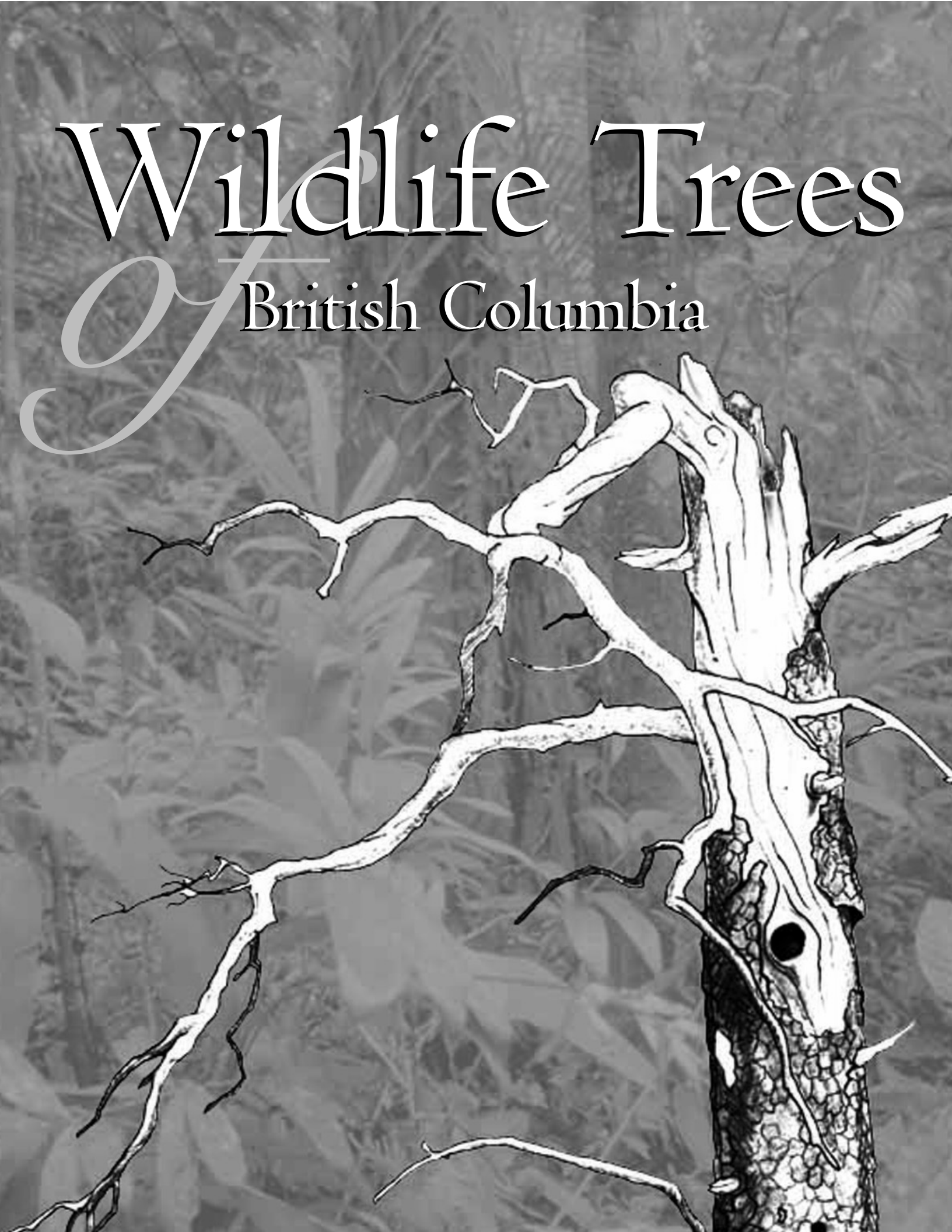
Wildlife Trees of British Columbia



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Wildlife Trees of British Columbia

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project WILD

Province of British Columbia

Ministry of Environment, Lands and Parks

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Preface

Project WILD is a supplementary, interdisciplinary, conservation, and environmental education program. The goal of Project WILD is to assist learners of all ages to develop awareness, appreciation, knowledge, and skills that will result in responsible and informed decisions and constructive action toward the earth and its inhabitants.

The *Wildlife Trees in British Columbia* book complements Project WILD and is intended to increase the awareness of wildlife trees in British Columbia. The book contains background materials and activities about wildlife trees and the species dependent on them. Funding was provided by the Canada-British Columbia Partnership Agreement on Forest Resource Development: FRDA II. At the present time in British Columbia, Project WILD receives financial support from the Ministry of Environment, Lands, and Parks through the Habitat Conservation Fund and from the Ministry of Forests.

Introduction

Welcome to *Wildlife Trees in British Columbia*. This book is a "made in British Columbia" learning resource that complements the Project WILD program. On the pages to follow, you will discover one of nature's fascinating and special habitats called wildlife trees. Wildlife trees can be either living or dead and decaying trees of any age. They are vital to the livelihood of many different kinds of wildlife in the forest. These special trees are an important part of the forest ecosystem, and contribute to British Columbia's biological diversity. The purpose of this book is to provide information and suggest activities that will increase your awareness, understanding, and knowledge of wildlife trees in our province. After all, we are endowed with a wide variety of forest types and tree species that make British Columbia such a unique place to live and learn. The background section of the book was written to be shared with children. The activity section contains lessons for various grade levels or audiences. Choose activities appropriate for your students or program. If you only have a short period of time, make sure you try out No Room At The Animal Inn or Animal Inn Who Am I? These two activities will provide an introduction to wildlife trees and the plants and animals that use them. You are encouraged to adapt or modify the activities to suit the needs of your audience. Have fun exploring and learning about the exciting world of wildlife trees!

British Columbia's Forests

British Columbia has some of the greatest and most important forests in the world. Our forests are home to a large number of different types of plants and animals. This range of species is called **biodiversity**. British Columbia's forests have more species of plants and wildlife than any other province or state in North America.

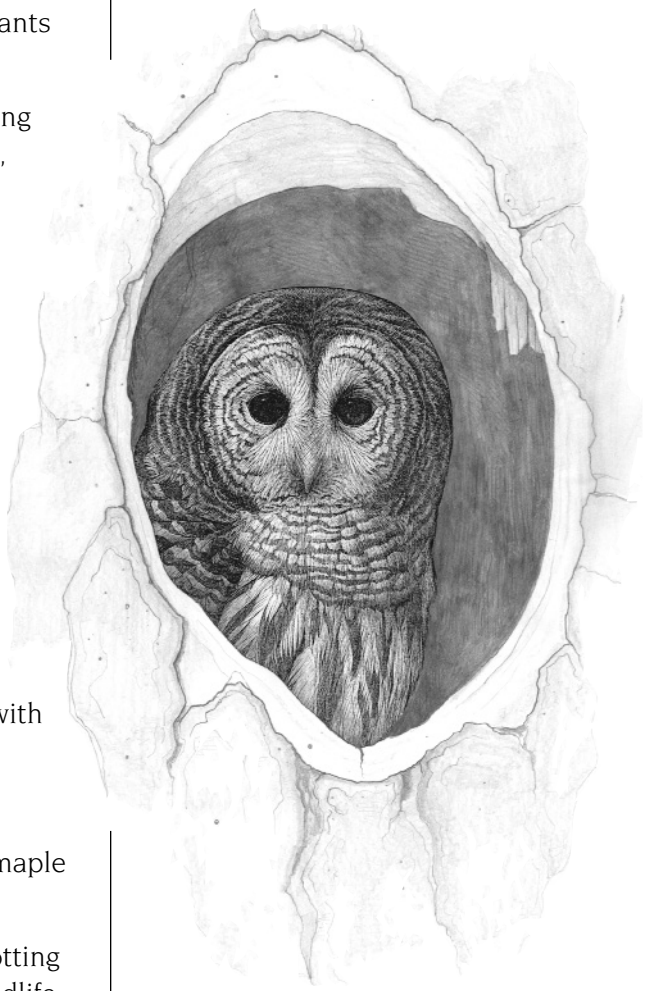
It has taken about 10,000 years for our forests to evolve into living communities of insects, birds, mammals, plants, fish, and fungi, all of which interact with each other and the nonliving environment to form what we call an **ecosystem.**

During this time, nature has evolved a forest community which consists of many different layers or webs of life. These layers include the forest floor, — damp or dry, and alive with 'creepy crawlies' — right up to the very tops of the trees, called the **canopy,** where the sunlight shining through provides the energy for the forest to grow.

Wildlife Trees: Part of the Forest Ecosystem

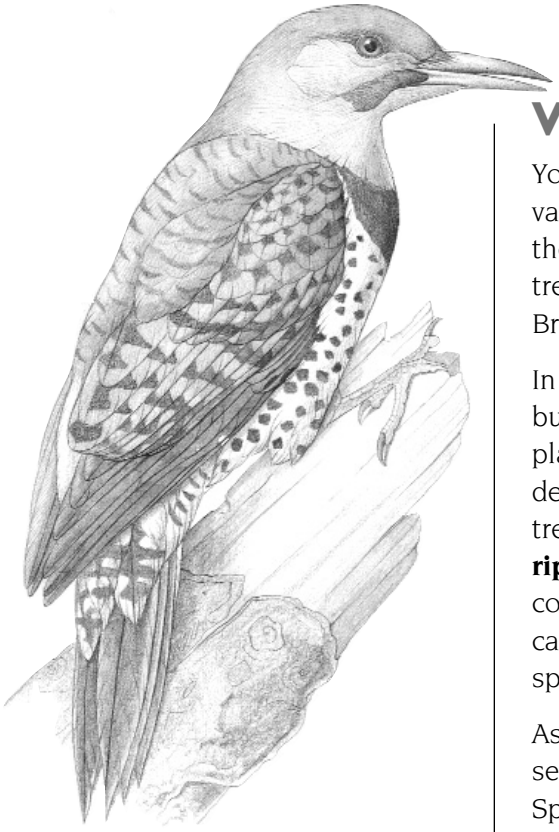
Within the forest ecosystem, there are plants at many different stages of their life cycle. Trees have a natural life cycle, starting with **germination** of a seedling through the growth of a mature tree, eventually ending with death and decay. How long this natural life cycle takes depends on the type of tree. Some species like cedar can live for more than a thousand years while others like maple may only live as long as you or me.

But from the time a tree is a seedling to the time it becomes a rotting log or woody debris on the forest floor, it provides **habitat** for wildlife in the forest. At different stages of its life, it offers food, shelter, and resting places for different species of animals and plants. Any standing dead or living tree with special characteristics that provide habitat for wildlife is called a **wildlife tree.**



Barred Owl roosting in an cavity in winter. Its familar hooted call sounds like, "Who cooks for you, who cooks for you all."

N*ote*: Words printed in **boldface** type are defined in the Glossary on p. 93.



Northern Flicker – often feeds on ground for insects and fruit.

Why are Wildlife Trees Important?

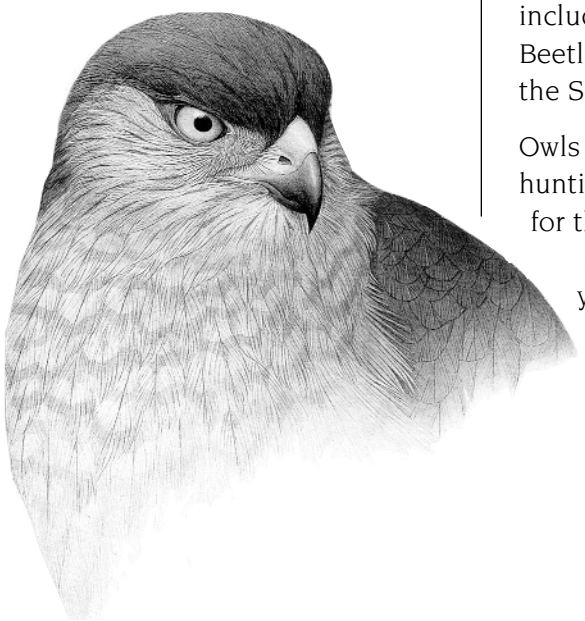
You may not think that dead or dying trees could provide anything valuable to the life of a forest. In fact, wildlife trees play a vital part in the complex webs of life that make up the forest ecosystem. Wildlife trees are important because over 90 different plants and animals in British Columbia's forests need them for habitat.

In wildlife trees, bats, bears, birds and insects find food and shelter, build their nests or dens and raise their young. Many different types of plants and animals, from the simplest **invertebrates** to the more developed mammals, from **lichens** to flowering plants, utilize wildlife trees for habitat. They are important habitat along river banks or **riparian** areas, where they provide animals with feeding, nesting, cover and perching sites. Wildlife trees that have fallen into the water can provide shade, shelter, and cover for fish and other aquatic species living in the water below.

As wildlife trees disappear, the survival of some species becomes seriously threatened. Without wildlife trees, some species, like the Spotted Owl or Keen's Long-eared Bat, could disappear from British Columbia's forests.

Wildlife trees are also an important part of the many natural life cycles in the forest ecosystem. Many birds that depend upon wildlife trees also feed on forest insects, which helps keep insect numbers under control. For example, the diet of the Three-toed Woodpecker includes Mountain Pine Beetles. Brown Creepers feed on Bark Beetles, while nuthatches and chickadees eat the eggs and grubs of the Spruce Budworm.

Owls and hawks are **predators.** They depend upon wildlife trees for hunting perches, shelter, and nesting. From these perches they scan for their next meal of small mammals, such as mice or voles, found living off the forest floor. Small mammals feed on tree seeds and young seedlings. Without the natural control of predators, insect and small mammal populations could increase dramatically and limit the growth of the forest. Wildlife trees and the various predator-prey relationships are all part of the forest ecosystem.



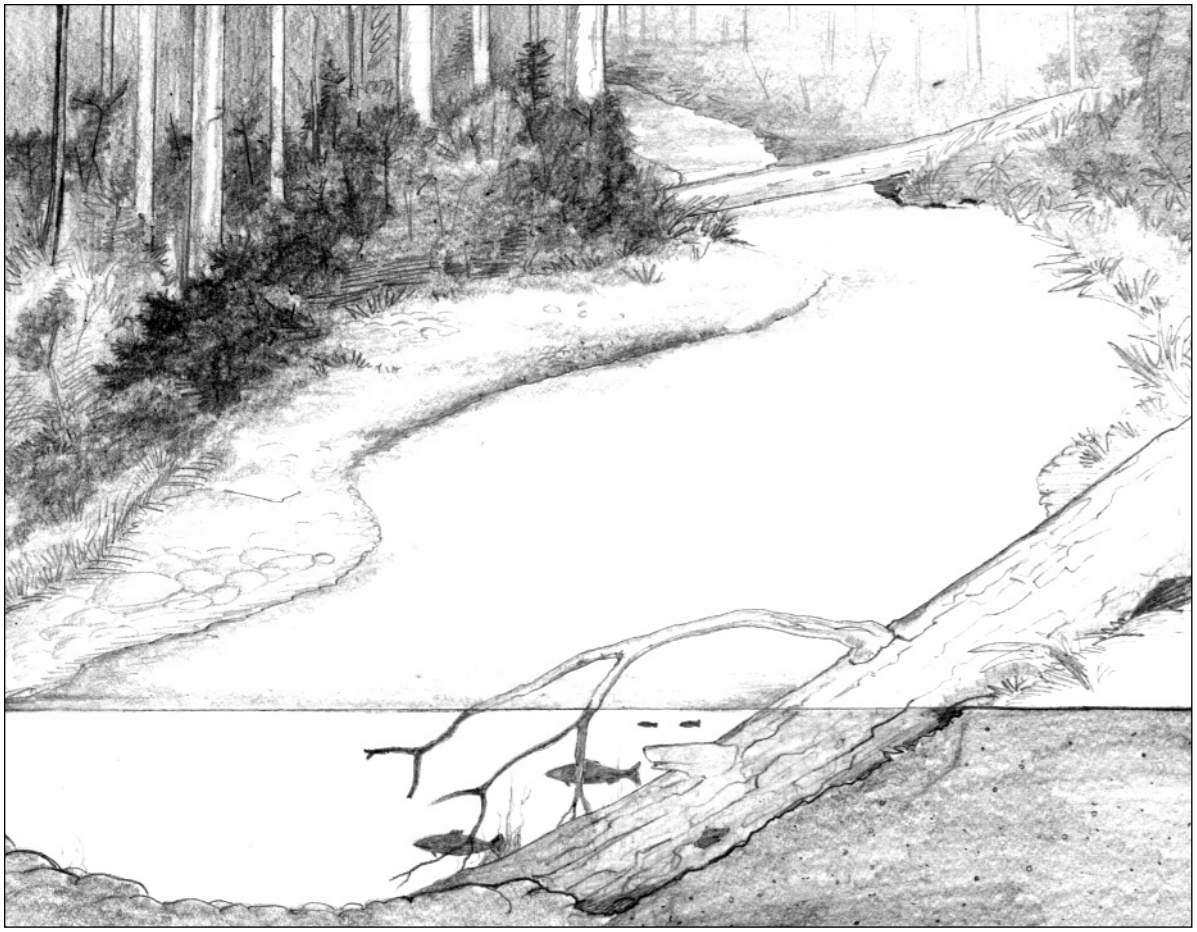
Cooper's Hawk – has a regular branch, log or stump for plucking feathers from its prey.

How are Wildlife Trees Created?

Wildlife trees are created in many ways. Trees do not die simply of old age, but are killed by insect attack, disease, fire, lightning, lack of light, or poor growing conditions. As a result, wildlife trees can be found in all forest ecosystems, such as alpine meadows, coastal forests, or on flat lowlands.

The decay of standing live or dead trees may start from the centre of the tree or from the outside, in the bark. These different types of decay can provide different kinds of habitat for wildlife. Trees rotting in the centre may be hollowed out and used for nesting while rotting bark might provide food.

As trees rot and decay, they become smaller as branches and bits of the trunk break off and fall to the ground. They also become softer as the wood breaks down or **decomposes** from bacteria, wood boring insects, and fungi. How quickly a tree decomposes depends on the type of tree, size, and climate. The bigger the tree or drier the climate, the more slowly it will take for the tree to decay. This means it can provide a home for wildlife over a longer period.



Riparian Zone

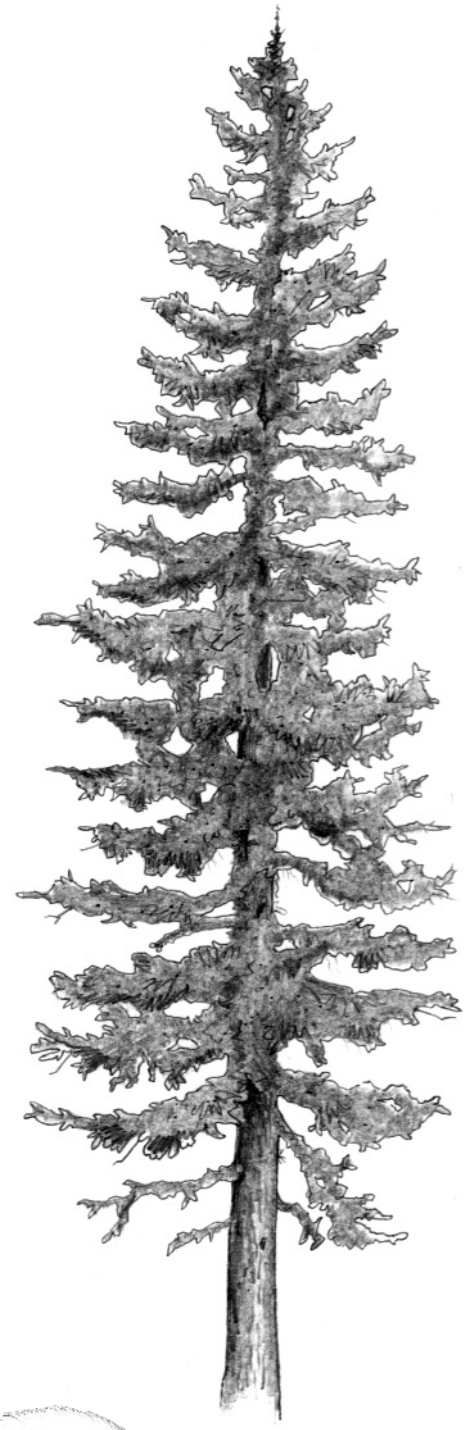
Identifying Stages of Decay

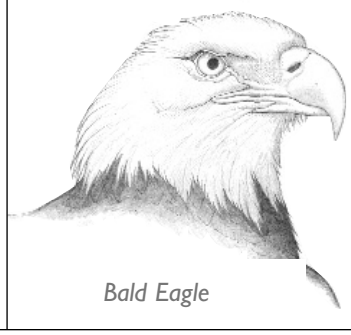
Throughout its life cycle, a tree will serve as habitat for different species of wildlife, and as time goes by, the value of a wildlife tree to a particular animal will change.

If a tree is still living but diseased, it can be of value to a Red-tailed Hawk, Bald Eagle or Osprey which often use the dead, upper branches as hunting perches. But by the time the tree has completely broken apart and rotted to crumbling woody debris on the forest floor, the Red-tailed Hawk, Bald Eagle and Osprey will have moved on, followed by a succession of woodpeckers, bats, squirrels and salamanders. Each of these will, at some stage, find food, shelter, or make a nest or den in the decaying tree.

The following illustrations show representative examples of species that use wildlife trees during different stages of decay. Remember that literally hundreds of species depend upon wildlife trees and that some species use wildlife trees during more than one stage.

Stage 1

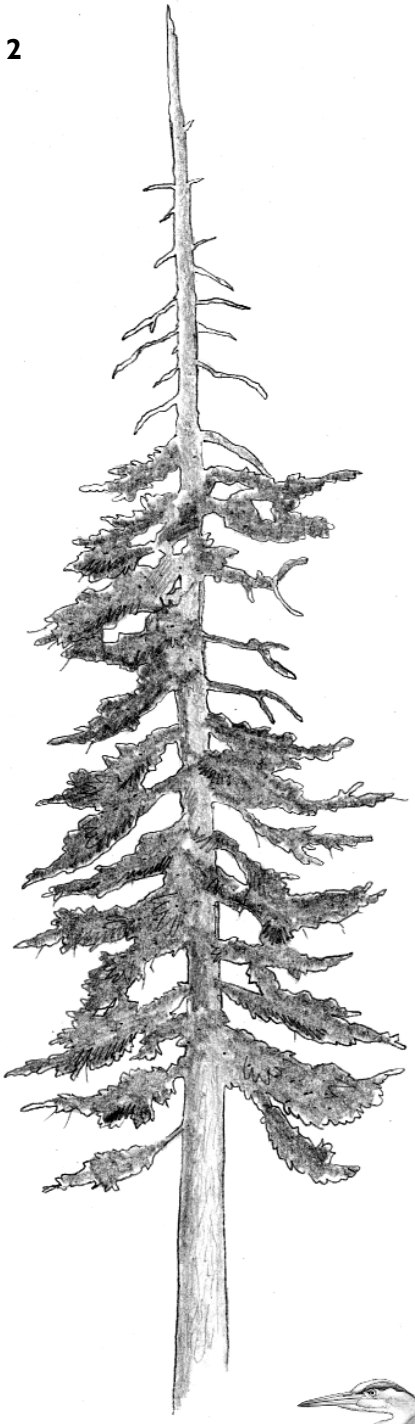




Bald Eagle

Tree Description:
Live and healthy

Stage 2



Tree Description: Live but unhealthy due to insect or disease damage

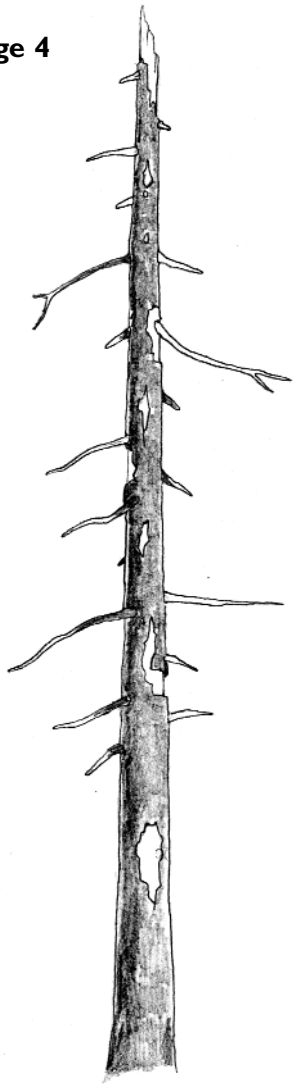
Great Blue Heron

Stage 3

Tree Description: Dead but still has a hard heartwood

Pileated Woodpecker

Stage 4



Tree Description: Dead; loose bark, leaves gone, half of branches lost and top usually broken

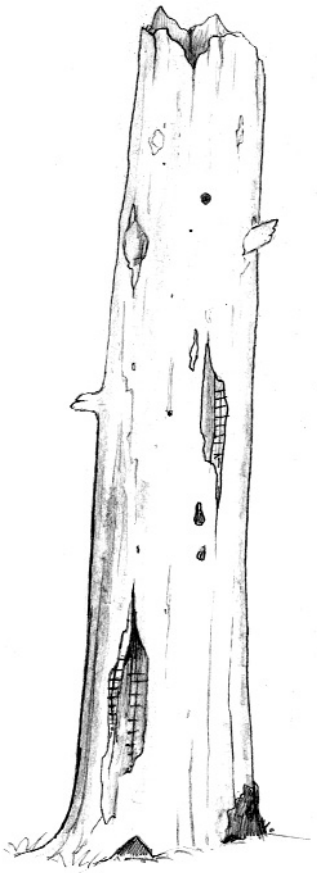
Little Brown Myotis

Stage 5

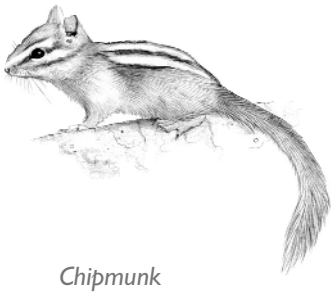
Tree Description: Internal decay, heartwood soft, and most of branches are gone

Black-capped Chickadee

Stage 6

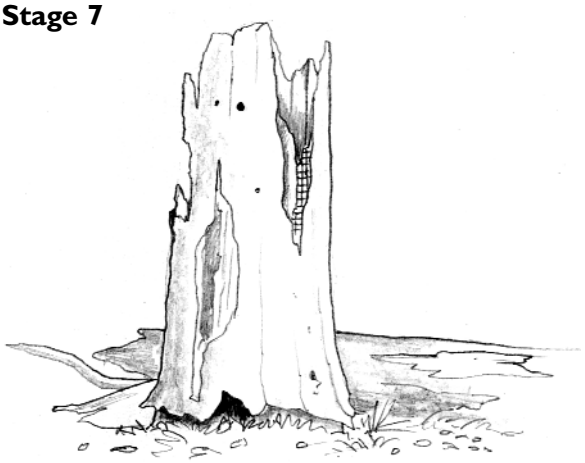


Tree Description: Tree is getting shorter as decay process continues and large pieces of bark are sloughed off



Chipmunk

Stage 7



Tree Description: Hard outer shell but hollow inside and roots decomposed

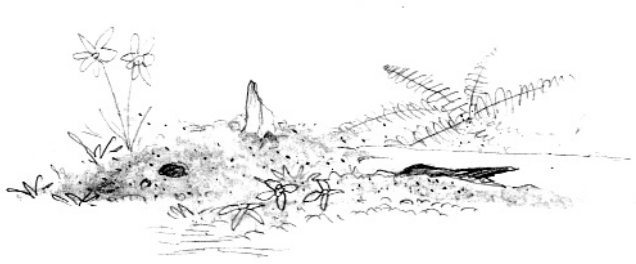
Red Squirrel

Stage 8

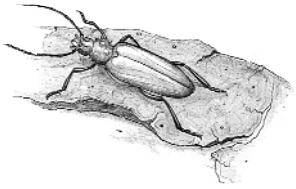
Tree Description: A short stump with an accumulation of woody debris around base

Clouded Salamander

Stage 9



Tree Description: Woody debris



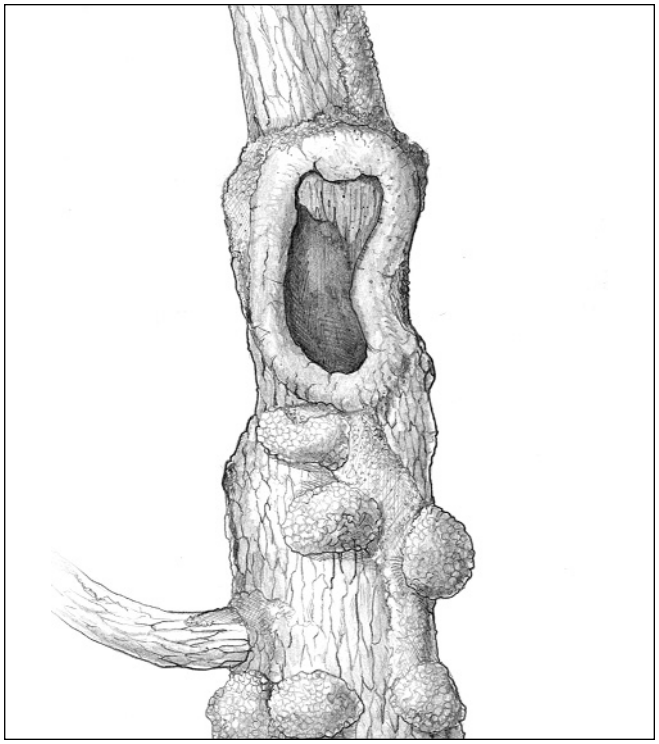
Spiny Longhorn Beetle

Carpenter Ant

What Makes A Good Wildlife Tree?

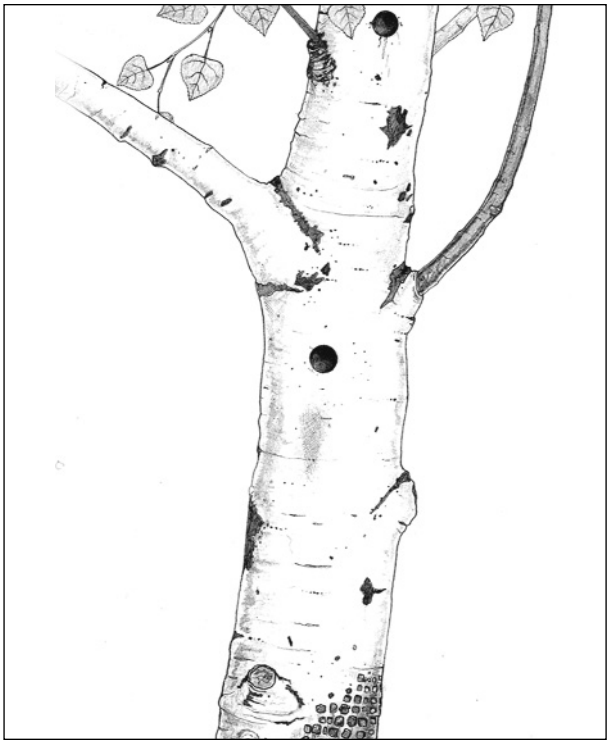
Most of the animals that use wildlife trees for food and shelter need a tall tree with a fairly wide trunk. The tree has to be tall if it is to be useful as a hunting perch, and a wide trunk allows plenty of room for digging out safe, well-insulated, nesting spaces and shelters.

Signs such as woodpecker holes or nests, feeding holes, discarded tree cones, fresh woody chips and owl pellets are some indicators that a tree is being used by birds or mammals. Of course, one tree on its own does not make up a complete habitat for some animals. The most valuable wildlife trees that provide the best habitat for animals are found in areas with surrounding forest cover and access to food and water.

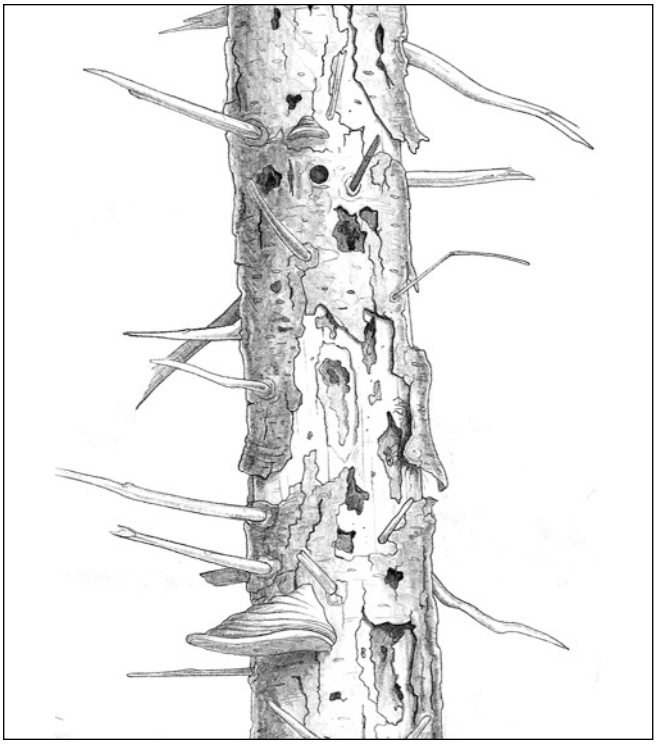


Natural cavity in a big leaf maple.

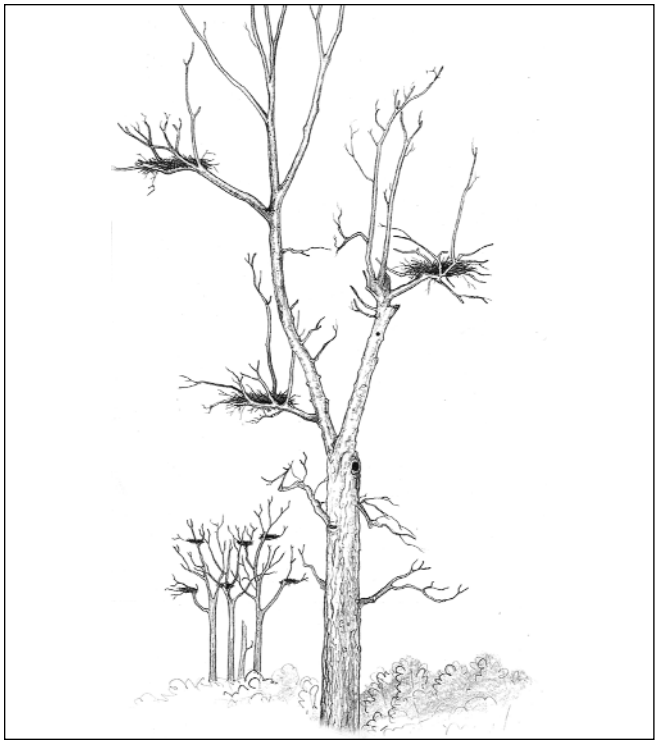
"Chimney effect" in western redcedar (a bat tree).



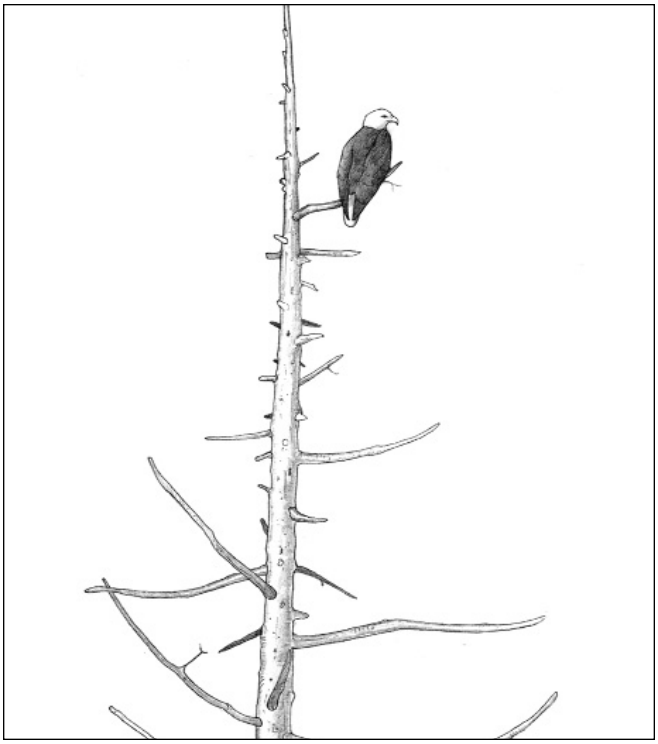
Live hardwood with primary cavity excavation and feeding holes



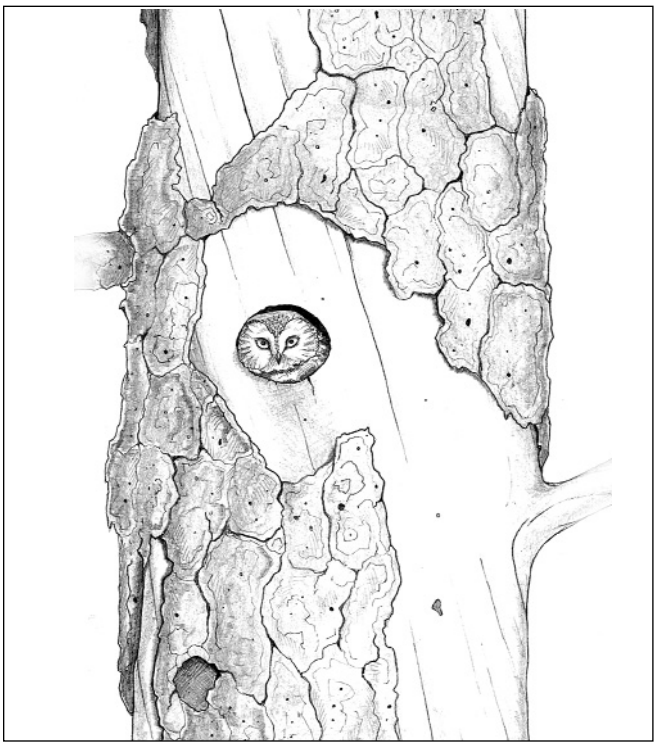
Heart rot and loose bark in grand fir (used by birds such as brown creepers and nuthatches).



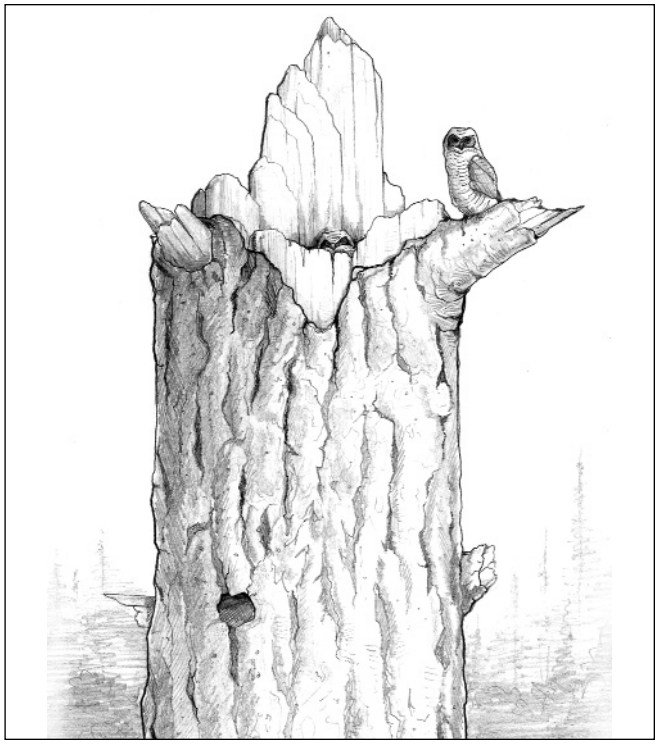
Branching in black cottonwood (nesting for Great Blue Heron).



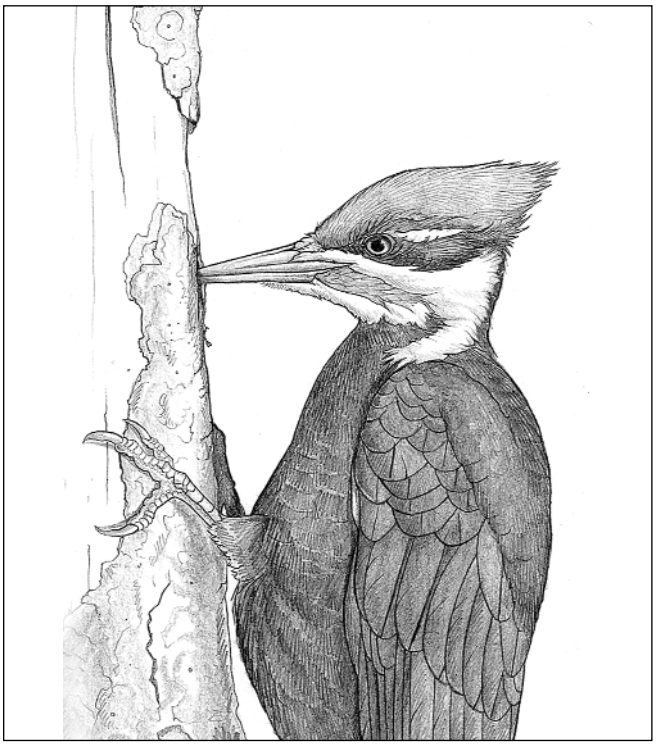
Spike top (for perching birds such as Bald Eagle).



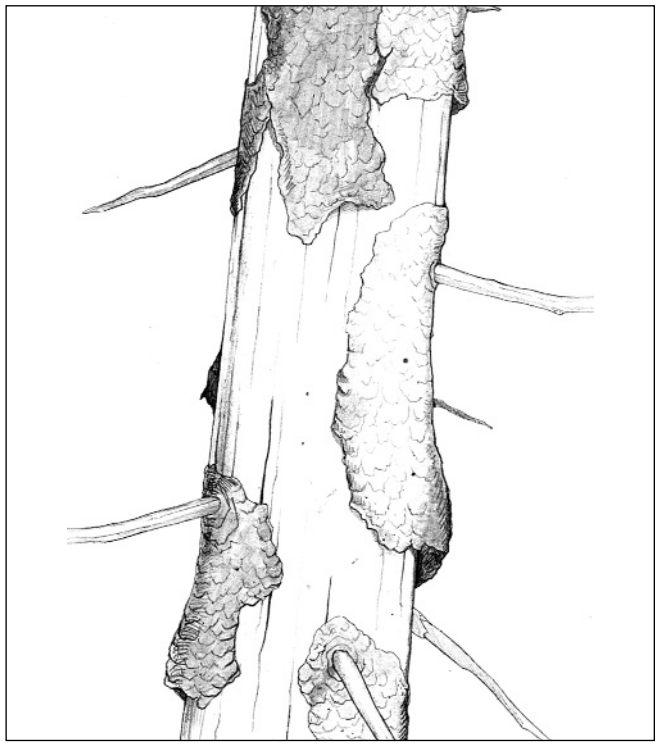
Secondary cavity in ponderosa pine (Saw-whet Owl using old Northern Flicker cavity).



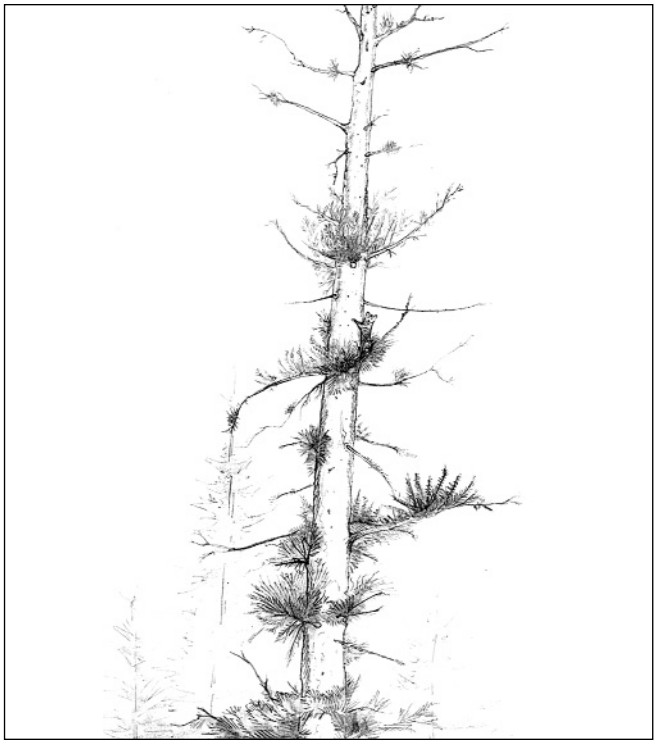
Douglas-fir (nesting and perching for Great Horned Owl).



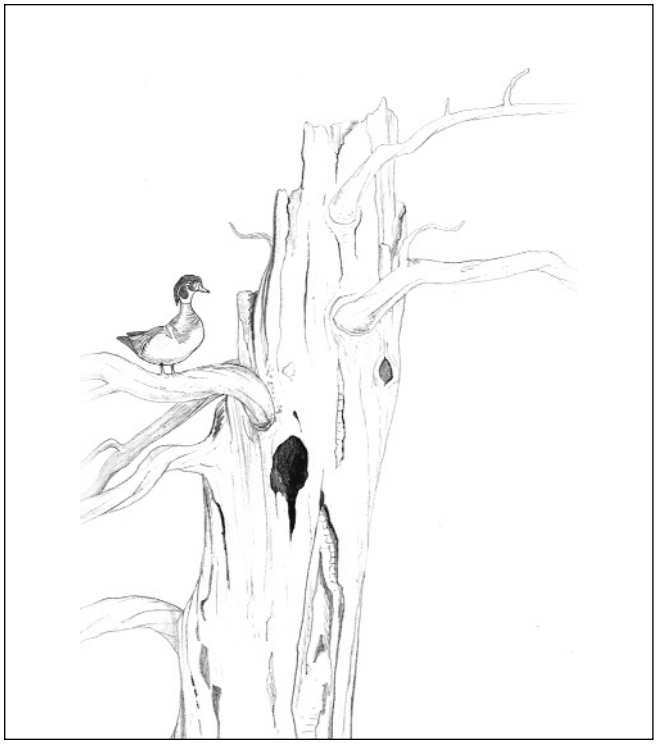
Pileated Woodpecker excavating for insects.



Loose bark, suitable for a bat roost or Brown Creeper nest.



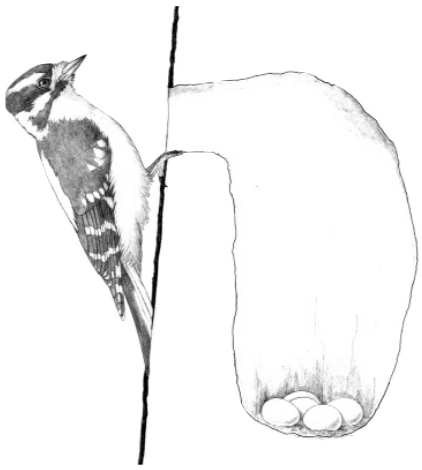
Witches' broom, habitat for marten and other wildlife tree users.



Wood duck at enlarged cavity in dead ponderosa pine.

Wildlife Trees…Who Needs Them?

Over 90 different animals and plants in British Columbia depend on wildlife trees for habitat.



Downy Woodpecker – female at entrance to primary cavity

They may be divided into seven groups that use wildlife trees at different stages of decay.

Primary Cavity Excavators

Primary cavity excavators are birds. They use their beaks to excavate into decaying wood. We've all heard woodpeckers with their familiar "rat-a-tat-tat", as they chisel out a home or search for food in trees. Once the tree softens, nuthatches and chickadees bore into the decaying tree, creating nesting sites. Once these birds leave, others can move in. It's a bit like an animal inn!

American Kestrel – nest tree in background

Secondary Cavity Users

These are birds and mammals that don't make their own holes but move into existing ones, often made by woodpeckers or formed where branches have fallen off the tree. They use these holes for storing food, for shelter or for building nests and rearing their young. This group includes some of the owls, swallows, bluebirds and ducks, as well as mammals like marten, raccoons, squirrels and mice.

Osprey – also uses artificial structures

Open nesters

These are birds that build large, heavy nests on the tops or in the crooks of large wildlife trees. Ideal nesting conditions for birds like the Great Blue Heron, Osprey, Bald Eagle and large hawks and owls are created when trees are topped or broken from strong winds, or from lightning strikes.

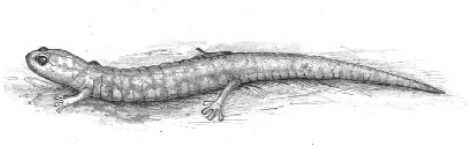
Mammals

Bats will roost and rear their young in between loosened bark or inside hollowed out trees. In the northern and eastern parts of British Columbia, caribou will feed on lichens which grow on old or dying trees. Black bears use large hollows of wildlife trees to hibernate over the winter. The soft, rotting wood can be easily hollowed out at the base of the tree, to form a bear's winter den.

Red Squirrel

Amphibians

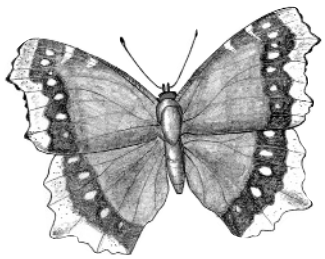
Amphibians such as the Clouded, Long-toed and Western Red-backed Salamanders use wildlife trees for shelter, food and as safe, moist sites to lay their eggs.



Clouded Salamander

Insects

There are many varieties of insects that use wildlife trees. Ants and termites are two important examples. They help break down the rotting branches and stumps of wildlife trees into smaller and smaller parts by chewing up the wood. They help nutrients from the wood to return to the soil to foster the growth of new trees.



Mourning Cloak Butterfly – some adults overwinter behind loose bark

Plants

As wildlife trees fall to the ground and become woody debris, they provide nutrients to the soil and surrounding plant communities. Mosses, lichens, fungi and other types of plants can also be found growing on the branches and trunks of wildlife trees.

Nurse log

Rooms With a View

For the open nesting Bald Eagles of British Columbia, their nests really are rooms with a view. A pair of eagles often pick the tallest, or dominant tree, in their territory and, because they often repair and reuse the same nest each year, their homes can be the largest of any bird in the world. An eagle in the wild is known to have lived at least 27 years and the oldest Bald Eagle in captivity lived to 50 years.

Waterfront property is important for tree choice, too, as few nests in British Columia are more than 1.6 kilometres away from water. Other considerations are: proximity to food sources, a clear flight path from the nest to a spot on a beach or river, an easy approach from different directions depending on wind, a great view, and a tree strong enough to hold sometimes hundreds of kilograms worth of nest.

The species of tree chosen varies throughout the province. Here's a list of some study areas, the total number of nests found, the most used tree species and the percentage of use for that species.

Location:	No. of Nests	Tree Species	%
Fraser Delta & Valley	17	cottonwood	79
Gulf Islands	35	Douglas-fir	100
Nanaimo area	65	Douglas-fir	94
Barkley Sound	25	western redcedar	60
Quatsino Sound	61	Stika spruce	52
Queen Charlotte Islands	85	Sitka spruce	87
Okanagan	5	ponderosa pine	80
East Kootenay	26	cottonwood	96
Cariboo	18	Douglas-fir	83
Cheslatta Lk.-Nechako R.	30	cottonwood	70
Peace River area	6	cottonwood	100

It is important that we maintain large wildlife trees, and younger live trees to replace them, near water and food sources for Bald Eagles.

Bald Eagle – Its open nests are the largest in the world.

Bats in British Columbia

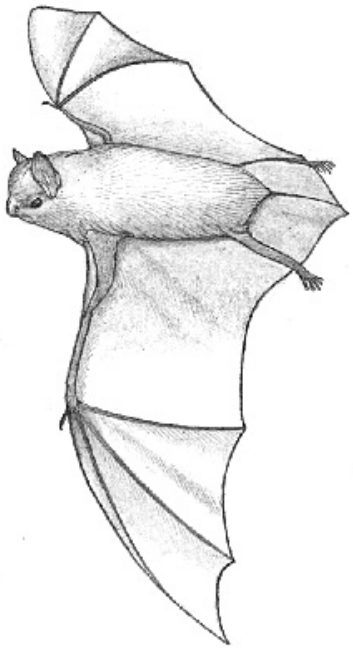
The approximately 1,000 species of bats found throughout the world make up twenty-five percent of the known mammals and are in their own mammalian order of Chiroptera — Latin for "hand-wing". In almost every habitat except the polar regions, they perform vital roles such as fruit pollination, seed dispersal and insect control. A colony of twenty million Mexican Free-tailed Bats in Texas have been estimated to eat as much as 100,000 kilograms of nocturnal insects each night. In an experiment, Little Brown Bats, which are found throughout British Columbia, ate as many as 600 mosquitoes per hour.

There are twenty species of bats known to Canada, with British Columbia having the greatest diversity with sixteen species, eight of which are found no where else in Canada. Half of those species are on our provincial Red and Blue Lists and for most of the species, our knowledge of them is limited.

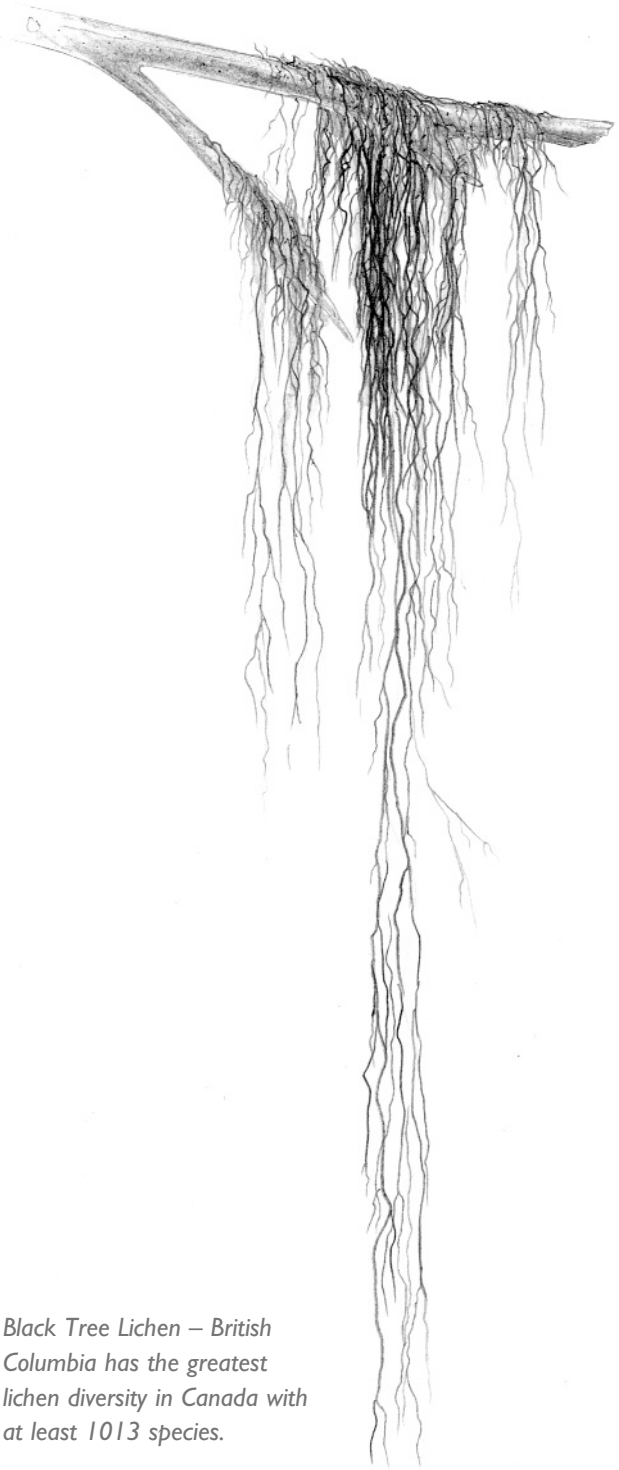
Roosting sites are one of the most important factors in the numbers and distribution of bats. Wildlife trees, with both natural and excavated cavities and loose bark, are important roost sites. Other sites include tree foliage, rock crevices, animal burrows, storm sewers, abandoned mines, buildings and holes under rocks.

In British Columbia, urban encroachment and logging practices that included large clear cuts, removal of wildlife trees and intensive management of young forests have decreased the availability of roost sites. Some species seem to have adapted. Big Brown Bat maternity colonies are found regularly in buildings, yet in the Okanagan they are usually found in ponderosa pine wildlife trees, suggesting an original preference for tree cavities. Other species such as the Red Listed Keen's Long-eared Myotis may not be as adaptable.

New forest practices that take wildlife trees into consideration, especially those found in riparian areas, more field studies of bat behavior and range and an increased public awareness of the benefits of bats, will improve the chances of these fascinating animals.



Little Brown Myotis– can eat up to 600 mosquitoes per hour.



Black Tree Lichen – British Columbia has the greatest lichen diversity in Canada with at least 1013 species.

Liking the Lichens

What is a lichen you ask? A witty park naturalist will answer "why, it is a fungus and an alga getting together and likin', or *lichen*, it". This is actually true. A lichen is a symbiotic relationship between a fungus and an algae colony. Often mistaken as a moss or a plant, the lichen is an organism that's distinctly different. There are over 20,000 species of lichen in the world. In North America, about 3,500 have been found, with British Columbia having the greatest diversity in Canada with at least 1,013 species.

Lichens are among the oldest living things on earth. They grow in almost all environments, including on rocks in Antarctica. Some Arctic lichens are up to 4,500 years old, needing hundreds of years to grow a few centimetres.

Lichens are very important to the world's biodiversity in many ways. On 8% of the planet's land surface, lichens are the dominant vegetation. Lichens help to fertilize soil by turning nitrogen into important compounds for building proteins and DNA. For humans, lichens have become an early warning (like canaries in the mines) because they are so sensitive to atmospheric pollution. In British Columbia, another threat to lichen diversity is habitat loss. Many of British Columbia's rare lichens occur in forested areas and may need centuries of succession to become established. A large percentage of these forested areas are being replaced by young forests intended for rotational harvesting.

Many creatures eat lichens, and some, like the southern populations of British Columbia's caribou, are dependent on it for their survival. Caribou prefer the hair-like, or fruticose lichens that hang from dead branches of both life and dead trees, and eat about 4.5 to 5.5 kg of lichen per day. That can equal 95% of their winter diet when snow covers their usual food at higher elevations.

Wildlife At Risk

British Columbia has a large number of different animals and plants that contribute to our province's biodiversity. To help ensure the long-term survival of these species, biologists have lists of plant and animal species that are at risk and need protection and conservation.

Red List: *Species at risk which are endangered or threatened, or are candidates for these designations.*

Blue List: *Species at risk which are vulnerable or sensitive and which could become endangered in the future.*

Yellow List: *Species not at risk but which are of some particular management concern.*

The loss of wildlife tree habitat has resulted in some wildlife populations being threatened. Some wildlife tree users have been placed on the Red and Blue lists (Appendices B and C).

Southern Red-backed Vole – A Blue List species

In addition to having lists which highlight animals most at risk in British Columbia, there are regulations under the B*ritish Columbia* W*ildlife Act* which help protect wildlife trees in the province. Wildlife trees containing nests of Eagles, Peregrine Falcons, Gyrfalcons, Ospreys, or Great Blue Herons are protected at all times and cannot be cut down. All bird nests are protected when a bird is sitting on its eggs. These regulations protect the special habitat that standing live or dead trees provide for wildlife.

Cultural Ties to Wildlife Trees

The songs, dances, creation narratives, and artwork of many First Nations peoples speak of connections to parts of the earth, such as sea, sky, river, mountain and forest, and the spirits within all things. Those connections come from the land and the diversity of cultures, styles and people in British Columbia are as varied as the diversity of climates, plants, animals and geography.

A constant throughout history and in the province between the different First Nations groups is the connection to plants, and specifically trees. Trees were used for everthing from transportation to weapons, from eating utensils to ceremonial masks. What follows is a brief look at how some First Nations peoples used specific species of wildlife trees and some of the flora and fauna connected to them.

Ponderosa pine P*inus ponderosa* — The Shuswap and Okanagan people used its rotten wood in the tanning of skins.

Douglas-fir *Pseudotsuga menziesii* — For the preparation of dogfish meat, the Comox people would place the fish stuffed with the powder of rotten Douglas-fir wood in a cooking pit.

Red alder *Alnus rubra and relatives* — Seasoned or partially rotted wood worked well throughout the province for smoking salmon and the cooking of deer meat.

Trembling aspen *Populus tremuloides* — The Carrier people of the interior used the soft and rotten wood of aspen wildlife trees as a lining for baby cradles.

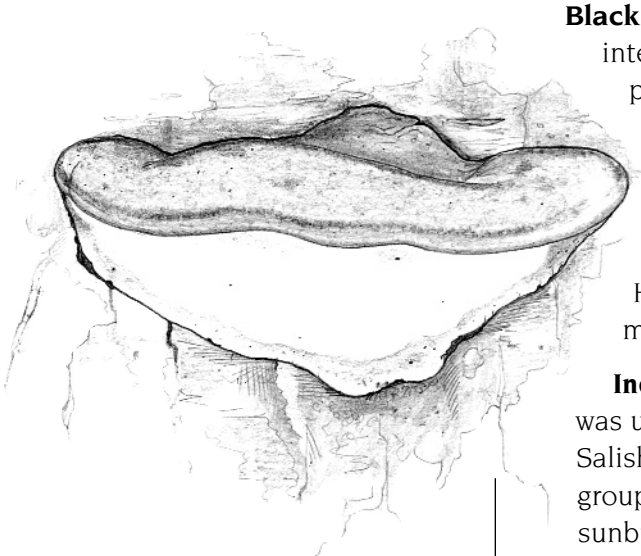
Western redcedar *Thuja plicata* — The cedar was prized on the coast for its resistance to rot and could still be used after it had fallen. Harvesting of bark for clothing, baskets and rope as well as wood for houses was done so as not to kill the tree. The exposed wood though gave opportunities for insect and fungal attacks and provided easier access for species such as the Pileated Woodpecker to the heartwood and its insects.

Wolf lichen *Letharia vulpina* — The bright yellow dye produced from this interior lichen was used throughout its range and even traded out to the coast.

Black tree lichen *Alectoria fremontii* — As an alternative to skins, interior groups like the Thompson used lichens for weaving ponchos and shoes and other clothing. Black tree lichen also provided food during tough winters.

Old man's beard *Alectoria sarmentosa* — The Shuswap and Bella Coola people used this light green lichen for false hair and whiskers for dance masks and masquerading. The Haida used it as a strainer for hot tree pitch used in medicines.

Indian paint fungus *Echinodontium tinctorium* — The red pigment was used by the Okanagan, Thompson, Lower Lillooet, Straits Salish, Sechelt, Kwakiutl, Nuu-Chah-Nulth, Tsimshian and Tahltan groups for face paint, cosmetic purposes, and to protect skin from sunburn or insect bites.



Bracket fungus – for caulking canoes and many other uses

Bracket fungus *Polypore* sp, — The many species throughout the province were used in a variety of ways. Many of the First Nations peoples used the interior of the fungus as a slow burning fire keeper. The Haida used the mycelium from the inner bark of Sitka spruce wildlife trees in a paste to caulk canoes and bentwood boxes.

Wildlife Trees Around the World

Wildlife trees in British Columbia aren't the only animal inns. The Baobab tree of the dry savannahs of Southern Africa look like they are growing into the earth with branches that look like roots. Some can reach heights of 20 metres, circumferences of 15 metres, and ages of over a thousand years. Cavity nesters like the Orange-bellied Parrot and the Lilac-breasted Roller make themselves at home while bushbabies, a small, nocturnal primate that lives in the hollows, waits for nightfall to eat nectar from flowers. The female Yellow-billed Hornbill may be one of the most fascinating tenants of all. She chooses a hollow, lays her eggs, then seals herself inside with a mud wall. The male feeds her insects through a tiny slit in the wall for six weeks. After the eggs hatch and the young get large, she breaks her way out. The young hornbills rebuild the wall and are fed by both parents for three more weeks until they break out and fly away.

The **Woolly Mouse Opossum,** *Micoureus cinereus*, could be considered an open nester of the mature and secondary evergreen rainforests, gallery forests, gardens and plantations of Central South America from Belize south to northern Argentina, Paraguay and southeast Brazil. This solitary and nocturnal marsupial feeds on insects, small animals, fruit and nectar in the middle to upper levels of dense canopy. It builds a nest of dead leaves in the crowns of palm trees.

The **White Stork,** *Ciconia ciconia*, is found throughout Europe, North Africa and the Middle East. It is an open nester on both live and dead wildlife trees and a host of human structures such as chimneys, church towers, haystacks, ruins and even artificial nest structures similar to ones provided for Ospreys in North America. The White Stork is an example of a species that has evolved to adapt to human settlement, helped by local conservation efforts and positive public sentiment that has even spawned the fairy tale of storks delivering babies.

The **Tree Hyrax** or **Dassie,** *Dendrohyrax arboreus*, lives in the lowland rainforests of Eastern Africa and the evergreen forests of Natal and Cape Province of South Africa. Although they look like rodents such as our marmots, they've actually evolved from ungulates and are related to elephants and aardvark. While most of the Dassies live in the crevices of rocks, the Tree Hyrax's life revolves around its den tree. Their density can be in the hundreds for a few square kilometres and the diet of this mostly nocturnal mammal includes foliage, twigs, fruits, vines, and even tree lichens in alpine zones.

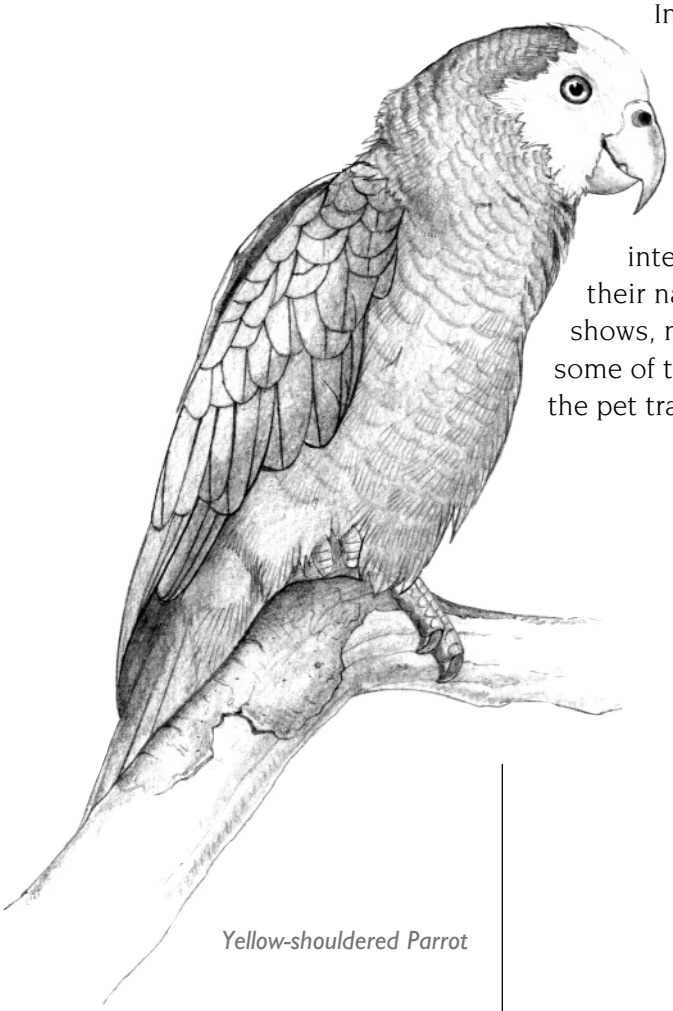
Parrots, which are predominately cavity nesters, are in crisis throughout the world. Of the approximately 330 species, 71 were at risk of extinction and 29 were threatened in 1992.

Some of the threats include:

- loss of habitat and wildlife trees necessary for nesting
- shooting and trapping for trade or subsistence food
- harvesting young for pets, (wildlife trees are often cut down to aid capture, which ruins the current year's breeding success and destroys a nest site
- destruction for being an agricultural pest.
- fewer resources available in less developed nations for conservation programs

In Australia, most parrots nest in tree hollows, especially those found in broken limbs of the eucalyptus tree. The lack of suitable nest sites near food sources will only get worse because of poor regeneration of eucalyptus trees.

The Caribbean Islands of St. Lucia, Saint Vincent and the Grenadines, and Dominica have had excellent results with intensive environmental education programs revolving around their national birds — endemic species of parrots. Songs, puppet shows, newsletters, radio programs and fan clubs have reversed some of the declining trends and have helped decrease collection for the pet trade and subsistence food hunting.



Yellow-shouldered Parrot

What Can I Do To Help?

Wildlife Tree Signs

Wildlife tree signs are one way of making everybody aware of how important wildlife trees are in providing habitat for various forms of wildlife. Signs can be placed on certain trees when there is evidence of the tree being used as a home by wildlife or if the tree is large or old and is likely to become a good wildlife tree in the future. Signs are for both private and public land. So think about starting a wildlife tree signing program in your area! For more information please contact:

Wildlife Tree Committee
c/o Habitat Protection Branch
Ministry of Environment, Lands & Parks
780 Blanshard Street
Victoria, B.C. V8V 1X4

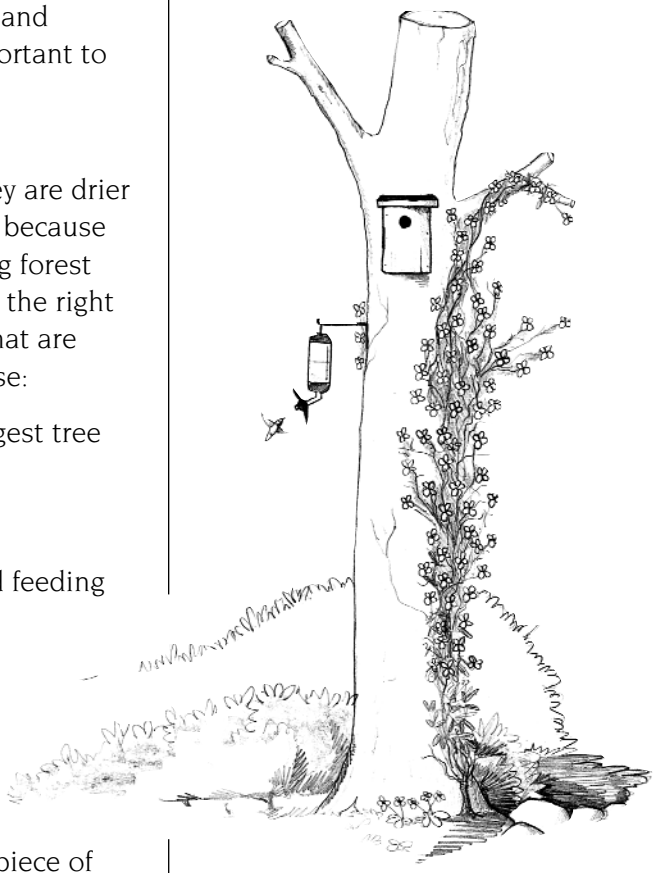
In addition to the wildlife tree signing program, there are many other avenues being explored to help preserve and protect wildlife tree habitat. A wildlife tree assessment course helps forestry workers learn how to identify important wildlife tree habitat and become more aware of why wildlife tree conservation is important to good forest management.

Don't Use Wildlife Trees for Firewood!

Although wildlife trees are considered desirable because they are drier than green trees, they are actually an inefficient heat source because of the heart rot often found inside. Wildlife trees found along forest edges and near roads are especially vulnerable. By choosing the right kind of trees for firewood, you can help conserve the trees that are more likely to be used by wildlife. The trees to leave are those:

- greater than 40 cm diameter at breast height or the largest tree on site
- in riparian areas or forest edges
- with signs of wildlife activity such as cavities, nests and feeding holes.

If you are cutting trees for firewood, try to cut live trees in late winter or early spring when birds are usually not nesting. Allowing the cut trees to cure over the following winter will provide more efficient heat for your stoves and fireplaces. We can make a difference by reducing the amount of firewood we use. Using one less piece of firewood at our campsite each night could mean a lot fewer trees



A backyard habitat that includes a wildlife tree.

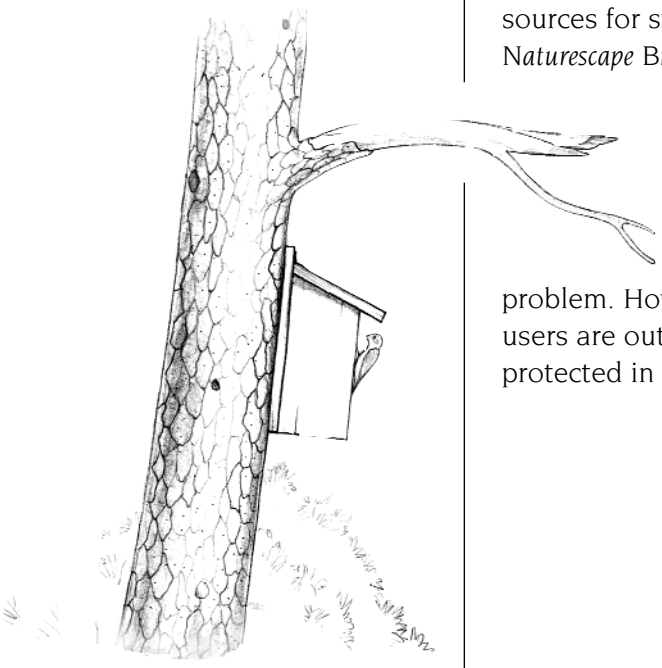
being cut down. Changing our firewood cutting habits will increase the amount of homes and feeding opportunities for British Columbia's wildlife tree users.

In Your Own Backyard

- Leave trees with broken tops, hollow trunks, and feeding or nesting, cavities. Fallen trees provide great wildlife habitat too.
- Leave wildlife trees standing until they pose a safety threat.
- Use fallen trees in landscape design around the garden!
- Remove only unsafe branches and tops with the help of a professional arborist or professional tree service.

Artificial Nest Structures

Artificial nest structures for wildlife such as nest boxes make great action projects. They have been used successfully by some wildlife tree users such as bluebirds, Wood Ducks and Western Screech-Owls, and Ospreys. All have benefitted from some of these large scale to smaller backyard artificial nesting programs. There are a number of sources for styles and dimensions of these structures including *Naturescape British Columbia* (see Appendix D for more information).



Secondary Cavity Users prefer different sized holes and boxes. To attract a particular species, you also need to know their range and habitat preference.

It is important to remember that artificial nest structures built to represent natural cavities or whole wildlife trees should not be considered the final objective of a conservation program. They can provide a temporary solution as well as increase public awareness of the problem. However, the only real solution is to ensure that wildlife tree users are out of risk and that wildlife trees in critical habitats are protected in sufficient numbers, along with live trees to replace them.

Wildlife Tree Key Concepts

Concept A: Wildlife trees are standing live or dead trees which provide habitat for wildlife.

- Wildlife trees can be deciduous or coniferous species.
- Wildlife trees can be found in all forested areas of British Columbia and all parts of the world.
- Wildlife use wildlife trees for food, shelter, nesting, resting, denning, cover and hunting perches.
- Wildlife trees that are dead or decaying provide important nutrients back to the soil.

Concept B: Wildlife trees are part of the forest ecosystem.

- Wildlife trees are found in all types of forest ecosystems.
- Wildlife trees play an important role in the forest ecosystem.
- Wildlife trees are a part of the forest's energy web.

Concept C: Wildlife trees are valued.

- Wildlife trees contribute to biodiversity.
- Wildlife trees provide habitat for communities of living and nonliving things that interact and are interrelated.
- Wildlife utilize wildlife trees throughout the different stages of the tree's life cycle.
- Humans and natural events impact upon and contribute to the loss of wildlife tree habitat.
- Wildlife trees are valued for wildlife viewing and natural history observation.

Concept D: Wildlife trees are at risk.

- Loss of wildlife tree habitat is a major concern for threatened and vulnerable species of wildlife in British Columbia
- Over 90 species of animals depend on wildlife trees for one or more of its habitat components.
- The importance of wildlife tree habitat has been recognized and is being addressed.

Activities	Concept A	Concept B	Concept C	Concept D
1 Animal Inn…Who Am I?	✓	✓		
2 Wildlife Tree Food Web		✓	✓	
3 No Place Like Home!		✓		
4 No Room At The Animal Inn!	✓		✓	
5 Animal Inn Under Construction	✓		✓	
6 Wildlife Tree Inn	✓	✓	✓	
7 Junior Wildlife Tree Assessor	✓			✓
8 Wildlife Tree Scavenger Hunt	✓			

(Continued next page)

Activities	Concept A	Concept B	Concept C	Concept D
9 Wildlife Tree Rummy	✓		✓	
10 What's For Dinner?				✓
11 Life in a Log	✓	✓	✓	
12 Waterlogged	✓			
13 You Gotta Lichen Caribou!	✓			✓
14 Alert! Code Red and Blue!			✓	✓
15 Tree of LIfe			✓	
16 Spirit Tree Biography		✓	✓	
17 Making Decisions		✓	✓	
18 Animal Inn Tenants' Association	✓		✓	
19 Arboreal Theatre	✓	✓	✓	
20 Wildlife Trees in the News!	✓			✓

Activity 1

Animal Inn…Who Am I?

Objective

Students will be able to:

1 identify some wildlife tree users; and

2 recognize different ways to classify them.

Method

With wildlife tree user pictures on their back, participants will ask questions to figure out which wildlife tree user they are.

Background

In British Columbia, there are about 90 species of wildlife tree users…from salamanders and owls to squirrels and caribou! Provincial Wildlife Biologists have compiled a list of known wildlife tree users; species that are in some way dependent on wildlife trees for their survival. A copy of this list is in the back of the manual (Appendix A).

The following classifications may be helpful to the students in generating questions:

Amphibians (i.e., frogs and salamanders)
- adults live in damp terrestrial habitats
- lay eggs in water
- aquatic larvae have gills for breathing
- body covered with moist skin
- cold blooded

Birds
- body covered with feathers
- light bones
- forelimbs modified - wings for flight
- lungs for breathing
- warm blooded
- shelled eggs

Mammals
- body covered with hair or fur
- warm blooded
- relatively large brain
- live young, fed milk from mammary glands

Grade

K–12

Subject

Science, Drama

Skills

analysis, classification, communication, comparing similarities and differences, description, recognition, small group work, synthesis

Duration

15 to 25 minutes

Group

any size

Setting

indoors or outdoors

Keywords

amphibians
birds
carnivores
herbivores
mammals
omnivore
reptiles

Carnivore
flesh eating animal

Omnivore
feeds on both plants and animals

Herbivore
feeds on primary producers; mostly green plants

Other ideas for classification include where the plant or animal lives or its size.

This activity is an introductory type activity that may be used with any age or size of group. It is also a good icebreaker activity for a new class or group.

Materials

- pictures of wildlife tree users on cards with a string attached (to go around neck) – use pictures from calendars or magazines, or photo-enlarge Species Cards on pp. 88–91. (See sample on facing page.)

Procedure

1. Tell the students that they will be given a picture of a wildlife tree user put on their back, and that they must ask questions to find out what they are. The questions must require"yes" or "no" responses such as; "Do I have fur?", "Do I eat meat?", "Do I live in the forest?". You may want to brainstorm some possible yes or no questions or classifications (such as herbivores, omnivores etc.) with your class. Depending on the age group, you may want to add hints such as all plants or animals are found in British Columbia.
2. Once you have placed a picture on their back, they are free to start the activity. You may want to stipulate that they should ask each person only one question at a time, then move on to the next person.
3. Once a student guesses their plant or animal correctly they can pull their card around to face out on their chest. They can still participate by answering questions for other students.
4. The activity can be finished in a certain time period or until everyone has guessed their species. The last few students may need some hints so they don't feel frustrated.
5. Wrap up the activity by connecting all the animals to wildlife trees. This can be a great introduction to other activities in the manual.

Extensions

1. This activity can be used prior to a Wildlife Tree walk. With students wearing their wildlife tree user signs, have them make connections between themselves and wildlife trees. For example, a student wearing a Red-breasted Sapsucker card could be asked about or shown which tree a real sapsucker has fed on. To conclude the walk, form a circle and have students whose animals were picked remind

other students how they use wildlife trees. Those students not chosen can discuss why the habitat wasn't right for them. For example, there might not have been any trees big enough to support a Bald Eagle's nest.

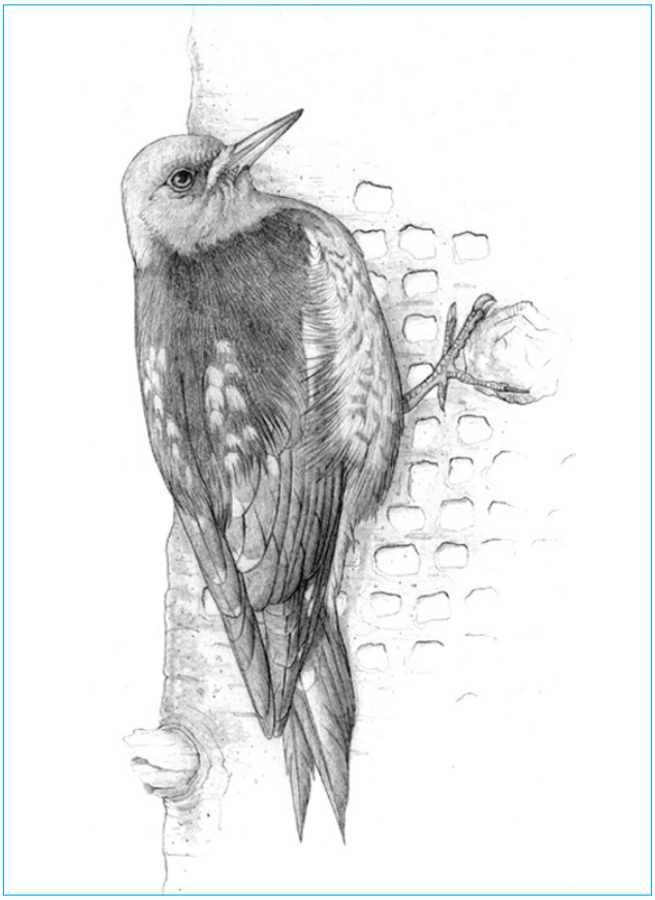
2 Students could use their animals as the subject of reports and clipping files (see *Wildlife Trees in the News!*).

Evaluation

1 Have the students list ten different wildlife tree users.

2 Have the students write a paragraph about which animal they were.

3 Illustrate how the wildlife tree users are connected to a wildlife tree.



Red-breasted Sapsucker
Sphyrapicus ruber

Wildlife Tree Use:

- Primary Cavity Excavator
- Roost
- Forages for insects, especially ants.

Notes: Drills rows of holes or sapwells in a variety of tree species and feeds on both the sap and insects attracted to the sap.

Sample of an enlarged Species Card useful for several of the activities in this book.

Activity 2

Wildlife Tree Food Web

Grade
3–12

Subject
Science

Skills
analysis, classification, description, discussion, generalization, identification, interpretation, kinaesthetic concept development, observation, psychomotor development, synthesis, writing

Duration
20–30 minutes

Group Size
minimum 15 students

Setting
indoors or outdoors

Key Words
community
consumers
decomposers
ecosystem
food chain
food web
producers

Materials
string ■ cards or pictures with different elements of a wildlife tree community

Objective
Students will be able to:

1. recognize that wildlife trees are important parts within the forest food web.
2. define and give examples of a food chain and food webs that centre around wildlife trees.

Method
Students will become different components in a wildlife tree food web.

Background
An ecosystem is an interacting and interrelated community of living and nonliving physical and chemical things between which energy and materials are exchanged. A community includes a group of plants and animals that occur in a given habitat. An ecosystem can be as large as the ocean or forest, or as small as an aquarium filled with plants, fish bacteria, fungus and invertebrates.

The community of plants and animals that uses wildlife trees for habitat interact with nonliving things to form part of the forest ecosystem. Energy and nutrients are exchanged within any ecosystem through a series of cycles of eating or being eaten. This is called a food chain. Wildlife trees provide habitat for many different animals and plants, which are connected through food chains. For example, Spotted Owls prey on Flying Squirrels which in turn eat lichens that grow on wildlife trees.

There are many food chains that occur within the forest ecosystem. Food chains that revolve around wildlife tree habitat are numerous and some are interconnected. The pattern on interconnecting food chains is called a food web. Plants and animals that use wildlife trees for habitat are interrelated in a complex food web. Each species getting its nourishment from one or more of its fellow inhabitants in the wildlife tree community.

This activity demonstrates wildlife tree food chains and food webs.

Procedure
1. Brainstorm with your class what plants and animals depend on wildlife trees for habitat. List them on the blackboard. Have the

students classify the components of the wildlife tree community into producers, consumers, and decomposers.

2 Introduce food chains and have the students list some food chains that centre around wildlife tree habitat.

3 Ask or wait and see if the students recognize that some of the food chains are interconnected. Discuss and define food webs with the students.

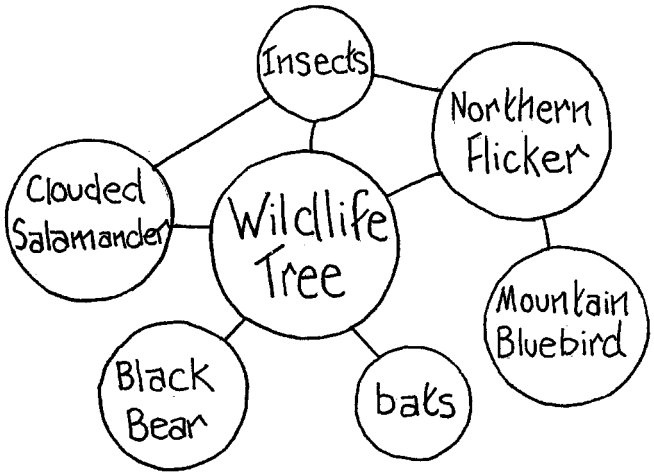
4 Tell the students that they are going to become parts in the wildlife tree food web. Assign each student a name tag or picture of a plant or animal that uses wildlife trees for habitat.

5 Have one student become a wildlife tree and have that person stand in the middle of the classroom.

6 The student who is the wildlife tree will start by holding onto the end piece of the ball of string. That student will pass the ball to a student (plant or animal) who uses the wildlife tree for habitat. For example, a wildlife tree is food for insects which are then eaten by woodpeckers etc. Ask each student what they are eaten by in order to pass the ball of string onto the next plant or animal. When all the relationships have been exhausted for one group cut the string and start back at the tree.

7 Continue to connect the students until all the relationships have been discovered. The end result will be a large connection, web, of animals and plants that use wildlife trees for habitat.

8 Ask the students to pull gently on their string. Discuss what would happen if some element(s) were not available or were destroyed.



Example of a wildlife tree food web

Evaluation

1 Define food chains and food webs.

2 Draw a wildlife tree food web.

Extensions

1 Have the students research the animal that he or she became in the web and have them make a poster showing how that particular animal fit into the wildlife tree web.

2 After doing the web activity have the students draw the web on paper and adding other components that were missed.

3 Discuss animals and plants found in riparian areas and how they use wildlife trees for habitat.

4 See "Forest Floor" p 79 in *Hands-On-Nature* by Jenepher Lingelbach for activities that relate to the forest floor communities.

5 Try the activity "Forest Concentration" p 48 in *Project Learning Tree*.

Grade
K to 12

Subject
Science, Language arts, Art, Social Studies, Home Economics

Skills
analysis, classification, comparing similarities and differences, drawing, generalization, psychomotor development

Duration
two 45 periods

Setting
indoors

Group Size
small group work

Keywords
habitat
survival needs
community

Materials
- equipment to build a human community (cardboard, paper tubes, boxes, markers, etc.)
- equipment to build a forest community (toilet tubes, paper, paint, papier maché, modeling clay, cones, leaves, soil, etc.)

Activity 3

No Place Like Home!

Objectives
Students will be able to:

1. understand the roles of wildlife trees in the forest ecosystem; and
2. compare the roles of wildlife trees in the forest to human communities.

Method
Students create and compare the components of both a human community and a wildlife tree ecosystem.

Background
An ecosystem is a community of organisms that interact with themselves and the non-living environment. A natural ecosystem consists of four main components: producers (green plants), consumers (animals), decomposers (bacteria, fungi), and the non-living environment.

The basic needs for the survival of all living things include food, water, shelter, and space. The following are examples of community labels:

Food source (farm, garden)
Food sales (grocery, market)
Shelter (house, apartment)
Water (community resources; water district)
Space (park, backyard)

The main purpose of this activity is for the students to make connections between their own community and the forest/ wildlife tree community.

Procedure
1. Prior to starting this activity it might be a good idea to brainstorm with the students what our basic needs are for survival. Begin by circling one idea, such as 'basic needs', on a piece of paper or the blackboard. Expand this to include other animals. There may be many varying ideas, but during the initial brainstorm anything goes. Write it all as extensions from your initial idea and see where it leads. After that, you can decide as a class which needs are absolutely essential for survival - and begin again to collect ideas of how you might meet each of those needs.

2 Build a human community with your students. The model could include people, reservoirs, houses, stores, garbage collectors, gas station, etc. It should represent all the ways that we supply our basic needs for survival as a community. You may want to label the things in your model that are important for human survival.

3 After discussing and experiencing the concept of community, build a model forest representing live and healthy trees, dead and dying trees, coarse woody debris, nurse logs and different kinds of wildlife (insects, worms, deer, mice, frogs, squirrels, birds...). Label the "jobs" in this community to reflect similar ones in your human community. For example, slugs act as garbage collectors (decomposers), wildlife trees as grocery stores for woodpeckers, squirrels, salamanders, frogs and insects (who become food for the latter).

Extensions

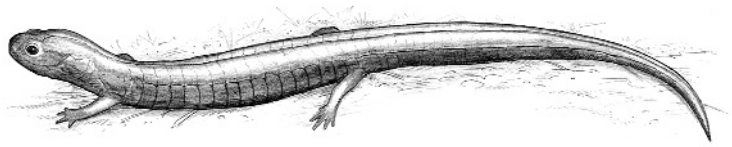
1 A follow-up for this activity might be field trips to parts of your community as represented in the model. Perhaps the students could go on scavenger hunts to find where basic survival needs are met in each community.

2 Illustrate some different ways in which wildlife depend on a wildlife tree for their home.

Evaluation

1 List the basic survival needs for all living things.

2 Describe the similarities and differences of a human home to that of a wildlife tree user's home.



Western Red-backed Salamander –a terrestrial salamander who prefers the moist environment of downed wildlife trees.

Activity 4

No Room At The Animal Inn!✤

Grade
K–9

Subject
Science, P.E., Math

Skill
application, description, discussion, generalization, kinaesthetic conceptual development, observation, psychomotor development

Duration
30–45 minutes

Group Size
15 or more students

Setting
outdoors or indoors; a large area needed for running

Key Words
habitat
habitat destruction
limiting factors
population

Materials
area large enough to for students to run ■ chalkboard or flip chart and writing materials

✤ This activity is a modified version of the activity "Oh Deer!" found in the P*roject* WILD activity guide.

Objective
The student will be able to:

1. identify and describe food, water and shelter as three essential components of habitat;
2. describe the importance of wildlife tree habitat for animals;
3. define limiting factors and give examples; and
4. recognize that some fluctuations in wildlife populations are natural, as ecological systems undergo constant change.

Method
Students become wildlife tree users and components of wildlife tree habitat in an highly involving physical activity.

Background
For any population of animals to survive, they must be able to reproduce successfully. Disease, predators, bad weather, pollution, and starvation are limiting factors, which can affect the survival of a species.

One of the main reason that a species becomes threatened or endangered is because its habitat is destroyed, either through natural causes like fire or flooding, or by human activities, like agriculture, logging, or urban development.

This activity shows how important habitat is for wildlife tree users; how habitat provides only a limited supply of food, water, space, and shelter; and how this in turn controls and changes the size of an animal population.

Students will discover how the population of a particular species goes up or down, depending on the availability of suitable habitat. In this activity, we look at animals that rely on wildlife trees for habitat. The activity demonstrates the fluctuation of animal populations from year to year.

Procedure
1. Begin by telling students that they are about to participate in an activity that emphasizes the four key components necessary for wildlife tree users survival. Review the essential components; food, water, shelter and space. Choose an animal that is dependent on a wildlife tree for habitat. Discuss with the students what that animal needs in order to survive. For example, a Great Horned Owl uses

wildlife trees to nest and roost. Great Horned Owls also require water and food. This activity emphasizes only three components of habitat requirements: food, water and shelter — wildlife trees.

2 Ask your students to count off in fours. Have all the ones go to one area; all twos, threes and fours to go to another area. Mark two parallel lines on the ground or floor, nine to 18 metres apart. Have the ones line up behind one line; the rest of the students line up behind the other line.

3 All the ones will become a Great Horned Owl or some other wildlife tree user. Ask the students what the key components of habitat are for an animal to survive. Tell the students that Great Horned Owls need wildlife trees to nest or roost in, plus food and water and space. Assume for this activity that there will adequate space, so the students, Great Horned Owls, will be looking for wildlife tree (shelter), food and water. When a Great Horned Owl is looking for a wildlife tree, it must hold its arms straight out sideways. When the owl is looking for water, it must put its hands over its mouth. When it is looking for food, it must clamp its hands over its stomach. Great Horned Owls will choose what they are looking for at the start of each round. They cannot change what they are looking after the round has started.

Great Horned Owl (immature) – the most widespread owl species in North American

4 The twos, threes and fours are food, water, and wildlife trees. At the start of each round each student gets to choose which component he or she will be for that round or year. The students depict which component they are in the same way the Great Horned Owls show what they are looking for.

5 The activity starts with all players lined up on their respective lines (owls on one side and habitat components on the other side) and with their backs to each other on the other line.

6 Begin each round or year by asking the students to make their signs — each owl making the sign that they will be looking for. Give the students a few moments to choose their sign. When ready count to three and at three each student turns around.

7 When the owls see what they are looking for they must run to it. Each owl must hold the sign of what they are looking for until getting to that habitat component. When the owls have found what they are looking for they take the habitat components back to the owl side of the line. These habitat components will become the owls for the next round. The owls that didn't find what they were looking for must go the habitat side and in the next round they will

become a habitat component. Have a student or yourself record the number of owls that survived each round or year.

8 Play the activity at a quick pace for at least 10 rounds. At the end of 10 rounds, bring the students together for a discussion.

9 Ask them what happened to the owl population and explain the reasons why. Put the data for each round onto graph paper to show how the owl population changed from year to year. The fluctuation of the owl population is a natural process. The fluctuations are a result of the availability of food, water and wildlife trees as well as other possible limiting factors (disease, weather, etc., could be incorporated into the activity). The owl population will continue to increase then decrease as long as there is good habitat and enough owls to reproduce.

Extensions

1 Graph the number that survived from year to year or use jelly beans in clear containers to illustrate the fluctuations.

2 Try "Trees as Habitats" p 112 and "Wildlife Habitat" p 117 in P*roject* L*earning* T*ree*.

3 See "Camouflage pp. 201–205 in H*ands-On-Nature* by Jenepher Lingelbach.

Evaluation

1 Have the students list the four essential components of habitat. Ask them why wildlife trees are special habitats.

2 Define limiting factors for wildlife tree users.

Activity 5

Animal Inns Under Construction!

Objective

Students will be able to:

1. recognize that wildlife trees provide habitat for many different species;
2. wildlife trees support Biodiversity in British Columbia; and
3. describe the different components that make up a wildlife tree

Method

Groups of students create components of a wildlife tree and bring them together to see what variety of the animals, insects, and plants a wildlife tree can support.

Background

Wildlife trees are truly animal inns. Some provide more 'rooms' than others. Trees in a variety of habitats throughout the province have been known to be homes for several different species of vertebrates at the same time. For example, bats, swallows, woodpeckers and owls may all be in one tree at the same time, if the conditions are right. Those conditions include adequate food, water, shelter and space for each individual species. This could mean a variety of both natural and excavated cavities, loose bark, a broken top, limbs for perching, minimal disturbance and proximity to food and water sources. The time when the tree is most used is during breeding season. Some birds may be most active early in the morning but owls and bats are more often active at dusk and later in the evening.

Usually, there may be only one 'family of guests' at a time. That's only for the vertebrates, though. There is also an amazing diversity of invertebrates who make wildlife trees their home. Entomologists in British Columbia can go practically anywhere in the province and not only find new insects but they may also find new species that have never been seen before! There is also a myriad of plants, lichens and fungi that need wildlife trees to survive. Many species in turn need those plants and insects for habitat and food sources.

When choosing species for this activity, whether its the type of wildlife tree or the wildlife tree users species, you may want to look at species you can find in your part of the province. A Bald Eagle will prefer Douglas-fir on the coast, but may find that Black Cottonwoods are the only suitable tree on the Peace River. Spotted Bats have only been found in the Southern and Central Interior. The threatened White-

Grades

4 – 9

Subject

Science, Art, Home Economics, Social Studies

Skills

analysis, communication, description, discussion, evaluation, invention, psychomotor skills, observation, synthesis

Duration

two 45 minute periods

Group Size

work in groups of 4 to 5

Setting

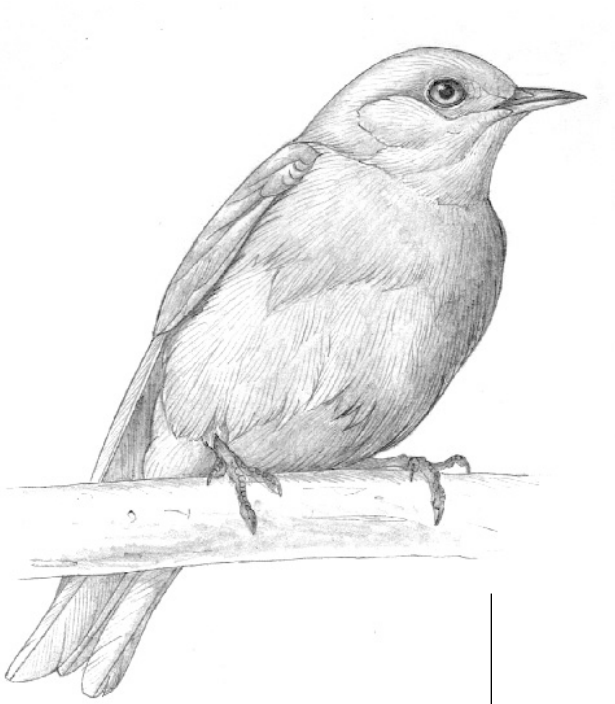
indoors

Keywords

biodiversity
habitat
limiting factors
food chain

Materials

■ drawing paper ■ crayons, coloured markers, paint, and brushes ■ scissors and tape ■ four cardboard boxes of equal size ■ wildlife tree users list



Mountain Bluebird – A Secondary Cavity User.

headed Woodpecker could be a species on the same wildlife tree model, especially if the tree was a ponderosa pine because its range is similar. Consult the list of suggested resources in the appendix for further information about these species. There are also several publications available from a variety of government agencies.

Procedure

1 Discuss with your students how different stages of a wildlife tree provide a variety of feeding, nesting and shelter opportunities.

2 Split students into four groups. They will each have a cardboard box that will become a section of the tree that they are going to create.

3 Have students determine which species should live in their section or let them make choices from the following suggestions:

Top:

- Great Blue Heron — open nester; roost; hunting perch
- Great Horned Owl — secondary cavity user; nests on broken treetops; hunting perch
- Red-tailed Hawk — hunting perch
- Osprey — open nester; lookout and feeding perch
- Golden Eagle — open nester on large tree limbs

Middle:

- Mountain Bluebird — secondary cavity user; hawking perch
- Pileated Woodpecker — primary cavity user; roost; foraging
- Wood Duck — secondary cavity user
- Little Brown Myotis — nursery; day roost in cavity and behind bark
- Lichen — grows on rotting logs and wildlife trees
- Insects — species include bark beetles chewing tunnels in the wood

Middle:

- Western Screech-owl — secondary cavity user; roost
- Licorice Fern — found usually on sides of deciduous trees on coast
- Downy Woodpecker — primary cavity user; roost; foraging
- Raccoon — nest; summer and winter dens in cavities
- Insects — species include Black Carpenter Ants
- Deer Mouse — nests in cavities and behind bark; summer and winter dens in cavities

Base:

- Clouded Salamander— lays eggs in rotting wood; feeding site; shelter
- Black Bear — hibernates in hollow root systems and wildlife trees
- Bracket Fungus — the fruiting body of an internal tree fungus
- Slugs — lay eggs in rotting wood
- Mountain caribou — feeds on lichens found on rotting logs and wildlife trees
- Western Red-backed Salamander— lays eggs in rotting wood; feeding site; shelter

4 Students create images for each of the four sides on the box then tape them on.

5 When the boxes are stacked in the right order, they will give the students an idea of all the animals, plants and insects a wildlife tree can support For example, one side of the box tree could show from top to bottom: a Bald Eagle on a nest, a Pileated Woodpecker making a cavity, a Raccoon roosting in an old cavity and a Clouded Salamander looking for slug eggs.

Licorice fern – an epiphyte, a plant growing on a plant

Extensions

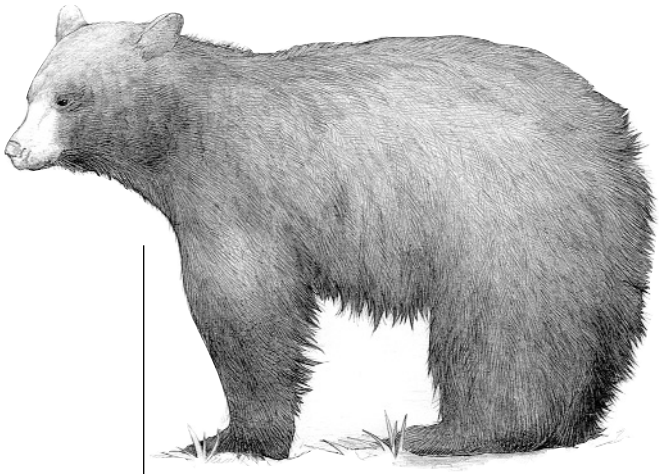
1 Wildlife Trees, or different sides, could be made to represent the different seasons, habitats (Boreal Plains versus Coastal Mountains) or tree species.

2 Habitat restoration techniques could be discussed with the addition of wildlife tree signs and nest boxes to the box tree.

Evaluation

1 List some of the wildlife tree users and describe how they are dependent on the tree.

2 Illustrate how a wildlife tree can be used through a webbing process.



Black Bear. There are an estimated 120,000 Black Bears in British Columbia.

Activity 6

Wildlife Tree Inn

Grade

K–8

Subject

Language Arts, Science, Art

Skills

communication, description, discussion, drawing, listening, listing, reading, researching, reporting, small group work, synthesis, writing

Duration

two to three 45 minute periods

Group Size

individual or in small groups

Setting

indoors

Keyword

Habitat

Materials

drawing paper ■ crayons ■ chalk ■ different types of materials (cones, cloth, twigs, old leaves, etc.) that could be used to make a large colourful mural ■ wildlife tree user list.

Evaluation

1 Product requires recognition.

2 List the four basic habitat components that humans and wildlife need to survive.

Objective

Students will be able to recognize that wildlife trees are important habitat homes for many different animals.

Method

Create a mural of a wildlife tree with some of the animals in British Columbia that use wildlife trees for habitat.

Background

Humans and other animals — including pets, farm animals, and wildlife — share some of the basic needs. Every animal needs a home, food, water, and living space. Humans have houses which we call homes, and animals too have homes. These are referred to as habitats.

Wildlife trees are habitat, and there are over 90 different species of animals who use wildlife trees for food, shelter and nesting. The largest group are cavity nesting birds, such as owls, woodpeckers, and ducks that nest in holes in the decaying tree. Some birds like eagles and ospreys will build large nests on the top of dead trees that have broken tips, but almost one in every five of British Columbia's bird species are cavity nesters. A number of mammals and amphibians also make their homes in the wildlife trees.

The purpose of this activity is to demonstrate the wide range of animals that depend on wildlife trees for habitat.

Procedure

1 Discuss with your students the different animals that rely on wildlife trees for their homes (see Appendix A for list of wildlife tree users). Compare this to their own needs for a home.

2 Ask each student to chose something that depends on a wildlife tree so they can draw it on wildlife tree mural.

3 Have the students label the animal or plant that they draw and explain how they use the tree for habitat.

Extensions

1 Have the students research a wildlife tree user and write a short paragraph or story describing how that animal uses a wildlife tree. Paste their paragraphs to the mural next to the drawing or picture of that animal.

2 Have the students write a poem or song about wildlife tree homes. Try rewording the song of "Home on the Range" to "Home at the Wildlife Tree Inn."

Activity 7

Junior Wildlife Tree Assessor

Objective

Students will be able to:

1. identify wildlife trees on their own school grounds or immediate area;
2. suggest and evaluate ways to maintain and protect wildlife trees;
3. describe characteristics that make good wildlife trees; and
4. assess a tree to determine its value as a wildlife tree.

Method

Students identify and assess good examples of wildlife trees on their school grounds or adjacent woodlot or park.

Background

Wildlife trees are found in all forested areas of British Columbia and can develop from any coniferous or deciduous tree. Wildlife trees provide a special kind of habitat as part of the forest ecosystem.

Over 90 species of animals in British Columbia use wildlife trees for habitat. Some of these animals that are dependent on the dead and decaying trees are endangered or threatened because this habitat is being lost. Although conservation and protection of wildlife tree habitat is important, not all trees are good wildlife trees. Therefore, certain features or characteristics are considered to determine whether or not a tree is a good wildlife tree, or if the tree is likely to become a good wildlife tree in the future.

The following are some things to consider when identifying and assessing wildlife trees:

1. Stage of the life cycle (see "Identifying Stages of Decay", pp. 8–22 for more information)
   a. broken tops — allow open nesting birds such as Ospreys, Bald Eagles or Great Blue Herons to build nests.
   b. peeling bark (on thick barked trees) — allows bats to roost or nest.
   c. rotting wood — soft wood allows primary cavity excavators such as woodpeckers to drill nest holes or to look for food.

Grade

Grades 7–12

Subject

Science, Language Arts

Skills

analysis, discussion, generalization, observation

Duration

30–45 minutes

Group Size

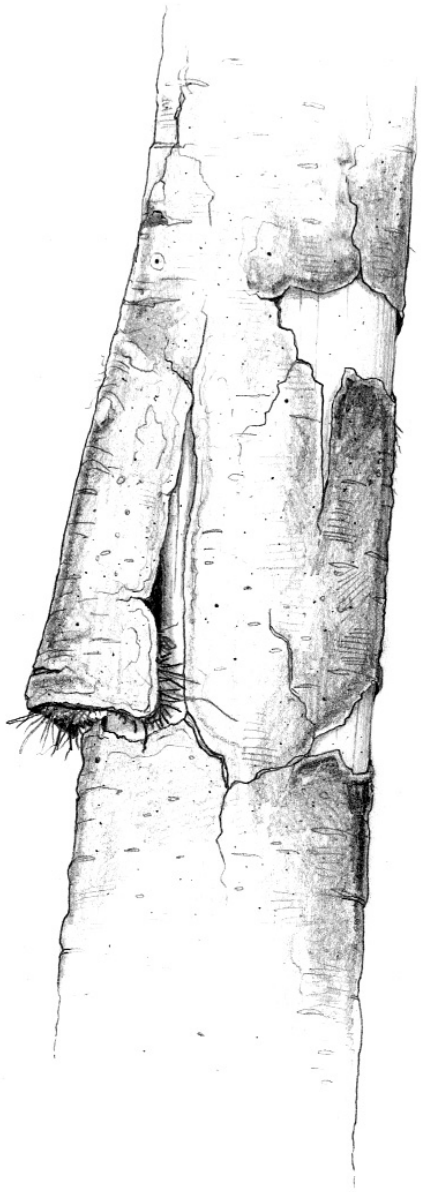
three or four

Setting

outdoors or indoors

Key Words

ecosystem
habitat



Brown Creeper nest under loose bark

Materials

create or use the provided worksheet of key questions for the students so they can identify good wildlife trees ■ pictures of wildlife trees and species that use them ■ assessor's card

d loss of branches — can result in natural cavities which can allow secondary cavity-users like owls, raccoons and ducks to build nests or find shelter.

e large limbs - can be used for hunting perches.

2 Amount of time remaining

a depends on the stage of decay

b species of tree — some like cedar will live longer

c size — large tree will decay more slowly

d climate — trees in dry areas will decay more slowly compared to those in wet areas.

3 Cause of death and decay

a fire

b disease

c fungus

d insects

e lightning

f center rot vs bark rot

4 Surrounding habitat

a shrubs and other vegetation can provide cover for wildlife

b water and food source nearby

c undisturbed/disturbed — roads or development may deter wildlife from using the tree

5 Evidence of wildlife using tree

a feeding holes

b nests or cavities

c insects for food

d perching limbs

e fecal remains

6 Safety

a workers

b public

These are just a few things that are considered when deciding the whether a tree is a good wildlife tree. The objective of this activity is for the student to recognize and identify wildlife trees.

Procedure

1 Brainstorm with the students about animals that use trees. Create a list of wildlife that use trees for food, homes, resting, hunting perches, nests or breeding sites.

2 Introduce wildlife trees. Explain to the student why these trees are unique and why they are different from other trees. Reflect on why it is important to have a variety of plants and animals.

3 Have the students describe and pick from their list what kinds of animals use these types of trees. Ask the students to describe the important characteristics of these trees and why certain species might use them for homes, food, or resting spots. After you have several suggestions and reasons why animals might use wildlife trees, explain to them that some trees make better wildlife trees than others (softer wood, proximity to water, etc.).

4 Summarize the characteristics that make some trees more valuable than others. Ask the students for reasons. For example, why do some birds use wildlife trees that are relatively tall compared to one that is short? Why would a wide trunk be better?

5 After you have discussed the value of wildlife trees and have gone over key characteristics that make a tree valuable have the students get into groups of two or three. Tell the students they are going to be tree detectives and their goal is to locate and assess a wildlife tree. Each group should have a worksheet to write down why a certain tree is a wildlife tree (signs of tree users, etc.). Give the groups at least 15–20 minutes to see if they can identify a wildlife tree on their school grounds or some other nearby area.

6 Have the groups explain why the tree they picked is a wildlife tree. Pick a wildlife tree and go over the parts of the tree that are being used or could be used by different animals.

Extensions

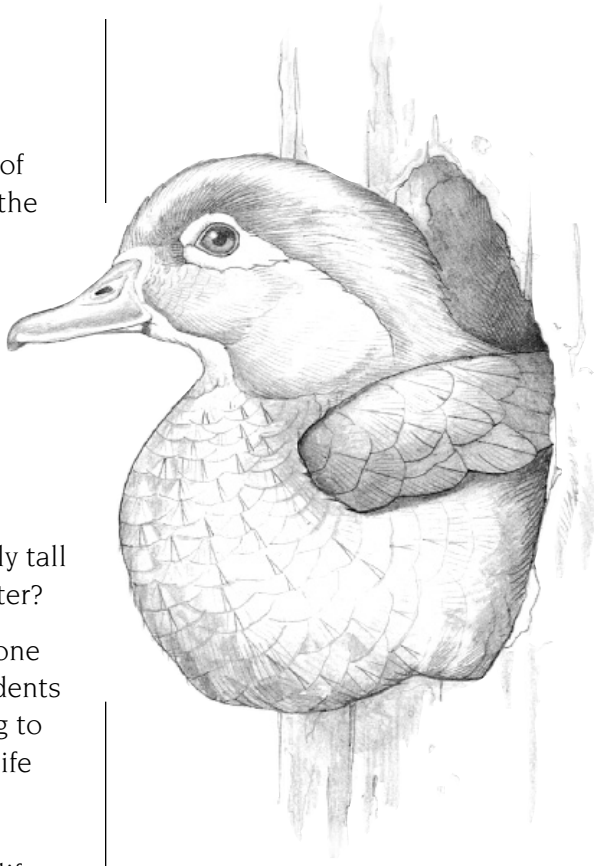
1 Ask the class to think of ways to help protect wildlife trees. If there is a good wildlife tree on the school grounds, the students may want to identify it with a wildlife tree sign.

2 Have the students research a wildlife tree user.

3 Have the students plot the wildlife trees that are being used on a map. Add overlays to the map that include the different kinds of species found using the trees or other special characteristics.

4 See "Rotting Logs" pp. 98-103 in H*ands-On-Nature* by Jenepher Lingelbach.

5 Try the activity "Adopt-A-Tree" p 4 and "Trees as Habitats" p 112 in P*roject Learning Tree*.



Female Wood Duck. Some Wood Duck nests have been found as high as 20 metres.

Evaluation

Have the students write a short paragraph explaining the characteristics that make some trees better wildlife trees than others.

Additional Information on Wildlife Trees:

Wildlife Tree Committee
Wildlife Branch
Ministry of Environment, Lands & Parks
780 Blanshard
Victoria, B.C. V8V 1X5
Phone: 387-9765

Junior Wildlife Tree Assessor's Card

A / Tree Longevity

	Value
high	1
moderate	2
low	3

A ____

B / Height (m)

>20 m	high 1
5–20 m	moderate 2
<5 m	low 3

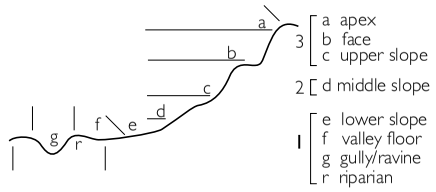
B ____

C / Diameter at Breast Height (cm)

>50 cm (or greatest WT for site)	high 1
20-50 cm	moderate 2
< 20 cm	low 3

C ____

D / Site Position



	low 3
	moderate 2
	high 1

D ____

E / Decay Value

Live		Dead					Dead Fallen	
2		1 (high			2	3 (low)		2

E ____

Wildlife Tree Habitat Value Rating:

5–7 = high
8–10 = medium
11–15 = low

Add

A+B+C+D+E = ____

Wildlife Tree Use

How Did This Wildlife Tree Die?

Map Your Wildlife Tree In Its Habitat

Wildlife Tree Illustration

Habitat Description

Adapted from *Wildlife/Danger Tree Assessor's Card*

Activity 8

Wildlife Tree Scavenger Hunt

Objective

Students will be able to describe and observe characteristics of wildlife trees.

Method

Students will look for wildlife trees and signs of plants or animals that use wildlife trees for habitat during a scavenger hunt.

Background

Wildlife trees provide habitat for many different animals. Wildlife trees can be found in all forest ecosystems and can be created in many different ways. Insect damage, disease, fire, lightning, lack of light or poor growing conditions are just some things that can cause a tree to decay.

Standing dead or live trees may start decaying from the centre of the tree or from the outside, in the bark. As a tree rots and decays, it becomes smaller as branches and bits of the trunk break apart and becomes part of the forest floor. The tree also becomes softer as the wood is being decomposed by bacteria, fungus and wood boring insects. The size, species and climate all can effect the rate at which a tree will decay. A large tree will decay slowly compared to a smaller tree and a dry climate will might also mean a tree will decay more slowly. The longer it takes for a tree to decay the longer that tree can provide habitat for wildlife.

Certain special characteristics make certain trees more valuable as wildlife trees than others. Tall trees are more useful as hunting perches and trees with wide trunks allow plenty of room for nests and shelters. Wildlife will also use trees that have surrounding vegetation for cover, protection and food. Trees situated near a water source will provide another important component of an animal's habitat.

Primary cavity excavators such as the Pileated Woodpecker excavate holes for nesting and drill into decaying trees for food. Secondary cavity users such as owls, squirrels and ducks will nest in abandoned cavities built by primary cavity excavators or cavities formed when limbs break off. Open nesters such as Ospreys, Bald Eagles or hawks will use the broken tops of wildlife trees for nesting or large, dead limbs for hunting perches. Insects, salamanders, frogs and plants also use wildlife trees for habitat. Signs such as nesting cavities, feeding

Grade

K–12

Subject

Science, Biology

Skills

analysis, application, description, discussion, generalization, observation, small group work, synthesis

Duration

20–30 minutes

Group Size

groups of two

Setting

outdoors

Keywords

primary cavity excavators
secondary cavity users
open nesters

holes, discarded tree cones (squirrels eating the seeds), owl pellets, and insect holes are just a few indicators that a tree is in use.

The objective of this activity is for students to look for some of the different characteristics of wildlife trees.

Materials

Photocopy one scavenger hunt check list for each group of two or three students.

Procedure

1. Before students get into groups of two or three, go over the characteristics of wildlife trees and talk about how animals might use these types of trees for habitat.
2. Take the students out to an area that has some wildlife trees.
3. Have the students work together in groups of two or three. Ask the students to try finding as many items on their checklist as possible. For each item checked off on the list ask each group to state why and how they came to their conclusions.

Caution: Please do not remove any plants or animals — the students are just to observe and check off any wildlife tree use or evidence of usage.

Extensions

1. Have each group of students make up a chart showing the different ways animals use wildlife trees, listing the users.
2. Have each student write a story about wildlife trees or an animal that uses one.

Evaluation

1. Ask the students to describe or list some wildlife tree characteristics and how they would be used by an animal.

Additional Resources

See pp. 77-79 in H*ands-on-*N*ature* by Jenepher Lingelbach.

Activity Checklist

Wildlife Tree Scavenger Hunt

Find evidence of wildlife trees, signs of animal and plants that use wildlife trees, and other features. Remember: **do not disturb anything!**

_____ A cavity that might be in use

_____ A good place for a bat to roost

_____ A nest of some sort

_____ Woody debris

_____ A hunting perch

_____ A wildlife tree with its top broken off

_____ Insects that could be food for birds

_____ A deciduous wildlife tree

_____ Woodpecker holes

_____ A hollow trunk where a bear could sleep

_____ A wildlife tree in a dry, sunny forest

_____ Fungi

_____ The sounds of a woodpecker drilling into a tree

_____ A coniferous wildlife tree

_____ Owl pellets

_____ Lichens

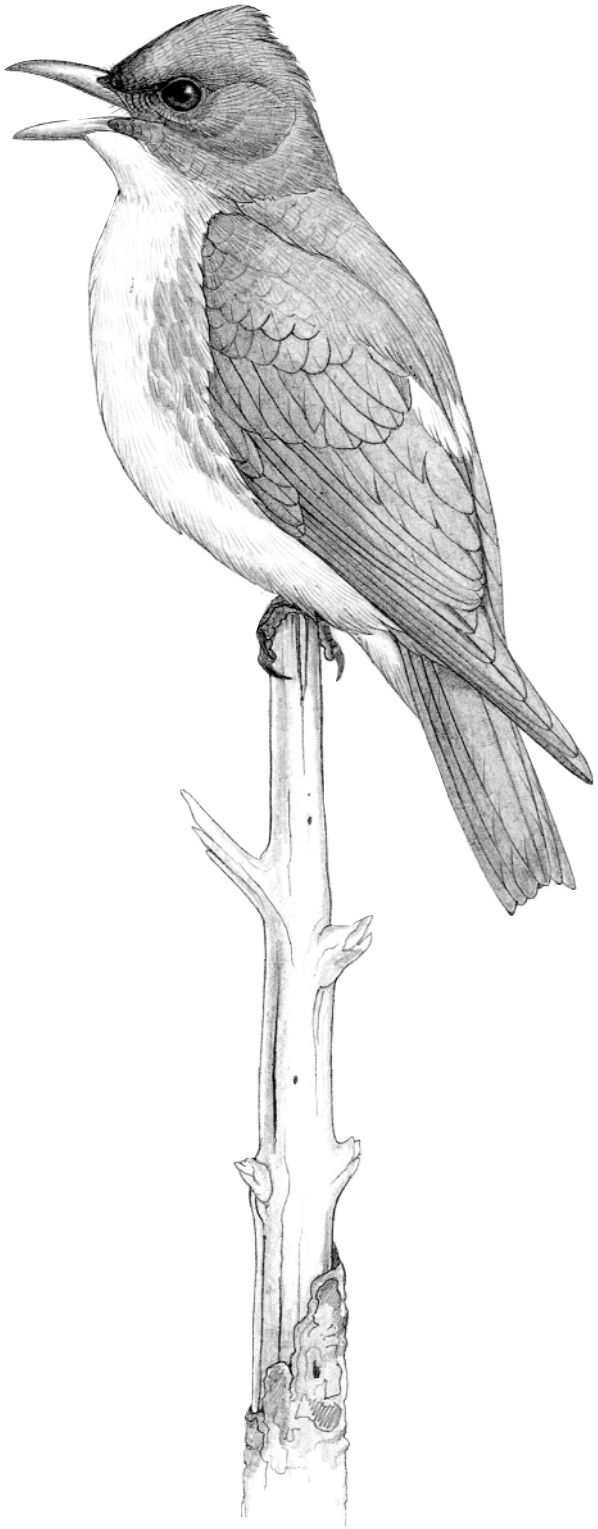
_____ A wildlife tree in a wet forest

_____ A standing wildlife tree

_____ Moss growing on a log

_____ Animals using a tree

_____ Squirrel middens



Olive-side Flycatcher. Flycatchers use tops of wildlife trees for hunting perches. This species call sounds like, "quick-three-beers."

Activity 9

Wildlife Tree Rummy✣

Grade
Grades 4–8

Subject
Science

Skills
analysis, application, classification, comparing similarities and differences, group work, reading, writing

Duration
45 minute period

Group Size
groups of two or four

Setting
indoors or outdoors

Keywords
wildlife trees
habitat

Materials
one set of Wildlife Tree Cards for groups of three or five students — the cards represent different wildlife tree users, different stages of wildlife tree decay, different uses for wildlife trees by humans and animals.

✣ This activity is a modified version of the activity "Habitat Rummy" found in the P*roject* WILD activity guide.

Objective
Students will be able to:

1. describe interdependence of human/wildlife tree/wildlife tree users;
2. identify components of habitat as food, water, shelter, and space in a suitable arrangement; and
3. apply knowledge of these habitat components to habitat requirements of various wildlife tree users.

Method
Students determine the habitat needs for various wildlife tree users in a card game.

Background
People and other animals share some basic needs. Every species requires a place to live — a habitat, where the animal finds its food, water, shelter, and space.

Wildlife trees provide critical habitat for over 90 different animals in British Columbia. They depend on these dead and dying trees for food, shelter, nesting sites, and places to perch and roost.

The main purpose of this activity is to understand that all animals, including people, share some of the same basic needs.

Procedure
1. Ask each student to pick a wildlife tree user. Tell them they are going to research it or brainstorm with the class some of the wildlife tree users. Have students list their habitat.
2. Ask each student to find out what each animal needs to survive: type of food, water, and how they use wildlife trees. Use the research worksheet from Alert! Code Red and Blue! to help guide the students.
3. Have each student add the wildlife tree user they researched to a class chart that lists the wildlife tree users and the habitat requirements that species needs (food, water, shelter, space, and arrangement).
4. Make copies of the wildlife tree habitat cards that come with this activity or have the students make their own for the animal they researched.

5 To play the game…

   a The object of the game is for a player to get four cards from one vertical column or a complete set of habitat components for an animal. The game ends when all the habitat components are in complete sets. The student with the most sets is the "winner" of the game.

   b The game begins as one student deals four cards to each of the players in his group. The first player may discard an unwanted card and select another from the rest of the deck. The discarded cards will be placed face up next to the new cards. The next player can either pick up a new card or pick up the top card from the discard pile. Play continues until a complete set of habitat cards for a wildlife tree user is complete. When a player gets a complete set they will yell "Habitat!" This process will continue until all habitat sets are complete. Tally up the number of complete sets each player has and the one with the most is the winner.

6 Ask the students to summarize what they have learned about wildlife tree users and how they depend on wildlife trees

Extensions

1 Food Chain Rummy: Play as in rummy. Players get a point for each component of every complete food chain. Cards may be added to either end of the food chain by any other player, acquiring points for every card involved each time. High score wins. Cards remaining in hand at the end of the game must be subtracted from the player's score.

2 Have students make their own cards.

3 Discuss local wildlife tree users and the type of habitat requirements they need.

4 Have the students make a model of a wildlife tree user habitat.

5 Have the students make a collage or diorama of the animal they researched.

6 For younger students try a puppet show with the different wildlife tree users. Ask the students to describe where the animal lives and what its needs are.

Evaluation

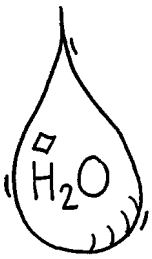
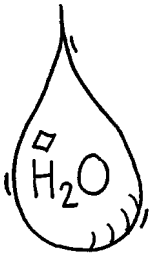
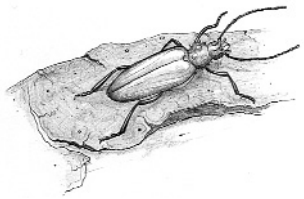
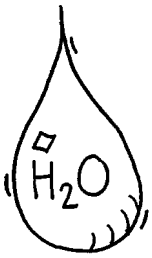
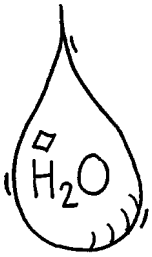
1 Observation and if students are successful at playing the game.

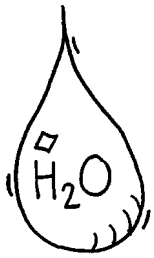
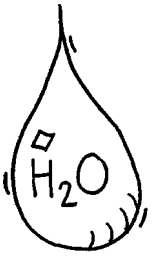
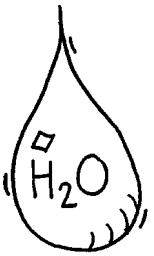
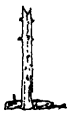
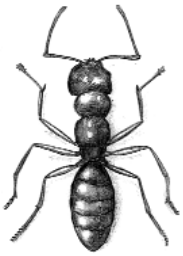
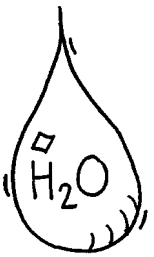
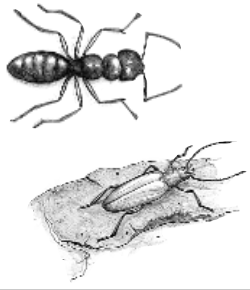
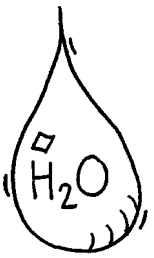
2 Have the students explain why they won or lost the game.

Activity Worksheet

Wildlife Tree Rummy Habitat Cards

Photocopy the habitat cards below or have students make their own.

Wildlife tree users	Food	Water	Wildlife Tree Habitat
			Stage 1 
			Stage 2 
			Stage 3 
			Stage 4 

Wildlife tree users	Food	Water	Wildlife Tree Habitat
	insects seeds berries carrion		Stage 5 
	plants insects amphibians fish & shellfish young mammals & birds		Stage 6 
	seeds & nuts berries bird eggs & young		Stage 7 
			Stage 8 
			Stage 9 

Activity 10

What's for Dinner?

Grade
4–12

Subject
Science, P.E.

Skills
analysis, description, discussion, evaluation, generalization, kinaesthetic concept development, psychomotor development

Duration
20–45 minutes

Group Size
best with at least ten students

Setting
outdoors or indoors (large area needed)

Keywords
habitat
limiting factors
predator
prey

Objective

Students will be able to:

1. discuss predator/prey relationships that revolve around wildlife tree habitat;
2. recognize limiting factors that affect wildlife tree users; and
3. describe the importance of wildlife trees for predator and prey.

Method

Students will become predator and prey species that depend on wildlife trees for habitat.

Background

In order to survive, animals need food, water, shelter and space. These four essentials for life are found in the natural surroundings, or habitat, where an animal lives. In British Columbia dead and decaying wildlife trees are habitat for over 90 different species of animals. Each one of these animals rely on wildlife trees for a home where they can find food and shelter. For example, an eagle requires a tall tree with either a broken top or a branch that is big enough on which to build a nest. At different stages of decay, these trees are used by different animals.

But some dead and decaying trees are more valuable for wildlife than others. If an animal is to survive it needs to be able to find its food and water fairly close to where it takes shelter.

This activity demonstrates a predator and prey relationship that revolve around wildlife trees.

Procedure

1. Have students pick a predator/prey pair that is dependent on wildlife trees — one predator for every five to six prey. Example: Red-tailed Hawk and Deer Mouse
2. Identify students as either predators, Red-tailed Hawk, or prey, Deer Mouse.
3. Arrange five hoops that represent wildlife trees around one end of the field. Place two more on each side of the field that represent the predators perch or home. Arrange the water tokens at the opposite

end from the wildlife trees. The food tokens (insects) and temporary cover (cones) can be scattered between the shelter and water.

4 Make sure the predators are clearly marked. Predators start at their hunting perches but they cannot capture prey while in the shelter area. They are scouting out prey while they are at their perch. When predators leave their perch, they are to hunt for prey. A predator must tag the prey with two hands. When this happens, the prey must give one of their tokens up. Once the prey has lost both of its tokens, they will become parts of the forest (tree, etc.) that can then be used as temporary cover or safety zones by the prey still remaining. Predators require five tokens to live.

5 When you are ready to begin, have all the prey wait at their shelter. The goal of this activity is for the prey to gather one food token or one water token at a time. It is important to relay the message that the predators are not bad but rather they are trying to survive and meet all their habitat requirements. Each prey must go find one food or water token and return to the wildlife tree. The mice need two to four food tokens and two to four water tokens to survive (eight trips back and forth to their shelter). The mice are safe during their travels when they have both feet in or both hands on a temporary cover area.

6 Make each round of play about 5–7 minutes long. At the end of each round tally up the number prey who survived (ones who obtained a total of four tokens — two water and two food).

7 To make the game a little harder, limit the number of available temporary cover areas or move the shelter farther from the food and water. To slow this game down, have the prey use baby steps or be in pairs.

8 Interview students and ask how it felt to be the prey or predator. Then have the students who were prey be the predators and predators become the prey.

Extensions

1 Use local examples.

2 Try "The Thicket Game" pp. 137–138 in P*roject* WILD.

3 See "Hunter-Hunted" pp. 37–42 in H*ands-On-Nature* by Jenepher Lingelbach.

Materials

two food and water tokens for each student (make different colours) ■ bandannas for predators or some other marker (vests) ■ two tags or tokens for each prey ■ five hula hoops or areas marked with chalk or string to be used as shelter ■ five cones, boxes or hula hoops to represent areas that can provide temporary cover for the mice.

Evaluation

1 Ask students to diagram the relationship between predator and prey and the habitat component they share, wildlife trees.

2 Have the students write a paragraph about the relationship between wildlife trees and predator/prey.

3 Ask the students to draw a web diagram that shows wildlife trees and the animals dependent on them.

4 Discuss the strategy used by both the prey and predators in order to get their components of habitat.

Grade
K to 11

Subject
Science

Skills
analysis, classification, description, discussion, evaluation, observation, synthesis

Duration
one to two 45-minute periods

Group Size
groups of three to four

Setting
outdoors but can be modified for inside

Keywords
consumers
decomposers
producers
lichen
fungi
food chain

Activity 11

Life in a Log

Objectives:
Students will be able to:

1. recognize the variety and abundance of life supported in a fallen tree; and
2. understand the roles of insects and other wildlife in the decay of fallen trees and the regeneration process.

Method
Students investigate the microhabitat of a log through this hands-on, exploration activity.

Background
The age-old question "If a tree falls in the forest, does anyone hear it?" may be answered by the students in this activity. They may want to say "yes" to this question if they count all the wildlife in a forest that can use a fallen tree for shelter, nesting, food and overwintering. Wildlife trees are important whether they are standing or fallen as they are used in different ways.

Fallen wildlife trees are often called nurse logs because they support a whole variety of life on the forest floor. You may have seen one with trees and smaller plants growing from it. Underneath that growth may be a whole community of different organisms such as beetles, carpenter ants, centipedes, salamanders, slugs, snails, mice, and voles. They say there are more living cells in a dead tree than a live tree — have a look and see!

When investigating a fallen tree, keep in mind that it is a home to many different animals. If you pull the tree apart, you may damage the homes of some of the living things you are investigating. Be very careful to pick up pieces of the tree that are already detached, then replace them exactly as they were before. Also remember that repeated disturbance may scare some living things from their homes (such as salamanders and small rodents).

Procedure
1. Find a forested area that has a variety of fallen trees. Choose carefully the tree that you would like to study (try to find one that does not need to be destroyed and pulled apart).Find a fallen tree that includes woody debris around it.

2 Hand out magnifiers (teach how to use, if necessary) to each group of students. Important: Explain the importance of exploring without destroying. You may want to use the analogy of the pieces of bark and wood being like a roof on someone or something's house. Tell them you would like to see how many creatures they can find living in and around this fallen tree.

3 Have the students record their observations in journals or on a worksheet. Ask them to sketch what they find in their journals or worksheet. You may include pre-assigned classifications such as: moss, lichen, fungus, insects, spiders, amphibians, reptiles etc.

4 Wrap up this activity by discussing what was found by each group and collating any data collected. Compare the findings.

Life in a log

Extensions

1 Have the students create a mural of all the things found on the log.

2 Write a report based on the worksheet or journal.

3 Visit the same log during different seasons.

4 Use this activity to introduce the activity No Place Like Home!

5 Conduct a population study for the various wildlife found on logs in a certain area.

Evaluation

1 Name three things that you saw living or using the log.

2 Illustrate the different uses of a log.

3 Classify the different wildlife observed into producers, decomposers and consumers.

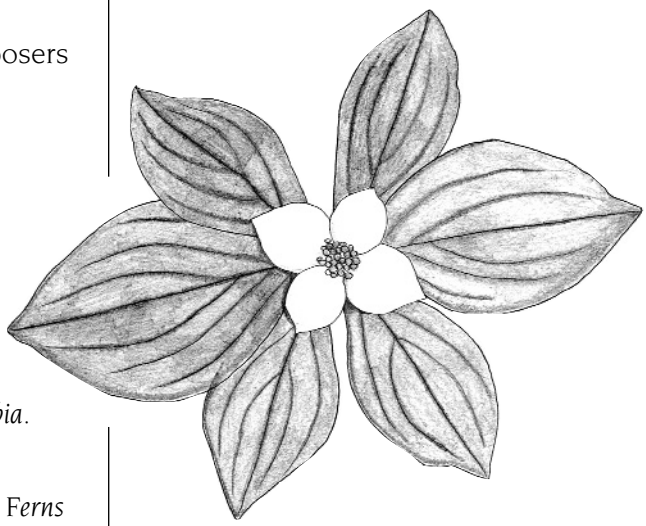
Resources

Knopf, Alfred A. 1992. *The Audubon Society Field Guide to North American Insects and Spiders*, Random House Canada Limited, Toronto, 10th printing.

Pojar, Jim and MacKinnon, Andy. 1994. *Plants of Coastal British Columbia*, Lone Pine Publishing, Canada,.

MacKinnon, Pojar and Coupe. 1992.*Plants of Northern British Columbia*. Lone Pine Publishing, Canada,.

Vitt, Dale; Marsh, Janet and Bovey, Robin 1988. *Mosses, Lichens and Ferns of Northwest North America*, Lone Pine Publishing, Canada.



Bunchberry – grows in many habitats but prefers trunks, logs and stumps on coast.

Activity 12

Waterlogged

Grade
3 to 11

Subject
Science, Physical Education

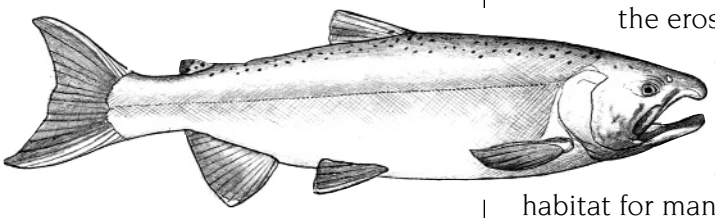
Skills
analysis, application, discussion, generalization, interpretation, observation, psychomotor development

Duration
30 to 45 minutes

Group Size
minimum 12

Setting
indoors or outdoors

Keywords
riparian
invertebrates
erosion



Coho Salmon. One of B.C.'s five species of salmon. The others are Chinook, Chum, Pink and Sockeye.

Objectives
Students will be able to recognize the importance of wildlife trees in riparian areas.

Method
Students become members of the aquatic environment in an active hands-on simulation using a fast flowing stream with both fast sections and pools caused by downed wildlife trees.

Background
Streams, rivers, and other waterways are vital habitat throughout British Columbia for species that live both in and out of the water. The riparian zone — the area of vegetation from the streambank to the upland slope of the waterway's flood plain — is an important ecosystem. Trees, both live and healthy, and wildlife trees are critical components of this ecosystem, which is a home and a travelway for many species across the province.

Live and healthy trees provide shade for fish as well as habitat for numerous invertebrates that will fall into the water and eventually become a food source for various aquatic species. Wildlife trees provide habitat for species that require proximity to water and aquatic food sources. Bald Eagles, Ospreys, bats and mergansers are just a few of the riparian zone wildlife tree users that need their homes near water.

When a wildlife tree falls into the water, it performs many other vital roles to enhance wildlife habitat. Large logs can stabilize stream channels and create a series of pools and rapids. Fish, amphibians and invertebrates find slower flowing eddies are easier to live in. Logs and root systems provide cover from predators and help to dissipate the erosion energy of the stream on its banks. Deep pools can also be a place to go when stream levels fluctuate due to drought or flood. Finally, wildlife trees in streams can create gravel bars behind them and channels around them which provides spawning and rearing habitat for many of the fish species in British Columbia.

Many of our urban streams and waterways have been culverted, diverted, channeled and paved over. Others throughout the province have been changed by dams, logging and mineral extraction practices. The effects from these practices on some species have been disastrous. Education about how this important ecosystem works and

its components such as wildlife trees, will hopefully preserve what we have and rehabilitate some of what we have lost.

Procedure

1 Place two ropes parallel to one another 4 metres apart, with cones at each of the four ends of the ropes.

2 Split your group into two with one half becoming water at the head of the stream. The water travels in waves, holding hands across the width of the stream. Optional: Have four students hold corners of a 4 x 4 metre tarp at the end of stream and shake it to represent rapids.

3 Split the second half of the students into three groups: a) salmon with open hands on cheeks like gills, b) insects with fingers for wriggling antennae and c) crayfish that snap their pincers.

4 The object for the stream inhabitants is to stay in the stream marked by the rope banks and the cones. Start the activity with the salmon, insects, and crayfish role playing throughout the stream. Send waves of the water down one after the other. Any stream animals that get caught by the water get forced out of the stream zone or down into the rapids that students are waving. This represents a fast flowing stream with no wildlife trees to protect or shelter the stream inhabitants, so they get swept downstream.

5 Add several downed wildlife trees (benches or chairs) to the stream once students have had the chance to see how hard it is to survive in a fast flowing, straight-sided stream (see diagram next page). Place trees at right angles to the banks, stretching half way out into the stream.

6 Have the salmon, insects and crayfish return to their new stream. Send the water back down the stream, still holding hands. The water should find it much harder to capture the inhabitants once the obstacles force them to take the path of least resistance in the same way water does.

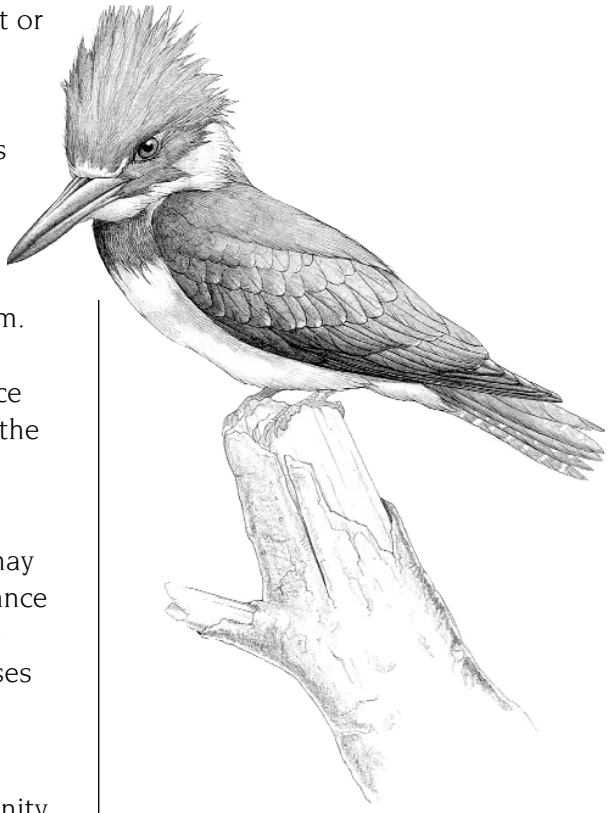
7 Where trees have been added, create a bend in the rope, that represents the stream bank, opposite the top of the tree. You may have to add the extra pieces of rope to maintain the same distance to the cones. Once the water has had a chance to run down the stream again, you can discuss how the change in direction causes banks to weaken and undercut future downed wildlife trees.

Extensions

1 Find an example of both these kinds of streams in your community. Often straight streams have been altered or channeled by humans.

Materials

■ 4 pylons or cones ■ 4 x 25m lengths of rope ■ 6 x benches, sets of chairs, blankets to represent fallen trees in the stream ■ optional: tarp for rapids



Belted Kingfisher – only the female has a rufous band across its chest.

What are the differences and similarities? Which has the most signs of wildlife and habitat?

2 Use aerial photographs to look at areas of streams which could provide good habitat and cover for fish.

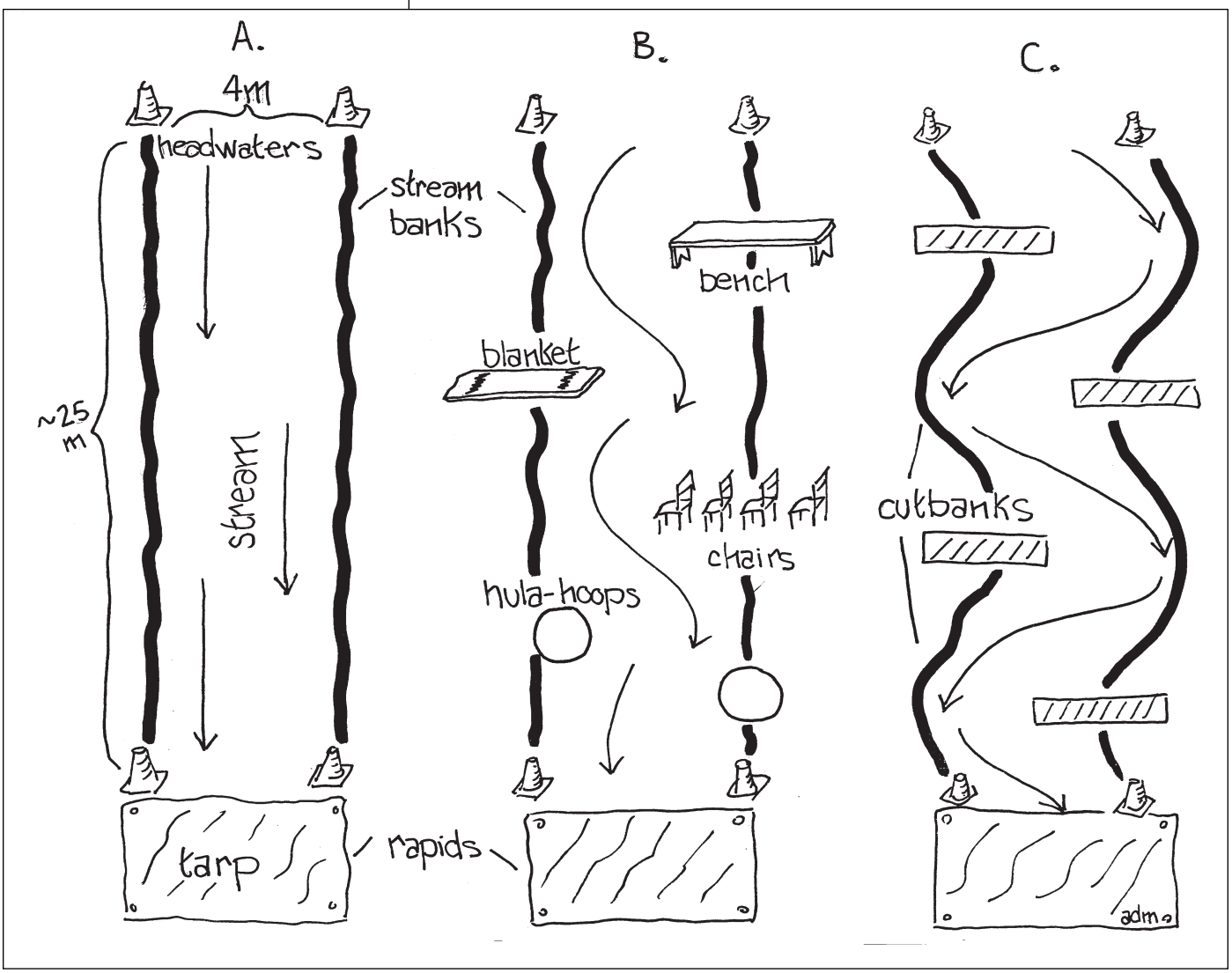
3 Try Hooks and Ladders p. 184 in the P*roject* WILD activity guide to learn more about what salmon go through to survive.

Evaluation

1 Illustrate a riparian area to show the benefits of downed wildife trees for the various aquatic species.

2 What are some factors that affect wildlife in riparian areas?

3 List some of the benefits of wildlife trees located in riparian areas for fish.



Activity 13

Ya Gotta Lichen Caribou!

Objectives:

Students will be able to:

1 understand the role wildlife trees play in the life cycle of British Columbia's southern populations of caribou;

2 understand the concept of habitat fragmentation; and

3 describe how habitat fragmentation affects caribou.

Method:

Groups of students become four separate herds vying for food, water and space in this physically active demonstration of how our old forests are becoming more and more fragmented.

Background:

Habitat fragmentation is the breaking up or destruction of a habitat's components. Fragmentation occurs when it becomes difficult for a species to cross from one section of an originally intact habitat to another or for that species to survive in a habitat that no longer provides either the necessary food, water, shelter or space.

Fragmentation can happen on many levels, from the small or microhabitats to the larger or macrohabitats. For example, in some urban parks and housing developments fragmentation can occur by the removal of the forest understory. The understory can consist of a variety of different bushes, ferns, flowers and leaf litter which provide food and shelter for various creatures. Humidity, wind exposure, light availability and temperature also have an affect on the life cycles of the species found in this microhabitat.

On the macrohabitat level, the loss of habitat or habitat fragmentation through resource extraction, agriculture, road building and urban encroachment have contributed to the loss of wildlife trees throughout the province. One species that use wildlife trees and is being affected by habitat fragmentation are the southern populations of the caribou.

During the summer, caribou depend on a variety of grasses, sedges, horsetails, flowering plants and the leaves of willow and dwarf birch for their diet. In the winter, when snow covers most of the vegetation on the ground, the caribou's diet consists exclusively of lichens such as the black tree lichen,B*ryoria fremontii* and old man's beard, U*snea lapponica*. These are arboreal or tree lichens which can be found

Grade

4 - 12

Subject

Science, math, social studies, physical education

Skills

application, comparing similarities and differences, description, discussion, evaluation generalization, kinaesthetic concept development, psychomotor development

Duration

30 - 45 minutes

Group Size

15 and larger

Setting

indoors or outdoors (large area needed)

Materials:

■ gymnasium or large playing field ■ Four pylons ■ food and water tokens (different colours) ■ three hula hoops ■ suitable lengths of rope to delineate roads ■ tarps to indicate clearcuts or urban development

Caribou. The southern populations of British Columbia's caribou are on the Provincial Blue List.

growing on the dead lower branches of both living and dead trees throughout the caribou's range. They feed either by taking the lichen directly off the tree, picking up lichen that has been blown down to the snow, or from the branches of fallen wildlife trees.

Caribou do not depend on specific, individual trees as do many of the other wildlife tree users discussed in this book. However, they do rely on having stands of trees with enough diversity to provide lichens for immediate use as well as stands of trees that will ensure dispersal of lichens to future generations of trees. Often the trees that provide the most lichens are living trees with larger diameters and wildife trees, especially those in stages 2 through 4 (see illustrations pp. 8–11). Stands of mature forests, with their wide crowns and multi-layered canopies, provide areas with less snow cover and protection from wind.

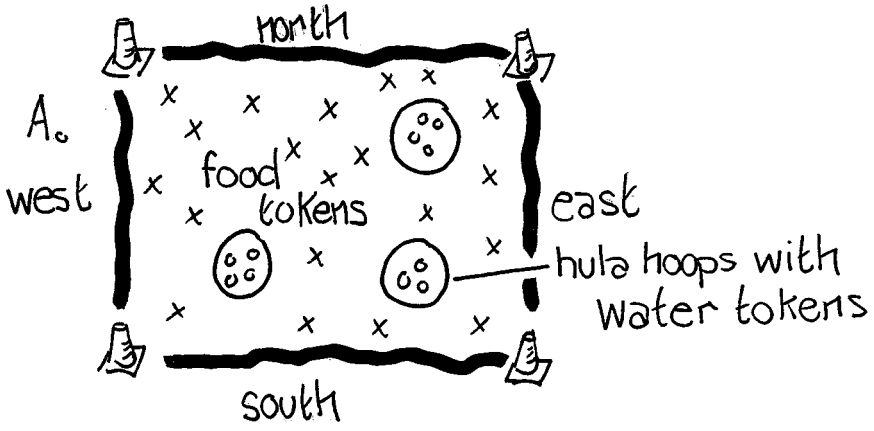
In the past, large clearcuts have suited the food needs of other more adaptive ungulates such as Mule Deer. The increase of their numbers has strengthened populations of wolves who in turn have preyed upon some caribou populations. Logging and mining roads have increased the accessibility by humans to hunt caribou. The increasing number of roads in general has meant urban encroachment which in turn effects traditional feeding territories and migration routes of the caribou.

Procedure

1 Prior to the start of this activity, ask the students to describe the components of habitat. What do all animals need to survive? Together discuss the habitat requirements of caribou. Brainstorm with the students what some of the limiting factors that affect the survival of caribou.

2 Discuss with the students the term habitat fragmentation and what it means. Tell the students that they are going to participate in an activity that looks at how fragmentation of habitat affects caribou.

3 To start this activity, mark out the winter habitat of the caribou as show in the diagram at left.



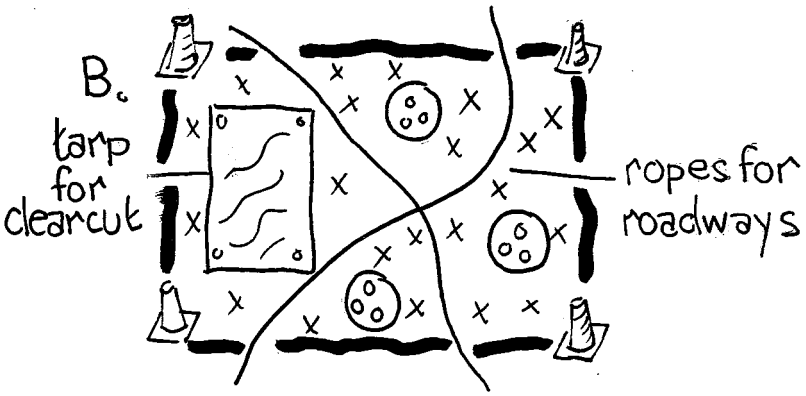
4 Spread food tokens throughout the winter habitat and place water tokens within the hoops.

5 Split the students into four herds: North, South, East and West. Although caribou drop their antlers in winter, the caribou for this activity can hold their hands above their head like antlers. Have all the caribou stand facing away from the habitat with one herd for each side of the square. They may only exit or enter the square from their side.

6 On your signal, have them run into the habitat to get both a food (lichen) and a water token. There should be enough for everyone.

7 Prior to introducing what habitat fragmentation does to caribou populations try introducing a predator such as wolves. This is to demonstrate that animal populations are not static year after year but are continually changing in response to a variety of natural limiting factors. Natural limiting factors tend to maintain populations of species in predictable ranges. This "balance of nature" often goes up and down over time. Because wolves hunt in packs, the wolves must hold hands and encircle the caribou they wish to eat. If they capture a caribou, they must take it to the sidelines before entering the habitat again. Safety for the caribou is reaching the sidelines with both a food and water token without being caught. This round may be tried several times depending on the success of the wolves.

8 In the next round, have the caribou facing away and distribute the food and water tokens as before. This round, add some roads and/or clearcuts as shown in the diagram.

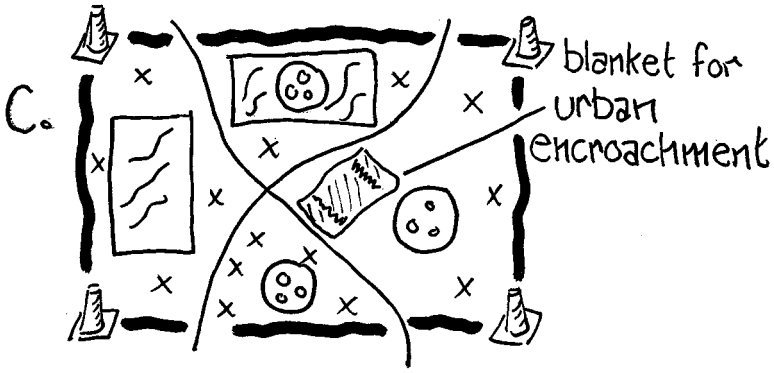


For the purposes of the activity, caribou are not allowed to cross roads or clearcuts. Those caribou unable to get both food and water will die and become part of the habitat. After the round, those

caribou that have died can now become wolves in the next round. Try this a couple of times so the students get a good idea of what is happening.

Note: If the wolves are becoming too successful, the caribou that have died could then become deer which feed in clearcuts and can move throughout the habitat.

9 Try adding another factor that contributes to habitat fragmentation (urban encroachment, clearcut etc.) as follows:



10 The activity can be ended by asking the students what could be done to decrease habitat fragmentation for the caribou. One example of what is being done includes deactivation of logging roads.

Extensions

1 Students can graph the progress of the herds by following the steps outlined in the Project WILD activity, 'Oh Deer'.

2 Have students research current logging practices by writing to appropriate agencies or by asking community experts to present the new methods. They can then make changes to the activity that include:

smaller clearcuts and partial cutting
wildlife corridors
deactivation of logging roads

3 Using maps and aerial photos discuss the affect roads have played on caribou and other species.

Evaluation

1 Name the essential components of habitat.

2 Define habitat fragmentation.

Activity 14

Alert! Code Red and Blue!

Objective

Students will be able to research wildlife tree users that are at risk, endangered, threatened or vulnerable and develop a creative display or publication.

Method

Students create a flyer or poster to increase public (school, other students, community, etc.) awareness of Red and Blue listed species that are dependent on wildlife trees for habitat; include information about how the species uses the wildlife tree for food, shelter, nesting, or resting.

Background

Provincial wildlife biologists have identified animals that are at risk or could become at risk in the future. These wildlife species are given special attention and extra effort is taken to conserve them and their habitat.

There are many reasons why a particular type of animal might be at risk, but one of the main reasons is the loss of habitat. In British Columbia over 90 different animals rely on dead and decaying wildlife trees for food and shelter. If these old trees are destroyed, it would be difficult if not impossible for many species to adapt to a new habitat. Some could be in danger of becoming endangered, threatened, or extinct.

The **Red List** includes species that are endangered or threatened or could become designated as one of these. Wildlife tree users on this list include the Spotted Owl and Keen's Long-eared Myotis (bat). The Spotted Owl is an open nester that relies on old growth forest for habitat. It uses wildlife trees for nesting and roosting. Keen's Long-eared Myotis roosts and nests behind the soft bark or in the hollows of the decaying wildlife tree. Both the Spotted Owl and Keen's Long-eared Myotis are Red-listed species. The other wildlife tree-dependent species on the Red List include the following:

Purple Martin
White-headed Woodpecker
Northern Long-eared Myotis
Williamson's Sapsucker *nataliae* subspecies
Red-tailed Chipmunk *simulans and ruficaudus* subspecies
Ermine *haidarum* subspecies

Grade

Grades 6–12

Subject

Art, Science, Language Arts

Skills

analysis, communication, discussion, drawing, researching, reporting, group work, synthesis

Duration

two or three 45-minute periods

Group Size

one or two

Setting

indoors

Key Words

at risk
endangered
extinct
habitat
management
threatened
vulnerable

All species on **Red List** are not necessarily threatened or endangered but include candidates for those designations. Often more research is needed to clarify their specific status. There are some rare species we know little about.

The **Blue List** includes species which are thought to be vulnerable and could, in the future, be threatened. The following species on the Blue List rely on wildlife trees for habitat:

Bald Eagle
Barn Owl
Flammulated Owl
Fisher
Great Blue Heron
Gray Flycatcher
Lewis' Woodpecker
Spotted Bat
Western Small-footed Myotis
Sitka Mouse
Townsend's Chipmunk
Northern Pygmy-Owl *swarthi* subspecies
Northern Saw-whet Owl *brooksi* subspecies
Western Screech-Owl *kennicottii* and *macfarlanei* subspecies
Hairy Woodpecker *picoideus* subspecies
Williamson's Sapsucker *thyroideus* subspecies
Least Chipmunk *oreocetes* subspecies
Ermine *anguinae* subspecies
Caribou southern populations

The objective of this activity is for students to research a wildlife tree user that has been designated to either the Red or Blue Lists.

Materials

poster paper, crayons, and supplies necessary to create a colourful and informative poster.

Procedure

1. Introduce the terms *endangered*, *threatened*, *vulnerable* and *extinct* and define them. Introduce the Red and Blue Lists that identify species status in British Columbia.
2. Assign each student, or group of students a wildlife tree species that has been designated on one of the lists.
3. Have the students research their species, obtain pictures, and find any other information that describes the species habitat and its role in the environment. Have the students fill out the wildlife research activity sheet to help them with their research.
4. Make a poster or oral report about their species and how it depends on wildlife trees for habitat.
5. Have students discuss the common element of importance to these species.

Extensions

1. Create a bulletin board area at your school to inform people about wildlife trees and species that are endangered or threatened as a result of this habitat disappearing.
2. Set aside a day in your school dedicated to the various wildlife tree users that are endangered or threatened.

3 Create a book for the school library.

4 Have students teach other students or have them "buddy read" about the species they are researching.

5 List species that occur locally.

6 Try "Endangered Species" p 124 in *Project Learning Tree*.

Evaluation

1 What is the common factor between the wildlife tree users?

2 Discuss what happens as a result of habitat loss.

3 Product requires recognition.

4 Define endangered, threatened, extinct. at risk, vulnerable.

For Younger Students

Provide background about wildlife trees and talk about local species that use them. Have the students create a collage or draw pictures of an endangered or threatened wildlife tree user.

For Older Students

Give the students a list of wildlife tree users who are on one of the three lists. Don't tell them that the species on the list are endangered and wildlife tree users. After they have researched their species, use the discover method so they can find out about the common element (wildlife tree users) that ties these species together.

Northern Saw-whet Owl. These tiny owls have a variety of calls. One sounds like a saw being sharpened (whetted).

Additional Resource Information

Pamphlets and brochures on endangered wildlife:

Wildlife Branch
Ministry of Environment, Lands & Parks
780 Blanshard Street
Victoria, B.C. V8V 1X4
387-9737

COSEWIC
Environment Canada
Publications Distribution Section
Ottawa, Ontario K1A 0E7

State of the Environment Report for B.C. available from:

Ministry of Environment, Lands & Parks
Public Affairs Branch
810 Blanshard Street
Victoria, B.C. V8V 1X4
Phone: (604) 387-9422

Environment Canada
Communications
Pacific & Yukon Region
224 West Esplanade
North Vancouver, B.C. V7M 3H7
Phone: (604) 666-5900

Activity Worksheet

Alert! Code Red and Blue Wildlife Research

Name: _____ **Date:** _____

Biologists research wildlife so they can understand what certain animals and plants need in order to live. The more we know about the wildlife found in British Columbia, the more we can help make ensure their habitat is protected. Select an animal that uses wildlife trees for habitat. Investigate this animal by answering the following questions.

Name of animal:

_____

1) What does the animal eat?

_____

2) Is the animal a mammal, fish, amphibian, reptile, bird, etc.?

_____

3) Is the animal nocturnal (active at night) or diurnal (active during the day)?

_____

4) Is the animal a predator or prey species?

_____

5) How many young does the animal usually have?

_____

6) Average weight: _____Average height: _____

7) Where would you find this animal?

_____

_____

_____

8) How does this animal use wildlife trees?

_____

_____

9) What is the status of this animal (rare, endangered, threatened etc.)?

_____

10) How long does this animal live ?

_____

11) Does it migrate, hibernate or stay here for the winter?

_____

12) What other interesting information can you find?

_____

_____

_____

_____

_____

13) Draw a picture of the animal.

Activity 15

Trees of Life

Objectives

Students will be able to:

1. understand and appreciate the importance of trees to First Nations peoples throughout the province;
2. research information about the ethnobotanical and technological uses of different species of trees; and
3. add information to their research gained from interviews with community experts.

Method

Students work in groups and brainstorm how First Nations peoples were able to survive without modern technologies. Research and interview projects are completed and presented to the rest of the class.

Background

Plants in British Columbia, today, are looked at in a very different way than how the First Nations peoples did prior to contact with settlers. Despite many different languages, great distances between them and the varieties of ecosystems in which they lived, the First Nations all had one thing in common, their knowledge and need of plants.

A great deal of day to day life in pre-contact times revolved around and related to plants. Medicines, language, clothing, transportation and ceremonial life were rooted in the knowledge and use of the natural world. A great deal of food, and the technologies necessary for the gathering, fishing and hunting of all food sources, came from plants. Trees, and many of the species of plants, mosses, lichens and fungi associated with them, were vital. Wildlife trees played a significant role, providing the raw materials for a variety of uses. They also provided homes for many of the wildlife players of mythical traditions and species important for food.

Procedure

1. Have students brainstorm what they feel they need to survive in their community. Once they have listed modern needs, have them discuss what they think people would have used hundreds of years ago in British Columbia.

Grade

4 to 9

Subject

Social Studies, Language Arts

Skills

analysis, comparing similarities and differences, discusion, generalization, group work, listing, reporting, research, writing

Duration

two to three 45 minute periods

Setting

indoors

Group Size

any size

Douglas-fir sprig. Wood from this tree was often used for fish hooks.

Key Questions:

What do we need to survive?
examples: food – grocery store,
water – tap,
shelter – house,
transportation – bus, car

What did First Nations peoples use?
examples: food – plants & animals,
transportation – foot & canoe

Do we still have the necessary plants and animals in our local forest?

How did First Nations peoples use plants and trees to provide what we take for granted today?

How do we use trees today?
Examples: nature appreciation,
climbing,
firewood,
lumber for construction

2 Unanswered questions can become the basis for research essay topics such as: local tree species, First Nations use of plants and trees for transportation, shelter, food, and clothing. Students can be split into groups and assigned areas of study or may choose their own topics.

a Students can access information in both school and local libraries or contact the appropriate agencies.

b Students may also gain local information from First Nations peoples in their own communities by conducting interviews. See the appendix of the P*roject* WILD manual for suggestions of interviewing techniques and B*ackyard* B*iodiversity and* B*eyond* for the activity "Biodiversity Stories From the Family."

3 Complete information webs with the knowledge gained from their research and writing by asking the above questions again. Links between trees, peoples, regions and styles of use should become apparent.

Extensions

1 Older students could research First Nations stories and myths about the trees or wildlife tree species and present or illustrate them for the class.

2 Refer to the section Wildlife Trees Around the World p 24. Have the students research how other cultures use trees and other plants.

Evaluation

1 Essay or research requires recognition.

2 Have the students list some examples of how First Nations peoples used trees.

Activity 16

Spirit Tree Biography

Objectives

Students will be able to understand that trees are a work in progress from tiny seed and seedling, to maturity and down through the stages of decay.

Method

Students use their imagination to create and write about some of the wildlife, forces of nature and people that have affected the life and death of a single tree.

Background

The life span of humans is very short compared to many of the species of trees throughout British Columbia. Unless we have the opportunity to follow the life of a particular tree in our own yard or favorite park over many years, it can be hard for us to imagine how long it may have been there. Also difficult to picture is that the tree may take many more years to become part of the forest again in the form of soil.

The purpose of this activity is for students to understand the concept that trees both living and dead are not static; that they're constantly changing as a result of the wildlife, forces of nature and people. To introduce this activity, you may want to show images of a single species of tree in various staged from seed to seedling, sapling to maturity and down through the stages of decay to a nurse log.

The following is a list of some of the verified ages of ancient trees in British Columbia from *The Guide to the Record Trees of British Columbia* by Randy Stoltmann, published by the Western Canada Wilderness Committee in 1993. Ages were determined from ring counts on stumps or by increment borer.

Species	**Age** (yrs)	**Location**
Yellow-cedar	1,693	Caren Range, Sechelt Peninsula
Douglas-fir	1,307	Waterloo Mountain, Vancouver Island
Western redcedar	1,212	Cheewhat Lake, Vancouver Island
Western Larch	920	Cranbrook
Western Hemlock	902	Tetrahedron Plateau

Procedure

This activity is designed to follow other activities that have introduced the concept of wildlife trees and their users.

Grade

4 to 12

Subject

Language Arts, Science

Skills

application, description, discussion, interpretation, observation, research,writing

Duration

two 45 minute periods

Group Size

any size

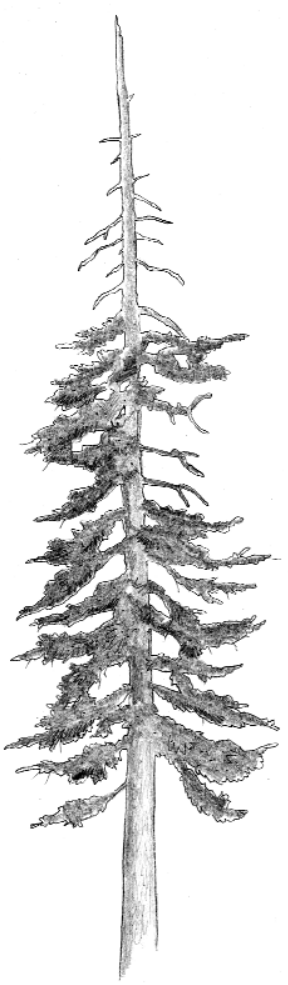
Setting

indoors and outdoors

Materials

- writing materials

A word of caution: Depending on the age of your participants, you may or may not want to discuss the concept of anthropomorphism — projecting human characteristics upon the wildlife and trees in their biography. Trying to understand a tree's life from its perspective can be both a challenging and rewarding goal.



1 Have students brainstorm about the common species of trees in their area.

2 Work with students to establish the age of a particular wildlife tree and the stage of decay it is at presently. They may choose a tree they have seen on a wildlife tree walk or assessed in Jr. Wildlife Tree Assessor. Resources such as the *Tree Book* discuss maximum average heights for different tree species. Average ages are difficult to determine because of such variables as site, soil, disturbances, and climate. Local experts should be contacted for specific information to help age individual trees with processes such as an increment borer.

3 The students will then work backwards from the present to create the history of the tree and its habitat. Students may look at the evidence presented by an actual tree to see which forces of nature have affected them like fire, lightning, or flood. Evidence may also be present in the form of cavities, fungus or nests to suggest the species that have visited the tree. Research and imagination can help to create the people that might have visited the tree from sapling to its present state. You may want to ask:

"If a tree could tell you about its life beyond just the counting of its growth rings, would it talk about all the animals and plants that made it their home? Would the spirits of the wildlife and the people that relied on the tree for their survival speak, too?"

4 Once the biographies are completed, have the students discuss who visited their trees and how they reached their current state. Diversity of tree species, wildlife, and experiences can be webbed together.

Extensions

1 A collection of the stories could be bound together as a book. Illustrations by the students of the trees and the people and wildlife associated with them could be added.

2 Instead of telling the life of the tree in the form of a biography with words and pictures, have the students try form poetry — the words form the shape of the tree from top to bottom, leaving room for cavities and longer sentences for branches.

3 If students have chosen a particular tree in nature or the school yard, encourage them to visit that tree through the seasons and through the years. Their visits and memories can be entered into a journal as outlined in the Project WILD activity 'Wild Words'.

Evaluation

1 Write a short description or poem about a tree's life cycle.

2 List some factors that contribute to a tree's death and decay.

3 Name some local tree species.

Activity 17

Making Decisions

Objective

To examine and evaluate the role of wildlife trees in relation to the surrounding environment.

Method

Students discuss and assess the hypothetical dilemmas concerning wildlife trees.

Background

Wildlife trees are trees that provide valuable habitat for the conservation or enhancement of wildlife. Dead or decaying wildlife trees are sometimes called "snags" and are a vital of the forest ecosystem. Because many animals rely on these special wildlife trees for food and shelter, it is important to protect both live and healthy wildlife trees. Live and healthy wildlife trees will eventually die and provide habit for future generations of wildlife which depend on decaying trees.

In British Columbia, there are over 90 species of animals that utilize dead or decaying wildlife trees for nesting, feeding, shelter, roosting, and overwintering. The largest group of wildlife tree users are the cavity-nesting birds such as woodpeckers, chickadees, nuthatches, bluebirds and certain owls and ducks. Other cavity users include marten, black bears, and bats. Eagles and ospreys often use wildlife trees to build their large nests as well as using them for hunting and resting perches.

Preserving a habitat is not always easy. This activity sets out imaginary problems and difficult situations that students might meet in everyday life when they try to put conservation ideas into practise. Its up to the student to make a decision!

Procedure

1 From the attached pages you will need to copy and cut up the dilemma cards.

2 Divide the class into groups of four and give each group a stack of dilemma cards.

3 The first student draws a dilemma card and is given a few minutes to decide what he or she should do. Other group members do likewise.

Grade

4–12

Subject

Social Studies, Science, Language Arts

Skills

analysis, application, discussion, evaluation, problem solving, small group work, synthesis, writing

Duration

30–45 minute period

Group Size

four or five

Setting

outdoors or indoors

Keywords

ecosystem
habitat

Materials

copies of dilemma cards

4 After two minutes the student then reads the dilemma out loud to members of his or her group. That student then tells the rest of the group about his or her decision regarding the dilemma and reasons for the decision. Each member of the group has an opportunity to discuss the dilemma as does the person whose dilemma is being discussed. The discussion gives the group an opportunity to share their ideas and gives the students experience in taking personal responsibility for decision making. I*t is not necessary for the students to reach a consensus*. The purpose is to provide an opportunity to examine, express, clarify, and take responsibility for their own reasoning.

5 The card is returned to the bottom of the stack and the next student selects a card from the top. Continue this process until all students have had an opportunity to express their decision and rationale about a dilemma.

Extensions

1 Have the students create their own dilemmas regarding wildlife trees.

2 Adapt this to a debate format.

3 Have students work in groups of two or three over a dilemma, then bring it back to discuss with the entire group.

4 Collect newspaper articles surrounding wildlife and forest issues. Evaluate them and discuss in class.

Evaluation

Have each student choose a dilemma or write one of their own and write a short paragraph on the positive and negative effects of the options. Indicate what additional information, if any, is needed to make a responsible and informed decision.

Example Dilemmas

You may want to adapt these dilemmas or create your own to suit your audience and location.

Dilemma Card 1

You are out on a weekend outing with your family. While travelling along a forestry road you come across a pickup truck with chain-saws, you notice two men looking at a wildlife tree with a sign on it. Should you:

- Keep driving.
- Stop and discuss with them the importance of wildlife trees.
- Return to the nearest phone and call a conservation officer.
- Other

Dilemma Card 2

You are a home owner. You have an acre of land that is situated along the lake. You have a beautiful house that has lots of windows overlooking the lake. Your view would be perfect except for a 30 m Douglas-fir that has a broken top. You have noticed Ospreys in the area starting to move sticks into the Douglas-fir and an Osprey has been perching on the tree in your yard. Should you:

- Remove the tree before an Osprey builds its nest on the tree
- Leave the tree standing so that an Osprey might use it for a nest
- Shoot the Osprey
- Other

Dilemma Card 3

You live in a neighbourhood that has several mature fir and cedar trees that line the street and are growing in your neighbours' yards. The neighbour that lives right next to you has decided to take down all the trees along his and your property line. You feel that the trees don't really pose a threat to anyone but your neighbour seems to feel differently. A couple of the trees are used by a Pileated Woodpecker and, on occasion by a Flammulated Owl. Should you:

- Try to persuade your neighbour to change his mind.
- Explain why the trees are important to wildlife and try to come up with some sort of compromise.
- Don't say anything.■

Dilemma Card 4

You have just spent thousands of dollars building a trout pond on your property. Close by is a stand of trees, one of which is a decaying wildlife tree. The wildlife tree shows several signs of being used for feeding and some cavities for nesting. Just prior to completion of your trout pond you notice a Kingfisher perching in the wildlife tree. You are concerned that the Kingfisher will eat the trout in your new pond. Should you:

- Help a conservation officer to trap the Kingfisher and relocate it somewhere else.
- Cut down the trees and hope the Kingfisher will move somewhere else.
- Shoot the Kingfisher.
- Live with the Kingfisher and share the trout.
- Other

Dilemma Card 5

You live in the country and your neighbourhood is close to a Tree Farm License. There is a pond in the tree farm license that is home to Marten, Raccoon, Pileated Woodpeckers, Kingfisher and you have seen owl pellets. This pond is a favourite visiting site for you and your friends. The company who has the tree farm license is planning to start logging shortly in the area where the pond is located. Should you:

- Attend the company's public planning sessions to provide input.
- Stand in front of the loggers vehicles.
- Get a petition from all your friends in the neighbourhood and take it to the company.
- Other

Dilemma Card 6

One day you come home from school and notice a Tree Topping Company truck parked on your street. There are two workers standing outside looking at the trees lining the border. You find out that they have to trim and top the trees that are found next to the power lines. The tree that they are looking at has a large cavity with a Northern Saw-whet Owl sleeping in it. Should you:

- Phone the power company that has contracted them out and express your concern about this particular tree.
- Ignore what they plan on doing.
- Ask them to call a conservation officer to find out what they should do.
- Other

Activity 18

Animal Inn Tenants' Association

Objectives

Students will be able to:

1 understand that wildlife trees can support a variety of wildlife tree users, often at the same time; and

2 recognize the variety of needs of wildlife tree users.

Method

In a role playing activity, students present a case for their prospective tenants — wildife tree users — at a tenants' association meeting.

Procedure

1 Create an outline of a wildlife tree on a large piece of paper. The activity will take the form of a meeting involving certain wildlife species who would like to move into a wildlife tree. The number of different residents that will be allowed living space can be decided beforehand, or at the tenants' association meeting once everyone's needs have been heard.

2 Assign students to represent one of the wildlife tree users, "the tenants". Assign other students to be the chair, committee, or outside experts at the meeting

3 Some preparation, or background work should be done by all the students participating. Students will need to read their Wildlife Tree Species Card if they are representing prospective tenants. The students should research the various tenants that they are representing as well as background information to support their tenants at the meeting. All the students should be given time to prepare a presentation, questions, and answers. Students must also be aware that they will need to improvise their presentation or questions according to what happens during the meeting.

4 The meeting is brought to order by the chair. All tenants must first be recognized by the chair before they can speak. Each student will have a turn representing their tentant and will be questioned by the chair about their position. After all the testimonies, questions, and statements are given, the chair and committee must vote on who will be accepted (according to needs) and give their reasons for how they voted. (You may want to divide the hearing into two days).

Grade

4 to 12

Subject

Social Studies, Science, Drama

Skills

analysis, classification, communication, comparing similarities and differences, debating, description, discussion, inference, interpretation, invention, listening, listing, observation, public speaking, reading, research, visualization, writing

Duration

at least 45 minutes

Setting

indoors

Group Size

minimum 10 to 35

Materials

■ large piece of paper ■ markers ■ information cards (either the standard ones or student-created) ■ a room set up for a hearing ■ optional role-play props

5 The following are a list of questions you can use to discuss the meeting and the decision.

What factors influenced the decision in the end?

What have the students learned about wildlife trees during this process?

What have the students learned about the wildlife who use these trees?

What kind of things can we, as human beings, do to help wildlife who need wildlife trees?

Extensions

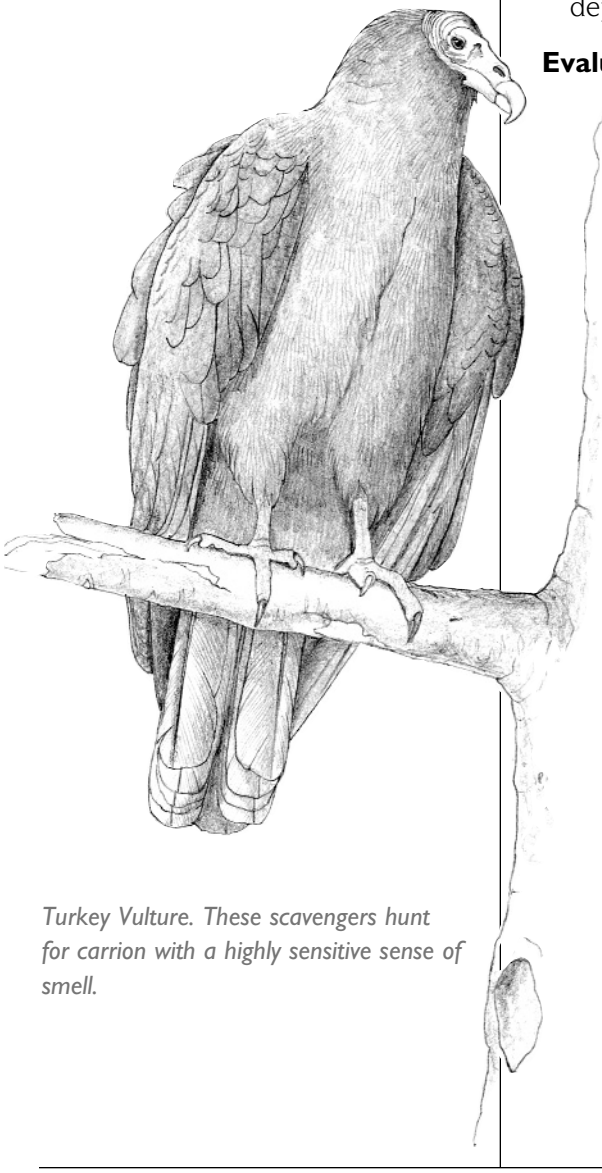
1 Try "To Compromise or Not to Compromise" p 295 in the P*roject* WILD activity guide.

2 Have the students write a story about wildlife trees and the animals dependent on them for habitat.

Evaluation

1 In what ways do wildlife tree users depend on wildlife trees for habitat?

2 What are some of the factors that determine whether or not a tree is a wildlife tree?



Turkey Vulture. These scavengers hunt for carrion with a highly sensitive sense of smell.

Activity 19

Arboreal Theatre

Objectives

Students will be able to:

1. understand the components of a wildlife tree ecosystem;
2. recognize how a wildlife tree goes through a variety of successional stages from a living to a dying tree; and
3. analyze how the different stages can be used by wildlife.

Method

Using guided imagery, students become the tree, wildlife tree users and the forces of nature that change the tree such as wind, water, lightning, fire, insects, disease and fungus.

Background

The relatively short life span of humans compared to the trees of British Columbia's forests makes it hard for us to understand how long a tree may have been around. The age of a wildlife tree can be even more difficult to comprehend. Some of our trees such as Douglas-fir, ponderosa pine and Western redcedar can be hundreds of years old at maturity; it can take hundreds of years more to go through the stages of decay from live and healthy to coarse, woody debris on the forest floor. See page 71 for more information on some tree ages.

Every wildlife tree has its own cycle and has been created in different ways. Fire, rain, wind, lightning, and snow buildup may all contribute to the death of a tree. Other factors include disease, fungus and insect attack, poor soil and growing conditions. Wildlife tree users that make the tree home or part of it's life cycle include Primary Cavity Excavators, Secondary Cavity Users, Open Nesters, mammals, amphibians, insects and plants.

Procedure

1. The number of students you use to create the wildlife tree depends on the size and age of the class. Before you split the group up into those that will be the tree and those that will be the users, spend some time choosing where the tree might be from. Think about its place in its own ecosystem and relate that to its place in an ecoprovince and finally, where it is in relation to the rest of B.C.
   a. **small groups:** a small group of tree people can cluster around a pair of chairs or a small step ladder. Those on the top can

Grade

4 – 12

Subject

Science, Drama, Language Arts

Skills

analysis, comparing similarities and differences, description, discussion, inference, interpretation, listening, listing, observation, visualization

Setting

Indoors

Group Size

minimum 15

Duration

at least two 45 minute periods

Materials

■ orange garbage bags for fire ■ white sheet for snow ■ small step ladder

*Optional - "tickle trunk" of costumes/ props can be compiled for use with this activity. Here is a list of suggestions for items you might want to include in your collection: hard hat, wildlife tree sign and hammer, feather hats (representing different birds), cardboard handsaw, toy chainsaw.

pretend their arms are limbs while those on the bottom can pretend their feet are roots. Make sure there's enough people left over to play the parts of the wildlife tree users.

b **large groups:** to involve more folks, why not move the tree from the vertical to the horizontal. Have the tree people become parts the wildlife tree, from roots, through trunks and limbs to the crown, all on the ground. This will take more organization but will also allow for more spots to be visited by the wildlife tree species because the tree can be made much larger - even big enough to be life sized!

2 Wildlife tree users can be chosen from local species or picked at random from the Species Cards on pp. 88–91. For larger groups, you can pair species up to represent mates, or as in the case of some maternity colonies of bats, have a number participants represent the bat colony.

3 If the group has been introduced to the concept of wildlife trees and their users, you may be ready to continue. If this is their first activity, you may want to discuss the various stages and how and when each of the different species represented would use the tree. This allows them to be prepared for their entry into the play.

4 An important component of the imagery is to portray the passing of seasons and years between events that change the wildlife tree. Active participation in this keeps parts of the tree and users busy before and after they play a role. Here are some suggestions as to how you can have a group represent the seasons and the passage of time. Once the group understands the process, the seasons need not be said, just the actions repeated. As the activity goes on, this part can go faster and faster to represent longer stretches of time.

Season Chanting…

Rain and Spring – finger snapping or tapping for rain, stretching and yawning for new growth in the forest

Sun & Summer – panting and wilting under the suns hot rays

Wind & Fall – swaying, snapping and cracking to represent branches and bark

Snow & Winter – white sheets are draped over the tree for the weight of the snow, shivering and cracking for cold and ice popping fibre apart.

Evaluation

1 Have the students describe the components of a wildlife tree.

Extensions

1 Have students discuss and research the human impact on the tree. Trees in well traveled river valley corridors may have had First Nations peoples contact. Perhaps as a younger tree, cedar bark was stripped for baskets. European explorers may have passed, blazing a trail with an axe. Settlers may have cleared land nearby for a farm or town and both hand loggers and mechanized logging may have impacted nearby trees. A wildlife tree assessor may have set the tree aside from logging, or a school may have asked the land owner to preserve it and put a wildlife tree sign on it. These impacts can be interwoven into the life and death history of the wildlife tree.

2 If time permits, you can also represent the birth and growth of the tree. This concept will come full circle when the wildlife tree becomes a nurse log for new tree seedlings.

Activity 20

Wildlife Trees in the News!

Objectives

Students will be able to:

1. research wildlife trees and their users;
2. compare with local, provincial and national issues concerning wildlife trees; and
3. distinguish between fact and opinion.

Method

Once students have been introduced to the concept of wildlife trees in British Columbia, they will be asked to search for news about wildlife trees and their users on local, provincial and national scales.

Background

Biodiversity, defined as the variety of life in all its forms including species, genetic, ecosystem and landscape diversity, is greater in British Columbia than any other province in Canada. B.C.'s wildlife represents: 70% of Canada's nesting bird species, 72% of Canada's land mammals, 50% of Canada's amphibian species, and 41% of the land reptile species! B.C. actually has the most diverse range of plants and animals in all of North America.

Wildlife trees are a part of this biodiversity. Classified as "any standing dead or live tree with special characteristics that provides habitat for wildlife". In B.C., wildlife trees provide habitat for over 90 species of vertebrate wildlife, not to mention things like plants, fungi, lichen and invertebrates. Even wildlife trees that fall into streams create important habitat for fish and other aquatic wildlife species.

There have been a great number of media articles that concern wildlife trees and the species that are dependent on them. There may be other articles connected to wildlife trees concerning; local parks, land development, agricultural uses and habitat rehabilitation projects. The awareness generated about wildlife trees will hopefully lead to more informed decisions about wildlife trees in our own communities.

Grade

4 - 12

Subject

Language Arts, Social Studies, Science, Geography, Art

Skills

analysis, application, comparing similarities and differences, description, discussion, evaluation, generalization, media construction, research, reporting, reading, synthesis, writing

Duration

two 45-minute periods
and ongoing

Setting

Indoors

Group Size

individual or in groups

Keywords

biodiversity
species diversity
genetic diversity
bias
accuracy
facts
opinion

Materials

■ Newspapers - local, provincial & national ■ magazines ■ bulletin board ■ scissors ■ glue ■ stapler

Procedure

1 Have students create a bulletin board with a drawing or painting of a wildlife tree as its central focus. Add file folders or manila envelopes to the board. Have students create titles and images for these folders such as:

Secondary Cavity User	Primary Cavity Excavators
Mammals	Parks
Open Nesters	Trees
Forestry	

Arrows can be added to connect, for example, Open Nesters to the top of the tree.

2 Ask students to search through local, provincial and national media sources for information that falls into the above or other wildlife tree related topics. This process can go over a long period with students sharing items as they find them.

3 Local, provincial and federal resources can be tapped for information. Local experts from naturalist groups, tree services, logging companies and government agencies may be written to or asked to come into the class to answer questions and fill in gaps in information.

4 Students can also provide the information by documenting wildlife trees and their users that they find in their yards, at school and in local parks.

Evaluation

1 Have the students list facts and opinions in a news article.

2 Write a news article on one of the wildlife tree users.

Extensions

1 The Wildlife Tree Resource Centre can be used to provide background information for other activities such as Animal Inn…Who am I?, Animal Inn Tenants Association and Making Decisions.

2 To connect with Language Arts, Social Studies, Science or Math, students can create reports, presentations or problems relating to information gathered in the resource centre.

3 Have students or groups of students create a Wildlife Tree newspaper using information gathered in the resource centre. Articles, interviews and pictures can focus on local, provincial and national issues involving wildlife trees and their users.

Creativity can really be encouraged here to add things such as:

Want Ads/Personal Columns:

Single, Male Pileated Woodpecker looking for female of the same species for mating purposes. Has a recently excavated cavity in a big beautiful Douglas-fir wildlife tree in a dense forest. Plenty of bark beetle larvae nearby.

Activity Worksheet

Wildlife Tree Poetry

Name: _____Date: _____

Write a poem about wildlife trees using the following Cinquain poetry style.

Line 1: title in two syllables or words

Line 2: description of title in four syllables or words

Line 3: description of action in six syllables or words

Line 4: description of feeling in eight syllables or words

Line 5: simile or metaphor for title in two syllables or words

Poem

_____

_____

_____

_____

_____

Osprey

Fishing Eagle

Moves above dark water

With graceful strength it finds its meal

Seeker

Osprey

Activity Worksheet

Wildlife Tree Word Search

Find the following wildlife tree words in the alphabet grid below.

animal inn	insects	wildlife tree	bat	lichens
bear	open nester	cavity	owl	chickadee
predators	decaying	forest	snag	habitat
stumps	hawk	tree signs	hollow	wood duck
	hunting perch		woodpecker	

W A T H C H I C K A D E E S F G H

L I E C M A U E K I B P Z U C R A

N P L E F J V L I C H E N S A V B

H Q R D I W E I A Q U S A C T H I

C S O U L K B V T N O D O R S O T

R O T T G I I I N Y W O D W E L A

E E R T N T F Z Y P N O I O R L T

P J F W I I R E K C E P D O O W W

G I D Y Y J B A T I S H I F F W O

N N I L A M I N A R B T A J C L L

I N S E C T S A L V E E U R Q K L

T Y I K E P N E S H S E A M T O O

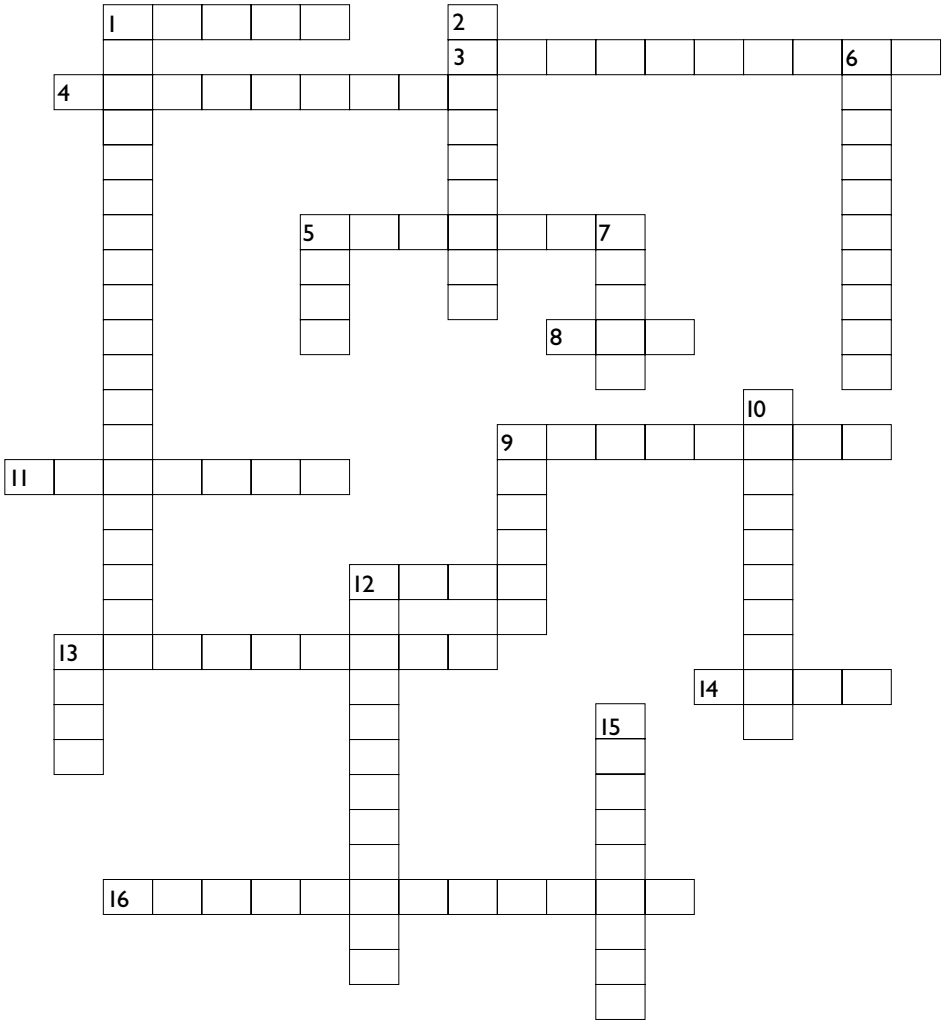
N P W R D Q S R O T A D E R P H H

U A N O P E N N E S T E R Y I S S

H X O G A N S N G I S E E R T A R

Activity Worksheet

Wildlife Tree Crossword Puzzle



Down

1) Birds and mammals that use cavities that have already been made in a tree.

2) Plants and animals that interact in a common environment.

5) A predator which uses limbs of wildlife trees for hunting perches.

6) Animals in danger of becoming extinct or disappearing are considered to be _____.

7) Bears and other mammals will use the hollowed_____ of wildlife trees for shelter.

9) Wildlife trees are one component of the _____ecosystem.

10) _____ is an example of a primary cavity excavator.

12) A variety of living things in an area.

13) Predators like owls feed on other animals or _____.

15) Decaying trees provide_____ to the soil.

Across

1) Dead or decaying trees are sometimes called _____.

3) Birds that build nests on the tops of trees are known as _____.

4) An interacting community of living and nonliving things.

5) A place where an animal finds food, water, shelter and space to live.

8) Wildlife trees are a bit like an animal _____.

9) One of the dangers threatening wildlife tree habitat is the use of the tree for _____.

11) Wildlife trees will eventually provide nutrients to the soil when they are decomposing or_____.

12) Mammals such as _____ will roost inside loosened bark.

13) Animals that prey on others animals.

14) An animal that uses the trunk of a decaying tree.

16) Any tree that provides habitat for wildlife is called a _____.

Activity Worksheet

Wildlife Tree Quiz

Name: _____ **Date:** _____

1) The Pileated Woodpecker eats insects found on:
   a) young tree seedlings
   b) dead or decaying trees
   c) the ground
   d) rotting logs

2) Rotting trees will provide soil with:
   a) nutrients
   b) water
   c) bacteria
   d) disease

3) Habitat includes the following:
   a) food, water and space
   b) water, nutrients, and cover
   c) shelter, water, nutrients and cover
   d) food, water, shelter and space

4) The word that means a variety of living things:
   a) diversity
   b) biodiversity
   c) university
   d) unidiversity

5) Birds that build their nests on the tops of trees are called:
   a) open nesters
   b) secondary cavity-users
   c) primary cavity excavators
   d) predators

6) Wildlife in danger of becoming extinct are;
   a) threatened
   b) rare
   c) abundant
   d) endangered

7) Wildlife trees are found:
   a) only in coastal forests
   b) in Douglas-fir forests
   c) in all kinds of forests
   d) only in rainforests

8) An example of a predator is:
   a) a mouse
   b) a mushroom
   c) a flower
   d) a hawk

9) Wildlife trees are important:
   a) firewood
   b) habitat
   c) telephone poles
   d) shelters

10) Nesting cavities are formed in wildlife trees when:
   a) the tree is a seedling
   b) the wood is soft and rotting
   c) the tree is healthy
   d) the wood is hard

11) An ecosystem is:
   a) an interacting community of living and nonliving things.
   b) a community of plants and animals
   c) the plants and animals in a forest
   d) a relationship between animals and their environment

12) The area located along a river, lake or stream bank is called:
   a) wetland area
   b) a beach
   c) riparian area
   d) waterside

Answers
1) b, d 2) a, 3) d, 4) b 5) a, 6) d, 7) c,
8) d, 9) b, d 10) b, 11) a, 12) c

Activity Worksheet

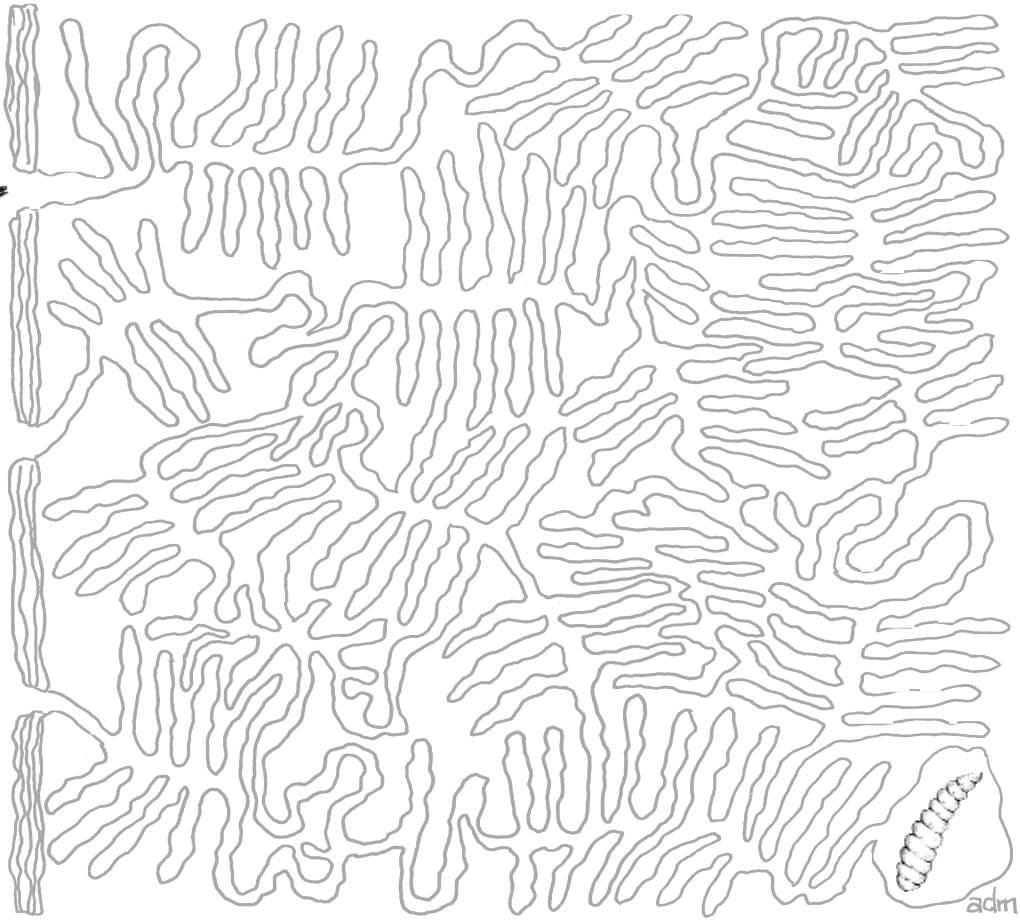
Woodpecker Maze

Can you find which woodpecker gets its dinner? Draw a tongue from your woodpecker to the beetle larvae. Try not to get stuck at the end of a bark beetle channel.

Hairy Woodpecker

White-headed Woodpecker

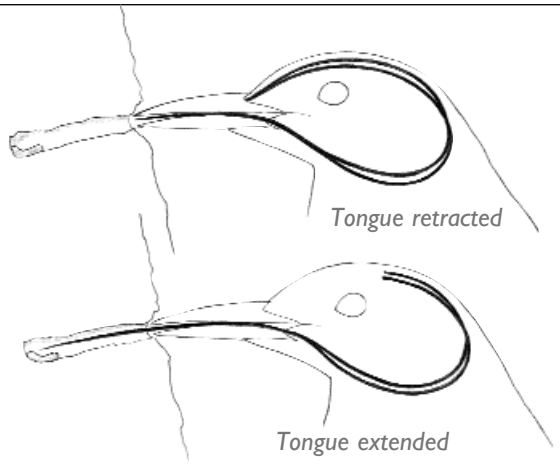
Black-backed Woodpecker



How Woodpecker Tongues Work:

The Northern Flicker (see illustration right) has a specialized system for getting its dinner. Its tongue is anchored at the base of its bill. When retracted (top right), the tongue is wrapped around the skull. A complex system based on long tongue or hyoid bones allows flickers and the other woodpeckers shown above to zip out their tongues like a carpenter's tape measure. Barbs on the end of the tongue, along with sticky saliva, help them grab their prey (bottom right). Sapsuckers have shorter tongues with hairy-looking tips that help them suck sap.

Adapted From: *The Birder's Handbook*, Ehrlich et al.



Activity Worksheet

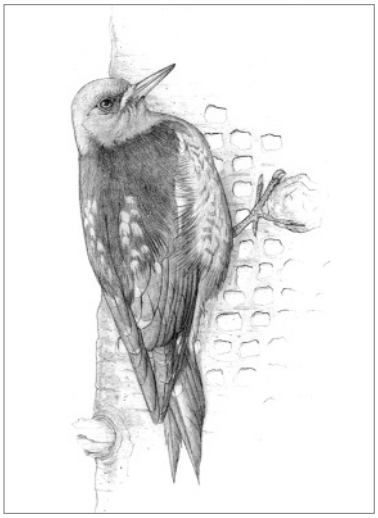
Wildlife Tree Species Cards

The following illustrations are all wildlife tree users found in British Columbia. They represent the main wildlife tree user groups and include Primary Cavity Excavators, Secondary Cavity Users, Open Nesters, Mammals, Amphibians, Plants and Insects. You can photocopy them and cut them out for a variety of the activities in this book or create your own activities or card games. You may want to do some research to find out which species are found in your area.

Pileated Woodpecker
Dryocopus pileatus

Wildlife Tree Use:
- Primary Cavity Excavator
- Roost
- Forages for insects

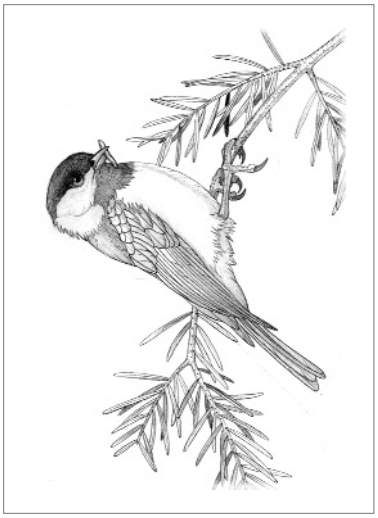
Notes: B.C.'s largest woodpecker and the inspiration for Walter Lantz's Woody Woodpecker. Feeding cavities are large, vertical and rectangular.



Red-breasted Sapsucker
Sphyrapicus ruber

Wildlife Tree Use:
- Primary Cavity Excavator
- Roost
- Forages for insects, especially ants.

Notes: Drills rows of holes or sapwells in a variety of tree species and feeds on both the sap and insects attracted to the sap.



Black-capped Chickadee
Parus atricapillus

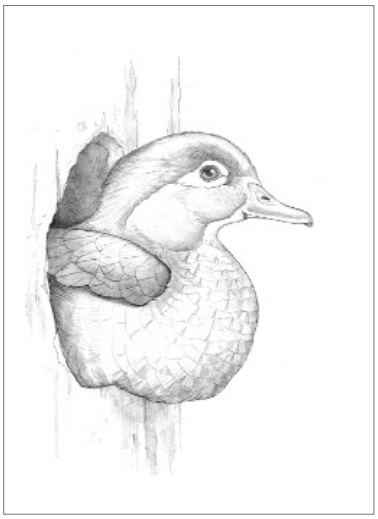
Wildlife Tree Use:
- Weak Primary Cavity Excavator
- Occasional Secondary Cavity User
- Foraging
- Winter Roost

Notes: Many of us recognize its call of "chicka-dee-dee-dee", while some of us say spring begins when they hear its call of "Heeere-sweetie".

Northern Flicker
Colaptes auratus

Wildlife Tree Use:
- Primary Cavity Excavator
- Roost
- Forages for insects

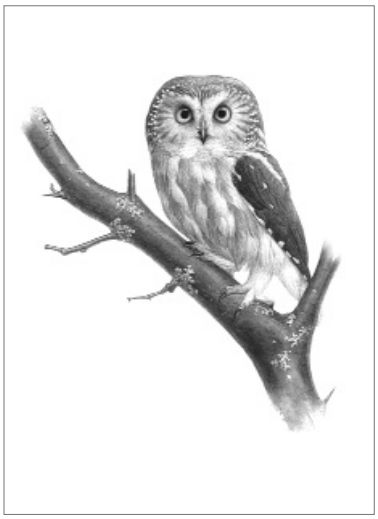
Notes: Food may include fruit, nuts and grains. Will use old cavities for nesting and roosting.



Wood Duck
Aix sponsa

Wildlife Tree Use:
- Secondary Cavity User

Notes: B.C.'s only species of duck that regularly perches on branches, the Wood Duck may nest as high as 25 metres.



Northern Saw-whet Owl
Aegolius acadicus

Wildlife Tree Use:
- Secondary Cavity User
- Winter Roost

Notes: At an average of 20 cm, this owl is not quite as big as a robin. The Queen Charlotte Island's sub-species, A. *a. brooksi*, is on the Blue List.

Belted Kingfisher
Ceryle alcyon

Wildlife Tree Use:
- Hunting Perch

Notes: Kingfishers are Primary Cavity Excavators but not in wood. They prefer to excavate long nesting holes in the sand and soil of streambanks and other similar soil structures.

Mountain Bluebird
Sialia currucoides

Wildlife Tree Use:
- Secondary Cavity User
- Hawking Perch

Notes: There's a close relationship between these beautiful birds, aspens and both the Hairy Woodpecker and Norther Flicker. Where their breeding ranges overlap in the interior, both species prefer decaying Aspens for their nest site and, as a result, so do the bluebirds.

Great Blue Heron
Ardea herodias

Wildlife Tree Use:
- Open Nester on large tree limbs
- Roost
- Hunting Perch

Notes: Development threats to its habitat of large stands of mature forest near its aquatic foraging grounds have put B.C.'s largest heron on the Blue List. Its place on the top of the food chain has made it an indicator of wetland health.

Turkey Vulture
Cathartes aura

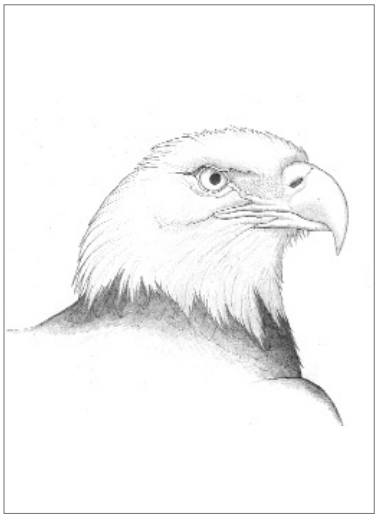
Wildlife Tree Use:
- Roost
- may nest among roots

Notes: Hundreds of Turkey Vultures congregate and roost in the trees on the southern tip of Vancouver Island, waiting until the conditions are right for migration south. Their heads have no feathers so they can easily get into carrion.

Osprey
Pandion haliaetus

Wildlife Tree Use:
- Open Nester on large tree limbs and broken tops
- Lookout and Feeding Perch

Notes: Ospreys always hold their fish dinners head first as they fly back to the nest or their feeding perch. Spines on the pads of the soles of its toes help it hold onto its slippery catch.



Bald Eagle
Haliaeetus leucocephalus

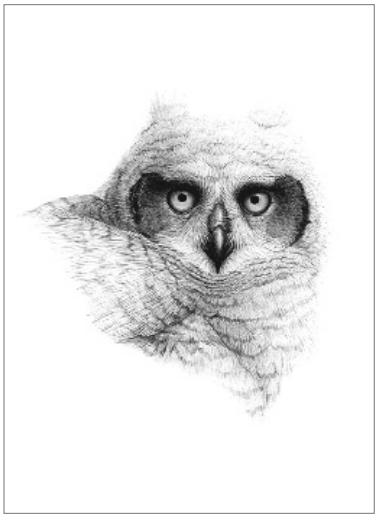
Wildlife Tree Use:
- Open Nester on large tree limbs
- Hunting Perch
- Roost
- Preening

Notes: Up to 15,000 Bald Eagles winter in B.C. – approximately 40% of the world's population. It can take four to five years for young birds to acquire the mature plumage of white head and tail.

Red Squirrel
Tamiasciurus hudsonicus

Wildlife Tree Use:
- Nest
- Summer and Winter Dens in cavities
- Cavities used for Feeding Stations

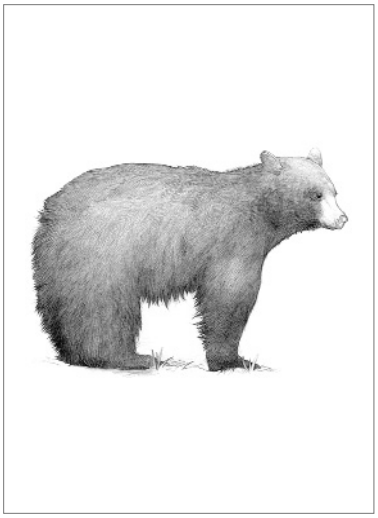
Notes: Squirrels feeding on conifer seeds and mushrooms help spread seeds and spores throughout the forest but they also feed on young tree seedlings and predate on birds' eggs and nestlings.



Great Horned Owl
Bubo virginianus

Wildlife Tree Use:
- Open Nester on broken tops and other species nests
- Secondary Cavity User
- Hunting Perch

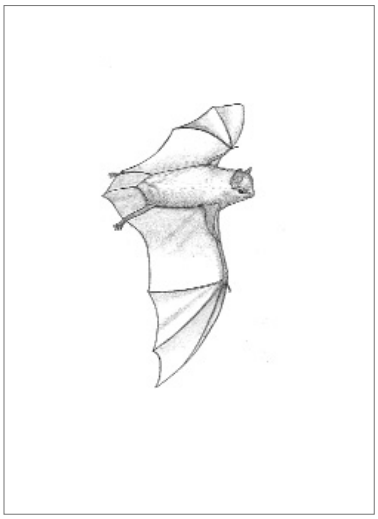
Notes: The Great Horned has the widest distribution of the owls in North America and is one of the first to nest in very early spring. It has loud call, "Whooo, who-who-who, whooo - whooo."



Black Bear
Ursus americanus

Wildlife Tree Use:
- Hibernates in hollow trees, at bases of trees (especially cedars) and under fallen wildlife trees

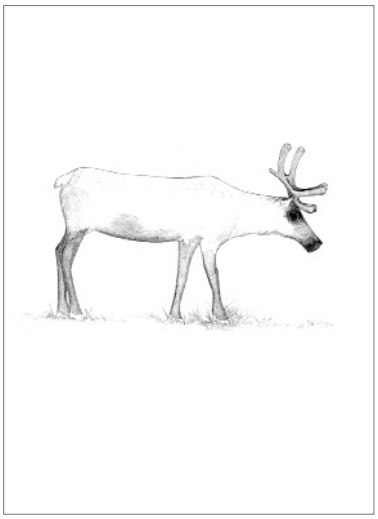
Notes: Black Bears are omnivores, which means they eat practically anything from Skunk Cabbage and ants to fish and carrion.



Little Brown Myotis
Myotis lucifugus

Wildlife Tree Use:
- Cavities as nursuries
- Day Roost in cavites and behind bark

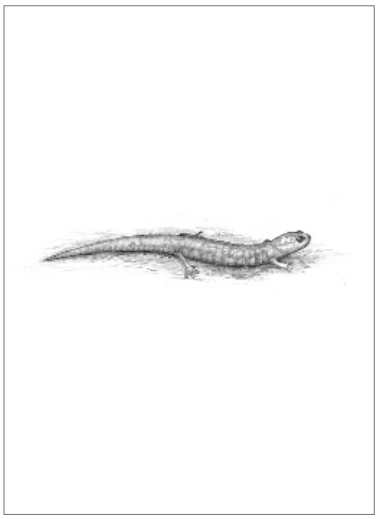
Notes: This tiny (6.2 g to 10.2 g in weight and 70 to 108 mm in length) and abundant bat is found throughout the province. It can eat up to 600 insects an hour!



Caribou
Rangifer tarandus

Wildlife Tree Use:
- Winter diet made up almost entirely of lichens found in mature stands of trees that include both standing and downed wildlife trees.

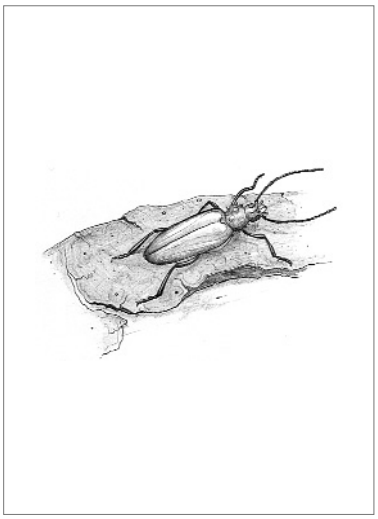
Notes: The southern populations of caribou are on the provincial Blue-List because of habitat loss and fragmentation.



Clouded Salamander
Aneides ferreus

Wildlife Tree Use:
- Lays eggs in rotting wood
- Feeding site
- Shelter

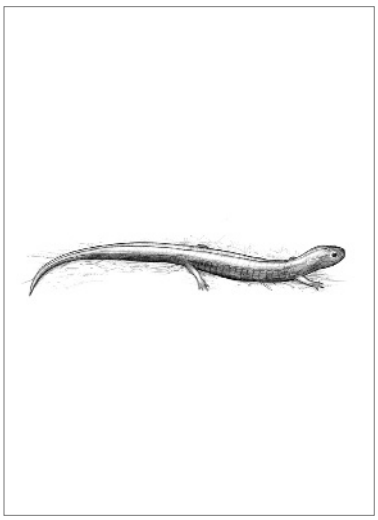
Notes: All salamanders are very fragile and sensitive to human touch due to the salts on our fingers. Some like the Clouded Salamander are completely terrestrial – they don't need standing or running water.



Spiny Longhorn Beetle
Ergates spiculatus

Wildlife Tree Use:
- Larvae feeds on wildlife trees

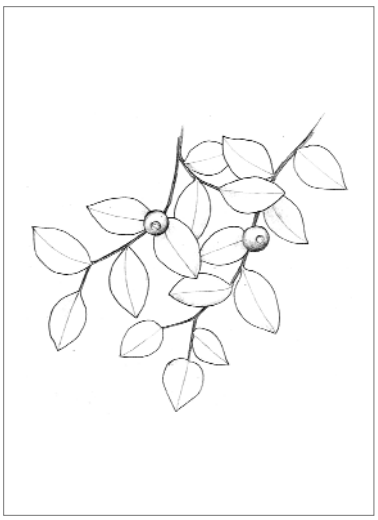
Notes: The Spiny Longhorn is B.C.'s largest beetle at up to 6 cm long. Its large white larvae bore into the wood of conifer, mainly Douglas-fir and pines, especially injured or dead trees, logs and stumps. The larvae is an important food source for woodpeckers.



Western Red-backed Salamander
Plethodon vehiculum

Wildlife Tree Use:
- Lays eggs in rotting wood
- Feeding site
- Shelter

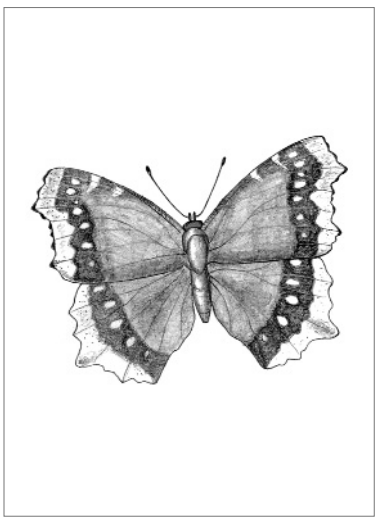
Notes: The Western Red-backed Salamander Respiration occurs through its skin and the lining of its mouth. They like the dampness found in rotten logs because their skin must remain moist to work.



Red Huckleberry
Vaccinium parvifolium

Wildlife Tree Use:
- Grows in soil rich in decaying wood, especially on logs and stumps.

Notes: The juicy red berries were an important food source for first peoples and were even used as fish bait because they look like salmon roe, a favourite food of trout.



Mourning Cloak Butterfly
Nymphalis antiopa

Wildlife Tree Use:
- Larval Food is many trees including elm, poplar and willow
- Gray and thorny pupae may be found together under leaves and loose bark
- Many adults winter under loose bark

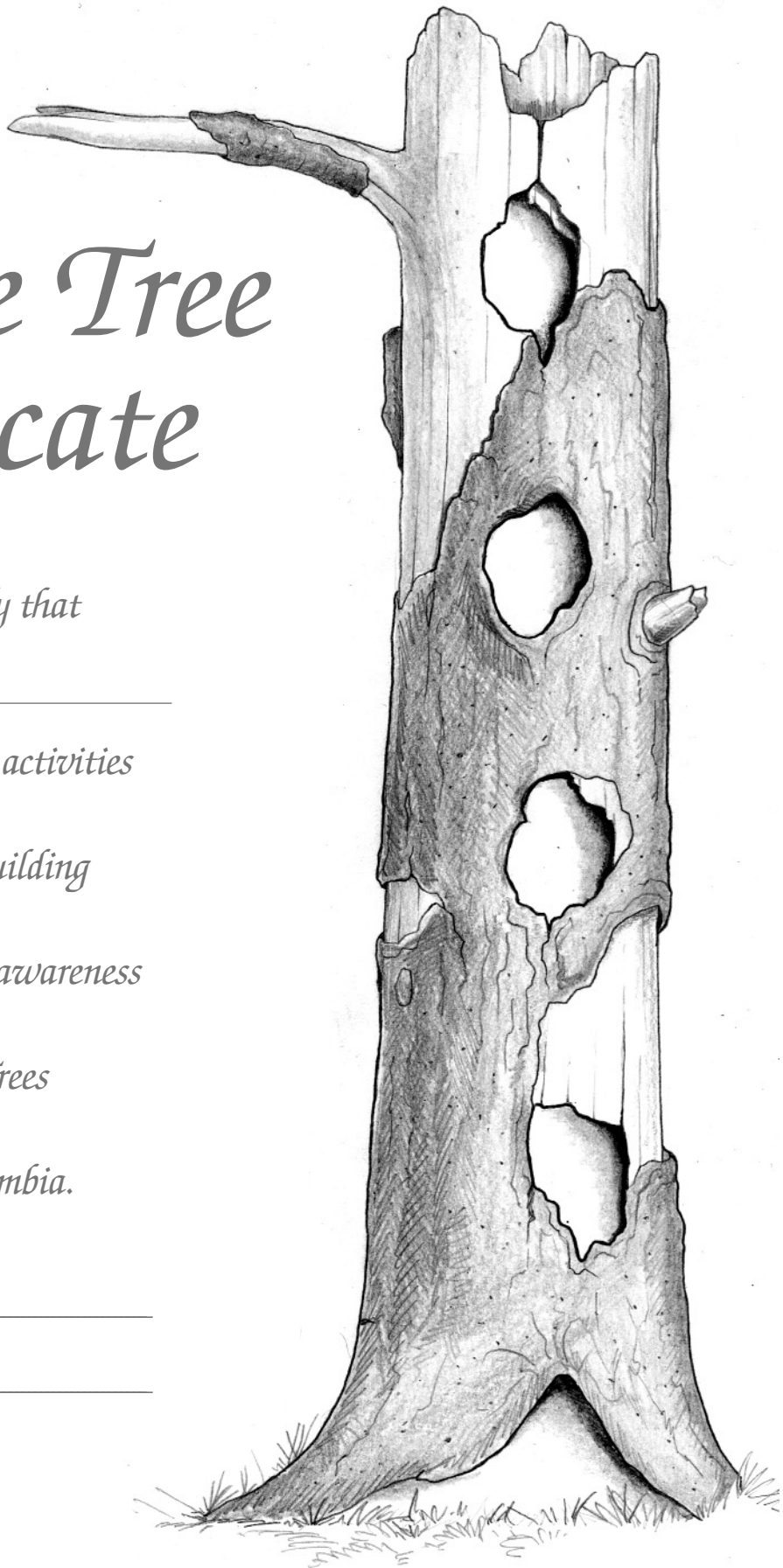
Notes: The undersides of their wings looks like bark or weathered wood.

Licorice Fern
Polypodium glycyrrhiza

Wildlife Tree Use:
- Often grows on tree trunks and branches (especially bigleaf maple)

Notes: This fern is an epiphyte - a plant growing on another plant, and is found along the coast. Both species get through periods of drought by curling and drying up like mosses and lichens.

Wildlife Tree Certificate



This is to certify that

_____

has participated in activities

important for building

understanding and awareness

of Wildlife Trees

in British Columbia.

Date: _____

Leader: _____

References

Blood, D.A., Anweiler, G.G. *Status of the Bald Eagle in British Columbia*. Wildlife Branch, Ministry of Environment, Lands & Parks. WR-62 February 1994.

Campbell, R. W. and A.P. Harcombe. 1990. *The Vertebrates of British Columbia*. Heritage Record No. 20, British Columbia Provincial Museum, Victoria, B.C. pp. 45–64

Guy, S., T. Manning, J. Cooper, M. Fenger, P. Bradford. In Press. *Wildlife Trees and the Animals that Depend on Them*. Lone Pine Publishing Ltd. Edmonton, Alberta.

Nagorsen, D. W., Brigham, R.M. 1993. *Bats of British Columbia*. UBC Press,

Thomas, J.W. 1979. *Wildlife Habitats in Managed Forests: the Blue Mountains of Oregon and Washington*. Agriculture Handbook No. 553. Forest Service, U.S. Department of Agriculture, Portland, Oregon. pp. 60–90.

Vitt, D., 1988. *Mosses, Lichens & Ferns of Northwest North America*. Lone Pine Publishing, Edmonton,

Wildlife Tree Committee. 1992. *Wildlife/Danger Tree Assessor's Course Workbook*. pp. 1–9.

Glossary

Arboreal
tree dweller

Biodiversity
a variety of life in all its forms; includes species, genetic, ecosystem and landscape diversity

Biologist
a person who studies living organisms and their relationship to one another

Biotic
the living components of an ecosystem

Canopy
the layer formed by leaves and branches of the forest's tallest trees

Community
a group of plants or animals that live in the same habitat

Coniferous
a cone bearing plant such as firs, pines, spruces etc.

Consumer
organisms that feed on other living things

Deciduous
trees and shrubs that lose their leaves each autumn

Decompose
mechanical or chemical breakdown of dead organic materials into simple inorganic materials

Dependent
relying on another thing for support

Ecosystem
an interacting and interrelated community of living and nonliving things that constantly change

Endangered
a species of animal or plant that is in immediate danger of becoming extinct

Extinct
a species which is no longer living

Food chain
the transfer of food energy from a chain or series of organisms in which feed on the individuals

below it in the chain. Species can be represented in several food chains. Example: grass-deer-wolves

Food web
an interlocking pattern of food chains

Fragmented landscape
once continuous but now isolated landforms or ecosystems

Germination
the first growth from a seed

Habitat
the place where an animal or plant lives and includes food, water, space and shelter

Invertebrates
animals without backbones

Lichen
a fungus and an alga growing together, as one, in a symbiotic relationship

Limiting factor
anything in the environment that influences or puts limits on a plant or animal population

Niche
the function or role of a plant or animal

Open nester
birds making their nests on the tops of wildlife trees or use large bare limbs for perches

Predator
animals and plants that catch and consume other organisms

Producer
organism that produces its own food

Population
members of the same species living in the same area at the same time

Primary cavity excavator
birds, such as woodpeckers, that drill or excavate holes into trees for nesting, feeding, or roosting

Riparian
located or living along or near a stream, river or body of water

Secondary cavity-user
animals that use existing holes in trees for nesting, denning, roosting or for cover

Snag
a standing dead tree

Species
a population of individuals that are more or less alike that can interbreed and produce fertile offspring

Stump
a remnant of a standing tree

Threatened
a species that is likely to become endangered and if it is not protected could become extinct

Wildlife tree
any standing, dead or living, tree that provides habitat for wildlife.

Understory
lowest level of plants under taller plant species

Vulnerable
any species of plant or animal that is at risk because of low or declining numbers, limited to the fringe of its range or for some other reason, but is not a threatened species

Appendix A

List of Wildlife Tree Users

Birds

Great Blue Heron	open nester on large tree limbs;roost; hunting perch
Wood Duck	secondary cavity user
Common Goldeneye	secondary cavity user
Barrow's Goldeneye	secondary cavity user
Bufflehead	secondary cavity user
Hooded Merganser	secondary cavity user
Common Merganser	secondary cavity user
Marbled Murrelet	open nester on large tree limbs
Bald Eagle	open nester on large tree limbs; hunting perch; roost; feather maintenance
Golden Eagle	open nester on large tree limbs
Cooper's Hawk	open nester; hunting perch; prey plucking post
Northern Goshawk	hunting perch; open nester
Red-tailed Hawk	hunting perch; open nester
Swainson's Hawk	open nester; hunting perch
American Kestrel	secondary cavity user; hunting perch
Merlin	secondary cavity user
Osprey	open nester on large tree limbs and broken tops;lookout and feeding perch
Turkey Vulture	roost; nests among roots
Boreal Owl	secondary cavity user; winter roost
Barn Owl	secondary cavity user; winter roost
Barred Owl	secondary cavity user; nest on broken treetops; winter roost
Flammulated Owl	secondary cavity user
Great Horned Owl	secondary cavity user; nests on broken tree tops; hunting perch
Great Grey Owl	nests on broken tree tops and old nests; hunting perch
Northern Hawk-Owl	secondary cavity user; nest on broken tree tops; hunting perch; winter roost
Northern Pygmy-Owl	secondary cavity user; winter roost
Northern Saw-whet Owl	secondary cavity user; winter roost
Spotted Owl	secondary cavity user; winter roost
Western Screech-Owl	secondary cavity user; roost
Vaux's Swift	secondary cavity user
Belted Kingfisher	hunting perch
Lewis' Woodpecker	primary cavity user; roost; forage for food; hawking perch
Yellow-bellied Sapsucker	primary cavity user; roost; foraging
Red-naped Sapsucker	primary cavity user; roost; foraging
Red-breasted Sapsucker	primary cavity user; roost; foraging
Williamson's Sapsucker	primary cavity user; roost; foraging
Downy Woodpecker	primary cavity user; roost; foraging
Hairy Woodpecker	primary cavity user; roost; foraging
White-headed Woodpecker	primary cavity user; roost; foraging
Three-toed Woodpecker	primary cavity user; roost; foraging
Black-backed Woodpecker	primary cavity user; roost; foraging

Northern Flicker	primary cavity user; roost; foraging
Pileated Woodpecker	primary cavity user; roost; foraging
Pacific-slope Flycatcher	secondary cavity user; hawking perch
Ash-throated Flycatcher	secondary cavity user; hawking perch
Purple Martin	secondary cavity user
Tree Swallow	secondary cavity user
Violet-green Swallow	secondary cavity user
Black-capped Chickadee	primary cavity user; sometimes uses secondary cavities; foraging; winter roost
Mountain Chickadee	primary cavity user; sometimes uses secondary cavities; foraging; winter roost
Boreal Chickadee	primary cavity user; sometimes uses secondary cavities; foraging; winter roost
Chestnut-backed Chickadee	primary cavity user; sometimes uses secondary cavities;foraging; winter roost
Red-breasted Nuthatch	primary cavity user; sometimes secondary cavity; foraging; winter roost
White-breasted Nuthatch	primary cavity user; sometimes uses secondary cavities; foraging;winter roost
Pygmy Nuthatch	primary cavity user; sometimes uses a secondary cavity; foraging; winter roost
Brown Creeper	secondary cavity user-behind bark; foraging
Bewick's Wren	secondary cavity user
Winter Wren	secondary cavity user; nests among logs and roots
House Wren	secondary cavity user
Western Bluebird	secondary cavity user; hawking perch
Mountain Bluebird	secondary cavity user; hawking perch
House Sparrow	secondary cavity user

Amphibians

Clouded Salamander	lays eggs in rotting wood; feeding site; shelter
Western Red-backed Salamander	lays eggs in rotting wood; feeding site; shelter

Mammals

Big Brown Bat	nursery and day roost in cavities
Hoary Bat	day roost in cavities
Pallid Bat	day roost in cavities
Silver-haired Bat	nursery; day roost; hibernation site in cavities and behind bark
California Myotis	nursery; day roost in cavities and behind bark
Keen's long-eared Myotis	nursery; day roost in cavities and behind bark
Little Brown Myotis	nursery; day roost in cavities and behind bark
Long-legged Myotis	nursery and day roost in cavities and behind bark
Northern Long-eared Myotis	nursery and day roost behind bark
Fringed Myotis	nursery; day roost in cavities
Western Small-footed Myotis	day roost behind bark
Western Long-eared Myotis	nursery; day roost in cavities and behind bark
Yuma Myotis	nursery; day roost in cavities and behind bark
Western Red Bat	day roost in cavities
Columbian Mouse	nests in cavities or behind bark; summer and winter dens in cavities
Deer Mouse	nests in cavities or behind bark; summer and winter dens in cavities
Sitka Mouse	nests in cavities or behind bark; summer and winter dens in cavities
Keen's Mouse	nests in cavities or behind bark; summer and winter dens in cavities

Busy-tailed Woodrat	nests in cavities or behind bark; summer and winter dens in cavities
Southern Red-backed Vole	nest and summer den in cavities
Northern Flying Squirrel	nest; summer and winter dens in cavities; cavities used for feeding
Yellow-pine Chipmunk	nest and summer den in cavities
Least Chipmunk	nest and summer den in cavities
Red-tailed Chipmunk	nest and summer den in cavities
Townsend's Chipmunk	nest and summer den in cavities
Douglas' Squirrel	nest; summer and winter dens in cavities; cavities used as feeding stations
Red Squirrel	nest; summer and winter dens in cavities; cavities used for feeding stations
Marten	nest; summer and winter dens in cavities
Fisher	nest; summer and winter dens in cavities
Ermine	nest and summer den in cavities
Long-tailed Weasel	nest; summer and winter dens in cavities
Least Weasel	nest and summer dens in cavities
Spotted Skunk	nest, summer and winter dens in cavities
Raccoon	nest; summer and winter dens in cavities
Black Bear	hibernates in hollow trees and fallen logs
Caribou	feeds on lichens found on rotting trees

Appendix B

British Columbia Wildlife on the Red List (1993)

The Red List provides a list of candidate species and sub-species to be considered for legal designation under the B.C Wildlife Act as Endangered or Threatened. It also included the four species already designated as Endangered: the Sea Otter, Burrowing Owl, American White Pelican, and Vancouver Island Marmot. These are taxa which have either very small local populations, or biological characteristics that make them imperiled. Not all Red-listed taxa will necessarily become designated under the Wildlife Act. Placing taxa on these lists flags them as being at risk and requiring investigation.

▲ *indicates wildlife that use wildlife trees for habitat*
★ *indicates a sub-species*

Amphibians

Tiger salamander *Ambystoma tigrinum*
Pacific Giant Salamander *Dicamptodon tenebrosus*
Coeur D'Alene Salamander *Plethodon idahoensis*
Northern Leopard Frog *Rana pipiens*

Reptiles

Short-horned Lizard *Phrynosoma douglassii*
Sharp-tailed Snake *Contia tenuis*
Gopher Snake *Pituophis melanoleucus catenifer* ★
Night Snake *Hypsiglena torquata*

Birds

Western Grebe *Aechmophorus occidentalis*
American White Pelican *Pelecanus erythrorhynchos*
Pelagic Cormorant *Phalacrocorax pelagicus pelagicus* ★
Brandt's Cormorant *Phalacrocorax penicillatus*
▲ Northern Goshawk *Accipiter gentilis laingi* ★
Ferruginous Hawk *Buteo regalis*
Peregrine Falcon *Falco peregrinus anatum* ★
Prairie Falcon *Falco mexicanus*
Sage Grouse *Centrocercus urophasianus*
Upland Sandpiper *Bartramia longicauda*
Forster's Tern *Sterna forsteri*
Thick-billed Murre *Uria lomvia*
Common Murre *Uria aalge*
Horned Puffin *Fratercula corniculata*
Yellow-billed Cuckoo *Coccyzus americanus*
Burrowing Owl *Athene cunicularia*
▲ Spotted Owl *Strix occidentalis*

- Williamson's Sapsucker *Sphyrapicus thyroideus nataliae* ★
- White-headed Woodpecker *Picoides albolarvatus*
- Horned Lark *Eremophila alpestris strigata* ★
- Purple Martin *Progne subis*
- Sage Thrasher *Oreoscoptes montanus*
- Sprague's Pipit *Anthus spragueii*
- Bay-breasted Warbler *Dendroica castanea*
- Cape May Warbler *Dendroica tigrina*
- Connecticut Warbler *Oporornis agilis*
- Yellow-breasted Chat *Icteria virens*
- Brewer's Sparrow *Spizella breweri breweri* ★
- Grasshopper Sparrow *Ammodramus savannarum*
- Sharp-tailed Sparrow *Ammodramus caudacalus*
- Vesper Sparrow *Pooecetes gramineus affinis* ★

Mammals

- Tundra Shrew *Sorex tundrensis*
- Pacific Water Shrew *Sorex bendirii*
- Water Shrew *Sorex palustris brooksi* ★
- Townsend's Mole *Scapanus townsendii*
- Pallid Bat *Antrozous pallidus*
- Southern Red Bat *Lasiurus blossevilli*
- Keen's Long-eared Bat *Myotis keenii*
- Northern Long-eared Bat *Myotis septentrionalis*
- Snowshoe Hare *Lepus americanus washingtonii* ★
- White-tailed Jackrabbit *Lepus townsendii*
- Mountain Beaver *Aplodontia rufa rufa* ★
- Southern Red-backed Vole *Clethrionomys gapperi occidentalis* ★
- Townsend's Vole *Microtus townsendii cowani* ★
- Northern Bog Lemming *Synaptomys borealis artemisiae* ★
- Northern Pocket Gopher *Thomomys talpoides segregatus* ★
- Vancouver Island Marmot *Marmota vancouverensis*
- Red-tailed Chipmunk *Tamais ruficaudus simulans* ★
- Red-tailed Chipmunk *Tamais ruficaudus ruficaudus* ★
- Least Chipmunk *Tamais minimus selkirki*
- Sea Otter *Enhydra lutris*
- Wolverine *Gulo gulo vancouverensis* ★
- Ermine *Mustela erminea haidarum*
- Long-tailed Weasel *Mustela frenata altifrontalis* ★
- Wood Bison *Bison bison athabascae*
- Dall's Sheep *Ovis dalli dalli*

Fish

- Lake Lamprey *Lampetra macrostoma*
- Cisco *Coregonus artedii*
- Broad Whitefish *Coregonus nasus*
- Least Cisco *Coregonus sardinella*
- Dragon Lake Whitefish *Coregonus* sp.
- Giant Pygmy Whitefish *Prosopium* sp.
- Pygmy Longfin Smelt *Spirinchus* sp.
- Emerald Shiner *Notropis atherinoides*
- Spottail Shiner *Notropis hudsonius*
- Northern Redbelly Dace X Finescale Dace *Chrosomus eos x Neogaeus chrosomus*
- Dace *Neogaeus*
- Speckled Dace *Rhinichthys osculus*
- Nooksack Dace *Rhinichthys* sp.
- Umatilla Dace *Rhinichthys umatilla*
- Salish Sucker *Catostomus* sp.
- Giant Black Stickleback *Gasterosteus* sp.
- Enos Lake Kimnetic Stickleback *Gasterosteus* sp.
- Enos Lake Benthic Stickleback *Gasterosteus* sp.
- Paxton Lake Limnetic Stickleback *Gasterosteus* sp.
- Paxton Lake Benthic Stickleback *Gasterosteus* sp.
- Priest Lake Limnetic Stickleback *Gasterosteus* sp.
- Priest Lake Benthic Stickleback *Gasterosteus sp.*
- Balkwill Lake Limnetic Stickleback *Gasterosteus* sp.
- Balkwill Lake Benthic Stickleback *Gasterosteus* sp.
- Emily Lake Limnetic Stickleback *Gasterosteius* sp.
- Emily Lake Benthic Stickleback *Gasterosteus* sp.
- Hadley Lake Limnetic Stickleback *Gasterosteus* sp.
- Hadley Lake Benthic Stickleback *Gasterosteus* sp.
- Ninespine Stickleback *Pungitius pungitius*
- Cultus Lake Sculpin *Cottus* sp.

Appendix C

British Columbia Wildlife on the Blue List (1993)

The Blue List includes vulnerable taxa that could become eligible for the Red List in the forseeable future. The Blue List also includes species that are generally suspected of being vulnerable, but for which information is too limited to allow designation in another category.

(▲ indicates wildlife that use wildlife trees for habitat)

★ *indicates a sub-species*

Amphibians

Tailed Frogs *Ascaphus truei*
Great Basin Spadefoot Toad *Scaphiopus intermontanus*

Reptiles

Painted Turtle *Chrysemys picta*
Rubber Boa *Charina bottae*
Western Yellow-bellied Racer *Coluber mormon*
Gopher Snake *Pituophis melanoleucus deserticola* ★
Western Rattlesnake *Crotalus viridis*

Birds

Double-crested Cormorant *Phalacrocorax auritus*
American Bittern *Botaurus lentiginosus*
▲ Great Blue Heron *Ardea herodias*
Green-backed Heron *Butorides striatus*
Trumpeter Swan *Cygnus buccinator*
Oldsquaw *Clangula hyemalis*
Surf Scoter *Melanitta perspicillata*
Turkey Vulture *Cathartes aura*
▲ Bald Eagle *Haliaeetus leucocephalus*
Swainson's Hawk *Buteo swainsoni*
Peregrine Falcon *Falco peregrinus pealei* ★
Gyrfalcon *Falco rusticolus*
White-tailed Ptarmigan *Lagopus leucurus saxatilis* ★
Sharp-tailed Grouse *Tympanuchus phasianellus columbianus*
Sandhill Crane *Grus canadensis*
Lesser Golden-Plover *Pluvialis dominica*
American Avocet *Recurvirostra americana*
Wandering Tattler *Heteroscelus incanus*
Long-billed Curlew *Numenius americanus*
Hudsonian Godwit *Limosa haemastica*
Short-billed Dowitcher *Limnodromus griseus*
Red-necked Phalarope *Phalaropus lobatus*
California Gull *Larus californicus*
Caspian Tern *Sterna caspia*
▲ Marbled Murrlet *Brachyramphus marmoratus*
Ancient Murrlet *Synthliboramphus antiquus*
Cassin's Auklet *Ptychoramphus aleuticus*
Tufted Puffin *Fratercula cirrhata*
▲ Barn Owl *Tyto alba*
Short-eared Owl *Asio flammeus*
▲ Flammulated Owl *Otus flammeolus*
▲ Western Screech-Owl *Otus kennicottii kennicottii* ★
▲ Western Screech-Owl *Otus kinnicottii macfarlanei* ★
▲ Northern Pygmy-Owl *Glaucidium gnoma swarthi*
▲ Northern Saw-whet Owl *Aegolius acadicus brooksi*
White-throated Swift *Aeronautes saxatalis*
Black-chinned Hummingbird *Archilochus alexandri*
▲ Lewis' Woodpecker *Melanerpes lewis*
▲ Williamson's Sapsucker *Sphyrapicus thyroideus thyroideus* ★
▲ Hairy Woodpecker *Picoides villosus picoides*
Yellow-bellied Flycatcher *Empidonax flaviventris*
▲ Gray Flycatcher *Empidonax wrightii*
Steller's Jay *Cyanocitta stelleri carlottae* ★
Canyon Wren *Catherpes mexicanus*
Hutton's Vireo *Vireo huttoni*
Philadelphia Vireo *Vireo philadelphicus*
Black-throated Green Warbler *Dendroiez virens*
Palm Warbler *Denroica palmarum*
Canada Warbler *Wilsonia canadensis*
Lark Sparrow *Chondestes grammacus*
Smith's Longspur *Calcarius pictus*
Bobolink *Dolichonyx oryzivorus*
Pine Grosbeak *Pinicola enucleator carlottae* ★

Mammals

Black-backed Shrew *Sorex arcticus*
Trowbridge's Shrew *Sorex trowbridgii*
Fringed Myotis *Myotis thysanodes*
▲ Western Small-footed Myotis *Myotis ciliolabrum*
▲ Spotted Bat *Euderma maculatum*
Townsend's Big-eared Bat *Plecotus townsendii*
Nuttall's Cottontail *Sylvilagus nuttallii*
Mountain Beaver *Aplodontia rufa rainieri* ★
Western Harvest Mouse *Reithrodontomys megalotis*

Great Basin Pocket Mouse *Perognathus parvus*
Cascade Mantled Ground Squirrel *Spermophilus saturatus*
▲ Least Chipmunk *Tamias minimus oreocetes* ★
▲ Southern Red-backed Vole *Clethrionomys gapperi galei*
Northern Bog Lemming *Synaptomys borealis borealis* ★
Meadow Jumping Mouse *Zapus hudsonius alascensis*
Wolverine *Gulo gulo luscus* ★
▲ Fisher *Martes pennanti*
▲ Ermine *Mustela erminea anguinae* ★

Badger *Taxidea taxus*
▲ Black Bear *Ursus americanus emmonsii* ★
Grizzly Bear *Ursus arctos*
Plains Bison *Bison bison bison* ★
Roosevelt Elk *Cervus elaphus roosevelti* ★
California Bighorn Sheep *Ovis canadensis californiana* ★
Rocky Mountain Bighorn Sheep *Ovis canadensis canadensis* ★
Stone Sheep *Ovis dalli stonei*
▲ Caribou *Rangifer tarandus* (*southern populations*)

Appendix D

Resources

✱ *Denotes a few of the resource materials recommended for use in British Columbia by the Ministry of Education 1993.*

Children's Books

Adams, Dawn. 1984. *The Forest*. WEDGE, Univ.of British Columbia, Vancouver.

Anderson, Margaret J. 1976. *Exploring City Trees*. McGraw-Hill, New York.

Atwood, Ann. 1972. *The Kingdom of the Forest*. Charles Scriber's Sons, New York.

Busch, Phyllis S. 1968. *Once There Was a Tree*, The Story of the Tree; A Changing Home for Plants and Animals. Nelson, Foster & Scott Ltd.

Cobb, Vicki. 1981. *Lots of Rot*. J.B. Lippincott, New York.

Cochrane,J. and Coleman, J. 1979 *Animals and Their Homes*. Grosset and Dunlop, New York.

Donahue, Mike 1988. *The Grandpa Tree*. Roberts Rinehart Inc., Boulder, Colorado.

✱ Dr. Suess. 1971. *The Lorax*. Random House, New York (also available in video).

Fisher, A. *Animal Houses*. 1973, Thomas, Nelson and Sons, Toronto.

Guujaaw. 1984. *The Cedar*. WEDGE, University. of British Columbia, Vancouver.

✱ Hoberman, M. 1978 A *House is a House for Me*. Richmond Hill: Scholastic Tab Publications.

Hubbard, Fran. 1971. *Animal Friends of the Northwest*. Awani Press, Texas

Jaspersohn, William. 1980. *How The Forest Grew*. Greenwillow Press, New York.

Kelly, David and Gary Braasch 1988. *Secrets of the Old Growth Forest*. Salt Lake City: Gibbs and Smith.

Killion, Bette. 1989. *The Apartment House Tree*. Harper & Row, U.S.A.

Mazer, Anne. 1991. *The Salamander Room*. Random House, Toronto.

Milne, Lorus and Margery Milne. *Gadabouts and Stick-at-Homes: Wild Animals and their Habitats*.

Newton, James R. 1980. *Forest Log*. ThomasY. Crowell, New York, NY.

Romanova, Natalia 1985. *Once There Was a Tree*. Dial.

Rowland-Entwistte, Theodore. 1978. *Animal Homes*. Warwick Press, New York.

Ryden, H. 1988. *Wild Animals of America* ABC. Lodestar Books.

Ryder, Joanne. 1979. *Snail in the Woods*. Harper, New York.

Sabin, Francene 1982. *Wonders of the Forest*. Troll

Sanchez, Jose' Luis Garcia and Miguel Angel Pacheco. I A*m* A T*ree*. The Who Am I Series. New York, N.Y.

Selsam, Millicent E. 1966. H*ow to* B*e a* N*ature* D*etective*. Harper & Row, New York.

Silverstein, Shel. 1964. T*he* G*iving* T*ree*. Harper & Row, U.S.A.

Smith, George. 1970. W*oodland* A*nimals*. Abeland-Schuman, New York.

Suzuki, David and Barbara Hehner. 1989. L*ooking at the* E*nvironment*. Irwin Publishers.

The Nature Company; P.O. Box 2310; Berkley, California 94702

- T*he* M*an* W*ho* P*lanted* T*rees* by Jean Giono (available in video)

T*rees*: A C*elebration*

H*ow the* F*orest* G*rew*

- Terreson, Jeffrey. 1989. A*nimal* H*omes*. National Geographic Society.

Thornhill, Jan. 1991. A T*ree in a* F*orest*. OWL, Greey de Pencier Books, Toronto.

Tresselt, Alvin. 1972. T*he* D*ead* T*ree*. Parent's Magazine Press. New York.

Udry, Janice May. 1987. A T*ree is* N*ice*. HarperTrophy, U.S.A.

Educational and Curriculum Material

Anderson, Margaret. 1994. A*ncient* F*orests*: D*iscovering* N*ature*. Dog-Eared Publications, Wisconsin ([608] 831-1410).

Binder, Deanna et al. 1994. B*ackyard* B*iodiversity and* B*eyond* (A H*andbook for* S*tudents and* T*eachers*). Ministry of Forests and Canadian Heritage.

- Caudato., Michael J. and Joseph Bruchac 1988. *Keepers of the* E*arth*: N*ative* A*merican* S*tories and* E*nvironmental* A*ctivities for* C*hildren*. Golden, Colorado: Fulcrum Inc.

Chinery, Michael. 1977. T*he* C*omplete* A*mateur* N*aturalist*. Bloomsbury Books, London.

Cornell, Joseph. 1989. S*haring the* J*oy of* N*ature*. Dawn Publications, California.

Cornell, Joseph 1979. S*haring* N*ature* W*ith* C*hildren*. Ananda Publications.

Hayley, Dianne and Wishart, Pat. 1988, 1989, 1990, 1991. Knee High Nature Series; W*inter in* A*lberta*, F*all in* A*lberta*, S*ummer in* A*lberta*, S*pring in* A*lberta*. Knee High Nature, Edmonton.

Hunken, Jorie. 1994. E*cology for all* A*ges*: *discovering nature through activities for children and adults*. Globe Pequot Press, Connecticut.

Lingelbach, Jenepher. 1986. H*ands-On-*N*ature*: I*nformation and* A*ctivities for* E*xploring the* E*nvironment with* C*hildren*. Vermont Institute of Natural Science, Woodstock, Vermont.

McClaren, Milton et al. 1995. W*ater* S*tewardship*. Ministry of Environment, Lands,and Parks.

P*roject* L*earning* T*ree*. Supplementary Activity Guide. British Columbia Forestry Association. 9800A 140th Street, Surrey, B.C. V3T 4M5

P*roject* WILD. Environmental Education Activity Guide. Ministry of Environment, Lands & Parks. 2 - Victoria, B.C. V8V 1X4. Phone (604) 356 - 7111.

Suzuki, David and Barbara Hehner. 1989. L*ooking at the* E*nvironment*. Irwin Publishers.

Western Education Development Group. S*eeing* T*hrough the* T*rees*. 1977, University of British Columbia, Vancouver.

Western Education Development Group. A F*orest in* M*y* C*lassroom*. 1983, University of British Columbia, Vancouver.

Vancouver Environment Education Project. 1975. T*he* S*tump* B*ook*. Western Education Development Group, University. of British Columbia & the B.C.Forest Service, Vancouver.

General Information

Arora, D. 1986. *Mushrooms Demystified*. Ten Speed Press, San Francisco.

Arno, Stephan F 1977. *Northwest Trees*. Seattle: The Mountaineers.

Backhouse, Frances. 1993. *Wildlife Tree Management in British Columbia*. B.C. Ministry of Environment, Lands and Parks.

Caras, Roger. 1979. *The Forest*. Holt, Rhinehart and Winston. New York.

Farb, Peter. 1969. *The Forest*. Time-Life Books. New York.

Green, D.M. and W.R. Campbell, ed. 1986. *The Amphibians of British Columbia*.Royal British Columbia Provincial Museum Handbook, No. 45, Victoria.

Hancock, David 1977. *Guide to Western Wildlife*. Saanichton, B.C. Canada: Hanock House Publisher Ltd.

Harding, Lee and Emily McCullum, ed., 1994. *Biodiversity in British Columbia:Our Changing Environment*. Environment Canada, Canadian Wildlife Service.

Hosie, Robert. 1979. *Native Trees of Canada*. Don Mills, Ontario; Fitzhenry & Whiteside.

Jackson, James. 1978. *The Biography of a Tree*. Jonathan David Publishers. Middle Village, New York.

Ketchum, Richard M. 1970. *The Secret Life of the Forest*. American Heritage. New York.

Kricher, J.C. and G. Morrison. 1993. *Peterson's Ecology of Western Forests*. Houghton Mifflin Company, Toronto.

Mandahl-Barth, G. 1966. *Woodland Life*. Blanford Press, New York.

Maser, Chris 1988. *From the Forest to the Sea*: A *Story of Fallen Trees*. Portland: US Forest Service, General Technical Report PNW-GTR-229.

Maser, Chris 1988. *The Redesigned Forest*. San Pedro: R. and E. Miles.

McCormick, Jack. 1966. *The Life of the Forest*. McGraw-Hill. New York.

Nagorsen, David W. and R. Mark Brigham. 1993. *Bats of British Columbia*. Royal British Columbia Museum Handbook, UBC Press, Vancouver.

Naturescape British Columbia – Caring for Wildlife Habitat at Home. Ministry of Environment, Lands and Parks. 1-800-387-9853

Norse, Elliot A. 1990. *Ancient Forests of the Pacific Northwest*. Covelo, CA: Island Press.

Olson, S.F. and L. Blacklock. *The Hidden Forest*. 1969, V. King, New York.

Schwartz, George I. and Bernice S. Schwartz. 1971. *Life in a Log*. Natural History Press. New York.

Shalaway, Scott. 1993. *Ghost Trees Come Alive*. Birder's World. pp 52-55.

Weber, William 1982. *Attracting Birds and Other Wildlife To Your Yard*. Holt.

First Nations Uses of Trees

Stewart, Hilary. 1984. *Cedar*. Douglas & McIntyre, Vancouver.

Turner, Nancy. 1990. *Thompson Ethnobotany: knowledge and usage of plants by the Thompson Indians of British Columbia*. Royal British Columbia Museum Memoir No. 3., Victoria.

Turner, Nancy. 1992, 2nd ed. *Plants in British Columbia Indian Technology*. Royal British Columbia Museum Handbook No. 38, Victoria, B.C.

Field Guides

Johnson, Kershaw, MacKinnon and Pojar, ed. 1995. *Plants of the Western Boreal Forest and Aspen Parkland*. Lone Pine Publishing, Edmonton.

Lyons, C.P. and Bill Merilees. 1995. *Trees, Shrubs and Flowers to Know in British Columbia and Washington*. Lone Pine Publishing, Edmonton.

MacKinnon, A., Pojar and Coupe, ed. 1992 . *Plants of Northern British Comumbia*. Lone Pine Publishing, Edmonton.

National Geographic Society. 1991. *Field Guide to the Birds of North America*. National Geographic Society, Washington, D.C.

Parish, Roberta. *Tree Book: Learning to Recognize Trees of British Columbia*. B.C. Ministry of Forests and Canadian Forest Service, Victoria.

Peterson, R.T. 1990. *A Field Guide To Western Birds*. Houghton Mifflan Co., Boston.

Pojar, Jim and Andy MacKinnon, ed. 1994. *Plants of Coastal British Columbia*. B.C. Ministry of Forests and Lone Pine Publishing, Canada.

Vitt, Dale, H. 1988. *Mosses, Lichens & Ferns of Northwest North America*. Lone Pine Publishing, Edmonton.

Whitney, Stephen. 1992. *Western Forests*. Random House Ltd., Toronto.

Videos

- *Ancient Forests: Vanishing Legacy of the Pacific Northwest*. The Wilderness Society 1400 Eye Street, NW Washington, DC 20005
- *Animal Habitats*

Life on a Dead Tree

More Than Trees

Still Life For Woodpecker

The Puzzle of The Rotting Log

The Owl and The Timberman

Wildlife Trees: More Than Dead Wood. Minstry of Environment, Lands and Parks.

Wildlife Trees: A Threatened Habitat. Minstry of Environment, Lands and Parks

For Further Intensive Study of Wildlife Trees/ Wildlife Tree Users:

Wildlife Working Report No. 66. Jan. 1995. *A Bibliography of Selected Literature on Wildlife Trees with Annotations and Abstracts*. B.C. Ministry of Environment, Lands and Parks, Habitat Protection Branch, Victoria.

Appendix E

Cross Reference to Project WILD and Backyard Biodiversity and Beyond

Wildlife Tree Activity	Project WILD	Backyard Biodiversity & Beyond
Alert! Code Red and Blue!	Here Today, Gone Tomorrow Ethi-thinking	Extinct Endangered Species & Spaces of B.C.
Making Decisions	Changing Attitudes Planning for People & Wildlife Ethi-thinking Ethi-reasoning Enviro-ethics	
No Room At the Animal Inn	Habitat Lap Sit	
	Oh Deer!	
Wildlife Tree Rummy	Habitat Rummy	
What's For Dinner?	The Thicket Game Quick Frozen Critters	
Wildlife Tree Food Web	What's For Dinner? Owl Pellets	
Wildlife Tree Inn	My Kingdom For A Shelter	Biodiversity Through the Eyes of the Artist
Junior Wildlife Tree Assessor	Habitracks	Animal Mania
Wildlife Tree Scavenger Hunt	Urban Nature Search	Be A Biodiversity Detective
Animal Inn Tenants' Association	Interview with a Spider Shrinking Habitat To Compromise or Not to Compromise Planning for People and Wildlife	Animal Mania
Build A Wildlife Tree	My Kingdom for a Shelter	
Life in a Log	Ants on a Twig Microtrek Scavenger Hunt	Amazing Diversity Down Under
Waterlogged	Water Canaries Hooks and Ladders	
Wildlife Trees in the News!	Animal Poetry Changing Attitudes Facts and Falsehoods	Biodiversity Stories from the Family Family Memories Interview a Biodiversity Hero/Heroine
Spirit Tree Biography	Changing Attitudes	Biodiversity Stories from the First Nations Biodiversity Stories Through the Words of the Poet Family Memories
Animal Inn…Who am I?		Animal Mania
Ya Gotta Lichen Caribou	Migration Headache Migration Barriers	
No Place Like Home!	Everybody Needs A Home Habitat Lap Sit Habitracks What's That Habitat?	
Arboreal Theatre	Animal Charades Visual Vocabulary	

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