmon for a mate. The successful male courts the female and as she begins to release her eggs he releases his milt into the water and fertilizes the eggs. The fertilized eggs drop into the depression in the gravel and the pair moves slightly upstream and repeats the process. The gravel that is excavated for the next redd will wash downstream and cover the initial redd thus protecting the eggs. The redd must protect the eggs throughout their incubation period. The gravel size used to build the redd is important because it must provide adequate protection for the eggs (from predators, currents and stream disturbances) while still allowing for good water flow over the eggs to ensure adequate oxygen delivery. A female coho salmon lays approximately 2500 eggs.

**Vocabulary**

Redd: A small depression or nest in the gravel created by a female salmon to incubate her eggs.

Milt: The milky fluid released by a spawning male salmon that contains sperm cells.

Embryo: A young developing salmon still in the egg



## Materials

- Worksheets & pencils
- salmon egg display showing various developmental stages
- pea gravel
- Salmon eggs (fresh or frozen) and small cups to hold them.
- large, high-sided tray such as an aluminum baking pan (one per group)
- large gravel/rocks
- Modeling clay
- pitcher or small container to pour water such as a plastic cup or yogurt container – one per group
- computer (for viewing video)

## In the Classroom

### Introductory Discussion

1. Today we are going to talk about these (hold up salmon eggs). What are they?
  - Last week we dissected a salmon and saw where salmon eggs come from and today we are going to learn about what happens after the female salmon deposits the eggs and they are fertilized.
  - How would you describe a salmon egg? Is it like a chicken egg? Why or why not? (brainstorm on board)? [Round, pinky-orange, squishy, no hard shell etc.]
  - What conditions are important to ensure that the eggs hatch successfully?
    - Oxygen
    - Protection
    - Adequate water flow
    - Food (yolk)
    - \*darkness (keeps stress levels low)
    - cold water
  - Where do salmon deposit their eggs? (REDD) What is a redd? (small depression or “nest” that female salmon create in the gravel)
  - What does a redd look like? Let’s think about why a redd looks like it does.
  - What is a redd for? (Brainstorm on board)
    - Protect eggs
    - Prevent eggs from being washed away
    - Protect eggs from predators
    - Protect eggs from physical damage/disturbances (currents, crushing etc.)
  - Today we are going to do an activity to determine some of the characteristics that are important in building a redd and ensuring a successful hatch.
2. Short description of other items to discuss or review.
  - Remind students to act responsibly with the water – no splashing, throwing etc. and to ensure that they clean and dry their desks at the conclusion of the activity.



## SCIENTIST IN RESIDENCE PROGRAM

3. Briefly describe science experiment/activity.
  - Students will build redds using different sizes of rocks/gravel to determine how a redd's characteristics can affect egg survival.
4. For this activity the process of science that the students will focus on is observation; both making observations and recording their observations.
5. Briefly describe safety guidelines.
  - Students should wash their hands after handling the modeling clay and particularly after handling the salmon eggs.
  - Clean up any spilled water on the floor immediately to prevent slips or falls.

### Science Experiment

Experiment Title: Building a Redd

Purpose of Experiment: To determine how gravel size affects the functioning of the redd

Experimental Observations: The effects of using small gravel and large gravel will be observed separately. This is not an experiment with controls and treatments.

Prediction: Students will record their predictions for the different scenarios on their worksheets.

Methods and Instructions:

Set-up prior to experiment: Real salmon eggs can be used for this experiment but it is tidier to use modeling clay for the experiment and to observe the salmon eggs separately. Prepare the supplies for each group: a small cup of salmon eggs, a tray, a chunk of modeling clay, a container of water, worksheets. If there is no sink in the classroom a large bucket of water can be set in the middle of the room for groups to refill their containers.

Brief description of how students will work in groups or pairs: students will work in small table groups of 3-4 students.

1. Instruct students to set up their trays as demonstrated. Prop one end of the tray on a stack of one of two textbooks so that it is inclined. Use a piece of the clay to stop the tray from sliding if required.
2. Have the students roll their modeling clay into small balls to mimic salmon eggs. They can use the real eggs as a guide to determine how large to make them.
3. Guide the students through the worksheet directions: Place a pile of the clay eggs at one end of the tray. We are going to pour water on the eggs. Predict what will happen and fill out your prediction on your worksheet.
4. Record your observations.
5. How will building a redd help the situation? (ask for answers)
6. Use the rocks to build a redd for your salmon eggs. Which rocks do you think will make a better redd? Why?
7. Have half the class use small rocks and half use large rocks. Students will follow the instructions provided on their worksheets.
8. Repeat the experiment and record your observations.
9. Have students clean up the supplies and wipe their desk and then discuss the results as a class



### Closure Discussion

1. What happened?
2. What would happen in a salmon stream? With a stronger current?
3. What are some advantages of big rocks? What about disadvantages? Can you still see the eggs? Do you think predators can see them?
4. What are some advantages of small rocks? What about disadvantages? How do eggs get oxygen? Do you think they get oxygen better if they are covered with larger rocks or small rocks? What if they are covered with dirt?
5. What would happen to the eggs if a person or a bear stepped on each type of redd? Build a small redd using some real salmon eggs and test your prediction.
6. Let's talk about egg development in preparation for our next lesson.
7. I've brought in examples of eggs in different stages of development. I know that your eggs have recently hatched. How long did it take them to hatch? What determines how quickly eggs hatch? (Temperature)
8. How do eggs hatch? (as oxygen becomes limiting the embryo releases a hatching enzyme from glands located near its head. The fanning motion of the fins spreads the enzyme throughout the egg capsule. The hatching enzyme weakens the egg capsule. The weakening of the capsule combined with the squirming of the embryo and the increased movements as it struggles to obtain oxygen eventually result in rupture of the capsule.
9. Who wants to see some eggs hatch? If computers are available have the students watch the following video of salmon eggs hatching. <http://www.youtube.com/watch?v=Jgp6OjpfRQo> The video was created by Matt Casselman a volunteer at the Seymour River Hatchery and is used with permission.

### References (examples of the format to use for different types of references are below)

1. Fisheries and Oceans Canada. 2009. Salmonids in the Classroom – Intermediate. Fisheries and Oceans Canada. Also available online at: <http://www.pac.dfo-mpo.gc.ca/education/lessonplans-lecons/sicintermediate-secintermediaire-eng.htm>
2. Fisheries and Oceans Canada. 2009. Salmonids in the Classroom – Primary. Fisheries and Oceans Canada. Also available online at: <http://www.pac.dfo-mpo.gc.ca/education/lessonplans-lecons/sicprimary-secprimaire-eng.htm>.

### Extension of Lesson Plan

1. Comparing Coho Salmon Alevins and Fry – See Extension Activity Worksheet included with Lesson Plans.
2. Parts of an egg – Activity from Unit 4 of the Primary *Salmonids in the Classroom* Program available at <http://www.pac.dfo-mpo.gc.ca/education/lessonplans-lecons/sicprimary-secprimaire-eng.htm>.
3. Salmon and ATUs – Activity from Unit 5 of the Intermediate *Salmonids in the Classroom* Program available at <http://www.pac.dfo-mpo.gc.ca/education/lessonplans-lecons/sicintermediate-secintermediaire-eng.htm>

Name: \_\_\_\_\_

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

## LESSON 8: Salmon Eggs & Salmon Redds

### Materials

List the materials used for this experiment:

---

---

### Methods

Draw a picture and describe your experimental set up.



---

---

---

1. Place a scoop of salmon eggs at the high end of the tray. Predict what will happen to the salmon eggs if you pour a cup of water over them:

---

2. Gently pour water over the eggs. What happened? Record your observations:

---

---

Name: \_\_\_\_\_

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

3. Use the rocks provided to build a redd for your salmon eggs. Some groups will use small rocks and some will use larger rocks. Which rocks did your group use? \_\_\_\_\_

Predict what will happen when you pour water over your redd:

\_\_\_\_\_

4. Gently pour water over your redd and record your observations:

\_\_\_\_\_

\_\_\_\_\_

5. Discuss your results with the class.

Size of rocks	Advantages	Disadvantages
Small		
Large		

### Conclusion

Which rocks do you think would make a better redd. Why?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Comparing Coho Salmon Alevin and Fry

Materials:

- Worksheets (see below)
- Posters of the various coho salmon life stages or preserved examples – premade displays showing each life stage can be purchased.

If the material has not been discussed in class previously students can use Handout 6.2

***Salmon Alevins*** and Handout 7.2 ***Salmon Fry*** from *Salmonids in the Classroom –*

*Intermediate* to help them complete the activity. [http://www.pac.dfo-](http://www.pac.dfo-mpo.gc.ca/education/lessonplans-lecons/sicintermediate-secintermediaire-eng.htm)

[mpo.gc.ca/education/lessonplans-lecons/sicintermediate-secintermediaire-eng.htm](http://www.pac.dfo-mpo.gc.ca/education/lessonplans-lecons/sicintermediate-secintermediaire-eng.htm)

Name: \_\_\_\_\_

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

## Comparing Coho Salmon Alevin and Fry

Draw, color and label a picture of a coho salmon alevin



Draw, color and label a picture of a coho salmon fry



	<b>Alevin</b>	<b>Fry</b>
<b>Size</b>		
<b>Where they live</b>		
<b>Food source</b>		
<b>Threats to survival</b>		