wildsight – Teacher Backgrounder
Old Growth Forests

What is an ecosystem?

An **ecosystem** consists of all living things (animals, plants, fungi, bacteria, and other microorganisms) that interact with each other and the environment in which they live (air, water, and soil).

- Ecosystems can range from tiny to large: a drop of pond water, rotting log, river, patch of old growth forest, and a range of mountains can all be considered ecosystems. Small ones can fit inside larger ones, and boundaries tend to overlap with neighbouring ecosystems. e.g.- a rotting log can be found in a cottonwood forest which is growing there because there is a river next to it.
- Resource managers are moving away from managing landscapes for only one or two species (e.g.- creating lots of browse for deer and moose after logging), to addressing the needs of the broader ecosystem (e.g.- making sure there is habitat available for most wild creatures in an area).
- To aid in research, management and communication of ecosystems in B.C. a biogeoclimatic (BGC) ecosystem classification system has been developed. The system uses climate, soil, vegetation to group ecosystems at regional and local levels. Fourteen large ecological zones are recognized in B.C. In the Columbia Basin the following BGC's are represented: Interior Cedar Hemlock, Interior Douglas-fir, Ponderosa Pine, Montane Spruce, Engelmann Spruce-Subalpine Fir and Alpine Tundra.
- Ecosystems are constantly changing affected by natural disturbances such as fire, insect attack, windstorms, landslides or logging. Disturbance can return an ecosystem to its beginning. Succession involves changes in plants, animals and conditions as the new ecosystem develops from infancy to mature and old age.

Old Growth Forest Ecosystem

a.k.a climax forest, ancient forest, over mature forest, decadent

For an **old growth forest** to grow, nature must be able to take its course for a very long time without being disturbed much by people. Old growth forests are climax communities where there is a combination of very old*, large trees (veterans), both live and dead, as well as immature (< 80 years) and mature (80-120 years) trees growing among them.

> * "Old" means the dominant trees in the forest live longer than the average life span for those trees, generally > 120-250+ years, depending on the species.

- Compared with British Columbia's coast, where about 55% of the forests are over the age of 250 years, only about 6% of the forests in the interior are old growth. This is because, generally, there are more wildfires in the interior, and extensive harvesting of old growth occurred during the early part of the 1900s.
- Old growth forests are some of the world's great carbon storage reservoirs buffering the planet against global warming. They provide critical wildlife habitat, are home to specialist organisms such as mycorrhizal fungi, store and filter water and are increasingly valuable public recreation and wilderness tourism destinations.

- BC has the world's only temperate inland rainforest, all of which is found in the Columbia Mountains, Interior Cedar-Hemlock biogeoclimatic zone.
- The total amount of living matter (biomass) in an old growth temperate rainforest is three to eight times as great as the biomass of a tropical rainforest.
- In B.C. the survival of 77 animal species is closely associated or depends on availability of critical old growth forest habitat.

Where to find old growth forests in the Columbia Basin?

Old growth forests are typically found in small pockets scattered throughout the east and west Kootenays.

Indicators of Healthy Old Growth

A forest can be considered old growth when it contains old growth characteristics (see below), and is home to plants and animals that have adaptations to living in that environment, e.g.- Mountain Caribou (Columbia Mountains area), Martens, Pileated Woodpeckers, nurse logs and stumps.

I: Old Growth Characteristics

Are there:

- Big, old, living trees mixed with young and middle-aged ones
- Many different species of trees, sizes and variation in spacing
- Large dead, dying or broken trees, often with tree cavities in them
- Rotting logs and lots of woody debris on the moist forest floor
- Uprooted trees that make for hummocky ground
- Openings or gaps in the canopy where sunlight can reach the ground and multiple canopy layers.
- Shrubs, saplings and young trees growing in these sunny gaps
- Few signs of human disturbance (e.g.- logging, clearing for farms)

II: Associated Plants and Animals

Plants	Red-stemmed Feathermoss	**Mammals**
Western Red-cedar	Prince's Pine	* Mountain Caribou
Western Hemlock	Step Moss	* Grizzly Bear
Western Larch	**Fungi and Lichens**	* Wolverine
Douglas-Fir	Common Witch's Hair	Fisher
White/Engelmann Spruce	Bracket fungi	* Northern Long-eared Bat
Western Yew	Root rot fungi	Red-backed Vole
Devil's Club	Truffles	Northern Flying Squirrel
Falsebox	Black Old Man's Beard	**Amphibians**
Twinflower	**Birds**	Long-toes Salamander
Bunchberry	Winter Wren	**Invertebrates**
Rattlesnake Plantain	Pileated Woodpecker	Carpenter Ant
One-sided wintergreen	Barred Owl	Banana Slug
Round-leaved Violet	Bald Eagle	Wood Louse
	Townsend's Warbler	Millipede

*Rarity ranked as "Blue Listed" in B.C.

III: Some Examples of Animal and Plant Adaptations

- **Mountain caribou** are adapted to surviving winter in our snowy mountains. Unlike their relatives in the north who eat ground-growing lichens, these caribou eat tree lichens like Old Man's Beard that are hanging above the snow. Snowshoe-like hooves support them on the snow so they can reach high into the trees. Since they need 5 kg of lichens every day, and because lichens grow slowly, only old growth forests have enough to support caribou through winter. The thick boughs of old growth also catch early winter snows and allow caribou to browse on nutritious shrubs like falsebox longer into the season.
- **Northern Flying Squirrels** prefer living in old growth forests. Stretching flaps of skin between their front and back feet, these squirrels actually glide from tree trunk to tree trunk. Having huge eyes to see at night in dark forests, they are tremendously agile. Their favourite foods are mushrooms and underground "mushrooms" called truffles. The spores of these important fungi are spread throughout the forest in the squirrels' droppings. Dead and decaying trees often have tree cavities in them, either from wounds or woodpecker holes, which make great squirrel apartments.
- **Martens** are secretive, tree-climbing weasels that prefer large areas of mature and old forests. They use fallen trees as runways through the forest while hunting for Northern Flying Squirrels, Red Squirrels, and other small mammals, and in winter they tunnel under the snow in the spaces provided by woody debris on the forest floor. They also den inside tree cavities.

- **Pileated Woodpeckers** are large, crow-sized birds that require nesting trees big enough for them to fit inside of. Pileateds require roomy, hollow trees to sleep inside and as hiding places from predators. They have adapted extra-large chisel-like bills for hacking into carpenter ant galleries that are inside dying and fallen trees.
- **Nurse Logs and Stumps** are nurseries for baby trees. As forest soils are covered by thick leaf litter, White Birch, Douglas-fir, and some other kinds of trees take advantage of the soft, moist conditions of rotting logs and stumps to get a jump on life. Young trees send roots down through the soft wood and into the nutrient-rich soil below. As they grow and the rotting wood slowly disappears, the roots eventually hold the trees perched above the ground.
- **Lichen** is a symbiotic relationship between a fungus and an algae colony. Lichens are among the oldest living things on earth. In the Arctic some lichens are 4,500 years old! In B.C. we have the greatest diversity of lichen in the country with 1,013 species. Lichens are important to the biodiversity of the planet since they cover 8% of the earth's land surface. Lichen help to fertilize the soil by turning nitrogen into important compounds for building proteins and DNA. In B.C. the greatest threat to lichen diversity is habitat loss. Many grow in forested areas and may need centuries of succession to become established. As many forests are logged and replaced by young forests that are intended for harvest sometime in the next century, lichens will have difficulty getting established. Many creatures in the Columbia Basin eat lichen, and some like the Mountain Caribou depend on it for their survival. Caribou prefer the hair-like fruticose lichen that hangs from the dead branches of both live and dead trees. They can eat 4.5-5.5 kg of lichen per day – in winter that can equal 95% of their entire diet!

Threats to Old Growth

- There is much less old growth forest in the Columbia Basin today than there was in the late 1800s.
- Forest fires, both those caused by lightning and by humans, have periodically reduced old stands, and so have diseases and insect outbreaks. Given enough time and space, old forests can sometimes return again to those areas.
- The greatest threat is when people replace old growth with other types of land-use. For much of the twentieth century, old growth has been logged for its big trees. Forest companies replant trees to replace the ones they cut. Their general intention, though, is to harvest them again within 100 years, long before the 200-300 years it takes for a forest to regain old growth characteristics. Forestry practices are now being modified so that some old forests are not cut, but left as is.
- Settlement of valley bottoms in pioneer days often involved the cutting and removal of old growth forests. Land was converted for farming, communities, and roads. Many of us live where there used to be old growth. Development continues to be a threat to old forests today.

References for Further Research

Exploring Old Growth Forests – A Teacher's Manual
Published by Canadian Nature Federation, 1996

Can be purchased for a small fee from: Canadian Nature Federation, 1 Nicholas Street, Suite 606, Ottawa, ON K1N 7B7; 1-800-267-4088; www.cnf.ca
A secondary teacher's guide to lessons about eastern old growth forests that could be adapted for western ecosystems.

Old Forest Ecosystem Study Unit – Lesson Plans for Teachers
By Jackie Morris. Published by Living Landscapes Program, Victoria, 1999.

Available on loan from your nearest School District Resource Centre.
A five week science study unit that can be used in the B.C. Grade 7 Science Curriculum and is Columbia Basin specific.

Ontario's Old Growth: A Learner's Handbook
By Mark Stabb. Published by Canadian Nature Federation and Ancient Forest Exploration and Research, 1996.

Can be purchased for a small fee from: Canadian Nature Federation, 1 Nicholas Street, Suite 606, Ottawa, ON K1N 7B7; 1-800-267-4088; www.cnf.ca
An excellent layperson's guidebook describing and explaining old growth characteristics. Aside from tree species listed, information is also pertinent to western forests.

Secrets of the Old Growth Forest
By David Kelly and Gary Braasch. Published by Gibbs Smith, Layton, Utah, 1988.

Available through your local library or inter-library loan.
Text and photographs describing the natural history of old growth in the Pacific Northwest.