Science Unit: *Pacific Salmon and Mountain Pine Beetle*
Lesson 4: *Forest Ecology*

School year:	2007/2008
Developed for:	Irwin Park Elementary School, West Vancouver School District
Developed by:	Erika Eliason (scientist), Jenny Murdie and Wendy Newport (teachers)
Grade level:	Presented to grade 2; appropriate for grades 1 – 4 with age appropriate modifications.
Duration of lesson:	1 hour and 20 minutes

Objectives

1. To learn about different plants and animals in British Columbia
2. To explore how ecosystems work and how plants and animals interact
3. To classify animals as carnivores, omnivores or herbivores and discover food webs and food chains

Background Information

Pacific salmon are an important part of the ecosystem in British Columbia. They form a key part of the food web (they are predators of insects and small fish and are also prey for larger animals like bears and eagles). When fish spawn and die, their bodies decompose and provide nutrients to scavenging animals and plants. Fish need trees to provide shade over the water to keep the water cool and to hold the soil in place in order to prevent erosion so the rivers don't get too silty. In this lesson, the students will learn how plants and animals interact with each other to form food webs and food chains. If you remove just a few plants or animals from the food web, the whole ecosystem can fall apart.

Vocabulary

carnivore:	Eats other animals
omnivore:	Eats both animals and plants
herbivore:	Eats plants
food chain:	A linear feeding relationship between a series of plants and animals
food web:	The feeding relationship between many different plants and animals
invasive species:	A species that is now living in BC that is not originally from BC

Materials

- pelts
- skulls
- different stuffed animals (see below for complete list)
- signs for carnivore, herbivore and omnivore
- brown paper bags
- blindfolds (optional)
- forest objects (e.g. leaves, moss, lichen, berries, mushrooms, pine cones, moss, feathers, dandelions, needles, tree bark, branches etc)
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In the Classroom

Introductory Discussion

1. Short description of 'hook' to capture student's attention.
    - Introduce concept of Forest Ecology. How are fish an important part of the forest ecosystem? What do they eat? What eats them? What happens when they die? What role do trees play?
    - What is a food web? What is a food chain?
2. Briefly describe science experiment/activity.
    - The students will be divided into 2 groups. One group will explore different forest objects and the other will examine different animals found in British Columbia. Then the groups will switch.

Forest Ecology Activity #1

Activity Title: Forest Animals

Purpose of Activity:

- To examine some of the animals living in British Columbia
- To classify the animals as carnivores, herbivores or omnivores

Methods and Instructions:

Set-up prior to experiment:

- Borrow a variety of pelts and skulls and stuffed animals from a local university. I borrowed my specimens from the University of British Columbia Department of Zoology Cowan Vertebrate Museum (http://www.zoology.ubc.ca/~vertmus/). Please note that renovations are occurring at UBC and soon a new Beaty Biodiversity Museum will open (scheduled for 2009) that will house all the different biological collections (http://www.beatymuseum.ubc.ca/).
- Label 3 pieces of paper with carnivore, herbivore and omnivore.

1. Gather the students around a table. Have all the specimens out of sight in a box (see below for the list of specimens that I used).
2. Discuss the difference between carnivores (meat-eater), herbivores (plant-eater) and omnivores (eats plants and animals). Tell the students that you've brought a bunch of specimens and together you will classify them as carnivores, herbivores or omnivores.
3. Bring out each animal. If appropriate, allow the students to touch the specimen and pass it around. Make observations.
4. Have the students guess what the animals is, where it lives, what it does and what it eats (and what eats it!). Look at the size and shape of the teeth and other anatomical differences to help you guess.
5. Classify each animal as a carnivore, herbivore or omnivore and place them in a group under each sign.
6. The attached hand-out can be used as a follow-up or at the end of the lesson.

Forest Ecology Activity #2

Activity Title: Forest Plants

Purpose of Activity:

- To examine some of the plants living in British Columbia

Methods and Instructions:

Set-up prior to experiment:

- Go out into the local forest (e.g. UBC research forest) and collect a variety of plant items. Purchase some mushrooms and berries from a local grocery store.
- Put the items in brown paper bags (1 item per bag).

1. Gather the students around a table or carpet. The students will work in teams. The first student will be blindfolded (or close their eyes) and will **describe** the forest object that they feel with their hand to their partner. The partner tries to guess what the blindfolded student is describing. They then look into the bag together to see if they were correct. The students can then switch.
2. Alternatively, the teacher can have all the students sit in a circle and pass a bag around the circle so all the students can feel what is inside. They can describe it what it **feels** like, **smell**s like (and when they take it out of the bag) **looks** like.
3. Once all the items have been identified, take the items out of the bag and put them on the table. Discuss the items with the students. What does each item do? Why are they important?
4. Other items to discuss:
    a. Mushrooms and berries in the forest may be poisonous and students should never eat them.
    b. Not all the things we find in our forests are actually from British Columbia. Two widespread examples of invasive species are English Holly and English Ivy.
    c. Lichen is an important part of the Forest Ecosystem. It is food for animals, a source of water and a soil stabilizer. Lichen is very sensitive to pollution, therefore it can act as a pollution indicator. If you enter a forest in British Columbia and there is no lichen, there has probably been a pollution problem in that area.

Closure Discussion

1. What did you learn today?
2. What do carnivores, omnivores and herbivores eat?
3. Why are plants important?

References

1. Freeman, Scott. 2005. Biological Science. Pearson Prentice Hall.

Extension of Lesson Plan

1. Classroom Food Web: Use the objects you examined in this lesson to make a giant British Columbia Food web

    - Tape a cue card with a forest animal or plant (discussed in your lesson) to each student.
    - Each student should try and guess what they are (carnivore, omnivore, herbivore or plant) and how they might fit in the food web.
    - The students will pass a ball of yarn or string around and make a web based on who eats whom (e.g. sun → cedar tree → mouse → owl → insect → Douglas fir tree → sun → pine tree → squirrel etc). You can make a series of webs with different coloured string, or just use one string to go up and down the food chain in one continuous web. Note that this process can be quite organic, the same student can receive the string several times over etc.
    - Once the web is complete, have all the herbivores drop the rope (or all the plants or whatever) and see what happens to the web.

List of Animals

- Bear = omnivore = salmon, fish, small mammals, insects, berries, roots, mushrooms, sprouts
- Beaver = herbivore = water lily, trees (especially birch, poplar, willow), berries
- Belted kingfisher = carnivore = fish, frogs, aquatic insects
- Big brown bat = carnivore = insects, especially beetles
- Deer mouse = herbivore = seeds and fruit
- Flying squirrel = omnivore = plants, seeds, nuts, berries, mushrooms, bird eggs, insects
- Mink = carnivore = fish, crabs, frogs, rabbits, rats, mice, birds, muskrats
- Northern saw-wheat owl = carnivore = mice, shrews, insects, other birds
- Porcupine = herbivore = bark, branches, leaves, green plants, grass, berries, seeds, nuts, flowers
- Red-shafted flicker (woodpecker) = omnivore = grasshoppers, crickets, termites, wasps, beetles and their larvae, caterpillars, spiders, ants, fruit seeds including cherries, dogwood berries, poison ivy, sunflower seeds and nuts
- Red-tailed hawk = carnivore = crows, owls, small mammals, bats, shrews, snakes, lizards, insects, fish
- Shrew = carnivore = spiders, insects, moths, butterflies, beetles

Scientist Name:_____

Food Chain: Draw an arrow to show how the food chain is connected.
Label each picture as: **sun, plant, carnivore or herbivore**

(or replace these words with pictures that you find from the internet)

Owl

Mouse

Tree (seeds)

Sun

Scientist Name:_____

Food Web: Draw lines to show how the food web is connected

(or replace these words with pictures that you find from the internet)

mouse **salmon**

owl

beetle **mushroom**

SUN

bear **woodpecker**

beaver

spider **berry**

tree

grass