



ever changing,  
ever green

the lowland forests  
Olympic National Park

## lowland forest trails

Between sea level and 2000' in Olympic National Park live the lowland forests. However, not every lowland forest looks the same or supports the same plant life because of great differences in rainfall. The rain forests and coastal forests on the Park's west and south sides receive up to 150" of rain yearly, and are sometimes considered a special kind of low-elevation forest. The drier lowland forests on the north and east sides of the Park lie in the Olympic Mountains' rain shadow and receive less than 60" of precipitation yearly. For ease in plant identification, this booklet will consider only the following lowland forest trails on the drier north and east sides:

Soleduck Falls (Soleduck)  
Fairholm campground trail (Lake Crescent)  
Marymere Falls (Storm King, Lake Crescent)  
Elwha and Altaire campground trails (Elwha)  
Environmental Study Area trail  
(Port Angeles Visitor Center)  
Lake Creek trail (Heart of the Hills campground)  
Shady Lane trail (Staircase)  
Staircase Rapids trail (Staircase)  
Dose Terrace trail (Dosewallips)



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## the lowland forest

Several centuries ago much of the world was forested. Before paths were cleared and towns and farms established, the deep woods were often a place of mystery and legend. Elves, demons and dragons were even thought to lurk within. Today, a few examples of unspoiled forests stand preserved in our National Parks and Forests. Welcome to one of these forests.

The lowland forests are very dense, lush communities. Thousands of creatures live in a square foot of rich forest soil. In the lowland forest light is weak, the air cool and the ground soft. And no matter the season, every hue and shade of green are present.

Meet the creatures who make the lowland forest their home. Touch the spongy moss and damp soil. Listen to raindrops drip down, or watch shafts of sunlight find their way to ferns below. Stay awhile. Louis Agassiz, a great scientist who found excitement in all the things around him, once said, "I spent the summer traveling. I got halfway across the backyard."



## a season in the forest

Forest creatures adapt ingeniously to the subtle changes of passing seasons. The internal clocks of plants and animals often are governed by the length of the daylight period, a phenomenon known as "photoperiodism." Shortening days in fall change the intricate chemistries of plants and animals. Some birds respond by migrating. The Douglas squirrel busily caches food for winter use. The black bear may seek a den for winter sleep. Grouse grow "snowshoes" of long, feathery scales on their toes. Other creatures accumulate fur and fat. The green chlorophyll in leaves disintegrates, revealing fall colors. Deciduous trees, appropriately named for a Latin word meaning "to fall off," shed thousands of leaves. The evergreen conifers scatter seeds from cones. Although these conifers support green foliage throughout the year, photosynthesis occurs only at above-freezing temperatures.

Life renews quickly after a winter of rest. Wildflowers dot the forest in early spring, taking advantage of available sunlight before new leaves on trees and shrubs once again close the canopy. Buds swell with new growth and split open. Frogs begin an evening chorus. Bird songs, sounding like proclamations of joy to a casual listener, are territorial advertisements as mating season approaches.

As summer temperatures increase, the forest hushes. The green food-producers are hard at work -- a single, mature tree may lift a ton of water from the earth every day. Toadstools push up after a summer shower. Many animals wait until night to roam the woods, leaving only paw prints and nipped branches for daytime visitors to observe. New plants and animals replace fallen neighbors, testimony to seasons of change in the lowland forest.

## levels of life

Although your visit is just a sampling of a season, you are still witness to a dynamic community. Daily events include birth, food gathering, growth, reproduction, death and decomposition. But what chaos! Layer upon layer of greenery crowds all available space. Fallen trees criss-cross the ground. Plants grow on soil, on rocks and on trees both living and dead. Chaos? Not at all. The relationships between these activities form a very tightly organized, even somewhat predictable, cycle. Call it -- building up and breaking down.

### building up...

What was here before this forest? Another forest. And before that? Yet another forest, but not quite the same one. Like a growing person, a developing forest also changes with time. And as in human populations, new combinations of forest also changes with time. And as in human populations, new combinations of forest organisms replace those that have died. This continuous renewing process is called succession -- a gradual shifting of plant and animal populations.

Succession begins when a portion of forest is cleared by a major disturbance, such as fire, disease or wind. Root systems often remain intact after such a disturbance, and greenery soon sprouts. Sun-tolerant plants first take the lead. Many of these opportunists (such as fireweeds) are not true deep woods species but often are found in open, disturbed areas. Broadleaf trees, Douglas-fir seedlings and many shrubs soon appear, their branches gradually shading the forest floor. The sun-loving plants gradually are replaced by more shade-tolerant species. Competition further refines the community. Cedar and hemlock seedlings thrive in the increasingly shady understory. Broadleaf trees, once abundant in the clearing, now become limited to sunlit stream banks and moist bottomlands. The number of Douglas-fir seedlings declines, unable to compete in the spreading shade.

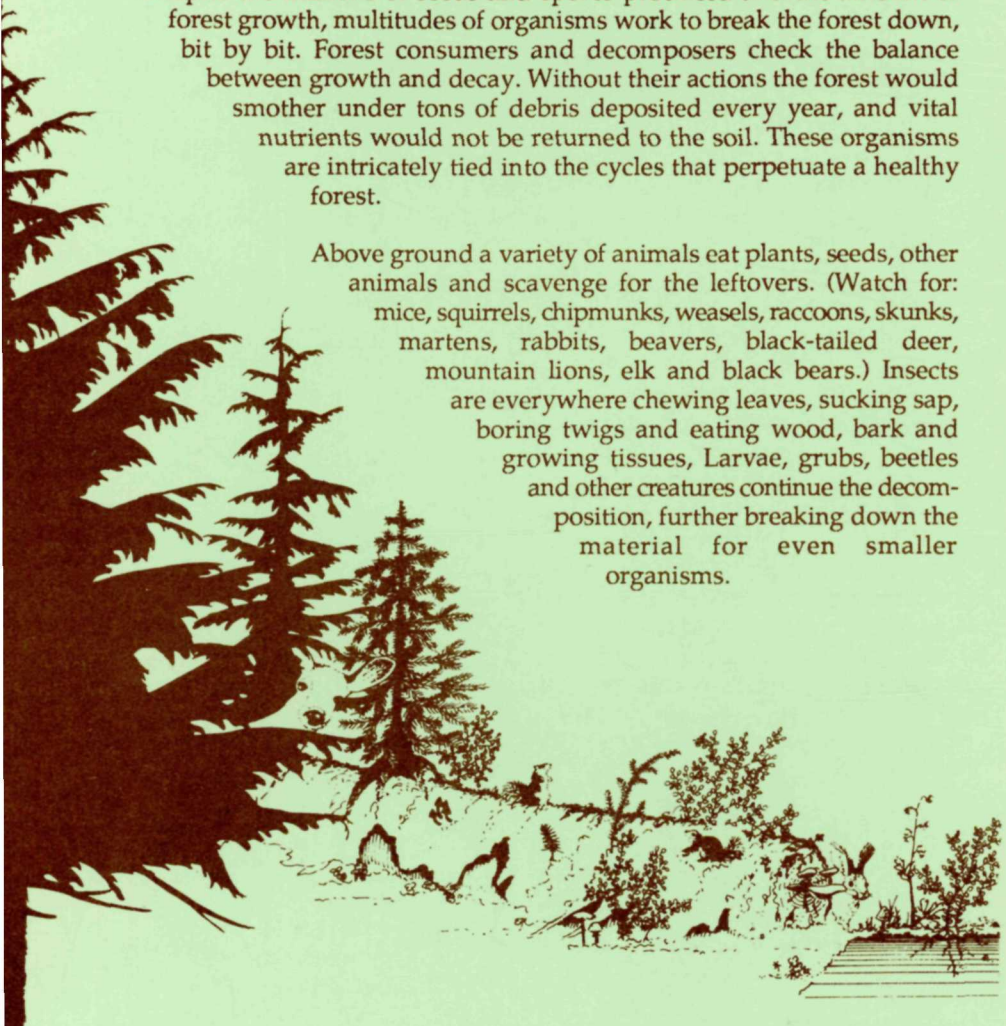


With the appearance of cedars and hemlocks, the forest is moving towards the advanced stage of succession. Succession slows until another major disturbance when the whole process begins again. The shifting of communities never really ceases completely. The fight for space, light, food and moisture continues. Mosses and lichens find room on tree limbs. Space on a log or stump is taken quickly by the ambitious. Seedlings growing on a fallen trunk stretch roots towards the ground to assure survival as their "nurse-log" rots.

## ...and breaking down

Despite the millions of seeds and spores produced and the amount of forest growth, multitudes of organisms work to break the forest down, bit by bit. Forest consumers and decomposers check the balance between growth and decay. Without their actions the forest would smother under tons of debris deposited every year, and vital nutrients would not be returned to the soil. These organisms are intricately tied into the cycles that perpetuate a healthy forest.

Above ground a variety of animals eat plants, seeds, other animals and scavenge for the leftovers. (Watch for: mice, squirrels, chipmunks, weasels, raccoons, skunks, martens, rabbits, beavers, black-tailed deer, mountain lions, elk and black bears.) Insects are everywhere chewing leaves, sucking sap, boring twigs and eating wood, bark and growing tissues, Larvae, grubs, beetles and other creatures continue the decomposition, further breaking down the material for even smaller organisms.



A period of warmth and moisture may generate mushrooms, the short-lived reproductive stage of certain fungi. The hard, rounded shelves on older trees are bracket fungi and also represent this spore-producing stage. Fungi are important decomposers and recyclers because few other organisms can attack fresh, acidic forest litter. Tap a ripe mushroom -- a cloud of spores (tiny air-borne seeds) falls from the gills. Some fungi produce millions of spores an hour.

Life does not stop at the soil's surface. Beneath the forest floor is the most densely populated level of the forest. Millions of tiny animals and billions of bacteria live in an acre of rich forest soil. They mix organic material with mineral soil and create a maze of underground tunnels, allowing air and water to penetrate the soil.

Two of the more important tunnelers are moles and earthworms. Moles create healthy soil with their earth-moving. With shovel-shaped paws and strong claws, a mole "swims" through about 300' of earth a day looking for insects and worms. Examine an earthworm face to face and notice its protruding lips. These lips moisten leaf particles with enzymes, or digestive juices. As the material moves through the worm's body, the acids are neutralized, and the pieces are ground smaller. Most animals cannot digest fresh litter until it is first softened by creatures like the earthworm.

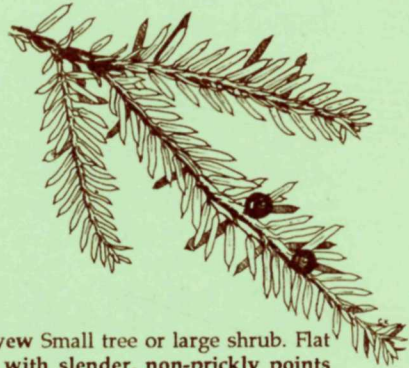
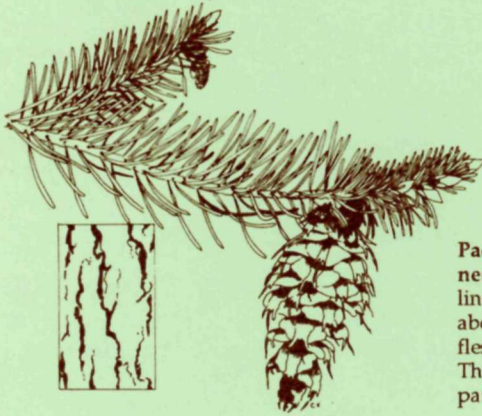
No matter which level of the lowland forest you examine, life abounds. Take a closer look. "Nature will bear the closest inspection. She invites us to lay our eye level with her smallest leaf, and take an insect view of its plan." (Thoreau)



# trees

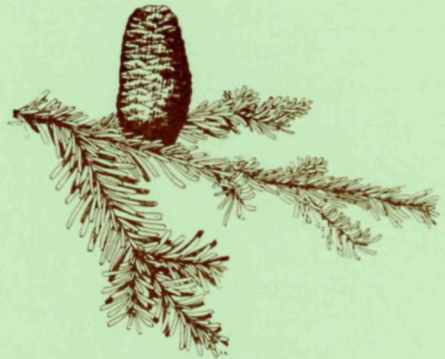
Examine the needles/leaves, cones/fruit, bark and other features to identify lowland forest trees. The first seven listed are coniferous evergreens, trees with needle- or scale-like foliage. The remainder are broadleaf, flowering trees which shed their leaves in autumn (except for Pacific Madrone which is evergreen).

**Douglas fir** Very common. Pointed needles, usually on all sides of branchlets. Buds are pointed, covered with reddish-brown, overlapping scales. Cones with 3-forked bracts protruding between paperish scales, 2-4" long. Mature bark reddish-brown, heavily furrowed.



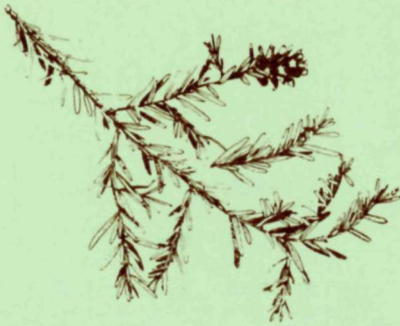
**Pacific yew** Small tree or large shrub. Flat needles with slender, non-prickly points line opposite sides of twig, yellow-green above, pale green below. On female trees, fleshy red cup holds small green seed. Thin, purplish bark scales of in wavy patches.

**Grand fir** Grows only in Pacific NW, also known as lowland white fir. Long, flat needles blunt or notched, shiny dark-green above, whitish below. Needles alternate long and short, spread in two comb-like rows from opposite sides of twig. Twig highly visible from top of branchlet (compare with Pacific silver fir). Upright cylindrical cones at tree top remain greenish until they disintegrate in fall.



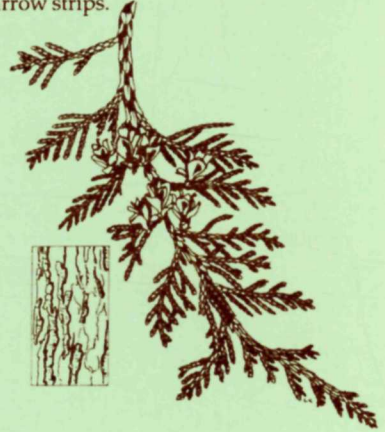
**Pacific silver fir** Blunt needles 1", dark-green above, silvery below. Some needles spread horizontally from twig, while needles on top of twig brushed forward. Barrel-shaped green cones turn deep purple in August. Mature bark ash-gray, smooth.



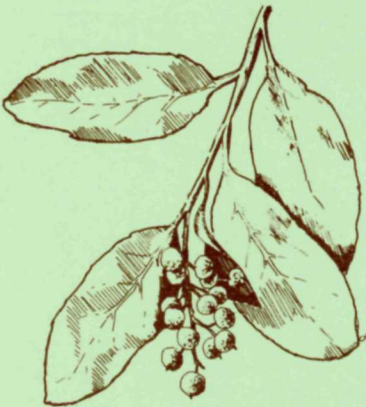


**Western hemlock** Small, flat needles, blunt and of unequal lengths, spread horizontally from opposite sides of twig to form spray-like branches. Numerous small cones hang from tips of branchlets. Tree top droops.

**Western redcedar** Spreading, drooping, branches from flat sprays with small, upright flower-like cones. Scale-like leaves arranged in tight, overlapping joints. Stringy bark shreds vertically into long, narrow strips.



**Sitka spruce** Seldom occurs great distances from salt water. Drooping branches give weeping appearance. "Bottlebrush" needles stiff, flattened and very prickly. Tan cones 2-4", have papery scales. Bark purplish or reddish-brown, flakes in large scales.

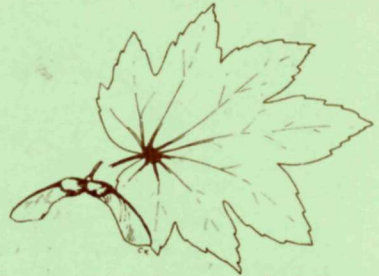


**Pacific madrone** Oblong leaves evergreen, leathery, 3-6" long. Clusters of white, bell-shaped flowers in May to June followed by round, reddish-orange, mealy berries in late summer. Reddish-brown bark peels raggedly.



**Scouler willow** Small tree in moist, sunny areas. Alternate leaves dark-green above, pale and often hairy below, 2-4" long. Male and female catkins ("pussy willows") occur on separate trees.

**Bigleaf maple** Prefers open areas. Leaves 8-12" wide, largest of any maple, with five smooth-edged, deeply-cut lobes. Yellow, fragrant flower clusters 4-6" long appear with leaves April to May. Leaves yellow-brown in fall.



**Vine maple** Prefers wet, shaded areas, often grows with cluster of trunks. Leaves have 7-9 pointed but short lobes with toothed edges, average 3-4" wide. Loose clusters of purple-red flowers appear when leaves half-grown April to May. Leaves scarlet in fall. "Wings" on seeds widely spreading.

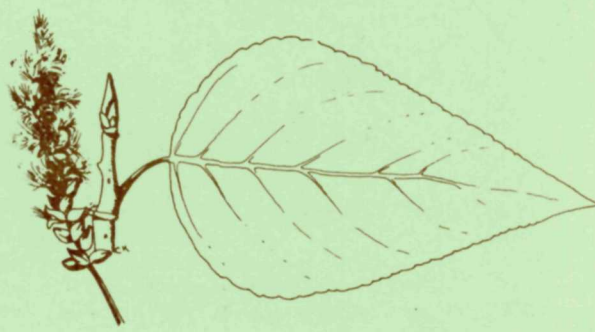


**Bitter cherry** Oval leaves 1-3" long, toothed edges, blunt tip on mature leaves. Rounded clusters of fragrant, white flowers appear when leaves half-grown in May, replaced by very bitter red cherries with thin flesh. Bark shiny purplish to bronze with light, horizontal dashes.



**Red alder** Grows in moist, sunlit clearings. Leaves egg-shaped, 3-6" long, have rounded teeth, dark-green above, paler with rusty hairs below. Leaf edges curl under slightly. Woody "cones" green, then brown. Showy male catkins hang like tassels in late March.

**Black cottonwood** Prefers moist soil. Broad, triangular leaves 4-6" long, deep-green above and whitish below. Edges have small, rounded teeth. Large, pointed buds have sticky, red resin. Flowers are grape-like bunches of light-green capsules in May which release "cotton" in summer.



# berries, shrubs and flowers



**Red huckleberry** Small, oval, bright-green leaves. Flowers bell-shaped, greenish-white, bloom in May. Tart, red berries ripen in July. Also look for Evergreen huckleberry with waxy, green leaves and woolly twigs.

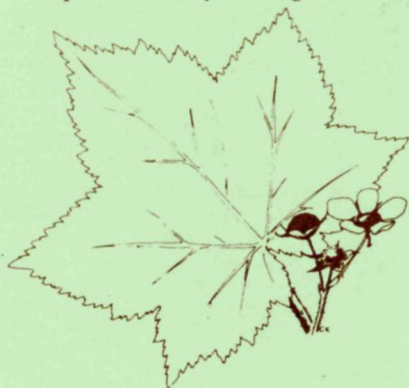
**Pacific red elder (Red elderberry)** 5-7 opposite, toothed leaves. Large shrub, 6-18" high. Yellowish-white flowers May until June.

Has small, smooth, red berries July and August. Found along streams and roadsides.



**Bunchberry dogwood** Whorled leaves have parallel, curved veins. Clusters of tiny flowers surrounded by showy, white bracts, blossom May to June. Later bears "bunches" of bright red berries. A miniature "copy" of the dogwood tree.

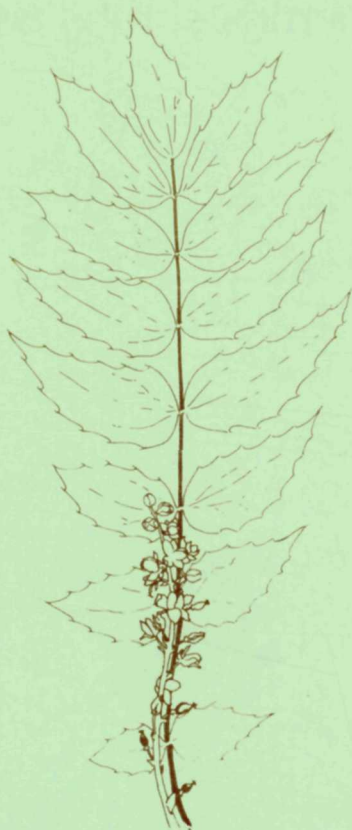
**Western thimbleberry** Widespread shrub with large, hair, maple-like leaves. White flowers in June become bright red "raspberries" in July and August.



**Salmonberry** Brown stems have scattered, weak spines. Leaflets usually in threes. Dark pink flowers bloom April to June. Yellow to orange-red berries late June through July.



**Wild ginger** Brownish-purple flower in May and June often hidden from view beneath heart-shaped leaves. Slight ginger odor -- not used commercially. Found in moist partially shaded places.



**Oregon grape** Holly-like leaves. Bright yellow flowers May to mid-June. Develops waxy, blue berries med-August. Prefers shade.



**Salal** Shrubby, grows 1-6' tall. Leathery, evergreen, oval leaves. White-pink flowers urn-shaped. Blossoms late May through summer, develops hairy, dark berries late July.



**Western spring-beauty** (Siberian montia, Siberian miner's lettuce) Opposite, paired leaves; lower leaves have long stems. Numerous white flowers with tiny pink veins blossom May to June. Long, slim stems give plant straggly appearance.



**Pacific bleeding heart** Delicate, lacy leaves. Pink, heart-shaped drooping flowers April to early June. Found in partially shaded places with rich soil.

**Queencup beadlily** Two or three long, shiny, green leaves. Single white flower blooms May to July. Single blue berry replaces flower late July. Prefers filtered sun and moist habitat.



**Deerfoot vanilla-leaf** Three fan-like leaves. Small, white flowers clustered on single stem, bloom May to June. Dried leaves have faint vanilla odor. Prefers deep woods where moist.



**Foamflower** Leaflets in threes, 3-5 lobed leaves. A small cloud of tiny, white, nodding flowers appear May to July.

**Western trillium** Three large, pointed leaves. Flowers with three white petals change to pink or purple as they age, bloom mid-April to May.



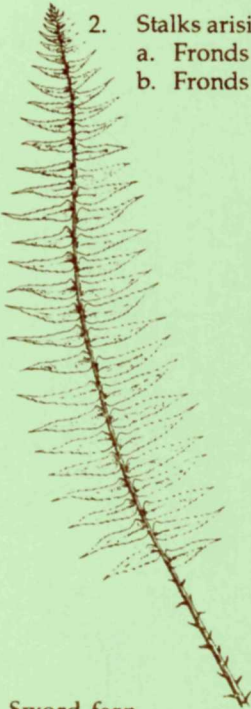
**Western starflower** Whorl of leaves. White-pink flowers, usually 6-petaled, on slender stems bloom May to June. Prefers shady, moist and cool conditions.



# ferns

The life cycle of a fern is an interesting one and involves two separate plants. Ferns reproduce by means of spores which are borne in brownish clusters on the undersides of the leaflets of fertile ferns. The ripe spore clusters dry and spring open, dispersing thousands of spores. These spores develop into tiny intermediate plants called gametophytes. In this phase sexual reproduction occurs. The fertilized egg then develops into a new fern.

- I. Fronds divided into simple leaflets
  - A. Leaflets toothed on the edges ..... Sword fern
  - B. Leaflets smooth on the edges
    - 1. Grows on tree trunks, stumps, sometimes rocks ..... Licorice fern
    - 2. Grows on moist forest floor ..... Deer fern
  
- II. Fronds divided into compound leaflets
  - A. Ferns stalk shiny black ..... Maidenhair fern
  - B. Fern stalk not shiny black
    - 1. Stalks arising in clusters, covered with loose scales
      - a. Fronds widest at the middle ..... Lady fern
      - b. Fronds widest at the base ..... Spreading wood fern
    - 2. Stalks arising singly, lacking loose scales
      - a. Fronds delicate, horizontal, 1' tall or less ..... Oak fern
      - b. Fronds robust, usually 1-4' tall ..... Bracken fern



Sword fern



Oak fern



Spreading  
wood fern



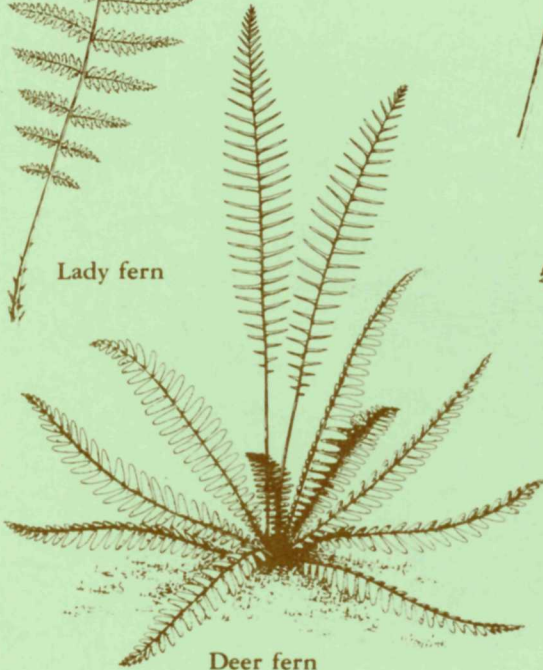
Licorice fern



Bracken fern



Lady fern



Deer fern



Maidenhair fern

**Other self-guiding trails to enjoy in Olympic National Park:**

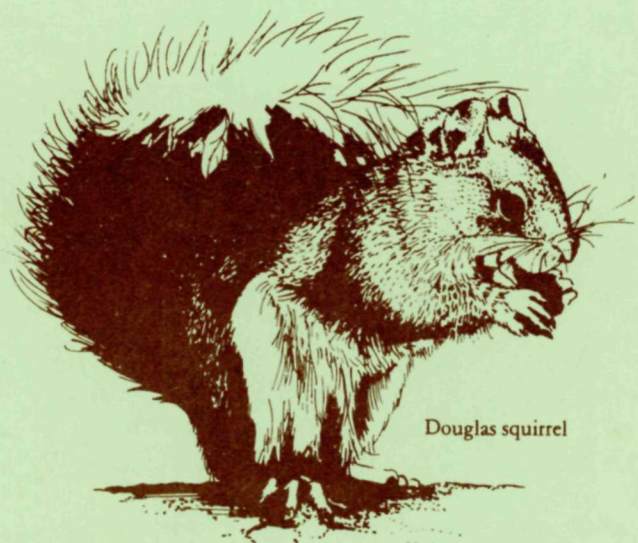
HALL OF MOSSES TRAIL at the Hoh

SPRUCE NATURE TRAIL at the Hoh

BIG MEADOW TRAIL at Hurricane Ridge

HURRICANE HILL TRAIL at Hurricane Ridge

INDIAN VILLAGE NATURE TRAIL at Ozette



Douglas squirrel