
CARBON RAIN FOREST TRAIL

THE CARBON RAIN FOREST NATURE TRAIL

by

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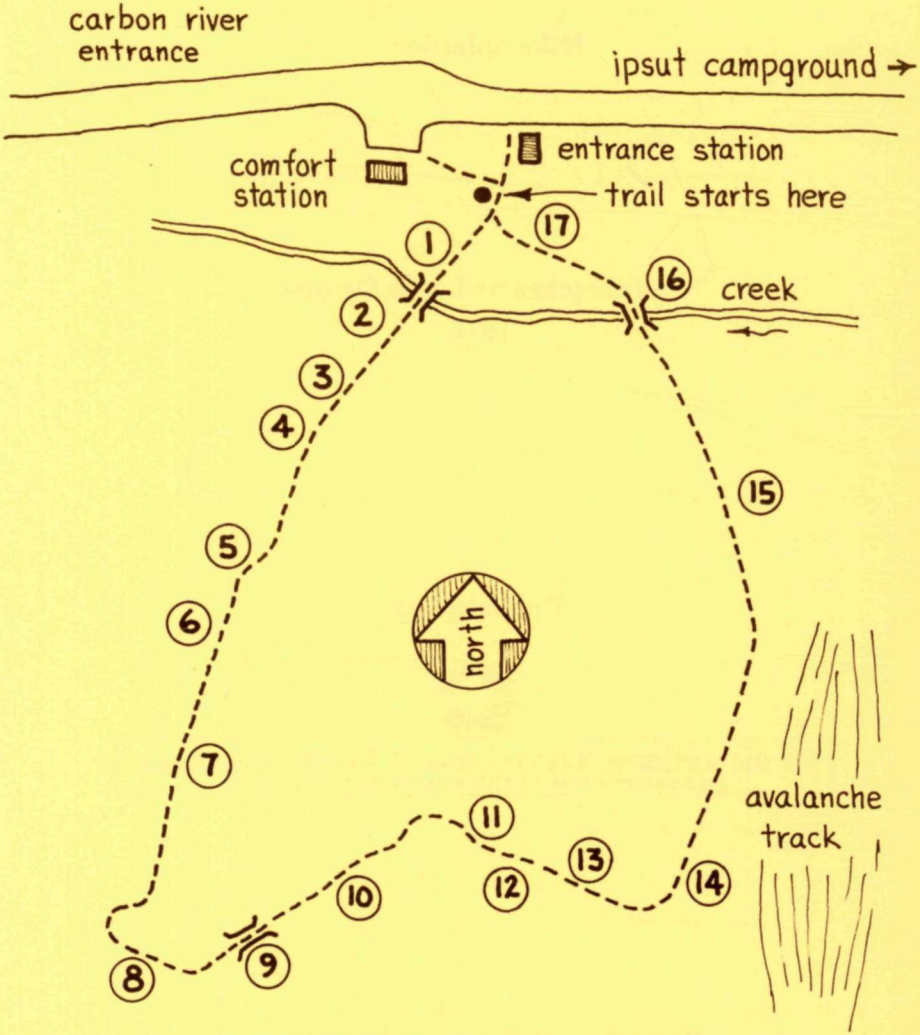
CARBON RIVER RAIN FOREST TRAIL



This trail is a cooperative effort between Mt. Rainier National Park and the White River District, Mt. Baker-Snoqualmie National Forest, U.S.D.A. Stops 5 through 8 on the trail are on U.S. Forest Service Land.

You are entering a rain forest preserved as it was before settlement of this valley. True rain forests are not usually found in inland areas of continental United States. As you follow the self-guiding rain forest trail, which is .4 kilometers (.3 mile) long and returns to this spot, look for similarities and differences between this forest and other forests you know. Take a few minutes and let the numbered stakes help you discover this Carbon River rain forest and see why it is a special kind of forest.

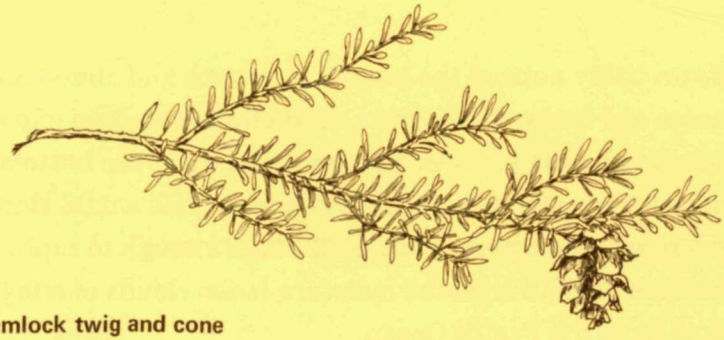
Stop 1. Why a rain forest? Looking down the trail, what do you notice that is different about this forest? What distinguishes it from other forests?

You probably noticed the luxuriant growth and abundant mosses and ferns. **Water** and a **mild climate** are two important reasons for what you see. You are standing at the bottom of a deep valley, low enough in elevation to yield a mild climate yet surrounded by mountain peaks high enough to capture abundant rainfall from the moisture-laden clouds moving inland from the Pacific Ocean.

Stop 2. You have just crossed June Creek, which originates as snow-melt waters high up on Florence Peak, 915 meters (3000 feet) above you. Storage of water as snow in the high country insures a steady water supply to the rain forest during the drier summer months, saturating the low-lying areas of this rain forest with **ground water.** Many locations within the Carbon River valley have soils so saturated with water that the trails must be built up above the muck with split-cedar "puncheon" just like the swamp bridge upon which you stand.

Stop 3. How does the ground here differ from where you stood a minute ago? You are on an island of "high ground" surrounded by lower boggy areas. Only a few centimeters in elevation here means the difference between dry ground and wet bog.

Look up into the crowns of the trees and make a complete circle about where you stand. How much sky did you see? The dense intertwined branches form an evergreen canopy that casts a permanent twilight on the undergrowth below. Remember this deep shade and compare it to other places in this rain forest ahead.



hemlock twig and cone

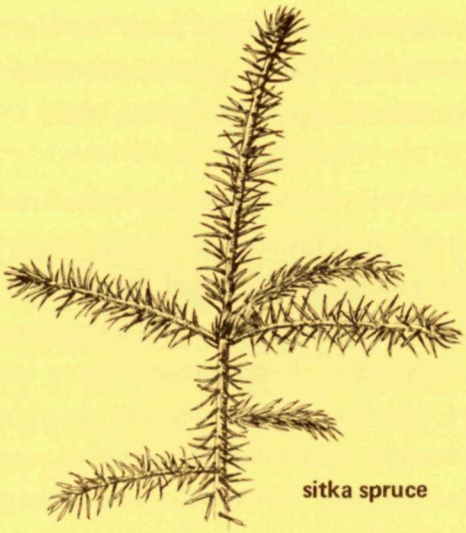
Now look down at the forest floor. Can you find the small 2 centimeter (¾ inch) cone of a **western hemlock**? Most of the trees around you are western hemlock. That is because it is one of the few trees that can tolerate deep shade and reproduce under it. See if you can find any other kinds of cones. Douglas-fir and western redcedar are less common here than the hemlock because they cannot grow as well in deep shade.

A snag behind you has a large "**conk**" or fruiting body of a fungus. How much of the fungus do you think is **inside** the tree? What is the fungus doing to the tree?

Stop 4. The plant with very large leaves is **skunk cabbage.** It has that name because it gives off a strong skunk-like odor in the spring as the young leaves unfurl. Do you think that some animals may like odors which we find unpleasant? It is known that smell of skunk cabbage attracts many kinds of insects which help exchange pollen from plant to plant. Thorough pollination insures an abundant supply of seeds for next year's crop of skunk cabbage. Because skunk cabbage is so succulent, it requries large amounts of moisture, and most frequently grows in boggy places like this.

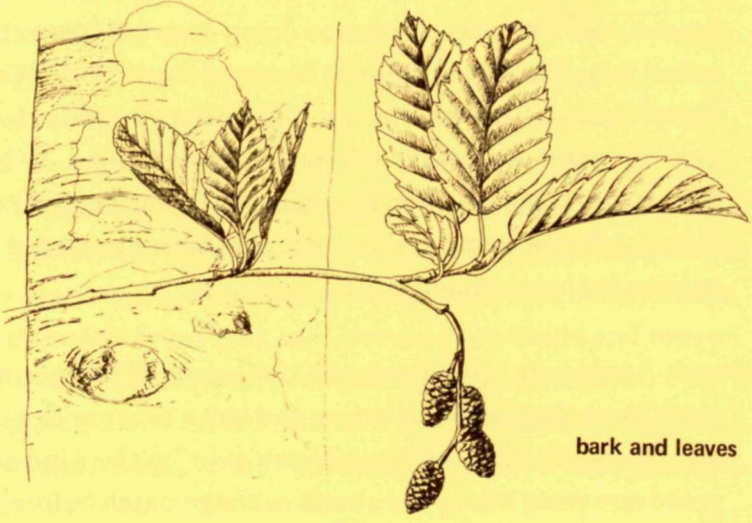
Stop 5. Gently feel the twigs of the tree before you. They are very prickly and are spaced all around the twig. The tree is a **sitka spruce.** It grows along the Pacific coast from Sitka, Alaska south to California, and is often called "tidewater spruce" because it grows so close to the sea. What would a coastal tree like sitka spruce be doing over 161 kilometers (100 miles) inland in Mount Rainier National Park? This deep rain forest valley offers moisture conditions very similar to those near the coast, so this tree finds a suitable **habitat**, or home, in this part of the park. Nowhere else in the park is sitka spruce found, and this is one of the most inland sites recorded for the species in the continental U.S.

Stop 6. Again look up towards the treetops. Did you see more sky? Were the trees evergreen and large or were they broad-leaved and small? A hemlock blown over by the wind a few years ago rests above the skunk cabbage patch before you.



sitka spruce

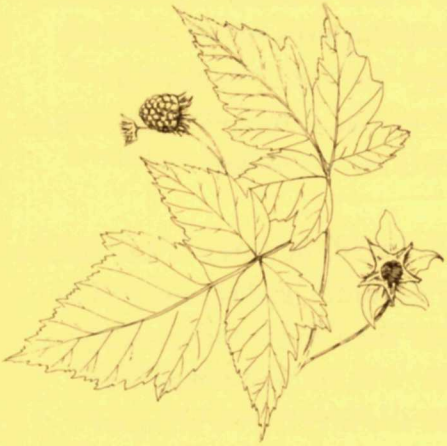
Because the shade-creating hemlock is gone, other plants requiring more light may now grow here. Plants that invade an area after it is opened up to the sky are called "**pioneers**" because they are the first one to inhabit the new opening. the most common pioneer tree here is the **red alder.** You can tell it by the broad leaves and whitish bark. Do you think there are animal pioneers too?



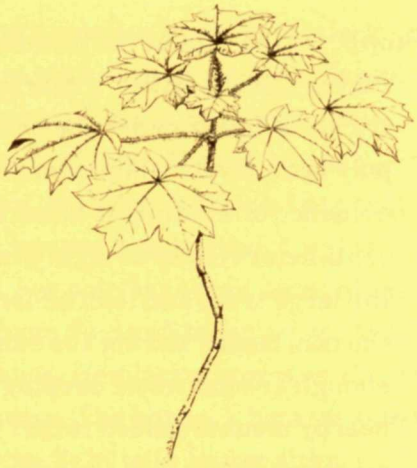
bark and leaves

Natural disturbances such as windfalls, forest fires, and slides continuously produce openings within the forest which soon become colonized by pioneering plants. This produces a variety of forest types — "islands" of younger, different looking forest within a "sea" of older forest.

Stop 7. Imagine yourself an early explorer like Dr. W.F. Tolmie who in 1833 became the first European to set foot in Mount Rainier country. The area he visited is only a few kilometers from where you are standing. What would you do if you wanted to penetrate deep into the Carbon River rain forest? Imagine crawling through the thick underbrush of salmonberry and devil's club. (Devil's club is the prickly-stemmed, big-leaved plant that seems especially made to hinder foot travel.)



salmonberry



devil's club

Finding your way through this forest is a constant game of crashing through thickets of young trees and scrambling over chest-high downed logs. If the underbrush didn't slow you, the mucky soils would!

Fortunately, today we have trails that make it easy to walk through the rain forest — there is little need to leave the trail. Indeed, with today's heavy foot traffic, the fragile rain forest vegetation would be harmed by trampling, were it not for well-constructed trails.

Stop 8. You have left the rain forest. The few meters you have just climbed have produced a remarkable change in the environment surrounding you. What do you notice that is different from below? The luxuriant undergrowth and moss cover of the rain forest is gone. Water drains aways so quickly from the coarse soils of this steep slope that plant growth is slow when compared to the soggy and fertile valley floor below. On sites where water is limited, plant growth is limited. Without abundant water, there is no rain forest.

Stop 9. Listen. Count the different sounds of water — the distant roar of Carbon River, a nearby waterfall, and the very close trickle of water under the bridge are some of the sounds you may hear. Everywhere you look or listen, you see or hear evidence of water. One hundred and fifty to two hundred centimeters (sixty to eighty inches) of rainfall each year supply the large trees and lush undergrowth with enough water. If the rain lapses during the summer months, there is usually enough ground water seeping down through the soils from the nearby mountainsides to carry the forest through until the rains return again in the fall.

Stop 10. How do you suppose this western hemlock got twisted around like the trunk of an elephant? Examining what the tree is growing on may give a hint as to how it got that way. Look for other strange growth patterns on trees in this rain forest.

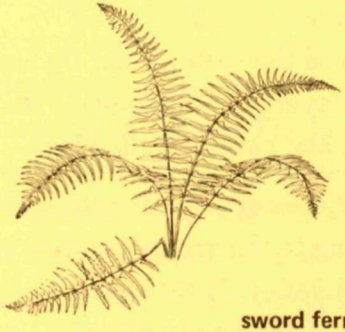
Stop 11. Stomp your feet and feel the spongy soil vibrate. The open water to the left of the root clump will help you see the vibrations you cause.

The floor of this rain forest is soft and yielding, not hard like on the mountainsides of this valley. Fine mineral particles have washed down from the mountains above and accumulated into deep layers on the valley floor. On top of these deposits are additional layers of rotting plant material ranging from leaves, needles, and twigs to fallen logs.

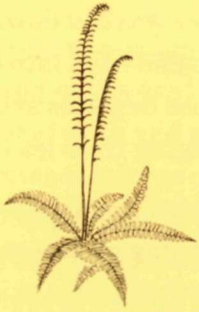
Behind you is a rotten snag. Pieces of wood are constantly flanking off the snag and falling to the ground, adding to the depth of soil in this rain forest valley. What animals help break trees down into the soil? How about woodpeckers.?

Stop 12. A large sitka spruce and a smaller western hemlock grow side-by-side and compete with each other for light and space. The dense evergreen canopy lets in only part of the daylight and in order for trees to survive they must each strive for their place in the sun, growing as fast as they can. When trees grow fast, under intense competition, they usually produce straight trunks with few side-branches. Most of the side-branches on the spruce have died and fallen off, giving it a "naturally pruned" appearance. Hemlocks, however, do not show very much **natural pruning.** The hemlock became somewhat curved because of its close fight with larger sitka spruce!

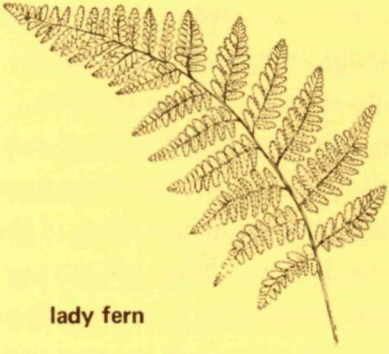
Stop 13. Ferns are an important part of the rain forest — they contribute to the lush and somewhat tropical appearnce of the undergrowth. See if you can find four of the more common ferns of the park in the small patch in front of you. Sword fern is the largest one, and has sawteeth on each leaf. Deer fern has the same shape but has smooth leaf margins. Lady fern has a single broad frond with finely divided leaves. Oak fern is the smallest here, with three fonds coming from a single stem.



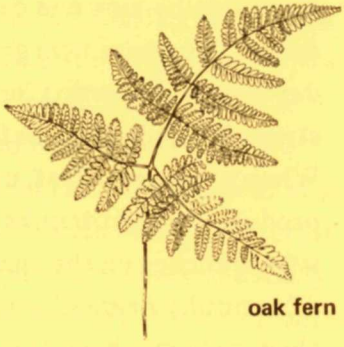
sword fern



deer fern



lady fern



oak fern

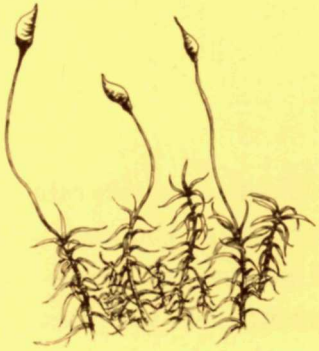
Stop 14. A pile of rock, mud, and tree debris has partially buried some of the trees before you. In January of 1972 heavy rains caused a landslide to occur high up on Sweet Peak above you. The debris flowed down a small creed bed, taking with it several large trees which are piled up where they were stopped by the standing timber as the slide slowed down on the level valley bottom. Mount Rainier is a geologically-active area where frequently-occurring slides like this serve to open up the dense evergreen forest to pioneering plants like red alder and Douglas-fir. Do you think that slide might be so recent that many "pioneers" have not yet had a chance to invade the new opening in the forest?

Stop 15. Probably one of the first things you noticed in this rain forest is how the moss covers nearly everything. Abundant rainfall allows for the profuse growth of mosses. The "**moss carpet**" before you consists of at least ten different varieties. Because mosses do not have showy flowers to attract us, we pay little attention to differentiating the many species. Close examination tells us that they are just as complex and just as interesting as the so-called higher flowering plants.

Instead of developing a fruit from a flower like in higher plants, mosses have **spore capsules** which perch atop a thin wiry stalk. Can you find one? See if you can find some **piggy-back moss.** It is easy to recognize because the new growth originates in the middle of last year's stem, which gives it a "piggyback" appearance.

Another kind of moss found in cool, wet places of this rain forest is **sphagnum.** It forms very large bogs in Canada and Alaska, but here in Mount Rainier National Park it is found in very small patches. When it rots it forms "peat moss" which is gathered for use in gardens as a mulch.

Perhaps you noticed that many of the places in the rain forest which are heavily carpeted with moss have few other plants growing there. Do you think it possible that the moss here grows so dense and so quickly that other plants cannot keep up with them?



close-up moss spore capsule

close-up of piggyback moss

Stop 16. Watch the sediments on the bottom of June Creek. Bits and pieces of rotting leaves and twigs are carried away very rapidly through the water. Nutrients that both plants and animals need are held in these particles in the form of food energy that flows through the rain forest in a cycle much like the water below you. The accumulation of **forest litter** on the ground is broken down into nutrients by fungi and microscopic bacteria, forming a rich black soil called **humus.** Plants then get their nutrition from the humus to grow, fruit, and mature.

Eventually they die and rot, themselves turning into humus, which will feed new plants in the rain forest. There are many such cycles, or **food chains**, in this rain forest. Can you think of some that include animals?

Stop 17. A Douglas-fir blown over by the wind many years ago gives us an easy look at the root system of a tree. How did the shallow root system support a large tree? Why didn't the roots penetrate very deeply into the ground?

The deep and fertile valley soil provides enough nutrients and water for the tree to grow. There is no need for the roots to go any deeper than a few feet. Instead, they spread out and radiate away from the trunk, remaining near the surface. An old woodsman's guide is that the roots underground never extend any further away from the trunk than the farthest branch above the ground.

Look on top of the root clump where young hemlock trees are beginning to grow. Live trees grow upon trees that have been long dead. Individual plants and animals in this virgin rain forest are continually living and dying, but the forest as a whole is constantly living and always remaining in a very stable state.

This rain forest has formed because a special set of environmental circumstances exist here. It takes a unique combination of favorable climate, fertile soils, and abundant water plus a very long time to develop a forest like this Carbon River rain forest.

If you have any comments on this trail, please send them to the Chief Park Naturalist, Mount Rainier National Park, Longmire, WA 98397.