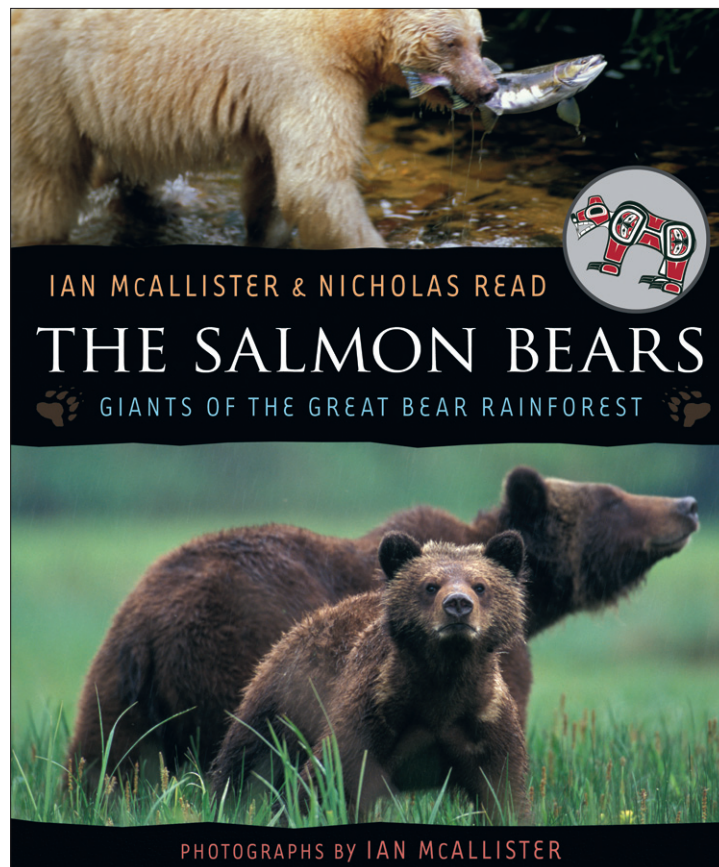


# Learning Guide

IAN McALLISTER & NICHOLAS READ

# THE SALMON BEARS

GIANTS OF THE GREAT BEAR RAINFOREST



9781554692057 PB with flaps • ages 8+

More resources at [www.salmonbears.ca](http://www.salmonbears.ca) and [www.pacificwild.org](http://www.pacificwild.org)



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**PACIFIC WILD** is a non-profit wildlife conservation organization that is committed to protecting the bears in the Great Bear Rainforest by developing and implementing solution-based strategies that protect wildlife and their habitat Pacific Wild has been at the forefront of large carnivore conservation on the British Columbia coast by supporting innovative research, public education, community outreach and awareness to achieve the goal of lasting wildlife protection.

For more information on Pacific Wild’s conservation work or to learn more about the bears of the Great Bear Rainforest please contact:

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# THE SALMON BEARS

## GIANTS OF THE GREAT BEAR RAINFOREST

Ian McAllister and Nicholas Read

**Subjects:** Life Science, Earth and Space Science, English Language Arts

**Grades:** 4–7

### The Book:

Extensively illustrated with Ian McAllister’s magnificent photographs, *The Salmon Bears* explores the delicate balance that exists between the grizzly, black and spirit bears that inhabit the last great wilderness along the central coast of British Columbia and their natural environment. Key to this relationship are the salmon that are born in the rivers each spring, who then go out to sea as juveniles and return as adults to spawn and die, completing a cycle of life that ensures the survival of not only their own species but also virtually every other plant and animal in the rainforest.

In clear language suitable for young readers, the authors describe the day-to-day activities that define the lives of these bears through the four seasons. But this is also very much the story of the Great Bear Rainforest—a vast tract of land that stretches along the western edge of BC, from the northern tip of Vancouver Island to the Alaska border, and contains some of the largest stands of old-growth forest left on the west coast. *The Salmon Bears* focuses on the interconnectedness of all life in the rainforest and makes a strong case for the importance of protecting this vital ecological resource.

### The Authors:

Ian McAllister is a founding director of Pacific Wild, a Canadian non-profit wildlife conservation group. An award-winning author and photographer, he has spent more than twenty years working to protect the West Coast’s temperate rainforest. Ian lives with his family on an island in the heart of the Great Bear Rainforest.

A lifelong lover of animals, Nicholas Read works as a journalism instructor at Langara College in Vancouver, British Columbia. He has written for the *Vancouver Sun*, *The Globe and Mail*, *Toronto Star* and other publications, and has authored two prize-winning children’s books.

### The Study Guide:

We’ve designed this study guide to be used alongside *The Salmon Bears*. Here, you’ll find thought-provoking discussion questions as well as ready-to-go lessons and extension activities centering on grizzly bears, black bears, spirit bears and the Great Bear Rainforest ecosystem. Paired with *The Salmon Bears*, this study guide addresses a number of the Prescribed Learning Outcomes established by the BC Ministry of Education. We’ve linked each activity with science themes and outcomes for grades four to seven—and where applicable, we’ve made connections with social studies, math, art and Language Arts outcomes too.

## Chapter 1: A Magical Place

The Great Bear Rainforest is a relatively pristine tract of land and water that's home to three kinds of bears, five species of salmon, wolves, old-growth red cedar trees, people, and numerous other plants and animals. Together, they form a complex ecosystem.

### Discussion Questions Before Reading

- What do you know about the Great Bear Rainforest?
- What is an ecosystem?

### Discussion Questions After Reading

- How do people utilize the Great Bear Rainforest?
- What does the term “web of life” mean?

### Science In Action

#### Main Activity

#### A Rainforest...in Canada?

*Focus: habitats, communities and ecosystems; climate and precipitation; impacts of weather on organisms; mapping; measurement; connecting to experience; making inferences*

When you hear the word *rainforest*, what images pop into your mind? Perhaps a humid area with a lush, green, dense canopy of broad-leafed trees? Maybe a few monkeys swinging in the trees? Most likely you won't picture a cool, quiet forest full of giants like the western red cedar and Sitka spruce trees towering 50 meters above you...but you could. Many people are surprised to learn that Canada has a rainforest ecosystem. In this lesson, students will learn how the “rain” fits into the word “rainforest.”

### Materials

scissors

string

SMART Board setup

Internet access

1. Cut pieces of string to the following lengths: 2.5 m, 1.5 m, 1 m, 50 cm, 40 cm, 30 cm.
2. Ask for volunteers to stand up at the front of the class. Instruct each to hold his or her string vertically. (Students with longer strings can stand on a desk or chair with teacher supervision.) Prompt the class to guess how these string lengths could be related to a definition of a rainforest.
3. Reveal that the string length is an approximation of the annual average *precipitation* in various cities and towns throughout British Columbia. Write a list of the following cities or towns on the board. Challenge students to match the city names with their annual average precipitation (Figure 1).

City/Town	Annual Average Precipitation (mm)	String Length
Bella Bella	2525 mm	2.5 m
Vancouver	1588 mm	1.5 m
Bella Coola	1184 mm	1 m
Prince George	554 mm	50 cm
Kelowna	409 mm	40 cm
Oliver	319 mm	30 cm

**Figure 1:** Statistics gathered from The Weather Network website. These statistics are based on the mean value of meteorological snow and rainfall data from 1961 to 1990.

\*\*To add to this list, head to [www.theweathernetwork.com](http://www.theweathernetwork.com). In the search bar, enter the name of your city or town. You'll be redirected to a page where you can click on your location. Select your location, then scroll down the page until you can click on **Statistics** (below the Long Term Forecast). Select the **Summary** tab. Here, you'll find a precipitation chart where you can look up your location's monthly and annual average precipitation.

4. Explain to students that rainforests—both temperate and tropical—are defined as ecosystems having a minimum annual precipitation of 2500 mm. After projecting a Google Earth map of British Columbia on the SMART Board (or whiteboard), have students locate the cities and towns from the above chart. Using the adjacent map or the one at the front of *The Salmon Bears* as a starting point, invite one or several students to trace an outline of the Great Bear Rainforest. Notice that Bella Bella is part of the Great Bear Rainforest, and is therefore actually situated *in* a rainforest!

To learn even more about BC's ecological areas, visit Sierra Club's interactive Ecomap here:

[www.sierraclub.bc.ca/education/ed\\_students/elementary-students/ecoprovince-map/ecoprovince-map/?searchterm=ecoprovince%20map](http://www.sierraclub.bc.ca/education/ed_students/elementary-students/ecoprovince-map/ecoprovince-map/?searchterm=ecoprovince%20map)

### *Extension Activities*

#### **A. Photo Op!**

*Focus: habitats, communities and ecosystems; exploring multimedia and visual texts to create meaning; using sensory description in informational writing; creating organized lists*

Explore photos and video of the Great Bear Rainforest. Start here:

[www.nature.org/ourinitiatives/regions/northamerica/canada/placesweprotect/great-bear-rainforest.xml](http://www.nature.org/ourinitiatives/regions/northamerica/canada/placesweprotect/great-bear-rainforest.xml)

[www.pacificwild.org](http://www.pacificwild.org)

[www.qqsprojects.org](http://www.qqsprojects.org)

[www.ilcp.com/projects/great-bear-rainforest-rave](http://www.ilcp.com/projects/great-bear-rainforest-rave)

Have students create a “sensory list” of the sights, sounds, smells and textures they might find in the rainforest.

## B. Web of Life

*Focus: habitats, communities and ecosystems; human impacts on ecosystems; interconnectedness of organisms; sustainability*

Draw a diagram (see *Appendix*, page 32) or create a web of life out of string. If you're making a string web, here's a great lesson from The Forest Foundation in California:

[www.talkabouttrees.org/docs/01-03.pdf](http://www.talkabouttrees.org/docs/01-03.pdf)

Once students have completed the activity, hold a class discussion about their observations. Use the following questions to guide the conversation:

1. What do you notice about the amount of interdependence between rainforest organisms?
2. What do you infer would happen if one or more of these organisms were to disappear or be endangered?
3. How does each organism's position in the web of life contribute to the overall health of the rainforest?
4. How could pollution and other dangers affect the web of life?

## C. Word Work

*Focus: reading informational texts to construct meaning; vocabulary building*

Instruct students to begin compiling a list of the terms they learn throughout *The Salmon Bears*. Some of your students may even enjoy making an illustrated glossary booklet. You'll find a **Vocabulary List** in the *Appendix* on page 33–34. Add to this as you read.

## D. Tree ID

*Focus: habitats, communities and ecosystems; reading informational and multimedia texts to create meaning; creating organized lists; classifying data*

Use field guides and websites to learn how to identify the various tree species found in the Great Bear Rainforest (use the **Tree Journal** handout in the *Appendix*, page 35). Start with the *Tree Book* from the BC Ministry of Forests, Mines and Natural Resources Operations:

[www.for.gov.bc.ca/hfd/library/documents/treebook/trees.htm](http://www.for.gov.bc.ca/hfd/library/documents/treebook/trees.htm)

Have students compile a chart that lists and describes some of the trees they can find in their own community.

## E. Rainforest Exploration

*Focus: habitats, communities and ecosystems; human impacts on ecosystems; sustainability; exploring multimedia texts to construct meaning; comparing and contrasting; classifying data; creating organized lists*

Break students into groups of three or four. Have each group research tropical rainforests. Use the **Forest Comparison** Venn diagram provided in the *Appendix* on page 36, to compare and contrast tropical rainforests with their temperate counterparts. Here are a couple links to get you started:

Temperate rainforest

[www.pc.gc.ca/eng/pn-np/bc/pacificrim/natcul/natcul1.aspx](http://www.pc.gc.ca/eng/pn-np/bc/pacificrim/natcul/natcul1.aspx)

Tropical rainforest

[www.rainforest-alliance.org/kids/facts](http://www.rainforest-alliance.org/kids/facts)

## F. Exploring Issues in the Great Bear Rainforest

*Focus: human impacts on ecosystems; interconnectedness of organisms; sustainability; Aboriginal respect for the environment; economy vs. environment; impacts of extracting living and non-living resources; listening to and/or reading informational texts to construct meaning; taking notes.*

Talk to a researcher or read an article about current studies and issues in the Great Bear Rainforest. Be sure to discuss problems and solutions. Have students record their information in **The Great Bear Rainforest Under Threat** (see *Appendix*, page 37). You'll find the following websites useful:

Pacific Wild

[www.pacificwild.org](http://www.pacificwild.org)

Sierra Club BC

[www.sierraclub.bc.ca/great-bear-rainforest/what-you-can-do](http://www.sierraclub.bc.ca/great-bear-rainforest/what-you-can-do)

The Wilderness Committee

[http://wildernesscommittee.org/what\\_we\\_do](http://wildernesscommittee.org/what_we_do)

Coastal First Nations

<http://coastalfirstnations.ca>  
[www.coastalguardianwatchmen.ca](http://www.coastalguardianwatchmen.ca)

## Chapter 2: Winter

During the winter, bears spend most of their time hibernating in dens insulated by high snow banks. This is where the cubs are born in December and January. They get their nourishment solely from their mother's milk, and won't emerge from their cozy den until March.

### Discussion Questions Before Reading

- What do bears do during the winter?

### Discussion Questions After Reading

- How do bears have to prepare themselves for the winter season?
- Do bears wake up during hibernation?
- Do bears den up and emerge from their dens at the same time every winter and spring?
- What challenges do bears face in the winter?
- What have you learned about hibernation?
- How do different animals survive the winter in the Great Bear Rainforest?

### Science In Action

#### Main Activity

#### Surviving the Winter

*Focus: habitats, communities and ecosystems; adaptation to environment; survival needs; exploring multimedia texts to construct meaning; mass; converting fractions to percent*

In order to survive the winter, grizzly bears must gain an additional 30 percent of their body mass between spring and fall. This activity will give your students a true appreciation of exactly what that means!

#### Materials

backpack

bathroom scale(s)

books or other heavy items (binders, canned food, etc.)

1. Have the students imagine that they are bears preparing for winter. Discuss why bears might sleep over the winter months and how they are able to achieve this. Here are a few questions and answers to get the ball rolling:
  - ♦ Why do bears enter a hibernation-like state? Perhaps to:
    - i. avoid the colder months;
    - ii. rest while food sources are scarce.
  - ♦ How do bears survive the winter without eating, exercising, urinating or defecating? Bears:
    - i. are able to reduce their metabolism because they can reduce their body temperature and heart rate;



- ii. use the fats eaten and stored during the active months to provide for their nutritional needs during hibernation;
- iii. use urea, normally a toxic waste product, to create new proteins.

Want more? Check out [www.pbs.org/wgbh/nova/nature/bear-essentials-of-hibernation.html](http://www.pbs.org/wgbh/nova/nature/bear-essentials-of-hibernation.html).

2. Here's where we get to merge science and math! Have each student record his or her weight in their math or science notebook. (Students who don't know their weight—or just don't feel like sharing it—can simply select a starting weight from the chart provided (Figure 2).)
  - ◆ Have students complete the chart, assisting them with the calculations if necessary.
  - ◆ Assign students to calculate 30 percent of their starting weight (some students may need teacher or peer assistance to do this).

This number, plus the starting weight, tells each student what his or her final pre-hibernation weight would be (if humans could hibernate, that is).

Starting weight in spring (kg/lbs)	Final weight in fall (kg/lbs)	Weight gained (kg/lbs)
27/60	36/80	9/20
32/70	?	10/23
36/80	49/107	?
41/90	?	14/30
45/100	60/133	>
50/110	?	?
?	?	?

**Figure 2:** If humans were bears, we would have a 30 percent weight gain from spring to fall!

3. Have students place their backpack on the bathroom scale. Fill the backpack with heavy items such as textbooks, etc., until the 30 percent of their original starting weight has been added.
4. Have the students attempt to lift their backpack. (This is an excellent time to discuss with students the fact that the Canadian Chiropractic Association recommends they carry no more than 15 percent of their body weight in a backpack. It's also a great time to do another calculation and discussion: What's 15 percent of your body weight? Do you think your pack is heavier than that on most days?) If the students would like to try wearing the backpack, stand behind them at the ready to take the full load of the pack. Whew!

### *Extension Activities*

#### **A. Bear's Annual Cycle**

*Focus: habitats, communities and ecosystems; survival needs; impacts of weather on organisms; reading informational texts to construct meaning*

Working independently or in pairs, have students complete **Timeline: A Bear's Annual Cycle** (see *Appendix*, page 38). Include important events that occur (or might occur, such as the birth of cubs) during each season. Encourage students to make their timelines detail- and illustration-rich. Post these around the classroom.



Photo credit: Ian McAllister

#### **B. Investigating Estuaries**

*Focus: habitats, communities and ecosystems; sustaining healthy ecosystems; living and non-living resources; human impacts on local ecosystems; reading informational texts to construct meaning; organizing information; taking notes*

Estuaries are complex—and pretty cool! Let's learn more. Start with the information in *The Salmon Bears*, and expand on it with this brochure from the BC Ministry of Environment.

[www.env.gov.bc.ca/wld/documents/Estuaries06\\_20.pdf](http://www.env.gov.bc.ca/wld/documents/Estuaries06_20.pdf)

Divide students into small groups to research estuaries. Assign each group one of the following questions:

1. What are estuaries?
2. How were estuaries formed?
3. What sorts of organisms live in estuaries (what is their ecology)?
4. What's unique about estuaries?
5. Why are they important?
6. Why are estuaries at risk?
7. How can estuaries be conserved and protected?

Gather as a class and use the jigsaw learning strategy to share students' findings with the rest of the group (for more info on jigsaw learning strategies, go to [www.jigsaw.org/steps.htm](http://www.jigsaw.org/steps.htm)). Have each student record point-form notes on their copy of **Estuary Investigation** (see *Appendix*, page 39).

### C. Comparing Bears

*Focus: structure and behavior of animals; habitats and communities; reading informational texts to construct meaning; organizing information*

Begin keeping a list of similarities and differences between grizzly bears, black bears and spirit bears. Use **One Bear, Two Bear, Three Bear!** in the *Appendix* on page 40. Have students add to this graphic organizer as they progress through the chapters in *The Salmon Bears*.

Additional information can be found at:

Pacific Wild

[www.pacificwild.org](http://www.pacificwild.org)

Bear Aware British Columbia Conservation Foundation

[www.bearaware.bc.ca](http://www.bearaware.bc.ca)

QQS Projects Society

[www.qqsprojects.org/projects/coastwatch.html#grizzly](http://www.qqsprojects.org/projects/coastwatch.html#grizzly)

North American Bear Centre

[www.bear.org/website](http://www.bear.org/website)

Grizzly Bear Outreach Project

<http://bearinfo.org/black-bears/black-bear-identification>

Sierra Club BC (ideal for intermediate readers)

[www.sierraclub.bc.ca/education/ecomap/central\\_interior/1blackbear.html](http://www.sierraclub.bc.ca/education/ecomap/central_interior/1blackbear.html)

[www.sierraclub.bc.ca/education/ecomap/coasts\\_mountains/1grizzlybear.html](http://www.sierraclub.bc.ca/education/ecomap/coasts_mountains/1grizzlybear.html)

## Chapter 3: Spring

As the snow melts, bears leave their dens and begin to feed on skunk cabbage and other plants as they spring to life.

### Discussion Questions Before Reading

- Why is spring such an important time of year for animals?

### Discussion Questions After Reading

- Do you think people should be allowed to hunt bears for sport?
- Do you think it's right to kill bears when they get too close to landfills or other areas near to human habitation?
- What can people do to minimize situations where bears could cause problems for humans and vice versa?

### Science In Action

#### Main Activity

#### Food Chains and Food Webs

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs; food chains; survival needs; interactions between organisms and the environment; human impact on ecosystems; making inferences; connecting to experience*

Life in the wild can often be reduced to who's eating whom. In fact, animals spend much of their time gathering and eating food. The grizzly, for example, spends seven months of the year foraging and fishing in preparation for the winter! In this lesson, students learn how organisms of the rainforest are connected in a food web.

#### Materials

tape

**Organism Cards** (see *Appendix*, page 41–43)

ball of yarn or string

1. Print out, cut and affix a tape loop to the **Organism Cards**. Give one organism card to each student and have him or her stick their organism to their chest.
2. Have all the students stand in a circle. Go around the circle and have each person read out their card, announcing whether they are a **producer**, **primary consumer**, **secondary consumer** or **tertiary consumer**. See the chart on the following page for some real-world food chains.

As students do so, they should quickly realize that some species are consumed by many different organisms (e.g., salmon are eaten by grizzly bears, wolves and lynx; rodents are eaten by eagles, hawks, owls and weasels).

## Food Chains in the Great Bear Rainforest

Producer	Primary Consumer	Secondary Consumer	Tertiary Consumer
Plants	Black-tailed deer	Wolf	
Plants	Rodent	Saw-whet owl or Western Screech Owl	
Plants	Insects	Bats	
Phytoplankton (single-celled, microscopic plant-like organisms like diatoms and algae that photosynthesize)	Zooplankton Animal-like forms of plankton, such as the larval and adult forms of some animal species and certain protozoans.	Pacific herring	Marbled murrelet
Plants	Mountain goat	Wolverine	
Phytoplankton	Zooplankton	Salmon	Grizzly bear
Phytoplankton	Zooplankton	Salmon	Bald eagle
Plants	Porcupine	Wolf	
Phytoplankton	Fish	River otter	Wolf

- Hand the ball of yarn to a producer and ask that student to toss the ball to another student, keeping the following guidelines in mind:
  - ◆ Make sure that when you get the string or yarn that you do not let go of it!
  - ◆ Start with a producer and toss to a primary consumer.
  - ◆ Go from primary consumer to secondary consumer.
  - ◆ Continue from the secondary consumer to a tertiary consumer.
  - ◆ Go from the tertiary consumer to a decomposer.
  - ◆ Repeat with a different producer.
  - ◆ As the string is being tossed to everyone, check and make sure that the string (food) web is accurate.
  - ◆ It's okay for a single person to get the string more than once. Just make sure students hang on to each length of string that they get!
- Ask the students to explain what they notice. Depending on their grade, they may mention:
  - ◆ *“Some producers are attached to many food chains.”*
  - ◆ *“The string looks complicated, like a giant spider web.”*
  - ◆ *“There are many organisms that eat salmon/zooplankton/phytoplankton.”*
  - ◆ *“I can't hold on to my string because I have so many strings to hold!”*

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5. Ask the students to close their eyes. Discuss an event that could affect these food chains, such as overfishing, hunting or environmental disasters (like the 1989 *Exxon Valdez* oil spill in Alaska, which you can read about at the Encyclopedia of Earth):

[www.eoearth.org/article/Exxon\\_Valdez\\_oil\\_spill?topic=58075](http://www.eoearth.org/article/Exxon_Valdez_oil_spill?topic=58075)

A model of what could happen with an oil spill in the GBR can be found here:

[www.livingoceans.org/initiatives/tankers/oil-spill-model](http://www.livingoceans.org/initiatives/tankers/oil-spill-model)

Tap the student with the organism most directly affected by these events, and have them tug their string. Ask the students to open their eyes and raise their hands if they felt the food web move. Repeat this again if not many students felt the food web move.

6. Discuss what this demonstration represents. Depending on their grade, students may mention:
  - ♦ “*All of the organisms in the food web are linked.*”
  - ♦ “*Even though I don’t eat \_\_\_\_, I felt my string move when the \_\_\_\_ were affected by the event.*”
7. Cut the string and allow the students to keep a piece of the food web!

### *Extension Activities*

#### **A. Speed Demons**

*Focus: analyzing environmental adaptation; organizing information; graphing data*

Divide students into small groups and have them brainstorm animals that move quickly. (Cheetahs, greyhounds, bears, roadrunners, horses, etc.) They may also wish to add a few relatively ponderous species to their lists! Have each group research the average top speeds of their chosen animals and create a chart or graph showing this information.

#### **B. Create a Field Guide**

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs; food chains; survival needs; interactions between organisms and the environment; sustaining healthy ecosystems; human use of living resources; exploring visual and informational texts to construct meaning*

Have each student research a different plant that grizzly bears feed on. You’ll find a number of them listed on page 24 of *The Salmon Bears*. Draw pictures and create a plant field guide. Explore how humans use these same plants.

Royal BC Museum Native Plant Database

[www.royalbcmuseum.bc.ca/Natural\\_History/Plants.aspx?id=274](http://www.royalbcmuseum.bc.ca/Natural_History/Plants.aspx?id=274)

E-Flora BC

[www.geog.ubc.ca/biodiversity/eflora](http://www.geog.ubc.ca/biodiversity/eflora)

Khutzeymateen Grizzly Bear Study

[www.for.gov.bc.ca/hfd/pubs/docs/mr/Whr/Whr31.pdf](http://www.for.gov.bc.ca/hfd/pubs/docs/mr/Whr/Whr31.pdf)

Note: This study is suitable for more advanced readers, but provides a great reference for BC coastal bears. Page 20 has a list of plant species that bears were recorded eating in the Khutzeymateen valley which is in the Great Bear Rainforest. Students can count how many different plant foods the Khutzeymateen bears eat!

**C. Reviewing the Research**

*Focus: habitats, communities and ecosystems; structures/behaviors of organisms; learning about tools to examine things that can't be seen with the naked eye; interactions between organisms and the environment; exploring multimedia texts to construct meaning; organizing information*

Using the **K.W.L.Q. Chart** in the *Appendix* (page 44), have students brainstorm what they already know about bears—and what they'd like to learn. Then watch the following videos about current bear research. Have students add to their **K.W.L.Q. Chart**.

Bear DNA research by Coastwatch in the Koeye

[www.nature.org/ourinitiatives/regions/northamerica/canada/placesweprotect/the-great-grizzlies-of-the-koeye-river.xml](http://www.nature.org/ourinitiatives/regions/northamerica/canada/placesweprotect/the-great-grizzlies-of-the-koeye-river.xml)

Coastwatch Koeye River Grizzly Study

<http://pacificwild.org/site/our-work/resources/learning-resources-the-salmon-bears.html>

Bear Center research from Washington State University

[www.youtube.com/watch?v=ZNd\\_Ec72a3w](http://www.youtube.com/watch?v=ZNd_Ec72a3w)



Photo credit: Ian McAllister

## Chapter 4: Summer

By summer the plants in the Great Bear Rainforest are in full leaf. Food abounds! Bears spend most of their time foraging and looking for a mate.

### Discussion Questions Before Reading

- Why do you think summer is an important time of year for bears?

### Discussion Questions After Reading

- What are bears' diets like in the Great Bear Rainforest during the summer?
- What kind of berries do you eat? Are any of them the same kinds that bears eat?

### Science In Action

#### *Main Activity*

#### **Keeping Track by Following the Tracks!**

*Focus: reading informational and visual texts to construct meaning; comparing the structures of animals living in different habitats and communities*

Summer is a time of intense activity in the Great Bear Rainforest. In a forest, a keen observer can find many signs of the animals that inhabit the area, from bird calls to scat to marks on trees to, of course, footprints. In this activity, students will learn to recognize different tracks left by animals of the Great Bear Rainforest.

1. Borrow or purchase a copy of *Animal Tracks of British Columbia* (Lone Pine Publishing, 2007). Don't have one? Try Bear Tracker at: [www.bear-tracker.com](http://www.bear-tracker.com).
2. Investigate the tracks made by animals living on the west coast of British Columbia, in the area of the Great Bear Rainforest.
3. Challenge students to complete **Keeping Track by Following the Tracks** (see *Appendix*, page 45–46). Invite them to check their answers against the key provided.

#### *Extension Activities*

##### **A. Aah...That's Good!**

*Focus: interactions between organisms and the environment; human impact on ecosystems; sustaining healthy ecosystems; animal behavior; exploring multimedia texts to construct meaning; making inferences*

Watch a film clip of a grizzly bear scratching itself on a tree. Then discuss the following questions.

<http://pacificwild.org/site/our-work/resources/learning-resources-the-salmon-bears.html>

1. For what reason(s) do bears like to scratch?
2. Why is it important for some researchers to study rainforest species in an unobtrusive way?
3. Besides the hair left behind from a tree scratch, what other things provide evidence that a bear has been in a given area?



## B. Myths and Legends

*Focus: listening to comprehend and interpret; making connections with prior experience; characteristics of First Nations cultures; exploring traditional texts from Aboriginal cultures*

Visit your school or local library to locate myths and legends that involve bears. Better yet, invite a guest speaker or storyteller in to share these historically significant stories.

## C. Bears Throughout History

*Focus: human impact on ecosystems; sustainability; assessing the relationship between cultures and their environments; exploring multimedia texts to construct meaning; organizing information*

Explore how bears have been a part of various cultures. Have students read the information on the following website:

[www.kidzone.ws/lw/bears/facts10.htm](http://www.kidzone.ws/lw/bears/facts10.htm)

Wikipedia has a section on culture and bears for more advanced readers.

<http://en.wikipedia.org/wiki/Bear>

Then using the **Word Cluster** graphic organizer in the *Appendix* on page 47, have students make jot notes about the way bears have been perceived over time.

## D. Gettin' Artsy

*Focus: exploring informational and visual texts to construct meaning; responding to text; creating images using a range of visual elements, processes and materials*

Have students read the description of the Great Bear Rainforest in the beginning of this chapter. Look at the photographs of spring and summer foliage. Using colored pencils or paints, draw this lush, plant-rich environment.

## E. Food Favorites in the Forest

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs; survival needs; interactions between organisms and the environment; human impact on ecosystems; sustaining healthy ecosystems; reading informational texts to construct meaning; making inferences*

Have students read pages 43 and 44 in the book, then make a list of the foods bears eat. What other animals eat these same foods? What can students infer might happen if one or more of these food items were to disappear from the forest ecosystem?

## F. Bears on the Beach

*Focus: reading informational and visual texts to construct meaning; responding to text; creating images using a range of visual elements, processes and materials*

Read the description of bears combing the beach for food on page 47 of *The Salmon Bears*. Have students draw, paint, sculpt or otherwise depict “beach bears” in the Great Bear Rainforest.

## G. New Babies for the Rainforest

*Focus: habitats, communities and ecosystems; interactions between organisms and the environment; sustaining healthy ecosystems; structures and behaviors of animals in different habitats and communities; exploring visual, multimedia and information texts to make meaning; taking notes; collaborating in pairs to explore and comprehend a variety of texts; presenting information*

Grizzly bears have the second-slowest reproductive cycles of any land mammal in North America. Only the polar bear has a slower cycle. As a class, make a list of mammals that live in the Great Bear Rainforest. Divide students into pairs and assign each student a mammal to research. Each pair should use library books and the Internet to research the reproductive cycles of their assigned mammal. Have students make notes on:

1. mating season and rituals;
2. gestational period;
3. length of time offspring remain with their mother;
4. length of time until the mother can/will bear more offspring; and
5. any other interesting facts about the reproductive cycle of their animal.

Have each pair share what they've learned about their chosen mammal.

## H. Create a Travel Brochure

*Focus: human impacts on ecosystems; analyzing how BC's living resources are used; reading visual and information texts for meaning; synthesizing information; writing purposeful information texts to engage and inform; using visual/artistic devices to enhance meaning and engage the audience*

Read the sidebar about the rise of grizzly bear tourism on page 48 of *The Salmon Bears*. Challenge students to create a travel brochure for grizzly bear tours in the Great Bear Rainforest. The National Council of Teachers of English offers an excellent step-by-step lesson plan (including rubric, samples and planning resources) for creating a travel brochure. Start here:

[www.readwritethink.org/classroom-resources/lesson-plans/travel-brochures-highlighting-setting-961.html](http://www.readwritethink.org/classroom-resources/lesson-plans/travel-brochures-highlighting-setting-961.html)

For a great example of marketing writing from an outfit that specializes in tours in the Great Bear Rainforest, check out this page from Spirit Bear Lodge, located in the community of Klemtu, BC:

[www.spiritbear.com/site/wildlife.html](http://www.spiritbear.com/site/wildlife.html)

## Chapter 5: Fall

Fall is the season of spawning salmon in the Great Bear Rainforest. Bears eagerly await the return of the silvery fish to the coastal estuaries. They know they're about to enjoy a fabulous annual feast, where they'll fill their bellies and store up fat for the coming winter.

### Discussion Questions Before Reading

- What do you know about the salmon life cycle?
- Which species in the rainforest depend on salmon?

### Discussion Questions After Reading

- What could happen to the forest ecosystem if salmon didn't return in the fall?
- What are some of the dangers salmon face throughout the course of their lives?
- What do you think are the evolutionary advantages of being a black bear with white fur?
- Do you think black bears and spirit bears behave any differently from one another?

### Science In Action

#### Main Activity

#### The Incredible Journey

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs, populations, communities and ecosystems; survival needs; interactions between organisms and the environment; human impact on ecosystems; sustaining healthy ecosystems; making inferences; reflecting on learning*

All of the five species of Pacific salmon are considered *anadromous*, meaning they are born in fresh water, migrate to the ocean and then return to fresh water to spawn. Scientists have discovered that, aided by their olfactory senses, adult salmon travel hundreds and sometimes a thousand kilometers to return to the very stream where they were born in order to *spawn*. To put it simply, salmon smell their way home! Pacific salmon will die after they spawn once; this is known as *semelparity*. The returning salmon provide a nutrient-rich diet for bears, and the spawned-out salmon provide a wealth of food for local scavengers, including ravens. Of the thousands of eggs laid by the female salmon, only a few will survive into adulthood and make the epic journey home. In this activity, students explore just how difficult it is for adult salmon to make it back home to their spawning grounds.

Find an image of the Salmon life cycle at [www.thinksalmon.com](http://www.thinksalmon.com).

**Materials:**

- 10 cones
- 2 recycling boxes or cardboard boxes of a similar size
- 1 skipping rope
- ~20 bingo chips
- 1 copy of the **Incredible Journey** (see *Appendix*, page 48)

1. After reviewing the salmon life cycle, discuss the dangers faced by salmon as they migrate from the ocean to their spawning streams.

Some possible comments may include:

- ◆ natural predators such as eagles, bears, wolves, etc.;
- ◆ humans;
- ◆ other environmental dangers, such as turbines in dams; and
- ◆ pollution in the ocean and/or streams.

In a large open area such as a field or gym, use cones to set the boundaries for this journey. Include an ocean, river, spawning ground and survival area in that order.

Six students will have special roles (explained below). The rest of the students are salmon attempting to make it back to their spawning grounds. Being tagged by the fishermen, turbine or bear represents dying. The students are allowed to start again at the ocean but they need to keep track of what killed them. They can either keep a tally on their own or an extra student can be stationed at each area to keep the tally.

2. Select two students to become fishermen. They represent the fishing industry. Fishermen stay in the ocean area and must keep one leg in a box or recycling bin. They can catch salmon by tagging the fish as they run by.
3. Select another two students to become a turbine, a large propeller-like part of a hydroelectric dam that generates electricity by spinning when water flows through it. The turbine is located in the river area and kills any fish that can't jump through the turbine (rope). These students turn the skipping rope between them, and the salmon have to jump through the rope. (Got yourself a room full of non-skippers? No problem. Just have the two students lay the rope on the floor between them and wiggle it back and forth as the salmon try to get through unscathed.) If they get caught...it's curtains for them. (As a side note, 90 percent of British Columbia's electricity comes from hydroelectric power. Many dams are equipped with fish ladders so that fish can take a detour from the turbines. But even with the fish ladders, fatalities occur because the salmon get too tired trying to swim up the ladder, they can't find the entrance to the ladder, or they jump out of the ladder area and get caught in the turbine.)



4. Select another two students to become bears. Located in the spawning area, the bears are free to run and catch their prey by tagging the fish as they run by.
5. Position yourself in the survival area. Provide the students with a bingo token when they make it through their incredible journey! This token represents a salmon that has been able to spawn to produce offspring that will live to make the incredible journey themselves.
6. Back inside the classroom, discuss what the students noticed. The data will vary depending on the number of students you have, however it is likely that the turbine will have killed many “salmon.” This may not be representative of the real life migration. Ask the students if they can think of why this is. Reasonable responses may include the following:
  - ◆ “Salmon are adapted to ‘jumping’ as they swim upstream.”
  - ◆ “Salmon mostly swim upstream with the aid of fish ladders so turbines don’t kill them.”
  - ◆ “Not every river or stream has a dam.”



Photo credit: Ian McAllister

***Extension Activities***

**A. Salmon Life Cycle**

*Focus: survival needs; interactions between organisms and the environment; sustaining healthy ecosystems; making inferences; reading informational and multimedia texts to construct meaning; reflecting on learning; organizing information; taking notes*

Use books and Internet resources to study the salmon life cycle (see **Salmon Life Cycle** in the *Appendix*, page 49). Here are some great places to begin:

- [www.pac.dfo-mpo.gc.ca/fm-gp/rec/species-especies/salmon-saumon-eng.htm](http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/species-especies/salmon-saumon-eng.htm)
- [www.earthlingenterprises.ca/earthlingenterprises/Salmon\\_Education.html](http://www.earthlingenterprises.ca/earthlingenterprises/Salmon_Education.html)

Have students fill in the **Salmon Life Cycle** chart using point form.

## B. The Forest Homunculus

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs, populations, communities and ecosystems; using a variety of image sources; creating images using image development strategies such as juxtaposition, metamorphosis, distortion and exaggeration*

Research in humans shows that the parts of our brains that are dedicated to sensory perception—you got it: touch, smell, taste, hearing and sight—are larger and more complex than other parts. For example, the skin on our hands is way more sensitive than the skin on our upper arms. A visual representation of this idea, called the sensory homunculus, was created using distortion and exaggeration to reflect the things our brains pay the most attention to rather than how we really look.

Think of the Great Bear Rainforest the same way. The forest relies on some things to help it grow more than others: for example, the salmon are what's known as a *foundation species*. They're pretty darn important. Without them, not much in the forest could grow. So if you were to draw a picture of the rainforest, you'd want to make it obvious that the salmon are an important part of this ecosystem.

Here's where we get creative! Draw a sketch of how you envision the different layers of the forest, from deep below the soil to the very tips of the trees. Be as concrete as you like in your picture. How does this foundation layer help the rest of the forest grow? Draw everything that the salmon nourishes in its role as a foundation species, from the microbes in the soil to the scavengers to the bushes to the tallest Sitka spruces. Your forest picture might look a little weird, and that's okay!

## C. Comparing Salmon Species

*Focus: reading visual and information texts to create meaning; organizing information; taking notes*

Study the differences between the five species of Pacific salmon. In an organized chart or table of their own design, have students record the identifying characteristics of each salmon species.

Wikipedia

[http://en.wikipedia.org/wiki/Salmon#Pacific\\_Ocean\\_species](http://en.wikipedia.org/wiki/Salmon#Pacific_Ocean_species)

Species of Pacific Salmon (note: this site lists six species)

<http://fishresource.com/fish/fish017.asp>

Pacific Salmon Commission

[www.psc.org/about\\_salmon.htm](http://www.psc.org/about_salmon.htm)

Think Salmon (content is geared to more sophisticated readers)

[www.thinksalmon.com](http://www.thinksalmon.com)

**D. Fishing Derby**

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs, populations, communities and ecosystems; survival needs; interactions between organisms and the environment; exploring multimedia texts to make meaning*

Watch a video clip of bears fishing. Here are some from the BBC:

[www.youtube.com/watch?v=4qLqs8oDVqA&feature=relmfu](http://www.youtube.com/watch?v=4qLqs8oDVqA&feature=relmfu)

[www.youtube.com/watch?v=QzZ4systdZc&NR=1](http://www.youtube.com/watch?v=QzZ4systdZc&NR=1)

[www.youtube.com/watch?v=0NcJ\\_63z-mA](http://www.youtube.com/watch?v=0NcJ_63z-mA)

Also some footage of bears from Pacific Wild:

<http://pacificwild.org/site/our-work/resources/learning-resources-the-salmon-bears.html>

**E. Black Bear...White Fur?**

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs, populations, communities and ecosystems; survival needs; interactions between organisms and the environment; sustaining healthy ecosystems; exploring visual, multimedia and informational texts to construct meaning*

Investigate and discuss the genetics of a spirit bear's white fur at the following sites:

Spirit Bear Adventures

[www.spiritbear.com/site/wildlife.html](http://www.spiritbear.com/site/wildlife.html)

Spirit Bear Youth Coalition

[www.spiritbearyouth.org/?page\\_id=4](http://www.spiritbearyouth.org/?page_id=4)

Valhalla Wilderness Society

[www.vws.org/project/spiritbear/about\\_bear/science\\_info.html](http://www.vws.org/project/spiritbear/about_bear/science_info.html)

**F. Legends of the Forest**

*Focus: analyze how the Aboriginal concept of interconnectedness of the environment is reflected in responsibility for and caretaking of resources; interactions between organisms and the environment; human impact on ecosystems; listening to make meaning; connecting to experience*

Invite a community member or storyteller to share a First Nations story about salmon, grizzly bears, spirit bears or any of the other animals living in the Great Bear Rainforest.

**G. From Paw to Poem**

*Focus: organisms as parts of interconnected food webs, populations, communities and ecosystems; animal behavior and structures; interactions between organisms and the environment; reading informational text to construct meaning; visualizing; writing imaginative texts to explore ideas and experiment with language and style*

Read the descriptions of bears fishing in this chapter. Have students write a poem about this event. Polish the poems and post them around the classroom, or create a classroom anthology.

## H. The Compost Connection

*Focus: interactions between organisms and the environment; human impact on ecosystems; sustaining healthy ecosystems; reading informational and visual texts to construct meaning; determining how personal choices and actions have environmental consequences; explaining why sustainability is important*

The decaying salmon act like a rich compost on the forest floor. Does your school compost? Read up on composting here, at the Greater Victoria Compost Education Centre:

[www.compost.bc.ca/learn/howto.htm](http://www.compost.bc.ca/learn/howto.htm)

Here, you'll find fact sheets, how-to sheets, activities, FAQs...pretty much everything you ever wanted to know about composting! Grab some parent volunteers and challenge your students to build a bin—and start a composting program in your school.



Photo credit: Ian McAllister



## Chapter 6: Winter Again

As winter returns, the bears in the Great Bear Rainforest prepare to go back to their dens. If they've worked hard in the spring, summer and fall to pack on the pounds, they'll have enough fat to last the whole winter through.

### Discussion Questions Before Reading

- What does a bear need to do to prepare for the winter?

### Discussion Questions After Reading

- What physical and behavioral traits do grizzly bears and black bears possess to survive winters?
- Discuss the risks that a bear faces during a five-month hibernation.

### Science In Action

#### Main Activity

#### A Year in the Life of a Bear

*Focus: habitats, communities and ecosystems; animal behavior; survival needs; interactions between organisms and the environment; reading informational texts to make meaning; graphing; analyzing and comparing data; making inferences*

How do bears spend their time? In this activity, students will review a bear's annual cycle by creating a circle graph. Next, students will create a graph depicting a day in the life of a bear (during fall), and compare it to a day in their own lives!

#### Materials:

SMART Board set up and/or chart paper

1. After reading *The Salmon Bears*, have the students identify the events in the life of an adult bear (see **Timeline: A Bear's Annual Cycle** in the *Appendix* on page 38).
2. Using the SMART Board computer program or just pencil and paper, have students create a circle graph (pie chart) of what a bears does month to month (Figure 3).

January	-bears are in their winter dens
February	-bears are in their winter dens
March	-bears are in their winter dens -bears may begin emerging from their dens late in the month
April	-bears emerge from their dens early in the month
May	-mature males and females mate
June	-mature males and females mate
July	-bears forage
August	-bears forage
September	-bears forage and fish salmon
October	-bears forage and fish salmon
November	-bears head to winter dens
December	-bears are in their winter dens -cubs are born

**Figure 3:** What a grizzly bear does in one year.

3. Ask students to think about a day in the life of a bear during the busy fall season, as the animal gears up for winter. How much of its day is spent eating? Can students infer how much of the day is spent sleeping? Where does mating fit in? Have students create a circle graph to represent 24 hours in the life of a bear. Guide students in a discussion of how this graph might differ according to the season, the weather, and the relative abundance or scarcity of food?
4. Next, have students brainstorm about how they spend their own days. What keeps them busy for 24 hours? School? Meals? Extracurricular activities? Chores? How much time do they spend sleeping? Texting? Have each student break down an average day in his or her life, then graph it. Compare this graph to the bear's. Whose life seems simpler?

**Extension Activities**

*Note to teachers: because Chapter 6 is relatively short, we've added a few activities here that relate to the sidebars in Chapter 5.*

**A. Building a Den**

*Focus: habitats, communities and ecosystems; survival needs; interactions between organisms and the environment; exploring visual and multimedia texts to create meaning; planning, organizing and diagramming*

1. Research bear dens and build a model (see **Planning Sheet: Building a Den** in the *Appendix*, page 50).

## 2. Watch bears in their dens:

North American Bear Centre

[www.bear.org/website/](http://www.bear.org/website/) (Hit the *Live Cameras: Videos, Slideshows and More* tab; click on *Videos*. There are plenty!)

Spirit Bear Hibernating in Den

[www.youtube.com/watch?v=CAZd-Le5GSs&feature=fvst](http://www.youtube.com/watch?v=CAZd-Le5GSs&feature=fvst)

**B. Producers, Consumers and Decomposers**

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs, populations, communities and ecosystems; interactions between organisms and the environment; sustaining healthy ecosystems; reading informational texts to make meaning; synthesizing and applying knowledge in a game environment*

Review the roles of *producers*, *consumers* and *decomposers* by projecting the following information onto a whiteboard, screen or SMART Board. Invite students to take turns reading the following:

- ♦ *All living things need energy to survive. Plants are what we call **producers**. Producers use solar energy from the sun, as well as minerals and nutrients from the soil, to survive. Producers provide energy for **consumers**. Consumers are organisms like cows, bears, people and ravens. In order to live, they need to consume (take in) energy. Consumers eat producers (like plants) to get energy. Some consumers (carnivores such as bears, wolves or eagles), will eat other consumers for their energy.*
- ♦ *When producers or consumers die, **decomposers** harvest energy from the decaying material. Decomposers are mainly bacteria and fungi. Worms can be decomposers too. Decomposers break down the materials in dead plants and animals, and even animal scat! Then the decomposers recycle these nutrients back to the producers. In turn, the waste created by decomposers replenishes the soil and is used by the producers to complete the food chain. Talk about a life cycle!*

Here's a great site to help students review what they've just read about:

[www.sheppardsoftware.com/content/animals/kidscorner/foodchain/producersconsumers.htm](http://www.sheppardsoftware.com/content/animals/kidscorner/foodchain/producersconsumers.htm)

When students have navigated the review page on producers, consumers and decomposers, invite them to play a few rounds of "The Producers, Consumers & Decomposers" game online (site above).

**C. Kicking Back with a Flick**

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs, populations, communities and ecosystems; survival needs; interactions between organisms and the environment; human impact on ecosystems; sustaining healthy ecosystems; exploring visual texts to make meaning*

Watch a few video clips on spirit bears:

[www.youtube.com/watch?v=7IRxdk6m17s&NR=1](http://www.youtube.com/watch?v=7IRxdk6m17s&NR=1)

[www.youtube.com/watch?v=VjvpOU349zY&feature=related](http://www.youtube.com/watch?v=VjvpOU349zY&feature=related)

[www.youtube.com/watch?v=CAZd-Le5GSs&feature=fvst](http://www.youtube.com/watch?v=CAZd-Le5GSs&feature=fvst)

[www.pacificwild.org/site/our-work/resources/learning-resources-the-salmon-bears.html](http://www.pacificwild.org/site/our-work/resources/learning-resources-the-salmon-bears.html)  
(the spirit bear video is at the bottom)

## Chapter 7: What the Future Might Hold

The Great Bear Rainforest is under threat from salmon farms, oil tanker traffic, logging, trophy hunting and climate change. But with increased awareness of this magical place—and cooperation by government and industry—we can keep this important ecological wonder healthy for generations to come.

### Discussion Questions Before Reading

- How do humans use the natural resources of the Great Bear Rainforest? How could this use affect the environment?

### Discussion Questions After Reading

- Do you think the Great Bear Rainforest is worth protecting? What can you do to help?
- What are some of the major risks to the Great Bear Rainforest?
- What kind of impact are humans having on the ecosystem? How might our choices, laws, etc., affect the rainforest?



Photo credit: Ian McAllister

### Science In Action

#### Main Activity

#### Take Only Pictures, Leave Only Footprints

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs, populations, communities and ecosystems; survival needs; interactions between organisms and the environment; human impact on ecosystems; sustaining healthy ecosystems; exploring visual texts to make meaning; synthesizing and evaluating information to create a new learning activity*

If you've explored any wild place with a park naturalist, you've probably heard the quote, "Take only pictures, leave only footprints."

1. Discuss as a class what this quote means.
2. Challenge students to develop an activity or assignment that evolves from this quote. Their activity must include a complete listing of materials, instructions and a learning outcome (i.e., the learning goal(s) that will be achieved once the activity is complete).
3. Have students write an entry in their science or language arts journal reflecting on their experience of creating and organizing an assignment for learning.

### *Extension Activities*

#### **A. Wilderness Politics**

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs, populations, communities and ecosystems; interactions between organisms and the environment; human impact on ecosystems; sustaining healthy ecosystems; exploring visual, informational and multimedia texts to make meaning; analyzing and synthesizing information; writing informational texts to teach, persuade or share an opinion*

Let's dig into some of the hot political and environmental issues surrounding this pristine piece of wilderness.

- ♦ **At Issue:** We learn that bears are hunted in the Great Bear Rainforest. While a hunter isn't allowed to shoot a spirit bear, it's quite possible that he could shoot a bear that carries the gene for a spirit bear. So, even though there are restrictions on hunting, the spirit bears aren't as well-protected as it seems. Besides the spirit bear argument, there's a lot of controversy over the trophy hunt in the Great Bear Rainforest. Guide students in a discussion of the fact that the government allows bears to be killed during this annual hunt. Use this page from the Pacific Wild website to engage students in conversation:

[www.pacificwild.org/site/our-work/stop\\_the\\_trophy\\_hunt.html](http://www.pacificwild.org/site/our-work/stop_the_trophy_hunt.html)

For a more in-depth discussion, go to:

[www.pacificwild.org/site/about/conservation-priorities/trophyhunting-of-b.c.-grizzly-bears.html](http://www.pacificwild.org/site/about/conservation-priorities/trophyhunting-of-b.c.-grizzly-bears.html)

- ♦ **At Issue:** Calgary-based oil and gas company Enbridge Inc. is proposing to build a 1,170-km-long pipeline through the Great Bear Rainforest. The purpose of the pipeline is to transport oil from the Alberta tar sands to a new port in Kitimat, on British Columbia's west coast. From there, the crude oil would be loaded on to tankers for export to international markets. If the project gets the go-ahead from government, more than 225 oil tankers would travel BC's northern inside coastal waters per year. (Currently there is no bulk crude-oil tanker traffic on BC's north coast.) Here's the problem: for better or for worse, our economy still needs oil to function. But what happens if one of those tankers has an accident and spills oil in the waters of the Great Bear Rainforest? How would the ecosystems be damaged? And could they ever be repaired?

## The Salmon Bears Learning Guide

The August 2011 issue of *National Geographic* showcases the Great Bear Rainforest, and includes articles about the Spirit Bear—and the implications of oil expansion into this precious habitat. Go to [www.pacificwild.org/site/press/1315423635.html](http://www.pacificwild.org/site/press/1315423635.html).

Have students choose one of these issues to research. (Be advised that some of the video footage of the trophy bear hunt is graphic and could upset your students; you may wish to steer them toward print instead of video resources.)

For more information about the proposed Enbridge pipeline:

[www.pacificwild.org/site/our-work/no-tankers-no-pipeline.html](http://www.pacificwild.org/site/our-work/no-tankers-no-pipeline.html)

[www.pacificwild.org/site/our-work/no-tankers-no-pipeline/first\\_nations\\_and\\_enbridge.html](http://www.pacificwild.org/site/our-work/no-tankers-no-pipeline/first_nations_and_enbridge.html)

[www.cbc.ca/bc/features/soundslides/pipe-dreams](http://www.cbc.ca/bc/features/soundslides/pipe-dreams) (radio slide show)

[www.cbc.ca/news/business/story/2010/05/27/enbridge-files-northern-gateway-application.html](http://www.cbc.ca/news/business/story/2010/05/27/enbridge-files-northern-gateway-application.html)

[http://pipeupagainstenbridge.ca/news/enbridge\\_oil\\_spill\\_in\\_n.w.t.\\_could\\_top\\_1500\\_barrels\\_read\\_more\\_http\\_www.calg](http://pipeupagainstenbridge.ca/news/enbridge_oil_spill_in_n.w.t._could_top_1500_barrels_read_more_http_www.calg) (news story about an oil leak in the Northwest Territories)

<http://pipeupagainstenbridge.ca/join/partners>

For more information about the trophy hunt:

[www.cbc.ca/news/canada/british-columbia/story/2009/03/17/bc-stop-bear-hunting.html](http://www.cbc.ca/news/canada/british-columbia/story/2009/03/17/bc-stop-bear-hunting.html)

[www.cbc.ca/news/canada/british-columbia/story/2008/07/28/bc-grizzly-bear-hunt.html](http://www.cbc.ca/news/canada/british-columbia/story/2008/07/28/bc-grizzly-bear-hunt.html)

[www.cbc.ca/news/canada/story/2005/12/13/bear-hunting-051213.html](http://www.cbc.ca/news/canada/story/2005/12/13/bear-hunting-051213.html)

[www.pacificwild.org/site/take\\_action/trophy\\_hunt\\_campaign.html](http://www.pacificwild.org/site/take_action/trophy_hunt_campaign.html)

<http://pacificwild.org/site/our-work/resources/the-trophy-hunt.html> (video link)

Assign students to respond to their research in one of the following ways:

1. Write a letter to your provincial or federal elected representative urging him or her to stop the trophy bear hunt/pipeline development.
2. Write an opinion piece (a letter to the editor) for a local newspaper stating your opinion of the issue.
3. Write a summary of the issue. Include evidence and details from your research that outlines both sides of the issue. (Students may choose whether to “pick a side” and argue for it toward the end of their summary).

## B. Connecting with Community

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs, populations, communities and ecosystems; human impact on ecosystems; sustaining healthy ecosystems; implementing a plan of action to address a local or global problem or issue*

Brainstorm with students some of the environmental issues that have an impact on their own lives. As a class, organize a school or community event, or take part in an ongoing/upcoming community initiative to raise awareness for this environmental issue.

## C. The Facts on Farming

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs, populations, communities and ecosystems; interactions between organisms and the environment; human impact on ecosystems; sustaining healthy ecosystems; exploring informational texts to make meaning; writing information texts that express ideas and information*

In chapter 7, we learn that many salmon smolts are at risk from disease and other problems passed along by nearby salmon farms. Have students read **Salmon Farming** in the *Appendix* on pages 51–52. Then ask them to complete **Salmon Farming: Q&A** on page 53.

## D. Exploring the Oolichan

*Focus: survival needs; interactions between organisms and the environment; human impact on ecosystems; analyzing how BC's living resources are used; analyzing how the Aboriginal concept of interconnectedness of the environment is reflected in responsibility for and caretaking of resources*

Bears like to dine on oolichan, an oily little fish that was used in various ways by British Columbia's First Nations throughout history. Investigate the oolichan via the Royal BC Museum's *Living Landscapes*:

[www.livinglandscapes.bc.ca/northwest/oolichan\\_history/preserving.htm](http://www.livinglandscapes.bc.ca/northwest/oolichan_history/preserving.htm)

What were the oolichan's uses? Historically, why was it such a valuable source of nourishment for First Nations communities? How do First Nations continue to use the oolichan today?

## E. One World: And We All Share It

*Focus: habitats, communities and ecosystems; organisms as parts of interconnected food webs, populations, communities and ecosystems; interactions between organisms and the environment; human impact on ecosystems; sustaining healthy ecosystems; exploring visual texts to make meaning*

Explore issues around human and bear interactions. Visit:

Bear Smart (a Whistler-based Canadian charity that helps humans and bears coexist as peacefully as possible)

[www.bearsmart.com/becoming-bear-smart](http://www.bearsmart.com/becoming-bear-smart)

Bear Aware BC

[www.bearaware.bc.ca](http://www.bearaware.bc.ca)

World Society for the Protection of Animals' Human Bear Conflict site

[www.humanbearconflict.org/index.htm](http://www.humanbearconflict.org/index.htm)

## The Salmon Bears Learning Guide

Northern Lights Wildlife Society (a Smithers-based rehabilitation shelter for bears, moose, deer and other animals)

<http://wildlifeshelter.ca>

Carnivore Conservation (a resource database for scientists and researchers)

[www.carnivoreconservation.org/portal/index.php](http://www.carnivoreconservation.org/portal/index.php)

North Shore Black Bear Society (a group for the conservation and protection of bears on Vancouver's North Shore)

[www.northshorebears.com/](http://www.northshorebears.com/)

BC Ministry of Environment Smart Bear Program

[www.env.gov.bc.ca/cos/info/bearaware](http://www.env.gov.bc.ca/cos/info/bearaware)

Get Bear Smart Society (protecting the wellbeing of bears by helping people and bears find a healthy way to coexist)

[www.env.gov.bc.ca/cos/info/bearaware](http://www.env.gov.bc.ca/cos/info/bearaware)

Humane Society Canada—Protect the Great Bear Rainforest (conservationists, Coastal First Nations and animal protection agencies join forces to protect the GBR bears)

<http://hsicanada.ca>

Bear Matters

[www.bearmatters.com](http://www.bearmatters.com)

# The Salmon Bears

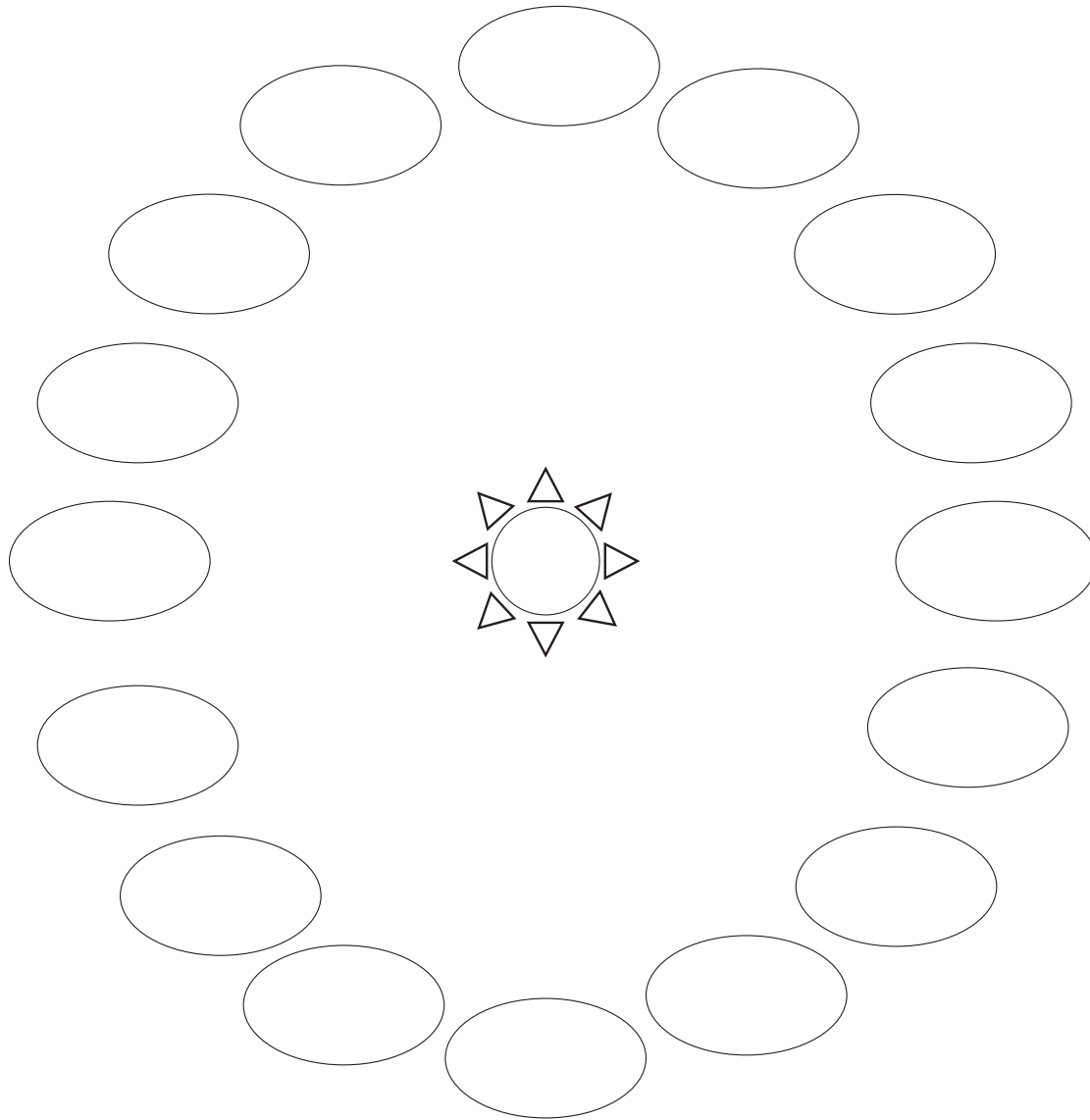


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**Web of Life**

Fill in the empty bubbles around the sun with organisms that live in the Great Bear Rainforest. Include plants, mammals, fish, birds, insects and other forms of life. Then draw lines between the living things that depend on each other. Make sure that everything is connected to at least one other thing. (You may find that certain circles are connected over and over again.)



**Discussion:** What do you notice about the amount of interdependence between rainforest organisms? What can you infer would happen if one or more of these organisms were to disappear become endangered? Explain how each organism's position in the web of life contributes to the overall health of the rainforest.

**Vocabulary List**

Fill in the blanks with the term that matches the definition listed.

<b>Chapter 1</b>	_____	living matter
	_____	an animal that eats other animals
	_____	ancient forest that has never been logged
	_____	an animal that eats the remains of dead animals that have been left behind by predators
	_____	a juvenile animal
	_____	a type of forest characterized by moderate temperatures and high rainfall
<b>Chapter 2</b>	_____	the state where an animal's body functions slow down dramatically, body temperature drops, and the animal does not move for an extended period of time
<b>Chapter 3</b>	_____	evergreen trees; trees with cones and needles instead of leaves
	_____	trees with leaves
	_____	place where a river meets the ocean and mixes with salt water
	_____	a tree that bears scratch and rub their scent into to communicate with other bears
	_____	a hood-shaped leafy sheath on some plants, including skunk cabbage
<b>Chapter 4</b>	_____	a wet, marshy area made of peat
<b>Chapter 5</b>	_____	a juvenile salmon that is migrating to the ocean
<b>Chapter 7</b>	_____	something that absorbs carbon compounds like CO <sub>2</sub> and prevents them from getting into the atmosphere and contributing to climate change

**Vocabulary List—ANSWER KEY**

<b>Chapter 1</b>	<b>biomass</b>	living matter
	<b>carnivore</b>	an animal that eats other animals
	<b>old-growth forest</b>	ancient forest that has never been logged
	<b>scavenger</b>	an animal that eats the remains of dead animals that have been left behind by predators
	<b>subadult</b>	a juvenile animal
	<b>temperate rainforest</b>	a type of forest characterized by moderate temperatures and high rainfall
<b>Chapter 2</b>	<b>hibernation</b>	the state where an animal's body functions slow down dramatically, body temperature drops, and the animal does not move for an extended period of time
<b>Chapter 3</b>	<b>coniferous</b>	evergreen trees; trees with cones and needles instead of leaves
	<b>deciduous</b>	trees with leaves
	<b>estuary</b>	place where a river meets the ocean and mixes with salt water
	<b>mark tree</b>	a tree that bears scratch and rub their scent into to communicate with other bears
	<b>spathe</b>	a hood-shaped leafy sheath on some plants, including skunk cabbage
<b>Chapter 4</b>	<b>bog</b>	a wet, marshy area made of peat
<b>Chapter 5</b>	<b>smolt</b>	a juvenile salmon that is migrating to the ocean
<b>Chapter 7</b>	<b>carbon sink</b>	something that absorbs carbon compounds like CO <sub>2</sub> and prevents them from getting into the atmosphere and contributing to climate change

**Tree Journal**

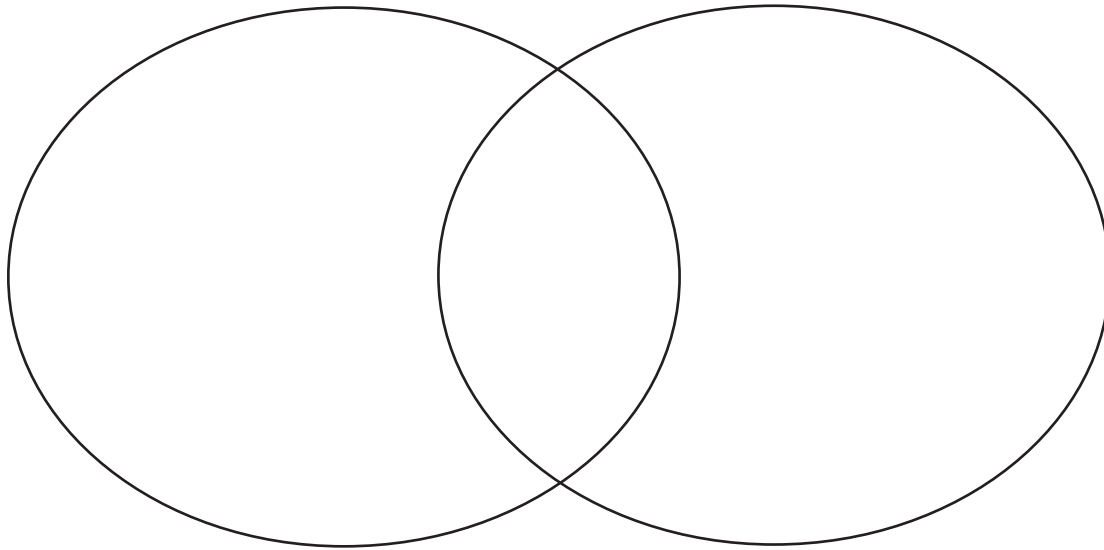
Labeled diagram:	
Common Name:	Scientific Name:
Physical Features:	Habitat:
Leaves, Cones and Bark:	Uses:
Questions or connections I have about this species of tree:	

The Salmon Bears

**Forest Comparison**

**Temperate Rainforest**

**Tropical Rainforest**



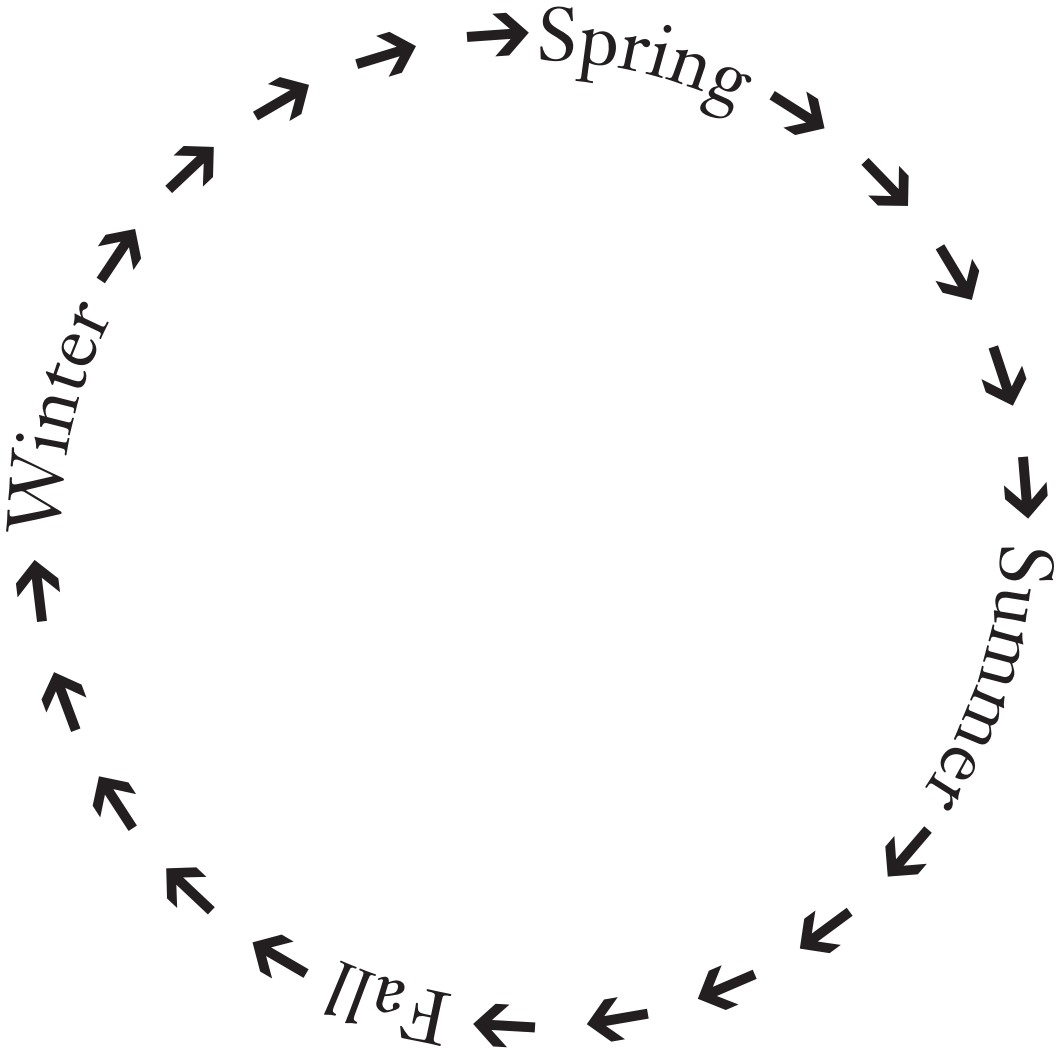
**The Great Bear Rainforest Under Threat**

Source (where/from whom you gathered your information):	
Problem:	Possible Solution:
My Thoughts and Questions:	My Actions:

The Salmon Bears

**Timeline: A Bear's Annual Cycle**

For each spot on the timeline, draw pictures and/or write descriptions representing events that might take place during one year of a bear's life. You've got loads of white space: use it up! Add plenty of detail and visual interest.



# The Salmon Bears



**Estuary Investigation**

Record your notes about estuaries in the following chart. Point form is fine!

<b>Guiding question</b>	<b>Here's what I've learned about estuaries</b>
1. What are estuaries?	
2. How were estuaries in BC formed?	
3. What sorts of organisms live in estuaries? (i.e., what is their ecology?)	
4. What is unique about estuaries?	
5. Why are estuaries important?	
6. Why are estuaries at risk?	
7. How can estuaries be conserved and protected?	

**One Bear, Two Bear, Three Bear!**

Bear	Grizzly Bear	Black Bear	Spirit Bear
Appearance			
Size			
Habitat			
Diet			
Fascinating Facts			
The main difference among the bears is			
The bears are all similar in that			

The Salmon Bears

Organism Cards

**Bear**

**Murrelet**

**Phytoplankton**

**Zooplankton**

**Heron**

**Herring**

**The Salmon Bears**

**Bald eagle**

**Gull**

**Salmon**

**Owl**

**Wolf**

**Wolverine**

**The Salmon Bears**

River otter

Rodent

Bat

Insects

Plants

Deer

**K.W.L.Q. Chart**

Use the questions in the left-hand column to guide you in filling in the chart below.  
(Be sure to fill out the first two rows *before* you watch the video clips on bears!)

<b>Topic:</b>	
What do I <b>know</b> about this topic already?	
What do I <b>want</b> to know more about?	
After watching the videos, what have I <b>learned</b> about the topic?	
What <b>questions</b> do I still have about the topic?	

The Salmon Bears

**Keeping Track by Following the Tracks**

Draw a line from the animal name to the illustration of the tracks it leaves behind.  
As an added challenge, the tracks are not to scale.

Otter



Wolverine



Grizzly Bear



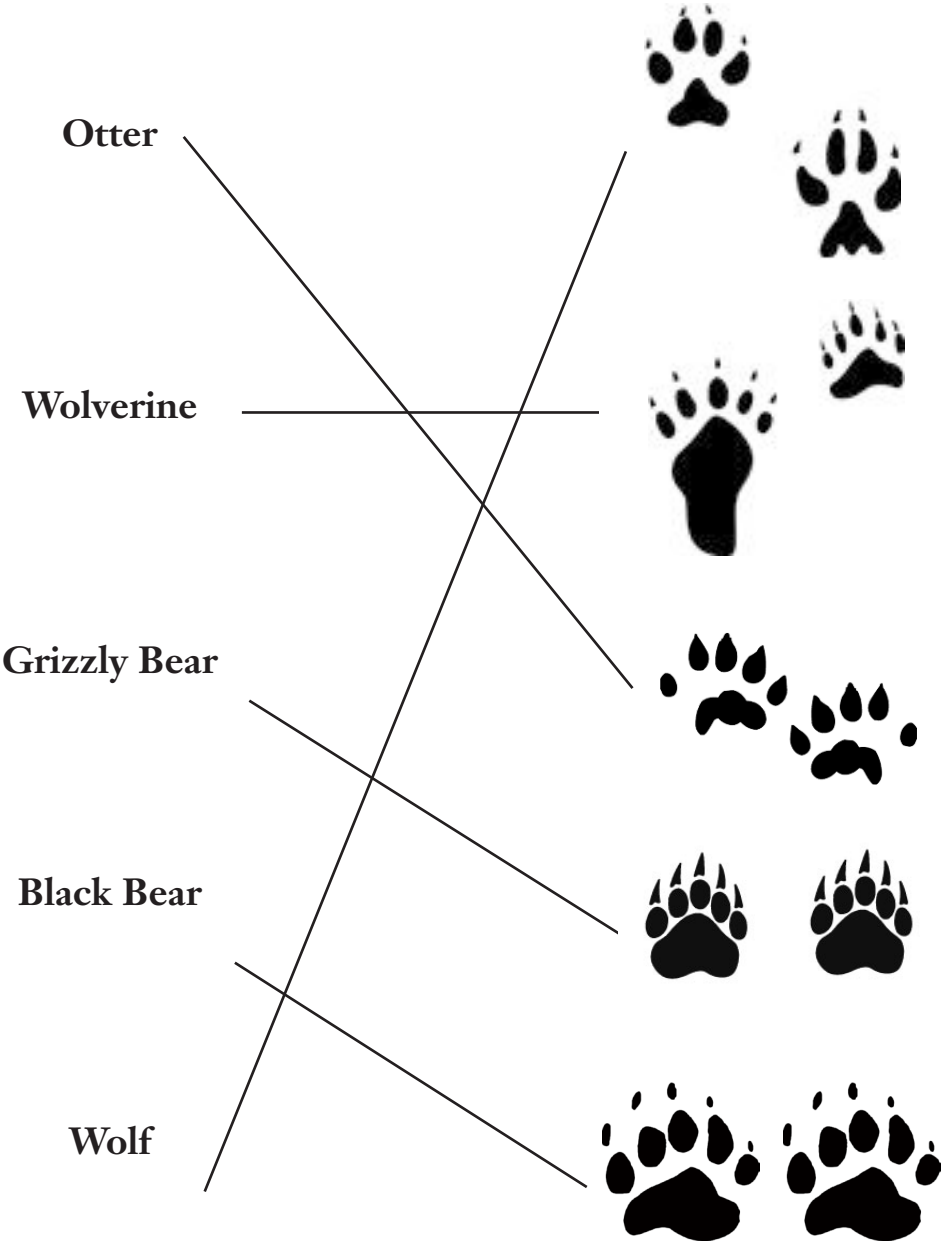
Black Bear



Wolf



Keeping Track by Following the Tracks—Answer Key



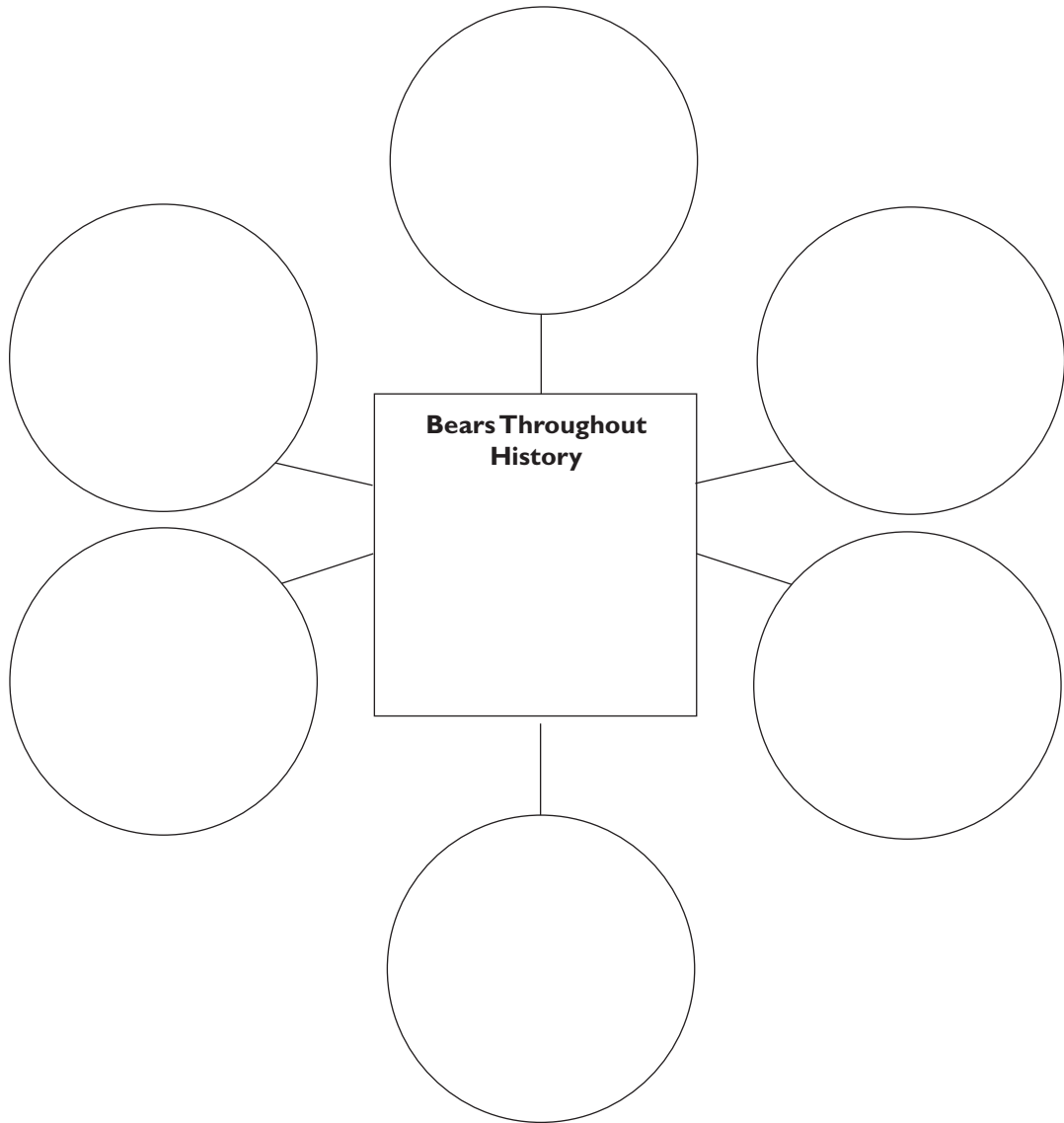
The Salmon Bears



**Word Cluster**

**Bears Throughout History**

Write about your topic in the circles.



### The Incredible Journey

Answer the following questions using full sentences.

1. Describe what role you played in this simulation.

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2. What are your thoughts and feelings about this activity?

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3. In this simulation, many fish died from a variety of causes. Tally up how many “fish” died from the following hazards:

Turbine	Predator	Fished by Humans

4. Looking at the chart above, where were the losses greatest? Least?

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5. Infer what would happen if **all** of the eggs deposited made their journey successfully (i.e., the fish made it to the open ocean and then back again to the spawning grounds)?

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6. What seemed realistic about this simulation? What did not?

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**Salmon Life Cycle**

Species: \_\_\_\_\_

	egg	alevin	fry	parr	smolt	adult	spawning adult
physical description							
habitat							
time spent at this stage							
diet							
dangers/ threats							
sketch a picture of a salmon at this stage							

**Planning Sheet: Building a Den**

Why do bears build a den?	
When do bears build their dens?	
Where do bears build their dens?	
Fascinating facts about dens:	
Possible materials to use in my model:	
Design plan for your den model:	

The Salmon Bears

## Salmon Farming

### A History of Salmon Farming in BC

Salmon farming in BC began in the early 1970s, mostly by small operators in coastal areas around Vancouver Island. But because the tidal flow wasn't ideal, waste products from the salmon built up quickly. The netcages had to be relocated, but this cost a lot of money for the fish farmers. Many of them had to sell their farms. Large multinational corporations purchased a number of these farms.

By the middle of the 1980s, people were starting to worry about the environmental consequences of the rising number of salmon farms. First Nations people worried: were their traditional lands and fishing grounds at risk? Fishermen worried: were they going to lose their jobs because everyone would start eating farmed salmon? Environmentalists worried: were the salmon farms polluting the water and destroying wild fish?

In 2008, in response to these concerns, the Canadian and BC governments decided to place a moratorium on the growth of fish farms. That meant no more farms could be created. The moratorium remains today in northern BC, but southern BC is open for new farm applications. Even though there aren't many new fish farms, the farms that were in operation before the moratorium are producing almost double what they were before. And big companies are pressuring the Provincial and Federal Governments to support large-scale expansions. This would allow major expansion of netcages along BC's pristine northern coast.

### The Risks of Salmon Farming

Expanding the salmon farms will provide people with more fish to eat. But it will also make some problems worse. Farmed salmon often catch diseases since they live in such crowded conditions. These diseases, such as sea lice, can be passed along to nearby wild fish. Sometimes they're bad enough to kill other species. Often the farmed fish require antibiotics and other drugs to prevent them from getting sick—but traces of these drugs could be passed along to the people who eat the fish or lead to drug resistance in the environment.

Problems also happen when the netcages break open. This happens through accidents, during ocean storms, or when a large seal or whale goes after the fish inside. When the farmed fish get out, they can transfer diseases to wild fish, or even compete with them for food and habitat.

Waste from fish farms passes through the netcages, and it suffocates life on the ocean floor. These wastes also drift through the marine environment, possibly contaminating shellfish beds and other habitats. Disease spreads along the food chain.

Salmon farmers have killed seals, whales, sea lions and seabirds, and animals can also get injured when they get entangled in nets. Orcas that used certain areas for decades moved away when the fish farms moved in.

**Is There A Better Way?**

Fish farming causes a lot of problems. One really good solution is for fish farms to start using closed containment systems. If the salmon are raised inside closed pens, there's no risk of them escaping. No risk of passing diseases along to wild fish. No more concentrated fish poop wrecking the ocean floor. No more farmed fish entering the ecosystem and competing with wild fish for food—or even worse, breeding with them and weakening wild fish stocks if the Pacific salmon are farmed.

It's up to government to make laws forcing industry to change its ways. Will it happen?

*Adapted from David Suzuki Foundation materials with assistance from Jay Ritchlin, Director Marine Conservation.*

**Salmon Farming: Q&A**

Read **Salmon Farming**. Working on your own or with a partner, answer the following questions.

1. What problem did B.C.'s first salmon farmers face?

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2. Explain how the salmon farms fell into the hands of large corporations.

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3. For what reasons were people initially concerned about salmon farming?

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4. What will happen if the government lifts the moratorium on new fish farms?

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5. List and explain three major problems with fish farming using netcages.

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6. How does fish farming negatively impact marine mammals?

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7. Explain one proposed solution to netcage fish farming that will better protect other fish and mammals from the risks of salmon farming.

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8. As you see it, what risks do salmon farms pose to bears in the Great Bear Rainforest? Support your answer with evidence from the passage.

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### Salmon Farming: Q&A—ANSWER KEY

1. What problem did BC's first salmon farmers face?  
*Waste products built up quickly due to inadequate flushing by the tides.*
2. Explain how the salmon farms fell into the hands of large corporations.  
*Small-scale salmon farmers couldn't afford to pay the costs to relocate their netcages, so they were forced to sell to large businesses.*
3. For what reasons were people initially concerned about salmon farming?  
*First Nations were concerned about the impact to their traditional land and fishing grounds. Traditional fishermen were concerned that the salmon farms would put them out of work. Environmentalists were concerned about the damage the fish farms were making to the environment.*
4. What will happen if the government lifts the moratorium on new fish farms?  
*More fish farms will sprout up and the damage to the environment will be much more pronounced. More farmed fish = more waste, more disease and more invasion of natural habitat in the event of cage breakdown.*
5. List and explain three major problems with fish farming using netcages.  
*Diseases such as sea lice are passed on to native stocks; fish farm waste suffocates organisms on the ocean floor; marine mammals get entangled in nets.*
6. How does fish farming negatively impact marine mammals?  
*Mammals get caught in the nets and drown; salmon farmers shoot off guns and other loud equipment to scare away the whales, but this in turn interferes with their ability to communicate underwater.*
7. Explain one proposed solution to netcage fish farming that will better protect other fish and mammals from the risks of salmon farming.  
*Closed containment systems prevent fish from escaping into the wild, trap waste products and reduce the risk of disease.*
8. As you see it, what risks do salmon farms pose to bears in the Great Bear Rainforest? Support your answer with evidence from the passage.  
*If farmed salmon escape, they can pass diseases to wild salmon stocks. This weakens the wild salmon. They might not survive to make it back to the estuaries for spawning, which would decrease the amount of food the bears have to survive. Also, cross-breeding between farmed and wild species could weaken existing wild stocks.*



**Glossary**

<b>anadromous</b>	migrating from salt water to spawn in fresh water
<b>biomass</b>	the amount of living matter in a given habitat
<b>bog</b>	a type of wetland characterized by deposits of dead, decaying biomass
<b>consumer</b>	in a food web, the organism that eats the producer
<b>ecosystem</b>	a system formed by the interaction of a community of organisms with their environment
<b>food chain</b>	a series of organisms that are related by what they eat
<b>hibernate</b>	a period of inactivity for an organism during the winter season
<b>migrate</b>	to pass from one region to another; occurs during certain seasons
<b>organism</b>	any living thing
<b>precipitation</b>	all forms of water falling from the atmosphere, including rain, snow, mist, hail and sleet
<b>primary consumer</b>	in a food chain, the organism that eats the producer
<b>producer</b>	any organism that makes its own food by using the sun's energy through photosynthesis
<b>secondary consumer</b>	in a food chain, the organism that eats the primary consumer
<b>semelparity</b>	when an organism produces offspring only once in its lifetime
<b>spawn</b>	the mass of eggs deposited by some organisms, such as salmon
<b>temperate rainforest</b>	a coniferous or broadleaf forest with mild temperatures that receives 2500 mm or more precipitation annually
<b>tertiary consumer</b>	in a food chain, the organism that eats the secondary consumer

## Further Resources

### Fiction Titles

- Craigian, Charlie and the Sechelt Nation. *Mayuk the Grizzly Bear: A Legend of the Sechelt People*  
Hobbs, Will. *Beardance*  
— *Bearstone*  
Hunter, Erin. *Seekers* (series)  
Lewis, Margaret Anne. *Sleeping Bear: The Legend*  
Mikaelsen, Ben. *Touching Spirit Bear* (upper grades)  
Taylor, Harriet Peck. *When Bear Stole the Chinook*  
Wilson, Karma and Jane Chapman. *Bear Snores On*

### Nonfiction Titles

- Green, Jen. *Bears* (Amazing Animal Hunters)  
Howse, Jennifer. *Spirit Bears* (Canadian Animals)  
Lukas, Catherine. *Bears* (Amazing Animals)  
Markle, Sandra. *Grizzly Bears* (Animal Predators)  
McAllister, Ian. *Last Wild Wolves: Ghosts of the Rainforest*  
McAllister, Ian, Karen McAllister and Cameron Young. *The Great Bear Rainforest: Canada's Forgotten Coast*  
McAllister, Ian and Nicholas Read. *The Sea Wolves: Living Wild in the Great Bear Rainforest*  
Patent, Dorothy Hinshaw and Deborah J. Milton. *Garden of the Spirit Bear: Life in the Great Northern Rainforest*  
Rockwell, David. *Giving Voice to Bear* (teacher resource)  
Russell, Charles. *Spirit Bear: Encounters with the White Bear of the Western Rainforest*  
Russell, Charles. *Grizzly Heart* (teacher resource)  
Sheldon, Ian and Tamara Harston. *Animal Tracks of British Columbia*  
Swanson, Diane. *Spirit Bears* (Welcome to the World)  
Swinburne, Stephen R. *Black Bear: North America's Bear*  
Tagliafaro, Linda. *Bears and Their Dens* (Animal Homes)  
Tessier, Tess. *White Spirit Bear*

### Films

- BBC. *Nature's Great Events: Salmon Run* (documentary)  
Cole, Nigel. *Nature: Bears* (documentary)  
National Geographic. *Last Stand of the Great Bear* (documentary)  
— *Bear Island* (documentary)  
Pacific Wild videos at <http://pacificwild.org/site/our-work/resources/the-trophy-hunt.html>

(Note: appropriate for upper grades; we recommend teachers preview the trophy hunt video)