

**STREAM TO SEA ACTIVITY: Making A Redd**  
 A classroom experiment that explores how salmon protect their eggs

**Science 3 Prescribed Learning Outcome(s) met and Curriculum Organizer(s)**

*It is expected that students will:*

Curriculum Organizer: Processes And Skills Of Science

- Ask questions that foster investigations and explorations relevant to the content;
- Measure objects and events

**Overview of Activity:**

In this hands-on classroom activity, students will build two model salmon redds (i.e. a nest made of gravel in which salmon spawners lay their eggs); one with and one without gravel. A simple experiment will demonstrate the different effects of flowing water and predators on exposed and sheltered salmon eggs. Students will compare experiment outcomes, discuss their experiments' conclusions, and consider how the experiment relates to a real stream.

**Estimate of time required:**

Number of lessons: 3 lessons

Each lesson requires: 30-45 minutes

Can be done: Anytime       Fall       Winter       Spring       Summer

Notes:

Natural Area Required: None - Indoor Activity       Ocean OR     Stream OR     Estuary

**Overview of Materials and Resources Required:**

Material Available for downloading:

- Activity Description(s)
  - "Making A Redd"
- Student Handout(s)
  - "Making A Redd Observation Page (Handout 9.2)"
- Background Information
  - "Salmon Spawners"
- Discussion Questions
  - (Included In Activity Description Document)
- Evaluation /Assessment Tool(s)
  - (Included In Activity Description Document)

Other Required or Suggested Material:

- Large basin(s), water, modeling clay, toothpicks, rock 5-10cm in diameter, and gravel.

**Suggested Assessment Activities:**

- Included in Activity Description

**Recommended Additional Resources and Optional Enrichment Activities:**

(E.g. Web-sites, Teaching Guides, Student Reading, Videos/Audio-tapes, Posters and Brochures, Field Trips:

- "Salmonids in the Classroom - Primary" (2002). Fisheries and Oceans Canada. Unit 9: Salmon Spawners. Available from BCTF Lesson Aids Catalogue.
- A field trip to a local salmon spawning stream will enhance this classroom activity; such a field trip is best done in the fall or winter when the students can see redds being made by spawning salmon.
- "Where and When to See Salmon" brochure  
[http://www-heb.pac.dfo-mpo.gc.ca/publications/when-where\\_salmon.htm](http://www-heb.pac.dfo-mpo.gc.ca/publications/when-where_salmon.htm)
- If your class or school has a Classroom Incubation Project (salmon incubator tank), show students where eggs are located, and discuss why eggs in a basket don't require a redd.
- Pacific salmon life history posters  
[http://heb.info.pac.dfo.ca/hebdev/community/pdf/eduorder\\_e.pdf](http://heb.info.pac.dfo.ca/hebdev/community/pdf/eduorder_e.pdf)

**Support may be Available.**

Contact your local Stream to Sea Education Coordinator or Community Advisor.

[www-heb.pac.dfo-mpo.gc.ca/community/contacts/ec\\_e.htm](http://www-heb.pac.dfo-mpo.gc.ca/community/contacts/ec_e.htm)

or phone (604) 666-6614 to find out if an Education Coordinator in your area assists with this activity.

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# MAKING A REDD

*This experiment demonstrates how a gravel redd protects salmon eggs from predators. If you have done "Unit Three: Salmon Eggs", you may prefer to replace parts one and two with a brief review.*

## Materials:

- ▶ Large basin(s)
- ▶ Water
- ▶ Modelling clay
- ▶ Toothpicks
- ▶ Rocks 5 to 10 cm in diameter and gravel
- ▶ Copies of "Handout 9.2: Making a Redd Observation Page" for each student

## Time required:

Three lessons

## Level of conceptual difficulty:

Moderate to advanced

## Suggestions for assessment:

Review students' discussion and observation pages to ensure that the students can describe how a redd protects salmon eggs from predators and strong water flows.

## INTRODUCTION

- Discuss with the class how pets and other animals keep newly born babies safe and healthy.  
*They make a secure nest or den for the babies, bring them food and drink and protect them from intruders.*
- Explain that a redd is like a nest made of gravel on the stream- or lakebed, in which spawners lay their eggs.
- Have the class suggest reasons spawners create a redd in which to lay their eggs. Write their ideas on "Handout 9.2: Making a Redd Observation Page".

## EXPERIMENT, PART ONE

- Decide whether you will do the following experiment as a demonstration or in groups. If in groups, provide each group with the items from the materials list.
- Have students make small eggs from modelling clay (about ½ cm in diameter), place them at one end of a basin and predict what might happen to them in a stream.
- Tilt the basin on an angle, pour water gently over the model eggs, and have students count the eggs that are washed to the bottom of the basin.
- Have some students, in pairs, act as birds and use toothpicks to peck at the eggs. Count and record the eggs they catch in 10 seconds.

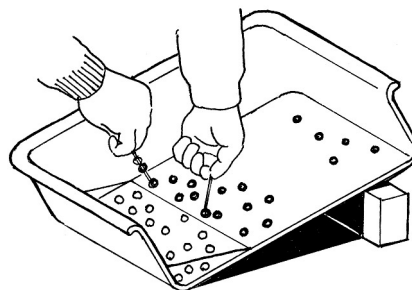
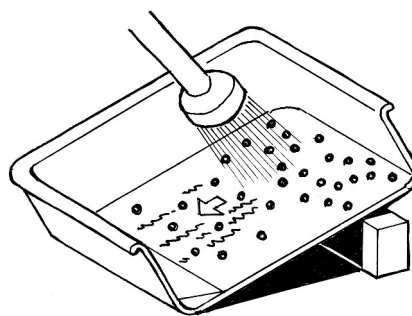


Illustration: Donald Gunn



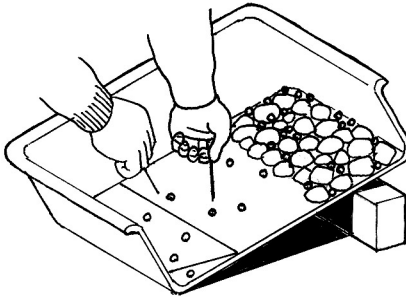
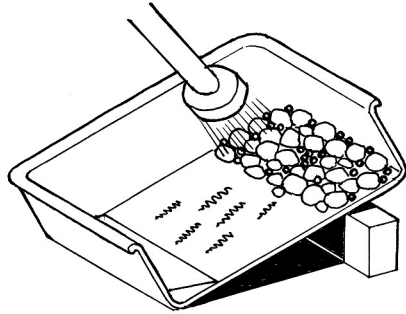


Illustration: Donald Gunn

## EXPERIMENT, PART TWO

- Make a model redd, using rocks and gravel at one end of a basin. Place the model eggs in the redd and cover them with gravel. Have students predict what might happen to them in a stream.
- Pour water gently over the redd and have students count the eggs that are washed away.
- Have some students, in pairs, act as birds and use toothpicks to peck at the eggs. Count and record the eggs they catch in 10 seconds.

## EXPERIMENT, PART THREE

- With the class, compare the outcomes for the eggs in the open stream and for the eggs in the redd. Make a graph to compare the number of eggs that were washed away or caught by birds in parts one and two of the experiment.

## DISCUSSION

- Discuss with the class what conclusions they can add to "Handout 9.2: Making a Redd Observation Page". If necessary, prompt them with questions, such as:
  - Were more eggs washed away with the redd or without?  
*Without.*
  - Did the birds catch more eggs with the redd or without?  
*Without.*
  - How was the redd in the basin like a redd in a stream?  
How was it different?  
*Similar materials and shape, but smaller, less water flow.*
  - How would a redd help protect the eggs in a real stream?  
*It would hide the eggs from birds and keep them from washing away. It would also help protect the eggs from other predators, such as fish and raccoons, so more would survive.*

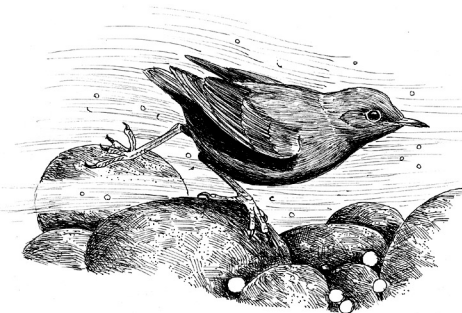


Illustration: Donald Gunn



# MAKING A REDD OBSERVATION PAGE

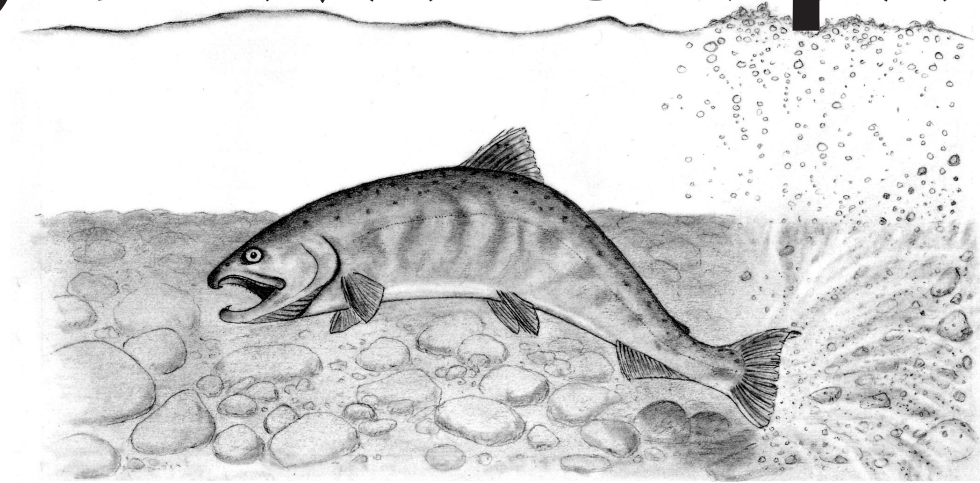


Illustration: Karen Uldall-Ekman

<p><b>Prediction</b> I predict that water will wash away more eggs when</p>			
<p>I predict that birds will find more eggs when</p>			
<p>Observations</p>			
<b>Eggs with no redd</b>		<b>Eggs in redd</b>	
Washed away	Found by birds	Washed away	Found by birds
<p><b>Conclusion</b> This experiment shows that</p>			

# BACKGROUND INFORMATION

## SALMON SPAWNERS

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In the final stage of the salmon's life cycle, the adults re-enter their home river and swim back to the stream or lakeshore in which they grew as fry. Salmon from inland rivers may travel many hundreds or thousands of kilometres, swimming from 30 to 50 km a day against the current. They follow the scent of the water from their home stream, past rapids and other obstacles, such as dams, rock slides and log jams, before reaching their destination. Fishers and predators, such as bears, otters, racoons and eagles, catch many salmon on their trip upstream.

When they enter fresh water, the salmon stop eating and live only on stored body fat. Their kidneys, gills and skin change to regulate the water and salt balance in their cells. To save energy, they lose the slime coating that helps protect them; their skin becomes thick and leathery, and they absorb their scales.

The salmon's appearance changes dramatically, with males and females developing distinct differences. Both males and females lose their silvery colour and take on deep red, green, purple, brown and grey colours. Their teeth become long and they develop a hooked jaw, which is particularly noticeable in the males. The body shape can change, with some species developing a pronounced hump on their back. Eggs ripen in the ovaries of the females, while sperm in the males changes into liquid milt.

When they reach their home stream or lake, the female uses her fins and tail to find a spot with the right gravel size and water conditions. With strong sweeps of her tail, she rearranges the stones in the gravel bed to form a redd, the nest-like depression in the stream- or lakebed where she will lay her eggs. Males fight among themselves to get close to a female. When a female chooses a male, they nudge and bump each other in an underwater courtship dance. The female deposits some of her eggs in the redd, and the male deposits his milt to fertilize them. Some species deposit up to 6,000 eggs, but the average is about 2,500. The female covers the eggs with gravel to protect them, and often moves on to build a second or third redd, which is fertilized by other males.

Both males and females die within a few days of spawning. Their bodies, battered and injured by the difficult trip upstream, decompose. Valuable nutrients from the carcasses form a rich food source for other fish and wildlife by fertilizing the stream or lake. Salmon carcasses that are carried onto riverbanks fertilize the forest and bushes. If most of the adult salmon are caught, the water will have few nutrients for the next generations of salmon and for the rest of the ecosystem.

