self-guiding trail

CARBON RAIN FOREST TRAIL

MOUNT RAINIER NATIONAL PARK

THE CARBON RAIN FOREST NATURE TRAIL

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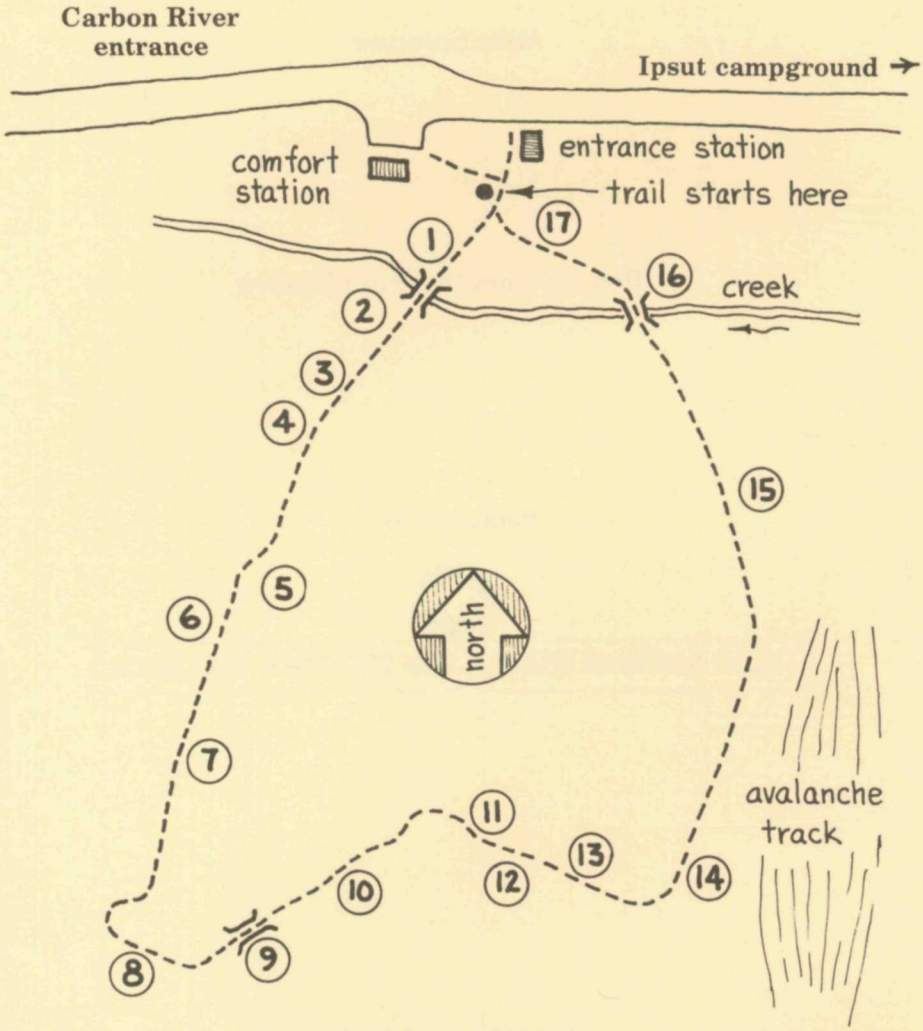
CARBON RIVER RAIN FOREST TRAIL



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

You are entering a rain forest preserved as it was before the settlement of this valley. True rain forests are not usually found in inland areas of the continental United States. As you follow the self-guiding rain forest trail, which is .3 mile (.4 kilometers) 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 this booklet help you discover the special qualities of the Carbon River rain forest.

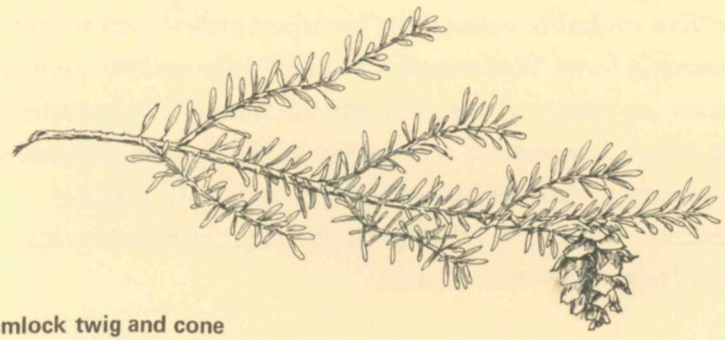
Stop 1. Why a rain forest? Looking down the trail, what do you notice that is different about this forest? What distinguishes it from other forests?

You have 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. The creek's water originates as snow melts high up on Florence Peak, 3,000 feet (915 meters) above you. Storage of water as snow in the high country insures a steady 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 inches (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 interwined branches from an evergreen canopy cast 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

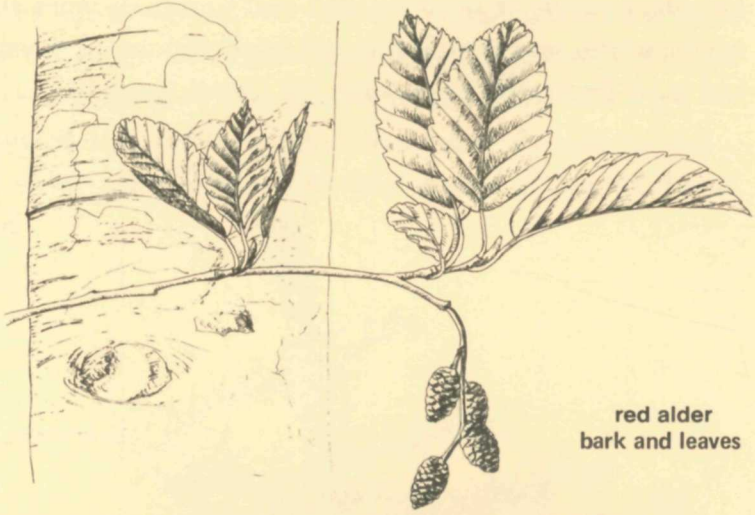
Now look down at the forest floor. Can you find the small 3/4 inch (2 centimeter) cone of a **western hemlock**? Most of the trees around you are western hemlock because it is one of the few trees that can grow and reproduce in deep shade. See if you can find any other kinds of cones. Douglas-fir and western redcedar are less common here than the hemlock because they require much more sunlight.

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 the smell of skunk cabbage attracts many kinds of insects which help pollinate the plant. Thorough pollination insures an abundant supply of seeds for next year's crop. Because skunk cabbage is so succulent, it requires large amounts of moisture, and most frequently grows in boggy places like this.

sitka spruce

Stop 5. Gently feel the needles 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 100 miles (160 kilometers) 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. Sitka spruce is found nowhere else in the park, and this is one of the most inland sites recorded for the species in the U.S. south of Alaska.



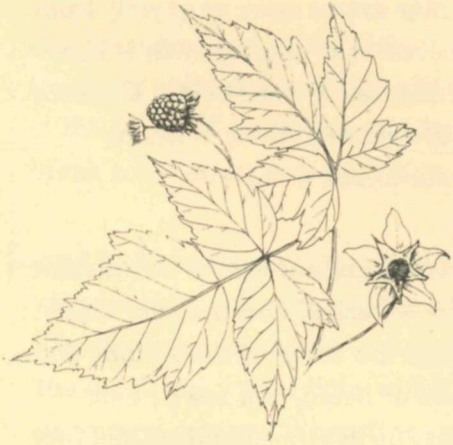
red alder
bark and leaves

Stop 6. Again look up toward the treetops. Did you see more sky? Are the trees evergreen and large or are they broad-leaved and small? A hemlock blown over by the wind a few years ago rests above the skunk cabbage patch before you. 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 are called **"pioneers"** because they are the first ones to inhabit the new opening. The most common pioneer tree here is the **red alder.** You can identify it by the broad leaves and whitish bark. Do you think there are animal pioneers too?

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 miles (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 would be a constant challenge 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. Indeed, with today's heavy foot traffic, the fragile rain forest vegetation would be harmed by trampling, were it not for well-constructed trails. So, please, stay on the trail.

Stop 8. You have left the rain forest. The few yards (meters) you have just climbed have produced a remarkable change in the enviroment surrounding you. What do you notice that is different from the rain forest? The luxuriant undergrowth and moss ground-cover is gone. Water drains away so quickly from the coarse soils of this steep slope that plant growth is slow 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. Sixty to eighty inches (one hundred and fifty to two hundred centimeters) of rainfall each year supply the large trees and lush undergrowth with sufficient water. During periods of summer drought, there is usually enough ground water seeping down through the soils from the nearby mountainsides to sustain the forest until the rain returns 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.

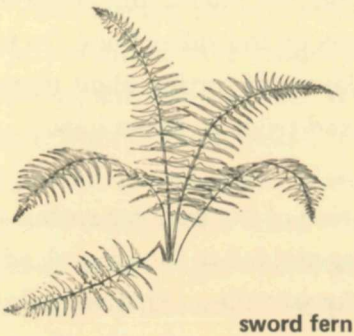
Stop 11. Stomp your feet and feel the spongy soil vibrate. Look in the small pool which may be located to the left of the root clump to see the vibrations you cause.

The floor of this rain forest is soft and yielding, not hard and rocky, like the mountainsides of this valley. Fine mineral particles have washed down from the mountains above and accumulated into deep soil 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.

Just ahead of you on the right side of the trail is a rotten snag. Pieces of wood flake off the snag and fall to the ground, adding to the depth of soil in this rain forest valley. What animals help break trees down into soil? How about woodpeckers?

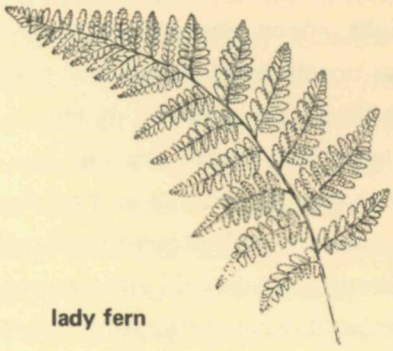
Stop 12. A large Sitka spruce and a smaller western hemlock grow side-by-side and compete for light, space, and soil nutrients. The two trees must grow as fast as possible to take advantage of the small amount of light which filters through the dense evergreen canopy. When trees grow fast, under intense competition, they usually produce straight trunks and retain few side-branches. Most of the lower branches have died and fallen off the spruce giving it a "naturally pruned" appearance. Hemlocks are more shade tolerant and can maintain their lower branches. The hemlock became somewhat curved because of its proximity to the Sitka spruce.

Stop 13. Ferns are an important part of the rain forest – they contribute to the lush and somewhat tropical appearance of the undergrowth. Four of the more common ferns of the park should be growing in the small patch by the numbered post. 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 fronds 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 high up on Sweet Peak above you. The debris flowed down a small creek bed, taking several large trees with it. As the slide slowed down on the level valley floor, standing timber stopped the downed trees. Mount Rainier is a geologically active area where slides like this serve to open up the dense evergreen forest to pioneering plants like red alder and Douglas-fir. Do you think this 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, it is easy to overlook the many species. Close examination tells us that mosses are just as complex and just as interesting as the so-called higher flowering plants.

Instead of developing a fruit from a flower like higher plants, mosses have **spore capsules** which perch atop a thin wiry stalk. Can you find one? The labels will help you recognize several varieties of moss. Take a close look at the **piggyback moss.** It is easy to recognize because the new growth originates in the middle of last year's stem, giving it a "piggyback" appearance.

Another kind of moss growing in the 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".

Perhaps you noticed that much of the rain forest is heavily carpeted with moss and few other plants grow there. Do you think it possible that the mosses here grow so densely 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 by 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 accumulating **forest litter** 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 to become 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 rain forest are continually living and dying, but the forest as a whole remains in a very stable condition.

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