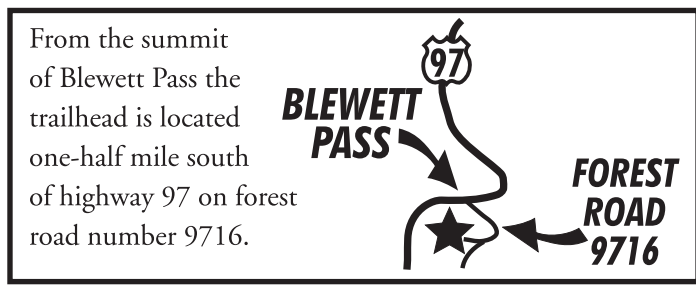
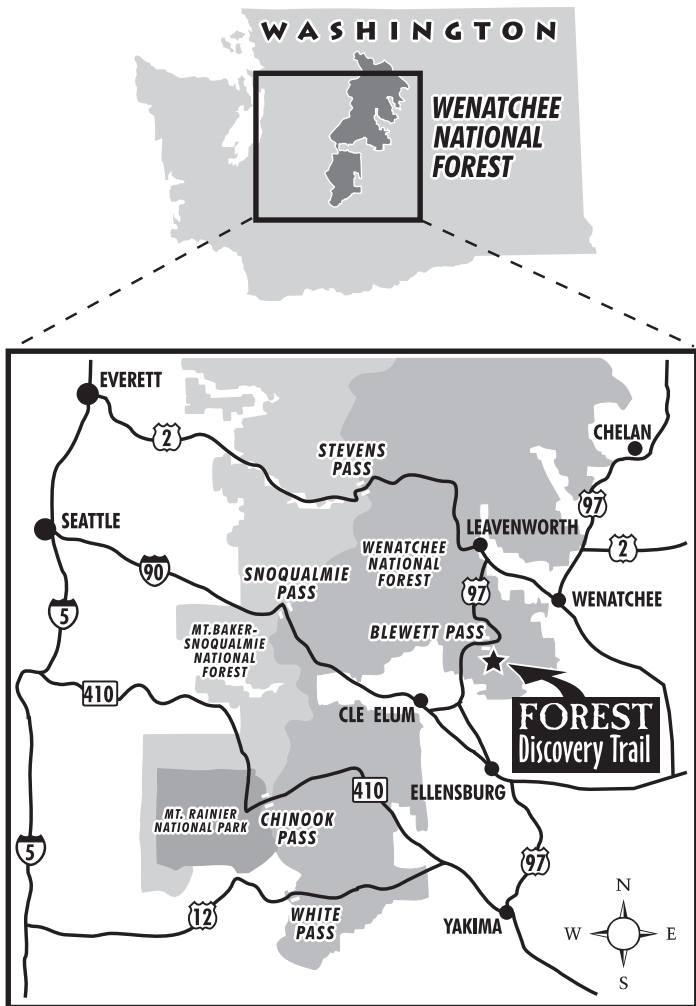


LOCATION MAP



From the summit of Blewett Pass the trailhead is located one-half mile south of highway 97 on forest road number 9716.

DISTANCE FROM:

MILES

- WENATCHEE.....37
- LEAVENWORTH.....25
- CLE ELUM.....24
- ELLENSBURG.....30

R6-WEN-99-100

Swauk FOREST Discovery Trail



U.S.D.A. Forest Service
Pacific Northwest Region
Wenatchee National Forest

For more information, contact:

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Wenatchee, WA 98801
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(509) 674-4411

Leavenworth Ranger District

600 Sherbourne
Leavenworth, WA 98826
(509) 548-6977

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CONCLUSION

We hope you've enjoyed hiking the Swauk Forest Discovery Trail and learning about forest management practices and ecosystem components. The Forest Service tries to balance the public's demand for recreational opportunities, timber production, and other "outputs" with the health and sustainability of the ecosystem. Some land management objectives are difficult to achieve without trade-offs. For instance, if a sun-loving, fire resistant tree species is to be planted in a densely forested area, it is necessary to make an opening that may affect scenery for a few years.



Like most Forest Service projects, this trail was planned and implemented by a team representing the following disciplines: wildlife biology, botany, silviculture, fire science, landscape architecture, engineering, recreation planning, interpretive writing. The trail was constructed in 1992 by Northwest Youth Group, a non-profit organization of teenagers from all over the United States.

SWAUK FOREST DISCOVERY TRAIL



Introduction

The Swauk Discovery Trail invites you to take a look at the forest and see beyond the trees. The USDA Forest Service, which manages your national forests, makes many decisions to accommodate a wide array of public uses and to maintain the health of the forest and its ecosystems. This 3-mile trail shows examples of these decisions.

Mature Forest

Forest management has evolved over the years, reflecting changes in the values the public attaches to resources. In the 1940s, 1950s, and 1960s timber production was considered of primary importance, so logging was widespread. Now, Americans are expressing their concern for other resources such as recreation, water and air quality, scenic beauty, and preservation of wildlife, fish, and plant species.

New information has brought changes in forest management, too. In the past, we tried to extinguish every wildfire that raged through the forest and grass land. Now we know that fire plays an important role in ecology and sometimes should be permitted to burn.

Over the past six decades much timber has been harvested here at Swauk summit. Timber sales planned by the Forest Service are divided into harvest units, following forest managers' "prescriptions" for "treatment," or cutting. At some of the 26 stops along this trail you will see the effects of these prescribed treatments: how the forest has responded, how the logged or "managed" areas fit into the surrounding landscape.

One of the big questions facing the Forest Service is how to balance economics, jobs, and timber supply with protection of other resources. Along this trail you will see past and relatively current attempts to balance these values.

Watch for numbered posts on both sides of trail; these posts correspond to the numbered stops in this brochure. There's a trail map in the middle of the brochure.

Growth has nearly stopped in this mature forest grove. This mixed species stand has not been disturbed by fire in well over a century, and is an example of a later stage of forest succession. The small grand fir tree in front of you sprouted in 1853; the larger lodgepole pine dates back to 1811! Note the ages marked on some of the other trees behind you.

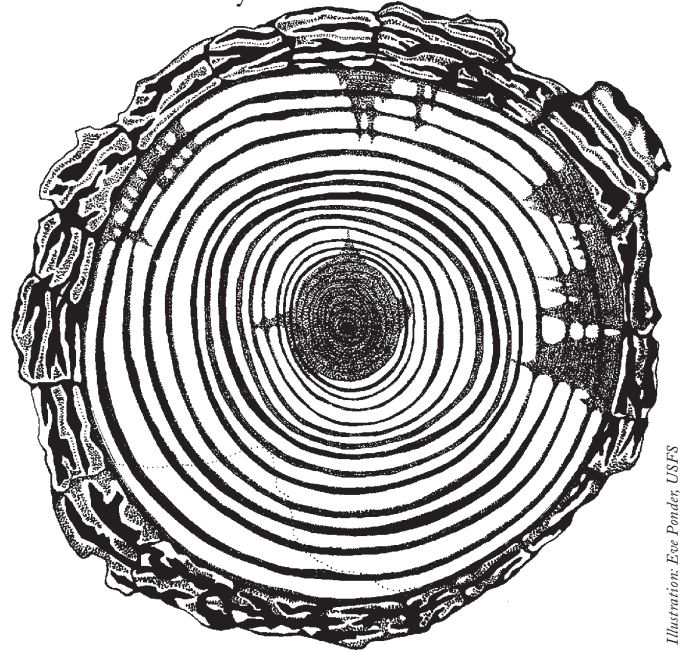


Illustration: Eve Ponder, USFS

As trees age and become crowded, their ability to compete for space, sunlight, soil moisture, and nutrients is decreased. As a result, some trees become stressed and more vulnerable to disease or insect attack.

Mature forests are an important part of the ecosystem. They are diverse in species, have aesthetic values, and provide unique structural characteristics vital to many wildlife species. How much of the mature forest should be left alone so that natural processes can take place, and how much should be managed by humans, is a major social decision.

Not Just Dead Wood

A tree that dies from fire, insects, disease, lightning, etc. and remains standing is called a snag. Insects such as beetles burrow into the bark, further exposing dying or dead tissue for other insects and fungi.

Birds called primary cavity excavators (PCEs) dig further into the wood, foraging for insects or creating nest sites. The pileated woodpecker is a PCE commonly found in eastern Washington. Abandoned PCE nests are often used by other species such as nuthatches, bats, flying squirrels, bluebirds, and martens which cannot create their own cavities. More than 100 wildlife species use snags during at least some of their life cycle.

Forest managers now try to craft prescriptions to leave a sufficient number of these “animal inns” for wildlife. Some ways of doing this are by felling trees away from snags, protecting snags from prescribed burns, and leaving live trees to become future snags.

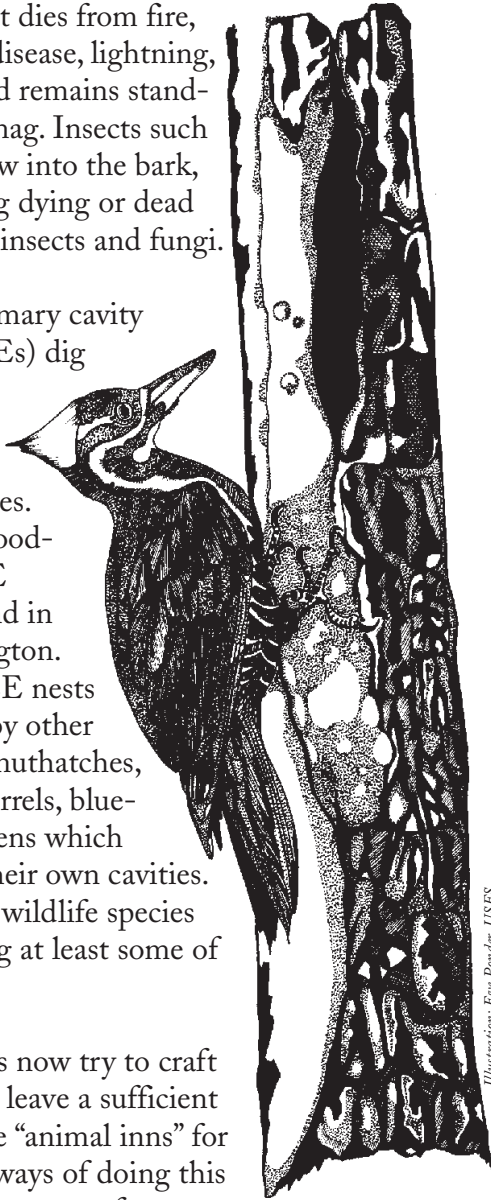
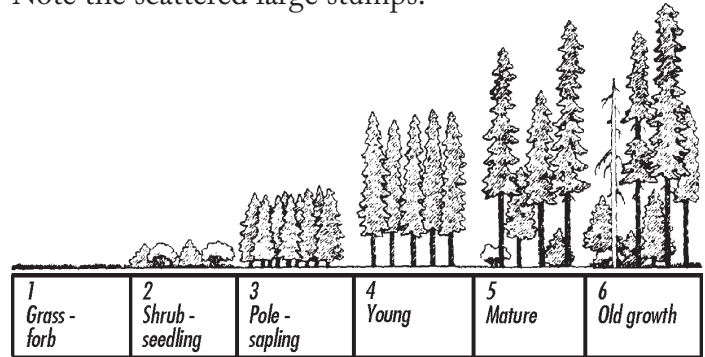


Illustration: Eve Ponder, USFS

The Dynamic Forest

If you were here 100 years ago you'd be walking through an open, park-like stand of large western larch, ponderosa pine, and Douglas-fir. You'd probably see blackened bark, the evidence of low intensity ground fires which frequently swept through the forest, consuming needles, twigs, and small trees. The thick bark of the large trees insulated them from the heat of these fires.

What happened? People began suppressing wildfires. Small trees, especially those which could grow in a shaded environment, no longer burned; so they became established in the understory. Selective harvesting of many of the mature trees accelerated the transition from open stands of larch, pine, and Douglas-fir to denser stands dominated by grand fir. Note the scattered large stumps.



FOREST SUCCESSION

Most of the trees now growing on this site are grand fir. Unlike the mature ponderosa pines you will see later along the trail, notice how grand fir limbs grow all along the trunk from the ground up. This provides habitat for many wildlife species, such as the northern spotted owl. It also increases the risk of fueling a large wildfire. Grand fir is more susceptible than other tree species to such stresses as drought, insects, and disease.

Group Selection Prescription

The Forest Service has chosen to manage this area through “group selection,” an uneven-aged management method where small groups of trees are cut within a large planning area. The small clearing below you is part of this group selection prescription. Removing the trees has made an opening small enough to be inconspicuous from a distance, yet large enough that sun-loving, early successional species such as ponderosa pine or western larch can successfully regenerate and grow.

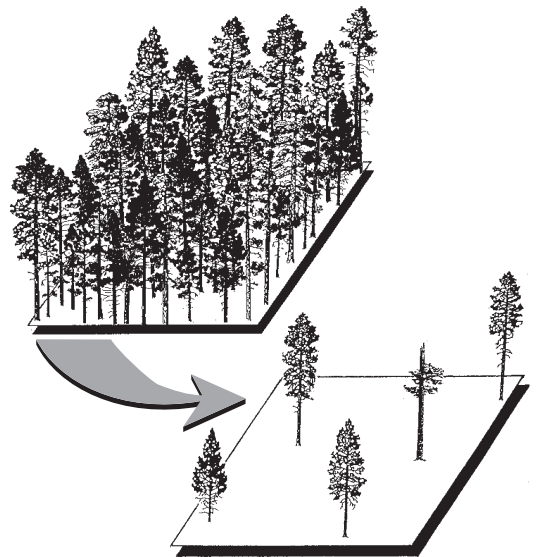


Small openings at stop 2, as viewed from opposite hillside across highway 97.

Over time, if more small openings were to be cut and planted, a mosaic pattern would develop of different ages and sizes of trees. Group selection can maintain the green, forested appearance of the landscape and renew the forest with sun-loving trees. The scenery viewed from Highway 97 was a consideration in choosing the prescription for this site.

Seed Tree Prescription

Instead of clearcutting, five to ten “seed trees” per acre can be left in a seed tree harvest prescription to provide a seed source. Seed trees can soften the visual impact of the harvest by leaving texture and form on the landscape. Seed trees also provide structural diversity, improve wildlife habitat, and can help maintain soil productivity, especially when left to complete their life cycles as snags and down logs.



Even though large trees have been left, the site remains very open and exposed to the sun—a good environment for growing shade-intolerant trees. Sometimes seed trees alone are relied upon to produce the new stand of trees, but here the stand was planted (in 1985) to ensure prompt regeneration.

How Big is an Acre?

The four corners of an acre are marked with fluorescent green posts. You are standing near the center of the acre. How many large (seed) trees do you count?

Evolution from a Clearcut

This area was clearcut in 1971. That fall a high intensity wildfire burned the logging debris. Not knowing how well the western larch would regenerate on its own, a crew planted ponderosa pine and Douglas-fir seedlings in spring 1972 at a rate of 450 trees per acre.

The wildfire exposed mineral soil, creating a seedbed favorable for western larch and other species to seed in naturally. Ten years later, the stand was densely vegetated with over 3,100 trees per acre. It was thinned in 1982 to 300 trees per acre to improve growth rates and tree vigor. Thinning reduces the competition the remaining trees have for sunlight, water, soil nutrients, and growing room.

Tree Identification

Between stops 22 and 23, see if you can identify the seven conifer species present:

- Douglas-fir
- Grand Fir
- Ponderosa Pine
- Lodgepole Pine
- Western White Pine
- Western Larch
- Engelmann Spruce

Miniature Ecosystem

An ecosystem is a community of organisms and its environment that functions as an integrated unit. It is the notion that plants, animals, and the environment (including soil) work together. Tiny microorganisms which may only be visible through a microscope are interrelated with the larger, more visible organisms. All are interdependent, and the health and survival of one part affects the other parts.

The spring below with its unique riparian (streamside or wetland) habitat is a miniature ecosystem within the larger Swauk forest ecosystem. The Douglas maple, mosses, and other vegetation growing in this microsite require more water than is found elsewhere in the forest.

To improve the spring for wildlife use, Forest Service crews dug it deeper, removed some brush, and placed a log to maintain water for wildlife during the dry summer months. Can you see signs that this spring has been visited by deer, elk, and other species?

To protect this fragile ecosystem, please stay on the trail.

Nature's Compost

Fallen branches, needles, and dead trees decompose on the forest floor, contributing important nutrients to the soil. This downed woody material, or debris, also provides habitat for rodents, amphibians, fungi, and other organisms which are important parts of the forest ecosystem.

Looking uphill, you will see forest debris which has built up naturally as a result of many decades of suppressing wildfires. On the lower side of the trail, branches and unused wood were left after logging. Both natural and logging debris add nutrients to the soil and shelter wildlife—but can also contribute to the spread of a catastrophic wildfire. To reduce this risk, debris is sometimes burned under controlled conditions.

Natural Role of Fire

Do you see the deep fire scar in the large ponderosa pine just below this stop? Before the early 1900s, natural wildfires occurred in the area about every 10 years. These fires were generally of low intensity because they were frequent enough that debris did not have a chance to build up. The thick bark of mature trees, like this pine, protected them from the cooler fires. Occasionally a large or “crown” fire destroyed a stand of trees, returning the area to the early stages of the ecological succession process.

Since water is often scarce in forests of the eastern Cascades, decomposition of woody debris can be slow. A low intensity fire can become an important decomposing agent, releasing nutrients such as nitrogen, calcium, phosphorus, and potassium to be cycled back into the soil.



Photo: Roger Wallace, USFS

Resource managers now recognize fire’s value in the ecosystem. Some national forests are developing fire management plans for wilderness areas, such as the Alpine Lakes Wilderness, which allow fire to play a natural role.

Look for evidence of other fires as you walk along the Swauk Forest Discovery Trail.

Swauk Viewpoint

The view to the east at the base of Tronsen Ridge is a mosaic of harvested and unharvested lands. To the south, Diamond Head is a dominant landform, as are Mt. Rainier to the southwest and craggy Mt. Stuart to the northwest. Beyond the obvious timber harvest in front of you, which is not visible from Highway 97, are recent seed tree and shelterwood prescriptions. These were designed so that “openings” or clearings would be subtle and unnoticeable from major travel routes.



View to the northwest



View to the southwest

Photos: Dan O'Connor, USFS

Concern for the scenery that is viewed from designated travel routes and recreational areas is an aspect of forest management which must be balanced with other resource objectives.

Gravel Pit

A dike is a fissure or vent in the bedrock into which lava flowed millions of years ago and hardened into basalt. The pit in front of you was once filled by a basalt dike; other dikes are visible behind you, at the next stop. Look for near vertical, dark brown rectangular forms which cut across the lighter sandstone bed in the distance.

Dike



Photo: Dan O'Connor, USFS

Basalt is a resource valuable for construction of roads, bridges, and dams. The Swauk sandstone prevalent in this area is not as suitable a material, so the basalt from the dike below was mined in the 1960s and then crushed and placed on Forest Service roads. Surfacing roads with gravel can prevent erosion, reduce sedimentation into waterways, and create a more pleasant road bed for driving.

Unique geological features such as dikes often provide habitat for rare plant species, or may influence other environmental factors (such as soil depth and moisture) which determine the kinds of plant and animal communities that can exist on the site.

Up this short, steep, side trail to the top of the hill is a panoramic viewpoint from which you can see portions of all six districts in the Wenatchee National Forest. Please stay on the trail to avoid trampling vegetation.

Fire As a Tool

Woody debris is often burned to lessen the chances for a large wildfire. Another reason forest managers sometimes use a “prescribed burn” is to prepare an area for replanting.

As well as cycling nutrients back into the soil, reducing debris by fire helps newly-planted seedlings get more sunlight. Burning often encourages natural regeneration by preparing a seedbed. Some species, such as western larch and ponderosa pine, require bare soil for their seeds to germinate.

Fire crews burned this area in the spring of 1993. They dug a “fire line” down to bare soil around the perimeter of the area to confine the fire to the site, then started the fire with drip torches. The following week, students from Ellensburg High School’s Environmental Club planted ponderosa pine and western larch seedlings here.



Photo: Roger Wallace, USFS

Although debris burns may be unsightly, scorched trees and blackened soil will be less apparent in a few years’ time as new growth appears. Stop 22 is a good illustration of this.

Scenic Resource

Sightseeing has become one of the most popular recreational activities in national forests. Because scenery is important, the Forest Service tries to incorporate design arts into all management practices such as logging, road building and campground construction so that the activities blend naturally with the landscape.

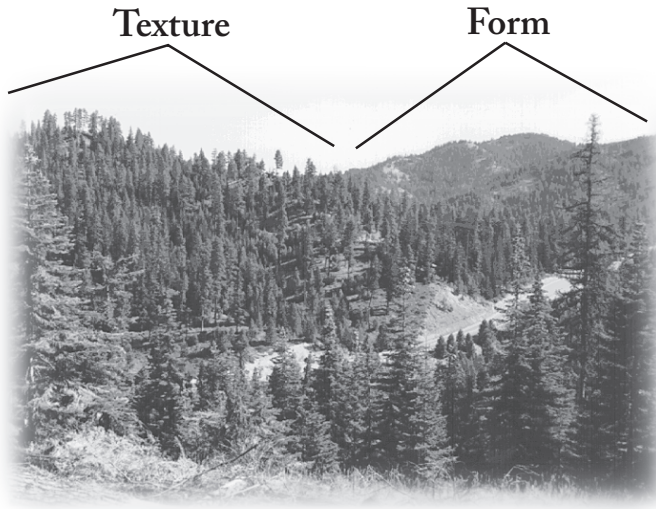


Photo: Dan O'Connor, USFS

The vista before you is a composite of past vegetation management decisions in which the four basic elements in the forest scenery were considered:

Form—three dimensional mass (large rock formation).

Line—anything arranged in a row or sequence (ridgeline, avalanche path).

Color—effect of light (trees in the distance).

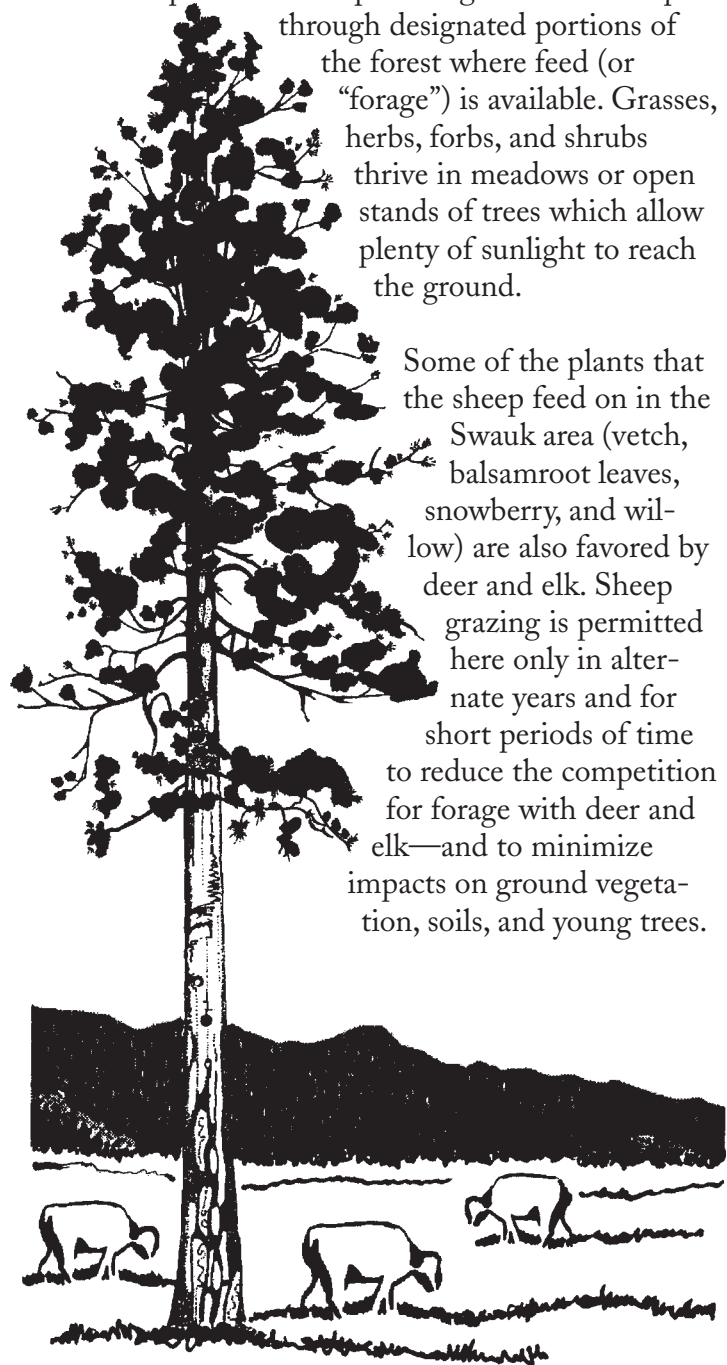
Texture—appearance of patterns (tree boughs).

At this viewpoint, texture is the most noticeable element. At other points along the Swauk Discovery Trail the landscape will be dominated by form (Diamond Head Mountain), line (large tree trunks), and color (western larch in autumn).

Range Management

Sheep and cattle grazing is a use of national forest land which dates back to the 1920s. Shepherders with permits guide their sheep through designated portions of the forest where feed (or “forage”) is available. Grasses, herbs, forbs, and shrubs thrive in meadows or open stands of trees which allow plenty of sunlight to reach the ground.

Some of the plants that the sheep feed on in the Swauk area (vetch, balsamroot leaves, snowberry, and willow) are also favored by deer and elk. Sheep grazing is permitted here only in alternate years and for short periods of time to reduce the competition for forage with deer and elk—and to minimize impacts on ground vegetation, soils, and young trees.



High Level Disturbance

This stop and the next one are two contrasting examples illustrating how the size and intensity of a disturbance can influence species composition of a stand of trees. Disturbances such as wildfire, severe wind storms, insect or disease outbreaks, and logging influence the establishment of plant communities in a forest.

When a disturbance removes the majority of a stand, an opportunity is created for sun-dependent species to regenerate and grow. This site was logged many years ago and the debris burned, leaving the area open and sunny. With the natural regeneration of ponderosa pine and Douglas-fir, it has reverted to an early stage of forest succession.



Photo: Dan O'Connor, USFS

Low Level Disturbance

This site shares the same topography, slope, climate, and soil as stop 17, but unlike stop 17 this site was not intensely disturbed. Here, small gaps in the tree canopy have been created over time as scattered individual trees were selectively logged or killed by insects or disease. The low level disturbance did not create openings large enough to allow sun-dependent tree species to regenerate and grow. Because the environment below the canopy has remained shaded, grand fir (which can survive and grow in shade) has been favored.

Discovery Viewpoint

"When you try to change any single thing, you find it hitched to everything else in the universe."

—John Muir

Ponderosa Pine Planting Unit

This area was helicopter logged in 1991 to avoid building a road. The site is visible from the highway, so many ponderosa pine and Douglas-fir trees were left to maintain scenic quality, along with other benefits. The logging debris was left on the site to provide wildlife habitat.

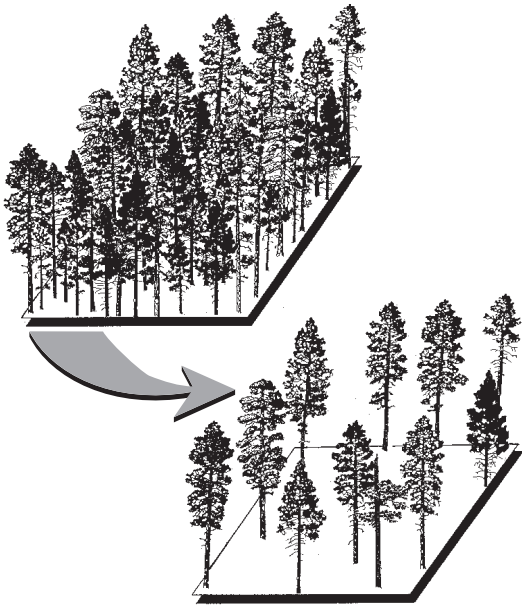
When the Forest Service sells timber, a percentage of this money is set aside for planting tree seedlings to reforest the site.



Ponderosa pine seedlings were planted here in the spring of 1992. The pines are more likely than other species to survive on this dry, southwest slope with its shallow, rocky soils. Looking carefully, can you see the newly-planted trees?

Shelterwood Prescription

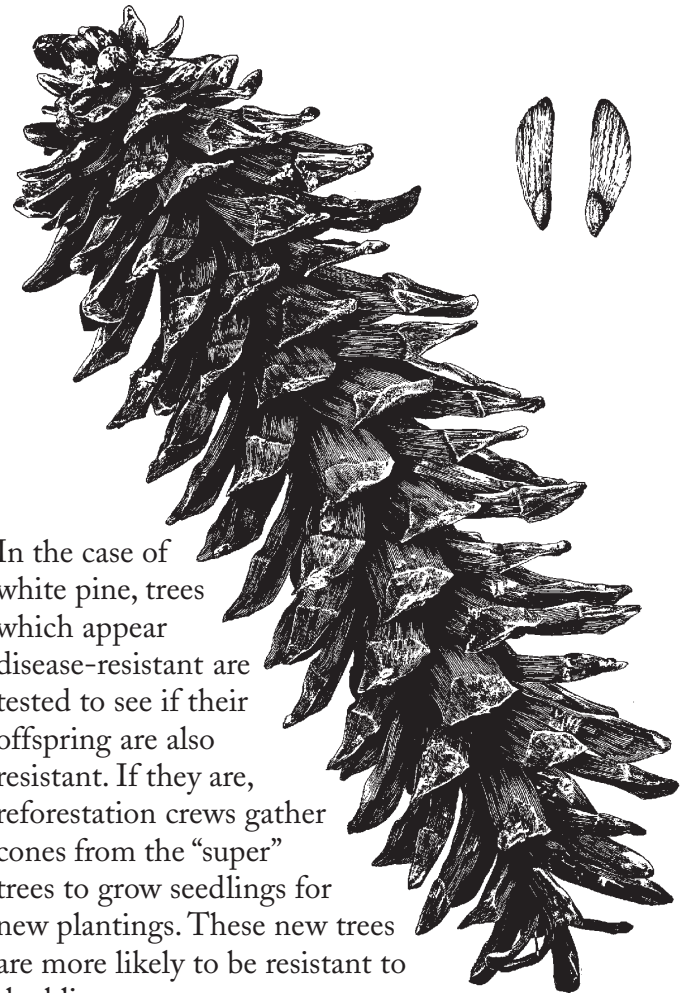
A shelterwood cut is an even-age (regeneration) harvest treatment which leaves 10 to 20 mature trees to the acre. These sheltering trees lessen temperature extremes on a harsh site. They can shade seedlings on hot, dry sites (steep south slopes) where moisture is in short supply—and can help shelter seedlings from frost damage in a “frost pocket.” Other reasons for prescribing a shelterwood cut are to meet scenic quality objectives or to provide wildlife habitat.



The stand in front of you resembles a shelterwood cut. Ponderosa pine was planted here in 1992 under approximately 30 shelter trees per acre. As these seedlings become established and grow, the shade and competition of the shelter trees will become a liability. Because ponderosa pine requires a sunny environment, vigorous growth is not expected unless a significant number of the shelter trees either die or are removed. Removal of Douglas-fir shelter trees with mistletoe will also protect from infection any Douglas-fir seedlings that regenerate naturally.

“Super” Tree

Just as some humans enjoy exceptional health and long life, some trees grow faster than others or may have the genetic makeup to withstand disease. Compared with its neighbors which are dying (see the red needles), this western white pine with an orange band of paint appears to be resistant to white pine blister rust disease.



In the case of white pine, trees which appear disease-resistant are tested to see if their offspring are also resistant. If they are, reforestation crews gather cones from the “super” trees to grow seedlings for new plantings. These new trees are more likely to be resistant to the blister rust.

Forest Roads

The public uses roads in national forest lands to sightsee and to reach hiking trails, campgrounds, and other recreational destinations. Roads also make it possible to harvest trees and suppress fires.



Road use, however, can have drawbacks. Roads can cause disturbance for many wildlife species. Poorly constructed or maintained roads can dump sediment into streams, filling in the gravel beds fish need for spawning. Road traffic noise may bother hikers, campers, and anglers. Roads occupy lands that could otherwise grow natural vegetation.

For these and other reasons, forest managers sometimes take roads out of use by closing them, temporarily or permanently. Temporary closures are by gates. Permanent or longterm closures are done by building earthen berms or ripping up the road bed for revegetation.

The trail you just walked down was once a section of road. Ahead of you, the road was taken out of service in 1992 to prevent motorized access to the trail.

JUNCTION

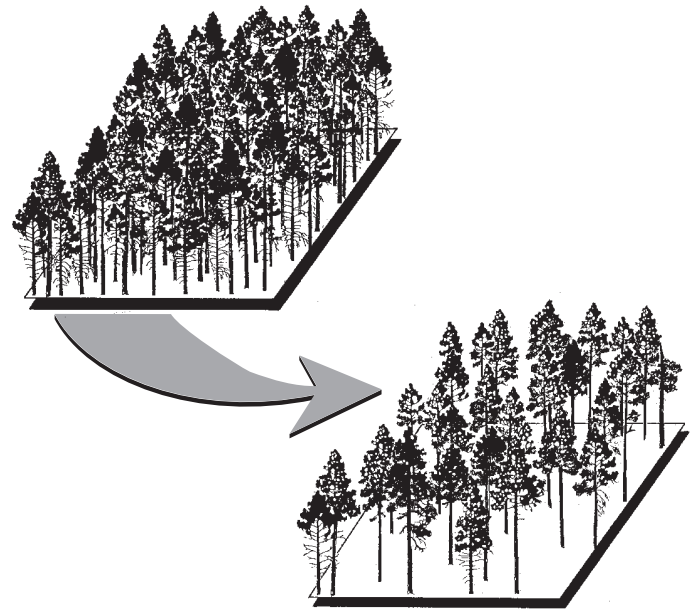
Which Way To Go?

At the trail junction you may take the short loop to stop 16A and back to the parking area or continue on the longer half-mile route, which leads to a breathtaking viewpoint. There is some steep ground on the longer route. **SEE MAP.** Caution: Watch for vehicles when crossing the road.

Commercial Thinning Prescription

Just as gardeners thin carrots to yield fewer, larger carrots, forests can be thinned to produce fewer, larger trees. By removing up to half of the smaller, weaker trees in a dense forest, the remaining trees benefit from extra water, sunlight, space, and soil nutrients. They become stronger, grow faster, and can better survive stresses such as drought, insects, and diseases.

The prescription for this stand was two thinning treatments, one of which was done in spring 1991 and the second in spring 1993. Timber cruisers used red and orange paint to mark the trees to be left on the site. The trees which were removed, though small, were large enough to mill into 2" x 4" lumber. Because they had commercial value, this treatment is called a commercial thinning.



Sometimes the stand is thinned when the trees are much smaller. When the thinnings have no commercial value, the prescription is called a precommercial thinning.

Blewett Pass Fire 1985

The sloping hillside across the valley, with dead trees on the skyline, is an example of natural disturbance on the landscape. A wildfire burned 90 acres in 1985. Immediately afterwards, pinegrass, snowbrush, and other early successional plants began to grow. Tree planters accelerated the successional process by planting ponderosa pines a year or two after the fire. You can see how the hillside is greening; the forest is renewing itself.

Fire Area



Photo: Dan O'Connor, USFS

Mistletoe and Wildlife Habitat

Dwarf mistletoe is a disease that greatly reduces the health of the infected tree. However, when viewed from the perspective of its role in the forest ecosystem, it offers some benefits.

Mistletoe brooms often serve as nesting platforms for raptor species such as the northern spotted owl and northern goshawk. Grouse roost in the brooms and eat mistletoe shoots. The jumbled branching form of the mistletoe also provides shelter for such mammals as northern flying squirrels and wood rats, which are prey for forest raptors. Providing wildlife habitat is an important aspect of forest management.



Illustration: Eve Ponder, USFS

An illustration of a Douglas-fir showing the effects of dwarf mistletoe.

Mosaic Landscape

The landscape across the valley is a mosaic of visual patterns, illustrating the design elements discussed at stop 7. *Form* is apparent in Diamond Head Mountain; *line* stands out where meadow edges contrast with forest and where ridgetops meet sky. Variations in *color* provide interest, especially in autumn when the western larch turn gold, and *texture* differences are noted as one views the closer versus the more distant stands of trees and the different kinds and sizes of tree patches.

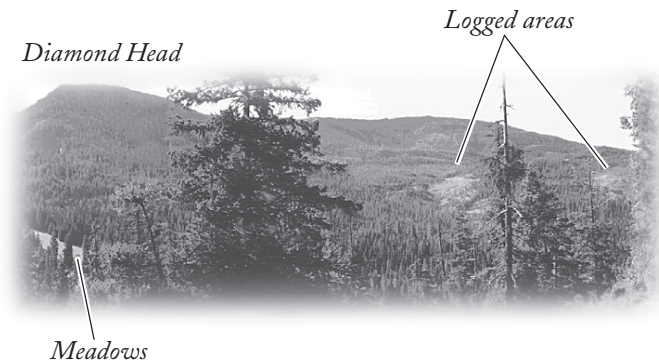


Photo: Dan O'Connor, USFS

The two logged areas are noticeable from the trail but not from Highway 97. The effort in the past 20 years has been to alter the landscape in a way that maintains a balance between timber harvesting and retention of scenery as viewed from travel routes.

Historic Logging

The first trees logged in the Swauk Pass area were removed from private land in the 1910s. More were removed in the 1930s from the right-of-way for the Cascade Lumber Company Railroad, which shut down in 1944.

Forest Service logging at this particular site occurred in 1945, 1973, and 1988. The large stumps near the trail are from the 1945 operation.



Photo: Boise Cascade Corporation, Yakima

Unlike today's loggers with chain saws, skidders, cable logging systems, and helicopters, the lumberjacks of yesteryear relied on simple tools. They felled trees with "misery whips," a colorful name for two-man cross-cut saws. Tree limbs were chopped off with axes. Husky horses skidded the trees from stump to landing. A large, steam-powered winch called a "donkey" later came into use for yarding (pulling) felled trees.

If a large tree had a broad swelling at its base, loggers sometimes chopped notches in the base of the tree with axes and inserted springboards to stand on so they could reach the smaller-diameter portion and make the felling job easier. Springboards may have been used on some of the western larch at Swauk Pass.

Swauk FOREST Discovery Trail

