

"The Amazing Diversity of BC's Forests"

National Forest Week 2006

Outline:

- **Intro**

- What is a Forest?
- Mystery Bag
- Intro BEC map

- **Four Forest Types:**

Dry, Pine, Wet and High Elevation

- climate/geography → weather/elevation/fire
- biology → tree species /adaptations, animal species/adaptations
- mini-review

- **Conclusion:** Summary should emphasize the fact that climate + geography determine the biology of the forest. Similar climate and geography mean similar biology.

Materials List:

- ◆ **Lesson Plan-** 5 pages
- ◆ **Overheads-** 5 total
 - Dry (#1), Pine (#2), Wet (#3) and High Elevation (#4) Forests &
 - Boreal Forest in Canada (#5)
- ◆ **Pictures or samples:**
 - Douglas fir or Ponderosa pine cookies or cross-sections (fire protection- thick bark)
 - Lodgepole pine and spruce cones (serotinus/non-serotinus)
 - Lodgepole pine and Western redcedar (cookies or cross-sections) to compare size and age
- ◆ **Forest Mystery Bag:** Make up your own bag with several items. See suggested list on page 1 of lesson plan.
- ◆ **"Amazing Diversity of BC's Forests" poster** for wall display

- ◆ **Forest Types Backgrounds (4) and Forest Types Pictures- (16)**
(Optional for lesson- can use overheads only, if preferred)

- ◆ **Research Activity**

- Website Research Activity Table- blank and answer key

Possible PLO's Related to NFW Lesson

Kindergarten

- describe features of local plants and animals (colour, shape, size, texture)
- compare local plants
- compare common animals

Grade 1

- classify objects events and organisms
- classify living and non-living things
- describe the basic needs of local plants and animals (e.g. food, water, light)
- describe how the basic needs of plants and animals are met in their environment

Grade 2

- describe ways in which animals are important to other living things and the environment
- explain why air, water, and soil are important for living things

Grade 3

- compare familiar plants according to similarities and differences in appearance and life cycles
- describe ways in which plants are important to other living things and the environment

Grade 4

- compare the structures and behaviors of local animals and plants in different habitats and communities
- analyze simple food chains
- analyze impacts of weather on living and non-living things

Grade 5

- *analyze how BC's living and non-living resources are used*
- *describe potential environmental impacts of using BC's living and non-living resources*

Grade 6

- analyze how different organisms adapt to their environments

Grade 7

- analyze the roles of organisms as part of interconnected food webs, populations, communities, and ecosystems
- assess the requirements for sustaining healthy local ecosystems
- *evaluate human impacts on local ecosystems*

Part I- Introduction: What is a Forest? (10 min.)

- We have a lot of different forests in BC. Today we will look at some of them and learn why they are different.
- What is the first thing you think of when you hear the word "forest"? (trees)

Mystery Bag: (Make up a small bag with a few forest samples for activity.)

- My bag holds samples of some of the things that make up a forest. What do you think I might have in here? (As students name things, pull them from the bag.... soil, moss, lichen, plant, rock, bug, tree branch, decomposing wood...)
- Are there other things that a forest needs that I don't have in my bag? What must plants in your garden have in order to grow? (water, air, sunlight, space)
- A forest is made up of living (biotic) and non-living (abiotic) things that depend on each other to survive.

Show Biogeoclimatic Map of BC (BEC Map):

- What does a map tell us? (take a few answers) Point out where we live.
- This is a special map of B.C. Why do you think there are so many colors? (all the colours, except for two (tundra and bunchgrass), represent a different type of forest.) Why do you think we have so many different types of forests? Can you think of any reasons? Factors like weather, the shape of the land, different soils, elevation → different plants growing in certain areas.
- We have different weather conditions as a result of the type of landforms, such as mountains and valleys. Most of our weather comes from the Pacific Ocean to the west of BC. When clouds pass over the Pacific, they pick up moisture, move across the land and bump into the Coastal Mts. The clouds must lose their moisture to rise up and go over the mountains. Then as they pass over to the other side, they have less moisture, so the area is drier.
 - **Optional:** You can use students to represent the mountains and clouds, with the 'clouds' walking to cross the ocean, moving lower as they become heavy with moisture, then dropping the moisture near the 'mountains' before passing up and over to reach the lower elevations beyond the mountain range.
- This map is a "**bio-geo-climatic**" map. "**Bio**" stands for things that grow, "**geo**" is the landforms, and "**climatic**" is the weather. Different plants or trees prefer different growing conditions. For example, some plants grow best in wet areas, some in dry areas and some up high in the mountains, where it is cooler. This

map tells foresters what the forest type is in a certain area. They can use this information to plan how and when to harvest or cut down the trees, what tree species should be planted afterwards, what wildlife could be found in an area so they can plan how to protect it, etc.

Part II- Looking at Four Forest Types* (20 min.)

(*For this lesson, forest types in the south/central interior of BC have been grouped or renamed – the Dry Forest is "PP/IDF" on the BEC map, the Wet Forest is "Interior Cedar Hemlock", the Pine Forest is "MS/SBPS" & the High Elevation Forest-"ESSF".)

- Today we'll talk about **Coniferous** trees (trees with cones and needles; "cone" is the root word). ...Conifers are the most common trees found in BC.
- When we look at the different forest types, think about four things: **temperature/ rainfall/ soil/ plants and animals.**

A. Dry Forest: Geography & Climate

- **Show top of overhead #1**: This is a Dry Forest. What do you see? (little undergrowth, trees are spaced out...)
- Is it easy for things to grow here? Why? (lack of water, hot temperatures)
- What does "growing season" mean? Explain the effects of sunlight, water, temperature, elevation (height above sea level).
- **BEC Map**: point to the area where Dry Forests are located. (Southern Interior- light and dark orange)

Dry Forest: Biology

- **Show the bottom left of overhead #1**...the dominant (main) species are Ponderosa pine and Douglas fir
- One way that our bodies help to keep us from getting too hot is that we perspire. We are able to "adapt" to the weather conditions.
- One way trees have "adapted" to the hot weather and dry conditions is with their roots. How could they get water when there is very little rain? (They grow long roots. Douglas fir & especially Ponderosa pine trees have the unique ability to grow their roots deep into the ground because they have adapted to grow under dry soil conditions.)
- Dry forests have fires- every 5-20 years. **Show the picture of the tree wedges.** How has the Ponderosa pine/Douglas fir tree adapted to fire? (has thick bark)
- **Show the bottom right of overhead #1**... Bull snakes are common in a dry forest. Why? (warmth, areas to burrow into, lots of food)
- What do you think the bull snake will eat? (insects, rodents, birds' eggs...)

OPTIONAL- If using forest background & pictures, then continue with Mini-Review

Mini-Review: (place the pictures onto the Dry Forest background)

- What tree types do you find in the Dry Forest? (Ponderosa pine, Douglas fir)
- What reptile might live in the Dry Forest? (bull snake)
- What takes place every 5- 20 years in this type of forest? (fire)
- Here is another animal that likes Dry Forests...What is it? (deer)

B. Pine Forest: Geography & Climate

- **Show the top of overhead #2:** What do you see? How is it different from the Dry Forest? (more trees, closer together, taller...)
- The Pine Forest is usually found at a higher elevation than the Dry Forest. Do you think the summers will be longer or shorter? (shorter) What about the winters? (longer, colder, wetter)
- The dominant (main) tree is the Lodgepole pine. Does anyone know what has been attacking large numbers of these trees in BC? (mountain pine beetles)
- **BEC Map:** show where the Pine Forests are. (mainly in BC's central interior-turquoise blue and dark pink)

B. Pine Forest: Biology

- **Show bottom left of overhead #2:** Lodgepole pine cones have tight scales compared to the cones of some trees. **Show samples or picture of the pine and spruce cones** to show the difference between the scales.
- Has anyone ever made popcorn? The heat puffs up the corn and turns the kernels into popcorn. Cones from the Lodgepole pine need heat such as fire to open the scales and release their seeds.
- Fires occur in Pine Forests every 100-150 years and can be high intensity (very hot). Remember that Ponderosa pines have thick bark to protect themselves from fire. The Lodgepole pines have thin bark that will not protect them from fire, but many new seedlings will grow because the cones need heat to open. The trees in these pine forests will grow close together as a result of the many seeds that are released from the cones all at once.
- **Show bottom right of overhead #2:** Mountain pine beetles depend on Lodgepole pine trees. Have you heard about this type of insect? What can you tell me about the MPB? (they leave behind a blue stain, create tunnels or galleries, are killing huge areas of Lodgepole pine, are the size of a grain of rice)
 - **Optional:** Students can research additional information about MPB at www.beetleinfo.com

OPTIONAL- If using forest background & pictures, then continue with Mini-Review

Mini-Review: (place pictures onto Pine Forest background)

- What trees are found in the Pine Forest? (Lodgepole pine)
- What pest likes these pine trees? (Mountain pine beetle)
- How often does fire go through this forest type? (100-150 years)
- Here is another animal that might live in the Pine Forest. What is it? (moose)

C. Wet Forest: Geography & Climate

- **Show the top of overhead #3:** We are going to talk about Wet Forests. Looking at the picture, what do you see? What is different from the other forest types? (lots of undergrowth, bigger trees...)

- The Interior Wet Forest is cool and moist (damp). The weather is mild (not too hot or too cold.) The "**understory**" plants (plants growing under the tree canopy) enjoy the shade and moisture.
- **BEC Map**: Show the area on the map and point out that it is near the Rocky Mt. range. (yellow green). Remind students that the clouds will drop their moisture as they go over the mountains.
- What do you think the weather will be like here in the winter? (lots of snow because the winters are cool) In the summer? (short dry spells)
- Why are there more plants and larger trees in this forest type? (more moisture, long growing season, moist soil)
- Do you think fires happen here as often as in the Dry and Pine Forests? Why? (No, because it is much wetter.) Fires occur every 150-200 years.

Wet Forest: Biology

- **Show the bottom left of overhead #3**: Trees in the Wet Forest like the moist conditions and need lots of water to survive. The Western redcedar is the dominant species here and is the provincial tree for BC.
- Let's talk about how trees in this forest "adapt" to the wet weather. Cedars have very flexible branches that easily bend (rather than break) when there is lots of water or snow.
- **Show samples or picture of the cedar and pine cross-sections**. Which tree do you think is the oldest? Bigger trees are not always older. Show spaces between growth rings. (wider spaces= more growth, less stress, better growing conditions)
- **Show the bottom right of overhead #3**: Salamander. What do you think salamanders need to survive? (wet, shady, cool, moist conditions)

OPTIONAL- If using forest background & pictures, then continue with Mini-Review

Mini-Review: (place pictures onto Wet Forest background)

- What tree species is found in the Wet Forest? (Western redcedar)
- What is one small creature that likes the wet conditions here? (Salamander)
- Here is a large animal that might live in this forest. What is it? (bear)
- What juicy plants grow here for bears to eat? (berries)

D. High Elevation Forest: Geography & Climate

- **Show top of overhead #4**: This type of forest is found near the tops of ski hills. What do you notice about this picture? (trees are in groups, don't cover the area) Why do you think the trees grow in groups or bunches? (trees grow in the areas where heavy snowfall can build up to protect them from harsh winter conditions, they grow where there is water, some areas may be affected by avalanches).
- There are very few trees at the top of the mountain. Why? (short summer, long/cold winter, tougher growing conditions/ lack of soil)
- Fires occur every 200-300 years here. Why? (wet, cool temperatures)

- **BEC Map:** Show the areas of High Elevation (dark purple)

High Elevation Forest: Biology

- **Show bottom left of overhead #4:** Engelmann spruce is the dominant (main) tree species. Look at the shape of this tree. What does it look like? How would this shape help these trees survive in the winter? (narrow crown, short needles and branches slope down, helping to keep the snow off of the tree)
- **Show the bottom right of overhead #4:** Mountain Caribou. Have you heard of mountain caribou? They have “adapted” to living at high elevations. They like the winter's deep snow because it helps them to reach the lichen on the higher branches. They also like to travel high up the mountains to escape their enemies.
- Do you know why they can walk easily on the snow? They have wide hooves that act like snow shoes.

OPTIONAL- If using forest background & pictures, then continue with Mini-Review

Mini-Review: (place pictures onto High Elevation background)

- What trees are found in High Elevation Forests? (Engelmann spruce)
- What animal did we mention that lives in this forest type? (mountain caribou)
- What does the mountain caribou like to eat from the trees? (Lichen)
- Alpine flowers such as these ones are often found in the high elevation forests. (Picture of fireweed.)

Part III- Summary (10 min.)

- We have talked about **Dry, Pine, Wet and High Elevation Forests**. Which forest is most like the area we live in?
- We looked at a special map of BC used by foresters showing **Biogeoclimatic Zones**. This means we looked at what three things? Remember we broke this term into three small words: "**Bio**", "**Geo**" and "**Climatic**". (Living things or plants & animals, landforms and weather)
- The **BEC map** shows twelve different forests in BC. We talked about four types. BC has many different kinds of forests because we have a variety of weather and landforms across our province.
- There is another type of forest in northern BC that goes all the way across Canada. It is the **Boreal Forest**. The Boreal Forest is very common across much of Canada because the landscape and weather conditions are similar there.
 - **Optional:** You may choose to have your students research to find out more information about the Boreal Forest. Some research sources: 1) Info and links in the Canadian Forestry Association's teaching booklet, "**The Boreal Forest- A Global Legacy**" (2005). If it is not available in your school library, go to www.canadianforestry.com ("Teaching Kits"- Volume #7). 2) www.borealforest.org . 3) "Cool Woods- A Trip Around the World's Boreal Forest" by Jane Drake is a good resource book with wonderful illustrations and info about the world's boreal forests.

- **Show overhead #5. (Boreal Forest in Canada)** The Boreal forest is the main forest type in Canada. It goes all the way across Canada and stretches right around the northern parts of the world.
 - **Optional:** The above link- "**Volume #7- The Boreal Forest-A Global Legacy**" **page 4** has a good black and white illustration of the global boreal.
- All forest types are determined by weather and landscape. Where there is a forest type, such as the Boreal Forest or some of the other forest types we have talked about, the weather and landforms will be similar and the plant and tree species in that region will be similar as well.