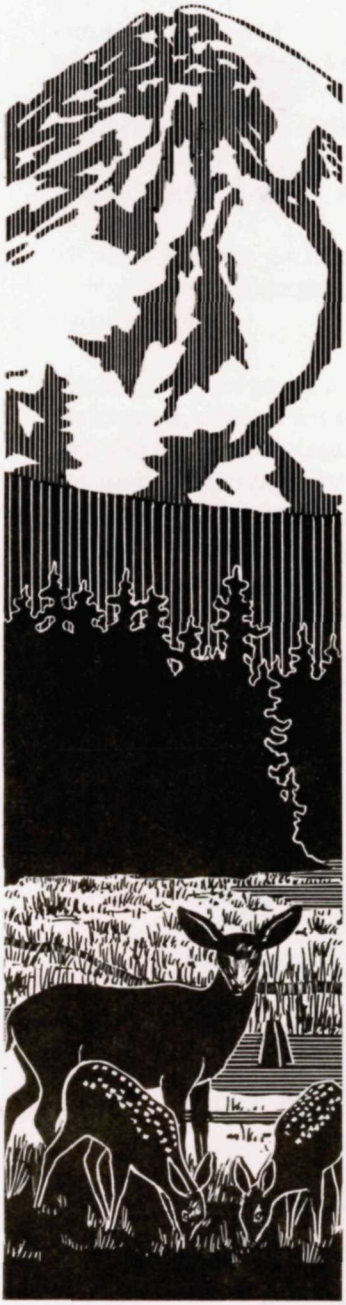

NISQUALLY VISTA

SELF–GUIDING TRAIL

MOUNT RAINIER NATIONAL PARK

NISQUALLY VISTA

SELF-GUIDING TRAIL

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The Nisqually Vista Nature Trail provides an opportunity to learn about some of the physical and biologic forces that have shaped the Paradise landscape. The trail is a 1.2–mile (2–km) loop which takes about an hour to complete. Many fine views of Mount Rainier and the snout of the Nisqually Glacier can be seen from this gentle trail. Mountain weather changes quickly, so dress accordingly. Remember that breathing is difficult at this 5,400-foot (1,620–m) elevation. Walk slowly and breathe deeply if you experience difficulty "catching your breath."

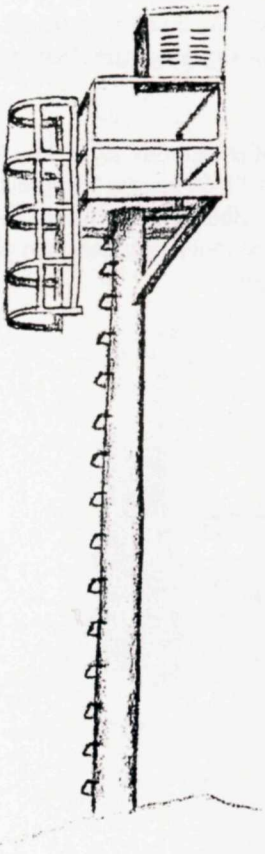
This leaflet directs you to points of interest along the trail, but there are no numbered posts. Directions and visual clues for stopping points are printed in italic.

Please stay on the paved walkway. Although it is tempting to explore through the meadow, research has shown that as few as 12–15 people trampling on an area will kill the plants and may cause erosion. Show respect for the meadow you have come to enjoy by observing it from the trail and leaving the plants where they are for the enjoyment of other people.

Your first stop is at Dead Horse Creek flowing under the bridge at the bottom of this hill.

DEAD HORSE CREEK

Dead Horse Creek flows all year with water released from melting snow. The gentle sound of the creek contrasts sharply with the gouging effects of ice and water on the landscape over time. The weight of snow bends these bridge railings, and snow creep bends the bases of trees.



From the bridge you can see the weather tower which is 23 feet (7 m) tall. Its height gives an idea how much snow accumulates here. During some winters, rangers can ski or snowshoe right up to the platform, and need not climb the pole at all! Most years the snowpack averages 15–20 feet; the annual snowfall averages about 50 feet (600 inches). The North American record for snowfall was set in the winter of 1971–72 when 93.5 feet (1,122 inches) of snow fell on Paradise.

Most storms approach this area from the southwest. Moist air moves inland from the Pacific Ocean, encounters Mount Rainier, rises and cools, then condenses to form rain or snow. On the upper mountain, snow that does not melt in summer compacts into glacial ice and becomes a major sculptor of the mountain.

Continue to the hilltop, where you will find a large hollow boulder at the edge of the trail on your right.

A WELL-TRAVELED ROCK

This unusual rock was once part of a lava flow that erupted from a vent at the summit of Mount Rainier. When this lava reached the surface, gas bubbled out before the rock hardened. Expanding gases, mainly steam dissolved in the lava, drive eruptions and push lava out of the volcano as pressures are released. A similar process takes place when champagne erupts from its bottle after the cork is popped. This blob of lava cooled so quickly that a large gas bubble was trapped inside. Later the rock broke open, exposing its hollow center.

The hollow rock, along with many other boulders nearby, was carried down to Paradise by a mudflow about 6,000 years ago. Many of these boulders are coated by a soft rusty colored crust, indicating that they were altered by volcanic fumes. The volcano had steamed violently for many centuries as hot gases dissolved rocks into clay. Then the weak mass of rock and clay was jostled or shoved by a small eruption so that a huge block avalanched down across Paradise. Trapping air beneath it, the slippery mass spread out into a sheet which flowed over ridges and valleys as though it moved without friction. It may have been 600 feet thick when the wet mudflow extended nearly 20 miles down the Paradise and Nisqually valleys. Remnants less than 15 feet thick remain in Paradise Meadow.

As you continue from the hollow rock, take time to enjoy the tranquil setting. Subalpine firs and mountain hemlocks grow in clumps amidst a variety of wildflowers. These spectacular meadow plants soften the effects of Mount Rainier's violent history.

Stop at the bench before the trail junction at the bottom of the hill.

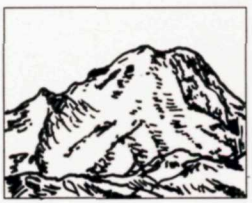
MOUNTAIN PASSAGES

Rising to 14,410 feet (4,394 m), Mount Rainier is the tallest of the Cascade volcanoes and one of the most massive mountains on Earth. This very young mountain began to form less than 700,000 years ago. Resting on the shoulders of much older mountains, young Mount Rainier erupted thick lava which flowed repeatedly like hot tar, filling the deep canyons around the vent. Because these lava flows resisted later erosion, most of them now form ridge tops. Paradise rests on one of these ancient lava flows. The Nisqually River was diverted to the side of this flow, causing the river and glacier to carve a new canyon.

Violent explosions occasionally threw pumice and ash on the slopes of the adolescent volcano. As the volcano matured, the long thick lava flows were followed by shorter thinner flows which piled atop one another like layers in a cake and built the giant cone to a height of nearly 16,000 feet. These layers, or strata, of lava give Mount Rainier the type classification of "stratovolcano".

Ice covered the mountain as it grew skyward and erosion began to attack the cone. During the last 10,000 years, huge masses of rock have repeatedly slid from the volcano, reducing the cone height by more than 1,000 feet and reducing its bulk by one third. This left a gaping eastward-facing depression in the mountain top.

In post–retirement during the last 2,000 years, Mount Rainier has partially rebuilt itself by repeated eruptions. A new cone of andesite lava now tops the summit depression. The latest eruption occurred more than a century ago when a small cloud of ash and pumice was sprayed over the eastern side of the volcano. Steam vents in the craters still melt caves under the summit ice cap. Throughout its history, eruptions have melted snow and ice, causing floods and mudflows to course down the flanks of the mountain.



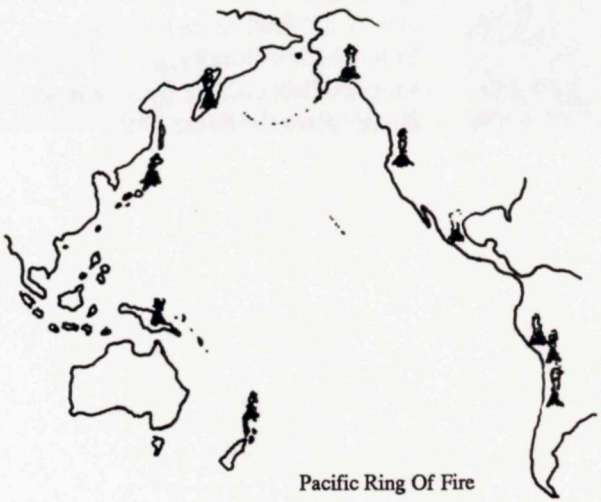
Continue a short distance on the right fork to the small pool at the right of the trail.

FAIRY POOL

This tiny pond is a Paradise landmark. Early visitors to Paradise partially blocked the drainage from this natural depression. Life forms in the pool race with the weather to grow, reproduce, and store food before the first snows cover them in September or October.

Soils around the pool are composed of fine particles of volcanic ash and mudflow materials. Rocks embedded in the soil are andesite–the intermediate lava that makes up Mount Rainier and most other volcanoes in a "Ring of Fire" encircling the Pacific Ocean. These volcanoes sometimes erupt gas-charged lavas which are blown into the atmosphere as pumice. Glassy pumice cools and hardens in the air before all the gas bubbles out, so that chunks are light enough to float on water. Tiny fragments of pumice, called ash, drift long distances through the air. Many layers of ash from Mount Rainier coat Paradise meadows, but some ash layers were carried from Mount St. Helens and even from Mount Mazama in Oregon, which erupted and collapsed, forming Crater Lake.

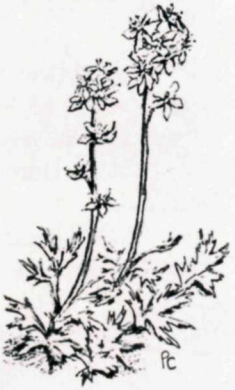
Ash soils are easily eroded when plant cover is removed or trampled, so please stay on the constructed trail.



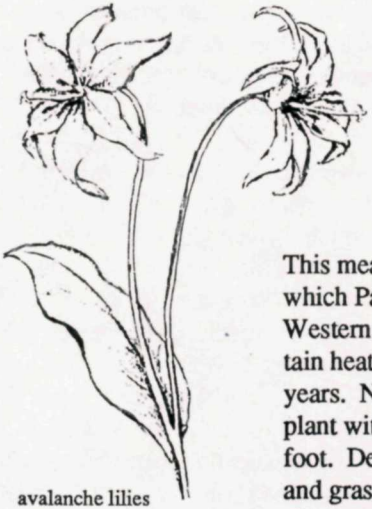
Pacific Ring Of Fire

Proceed around the corner to the small stream crossing.

MEADOW LIFE

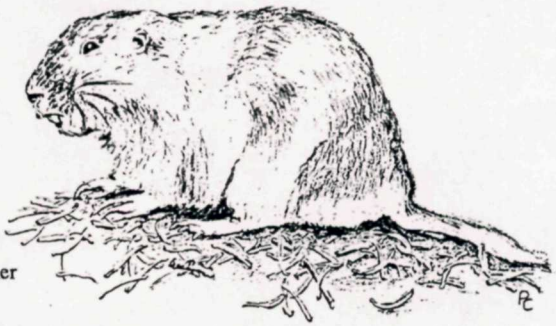


partridge foot



avalanche lilies

This meadow is one of several flower fields for which Paradise is famous. Avalanche lilies, Western bistort, lupines, Sitka valerian and mountain heath have bloomed here for thousands of years. Near the streams, look for a low mat–like plant with tiny pale–yellow flowers–the partridge foot. Dense root mats of this plant and of lupines and grass–like sedges hold the loose ash soils in place, preventing erosion.



pocket gopher

The soil may look "worked up" as though someone has been digging and pushing the soil around. Small holes and tunnel trails were made by pocket gophers and meadow voles, members of the rodent family. Active year round, gophers munch roots and bulbs, and voles nibble tender shoots of meadow plants under many feet of snow. Their activity helps to stir and aerate the soil.

Please heed again the need to stay on the trail.

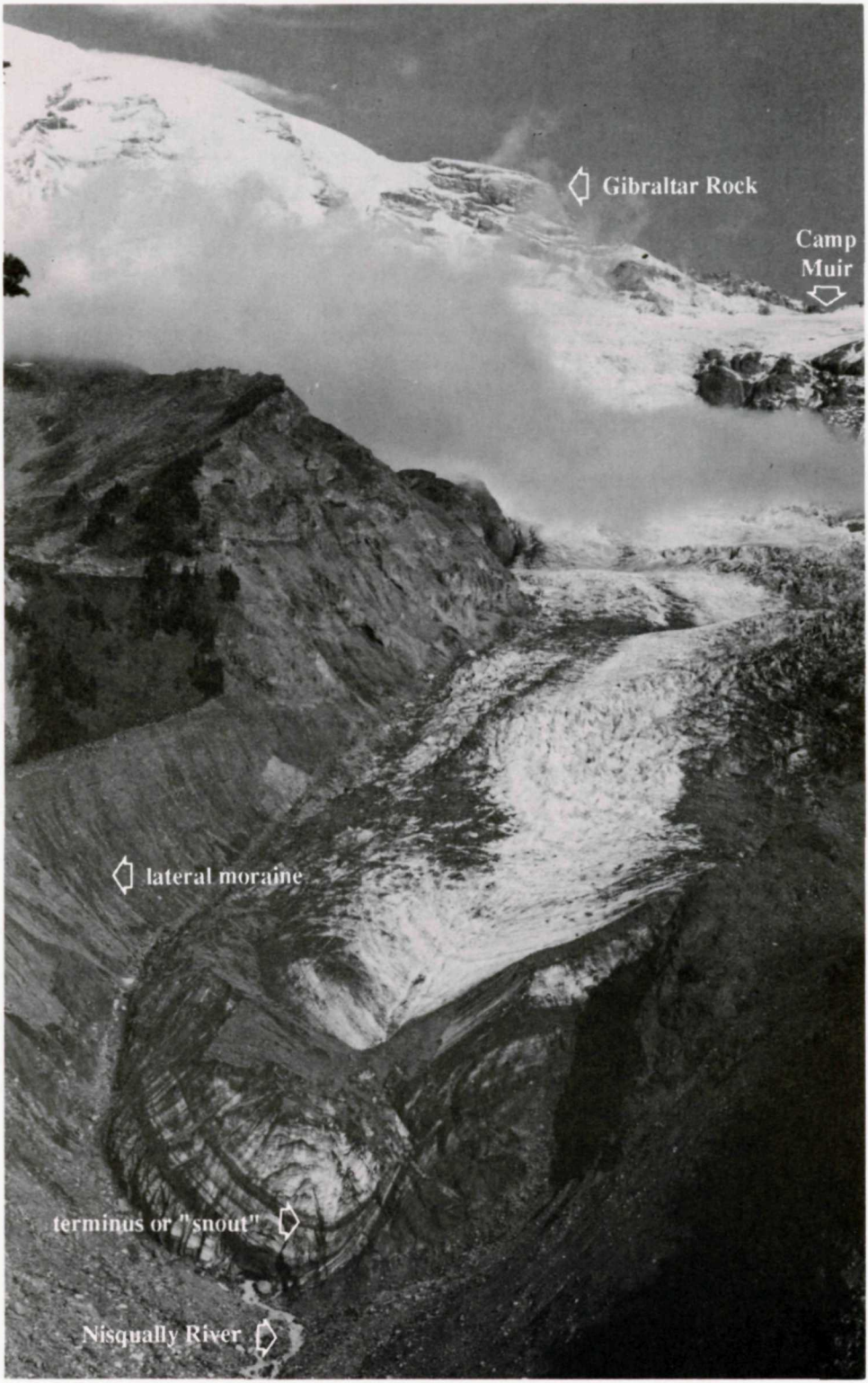
Continue to where the Nisqually Glacier can be viewed from a paved overlook on your right. **Take care to avoid falling over the 800-foot cliff!**

NISQUALLY GLACIER

The Nisqually Glacier is one of six glaciers (of the 26 named glaciers on Mount Rainier) beginning at the summit of the mountain. Glaciers are large masses of ice moving downhill under their own weight. They form when, for many decades, more snow falls in winter than can melt in summer. As succeeding snows accumulate, their weight compresses the air space out of the snowpack, and the individual crystals bond together into glacial ice. The Nisqually Glacier is more than 400 feet thick at one point.

The upper zone of the glacier, where snowfall exceeds melting, is called the accumulation zone, and the lower area where melting exceeds snowfall is termed the ablation zone. An equilibrium line, where ice accumulation equals ice loss, separates these zones. You can see this line, the boundary between fresh winter snow and older ice, well up–valley on the glacier's surface. A rising equilibrium line over several years may indicate a glacial retreat. A lowering equilibrium line may signal that the glacier is thickening and may later advance down–valley. During the Ice Ages, the Nisqually Glacier terminated 30 miles down–valley, beyond Ashford and Elbe. Recently, a warmer climate has prevented the glacier from extending more than 1 1/2 miles downstream from its present terminus. The glacier receded quickly during the first half of the 20th century. Small variations in climate have caused several small retreats and advances since 1945.

Proceed to the second paved overlook, where the glacier is easier to see.


Gibraltar Rock
Camp Muir
lateral moraine
terminus or "snout"
Nisqually River

SECOND OVERLOOK

John Muir said, "The life of a glacier can be just one hard grind." Take a moment to listen to the popping and "growling" noises that attend the work of the glacier. This mighty river of ice moves like a perfect plastic–brittle and breakable like a solid, yet deformable if compressed or capable of flowing like a liquid. Some of the glacier movement is by ice deformation, but most movement is simply the glacier sliding upon its bedrock. Where the ice flows over a steep cliff, around a bend, or over a bedrock knob, crevasses–cracks in the ice–form as the speed of the ice changes. Rocks frozen in the ice are dragged along, scraping the glacier bed and gouging the U–shaped valley. Rock fragments float along in the ice stream toward the terminus or snout of the glacier.

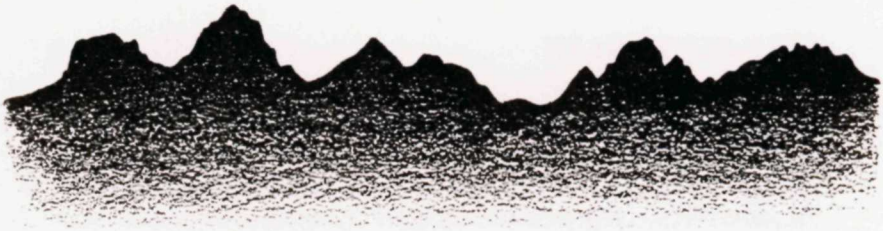
Proceed to the third overlook, Nisqually Vista, which offers the best view of the glacier and its U–shaped valley.

NISQUALLY VISTA

Note the huge quantity of rock covering the lower part of the glacier. As the ice melts, some of the rock load is piled up along the sides or in front of the glacier, forming loose ridges, called moraines. The lateral moraine on the far side of the valley was formed during the glacier's last major advance, around 1840. The sharp edge–the trimline–at the top of the moraine marks the upper surface of the glacier during the 1840s advance.

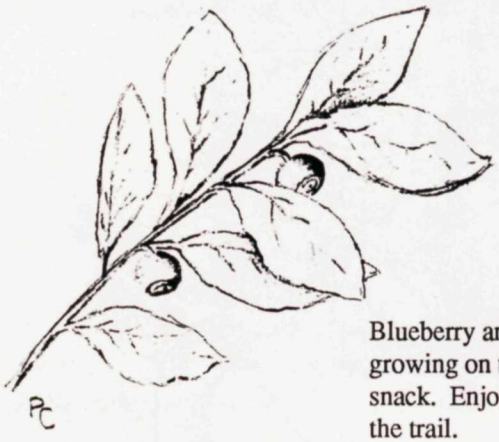
The Nisqually River issues from the snout of the glacier, carrying boulders and pulverized rock called glacial flour. Glacial flour gives the meltwater a muddy gray appearance and shows that the glacier is actively grinding its bedrock. Sometimes great quantities of water suddenly release from cavities within or beneath the ice. These glacial outburst floods, or **Jokulhlaups**–an Icelandic term pronounced Yo-kul-loips–scoop up rock debris in their path and roar down–valley for many miles before subsiding and releasing their loads.

Continue on the trail until it curves left. In fair weather, you will have good views of the rugged Tatoosh Range on your right.



TATOOSH RANGE

Erosion–resistant remnants of volcanic rocks much older than Mount Rainier form the peaks of the Tatoosh Range. Volcanoes of 25–35 million years ago spread great blankets of hot pumice and ash over the landscape; some flows were 350 feet thick. Heat trapped in the flows remelted the particles, forming the hard rock, known as welded tuff, of the Stevens Ridge Formation, which forms the peaks of the range. From beneath these rocks a large blob of magma many miles across pushed upward about 12 million years ago. Before it reached the surface, the molten rock cooled and hardened into the "salt and pepper" crystalline rock, known as granodiorite–a relative of granite. Granodiorite forms the base rocks under both the Tatoosh Range and Mount Rainier. As the entire Cascade Mountain Range rose, severe erosion carved rocks of the Tatoosh into the rugged ridges and deep valleys we see. In the last million years, repeated glaciation shaped the range into a series of sharp peaks called horns, and gouged steep–walled bowls called cirques. A tiny glacier can be seen to the left of the high, sheer–sided Pinnacle Peak.



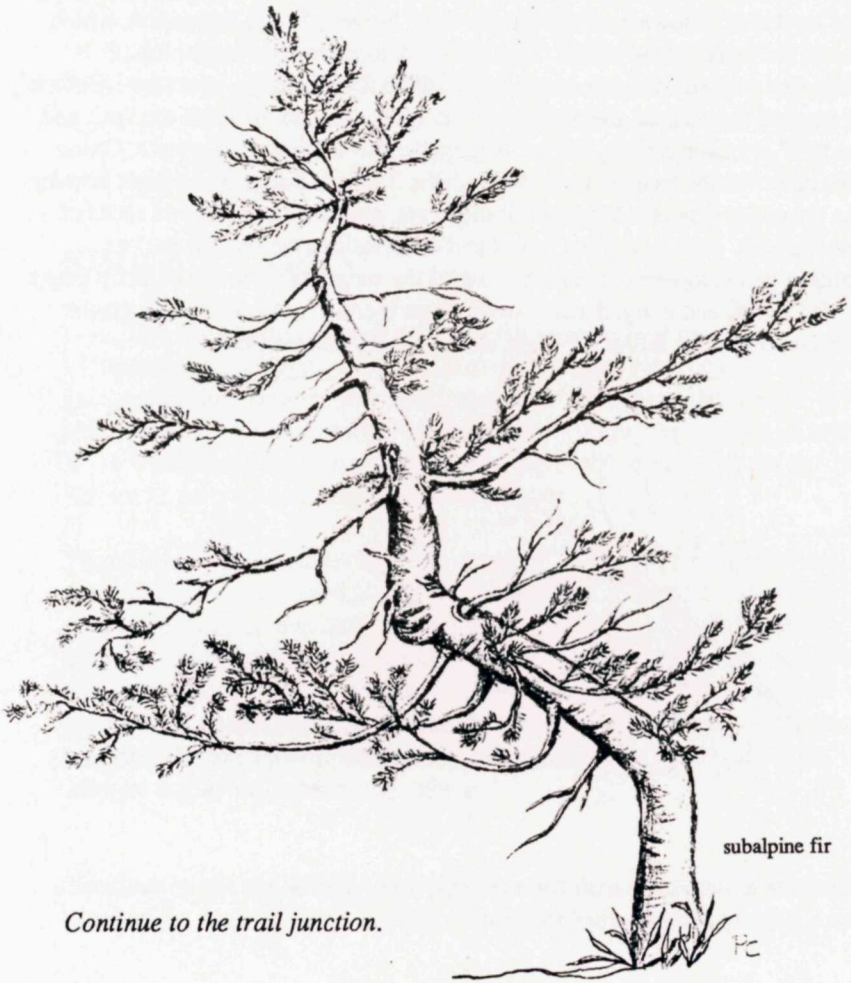
Blueberry and huckleberry bushes growing on this slope provide a tasty snack. Enjoy them, but please stay on the trail.

Continue to where the trail zig–zags left, then right. At the top of the switch–back, watch for small crooked trees.

CROOKED TREES

Both the mountain hemlock and subalpine fir are quite flexible, an adaptation to severe winters. Under heavy snow loads, small trees may bend to the ground. If a tree is held in this position for a long time, the trunk adjusts to the strain and becomes permanently bent.

Perhaps you noticed that most of these trees grow in clumps. The original trees in each group became established in periods of warm, longer growing seasons. They provide shelter and warmth required for the survival of nearby seedlings. Many of the young trees dotting the meadow started growing in the drought years of the early 1930s.



subalpine fir

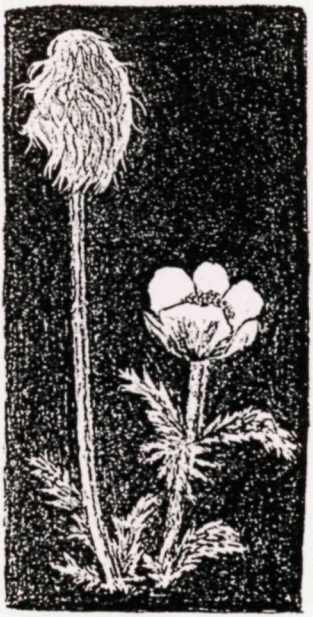
Continue to the trail junction.

TRAIL JUNCTION

We have looked at the geologic processes which built Mount Rainier and the forces now eroding it. We, too, can be shapers of the landscape. An old road to the right of the trail has been removed and the soil tilled. Native plants have again become established. We can aid restoration of the meadow and prevent erosion of fragile soils by staying on constructed walkways.

What does the future hold for "The Mountain"? Perhaps Mount Rainier will be built higher again by new eruptions. Or, if the eruptions are especially violent, the peak could be reduced to an ash–covered crater like Mount St. Helens. Perhaps more chunks of the mountain, weakened by hot gases, could avalanche from its sides. The glaciers may advance again if the climate cools, or they could disappear entirely if the atmosphere warms up.

We are privileged to witness a grand, flower–filled moment in a small, but violent, chapter in the Earth's history. This is the story of Mount Rainier.



Western anemone
seed-head and flower

Take the right fork to return to the visitor center.

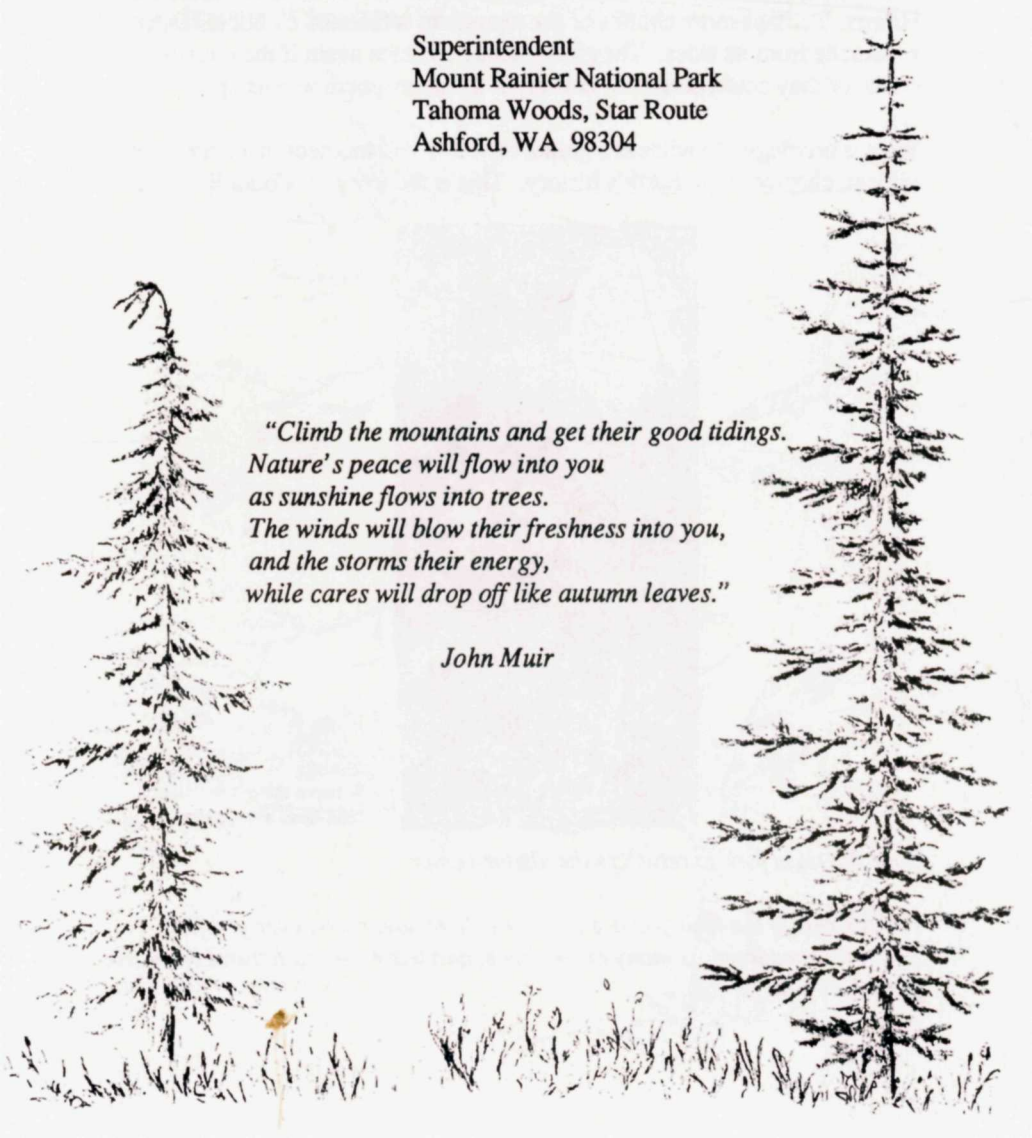
For the rest of the trail you are on your own to savor whatever you find. Enjoy the meadows, as many others have, and leave them a natural Paradise for others who follow.

We hope you have enjoyed your walk around the Nisqually Vista Trail. If you do not wish to keep this booklet, please return it to the box at the end of the trail.

You will find other self–guiding nature trails in the Park at Longmire (Trail of the Shadows), Sunrise (Sourdough Ridge Trail), near Stevens Canyon Entrance (Grove of the Patriarchs), Ohanapecosh (Forest Life Trail), and Carbon River (Rain Forest Trail).

Your comments on this booklet and the trail would be appreciated. Kindly leave them with a Park Naturalist at the visitor center, or write:

Superintendent
Mount Rainier National Park
Tahoma Woods, Star Route
Ashford, WA 98304



"Climb the mountains and get their good tidings.
Nature's peace will flow into you
as sunshine flows into trees.
The winds will blow their freshness into you,
and the storms their energy,
while cares will drop off like autumn leaves."

John Muir